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October 2, 2015

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Mr. Matt Aufman
Inactive Hazardous Sites Branch – REC Program
NCDENR – Division of Waste Management
217 West Jones St.
Raleigh, North Carolina 27603

Subject: *Remedial Action Plan and Preconstruction Report Addendum*
IHSB Site Name: Towers Road Disposal Area
IHSB Site ID No.: NONCD0002893

Dear Mr. Aufman:

On behalf of Harvey Point Defense Testing Activity, CH2M HILL is pleased to submit the referenced document for the Towers Road Disposal Area in Hertford, North Carolina. This technical memorandum presents changes in the operational approach that are necessary due to unexpected conditions encountered during implementation of the Remedial Action, including the discovery of material potentially presenting an explosive hazard at the 2nd Street Disposal Area and scrap tires at the 5th Street Disposal Area. Funding to complete this work and authorization to proceed from the Naval Ordnance Safety and Security Activity and Department of Defense Explosives Safety Board have been received and on-site work is scheduled to resume on October 12, 2015.

Please contact me at 757-671-6231 if you have any questions or comments.

Sincerely,
CH2M HILL

A handwritten signature in black ink that reads "Kim Henderson".

Kim Henderson
Registered Site Manager

cc: Mr. Brian Lee/HPDTA
Mr. Rodger Jackson/NAVFAC
Mr. Kirk Stevens/NAVFAC
Ms. Janna Staszak/CH2M HILL

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 1 OF 2

IHSB SITE NAME TOWERS ROAD DISPOSAL AREAS

DATE & NAME OF DOCUMENT Remedial Action Plan and Preconstruction Report Addendum, September 2015

TYPE OF SUBMITTAL (circle all that apply): Report, Work plan Work Phase Comp. Statement, Schedule Change

REMEDIATING PARTY DOCUMENT CERTIFICATION STATEMENT (.0306(B)(2))

"I certify under penalty of law that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this certification, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Harvey Point Defense Testing Activity
Name of Remediating Party

[Signature]
Signature of Remediating Party

10/2/2015
Date

NOTARIZATION

North Carolina (Enter State)

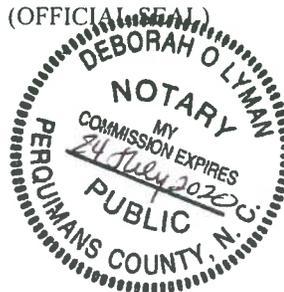
Perquimans COUNTY

I, Deborah Lyman, a Notary Public of said County and State, do hereby certify that Patrick N. Robertson did personally appear and sign before me this day, produced proper identification in the form of Drivers License, was duly sworn or affirmed, and declared that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 2 day of October, 2015.

[Signature]
Notary Public (signature)

My commission expires: 24 July 2020



REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 2 OF 2

IHSB SITE NAME TOWERS ROAD DISPOSAL AREAS

DATE & NAME OF DOCUMENT Remedial Action Plan and Preconstruction Report Addendum, September 2015

TYPE OF SUBMITTAL (circle all that apply): Report, Work plan Work Phase Comp. Statement, Schedule Change

REGISTERED SITE MANAGER CERTIFICATION OF SIGNATURES

As the Registered Environmental Consultant for the Site for which this filing is made, I certify that the signatures included herewith are genuine and authentic original handwritten signatures and/or true, accurate, and complete copies of the genuine and authentic original handwritten signatures of the persons who purport to sign for this filing. I further certify that I have collected through reliable means the originals and/or copies of said signatures from the persons authorized to sign for this filing who, in fact, signed the originals thereof. Those persons and I understand and agree that any copies of signatures have the same legally binding effect as original handwritten signatures, and I certify that any person for whom I am submitting a copy of their signature has provided me with their express consent to submit said copy. Additionally, I certify that I am authorized to attest to the genuineness and authenticity of the signatures, both originals and any copies, being submitted herewith and that by signing below, I do in fact attest to the genuineness and authenticity of all the signatures, both originals and copies, being submitted for this filing.

KIM HENDERSON

Name of Registered Site Manager

[Handwritten Signature]

Signature of Registered Site Manager

10/2/15

Date

REGISTERED SITE MANAGER DOCUMENT CERTIFICATION STATEMENT (.0306(b)(1))

"I certify under penalty of law that I am personally familiar with the information contained in this submittal, including any and all supporting documents accompanying this certification, and that the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete and complies with the Inactive Hazardous Sites Response Act N.C.G.S. 130A-310, et seq, and the remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

KIM HENDERSON

Name of Registered Site Manager

[Handwritten Signature]

Signature of Registered Site Manager

10/2/15

Date

NOTARIZATION

VIRGINIA (Enter State)

Virginia Beach COUNTY

I, Rebecca Singleton, a Notary Public of said County and State, do hereby certify that Kim Henderson did personally appear and sign before me this day, produced proper identification in the form of Drivers License, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant of the remediating party of the property referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certifications is true and accurate, and he or she then signed these Certifications in my presence.

WITNESS my hand and official seal this 2nd day of October, 2015

[Handwritten Signature]
Notary Public (signature)

(OFFICIAL SEAL)

My commission expires: 12/31/16



Remedial Action Plan and Preconstruction Report Addendum

IHSB Site Name: Towers Road Disposal Area

IHSB Site ID No.: NONCD0002893

PREPARED FOR: NCDENR Inactive Hazardous Sites Branch - REC Program

COPIES: Brian Lee, HPDTA
Rodger Jackson, NAVFAC
Kirk Stevens, NAVFAC

PREPARED BY: CH2M HILL, Inc.

DATE: September 2015

1 Introduction

This technical memorandum has been prepared to supplement the *Final Interim Remedial Action Plan and Preconstruction Report, Towers Road Disposal Areas – Waste and Soil, Harvey Point Defense Training Activity, Hertford, North Carolina, April 2014* (herein referred to as the RAP). It presents changes in the operational approach (primarily RAP Section 5) that are necessary due to unexpected conditions encountered during implementation of the Remedial Action (RA), including the discovery of material potentially presenting an explosive hazard (MPPEH) at the 2nd Street Disposal Area and scrap tires at the 5th Street Disposal Area. Preparation of this technical memorandum was conducted on behalf of Harvey Point Defense Testing Activity (HPDTA) and Naval Facilities Engineering Command (NAVFAC) in accordance with the Executed Registered Environmental Consultant (REC) Administrative Agreement [North Carolina Department of Environment and Natural Resources (NCDENR), 2013]. The overall RA has not changed, just the operational approach; therefore, the RAP has not been revised and no additional public outreach is planned.

2 Background

Towers Road Disposal Areas (TRDA) consists of the 2nd Street Disposal Area and 5th Street Disposal Area within HPDTA (**RAP Figure 1** and **RAP Figure 2**). The RA was initiated in June 2014 to address potential human health risks associated with exposure to waste and constituents in soil. The RA consists of the excavation and offsite transportation and disposal of waste and impacted soil, as well as support activities such as erosion and sediment control installation, vegetation clearing, geophysical and topographic surveying, confirmation sampling, and site restoration. RA activities completed to-date are summarized the RA Progress reports (September 2014, December 2014, March 2015, and June 2015). Unanticipated waste was encountered at the 5th Street Disposal Area, consisting of approximately 2,500 tires and 3 intact compressed gas cylinders; these wastes were left on site pending development of a plan for their management. All on site activities were stopped in August 2014 due to the discovery of MPPEH, determined to be whole and parts of 3.5-inch M29 Practice Rockets, in the excavated material at the 2nd Street Disposal Area on August 1, 2014.

For the 5th Street Disposal Area, an Explosives Safety Submission (ESS¹)-Determination Request was developed and submitted to Naval Ordnance Safety and Security Activity (NOSSA) in October 2014 to

¹ An ESS is a document required for intentional physical content with MEC and/or MPPEH and to conduct intrusive activities at sites known or suspected to contain MEC and/or MEC to ensure applicable Department of Defense regulations and standards are applied and health and safety procedures are identified and implemented to allow the work to be conducted safely.

determine whether or not an ESS was required to resume work. As a result of MPPEH not being identified within the 5th Street Disposal Area and only a limited amount of excavation remaining at that area, NOSSA responded to the ESS-Determination Request in November 2014 indicating that an ESS was not required to resume activities.

Because of known MPPEH present, an ESS was developed for the 2nd Street Disposal Area to ensure applicable Department of Defense regulations and standards are applied and health and safety procedures are identified and implemented to allow the onsite work to resume safely. The final ESS was submitted to NOSSA in September 2015; NOSSA provided interim approval of the ESS and endorsed it to Department of Defense Explosive Safety Board (DDESB). DDESB approval has not yet been provided, but work can be initiated based on NOSSA's interim ESS approval.

3 Remedial Action Activities Changes

The updated schedule for the RA (**RAP Figure 11, updated**) is provided. The following changes will be made to the RA activities due to the changes in conditions encountered:

- Unexploded Ordnance (UXO) Support Staffing
 - At a minimum, one senior UXO supervisor (SUXOS) will be on site to provide construction support for all intrusive activities at the 2nd Street Disposal Area, including waste and soil excavation and mechanical screening of excavated material, in accordance with the procedures outlined in the ESS. The SUXOS directly controls any intrusive activities in order to achieve maximum operational safety and efficiency. Additionally, a UXO quality control specialist (UXOQCS)/UXO safety officer (UXOSO) will be on site to oversee the UXO-related health and safety and quality control operations in accordance with the ESS.
 - At a minimum, all staff working at the 5th Street Disposal Area will have received Recognize, Retreat, and Report (RRR) training prior to working on site and UXO-qualified support will be on call to provide support, if needed. If the field team encounters suspected munitions and explosives of concern (MEC)/MPPEH, the field team will retreat from the area and report the suspected items to the UXO Technician and Project Manager. The UXO Technician will mobilize to the site to assess the suspected item(s). If MEC/MPPEH are encountered, NOSSA will be notified and work will not proceed until direction is received from NOSSA.
 - Only onsite UXO Technicians will have the ability to determine whether any items discovered are considered MEC or MPPEH. All MEC/MPPEH identified will be addressed in accordance with the ESS.
- Site Preparation
 - Additional traffic control measures will be implemented to control access to the work area at the 2nd Street Disposal Area; specific requirements are identified in the ESS.
 - Work zones will be established and clearly delineated using fencing and signs. Exclusion zones at the 2nd Street Disposal Area will be based on the explosive safety arcs identified in the ESS. The exclusion zones apply to the location where activity with the potential to result in contact with MEC/MPPEH is taking place and will move as the operations move. Only personnel essential to the operation will be allowed within the exclusion zones.
- Excavation and Screening
 - Equipment used during excavation and screening activities at the 2nd Street Disposal Area will be armored to protect the operator from hazardous fragments in the event that an item detonates during the excavation and screening and sized to maintain the required minimum separation distance. The materials and associated minimum thicknesses and the separation distances are identified in the ESS.
 - Equipment armoring and separation distances do not apply at the 5th Street Disposal Area.

- Material will be excavated in lifts no greater than 12 inches thick to allow for visible inspection.
- Material may not be direct-loaded into trucks for transportation off site.
- Material excavated from the 2nd Street Disposal Area will be mechanically screened in the vicinity of the excavation activities. The screen will be sized to retain items larger than 2 inches. Material retained (i.g., greater than 2 inches) will be inspected by a UXO technician for the presence of MEC/MPPEH.
- Material Handling
 - Material excavated from the 2nd Street Disposal Area will be managed in “lots” in accordance with the ESS. A lot may not be transported off-site without documentation that it has passed the quality assurance/quality control process.
 - MEC/MPPEH recovered during the removal action will be handled and stored in accordance with the ESS. Only UXO-qualified technicians on site will be allowed to inspect and move (if determined to be safe) MEC/MPPEH items.
- Geophysical Surveying
 - Because of the potential for MEC/MPPEH at the 2nd Street Disposal Area, minor changes to the Geophysical Survey Work Plan (**RAP Appendix F, updated**) have been made to address concerns identified by NOSSA with respect to Static Background Tests.
- Confirmation Sampling
 - Because of the presence of MEC/MPPEH at the 2nd Street Disposal Area, explosives residues (nitroaromatics/nitroamines plus pentaerythritol tetranitrate, nitroglycerin, and perchlorate) will be added to the confirmation sample analyte list for samples from that area.
 - There are no applicable North Carolina protection of groundwater or residential health-based preliminary soil remediation goals for explosives residues in soil. If explosives residues are not detected, excavation to address the potential presence of these constituents will be considered complete. If explosives residues are detected in confirmation samples, NCDENR will be contacted for direction and additional soil sampling may be conducted to define the horizontal extent of explosives residues in soil.
 - The analytical laboratory identified in the RAP quality assurance project plan (QAPP) will not be used, as the work is being conducted under a different contract, and a new laboratory will be procured. The selected laboratory will be a Department of Defense Environmental Laboratory Accreditation Program (ELAP)-certified laboratory capable of achieving the project quantitation limit goals identified in the RAP QAPP.
 - Data quality concerns were recently identified associated with volatile organic compounds (VOCs) analysis performed by Environmental Conservation Laboratories Inc. As a result, there is uncertainty with the detected constituents and reported concentrations of VOCs in soil at TRDA. To address the uncertainty at the 2nd Street Disposal Area², confirmation soil samples will be analyzed for total compound list (TCL) VOCs rather than the select VOCs identified in the RAP QAPP. Details of the quality concerns and resolution of the uncertainty will be provided in the upcoming RA Construction Completion Report and/or Remedial Investigation Report.
- Waste Characterization, Transportation, and Disposal
 - Any MEC/MPPEH recovered will be disposed in accordance with the ESS. In the event all surfaces of MMPEH cannot be inspected, inspection of MPPEH may require cutting of items with a chop saw and/or perforation of items with explosives to break open the cavities for inspection.

² Confirmation sampling at the 5th Street Disposal Area was completed in 2014. To address the uncertainty with the soil VOCs in that area, the data is being re-processed and TCL VOCs will be reported in the upcoming RA Construction Completion Report and/or Remedial Investigation Report.

- If MEC are encountered, they will be disposed on site via controlled detonation. Because the work is being conducted under G.S. 130A-310.3(e), it is assumed a waiver for permitting would be granted.
- To address handling and disposal of the scrap tires excavated from the 5th Street Disposal Area, the applicable federal, state, and local environmental regulations and state facility-siting regulations were updated (**RAP Appendix A, updated**). Scrap tires and compressed gas cylinders will be handled and disposed of in accordance with the applicable regulations.

5 References

This Section lists the documents consulted in the preparation of this report; not all references included herein are specifically cited in the text.

CH2M HILL. 2014. *Explosives Safety Submission Determination Request for Towers Road Disposal Areas 5th Street Disposal Area, Harvey Point Defense Training Activity, Hertford, North Carolina*. November.

CH2M HILL. 2015a. *Accident Prevention Plan, Towers Road Disposal Areas, Towers Road Disposal Areas, Harvey Point Defense Testing Activity, Hertford, North Carolina*. August.

CH2M HILL. 2015b. *Explosives Safety Submission for Towers Road Disposal Areas 2nd Street Disposal Area, Harvey Point Defense Training Activity, Hertford, North Carolina*. September.

Figures



Legend

 HPDTA Boundary

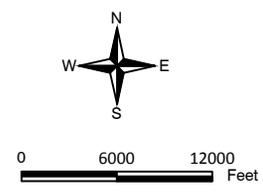
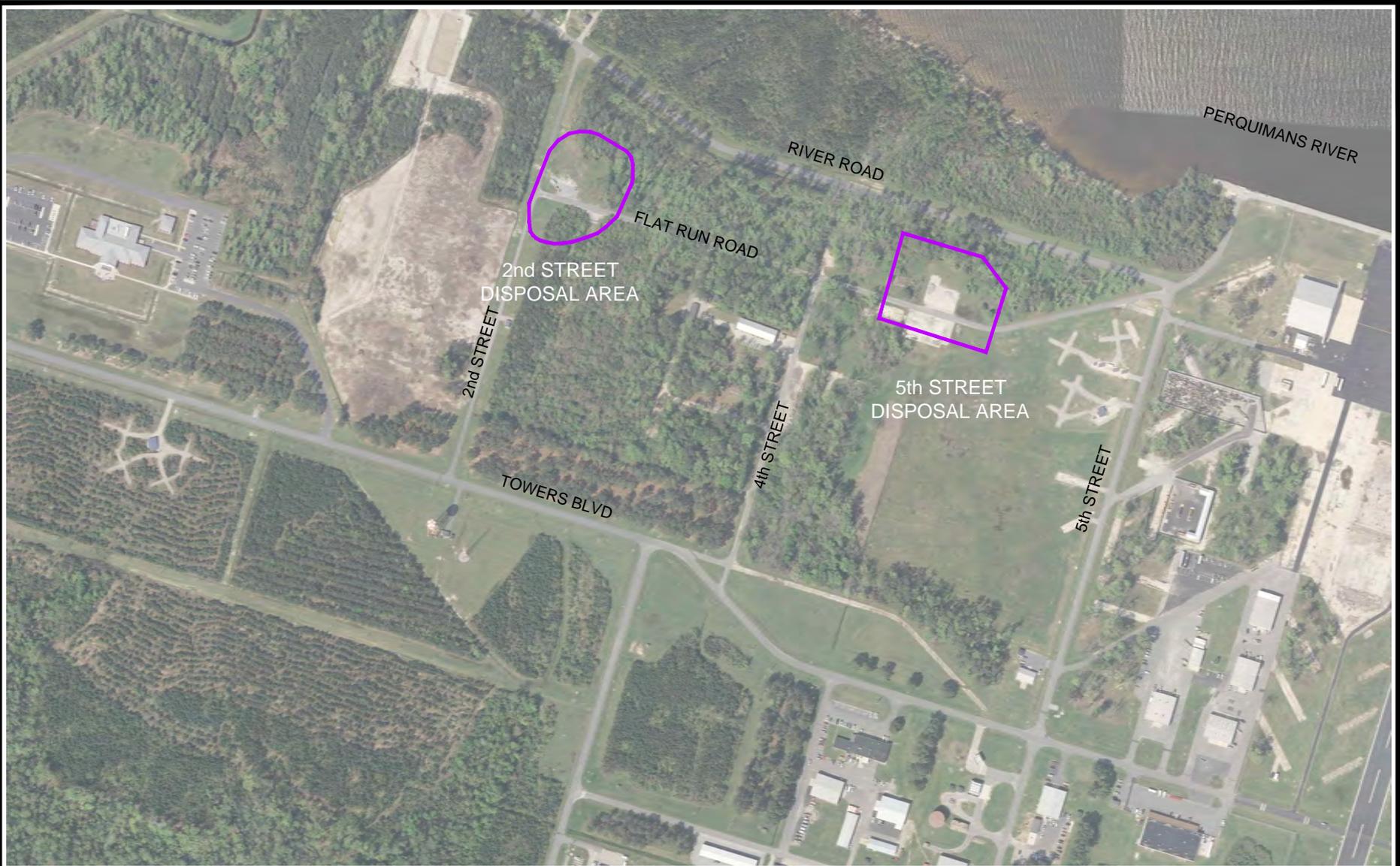


Figure 1
HPDTA Location
Harvey Point Defense Testing Activity
Hertford, North Carolina



Legend

 Investigation Area

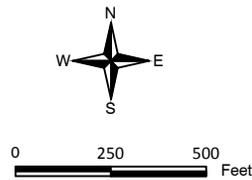


Figure 2
Site Location Map
Harvey Point Defense Testing Activity
Hertford, North Carolina

Appendix A
Applicable Regulations

Table A-1
Applicable Requirements
Towers Road Disposal Area Interim Remedial Action Plan and Preconstruction Report
Harvey Point Defense Testing Activity
Hertford, North Carolina

Classification	Media/Action/Location	Requirement	Prerequisite	Citation	
Chemical-Specific	Soil	North Carolina Preliminary Soil Remediation Goals (PSRGs) - RECs shall ensure that the Department's ascertainment of the most nearly applicable cleanup standards as would be applied under CERCLA/SARA are met. Characterization of risks to health, safety, public welfare, and the environment is not required under this Section for a disposal site, environmental medium, or chemical for which response actions have successfully reduced concentrations of hazardous substances to on-site natural background levels.	RECs shall ensure that the Department's ascertainment of the most nearly applicable cleanup standards as would be applied under CERCLA/SARA are met. Characterization of risks to health, safety, public welfare, and the environment is not required under this Section for a disposal site, environmental medium, or chemical for which response actions have successfully reduced concentrations of hazardous substances to on-site natural background levels. - Applicable for alternatives 2 and 3	15A NCAC 13C.0308 Inactive Hazardous Sites Branch PSRG Table; PCBs, the unrestricted use residential/industrial PSRG of 1 mg/kg will be used	
Location-Specific	Migratory Flyway	Almost all species of native birds in the United States are protected from unregulated taking.	Any activity taking place within a migratory flyway. Applicable for alternatives 2 and 3	Migratory Bird Treaty Act, 16 USC 703	
General Construction Standards — All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)					
Action-Specific	Managing storm water runoff from land-disturbing activities	Must obtain coverage under the general permit, develop a Stormwater Pollution Prevention Plan/Sedimentation and Erosion Control Plan as described in the permit, and implement the plan during construction.	Land-disturbing activity (as defined in N.C.G.S. Ch. 113A-53) of more than 1 acre of land. Applicable to alternatives 2 and 3	NC General Permit - NCG 010000	
	Coastal county stormwater management	Refer to Items (1), (2), and (3) for stormwater management requirements for Coastal Counties of North Carolina.	Activities within a Coastal County that require a Sedimentation and Erosion Control Plan (land-disturbing activity of more than 1 acre of land or a CAMA Major Development Permit) - Applicable to alternatives 2 and 3	15A NCAC 02H .1005	
	Waste Characterization and Storage — Primary Wastes (i.e., excavated contaminated soils)				
	Characterization of hazardous waste	Incorporates the requirements for generators at 40 CFR 262 with noted exceptions. The generator must determine if solid waste that has been generated is a hazardous waste using the procedure outlined at 40 CFR 262.11	Generation of RCRA-hazardous waste for storage, treatment or disposal - Applicable to alternatives 2 and 3	15A NCAC 13A.0107	
	Management of hazardous wastes	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste. These include but are not limited to the requirements to apply for a hazardous waste generator number; submit hazardous waste reports; maintain generation, shipment, and disposal records; and to meet the prescribed design and operation standards for hazardous waste facilities.	Generation of solid waste which is determined to be hazardous- Applicable to alternatives 2 and 3	40 CFR 262.11(d)	
Storage of solid waste	All solid waste must be stored in accordance with these requirements that include but are not limited to: <ul style="list-style-type: none"> • All solid waste shall be stored in such a manner as to prevent the creation of a nuisance, insanitary conditions, or a potential public health hazard. • Containers for the storage of solid waste shall be maintained in such a manner as to prevent the creation of a nuisance or insanitary conditions. • Containers that are broken or that otherwise fail to meet this Rule shall be replaced with acceptable containers. 	Generation of solid waste which is determined <i>not</i> to be hazardous - Applicable to alternatives 2 and 3	15A NCAC 13B .0104		

**Table A-1
Applicable Requirements
Towers Road Disposal Area Interim Remedial Action Plan and Preconstruction Report
Harvey Point Defense Testing Activity
Hertford, North Carolina**

Classification	Media/Action/Location	Requirement	Prerequisite	Citation	
Action-Specific	Design criteria for a hazardous waste staging pile	If hazardous wastes will be staged in piles outside the Area of Contamination then a permit must be obtained. Standards for the design and operation of the pile will consider the following factors: <ul style="list-style-type: none"> • Length of time pile will be in operation; • Volumes of waste you intend to store in the pile; • Physical and chemical characteristics of the wastes to be stored in the unit; • Potential for releases from the unit; • Hydrogeological and other relevant environmental conditions at the facility that may influence the migration of any potential releases; and • Potential for human and environmental exposure to potential releases from the unit. 	Storage of remediation waste in a staging pile – Applicable to alternatives 2 and 3	15A NCAC 13A .0109 (s) [40 CFR 264.554]; 15A NCAC 13A .0113	
	Temporary accumulation of hazardous waste in containers	If hazardous wastes will be temporarily accumulated in containers the generator must apply for a hazardous waste generator number; submit hazardous waste reports; maintain generation, shipment, and disposal records; and to meet the prescribed design and operation standards for hazardous waste accumulation in accordance with the amount of hazardous waste generated within a calendar month. A large quantity generator may accumulate hazardous waste at the facility for 90 days provided that: <ul style="list-style-type: none"> • waste is placed in containers that comply with 40 CFR 265.171-173; and • the date upon which accumulation begins is clearly marked and visible for inspection on each container • container is marked with the words "hazardous waste"; or • container may be marked with other words that identify the contents. 	Accumulation of RCRA hazardous waste on site as defined in 40 CFR 260.10- Applicable to alternatives 2 and 3	15A NCAC 13A.0107	
	Transportation of Wastes				
	Transportation of hazardous waste	If hazardous waste will be offered for transport the generator must comply with the generator standards of Part 262 including 40 CFR 262.20-23 for manifesting, Sect. 262.30 for packaging, Sect. 262.31 for labeling, Sect 262.32 for marking, Sect. 262.33 for placarding.	Offering hazardous waste for shipment – applicable alternatives 2 and 3	15A NCAC 13A.0106 [40 CFR 262.10(h)]	
	Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMTA and HMR at 49 CFR 171-180 related to marking, labeling, placarding, packaging, emergency response, etc.	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material - applicable alternatives 2 and 3	49 CFR 171.1(c)	
	Transportation of samples (i.e. contaminated soils)	Are not subject to any requirements of 40 CFR Parts 261 through 268 or 270 when: <ul style="list-style-type: none"> • The sample is being transported to a laboratory for the purpose of testing; or • The sample is being transported back to the sample collector after testing. 	Samples of solid waste or a sample of water, soil for purpose of conducting testing to determine its characteristics or composition - applicable alternative 2 and 3	40 CFR 261.4(d)(1)(i)-(iii)	
		• The sample is being stored by sampled collector before transport to a lab for testing		15A NCAC 13A.0106	
		In order to qualify for the exemption in paragraphs (d)(1)(i) and (ii), a sample collector shipping samples to a laboratory must: <ul style="list-style-type: none"> • Comply with U.S. DOT, U.S. Postal Service, or any other applicable shipping requirements • Assure that the information provided in (1) thru (5) of this section accompanies the sample. • Package the sample so that it does not leak, spill, or vaporize from its packaging. 		40 CFR 261.4(d)(2)(i)(A) and (B)	
				15A NCAC 13A.0106	
Scrap Tire Management					
Management of scrap tires	No person shall discard, deposit or dispose of scrap tire except at a site or facility permitted to receive scrap tires under these Rules, or a legitimate business exempt from a permit under G.S. 130A-309.57(d)	Generator of scrap tires - applicable alternatives 2 and 3	15A NCAC 13B .1100		

Table A-1
Applicable Requirements
Towers Road Disposal Area Interim Remedial Action Plan and Preconstruction Report
Harvey Point Defense Testing Activity
Hertford, North Carolina

Classification	Media/Action/Location	Requirement	Prerequisite	Citation
Action-Specific	<i>Storage of Oils</i>			
	Storage of fuels and oils (petroleum and non-petroleum) onsite including ERD substrate	If storage capacity limits are exceeded a Spill, Prevention, Control, and Countermeasures Plan must be prepared and implemented with procedures, methods, equipment, and other requirements to prevent the discharge of into or upon the navigable waters of the United States.	Total onsite storage capacity exceeding 1,320 gallons in containers that are 55 gallons or larger in size. Applicable for alternatives 2 and 3.	40 CFR 112

Appendix F
Geophysical Survey Work Plan

Revised Final

**Geophysical Survey Work Plan
Interim Remedial Action Plan and Preconstruction Report
Towers Road Disposal Areas – Waste and Soil**

**Harvey Point Defense Testing Activity
Hertford, North Carolina**

Contract Task Order 0017

Prepared for
**Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic**

Contract N62470-11-D-8012

Prepared by



CH2MHILL

Virginia Beach, Virginia
NC Engineering License #F-0699

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Table

1	Project Measurement Quality Objectives
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Acronyms/Abbreviations

AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
CFR	Code of Federal Regulations
DGPS	Differential Global Positioning System
EM	Electromagnetic
FTP	File Transfer Protocol
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IRA	Interim Remedial Action
IRAP	Interim Remedial Action Plan
MEC	Munitions and Explosives of Concern
MPC	Measurement Performance Criteria
MPPEH	Material Potentially Presenting an Explosive Hazard
MQO	Measurement Quality Objective
mS/m	milliSiemens/meter
PPE	Personal Protective Equipment
ppt	Parts Per Thousand
QC	Quality Control
RI	Remedial Investigation
RTK	Real-Time Kinematic

1 Geophysical Survey Work Plan

1.1 Introduction

This work plan presents the approach to conduct a follow-up geophysical survey at the Towers Road Disposal Areas located in Hertford, North Carolina. The geophysical survey is being conducted in support of an interim remedial action (IRA) to address wastes and impacted soils. A geophysical survey was conducted in May 2013 as part of the Phase I Remedial Investigation (RI) in an attempt to delineate the lateral extent (i.e. footprint) of potential buried metallic and non-metallic wastes, debris, and obstructions (e.g. former building foundations). An IRA is planned to remove the waste. A geophysical survey will be performed after the waste is removed in an attempt to determine whether waste remains in place below the excavation floor. This work plan provides details of the investigation objectives, equipment, approach, operational procedures, quality control (QC), and reporting requirements associated with the follow-up geophysical survey at the Towers Road Disposal Areas.

Additional details on the IRA are presented in the Interim Remedial Action Plan (IRAP) and Preconstruction Report.

1.2 Objective

The IRA includes planned excavation and removal of the wastes in locations that are above the water table to the visible limits. The follow-up geophysical survey will be conducted in an attempt to determine whether potential buried wastes, debris, or obstructions remain below the excavation floor. The results of the follow-up geophysical survey will be used to assist in determining whether additional excavation and removal of wastes is needed during the IRA.

1.3 Site Description and Background

The geophysical survey will be conducted at two separate sites within the Towers Road Disposal Areas: the 2nd Street Disposal Area and the 5th Street Disposal Area. Maps depicting the planned excavation areas are included as **Figures 4 and 5** in the IRAP and Preconstruction Report.

These two sites underwent initial geophysical surveying in May 2013 across the accessible portions of each site. With the exception of one test pit that contained wastes below the groundwater table (wastes were encountered at depths of approximately 9 to 10 feet [ft]), the depth of the wastes generally ranged from surficial to 6 ft based on Phase I RI test pitting results. Depth to groundwater is approximately 4 to 5 ft.

The combined survey area for the follow-up geophysical survey is estimated at 1.3 acres. This includes 0.7 acres at the 2nd Street Disposal Area and 0.6 acres at the 5th Street Disposal Area. These areas comprise the planned excavation footprint. The surface within the excavation may be loose, rough, and uneven.

Although present at 2nd Street Disposal Area, munitions and explosives of concern (MEC) and material potentially presenting an explosive hazard (MPPEH) are assumed to not be a factor for the geophysical survey at these sites. Additional details on the Phase I RI efforts are presented in the IRAP and Preconstruction Report.

2 Geophysical Survey

2.1 Approach

The geophysical survey will be conducted using the same approach as the initial survey. The survey will be conducted using the Geonics, Ltd. EM31-MK2 operated in vertical dipole mode. Terrain conductivity (i.e. quadrature) and in-phase response data will be recorded and analyzed for the presence of potential waste. Data will be collected along profiles with a nominal spacing of 5 ft and extending across the accessible portions of the survey area.

2.2 Project Personnel

Work will be performed by a geophysical subcontractor under the supervision of a CH2M HILL field representative. Specific personnel roles are listed below:

- **CH2M HILL Project Manager** – The CH2M HILL Project Manager will liaise directly with the client and will be responsible for project delivery within the established schedule and budget. The CH2M HILL Project Manager will coordinate with the CH2M HILL Field Representative and/or CH2M HILL Geophysicist and provide final review of the results and report submitted by the geophysical subcontractor.
- **Geophysical Subcontractor Project Geophysicist** – The Project Geophysicist will direct the field work being conducted under the supervision of the geophysical subcontractor Field Geophysicist/Geophysical Technician and will review all acquired data. The Project Geophysicist will have experience in the analysis and interpretation of EM31-MK2 data and will be responsible for the survey being completed in accordance with the work plan. The Project Geophysicist will be responsible for delivering data and results to CH2M HILL in accordance with the work plan and as detailed in the contracting scope of work between CH2M HILL and the geophysical subcontractor.
- **Geophysical Subcontractor Field Geophysicists** – The geophysical subcontractor Field Geophysicists will be responsible for data collection, compiling data and submitting data for daily review by the geophysical subcontractor Project Geophysicist. The geophysical subcontractors field personnel will have experience in the safe and proper operation of the geophysical instruments. Field personnel will also have experience working on industrial sites and will conduct the geophysical survey in accordance with the work plan and project health and safety requirements.
- **CH2M HILL Geophysicist** – The CH2M HILL Geophysicist will liaise with the geophysical subcontractor on technical matters and perform QC of the geophysical survey. The CH2M HILL Geophysicist will review the geophysical subcontractors data, as necessary, and draft and final reports.
- **CH2M HILL Field Representative** – The CH2M HILL Field Representative will provide in-field oversight of the geophysical subcontractor and liaise with installation personnel, the CH2M HILL Project Manager, and the CH2M HILL Geophysicist. The Field Representative will provide site access for the geophysical subcontractor, conduct daily safety briefings, provide safe behavior observations, document existing field conditions, and ensure that the field work is conducted in accordance with the work plan and project health and safety requirements.

2.3 Geonics, Ltd. EM31-MK2

The EM31-MK2 measures the electrical conductivity of subsurface materials by inducing a time-varying magnetic field and measuring the amplitude and phase shift of an induced secondary magnetic field. Variations in subsurface conductivity may be caused by the presence of buried metal objects, presence of

non-metallic wastes and debris, or by changes in geologic conditions that alter the conductive signature of subsurface materials.

Quadrature and in-phase are the two components of the EM31-MK2 induced magnetic field. The quadrature phase (measured in milliSiemens/meter [mS/m]) component is generally indicative of the bulk soil and groundwater properties, whereas the in-phase component (measured in parts per thousand [ppt]) is generally indicative of buried metal objects. By recording both the in-phase and quadrature-phase components and comparing the results from these two components, it is possible to evaluate whether a detected change in bulk conductivity is due to the presence of buried metallic objects or to the presence of non-metallic materials that may impact subsurface soil or pore fluid conductivity. The effective survey depth of the EM31-MK2 is approximately 20 ft in the vertical dipole orientation, although actual depth of investigation is dependent largely on site-specific conditions.

2.4 Positional Data

The geophysical survey will be collected using a real-time differential Global Positioning System (DGPS). Positional data will be recorded at 1 Hertz, with an accuracy of 3.3 ft (sub-meter) or better. Elevations do not need to be reported with the geophysical results.

The locations of relevant site features (e.g. obstructions, sources of interference) will be recorded using GPS for overlay on the geophysical results.

No site-specific location control exists at the survey areas. If NAEVA elects to utilize real-time kinematic GPS (RTK GPS) with the EM31-MK2, NAEVA will be responsible for establishing local site control under the current scope of work.

The project coordinate system is North Carolina State Plane Coordinate System, North American Datum 1983 (NAD 83) CONUS, and the units are feet.

3 Measurement Quality Objectives

Table 1 (at the end of this document) presents the measurement quality objectives (MQOs), measurement performance criteria (MPC), and test methods for the follow-up geophysical survey at the Towers Road Disposal Areas.

4 Quality Control

The geophysical and GPS instruments will be field tested to confirm proper operating conditions. Several basic QC tests will be performed as part of this investigation.

- **EM31-MK2 Warm-up and Functional Checks** – This is an instrument-specific activity, although standard warm-up time is generally 10 to 15 minutes to allow for minimization of sensor drift. Longer warm-up periods may be needed in cold weather. EM31-MK2 functional checks will be conducted in accordance with the instrument manufacturer specifications. Equipment warm-up will be performed the first time an instrument is turned on for the day or after it has been turned off for an extended period of time.
- **EM31-MK2 Static Background Test** – Static background testing will be performed at the start and end of each survey day. The test will be conducted in an area that is free of sources of interference with the EM31-MK2 kept stationary. Data will be collected for at least one minute with the instrument at the intended carry height for the production survey. The purpose of this test is to assess background response (i.e. effect of the ground component) and sensor noise levels from the start of the day through the end of the day. GPS data do not have to be logged with these tests. The results of this test will be qualitatively evaluated.

- **EM31-MK2 Vibration Test** – A vibration (i.e. cable shake) test will be performed at the start of each survey day. The test will be conducted by recording data for at least 1 minute with the EM31-MK2 either on the ground surface or at the intended survey height. During data collection, the operator will shake the instrument cables and connections while observing for noise spikes. If spikes are observed, the malfunctioning part or component will be repaired or replaced prior to starting the production survey. The purpose of this test is to identify potential malfunctioning parts in order to avoid unwanted noise in the data as the operator is walking around the site with the instrument. The results of this test will be qualitatively evaluated.
- **EM31-MK2 Dynamic Response Test** – The dynamic test will be performed at the start and end of each survey day by collecting data over a subsurface object capable of producing a response in the instrument (e.g. culvert metal drain pipe). If no such feature exists within close proximity to the survey area, a large metallic surface feature (e.g., drop inlet, manhole) may be used. The object will be sufficiently large to register a response with the EM31-MK2 because relatively small objects, such as flush-mount monitoring well caps, may not produce a detectable response in the EM31-MK2. The purpose of the dynamic test is to verify that the instrument can consistently detect the feature. The dynamic test will be conducted at the beginning and end of each survey day and GPS data will be logged with the EM31-MK2 data for this test. The results of this test will be qualitatively evaluated.
- **EM31-MK2 Repeat Data** – This test is performed to verify repeatability of the data and will be performed at the end of each survey day. Approximately 2% of the survey area collected with the EM31-MK2 will be repeated at the end of each survey day. Because of the intrinsic difficulty of following the exact path for collecting repeat data, this test will also be qualitatively evaluated. Repeat data will be recorded in a separate data file from the production survey and will be recorded with GPS data.

5 Data Acquisition, Processing, and Reporting

5.1 Field Notes

The geophysical subcontractor will be responsible for keeping a daily log book. Field notes will include, at a minimum, the following information:

- Field team leader name
- Field team members' names
- Date(s) of data collection
- Working hours onsite
- Instrument used
- Positioning method used (e.g. DGPS, RTK, fiducial)
- Production and QC data file names
- Data collection sampling rate
- Weather conditions
- Terrain conditions (including obstructions and data gaps)
- Other relevant field notes and observations

These field data will be reviewed on a daily basis and archived at the conclusion of the fieldwork by the CH2M HILL Field Representative. Pertinent field data will be compiled and summarized in support of the data summary report (described below).

5.2 Data Processing

Data processing will be system specific, but the general final processing steps that may be performed on the EM data include the following:

- Sensor bias, background leveling, 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, nonlinear, etc.)

5.3 Interpretation

The geophysical subcontractor will provide interpretation of the geophysical results by annotating the final contour maps to indicate the lateral extent of suspected buried wastes, if they appear to be present beneath the floor of the planned excavation. Annotations will also be provided depicting inaccessible survey areas (i.e. data gaps) and inferred sources of interference.

5.4 Final Maps

The results of the geophysical investigation will be presented as a series of plan-view, color-contoured maps depicting instrument response across the survey areas. Interpretations will be made directly on the maps as well as addressed in the accompanying report. The results maps will contain the following:

- Client name
- Project number
- Subcontractor name
- Map creator
- Map approver
- Date of map creation
- Scale bar
- Color bar for geophysical data (with units)
- Displayed map coordinates in project-specific coordinate system and units
- North arrow, legend, title block

5.5 Records Management

CH2M HILL will create and manage a project-specific file transfer protocol (FTP) or Share Point site prior to mobilization. Raw data files will be posted to the FTP site at the end of each survey day (or emailed to CH2M HILL as zip files if individual files are less than 3 megabytes in size).

Relevant field notes will be uploaded to the FTP site within one week of completion of the field survey. Upon project completion and submission of the final deliverable, all data and information (original and copies) of any type whatsoever shall be surrendered to the CH2M HILL Project Manager.

5.6 Deliverables and Schedule

The geophysical survey fieldwork as outlined in this work plan is tentatively planned for June 2013. The following provides a summary of the deliverable schedule.

The geophysical subcontractor will provide draft results within **48 hours** of completion data collection because the results will be used as guidance for planned follow-up intrusive investigations.

Final processed production and QC data, GPS features files, final maps and a draft report will be placed on the FTP or Share Point site within **three weeks** of demobilization from the site. The report will present a description of the survey methods, survey execution, encountered site conditions, data processing steps and data adjustments, results and interpretation, QC results, limitations and any other relevant information pertaining to the interpretation of the results. The geophysical subcontractor will issue a final report within **one week** of receipt of comments from CH2M HILL on the draft report.

The final processed data delivery package submitted to CH2M HILL will include the following:

- Raw EM31-MK2 and GPS (if applicable) files
- Processed survey and QC files in a format that can be directly read by Geosoft (.XLS, .GDB, .XYZ format)
- PDF maps depicting final results
- Native files for results maps (note: if Geosoft .MAP files provided, files must be packed .MAP files)
- Grid (.GRD) files
- PDF and native files depicting QC test results

Processed data files will include, at a minimum, eastings and northings (in the specified project coordinate system), raw instrument channels, time stamp, pre-processed and processed data channels.

TABLE 1
Project Measurement Quality Objectives
Geophysical Survey Work Plan

Measurement Quality Objective	Measurement Performance Criteria	Test Method
General System Operation		
System Operation – Geophysical instrument is operating properly.	<p>No excessive instrument drift will be observed throughout survey day.</p> <p>No excessive data spikes (>5 milliSiemens/meter [mS/m] above the mean for quadrature; >2 ppt above the mean for inphase) will be present in QC test files.</p> <p>Instruments will be free of obvious defects. Cables and system components will be in good working order.</p> <p>System responds consistently to known subsurface or surface metallic object</p>	<p>Battery level will be periodically checked throughout surveys. Instrument will undergo sufficient warm-up period and functional checks before use. Cables, connections, and system components will be inspected daily prior to use.</p> <p>Static background, dynamic response, and vibration QC tests will be conducted in accordance with Section 4 of this work plan.</p>
Geophysical Survey		
Data Quantity and Spacing – Down line data density is sufficient to achieve project objective.	<p>Maximum permissible spacing between data points will be 2 ft unless an obstruction or hazard is present. A spacing greater than this will not meet the MQO.</p>	<p>Results of survey will be quantitatively evaluated to ensure compliance.</p>
Survey Coverage (Lane Spacing)	<p>Lane spacing varies by no more than 2x the intended lane spacing of 5 ft, unless an obstruction or hazard is present. This results in a maximum permissible lane spacing of 10 ft for the EM31-MK2 survey.</p>	<p>Results of survey will be quantitatively evaluated to ensure compliance.</p>

TABLE 1
Project Measurement Quality Objectives
Geophysical Survey Work Plan

Measurement Quality Objective	Measurement Performance Criteria	Test Method
Repeatability	Repeat data depict general agreement with production survey data.	Repeat data collection will be conducted in accordance with Section 4 of this work plan and qualitatively evaluated for compliance.
Data Handling		
Data must be made available to the project team in accordance with the project schedule.	Geophysical data are presented in accordance with Section 5.6 of this work plan.	Results will be evaluated based on actual delivery of data.