



CH2M Virginia
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462
O +1 757.518.9666
F +1 757.497.6885
www.ch2m.com

June 17, 2016

Ms. Dianne Thomas
Inactive Hazardous Sites Branch – REC Program
NCDEQ – Division of Waste Management
217 West Jones St.
Raleigh, North Carolina 27603

Subject: *Remedial Investigation Work Plan Addendum*
IHSB Site Name: Towers Road Disposal Areas
IHSB Site ID No.: NONCD0002893

Dear Ms. Thomas:

On behalf of Harvey Point Defense Testing Activity, CH2M is pleased to submit the referenced document for the Towers Road Disposal Areas in Hertford, North Carolina. This technical memorandum presents the plan for installation of additional groundwater monitoring wells and sampling of the existing and proposed monitoring wells to further support the alternatives evaluation in the Remedial Action Plan. A project schedule for the Remedial Investigation Addendum activities is provided as part of the attached technical memorandum.

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

Sincerely,
CH2M

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

IHSB SITE NAME Towers Road Disposal Areas. Site ID NONCD0002893

DATE & NAME OF DOCUMENT June 2016 Remedial Investigation Work Plan Addendum

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

Brian Lee
Signature of Remediating Party

6/16/2016
Date

NOTARIZATION

North Carolina (Enter State)

Perquimans COUNTY

I, Deborah Lyman, a Notary Public of said County and State, do hereby certify that Brian Lee 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 16 day of June, 2016.

Deborah Lyman
Notary Public (signature)

(OFFICIAL SEAL)

My commission expires: 24 July 2020



REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 2 OF 2

IHSB SITE NAME Towers Road Disposal Areas, Site ID NONCD0002893
DATE & NAME OF DOCUMENT June 2016 Remedial Investigation Work Plan Addendum
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

Kim Henderson
Signature of Registered Site Manager

6.17.16
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

Kim Henderson
Signature of Registered Site Manager

6.17.16
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 17 day of June, 2016
Rebecca Singleton
Notary Public (signature) (OFFICIAL SEAL)

My commission expires: 12/31/16



Remedial Investigation Work Plan Addendum

IHSB Site Name: Towers Road Disposal Areas

IHSB Site ID No.: NONCD0002893

PREPARED FOR: North Carolina Department of Environmental Quality, Inactive Hazardous Sites Branch - REC Program

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

PREPARED BY: CH2M

DATE: June 2016

1 Introduction

This technical memorandum has been prepared to supplement the *Final Phase II Remedial Investigation Work Plan, Towers Road Disposal Areas, Harvey Point Defense Training Activity, Hertford, North Carolina, April 2014* (herein referred to as the Phase II WP). It presents additional groundwater investigation activities being conducted to further support the alternatives evaluation in the Remedial Action Plan (RAP).

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).

2 Previous Investigations and Actions

The Towers Road Disposal Areas consists of the 2nd Street Disposal Area and 5th Street Disposal Area within HPDTA (**Figure 1** and **Figure 2**). The following Remedial Investigation (RI) and Remedial Action (RA) activities have been completed under the REC program.

- **Phase I RI (CH2M, 2014a)** - Initiated in May 2013 and completed in August 2013 to identify waste disposal areas, characterize the chemical nature of releases/disposal activities, and collect sufficient data to establish preliminary remediation goals. Investigation activities included geophysical surveying, test pitting, collecting and analyzing surface and subsurface soil samples, collecting and analyzing groundwater samples, measuring groundwater levels, and managing and disposing of investigation-derived waste (IDW).
- **Waste and Soil RA, (CH2M, 2016b)** - Initiated in May 2014 and completed in November 2015, consisting of the excavation and offsite transportation and disposal of waste and impacted soil, to address potential human health risks.
- **Phase II RI (CH2M, 2016c)** - Initiated in May 2014 and completed in March 2016 to delineate the lateral and vertical extents of contamination and characterize site conditions sufficiently to conduct a feasibility study to support a proposed remedy. Investigation activities included collecting and analyzing surface and subsurface soil samples, collecting and analyzing groundwater samples,

measuring groundwater levels, and managing and disposing of IDW. Support activities included utility location prior to intrusive activities, monitoring well installation, and performing a topographic survey.

3 Additional Groundwater Investigation Activities

The groundwater investigation activities consisting of monitoring well installation, subsurface soil sampling, groundwater elevation measurement, monitoring well groundwater sampling, slug testing, site surveying, and IDW management will be conducted in accordance with the work planning documents (CH2M, 2014b, 2014c, 2015a, 2016a), except as noted below. Onsite unexploded ordnance support will not be required because all known areas with the potential to contain munitions and explosives of concern or material potentially presenting an explosive hazard have been excavated and/or mechanically screened, and backfilled with clean imported soils and any potential residual risks remaining at the site would be minimal (CH2M, 2016d).

- Monitoring Well Installation
 - Up to 12 monitoring wells (up to 6 at the 2nd Street Disposal Area and up to 6 at the 5th Street Disposal Area) will be installed. The proposed locations are shown in **Figure 3** and **Figure 4**, and will be determined in the field based on site conditions. Monitoring well locations were selected to further refine the horizontal and vertical extents of volatile organic compounds in groundwater within, upgradient, and downgradient of the groundwater plumes. Groundwater monitoring wells will be installed to depths ranging from approximately 30 to 50 feet below ground surface (bgs) and will have 10-foot screens.
- Subsurface Soil Sampling
 - A total of 4 subsurface soil samples (2 at each disposal area) will be collected and analyzed for grain size and bulk density and a total of 2 subsurface soil samples (1 at each disposal area) may be collected and analyzed for natural oxidant demand (NOD) to provide additional site-specific aquifer properties. The proposed sample locations are shown in **Figure 3** and **Figure 4**. The grain size and bulk density samples will be collected in the clay layer (approximately 8 feet bgs) and silty sand layer (approximately 20 feet bgs) and the NOD samples will be collected in the silty sand layer (approximately 20 feet bgs).
- Groundwater Elevation Measurement
 - Following completion of well installation groundwater elevations in all existing and newly installed site monitoring wells will be measured to further evaluate groundwater flow.
- Monitoring Well Groundwater Sampling
 - Groundwater samples will be collected quarterly (if funding and schedule allows) from all existing and newly installed wells and analyzed for the site-specific contaminants of concern identified in the RI Report (CH2M, 2016c). A total of 4 samples (2 at each disposal area) may be collected and analyzed for dehalococoides and functional genes (trichloroethene [TCE] reductase [tceA] and vinyl chloride reductase [bvcA, vcrA]) and a total of 2 groundwater samples (1 at each disposal area) may also be collected and analyzed for NOD to provide additional site-specific aquifer properties.
- Slug Testing
 - Following completion of groundwater sampling, slug testing will be performed in 2 select monitoring wells at each disposal area to evaluate aquifer hydraulic conductivity in the vicinity of the wells in accordance with the applicable SOP (**Attachment 1**).

- Site Surveying
 - A survey of the newly installed monitoring wells will be completed and include the horizontal coordinates and vertical elevations for each monitoring well.
- Investigation-Derived Waste Management
 - IDW consisting of soil cuttings from the monitoring well installation, purged/excess groundwater from monitoring well development and sampling, personal protective equipment, and decontamination fluids will be disposed of offsite.

4 Schedule

Additional groundwater investigation activities will be initiated in June 2016. The results will be included in the RAP for groundwater. The work is currently on schedule to meet the mandatory groundwater RA work phase completion deadline (April 8, 2018) outlined in the REC Administrative Agreement (NCDENR, 2013).

5 References

- CH2M. 2014a. *Phase I Remedial Investigation Report, Towers Road Disposal Area, Harvey Point Defense Testing Activity, Hertford, North Carolina*. March.
- CH2M. 2014b. *Phase II Remedial Investigation Work Plan, Towers Road Disposal Areas, Harvey Point Defense Testing Activity, Hertford, North Carolina*. April.
- CH2M. 2014c. *Explosives Safety Submission Determination Request for Towers Road Disposal Areas 5th Street Disposal Area, Harvey Point Defense Training Activity, Hertford, North Carolina*. November.
- CH2M. 2015a. *Accident Prevention Plan, Towers Road Disposal Areas, Towers Road Disposal Areas, Harvey Point Defense Testing Activity, Hertford, North Carolina*. August.
- CH2M. 2016a. *Explosives Safety Submission Determination Request for Towers Road Disposal Areas 2nd Street Disposal Area, Harvey Point Defense Training Activity, Hertford, North Carolina*. January.
- CH2M. 2016b. *Remedial Action Construction Completion, Remedial Action Completion Report, Harvey Point Defense Testing Activity, Hertford, North Carolina*. February.
- CH2M. 2016c. *Remedial Investigation Report, Towers Road Disposal Areas, Harvey Point Defense Testing Activity, Hertford, North Carolina*. April.
- CH2M. 2016d. *After Action Report for Towers Road Disposal Areas 2nd Street Disposal Area, Harvey Point Defense Testing Activity, Hertford, North Carolina*. May.
- NCDENR. 2013. *Executed REC Administrative Agreement, Towers Road Disposal Areas*. April.

Figures



- Legend**
- HPDTA Boundary
 - Initial Site Boundary



Imagery Source: ©2016 Esri

Figure 1
HPDTA Location
TRDA Remedial Investigation Work Plan Addendum
Harvey Point Defense Testing Activity
Hertford, North Carolina





Legend

-  Initial Site Boundary
-  Installation Boundary

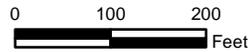
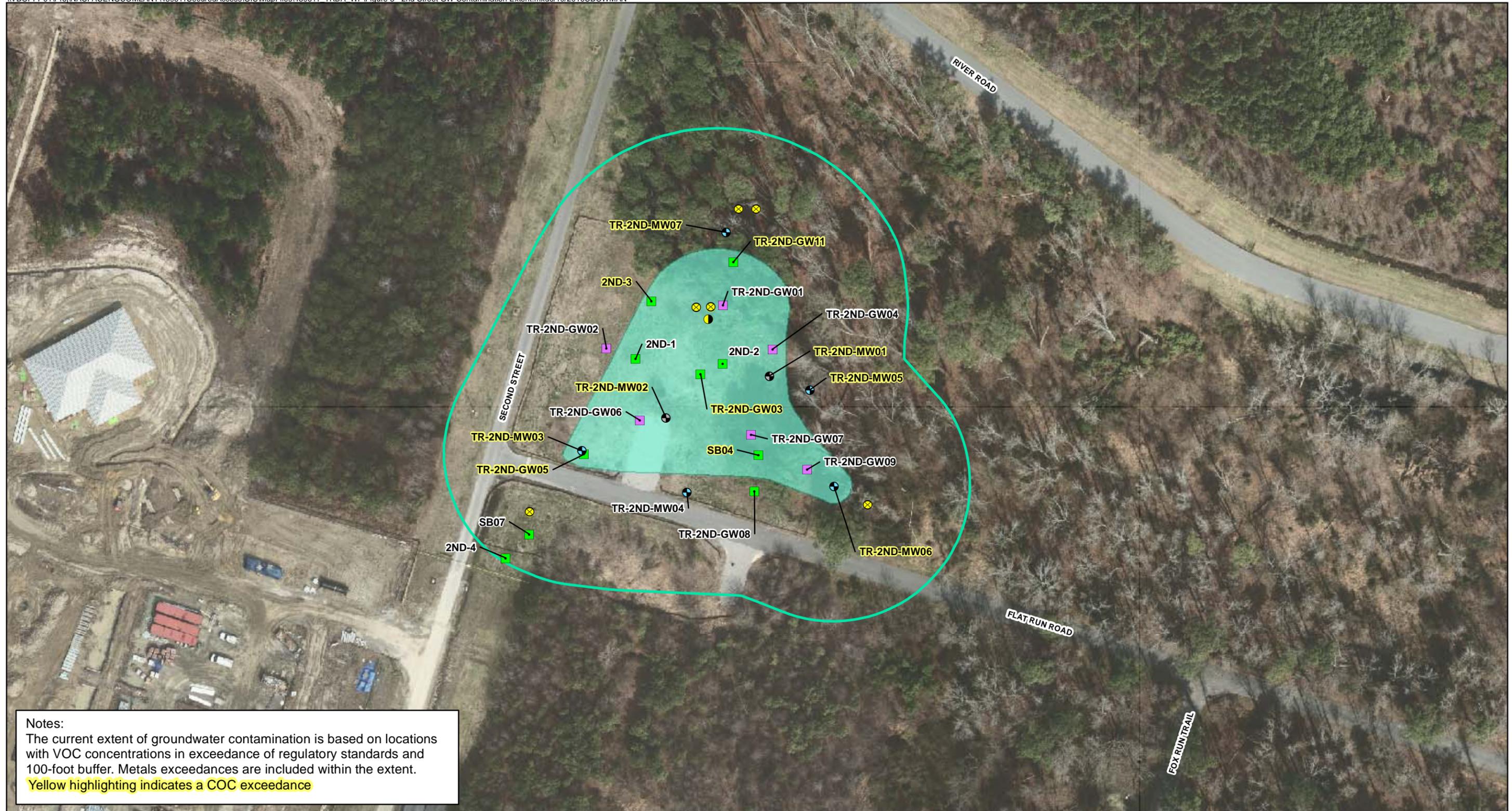


Figure 2
Site Location
TRDA Remedial Investigation Work Plan Addendum
Harvey Point Defense Testing Activity
Hertford, North Carolina



Notes:
 The current extent of groundwater contamination is based on locations with VOC concentrations in exceedance of regulatory standards and 100-foot buffer. Metals exceedances are included within the extent.
 Yellow highlighting indicates a COC exceedance

- Legend**
- Proposed Subsurface Soil Sample Location
 - ⊗ Proposed Monitoring Well Location
 - Abandoned Monitoring Well Location
 - Monitoring Well Location
 - Shallow Grab Groundwater Sample
 - Shallow/Deep Grab Groundwater Sample
 - VOC Exceedances Plume
 - VOC Exceedances Plume 100-ft Buffer

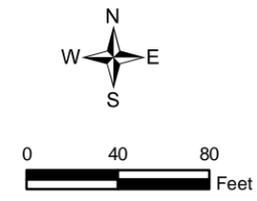
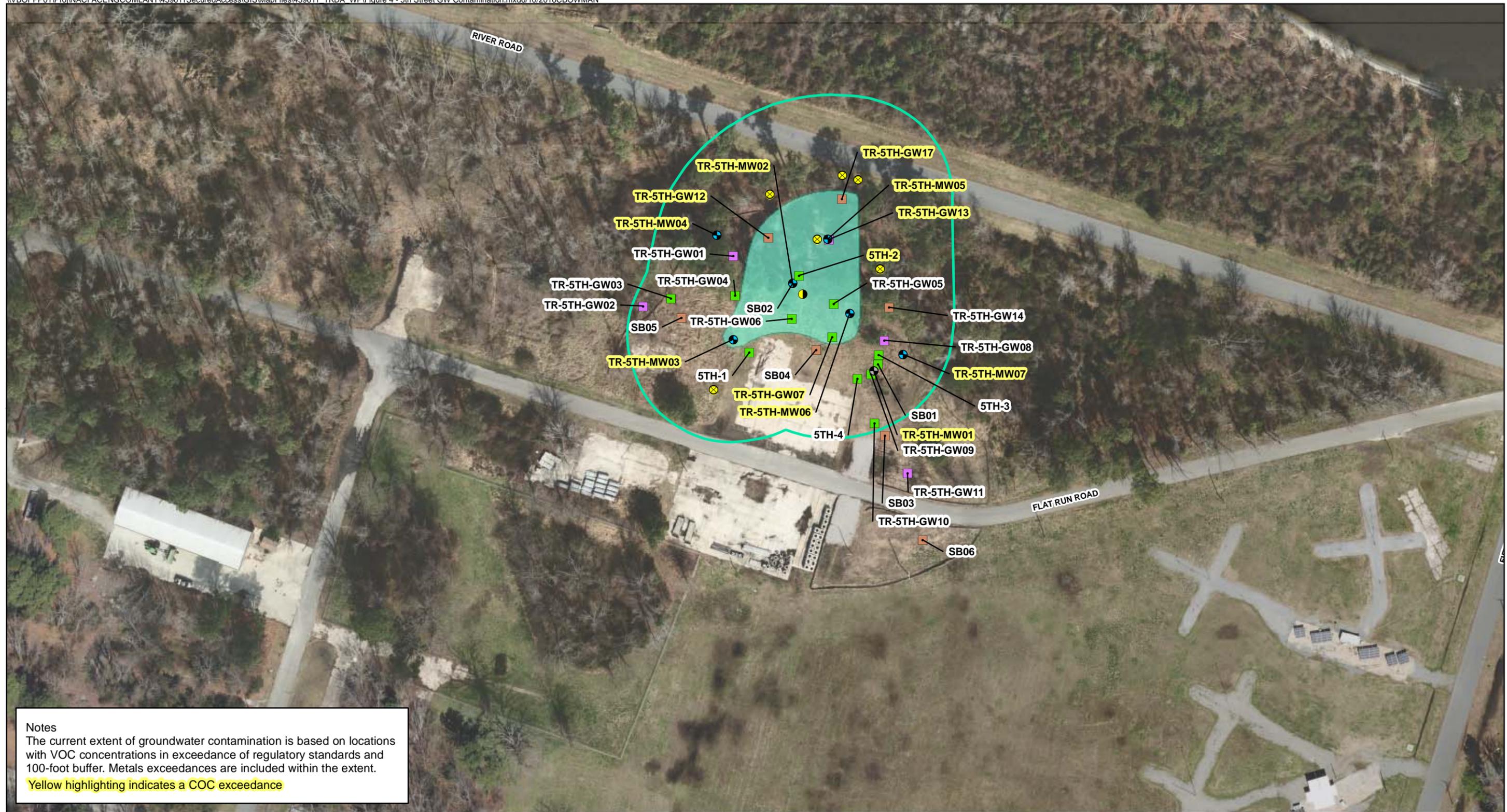


Figure 3
 2nd Street Disposal Area Current Extent of Groundwater Contamination
 TRDA Remedial Investigation Work Plan Addendum
 Harvey Point Defense Testing Activity
 Hertford, North Carolina



Notes
 The current extent of groundwater contamination is based on locations with VOC concentrations in exceedance of regulatory standards and 100-foot buffer. Metals exceedances are included within the extent.
 Yellow highlighting indicates a COC exceedance

- Legend**
- Proposed Subsurface Soil Sample Location
 - ⊗ Proposed Monitoring Well Location
 - ⦿ Abandoned Monitoring Well Location
 - Monitoring Well Location
 - Shallow Grab Groundwater Sample
 - Shallow/Deep Grab Groundwater Sample
 - Deep Grab Groundwater Sample
 - VOC Exceedances Plume
 - VOC Exceedances Plume 100-ft Buffer

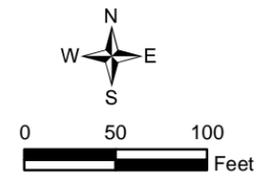


Figure 4
 5th Street Disposal Area Current Extent of Groundwater Contamination
 TRDA Remedial Investigation Work Plan Addendum
 Harvey Point Defense Testing Activity
 Hertford, North Carolina

Attachment 1
Slug Test SOP

Aquifer Slug Testing

I. Purpose and Scope

The purpose of this procedure is to outline the equipment and methods that will be used to perform variable-head tests (“slug” tests) on piezometers and monitoring wells. The guidance covers use of both air and solid displacement methods.

II. Equipment and Materials

- In-Situ data loggers or equivalent
- Well-testing assembly
 - packer
 - fittings for pressure transducers
 - fittings for air supply
 - release valve
- Compressed air
- Computer and associated equipment
- Solid displacement device with rope

III. Procedures and Guidelines

The tests to be performed are rising head tests. The tests are accomplished by lowering the head of water in the well and monitoring the recovery of the water level to the static water level. The water level will be lowered by one of two methods. One method is the use of an air displacement device. Alternatively, a solid displacement device removed from the well will be used.

The air displacement apparatus consists of a packer assembly, fittings to accommodate transducers and air pressurization, and a pressure-release valve. The packer is lowered into the upper portion of the monitoring well, secured in place and inflated, providing a seal between the apparatus and the inside of the well. Two fittings are provided for pressure transducers: one transducer is fed through the inside of the device and positioned below the water surface and the other is inserted to measure the air pressure inside the assembly. A third fitting is connected to the pressurized air supply, a compressed air tank.

The datalogger will be programmed to display the air pressure in units of head, the head measured by the submerged transducer, and the difference between the two. The difference between the two pressure transducers is the height of the water column on the submerged transducer. The readings are recorded in a field notebook, and then the assembly is pressurized. The air pressure applied will be equivalent to 3 to 7 feet

of head. The pressures are allowed to stabilize. The pressure of the air should not lower the water level to below the base of the bentonite seal installed in the well.

Each test is started by releasing the air pressure inside the assembly and allowing the water level to rise to the static water level. When the datalogger perceives a change in water level in the well above a preset trigger amount, it automatically begins to record the water levels and elapsed time. Alternatively, the datalogger can be started manually just prior to injection of air. Each test will be terminated when the water level has recovered to at least 90 percent of the original equilibrium level before pressurization. Note that the test method cannot be used if the well is screened across or near the water table.

An alternate method of lowering the water level is to use a solid displacement device. A single transducer will be installed in the well below the water table. A weighted solid displacement device is added to the well and the water level allowed to stabilize at the original static water level. The test is started by rapidly removing the displacement device, which causes a drop in the water level. The data logger begins recording the water level and elapsed time when the preset trigger amount is reached. Readings are taken as above, and the test stopped when the well has recovered to 90 percent of the original level.

At least two valid tests will be performed in each well. Additional tests will be required if there is some evidence that any of the tests were unacceptable.

At the end of each test, the test results will be transferred to a laptop and the data downloaded and checked for preliminary completeness.

IV. Attachments

None.

V. Key Checks and Preventive Maintenance

- Check that the packer assembly is in good condition and not leaking. Provide a repair kit including tape and clamps. Take additional packer assembly and other spare parts.
- Check the batteries for the datalogger and computer. Check that the computer disks containing the programs for the datalogger are packed.
- Check the datalogger calculation of the well hydraulic conductivity at the end of each test to determine if these are consistent with expectations.