SAMPLING AND ANALYSIS PLAN
OK TOOL SUPERFUND SITE
(OU1 Savage Municipal Water Supply Well)
Elm Street
Milford, New Hampshire
DES No. 198505002

This document serves as the Sampling and Analysis Plan for groundwater and water supply well sampling at OU1 of the Savage Municipal Water Supply Well Site by Weston Solutions, Inc.

Prepared for:
Federal Sites Section of the Hazardous Waste Remediation Bureau
Waste Management Division
New Hampshire Department of Environmental Services
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October 2017

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List of Acronyms

1,1-DCA	1,1-dichloroethane
1,1,1-TCA	1,1,1-trichloroethane
1,2-DCE	1,2-dichloroethene or 1,2-dichloroethylene
ARA	Absolute Resource Associates
AS	air stripping
AGQS	Ambient Groundwater Quality Standard
ARAR	Applicable or Relevant and Appropriate Requirement
AROD	Amended ROD
COC	contaminants of concern
DQO	data quality objective
EMD	Environmental Monitoring Database
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
ft	foot/feet
GC Area	groundwater cleanup area
HWRB	Hazardous Waste Remediation Bureau
ICL	Interim Cleanup Levels
ID	identification
ISCO	in situ chemical oxidation
NHDES	New Hampshire Department of Environmental Services
NHDPHS	New Hampshire Division of Public Health Services
OU	operable units
PCE	tetrachloroethene
PRB	permeable reactive barrier
PRDI	Pre-Remedial Design Investigation
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RDL	Reporting Detection Limits
RI	Remedial Investigation
ROD	Record of Decision
SAP	Sampling and Analysis Plan
Site	Savage Municipal Water Supply Superfund Site OU1

List of Acronyms (Continued)

SOP	Standard Operating Procedure
SVE	soil vapor extraction
TAT	turn-around time
TCE	Trichloroethene or Trichloroethylene
TI	Technical Impracticability
VOC	volatile organic compound
WESTON®	Weston Solutions, Inc.

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) has been prepared to provide site-specific information regarding ongoing monitoring at Operable Unit 1 (OU1) of the Savage Municipal Water Supply Well Superfund Site (Site located in Milford, New Hampshire. The SAP has been prepared consistent with and references the current version of the New Hampshire Department of Environmental Services (NHDES) Hazardous Waste Remediation Bureau (HWRB) Master Quality Assurance Project Plan (QAPP), EQA RFA #13027, available on the NHDES website.[1] The HWRB Master QAPP generally describes the data quality objectives (DQO), analytical procedures and measurements, including laboratory quality control (QC) protocols necessary to achieve DQOs, and data-assessment procedures for the evaluation and identification of any data limitations.

Any deviations from the procedures contained within this SAP shall be approved by the NHDES Project Manager and the Quality Assurance (QA) coordinator in advance, following concurrence with the United States Environmental Protection Agency (EPA).

The expectation is that the monitoring program at and in the vicinity of OU1 will continue to be implemented to monitor and characterize the extent of continued contamination in groundwater at the Site, with respect to chemical-specific Applicable or Relevant and Appropriate Requirements (ARAR) [in effect, the Ambient Groundwater Quality Standards (AGQS)] for the constituents of concern.

As this monitoring program proceeds, it will be subject to periodic review and modifications, if appropriate, in a manner consistent with observed water quality conditions and public and environmental health considerations.

1.1 Site Description and History

The Site is located in the western portion of the Town of Milford, New Hampshire, approximately 2 miles west of the center of town. The contaminated groundwater plume emanating from the Site extends approximately 6,000 feet (ft) eastward from the intersection of Route 101 and Elm Street. OU1 1 is roughly bounded on the west and north by North River Road and on the south by Elm Street. The eastern boundary of OU1 is coincident with the western boundary of OU2, the extended plume. The delineation of the boundary between OU1 and OU2 is shown on Figures 1 and 2. OU1 encompasses approximately 52 acres and is crossed by the Souhegan River. The Site lies within the floodplain of the Souhegan River. The dominant groundwater flow direction is to the east.

The Site has been divided into two operable units (OU), one fund-lead OU and a potentially responsible party-lead OU. Operable Unit 1 is also known as OK Tool. The approximate boundaries of OU1 are shown on Figure 1, Site Location Map.

First developed in 1950, the Savage Municipal Water Supply well provided potable drinking water to approximately 10,000 residents in the Town of Milford, New Hampshire. In February 1983, as part of the first routine sampling of water supplies for organic compounds as required under the Clean Water Act, the New Hampshire Water Supply and Pollution Control Commission found volatile organic compounds (VOC) above drinking water standards in water from the Savage Municipal water supply well. The VOCs found included 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), trans-1,2-dichloroethene (trans-1,2-DCE), tetrachloroethene (PCE), and 1,1-dichloroethane (1,1-DCA). Tetrachloroethene and trans-1,2-DCE were also found in water sampled from the well supplying the nearby Milford mobile home trailer park. The Site was added to the EPA National Priorities List on 1 September 1984.

[1] *http://des.nh.gov/organization/divisions/waste/hwrb/documents/hwrb_master_qapp.pdf*

A Remedial Investigation (RI) was completed in June 1991. The RI found VOC contamination in soils at 10 of the 13 suspected source areas throughout the Site. The highest concentrations of contamination were found between the OK Tool Company and the Souhegan River. The VOCs were the most prevalent contaminants found in groundwater samples from the Site.

On 27 September 1991, EPA issued a Record of Decision (ROD) selecting a remedy for cleanup of the Site. The ROD identified two portions of the contaminated plume that needed to be remediated: the concentrated plume near OK Tool and the extended plume, which includes the area encompassing the remainder having typically lower VOC concentrations. Division of the remedy into two OUs occurred by Consent Decree after issuance of the ROD. OU1 includes all of the former OK Tool property, and additional properties to the east, north, and west.

The final remedy selected for OU1 was modified from that described in the 1991 ROD as explained in the Explanation of Significant Differences (ESD) issued in December 1996. Elements of this remedy include institutional controls, a subsurface barrier (slurry) wall, four groundwater extraction wells (two inside the barrier), soil vapor extraction (SVE) via six wells screened in the vadose zone, air sparging via two wells screened within the deep overburden beneath the SVE wells, and groundwater monitoring. The remedy, as designed, involved treatment of extracted groundwater by air stripping and discharge of the treated water to the unconsolidated aquifer via a recharge chamber and three reinjection wells (two inside the barrier, one outside the barrier). Vapors from the air stripping (AS) system were treated by passage through granular-activated carbon prior to discharge to the atmosphere.

The design of the OU1 remedy was completed in March 1996, and its construction was completed in August 1998. Operation of the groundwater extraction system began in April 1999. The treatment plant has operated almost continuously since 1999 with only limited periods of extended downtime for maintenance or research purposes. The SVE system was last operated in March 2008. In September 2008, the SVE/AS system was decommissioned, and the boilers used for regeneration of the carbon were replaced with smaller boilers sized for building heat only. Beginning in May 2009, with approval of the NHDES Air Resources Division, vapor discharge from the tray aerators was vented directly to the atmosphere. Vapor emissions from the aerators can be redirected through the carbon vessels, if necessary, but regeneration of carbon will now need to be performed off-site.

In addition to the pump and treat method already implemented at OU1, a large scale in situ chemical oxidation (ISCO) treatment was conducted by Weston Solutions, Inc. (WESTON®) in the deep overburden during the fall of 2008. A second and third treatment were performed during fall 2009 and spring 2010 targeting till layers and geological lenses on the western portion of the Site.

Upward trends of VOC concentrations in several bedrock monitoring wells following installation of the remedy in OU1 prompted the initiation of additional bedrock investigations in 2010. From 2010 through 2012, a total of 16 deep bedrock boreholes (BR-1 thru BR-16) were installed and existing shallow bedrock monitoring well MW-16R was deepened to evaluate the vertical extent of contamination at the Site. In addition to the deep bedrock boreholes that were installed, borehole geophysics and packer testing, expanded residential drinking water sampling and pumping tests were performed. The investigations continued through 2013, and the results of bedrock investigations are presented in the *Remedial Investigation Report, Savage Municipal Water Supply Superfund Site, Milford, New Hampshire* (WESTON, 2014b). The bedrock RI determined that high concentrations of chlorinated solvents, predominantly PCE, extended into deep fractured bedrock in the vicinity of the former OK Tool facility in OU1.

A Feasibility Study was conducted in 2015 to evaluate potential remedial alternatives and a *Final Feasibility Study Report, Savage Municipal Water Supply Superfund Site (OU1), Milford,*

New Hampshire and a *Final Technical Impracticability (TI) Evaluation Report*, *Savage Municipal Water Supply Superfund Site (OU1), Milford, New Hampshire* were both issued in July (WESTON, 2015b).

Based on the results of the *TI Evaluation Report*, EPA issued an amended ROD (AROD) in August 2016. This AROD changes the remedy specified in the 1991 ROD for OU1 only. The changes include the establishment of an area encompassing the most highly-contaminated groundwater in the overburden and bedrock aquifers within OU1 where it has been determined that it is technically impracticable from an engineering perspective to achieve the ROD cleanup goals for the following contaminants of concern (COC): cis-1,2-DCE, 1,1,1-TCA, 1,1-DCE , trans-1,2-DCE, PCE, and TCE in groundwater. This area is referred to as the TI Zone and is bounded approximately 150 ft north of the northern bank of the Souhegan River, the OU1 boundary to the east and south, and a line drawn approximately 20 ft from the western edge of the slurry wall. A technical impracticability waiver of the requirement to meet federal and state groundwater standards has been applied to the TI Zone. In conjunction with the establishment of the TI Zone, the following measures will be implemented to reduce contaminant mass in OU1 and to manage the migration of contaminant mass from OU1 across the boundary of the TI Zone:

- ISCO in the PCE source area in overburden and bedrock to remove source material from the zone where non-aqueous phase PCE is most likely present and to thereby reduce contaminant concentrations migrating toward the boundary of the TI Zone.
- ISCO in the bedrock near the TI Zone compliance boundary to manage the migration of dissolved contaminants so as to prevent contaminated bedrock groundwater from migrating to areas beyond the TI Zone compliance boundary.
- An ISCO permeable reactive barrier (PRB) gate in the slurry wall to provide treatment of migrating groundwater to levels that meet the performance standards upgradient of the TI Zone compliance boundary. Effective implementation of the ISCO PRB gate should minimize the likelihood that future treatment of overburden groundwater outside of the slurry wall will be necessary. After construction of the overburden ISCO PRB through the slurry wall, it will no longer be necessary to provide hydraulic containment of the contaminated OU1 overburden groundwater inside the slurry wall. Therefore, operation of the existing overburden pump and treat system will be discontinued once the overburden PRB is in operation.

The *TI Evaluation Report* also found that it is possible to achieve groundwater cleanup standards over time within the rest of OU1 outside of the TI Zone which is now referred to as the groundwater cleanup area (GC Area). EPA's selected alternative for the GC Area within OU1 includes monitored natural attenuation, institutional controls, and five-year reviews to attain the remedial action objectives for the GC Area. A monitored natural attenuation program will be established to monitor attenuation of contaminant concentrations in the GC Area. The TI waiver does not apply to the GC Area.

Design of the changes described in the 2016 AROD began immediately following issuance of the AROD and implementation of the remedial measures are expected to begin in the next year or so.

Until the revised remedy can be implemented, groundwater will continue to be extracted from three shallow extraction wells, IW-1A, IW-2A, and IW-3A, located inside the barrier wall while maintaining an inward and upward hydraulic gradient across the slurry wall to ensure hydraulic control of the contaminant mass in the overburden. Treated water is being discharged to the recharge gallery to the northeast of the barrier wall. Groundwater sampling of overburden and shallow bedrock monitoring wells is being performed annually.

A Pre-Remedial Design Investigation (PRDI) commenced in early 2017 to further evaluate the extent of impact to the deep bedrock aquifer in the concentrated plume area and provide data required to design the ISCO delivery system. Ten deep bedrock wells were installed and represent a combination of source area injection wells, downgradient injection wells, and monitoring wells. Following the completion of each well, borehole geophysics and packer sampling were conducted to identify and characterize water-bearing fractures within the formation.

The second phase of the PRDI is currently underway to evaluate the extent of impact to the deep bedrock aquifer in the concentrated plume area and to provide additional data required to design the ISCO delivery system. Five new deep bedrock injection wells will be installed. Monitoring well BR-18 was installed during Phase 1 and will be deepened to 500 ft into bedrock in an attempt to intercept a larger fracture system that was encountered at a depth of 400-450 ft below ground surface at injection wells IP-18 and IP-19. The fracture system could represent a significant contaminant migration pathway if it is determined to be laterally expansive. Following the completion of each well, borehole geophysics and packer sampling will be conducted to identify and characterize water-bearing fractures within the formation.

1.2 Contaminants of Concern and Interim Cleanup Levels and Ambient Groundwater Quality Standards

The two groundwater quality criteria applicable to the Site include Interim Cleanup Levels (ICL) derived for the ROD, ESD and AROD, and AGQS adopted by the State. The AGQS values were developed subsequent to the ICLs in the original ROD and in most cases are more restrictive than the ICLs. The current clean-up criteria are the more restrictive of the two values for VOCs. The ROD states that arsenic, beryllium, chromium, lead, antimony, and nickel may be naturally occurring elements in the Savage Well aquifer. The cleanup levels for metals will be the ICLs/AGQS or background whichever is higher. The current clean-up criteria are only applicable to the OU1 GC Area. These criteria are waived from the TI Zone since issuance of the AROD.

Refer to the table below for a summary of the COCs and the associated ICLs and AGQS for groundwater. Only two compounds have ICLs lower than the AGQS values, antimony and beryllium as highlighted on the table.

Contaminants of Concern and Associated ICL and AGQS Criteria

Contaminants of Concern	**ROD ICLs (µg/L)**	**NHDES AGQS (µg/L)**
Benzene	5	5
1,1-Dichloroethylene (1,1 Dichloroethene, 1.1-DCE)	7	7
Trans-1,2-Dichloroethylene (Trans-1,2 Dichloroethene Trans-1,2-DCE)	100	100
Tetrachloroethylene (Tetrachloroethene, PCE)	5	5
1,1,1-Trichloroethane (1,1,1-TCA)	200	200
Trichloroethylene (Trichloroethene, TCE)	5	5
1,1-Dichloroethane (1,1-DCA)	3500	81
Methylene Chloride (Dichloromethane)	5	5
Antimony [1]	**3**	6
Arsenic [2]	50	10
Beryllium [1]	**1**	4
Chromium	100	100
Lead	15	15

Contaminants of Concern	**ROD ICLs (µg/L)**	**NHDES AGQS (µg/L)**
Nickel	100	100
Contaminant of Interest		
cis-1,2-Dichloroethylene [3] (cis-1,2 Dichloroethene, cis-1,2-DCE	N/A	70
Vinyl Chloride [3]	N/A	2

Notes:
µg/L = microgram per liter
1. Only two compounds, antimony and beryllium (bolded font) have ICLs lower than the AGQS values.
2. The arsenic standard was changed from 50 µg/L to 10 µg/L by EPA in 2001. NHDES has also changed the AGQS to 10 µg/L per RSA 485 C:6 (AGQS) and Env-Ws 316.01.
3. cis-1,2-DCE and vinyl chloride are contaminants of interest.

The ICLs are the result of a quantitative evaluation of analytical data that was performed during the development of the ROD, ESD, and AROD. Interim cleanup levels have been set based on the ARARs [e.g., Drinking Water Maximum Contaminant Levels] if available, or other suitable criteria.

The ROD states that while these cleanup levels are consistent with ARARs or suitable to-be-determined standards for groundwater, a cumulative risk that could be posed by these compounds may exceed EPA goals for remedial action. Consequently, these levels are considered to be ICLs for groundwater within the GC Area.

When all of the ICLs have been attained in the GC Area, a risk assessment will be performed on residual groundwater contamination to determine whether the remedial action is protective. Remedial actions shall continue until protective concentrations of residual contamination have been achieved or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final cleanup levels for this ROD and shall be considered performance standards for any remedial action.

1.3 Data Quality Objectives

The primary data quality objective for the long-term sampling/monitoring program is that all measurements be representative of the actual site conditions and that all data resulting from field, sampling, and analysis activities be comparable. Comparability is the extent to which data from one data set can be compared directly to similar or related data sets and/or decision-making standards. Data comparability will be achieved by continuity of acceptable laboratory practices, method analysis, sample collection procedures, and sample handling.

The specific data quality objectives for OU1 are as follows:

- Confirm water quality in compliance wells.
- To monitor for potential changes in groundwater quality that could pose a risk to human health and the environment.
- Establish long-term trends in contaminant levels to support future site management decisions.
- Evaluate the progress of remediation and attenuation of groundwater contaminants due to the implementation of the original ROD remedy and the current AROD remedy.

- Measure compliance with remedial action goals and criteria set forth in the site ROD, ESD, and AROD.

- Restoring all groundwater within the GC Area to safe drinking water levels.

In order to meet the site's DQOs and to ensure the integrity of the samples and chains-of-custody, all site wells must either be locked or within a secure area (e.g., a locked chain-link fence).

Performance acceptance criteria for all new data generated for this project will be based on principal Data Quality Indicators including precision, bias, representativeness, completeness, comparability, and sensitivity. Consistent with the HWRB Master QAPP, Section 1.4, for data generated by the Department of Health and Human Services, New Hampshire Division of Public Health Services (NHDPHS) Laboratory, EPA Laboratory in Chelmsford, Massachusetts, and Absolute Resource Associates (ARA) Laboratory in Portsmouth, New Hampshire, including ARA's subcontract laboratories, the Reporting Detection Limits (RDLs), and the acceptance limits for accuracy and precision have been accepted for use on this project. ARA is the current laboratory with whom NHDES has a contract.

Table 1 includes a summary of the test methods being performed and the associated RDLs. The method detection limits have not been included in **Table 1** as all the RDLs are below the action limits established for the Site.

Comparability is the extent to which data from one data set can be compared directly to similar or related data sets and/or decision-making standards. Data comparability will be achieved by continuity of laboratory practices, method analysis, sample collection procedures, and sample handling.

All data points of all types must be accurately located in 3-dimensional space. The expected accuracy for Global Positioning System data collection activities for the Site shall be within 1 ft. The expected accuracy for elevation data for the Site shall be one 100th of a foot.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

NHDES is responsible for 100% operations and maintenance of the Site and serves as the lead regulatory agency providing direct oversight for the remedial action at the Site. WESTON has been retained by NHDES to provide site sampling and remedial consulting services for the project.

Within WESTON, the Project Manager will be responsible for the overall contract management, ensuring that established protocols and procedures are used, and the management of day-to-day activities, staff, scheduling, and technical objectives are achieved. The QA Officer for the project will oversee all QA aspects of the project including, but not limited to, assisting with modifications of all subsequent SAPs, confirming that data quality documentation is appropriate, and that QA goals have been met. It is also the responsibility of the QA Officer to ensure that all procedures and techniques are conducted in accordance with the current SAP and HWRB Master QAPP.

The organizational chart in Appendix A illustrates the roles and responsibilities of those individuals involved in the project, and their different organizations. The Field Operations Lead is on-site for all field activities, responsible for coordinating sampling efforts, performing sampling management, QC, and sampling. Refer to Appendix A of the current HWRB Master QAPP, Program Organization and Responsibilities for more details. These are considered to be general pathways of communication and do not restrict communication between all parties, as necessary.

When the NHDPHS lab is used, the lab reports the analytical results to the QA Coordinator, after having audited the results in accordance with their Standard Operating Procedures (SOP).

3.0 FIELD MONITORING AND SAMPLING

This section describes the overall design of the field program and includes the specific information necessary to conduct the monitoring and sampling components of the program.

Field activities will be conducted in accordance with this SAP, unless site conditions require modifications. All equipment and any modifications to the procedures contained within this SAP shall be approved in advance by the NHDES Project Manager and QA Coordinator in consultation with EPA, documented in the site logbook, and presented in the final report. All samples are to be collected in accordance with the requirements of the SOPs included in **Appendix B**.

Equipment used to collect groundwater samples will be maintained in good working order. All non-dedicated equipment will be decontaminated in accordance with the Equipment Decontamination SOP in **Appendix B**. The electronic water level indicator will be the only field instrument that will need to be decontaminated between each monitoring location. All other equipment will either be dedicated or will not result in a risk of cross contamination between sample locations.

3.1 Multi-Media Sampling and Analysis

Multi-media sampling at the Site includes:

- Groundwater
- Drinking water from residential water supply wells, when required

Figure 1 illustrates the site location.

Figure 2 illustrates the delineation of the boundary between OU1 and OU2.

Figures 3A, **3B**, & **3C** illustrate the monitoring locations at the Site: **3A** South, **3B** Central, **3C** North.

Figure 4 illustrates the bedrock monitoring well locations.

Figure 5 illustrates the residential well sampling program as currently outlined in **Table 2**.

Table 1 lists all CCOCs, analytes, associated ICLs (ROD), standards, such as AGQS (Env-Or 600), and the associated Laboratory RDLs.

Table 2 lists the selected locations to be sampled and associated QC samples, methods and analytical parameters, and other requirements.

Table 3 lists the analytes and the analytical methods, sample volumes, containers, preservation, and holding time requirements.

Table 4 summarizes monitoring well construction information and includes well depths, screen lengths, screen depths, and comments.

Table 5 lists the specific QC sampling requirements.

In general, VOC samples shall be submitted to the NHDPHS laboratory located in Concord, New Hampshire using the NHDPHS chain-of-custody form found in **Appendix B**. If required, samples may be submitted to the current NHDES contract lab using the chain-of-custody form found in **Appendix B**.

Samples for VOC Headspace analysis, preserved with ascorbic acid due to the presence of permanganate, shall be submitted to the EPA Office of Environmental Measurement and Evaluation laboratory located in Chelmsford, Massachusetts using the modified NHDPHS chain-of-custody form found in **Appendix B**.

All trip blanks, sample vials, and preservatives will be provided by the NHDPHS laboratory or the current NHDES contract laboratory. WESTON will coordinate sample pick-up/delivery arrangements with each lab.

The laboratory turn-around-time (TAT) requested for all samples will be the standard 10 to 15 business day TAT.

3.1.1 Water Level Measurements

A synoptic water level round from all wells shall be conducted in the shortest possible time prior to beginning sampling in accordance with the Water Level Measurements SOP to assess groundwater flow directions.

Groundwater elevations will be measured as depth-to-water at the Site using an electronic water level indicator probe. Groundwater elevations will be calculated by subtracting the depth-to-groundwater from the reference elevation associated with each well (top of polyvinyl chloride riser or casing).

Refer to **Figures 3A**, **3B**, **3C**, **and 4** for the well locations. The depth to the bottom of the monitoring well shall be confirmed in each well in accordance with the Water Level Measurements SOP, at a minimum once every 5 years prior to the Five-Year Review. Refer to **Table 2** to determine when the depths to bottom are required.

3.1.2 Groundwater Sampling

Groundwater sampling and documentation shall be conducted in accordance with the Purging and Sampling Using a Peristaltic Pump SOP in **Appendix B**. Current monitoring locations are identified in **Table 2**.

Decontamination of non-dedicated equipment will be completed in accordance with the Equipment Decontamination SOP. Investigative Derived Waste generated from decontamination activities will be discharged to the ground surface.

Refer to **Subsection 4.2** below and **Table 5** for all required QC sampling including equipment blanks, duplicate samples, etc., with respect to groundwater sampling.

3.1.2.1 Potential Residual Permanganate

NHDES anticipates encountering residual permanganate at some site monitoring wells during groundwater monitoring events due to the proximity of some monitoring wells to ISCO injection points, the fact that some monitoring wells have been used as injection points, and the volume of permanganate that was injected across the Site. The purge water that is evacuated from the well shall be visually monitored for the presence of permanganate (distinct pink or purple color). If permanganate is

encountered during purging, groundwater sampling shall be conducted in accordance with the procedures outlined in the Purging and Sampling Using a Peristaltic Pump SOP section that pertains to the detection/anticipation of permanganate.

3.1.2.2 Fish Hatchery Well

A groundwater sample may be collected from fish hatchery production well (FH-14). Refer to **Table 2** for current monitoring locations. The location of the well is illustrated on **Figure 3C**. Monitoring well FH-14 is a 24-inch-diameter well. Sampling at FH-14 will be conducted in accordance with the Purging and Sampling Using a Peristaltic Pump SOP in Appendix B. Disposable polyethylene sample tubing will be installed to a depth of approximately 30 ft below the surface of the bulkhead prior to purging three tubing volumes in accordance with the SOP. The tubing will be removed from the well and disposed immediately after the collection of the samples.

If it is not possible to collect the sample from the well head in the field without interfering with the operation of the pump and other equipment in the well, the sample may be collected before the aeration tanks at the Milford Fish Hatchery (Station identification (ID) # DW-MFH-RW). This location has been referred to as the River Well (RW). To be consistent with past results at this location, the sample at this location is collected as a drinking water sample and is analyzed by EPA Method 524.

3.1.3 Residential Water Supply Sampling

Drinking water from selected residential water supply wells identified in **Table 2** will be purged and sampled in accordance with the Drinking Water Supply Sampling SOP, as required.

Refer to **Subsection 4.2** below and **Table 5** for all required QC sampling including equipment blanks, duplicate samples, etc., with respect to drinking water sampling.

Prior to each residential sampling round, the residents will be contacted to confirm that the selected taps are available for sampling as listed in **Table 2** and to confirm that the taps are “raw water” from the well and are not connected to any softeners, filters, or treatment of any kind. If needed, any new taps selected for sampling will be labeled with a separate designation for the Environmental Monitoring Database (EMD) as designated by NHDES. All new sample ID shall be approved by the NHDES Project Manager and the QA Coordinator in advance. A separate chain-of-custody form will be used for these samples.

4.0 QUALITY CONTROL

The following describes the QC steps used to demonstrate reliability and confidence in the monitoring data collected for this project and includes field equipment maintenance and calibration, field QC sample collection, and data verification and validation.

4.1 Equipment Maintenance

In general, all instrumentation necessary for field monitoring and health and safety purposes shall be maintained, tested, and inspected according to the manufacturer's instructions.

The following table provides the preventive maintenance steps for the typical equipment anticipated for the types of monitoring and sampling activities addressed by this SAP to ensure proper functioning of field equipment.

Field Equipment - Preventive Maintenance

INSTRUMENT	ACTIVITY	FREQUENCY
Electronic Water Level Indicator	Battery Check	Daily

4.2 Field Quality Control

The following provides a general description of the field QC sampling that will occur for the project. See **Table 5**, Summary of QA Samples for specific details.

Field Quality Control Requirements

QC Sample	Frequency	Acceptance Criteria	Corrective Action
VOC Trip Blank [1]	1 trip blank per cooler containing VOC samples (1 trip blank = 2 VOA vials)	No contaminants are detected	Flag in project reports
Duplicate [2]	▪ 1 duplicate per batch of 20 samples, per matrix, per parameter, per sampling method. ▪ If less than 20 samples are collected, then a minimum of one duplicate per matrix, per parameter, per sampling method is collected.	Duplicate results are within +/- 30%	Flag in project report
Equipment Blank [3]	If dedicated equipment is used, an initial equipment blank is required. No additional equipment blanks are required. If non-dedicated equipment is used, one equipment blank per sampling event, per equipment type is typically required;	No contaminants are detected	Flag in project reports

Notes:

1. Trip blanks will be prepared by the NHDPHS laboratory or the NHDES current contract laboratory and maintained at all times with the sample containers. The trip blank(s) will be designated "TRIP BLANK".
2. Duplicate samples are not intended to be blind duplicate samples. They will be designated with a "DUP" after the well designation (i.e. OKT_ PW-2S DUP). See **Table 5** for analysis.
3. Equipment blank samples will be designated as "EQUIP BLANK". Note that a comment is required on the chain-of-custody indicating what the equipment blank is for (i.e. water level meter). See **Table 5** for analysis & current requirements.

4.3 Data Verification and Validation

Data review, which includes a WESTON in-house examination to ensure data have been recorded, transmitted, and processed correctly; and data verification that includes the evaluation of completeness, correctness, and conformance/compliance of a specific data set, will be performed by the WESTON Project Manager or QA Officer at the end of each sampling event. As in the past, data collected will be compared to historical data to make sure it follows the same trends. If any of the samples do not follow the trends, then further investigation may be warranted.

Field water quality data collected/measured will be reviewed in the field by the WESTON QA Officer/Field Team Leader daily for all matrices. Review will generally consist of the following: (1) review of calibration data and end of the day check; and (2) review of raw data and field notes for outliers or inconsistencies that may indicate a problem with the equipment or sampling procedure.

All laboratory data generated by the NHDPHS and EPA laboratories will be reviewed by NHDPHS and EPA personnel, respectively, and will not require third-party validation. All laboratory data generated by the current NHDES contract lab or other laboratories that may be used will be reviewed by WESTON and will not require third-party validation.

The NHDPHS lab will evaluate field QC samples for all samples analyzed by the NHDPHS lab and will flag any data that does not meet the acceptance criteria under Field Quality Control Requirements listed in **Subsection 4.2** above. No other laboratories will perform this function. WESTON will be required to perform this task for all other laboratories that generate data and include their findings in their report of the sampling event.

The NHDPHS laboratory report will consist of the following:

- The completed chain-of-custody.
- Data qualifier description page.
- Sample summary page: includes lab IDs, corresponding client sample IDs, matrix, date/time collected, and date received.
- Analytical report comments and qualifiers page.
- Analytical results pages: method citation, results, units, RDL, prep date, analyzed date, regulatory limit, if applicable and qualifier code.

The EPA laboratory report will consist of the following in addition to the sampling results:

- The completed chain of custody.
- Data qualifier description page.
- Lab QC data.

The ARA laboratory report will consist of the following:

- Both excel and PDF components.
- A cover sheet.
- A summary of samples/ analyses requested.
- Data pages (results, reporting limits, analysis info, qualifiers, etc.)
- Case Narrative.
- Associated method blank data.
- Associated LCS data.
- Method specific duplicates or matrix spikes (as requested).
- The completed chain-of-custody.

Data validation requirements for the project will be evaluated at each Five-Year review, or as otherwise deemed necessary by NHDES with concurrence from EPA.

4.4 Quality Assurance Field Audits

It is the responsibility of the WESTON Project Manager to ensure that all sampling procedures and techniques are conducted in accordance with the SAP. This can best be assured by the use of field audits.

WESTON QA field audits shall be conducted by the WESTON QA Officer during monitoring events and will include observation of all sampling related activities including equipment calibration (when required), multi-media sampling, QC sampling, and decontamination activities to ensure that all procedures and techniques are conducted in accordance with this SAP and the current HWRB Master QAPP.

Field audits shall also be conducted if the field team is changed from one sampling round to the next or the scope of work for the project changes significantly from one sampling round to the next.

The results of the WESTON field audit which result in corrective actions will be reported to the NHDES Project Manager and the NHDES QA Coordinator verbally and noted in the field log book. Audit findings and corrective actions will be discussed with the NHDES Project Manager and the NHDES QA Coordinator to resolve the findings and corrective actions to the satisfaction of NHDES.

EPA and/or NHDES QA personnel shall periodically conduct separate field audits; review field methods, analytical procedures, and/or document tracking and record keeping practices, to assure compliance with the elements of this SAP. If corrective action is needed, additional field audits will be conducted to ensure all procedures and techniques used at the Site are conducted in accordance with this SAP and the HWRB Master QAPP. The WESTON Project Manager and WESTON QA Officer will be present during NHDES/EPA field audits (unless the audits are unannounced).

5.0 DOCUMENTATION

In order to comply with Waste Management Division Submittal Guidelines[2], the Department requests that all reports be submitted electronically though the OneStop program[3]. Nicole Gianunzio may be contacted at 271-7379 for assistance. Additionally, the Department requires WESTON to ensure that all of the laboratory data generated from the current sampling event is uploaded to the NHDES' EMD.

5.1 Documentation of Field Activities

In accordance with the HWRB Master QAPP, field personnel shall use field logbooks and/or pre-printed field worksheets to accurately document on-site conditions, field measurements, sample collection information, field instrument readings, calibration information, and other pertinent site-related information obtained during monitoring activities. **All information shall be recorded using ball point pens with black ink.** Sharpies can bleed through pages and smudge, making the documentation hard to read.

A permanently bound field logbook (per person) with individually numbered pages is maintained for field sampling information not recorded on field forms (e.g., calibration sheets, low flow purge forms, chain-of-custodies). All entries into the field logbook are made with permanent black ink, and corrections are made using a single line through the error with the initials and date of the individual who made the

[2] http://des.nh.gov/organization/divisions/waste/orcb/documents/electronic_submittal_guidelines.pdf

[3] https://www2.des.state.nh.us/OnestopDataProviders/DESLogin.aspx

correction. The unused bottom portion of each page shall be lined-out, initialed, and dated. The field notes in general shall include a description of field conditions that includes, as a minimum:

- Site location.
- On-site conditions.
- Date, start, and finish times of the work and weather conditions.
- Name and initials of person making entry.
- Names of other personnel present, if any.
- Names of visitors, if any.
- Purpose and summary of proposed work effort.
- Field instrument and calibration information.
- Sample collection information.
- Details of any deviation from the field operations plan or SOPs, including who authorized the deviation.
- Field observations/measurements.
- Sampling equipment used (including make model and serial number) and equipment calibration documentation.
- Field screening methods, if used, a description of screening locations and results.
- Location, description, and unique identifier for all photographs taken in association with the field activity.
- Any other pertinent information.

Field worksheets to be completed in the field include the water level worksheet; the daily calibration logs; and water quality worksheets, as applicable. All entries into the field forms are made with permanent black ink, and corrections are made using a single line through the error with the initials and date of the individual who made the correction. The unused bottom portion of each page shall be lined-out, initialed, and dated. Refer to the appropriate SOPs for a copy of the individual field worksheets and the specific information required for each form.

WESTON's Project Manager will be responsible for ensuring that the field files are entered into the project record and included in the annual report. Information recorded in other site documents other than the field logbooks (e.g., sampling worksheets, calibration logs, chain-of-custody forms) will not be repeated in logbooks except in summary form, as necessary.

5.2 Chain-of-Custody Procedures

Samples and unused sample containers shall remain in the sample collector's view at all times, unless locked in a vehicle or other secure place in accordance with the Chain-of-Custody SOP included in **Appendix B**. It is the sampler's responsibility to ensure that the samples are not tampered with prior to their delivery to the analytical lab. The WESTON QA Officer/Field Team Leader will review the chain-of-custody forms at the end of each day to ensure all data have been entered properly. The chain-of-custody form shall be completed to provide documentation that traces sample possession and handling from the time of collection through delivery to the analytical lab, and shall accompany the samples at all times. All information shall be recorded in permanent black ink. The chain-of-custody is a legal document that may be used for litigation purposes.

The WESTON QA Officer/Field Team Leader shall request a Log-in Summary from each lab (including subcontract labs) and will review each summary so that sample IDs and other sample information can be checked and verified before sample results are generated.

5.2.1 Sample Identification

In order to properly transfer sample results into the NHDES EMD, samples must be identified using the designated NHDES station identification.

- All sample ID's must have "OKT_" as a prefix. This includes any samples going to outside labs so that later this data may be uploaded into the NHDES EMD.
- The sample ID has to be 15 characters or less, including the "OKT_".
- Equipment Blanks must be labeled "EQUIP BLANK". The equipment from which the equipment blank was collected will be documented in the field log book and indicated in the comments section of the chain-of-custody form.
- Trip Blanks must be labeled "TRIP BLANK" without any other designation. Only one Trip Blank per chain-of-custody per cooler is acceptable.
- Sample duplicates are identified by adding "DUP" to the end of the station ID. The duplicate sample must be labeled "DUP" not "Dup" and there must be one space between the sample ID and DUP (example "OKT_PW-2S DUP"). Blind duplicates are not allowed. The space and "DUP" will not count toward the 15 character maximum.
- All new sample ID's shall be approved by the NHDES Project Manager and the QA Coordinator in advance.

5.3 Reports

The applicable laboratories will provide the analytical data reports along with a copy of the pertinent QC data. All field logs, field worksheets etc., will be provided to the WESTON Project Manager.

Annual Reports shall be prepared and submitted to NHDES documenting all field activities performed during the year including, but not limited to, remedial actions performed, groundwater monitoring events, residential sampling events, and a summary of treatment plant operations and maintenance information. In addition to documenting field activities, the annual report will summarize and evaluate the results of both the monthly treatment plant samples and the monitoring round conducted during the calendar year.

The Annual Reports on Remedial Progress will cover site operations from January to December.

A draft copy of the annual report will be submitted to NHDES and EPA. The draft report shall have "DRAFT" in the title. Draft report submittals will include a complete bookmarked PDF, a Microsoft® Word version of the report text and Microsoft Excel version of all tables. Draft reports shall be submitted to NHDES and EPA within 60 days after WESTON's receipt of the December plant analytical results.

WESTON will submit all final reports electronically through the OneStop filing system on the NHDES website. WESTON will also upload the sampling results from all outside laboratories (including the EPA Lab in Chelmsford, Massachusetts and the NHDES Contract Lab) directly into the NHDES EMD through OneStop, once the final report has been approved and uploaded.

Each annual report will include, but may not be limited to, the following information (intending to also reflect the requirements of Env-Or 606.18):

- A brief introduction that references the SAP, the NHDES Work Scope Authorization, and applicable contract, and describes completed sampling activities, results, and any unusual or noteworthy observations regarding the data and the Site.
- Site background information.
- Detailed summary of field activities since the previous report, including current sampling methodologies, additional studies, and sampling activities by others.
- A QA/QC Section (refer to Subsection 5.3.1).
- A detailed written analysis of the data collected, including:
  - An evaluation of the groundwater analytical data to determine whether groundwater clean-up standards have been met.
  - An evaluation to determine whether an increase or decrease in COC concentration trends is observed in site groundwater.
- An updated Site Conceptual Model.
- Recommendations for the following:
  - Additional remedial activities.
  - Modifications to the current monitoring program or to the SAP, including sampling program optimization.
  - Evaluation of well status (e.g., extent of fouling; need for redevelopment, repair, or pump replacement; assessment of flush-mount wells to be converted to above ground casing (or the reverse); and need for additional wells).
- Updated site map reflecting current site features.
- Updated well construction table (**Table 4** from the SAP).
- Groundwater potentiometric surface map.

- Data visualization maps for COCs (e.g., isoconcentration contour maps).
- Summary table of wells showing permanganate concentrations.
- Summary table of current and historical groundwater level and elevation data for all existing site wells.
- Summary table of current and historical compounds detected at all existing site wells, highlighting any compounds that exceed clean-up goals.
- Graphs of COC concentrations showing historical trends in groundwater (for those parameters that remain above AGQS anywhere across the Site) and in other media as necessary to support data analysis in report text.
- Copies of all field sampling worksheets/forms/logs and appropriate field logbook pages.
- A list of equipment used, including make and model (and serial number if available).
- A copy of all complete laboratory reports, applicable data validation reports, and the chain-of-custody forms. The lab reports shall be individually bookmarked in the last appendix in the report.
- For each complete laboratory report from laboratories other than the NHDPHS laboratory, WESTON will provide a table of relative percent difference between the sample and the duplicate sample and will flag any that does not meet the acceptance criteria The NHDPHS lab already includes this table in each of their complete data reports containing field duplicate samples.

5.3.1 Quality Assurance/Quality Control Section of Report

Each technical report should include general statements summarizing whether or not the QC criteria in this SAP and the HWRB Master QAPP were met in the field and in the laboratory. The report will include a discussion of any QA/QC problems and how they were resolved. WESTON will note anything unusual that is anticipated to affect the quality or usability of the data.

Examples for situations where the QA criteria were not met which would be included within a technical report:

- How does that affect the usability of the data?
- Can we use the data? If not, why not?
- Was any corrective action needed and what, if any, measures were taken?
- What changes are recommended for the future?

Examples of possible issues to be included within a technical report:

- Were contaminants found in the equipment blanks?
- Were any samples broken in transport to the lab?
- Did the lab report any difficulties, issues?
- Were the sample tags mixed up in the field if the results look abnormal?

TABLES

Table 1
Contaminants of Concern, Analytes, Associated ICLs, NHDES Standards and Lab Criteria
OK Tool Superfund Site (OU-1), Milford, New Hampshire

GROUNDWATER

Test Methods / Analytes	ROD Interim Cleanup Levels (ICLs)	NHDES Ambient Groundwater Quality Standards (AGQS) (Env-Or 600)	NHDPHS Lab Reporting Detection Limits (RDLs)	EPA Lab Reporting Detection Limits (RDLs)	EPA Lab [1] Reporting Detection Limits (RDLs) Headspace
Contaminants of Concern					
VOC Full List (NHDES 8260B) (µg/L)					
Benzene	5	5	2	1	1
1,1-Dichloroethylene	7	7	2	1	1
Trans-1,2-Dichloroethylene	100	100	2	1	1
Tetrachloroethylene (Tetrachloroethene) (PCE)	5	5	2	1	1
1,1,1-Trichloroethane	200	200	2	1	1
Trichloroethylene (Trichloroethene) (TCE)	5	5	2	1	1
1,1-Dichloroethane	3500	81	2	1	N/A
Methylene Chloride (Dichloromethane)	5	5	2	1	N/A
Total Metals by EPA Method 200.7/200.8 (mg/L)					
Arsenic	0.05	0.01	0.001	N/A	N/A
Antimony [2]	**0.003**	0.006	0.003	N/A	N/A
Beryllium [2]	**0.001**	0.004	0.001	N/A	N/A
Chromium	0.1	0.1	0.005	N/A	N/A
Lead	0.015	0.015	0.001	N/A	N/A
Nickel	0.1	0.1	0.005	N/A	N/A
Contaminant of Interest					
VOC Full List (NHDES 8260B) (µg/L)					
Cis-1,2-Dichloroethylene [3] by NHDES 8260B	N/A	70	2	1	0.5
Vinyl Chloride [3]	N/A	2	2	1	N/A

Notes:
N/A = not applicable
1. EPA VOC Head Space Analysis SOP: EIA-FLDVOA2.SOP
2. Only two compounds, antimony and beryllium (both bolded), have ICLs lower than the AGQS values.
3. cis-1,2-Dichloroethylene and vinyl chloride were not identified in the Record of Decision (ROD) as contaminants of concern; however, each has been observed in groundwater at concentrations greater than the AGQS and are, therefore, contaminants of interest.
mg/L = milligrams per liter
µg/L = micrograms per liter
N/A = not applicable
VOC = volatile organic compound

Table 1
Contaminants of Concern, Analytes, Associated ICLs, NHDES Standards and Lab Criteria
OK Tool Superfund Site (OU-1), Milford, New Hampshire

DRINKING WATER

Test Methods / Analytes	NHDES Ambient Groundwater Quality Standards (AGQS) (Env-Or 600)	NHDES Ambient Groundwater Quality Standards (AGQS) (Env-Or 600)	DPHS Lab Reporting Detection Limits (RDLs)
Contaminants of Concern			
VOC Full List (NHDES 524) (µg/L)			
Benzene	5	5	0.5
1,1-Dichloroethylene	7	7	0.5
Trans-1,2-Dichloroethylene	100	100	0.5
Tetrachloroethylene (Tetrachloroethene) (PCE)	5	5	0.5
1,1,1-Trichloroethane	200	200	0.5
Trichloroethylene (Trichloroethene) (TCE)	5	5	0.5
1,1-Dichloroethane	81	---	0.5
Methylene Chloride (Dichloromethane)	5	5	0.5
Total Metals by EPA Method 200.7/200.8 (mg/L)			
Arsenic	0.01	0.01	0.001
Antimony	0.006	---	0.003
Beryllium	0.004	---	0.001
Chromium	0.1	0.1	0.005
Lead	0.015	0.0135	0.001
Nickel	0.1	---	0.005
Contaminant of Interest			
VOC Full List (NHDES 524) (µg/L)			
cis-1,2-Dichloroethylene[2] by NHDES 8260B	70	70	0.5
Vinyl Chloride[2]	2	2	N/A

Notes:
"--" means MCL values are not established
1. MCL = Maximum Contaminant Level
concern; however, each has been observed in groundwater at concentrations greater than the AGQS and are, therefore,
NHDES = New Hampshire Department of Environmental Services
mg/L = milligrams per liter
µg/L = micrograms per liter
N/A = not applicable
VOC = volatile organic compound

Table 2 Sampling Locations and Analytical Parameters

OK Tool Superfund Site (OU-1), Milford, New Hampshire

78 Total wells to be sampled: 45 to be analyzed for 8260B (NHDPHS Lab); 25 with possible permanganate to be analyzed for Headspace analysis (EPA Lab); 8 Residential wells for 524.2 (NHDPHS Lab); plus trip blanks and duplicates. 4 wells (not included in the 78) are not scheduled to be sampled due to high permanganate levels.

Note: Water levels shall be collected within one (1) week prior to sampling and recorded on the water level worksheet (SOP B-1)[1].

Well #	Permanganate Concentration Oct 2017	Duplicates[6]	Well Type	Analytical Parameters[5]
Wells Inside Slurry Wall (28)				
OKT_IW-1	0		Deep overburden	**Water Levels[1] (SOP B-1).** **Purge and Sample[2] (SOP B-2).** **NHDES 8260B** **(NHDES Full List)** **NHDPHS Lab**
OKT_IW-2	0		Deep overburden	
OKT_PW-5M	0		Intermediate overburden	
OKT_PW-5D	0		Deep overburden	
OKT_PW-5R	0		Shallow bedrock	
OKT_PW-6S	0	8260B DUP	Shallow overburden	
OKT_PW-6M	0		Intermediate overburden	
OKT_PW-6MB	0		Intermediate overburden	
OKT_PW-8M	0		Intermediate overburden	
OKT_PW-10M	0		Intermediate overburden	
OKT_PW-10D	0		Deep overburden	
OKT_PW-16M	0		Intermediate overburden	
OKT_PW-17S	0		Shallow overburden	
OKT_PW-17M	0		Intermediate overburden	
OKT_PW-18M	0		Intermediate overburden	
OKT_PW-19M	0		Intermediate overburden	
OKT_PW-19D	0		Deep overburden	
OKT_PW-20S	0	8260B DUP	Shallow overburden	
OKT_PW-20M	0		Intermediate overburden	
OKT_PW-24	0		Shallow overburden	
OKT_PW-25S	0		Shallow overburden	
OKT_PW-26S[8]	--		Shallow overburden	
OKT_PW-27S	0		Shallow overburden	
OKT_PW-28	0		Intermediate overburden	
OKT_RW-1	0		Intermediate overburden	
OKT_SP-2	0		Deep overburden	
OKT_SVE-2	0		Shallow overburden	
OKT_SVE-3	0		Shallow overburden	

See Notes on Page 4

Table 2 Sampling Locations and Analytical Parameters

OK Tool Superfund Site (OU-1), Milford, New Hampshire

78 Total wells to be sampled: 45 to be analyzed for 8260B (NHDPHS Lab); 25 with possible permanganate to be analyzed for Headspace analysis (EPA Lab); 8 Residential wells for 524.2 (NHDPHS Lab); plus trip blanks and duplicates. 4 wells (not included in the 78) are not scheduled to be sampled due to high permanganate levels.

Note: Water levels shall be collected within one (1) week prior to sampling and recorded on the water level worksheet (SOP B-1)[1].

Well #	Permanganate Concentration Oct 2017	Duplicates[6]	Well Type	Analytical Parameters[5]
Wells Outside Slurry Wall (17)				
OKT_B95-13	N/A		Intermediate overburden	**Water Levels[1] (SOP B-1).** **Purge and Sample[2] (SOP B-2).** **NHDES 8260B** **(NHDES Full List)** **NHDPHS Lab**
OKT_MW-2R	N/A		Shallow bedrock	
OKT_MW-16C	N/A		Deep overburden	
OKT_PW-1D	N/A		Deep overburden	
OKT_PW-2S	N/A		Shallow overburden	
OKT_PW-2M	0		Intermediate overburden	
OKT_PW-2D	0		Deep overburden	
OKT_PW-2R	0		Shallow bedrock	
OKT_PW-3D	N/A		Deep overburden	
OKT_PW-11D	0		Deep overburden	
OKT_PW-12R	N/A		Shallow bedrock	
OKT_PW-13S	N/A		Shallow overburden	
OKT_PW-13M	N/A		Intermediate overburden	
OKT_PW-13D	N/A		Deep overburden	
OKT_PW-14S	N/A		Shallow overburden	
OKT_PW-14M	N/A	8260B DUP	Intermediate overburden	
OKT_PW-14D	N/A		Deep overburden	

See Notes on Page 4

Table 2 Sampling Locations and Analytical Parameters

OK Tool Superfund Site (OU-1), Milford, New Hampshire

78 Total wells to be sampled: 45 to be analyzed for 8260B (NHDPHS Lab); 25 with possible permanganate to be analyzed for Headspace analysis (EPA Lab); 8 Residential wells for 524.2 (NHDPHS Lab); plus trip blanks and duplicates. 4 wells (not included in the 78) are not scheduled to be sampled due to high permanganate levels.

Note: Water levels shall be collected within one (1) week prior to sampling and recorded on the water level worksheet (SOP B-1)[1].

Well #	Permanganate Concentration Oct 2017	Duplicates[6]	Well Type	Analytical Parameters[5]
Wells Inside Slurry Wall with Possible Permanganate (25)				
OKT_CI	0		Longer screened well, sample till interface	**Water Levels[1] (SOP B-1).** **If level of permanganate is below 100 ppm, collect sample for VOC Headspace analysis - EPA Lab according to the Purge and Sample SOP.** **Even if the permanganate levels appear to be zero, the samples will be analyzed for Headspace by the EPA lab.**
OKT_IP-3	1-10			
OKT_IP-8	0		Deep overburden	
OKT_IP-9	0		Deep overburden	
OKT_IP-10	0		Deep overburden	
OKT_IP-12	0		Deep overburden	
OKT_IP-13	0		Deep overburden	
OKT_IP-14	0		Deep overburden	
OKT_IP-101	0-1		Deep overburden	
OKT_IP-102	0-1		Deep overburden	
OKT_IP-103A	0	Head Space VOCs DUP	Shallow overburden	
OKT_IP-E2A	0-1		Shallow overburden	
OKT_IP-E3	1-10		Deep overburden	
OKT_IP-E4	1-10		Deep overburden	
OKT_IP-E5	0		Deep overburden	
OKT_MI-22	0-1		Shallow bedrock	
OKT_NCP	10		Longer screened well, sample till interface	
OKT_PW-6D	0-1		Deep overburden	
OKT_PW-15M	0		Intermediate overburden	
OKT_PW-15D	0		Deep overburden	
OKT_PW-16D	0		Deep overburden	
OKT_PW-18D	0		Deep overburden	
OKT_PW-20D	0		Deep overburden	
OKT_PW-22	0-1	Head Space VOCs DUP	Shallow overburden	
OKT_SP-1	0		Deep overburden	
Wells Inside Slurry Wall with Levels of Permanganate > 100 (not sampled - 4)				
OKT_IP-6	100-1000		Deep overburden	These wells still have permanganate well over 100 ppm and will not be sampled this year.
OKT_IP-E1	>1000		Deep overburden	
OKT_IP-E2	>1001		Deep overburden	
OKT_PW-25D	>1000		Intermediate overburden	

See Notes on Page 4

Table 2 Sampling Locations and Analytical Parameters

OK Tool Superfund Site (OU-1), Milford, New Hampshire

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Note: Water levels shall be collected within one (1) week prior to sampling and recorded on the water level worksheet (SOP B-1)[1].

Well #		Permanganate Concentration Oct 2017	Duplicates[6]	Well Type	Analytical Parameters[5]	
Residential Drinking Water Monitoring (8 wells on 7 properties)[3,7]						
Map	**Lot#**	**Address**	**Well ID**	**Sample Location**	**Duplicates**	**Analytical Parameters**
C3	4-36-1	300 N. River Rd[4]	OKT_DW-MFH-RW	Milford Fish Hatchery		**NHDES 524 (NHDES Full List) NHDPHS Lab Drinking Water (SOP B-4)**
B3, C3	4-17-C	479 N. River Rd	OKT_DW-29	Outside tap on the left at Unit #4	524 DUP	
B3, C3	4-17-C	479 N. River Rd	OKT_DW-30	Outside tap at well house		
C2	4-40	544 N. River Rd.	OKT_DW-5	Kitchen sink		
			OKT_DW-5A	Outside tap out front		
C2	4-3-50	559 N. River Rd.	OKT_DW-4	Outside tap in front		
C2	4-3-49	561 N. River Rd.	OKT_DW-3	Outside tap in front		
			OKT_DW-3A	Outside tap on left		
C2	4-6	569 N. River Rd.	OKT_DW-9	Kitchen sink after bypassing softener		
			OKT_DW-9A	Tap at tank before softener in basement		
C2	4-5	577 N. River Rd.	OKT_DW-2	Spigot to right of blue door in front.		

NOTES:

N/A = Not Applicable

"--" means not measured

1. A synoptic round of water levels at the wells to be sampled shall be completed before sampling begins.
2. All purge water generated shall be discharged to the ground surface.
3. Two wells are located at 479 River Road; therefore, both samples OKT_DW-29 and OKT_DW-30 must be collected.
4. FH-14 will be sampled before the aeration tanks at the Milford Fish Hatchery as drinking water sample OKT_DW-MFH-RW.
5. Metals samples are typically collected in selected wells outside the slurry wall in the year before the next Five Year Review in 2021.
6. An equipment blank on the water level meter is typically collected after use in PW-20S and decontamination in the year before the next Five Year Review. Refer to **Table 5** in the Sampling and Analysis Plan.
7. An equipment blank on the brass tap apparatus used for collecting drinking water samples is typically collected after decontamination and before use in the year prior to the next Five Year Review in 2021. Refer to **Table 5** in the Sampling and Analysis Plan.
8. Monitoring location PW-26S was observed to have water at 13.42 feet below measuring point on 10/11/2017. However, during permanganate monitoring on 10/12-10/13, the well went dry. Depth to bottom was measured at 18.50 (top of screen is 17.90 feet below measuring point). Upon a second evaluation, the well remained dry and depth-to-bottom was confirmed at 18.50. No sample will be collected from PW-26S in 2017.

Table 3

Media, Analysis, Test Methods, Containers/Sample Volume, Preservation, and Hold Time
OK Tool Superfund Site (OU-1), Milford, New Hampshire

Analytes	Lab	Number of Samples Including Field QC [1,2]	Analytical Method	Containers (Type and Size)	Preservation Requirements [3,4]	Maximum Holding Time
Groundwater Samples						
VOCs	EPA	25 field samples; 2 duplicates, 0 equipment blanks; trip blanks	Head Space Analysis EIA-FLDVOA2.SOP	2-40 mL VOA	4˚C +/- 2˚C HCL **<u>NOTE:</u> if Permanganate is present or suspected to be present, ascorbic acid will be used in place of HCL [3]**	14 days
VOCs	NHDPHS	44 field samples; 3 duplicates; 0 equipment blanks; trip blanks	NHDES VOC Full List (NHDPHS Lab's 8260B)	3-40 mL VOA	4˚C +/- 2˚C HCL	14 days
Residential Drinking Water						
VOCs	NHDPHS	8 field samples; 1 duplicate; 0 equipment blanks; trip blanks	NHDES VOC Full List (NHDPHS Lab's 524)	3- 40 mL VOA[1]	HCL, 4˚C +/-2˚C	14 days

Notes:

1. Trip blanks will be included in each cooler containing VOC samples. Trip blanks will include 2 VOA vials of HCl-preserved blanks for aqueous volatile organic compound (VOC) samples. Volatile organic compounds consist of the New Hampshire Department of Environmental Services (NHDES) Full List of VOCs analyzed by EPA Method 8260B, 524, and head space via EIA-FLDVOA2.SOP. Each cooler will contain one (1) temperature blank.
2. Refer specifically to **Table 5** for QC sampling requirements and any equipment blank details. Equipment blanks to be collected in the sampling round prior to the next Five Year Review.
3. Note that the pH requirements for samples preserved via an acid are less than 2 units and via a base are greater than 12 units.
4. If permanganate is present, the sample will be collected in a vial containing ascorbic acid crystals, see Purging and Sampling Using Peristaltic Pump SOP B-2 for specific details.
5. Metals samples to be collected in the sampling round before the 2021 Five Year Review.

Table 4 - Well Information Summary

OK Tool Superfund Site (OU-1), Milford, New Hampshire

Well #	Depth of wells (feet)[1]	Length of Screen (feet)	Screen depth feet below measuring point	Comments
OKT_B95-3	76.29	10	66.4 - 76.4	Deep overburden
OKT_B95-5	48.45	10	38.5 - 48.5	Intermediate overburden
OKT_B95-8	88.18	10	78.3 - 88.3	Deep overburden
OKT_B95-9	22.76	10	13.1 - 23.1	Shallow overburden
OKT_B95-12	62.56	5	57.0 - 62.0	Intermediate overburden (obstructed @4.28')
OKT_B95-13	64.23	5	59.2 - 64.2	Intermediate overburden
OKT_B95-15	95.25	10	84.9 - 94.9	Deep overburden
OKT_CI	68.17	47	17.9 - 67.9	Long screened, well, sample till interface
OKT_EW-1	90.14	30	59.9 - 89.9	Deep overburden
OKT_EW-2	84.2	30	53.7 - 83.7	Deep overburden
OKT_FH-14	42	10	32 - 42	Intermediate overburden (24 inch diameter well)
OKT_IP-1	75.82	5	70.2 - 75.2	Deep overburden
OKT_IP-2	88.65	5	83.0 - 88.0	Deep overburden
OKT_IP-3	88.00	5	82.9 - 87.9	Deep overburden
OKT_IP-4	87.51	5	82.2 - 87.2	Deep overburden
OKT_IP-5	89.51	5	84.2 - 89.2	Deep overburden
OKT_IP-6	75.31	5	0.4 - 75.4	Deep overburden 195-205
OKT_IP-7	78.68	5	73.0 - 78.0	Deep overburden
OKT_IP-8	79.62	5	74.8 - 79.8	Deep overburden
OKT_IP-9	80.29	5	74.8 - 79.8	Deep overburden 195-205
OKT_IP-10	69.52	5	64.5 - 69.5	Deep overburden 205-215
OKT_IP-11	69.78	5	64.2 - 69.2	Deep overburden
OKT_IP-12	68.99	5	63.2 - 68.2	Deep overburden
OKT_IP-13	58.52	5	53.7 - 58.7	Deep overburden 215-225
OKT_IP-14	58.70	5	52.9 - 57.9	Deep overburden
OKT_IP-101	71.91	5	66.7 - 71.7	Deep overburden
OKT_IP-102	71.57	5	67.0 - 72.0	Deep overburden
OKT_IP-103	65.04	5	60.0 - 65.0	Intermediate overburden
OKT_IP-103A	26.10	5	21.4 - 26.4	Shallow overburden
OKT_IP-104	96.85	5	91.7 - 96.7	Deep overburden
OKT_IP-105	52.58	5	47.5 - 52.5	Intermediate overburden
OKT_IP-106	52.70	5	47.3 - 52.3	Intermediate overburden
OKT_IP-107	85.14	5	80.0 - 85.0	Deep overburden
OKT_IP-E1	72.83	5	67.5 - 72.5	Deep overburden
OKT_IP-E2	75.83	5	70.9 - 75.9	Deep overburden
OKT_IP-E2A	39.29	5	34.6 - 39.6	Shallow overburden
OKT_IP-E3	71.66	5	67.1 - 72.1	Deep overburden
OKT_IP-E4	74.09	5	69.3 - 74.3	Deep overburden
OKT_IP-E5	75.18	5	70.1 - 75.1	Deep overburden

Table 4 - Well Information Summary

OK Tool Superfund Site (OU-1), Milford, New Hampshire

Well #	Depth of wells (feet)[1]	Length of Screen (feet)	Screen depth feet below measuring point	Comments
OKT_IW-1	103.42	30	'71.5 - 101.5	Deep overburden
OKT_IW-2	88.55	20	59.5 - 89.5	Deep overburden
OKT_MI-19	80.00	15	66.5 - 81.5	Shallow bedrock
OKT_MI-20	40.00	30	11.5 - 41.5	Shallow overburden
OKT_MI-21	40.00	25	18.0 - 53.0	Shallow overburden
OKT_MI-22	114.00	15	99.9 - 114.9	Shallow bedrock
OKT_MI-32	75.00	40	33.6 - 78.6	Deep overburden
OKT_MW-2A	39.00	10	28.9 - 38.9	Shallow overburden
OKT_MW-2B	81.00	10	71.3 - 81.3	Intermediate overburden
OKT_MW-2R	167.00	-	139.0 - 167.0	Shallow bedrock
OKT_MW-0312	100.70	5	95.3- 100.3	Deep overburden, depth from land surface,
OKT_MW-16A	29.38	10	19.0 - 29.0	Shallow overburden
OKT_MW-16B	51.85	10	41.9 - 51.9	Intermediate overburden
OKT_MW-16C	85.50	10	75.7 - 85.7	Deep overburden
OKT_MW-16R	390.00	-	100 - 390	Shallow bedrock
OKT_MW-27	15.00	10	5.8 - 15.8	Shallow overburden
OKT_MW-28	15.00	10	3.9 - 13.9	Shallow overburden
OKT_NCP	68.00	47	16.9 - 66.9	Longer screened well, sample till interface
OKT_PW-1S	36.01	10	26.0 - 36.0	Shallow overburden
OKT_PW-1D	95.06	10	84.9 - 94.9	Deep overburden
OKT_PW-2S	30.36	10	20.0 - 30.0	Shallow overburden
OKT_PW-2M	59.86	10	49.5 - 59.5	Intermediate overburden
OKT_PW-2D	107.68	10	97.3 - 107.3	Deep overburden
OKT_PW-2R	135.35	20	115.3 - 135.3	Shallow bedrock
OKT_PW-3S	32.79	10	22.6 - 32.6	Shallow overburden
OKT_PW-3D	97.77	10	87.6 - 97.6	Deep overburden
OKT_PW-4M	43.90	10	33.7 - 43.7	Intermediate overburden
OKT_PW-4D	79.00	10	69.0 - 79.0	Deep overburden
OKT_PW-5M	63.90	10	53.9 - 63.9	Intermediate overburden
OKT_PW-5D	108.61	10	98.1 - 108.1	Deep overburden
OKT_PW-5R	132.77	10	122.3 - 132.3	Shallow bedrock
OKT_PW-6S	32.45	10	22.1 - 32.1	Shallow overburden
OKT_PW-6M	52.80	10	43.2 - 53.2	Intermediate overburden
OKT_PW-6MB	71.00	10	60.8 - 70.8	Intermediate overburden
OKT_PW-6D	99.48	10	75.6 - 85.6	Deep overburden
OKT_PW-6R	107.75	10	98.1 - 108.1	Shallow bedrock
OKT_PW-7S	43.84	10	34.1 - 44.1	Shallow overburden
OKT_PW-7M	63.45	10	53.0 - 63.0	Intermediate overburden
OKT_PW-8M	41.71	10	32.1 - 42.1	Intermediate overburden

Table 4 - Well Information Summary

OK Tool Superfund Site (OU-1), Milford, New Hampshire

Well #	Depth of wells (feet)[1]	Length of Screen (feet)	Screen depth feet below measuring point	Comments
OKT_PW-9M	42.06	10	31.2 - 41.2	Intermediate overburden
OKT_PW-10M	57.49	10	47.5 - 57.5	Intermediate overburden
OKT_PW-10D	107.73	10	97.5 - 107.5	Deep overburden
OKT_PW-11M	58.41	10	48.3 - 58.3	Intermediate overburden
OKT_PW-11D	108.79	10	98.5 - 108.5	Deep overburden
OKT_PW-12S	32.11	10	21.8 - 31.8	Shallow overburden
OKT_PW-12M	72.07	10	62.1 - 72.1	Intermediate overburden
OKT_PW-12D	99.09	10	88.8 - 98.8	Deep overburden
OKT_PW-12R	136.16	20	115.9 - 135.9	Shallow bedrock
OKT_PW-13S	32.06	10	21.7 - 31.7	Shallow overburden
OKT_PW-13M	72.07	10	61.9 - 71.9	Intermediate overburden
OKT_PW-13D	106.94	10	96.5 - 106.5	Deep overburden
OKT_PW-14S	31.97	10	21.7 - 31.7	Shallow overburden
OKT_PW-14M	72.00	10	61.8 - 71.8	Intermediate overburden
OKT_PW-14D	102.15	10	91.9 - 101.9	Deep overburden
OKT_PW-15M	56.30	10	46.4 - 56.4	Intermediate overburden
OKT_PW-15D	73.00	10	62.9 - 72.9	Deep overburden
OKT_PW-16M	51.60	10	41.8 - 51.8	Intermediate overburden
OKT_PW-16D	79.60	10	69.6 - 79.6	Deep overburden
OKT_PW-17S	27.00	10	16.8 - 26.8	Shallow overburden
OKT_PW-17M	45.00	10	35.0 - 45.0	Intermediate overburden
OKT_PW-18M	47.60	10	37.4 - 47.4	Intermediate overburden
OKT_PW-18D	63.00	10	52.7 - 62.7	Deep overburden
OKT_PW-19M	46.90	10	37.2 - 47.2	Intermediate overburden
OKT_PW-19D	69.00	10	58.8 - 68.8	Deep overburden
OKT_PW-20S	33.40	10	23.7 - 33.7	Shallow overburden
OKT_PW-20M	70.30	10	60.6 - 70.6	Intermediate overburden
OKT_PW-20D	98.50	10	88.4 - 98.4	Deep overburden
OKT_PW-21	64.90	10	54.9 - 64.9	Intermediate overburden
OKT_PW-22	28.00	10	18.2 - 28.2	Shallow overburden
OKT_PW-24	28.40	10	18.8 - 28.8	Shallow overburden
OKT_PW-25S	29.40	10	19.2 - 29.2	Shallow overburden
OKT_PW-25D	60.50	10	50.2 - 60.2	Intermediate overburden
OKT_PW-26S	28.10	10	17.9 - 27.9	Shallow overburden
OKT_PW-27S	27.70	10	17.5 - 27.5	Shallow overburden
OKT_PW-28	74.70	10	64.8 - 74.8	Intermediate overburden
OKT_RW-1	40.94	10	29.9 - 39.9	Intermediate overburden
OKT_SP-1	64.90	5	58.9 - 63.9	Deep overburden
OKT_SP-2	60.60	5	55.5 - 60.5	Deep overburden

Table 4 - Well Information Summary

OK Tool Superfund Site (OU-1), Milford, New Hampshire

Well #	Depth of wells (feet)[1]	Length of Screen (feet)	Screen depth feet below measuring point	Comments
OKT_SVE-1	25.60	15	9.8 - 24.8	Shallow overburden
OKT_SVE-2	27.40	15	11.9 - 26.9	Shallow overburden
OKT_SVE-3	28.40	15	13.2 - 28.2	Shallow overburden
OKT_SVE-4	26.90	15	11.4 - 26.4	Shallow overburden
OKT_SVE-5	26.60	15	11.4 - 26.4	Shallow overburden
OKT_SVE-6	26.10	15	10.5 - 25.5	Shallow overburden

Notes:

Shading is for 45 exterior wells.

1. Depth is from top of PVC or top of casing if there is no PVC.

- = Wells are open boreholes with no screened interval.

Well depths from measuring point are from the May 4, 2016 Water Level Reading Table provided by Weston.

Screen depths are taken from Table 4-6 in the 2015 Annual Report.

TABLE 5 – SUMMARY OF QUALITY ASSURANCE SAMPLES
OK Tool Superfund Site (OU-1), Milford, New Hampshire

Media	Associated Sampling Equipment	Sample ID	Designated NOTE to be used on Chain-of-Custody	Analyses [1,4]
NO EQUIPMENT BLANK SAMPLES in 2017 [2,3]				
The data to be collected as part of this investigation is for screening purposes and therefore it is not typically necessary to collect equipment blank samples, except for the year before the Five-Year Review. In addition, historical data indicates that no contamination has been found in past water level meter or tubing (peristaltic pump) equipment blanks, therefore, it is not necessary to collect those equipment blanks under this SAP.				
Groundwater To be collected after use in OKT_PW-20S & decontamination [3]	Water Level	EQUIP BLANK	Water Level	**VOCs (8260B)** - NHDPHS Lab **Total Metals** (As, Sb, Be, Cr, Pb & Ni) - NHDPHS Lab
Drinking Water To be collected after decontamination and before use	Brass tap apparatus	EQUIP BLANK	Brass Tap	**VOCs (524)** - NHDPHS Lab **Total Metals** (As, Sb, Be, Cr, Pb & Ni) - NHDPHS Lab
DUPLICATE SAMPLES				
Groundwater	Peristaltic Pump	OKT_IP-103A DUP	N/A	VOCs Head Space Analysis - EPA Lab
	Peristaltic Pump	OKT_PW-22 DUP	N/A	VOCs Head Space Analysis - EPA Lab
	Peristaltic Pump	OKT_PW-6S DUP	N/A	VOCs (8260B) - NHDPHS Lab
	Peristaltic Pump	OKT_PW-14M DUP	N/A	VOCs (8260B) - NHDPHS Lab
	Peristaltic Pump	OKT_PW-20S DUP	N/A	VOCs (8260B) - NHDPHS Lab
Drinking Water	N/A	OKT_DW-29 DUP	N/A	VOCs (524) - NHDPHS Lab
TRIP BLANK/TEMPERATURE BLANK SAMPLES				
1 per cooler with aqueous VOCs samples (2 VOA Vials)	N/A	TRIP BLANK	**1 trip blank per COC per cooler only**	VOCs (8260B, 524, and head space)
Temperature Blank (1 per cooler)	N/A	TEMP BLANK	Check the box on the COC that there is a temperature blank in the cooler	Temperature

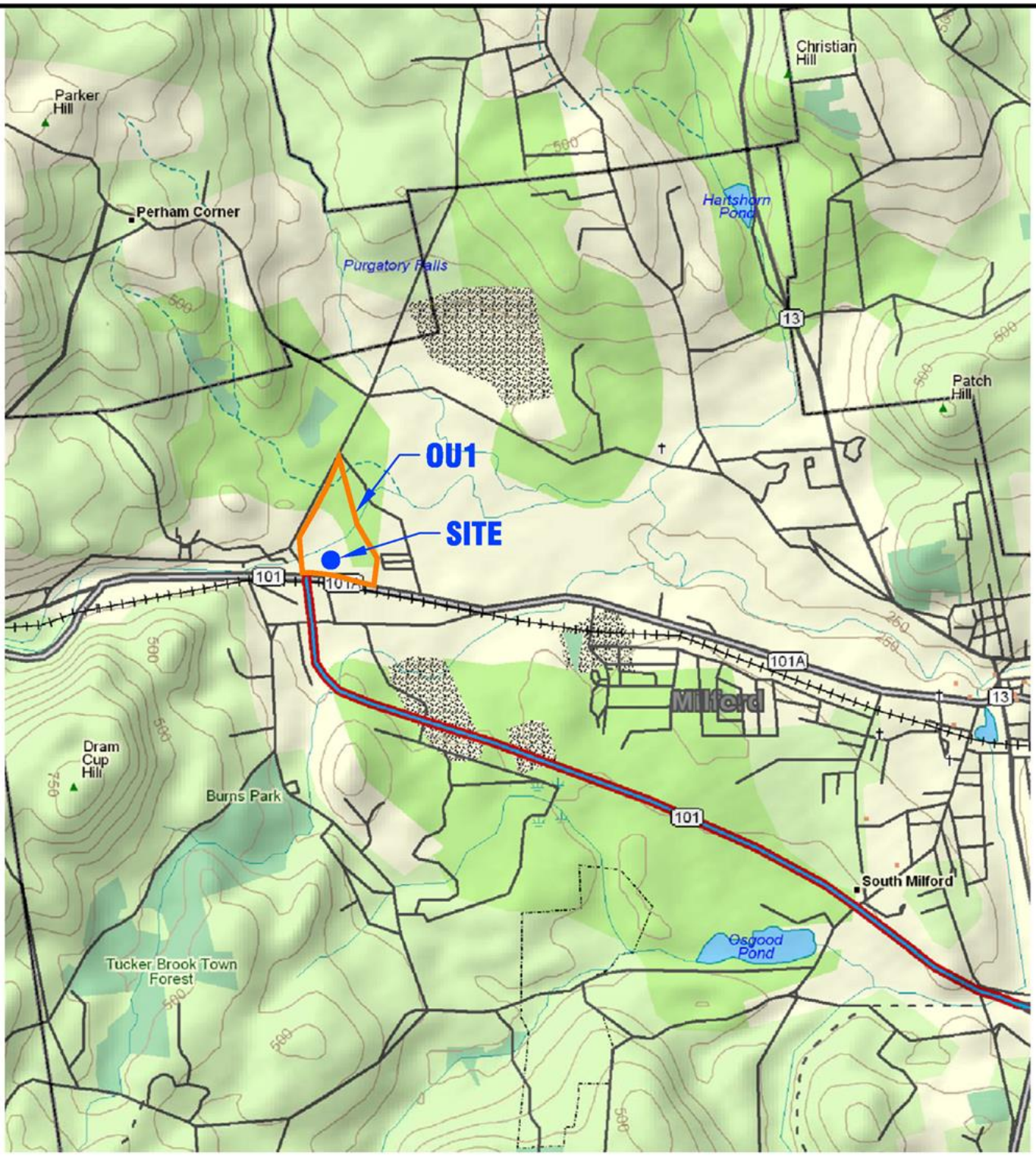
Notes:

1. Refer to **Table 3** for specific test methods for each analysis.
2. Equipment blanks are collected in the year before the Five-Year Review in 2021.
3. Equipment blank procedure: Once the field sample has been collected at the designated well, drop the water level probe to the bottom of the well as if collecting a depth-to-bottom measurement. Remove and decontaminate the probe and the length of tape used in the well according to the Equipment Decontamination SOP (B-3) in the Sampling and Analysis Plan. Collect the equipment blank.
4. Total metals (As, Sb, Be, Cr, Pb & Ni) are to be collected at selected wells in the year before the Five-Year Review and sent to the NHDPHS lab along with at least one duplicate sample.

TABLE 5 – SUMMARY OF QUALITY ASSURANCE SAMPLES
OK Tool Superfund Site (OU-1), Milford, New Hampshire

N/A = not applicable
NHDPHS = New Hampshire Division of Public Health Services
EPA = United States Environmental Protection Agency
VOC = volatile organic compounds
COC = chain-of-custody

FIGURES



SOURCE:
DELORME 3-D TOPOQUADS SOFTWARE; NEW HAMPSHIRE & VERMONT 3-D TOPOQUADS CD

GRAPHIC SCALE
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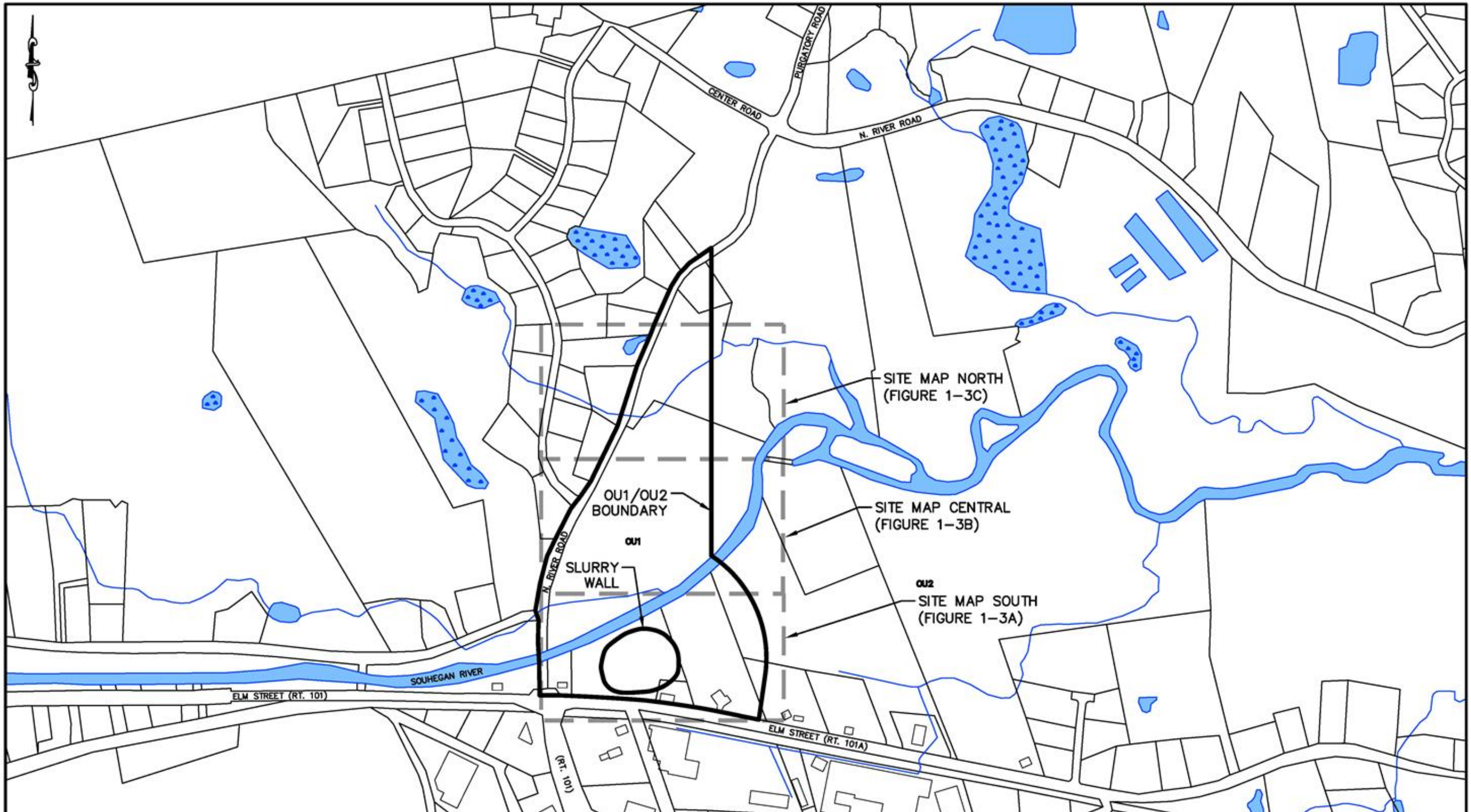
APPROXIMATE SCALE IN FEET

SITE LOCATION MAP	WESTON SOLUTIONS CONCORD NEW HAMPSHIRE		NEW HAMPSHIRE DEPARTMENT OF Environmental Services		
OK TOOL SAMPLING ANALYSIS PLAN OK TOOL (OU-1) SUPERFUND SITE MILFORD, NEW HAMPSHIRE	DRAWN BEG	DATE NOV 2015	DES. ENG.	DATE	W.O. NO. 20133.002.001
	CHECKED JAW	DATE NOV 2015	SCALE AS SHOWN	REVISION	FIGURE NO. 1

M:\Design\DWG\NHDES\savage\2015\2015 Annual Report\FIG 1-1.dwg, Layout1, 11/25/2015 12:31:30 PM, girardeb, 1:1



LEGEND

FIGURE INSETS

SOURCE:
PROPERTY MAPS TAKEN FROM TOWN OF MILFORD, NH, TAX MAP DATABASE, MAP NUMBERS B2, B3, C2, C3, D2, & D3, DATED APRIL, 2009.

GRAPHIC SCALE
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APPROXIMATE SCALE IN FEET

OU-1 BOUNDARY

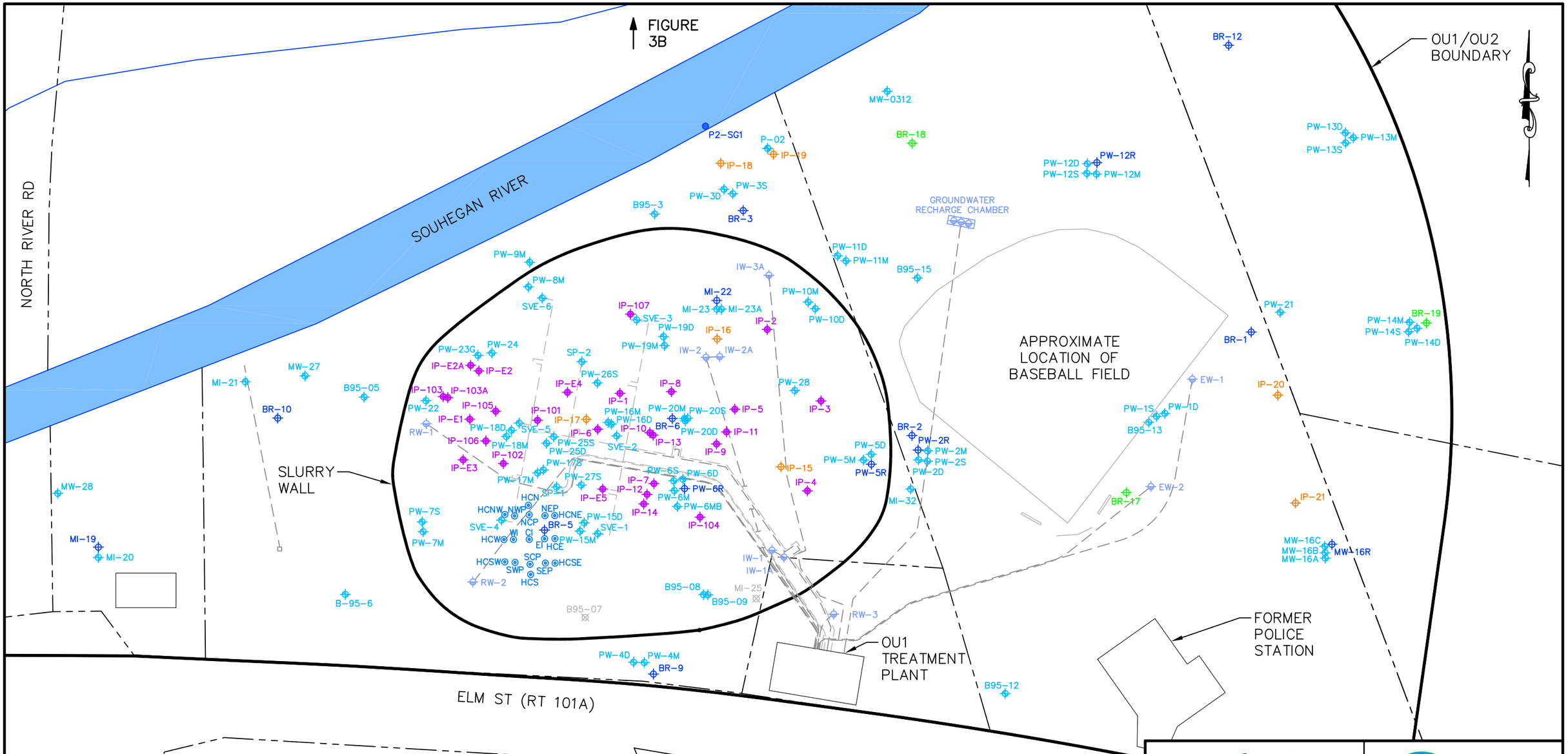
OK TOOL SAMPLING ANALYSIS PLAN
OK TOOL (OU-1) SUPERFUND SITE
MILFORD, NEW HAMPSHIRE

WESTON SOLUTIONS
CONCORD NEW HAMPSHIRE

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

DRAWN	DATE	DES. ENG.	DATE	W.O. NO.
BEG	NOV 2015			20133.002.001
CHECKED	DATE	SCALE	REVISION	FIGURE NO.
JAW	NOV 2015	AS SHOWN		2

M:\Design\DWG\NHDES\savage\2015\2015 Annual Report\FIG 1-2.dwg, Layout1, 11/25/2015 12:34:28 PM, girardeb, 1:1



SOURCE:
PROPERTY MAPS TAKEN FROM TOWN OF MILFORD, NH, TAX MAP DATABASE, MAP NUMBERS B2, B3, B4, C2, C3, C4, D2, D3, D4, E2, E3, & E4, DATED APRIL, 2009.

WESTON SOLUTIONS
CONCORD NEW HAMPSHIRE

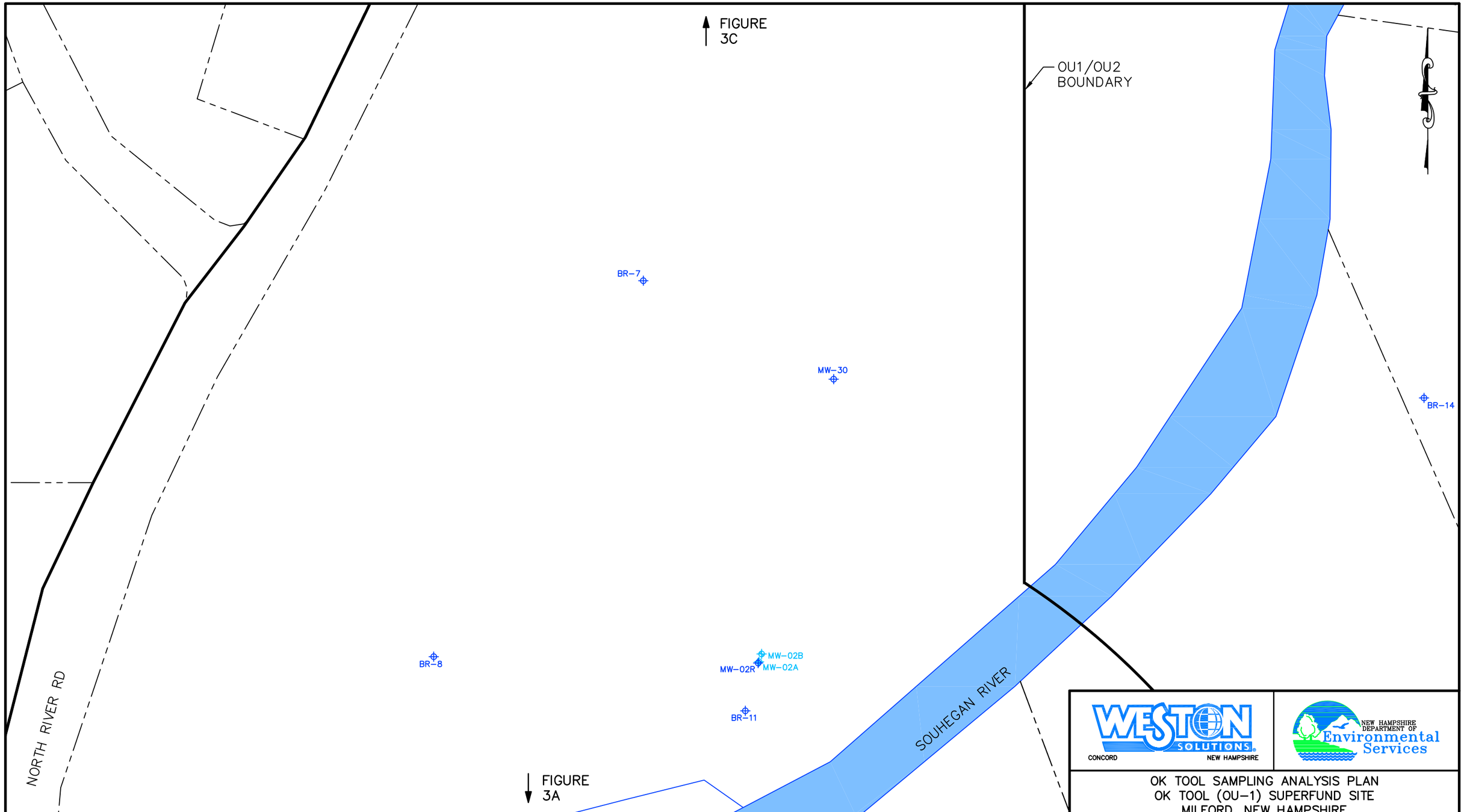
NEW HAMPSHIRE DEPARTMENT OF Environmental Services

OK TOOL SAMPLING ANALYSIS PLAN
OK TOOL (OU-1) SUPERFUND SITE
MILFORD, NEW HAMPSHIRE

SITE MAP SOUTH

DRAWN	DATE	DES. ENG.	DATE	W.O. NO.
DCH	OCT 2017			20133.002.001
CHECKED	DATE	SCALE	REVISION	FIGURE NO.
EJH	OCT 2017	AS SHOWN		3A

\\ndscrh1\cnh_data\Design\Design\DWG\N-DES\savage\2017\2017 SAP\FIG 3.dwg, 10/18/2017 11:11:31 AM



LEGEND

- BR-9 BEDROCK MONITORING WELL
- MW-102 OVERBURDEN MONITORING WELL
- PROPERTY BOUNDARY

GRAPHIC SCALE

100 50 0 50 100

APPROXIMATE SCALE IN FEET

SOURCE:
PROPERTY MAPS TAKEN FROM TOWN OF MILFORD, NH, TAX MAP DATABASE, MAP NUMBERS B2, B3, B4, C2, C3, C4, D2, D3, D4, E2, E3, & E4, DATED APRIL, 2009.

WESTON SOLUTIONS
CONCORD NEW HAMPSHIRE

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

OK TOOL SAMPLING ANALYSIS PLAN
OK TOOL (OU-1) SUPERFUND SITE
MILFORD, NEW HAMPSHIRE

SITE MAP CENTRAL

DRAWN	DATE	DES. ENG.	DATE	W.O. NO.
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CHECKED	**DATE**	**SCALE**	**REVISION**	**FIGURE NO.**
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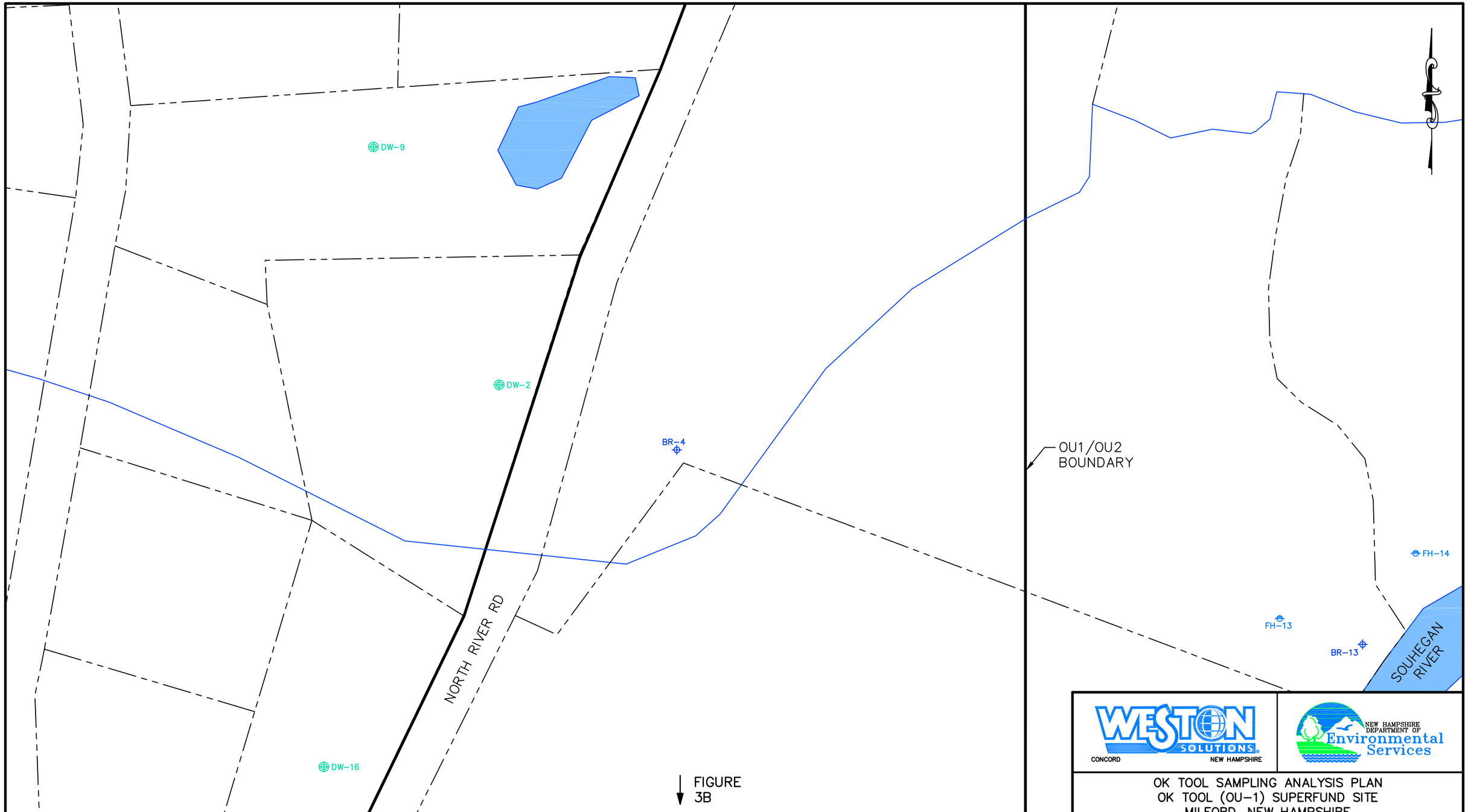

LEGEND

- BR-9 BEDROCK MONITORING WELL
- DW-16 DRINKING WATER WELL
- FH-3 FISH HATCHERY WELL
- PROPERTY BOUNDARY

GRAPHIC SCALE

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APPROXIMATE SCALE IN FEET

SOURCE:
PROPERTY MAPS TAKEN FROM TOWN OF MILFORD, NH, TAX MAP DATABASE, MAP NUMBERS B2, B3, B4, C2, C3, C4, D2, D3, D4, E2, E3, & E4, DATED APRIL, 2009.

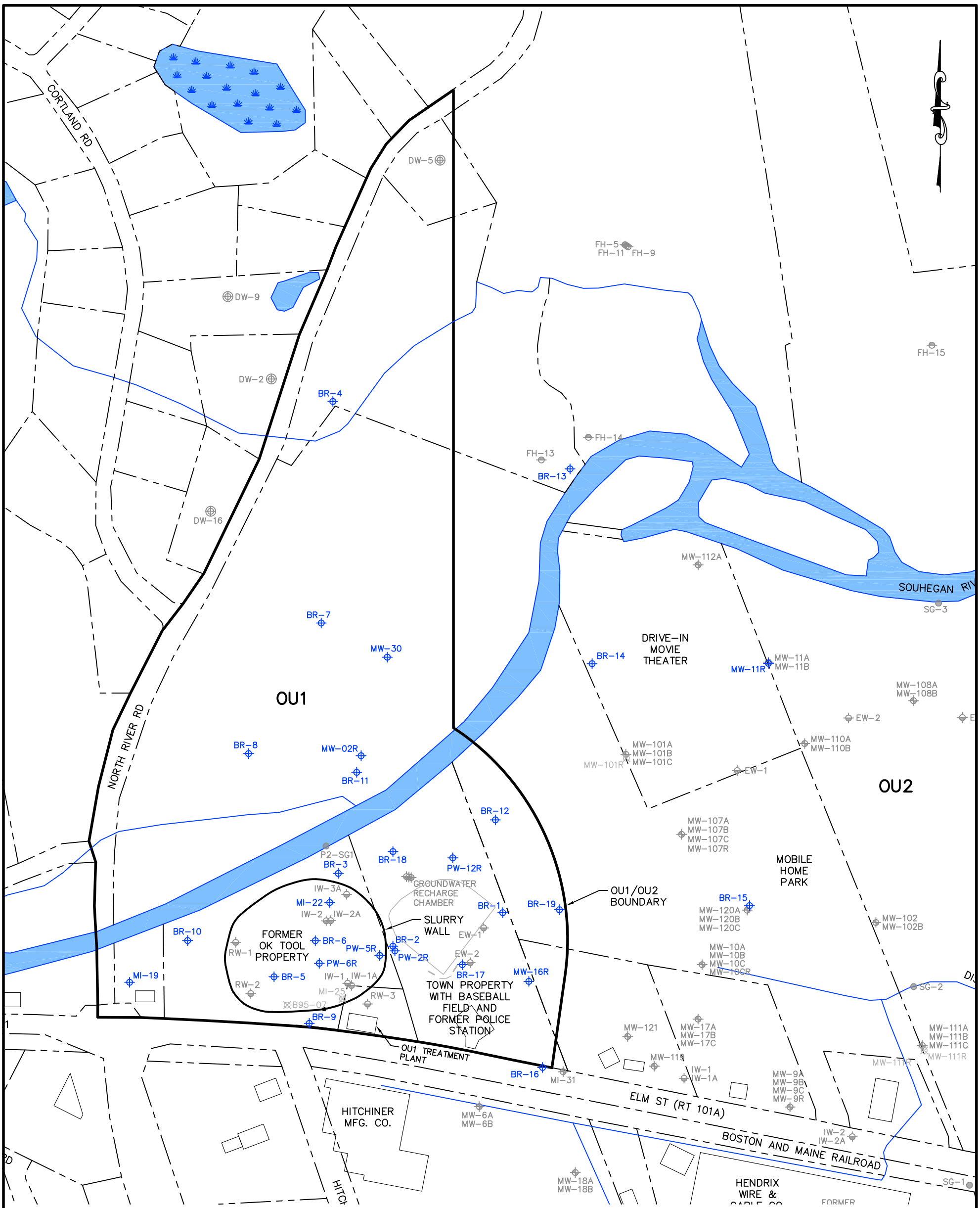
WESTON SOLUTIONS
CONCORD NEW HAMPSHIRE

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

OK TOOL SAMPLING ANALYSIS PLAN
OK TOOL (OU-1) SUPERFUND SITE
MILFORD, NEW HAMPSHIRE

SITE MAP NORTH

DRAWN	DATE	DES. ENG.	DATE	W.O. NO.
DCH	OCT 2017			20133.002.001
CHECKED	DATE	SCALE	REVISION	FIGURE NO.
EJH	OCT 2017	AS SHOWN		3C



LEGEND

BR-9	BEDROCK MONITORING WELL
MW-101R	ABANDONED BEDROCK MONITORING WELL
MW-102	OVERBURDEN MONITORING WELL
IW-1A	INJECTION, EXTRACTION, OR RECHARGE WELL
SG-6	STREAM GAUGE
RW-6	DRINKING WATER WELL
FH-3	FISH HATCHERY WELL

SOURCE:
PROPERTY MAPS TAKEN FROM TOWN OF MILFORD, NH, TAX MAP DATABASE, MAP NUMBERS B2, B3, B4, C2, C3, C4, D2, D3, D4, E2, E3, & E4, DATED APRIL, 2009.

GRAPHIC SCALE
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APPROXIMATE SCALE IN FEET

BEDROCK MONITORING WELL LOCATIONS

WESTON SOLUTIONS
CONCORD NEW HAMPSHIRE

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

OK TOOL SAMPLING ANALYSIS PLAN
OK TOOL (OU-1) SUPERFUND SITE
MILFORD, NEW HAMPSHIRE

DRAWN	DATE	DES. ENG.	DATE	W.O. NO.
DCH	OCT 2017			20133.002.001
CHECKED	DATE	SCALE	REVISION	FIGURE NO.
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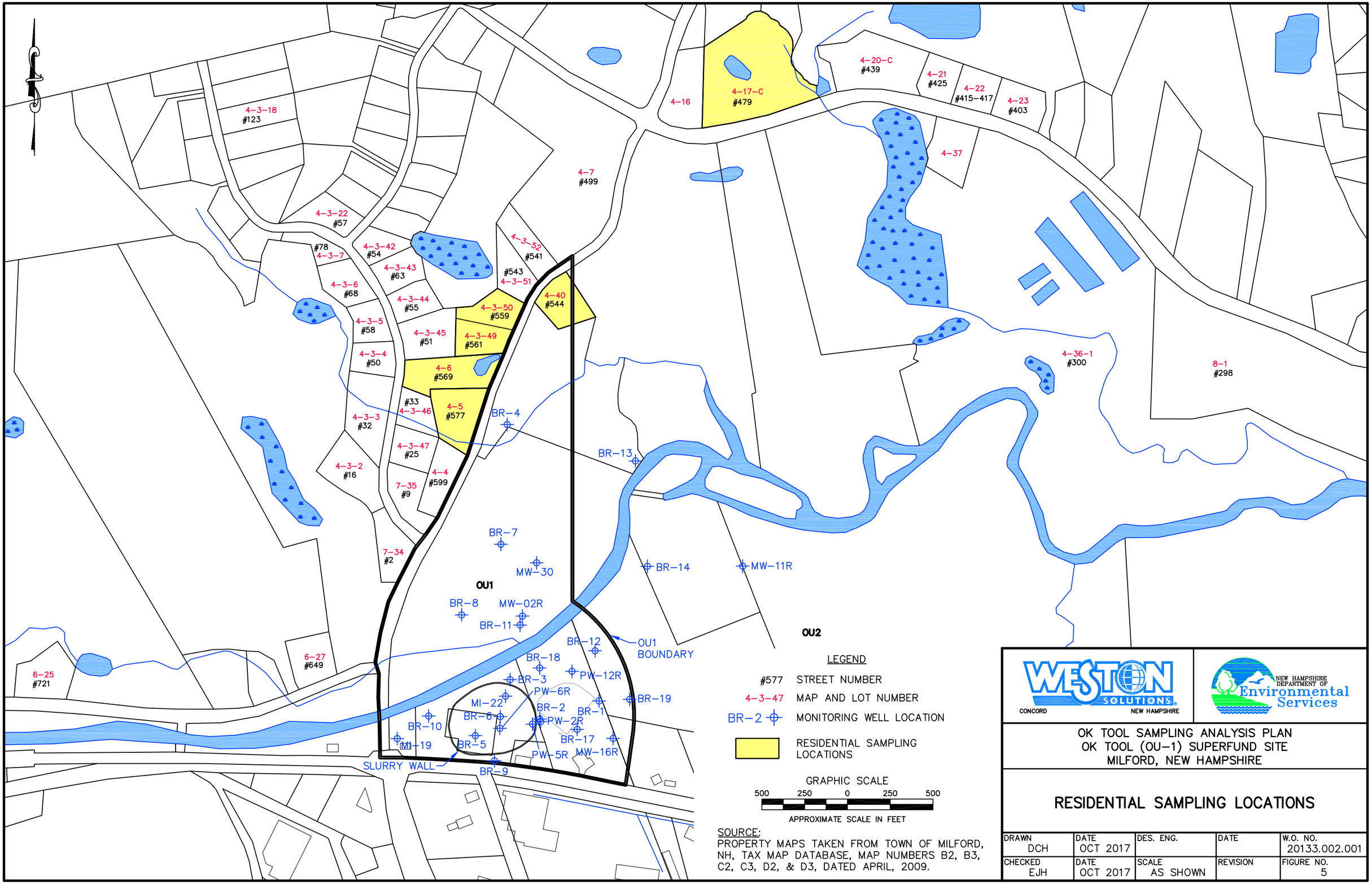

LEGEND

#577	STREET NUMBER
4-3-47	MAP AND LOT NUMBER
BR-2	MONITORING WELL LOCATION
	RESIDENTIAL SAMPLING LOCATIONS

GRAPHIC SCALE

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APPROXIMATE SCALE IN FEET

SOURCE:
PROPERTY MAPS TAKEN FROM TOWN OF MILFORD, NH, TAX MAP DATABASE, MAP NUMBERS B2, B3, C2, C3, D2, & D3, DATED APRIL, 2009.

WESTON SOLUTIONS
CONCORD NEW HAMPSHIRE

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

OK TOOL SAMPLING ANALYSIS PLAN
OK TOOL (OU-1) SUPERFUND SITE
MILFORD, NEW HAMPSHIRE

RESIDENTIAL SAMPLING LOCATIONS

DRAWN	DATE	DES. ENG.	DATE	W.O. NO.
DCH	OCT 2017			20133.002.001
CHECKED	**DATE**	**SCALE**	**REVISION**	**FIGURE NO.**
EJH	OCT 2017	AS SHOWN		5

APPENDIX A

PROJECT ORGANIZATION AND RESPONSIBILITIES

APPENDIX A
Project Organization and Responsibilities
OK Tool (OU-1) Superfund Site, Milford, New Hampshire
NHDES 198505002

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APPENDIX B

FIELD SAMPLING STANDARD OPERATING PROCEDURES

APPENDIX B-1
WATER LEVEL MEASUREMENTS

WATER LEVEL MEASUREMENTS

PURPOSE

This Standard Operating Procedure (SOP) *Water Level Measurements* is to set guidelines for the manual determination of the depth to water in monitoring wells at the OK Tool (OU-1) Superfund Site in Milford, New Hampshire.

In general, water-level measurements are used to construct water table or potentiometric surface maps and to determine flow direction as well as other aquifer characteristics. Therefore, a synoptic water level measurement round should be performed in the shortest possible time (preferably within a 24-hour period) before any purging and sampling activities begin.

Any modifications to this SOP shall be approved in advance by the New Hampshire Department of Environmental Services Project Manager and Quality Assurance (QA) Coordinator, in consultation with the United States Environmental Protection Agency (EPA), documented in the field logbook and presented in the final report.

EQUIPMENT AND MATERIALS

- Appropriate health and safety gear.
- Informational materials for sampling event: A copy of the current approved site-specific Health and Safety Plan, site-specific SAP, the current HWRB Master QAPP, boring logs (if available).
- Photoionization detector, if required.
- Site and well keys and other applicable field equipment to open wells.
- Water level worksheet (see attached).
- Logbook, pencil/pen/sharpies and a calculator. **Note: Only ball point pens with black ink shall be used to record field data (e.g., worksheets, log books)**. Sharpies can bleed through pages and smudge, making the documentation hard to read. Sharpies may be used to make a reference mark on the polyvinyl chloride (PVC) or casing for the water level measurement.
- Electronic water level meter of appropriate lengths (i.e., 100 feet (ft), 200 ft, and 300 ft, and measures in increments of 0.01 ft).
- Decontamination supplies in accordance with the Decontamination SOP in the Sampling and Analysis Plan (SAP).

GENERAL INFORMATION

All monitoring wells should be locked at all times, or within a secure locked area, to ensure the integrity of the well.

If water level measurements are being completed for the first time following well installation (or if it does not already exist), a survey mark/physical notch shall be placed on the top of the riser or casing as a reference point for future groundwater level measurements. If the top of the riser or casing is not flat, make the reference point the highest point. The measurement reference point should be documented on the Water Level Worksheet. Refer to **Table 4** in the SAP and the attached Water Level Worksheet for correct reference points.

All field personnel must be made aware of the measurement reference point, top of casing or top of PVC pipe being used, in order to ensure the collection of comparable data.

Before measurements are made, water levels in monitoring wells should be allowed to stabilize for a minimum of 24 hours after well construction and development. In low yield situations, recovery of water levels to equilibrium may take longer. All measurements should be made to an accuracy of 0.01 ft.

All equipment shall be decontaminated and checked, (e.g., batteries) prior to use to ensure that they are in proper working condition, and then decontaminated after each use. All equipment shall be decontaminated in accordance with the Decontamination SOP in the SAP.

WATER LEVEL MEASUREMENT PROCEDURES

Care should be taken to minimize water column disturbance. Use the following procedures to collect water level measurements:

1. Open the well and monitor the headspace with the appropriate air monitoring instrument to determine the presence of volatile organic compounds (if applicable). Record results in field log/worksheet.

2. In field book/field sheet, note if the lock was damaged or missing and any physical changes to well condition, such as erosion or cracks in protective concrete pad, road box, standpipe, etc.

3. Turn on the water level meter and adjust the sensitivity control.

4. Lower the electronic water level meter probe and measuring tape into the well from the reference point (e.g., top of PVC riser or casing) until the water surface is reached as indicated by a tone and/or the light display.

5. Read and record measurement (to 0.01 ft) along with the date, time on the attached Water Level Worksheet. In addition, note the reference point used (top of PVC riser or casing) if different from the reference point on the form.

6. The depth to the bottom of the monitoring well should be confirmed in each well included on **Table 4** and recorded on the Water Level Worksheet once every 5 years, during the sampling event just prior to the Five-Year Review, unless otherwise requested. Refer to **Table 2** to determine if depth measurements are required. Highlight any significant deviations in the depth to the bottom from the reported depth to bottom.

7. Remove all downhole equipment used for the water level measurement, and secure the well cap and lock.

8. Decontaminate all the equipment entering the well(s) in accordance with the Decontamination SOP in the SAP. The decontamination procedure for water level meters shall include the probes and, at a minimum, the length of tape used in that well. .

RECORDS AND DOCUMENTATION

All water level information should be recorded on the attached Water Level Worksheet.

QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC)

Equipment blanks may be required to ensure that the equipment has been properly decontaminated and that the decontamination procedures are adequate. Refer to **Table 5** in the SAP for specific QA/QC requirements.

REFERENCES

Water Level Measurement Procedure included in the current Hazardous Waste Remediation Bureau Master QAPP, EPA RFA #13027.

ATTACHMENT

Water Level Worksheet

WATER LEVEL WORKSHEET

Water Level Worksheet

OK Tool Superfund Site (OU-1), Milford, New Hampshire

Date:_____

Field Personnel: _____

Well #	Depth of wells (feet)[1]	Length of Screen (feet)	Screen depth (ft below measuring point)	Measured Depth to Water (feet)	Comments
OKT_B95-3	76.29	10	66.4 - 76.4		No water level
OKT_B95-5	48.45	10	38.5 - 48.5		No water level
OKT_B95-8	88.18	10	78.3 - 88.3		No water level
OKT_B95-9	22.76	10	13.1 - 23.1		No water level
OKT_B95-12	62.56	5	57.0 - 62.0		No water level
OKT_B95-13	64.23	5	59.2 - 64.2		
OKT_B95-15	95.25	10	84.9 - 94.9		No water level
OKT_CI	68.17	47	17.9 - 67.9		
OKT_EW-1	90.14	30	59.9 - 89.9		No water level
OKT_EW-2	84.2	30	53.7 - 83.7		No water level
OKT_FH-14	42	10	32 - 42		(24 inch diameter well)
OKT_IP-1	75.82	5	70.2 - 75.2		No water level
OKT_IP-2	88.65	5	83.0 - 88.0		No water level
OKT_IP-3	88.00	5	82.9 - 87.9		
OKT_IP-4	87.51	5	82.2 - 87.2		No water level
OKT_IP-5	89.51	5	84.2 - 89.2		No water level
OKT_IP-6	75.31	5	0.4 - 75.4		
OKT_IP-7	78.68	5	73.0 - 78.0		No water level
OKT_IP-8	79.62	5	74.8 - 79.8		
OKT_IP-9	80.29	5	74.8 - 79.8		
OKT_IP-10	69.52	5	64.5 - 69.5		
OKT_IP-11	69.78	5	64.2 - 69.2		No water level
OKT_IP-12	68.99	5	63.2 - 68.2		
OKT_IP-13	58.52	5	53.7 - 58.7		
OKT_IP-14	58.70	5	52.9 - 57.9		
OKT_IP-101	71.91	5	66.7 - 71.7		
OKT_IP-102	71.57	5	67.0 - 72.0		
OKT_IP-103	65.04	5	60.0 - 65.0		No water level
OKT_IP-103A	26.10	5	21.4 - 26.4		
OKT_IP-104	96.85	5	91.7 - 96.7		No water level
OKT_IP-105	52.58	5	47.5 - 52.5		No water level
OKT_IP-106	52.70	5	47.3 - 52.3		No water level
OKT_IP-107	85.14	5	80.0 - 85.0		No water level

Water Level Worksheet

OK Tool Superfund Site (OU-1), Milford, New Hampshire

Date:_____

Field Personnel: _____

Well #	Depth of wells (feet)[1]	Length of Screen (feet)	Screen depth (ft below measuring point)	Measured Depth to Water (feet)	Comments
OKT_IP-E1	72.83	5	67.5 - 72.5		
OKT_IP-E2	75.83	5	70.9 - 75.9		
OKT_IP-E2A	39.29	5	34.6 - 39.6		
OKT_IP-E3	71.66	5	67.1 - 72.1		
OKT_IP-E4	74.09	5	69.3 - 74.3		
OKT_IP-E5	75.18	5	70.1 - 75.1		
OKT_IW-1	103.42	30	71.5 - 101.5		
OKT_IW-2	88.55	20	59.5 - 89.5		
OKT_MI-19	80.00	15	66.5 - 81.5		No water level
OKT_MI-20	40.00	30	11.5 - 41.5		No water level
OKT_MI-21	40.00	25	18.0 - 53.0		No water level
OKT_MI-22	114.00	15	99.9 - 114.9		
OKT_MI-32	75.00	40	33.6 - 78.6		No water level
OKT_MW-2A	39.00	10	28.9 - 38.9		No water level
OKT_MW-2B	81.00	10	71.3 - 81.3		No water level
OKT_MW-2R	167.00	-	139.0 - 167.0		
OKT_MW-0312	100.70	5	95.3- 100.3		No water level
OKT_MW-16A	29.38	10	19.0 - 29.0		No water level
OKT_MW-16B	51.85	10	41.9 - 51.9		No water level
OKT_MW-16C	85.50	10	75.7 - 85.7		
OKT_MW-16R	390.00	-	100-390		
OKT_MW-27	15.00	10	5.8 - 15.8		No water level
OKT_MW-28	15.00	10	3.9 - 13.9		No water level
OKT_NCP	68.00	47	16.9 - 66.9		
OKT_PW-1S	36.01	10	26.0 - 36.0		No water level
OKT_PW-1D	95.06	10	84.9 - 94.9		
OKT_PW-2S	30.36	10	20.0 - 30.0		
OKT_PW-2M	59.86	10	49.5 - 59.5		
OKT_PW-2D	107.68	10	97.3 - 107.3		
OKT_PW-2R	135.35	20	115.3 - 135.3		
OKT_PW-3S	32.79	10	22.6 - 32.6		No water level
OKT_PW-3D	97.77	10	87.6 - 97.6		

Water Level Worksheet

OK Tool Superfund Site (OU-1), Milford, New Hampshire

Date:_____

Field Personnel: _____

Well #	Depth of wells (feet)[1]	Length of Screen (feet)	Screen depth (ft below measuring point)	Measured Depth to Water (feet)	Comments
OKT_PW-4M	43.90	10	33.7 - 43.7		No water level
OKT_PW-4D	79.00	10	69.0 - 79.0		No water level
OKT_PW-5M	63.90	10	53.9 - 63.9		
OKT_PW-5D	108.61	10	98.1 - 108.1		
OKT_PW-5R	132.77	10	122.3 - 132.3		
OKT_PW-6S	32.45	10	22.1 - 32.1		
OKT_PW-6M	52.80	10	43.2 - 53.2		
OKT_PW-6MB	71.00	10	60.8 - 70.8		
OKT_PW-6D	99.48	10	75.6 - 85.6		
OKT_PW-6R	107.75	10	98.1 - 108.1		No water level
OKT_PW-7S	43.84	10	34.1 - 44.1		No water level
OKT_PW-7M	63.45	10	53.0 - 63.0		No water level
OKT_PW-8M	41.71	10	32.1 - 42.1		
OKT_PW-9M	42.06	10	31.2 - 41.2		No water level
OKT_PW-10M	57.49	10	47.5 - 57.5		
OKT_PW-10D	107.73	10	97.5 - 107.5		
OKT_PW-11M	58.41	10	48.3 - 58.3		No water level
OKT_PW-11D	108.79	10	98.5 - 108.5		
OKT_PW-12S	32.11	10	21.8 - 31.8		No water level
OKT_PW-12M	72.07	10	62.1 - 72.1		No water level
OKT_PW-12D	99.09	10	88.8 - 98.8		No water level
OKT_PW-12R	136.16	20	115.9 - 135.9		
OKT_PW-13S	32.06	10	21.7 - 31.7		
OKT_PW-13M	72.07	10	61.9 - 71.9		
OKT_PW-13D	106.94	10	96.5 - 106.5		
OKT_PW-14S	31.97	10	21.7 - 31.7		
OKT_PW-14M	72.00	10	61.8 - 71.8		
OKT_PW-14D	102.15	10	91.9 - 101.9		
OKT_PW-15M	56.30	10	46.4 - 56.4		
OKT_PW-15D	73.00	10	62.9 - 72.9		
OKT_PW-16M	51.60	10	41.8 - 51.8		
OKT_PW-16D	79.60	10	69.6 - 79.6		

Water Level Worksheet

OK Tool Superfund Site (OU-1), Milford, New Hampshire

Date:_____

Field Personnel: _____

Well #	Depth of wells (feet)[1]	Length of Screen (feet)	Screen depth (ft below measuring point)	Measured Depth to Water (feet)	Comments
OKT_PW-17S	27.00	10	16.8 - 26.8		
OKT_PW-17M	45.00	10	35.0 - 45.0		
OKT_PW-18M	47.60	10	37.4 - 47.4		
OKT_PW-18D	63.00	10	52.7 - 62.7		
OKT_PW-19M	46.90	10	37.2 - 47.2		
OKT_PW-19D	69.00	10	58.8 - 68.8		
OKT_PW-20S	33.40	10	23.7 - 33.7		
OKT_PW-20M	70.30	10	60.6 - 70.6		
OKT_PW-20D	98.50	10	88.4 - 98.4		
OKT_PW-21	64.90	10	54.9 - 64.9		No water level
OKT_PW-22	28.00	10	18.2 - 28.2		
OKT_PW-24	28.40	10	18.8 - 28.8		
OKT_PW-25S	29.40	10	19.2 - 29.2		
OKT_PW-25D	60.50	10	50.2 - 60.2		
OKT_PW-26S	28.10	10	17.9 - 27.9		
OKT_PW-27S	27.70	10	17.5 - 27.5		
OKT_PW-28	74.70	10	64.8 - 74.8		
OKT_RW-1	40.94	10	29.9 - 39.9		
OKT_SP-1	64.90	5	58.9 - 63.9		
OKT_SP-2	60.60	5	55.5 - 60.5		
OKT_SVE-1	25.60	15	9.8 - 24.8		No water level
OKT_SVE-2	27.40	15	11.9 - 26.9		
OKT_SVE-3	28.40	15	13.2 - 28.2		
OKT_SVE-4	26.90	15	11.4 - 26.4		No water level
OKT_SVE-5	26.60	15	11.4 - 26.4		No water level
OKT_SVE-6	26.10	15	10.5 - 25.5		No water level

Notes:

[1] Depth is from top of PVC or top of casing if there is no PVC.

bgs = below ground surface

- = wells are open boreholes with no screened interval.

Water levels are to be collected before sampling only from wells being sampled during the current sampling event.

Wells not sampled during this sampling round are highlighted in yellow.

Well depths from measuring point are from the 4 May 2016 Water Level Reading Table provided by Weston Solutions, Inc.

Screen depths are taken from Table 4-6 in the 2015 Annual Report.

APPENDIX B-2
PURGING AND SAMPLING USING PERISTALTIC PUMPS

PURGING AND SAMPLING USING PERSITALTIC PUMPS

SCOPE AND APPLICATION

This standard operating procedure (SOP) *Purging and Sampling Using Peristaltic Pumps* covers groundwater sampling at the OK Tool OU1 Superfund Site in Milford, New Hampshire. The purpose is to provide a frame work for collecting groundwater samples that are indicative of mobile organic and inorganic loads at ambient flow conditions. We accomplish this by low pumping rates and negligible water level draw down.

Any modifications to this SOP shall be approved in advance by the New Hampshire Department of Environmental Services (NHDES) Project Manager and Quality Assurance (QA) Coordinator, in consultation with the United States Environmental Protection Agency (EPA), documented in the field logbook and presented in the final report.

Low flow field parameter sampling is not required at this site as there is adequate data indicating that purging three tubing volumes is sufficient to collect a representative sample from monitoring wells. The theory is that the water in the screened zone is in equilibrium with the aquifer. The goal is to sample only the water in the screened zone at a rate approaching ambient groundwater flow in order to minimize disturbance of the sampling zone and mixing of the riser water.

The collection of groundwater samples using the following sampling procedures will be carried out at a number of locations on the site identified in **Table 2** in the Sampling and Analysis Plan (SAP). Prior to conducting the sampling event, information regarding well construction, development, and water level records for each well to be sampled should be reviewed. Refer to **Table 4.** The attached diagram illustrates the equipment setup schematics. Sample tubing will be located at the mid-point of the saturated screen length.

Refer to **Table 3** for proper containers, preservatives, and holding times. Refer to the Chain of Custody, Sample Handling & Shipping SOP for proper sample labeling.

PERMANGANATE

The NHDES anticipates encountering residual sodium permanganate (permanganate) at some site monitoring wells during groundwater monitoring events due to the proximity of some injection points to monitoring wells, the fact that some monitoring wells are being used as injection points, and the volume of permanganate that was injected. The purge water that is evacuated from the well shall be monitored for the presence of permanganate. The New Hampshire Department of Public Health Services (NHDPHS) and EPA laboratories are aware that some samples may contain permanganate. If sodium permanganate is present, the approximate concentration shall be determined based on a direct comparison to pre-prepared vials of sodium permanganate standards, noted on the attached worksheet and the appropriate box shall be checked off on the chain of custody form. This method requires the addition of

ascorbic acid crystals to neutralize the permanganate. If the concentration of permanganate is greater than 100 parts per million (ppm), then no sample will be collected for laboratory analysis.

PURGE VOLUMES

The minimum purge volume for each well is the minimum of amount of water needed to purge three tubing volumes of water from that well based on the depth of the well rather than the current water level. Instead of calculating the purge volumes in the field, the minimum purge volumes for each well has been calculated and recorded on the attached worksheet to save time in the field and to ensure that the appropriate amount of water has been purged.

EQUIPMENT:

- Appropriate health and safety gear.
- Informational materials for sampling event: A copy of the current approved site-specific Health and Safety Plan, site-specific SAP, the current Hazardous Waste Remediation Bureau (HWRB) Master QAPP, monitoring well construction data, sampling worksheets, location maps, field data from prior sampling events, manuals for sampling, equipment set up diagrams, and the monitoring instruments' operation and maintenance manuals shall be brought to the site.
- Well/Site keys.
- Electronic water level meter of appropriate length [e.g., 100 feet (ft.), 200 ft.] capable of measuring to one one-hundredth of a foot (0.01 ft.) accuracy.
- Adjustable rate Geotech Peristaltic Pump Series II Variable Speed pump 300 + 600 RPM with Easy Load Peristaltic Pump Heads capable of using thin wall tubing and getting down to a purge rate of 50 milliliters per minute (ml/min).
- **Note:** When using peristaltic pumps, the pump must be placed on a table, or other surface, as close to the height of the well casing as possible to eliminate or reduce the buildup of air bubbles in the sample line between the peristaltic pump and the top of the casing.
- Power source: Fully charged batteries or portable battery jump packs capable of running the equipment e.g., (peristaltic pumps) all day, with fully charged spare batteries on hand.
- Appropriate tubing:

  The HWRB requires that a fiberglass measuring tape or other accurate measuring device be used when measuring and installing tubing.

  Dedicated one-quarter inch inside diameter x three eights inch outside diameter (1/4" ID x 3/8" OD) polyethylene tubing shall be cut to reach the appointed sampling depth and have enough for discharging.

Pharmaceutical or surgical grade silicon tubing for the pump - For sampling: thin walled tubing #16 (1/8" ID x ¼" OD x 1/16" Wall) and/or thin walled tubing #14 (1/16" x 3/16" x 1/16") if necessary to reduce flow to 50 ml/min. For connections: thick walled tubing #15 (3/16" x 3/8" x 3/32").

- A 250 mL graduated cylinder measured in 10 ml increments to accurately measure the flow in mL/min.
- A stop-watch to accurately measure the flow in ml/min.
- Graduated beakers measured in liters to collect purge volumes.
- Laboratory-grade deionized (DI) water.
- Paraphernalia to adequately shade equipment and tubing to prevent bubbles forming in the tubing, and to prevent the acid preservative in the sample containers from volatilizing. Paraphernalia should also be designed to protect both personnel and equipment from other elements including rain, wind, and etcetera.
- Decontamination supplies in accordance with the Decontamination SOP in the SAP.
- Logbook(s) and other forms (e.g., sample labels, chain-of-custody records and seals, sampling worksheets).
- Sample containers, preserved as necessary, sample labels, cooler and loose ice. Refer to **Table 2** and **Table 3** for analysis and containers.
- Re-sealable plastic bags to protect and store samples.
- Unpreserved VOA vials and ascorbic acid crystals for collecting samples containing sodium permanganate.
- Unpreserved VOA vials (one per sampler) to check approximate permanganate concentration. These vials will be rinsed and re-used.
- A series of permanganate concentration standards in unpreserved VOA vials to compare with the groundwater samples for the approximate groundwater permanganate concentrations.
- Trash bags to containerize solid waste.
- Toolbox to include such items as wrenches, pliers, screw drivers, 25 ft. measuring tape, a sharp knife with a locking blade, duct tape, etc.

PRELIMINARY PROCEDURES:

1. A synoptic water level measurement round shall be performed (in the shortest possible time) before any purging and sampling activities begin, from site monitoring wells included in

Table 2 and on the Water Level Measurement Worksheet in the Water Level Measurement SOP in the SAP.

2. Check well for security damage or evidence of tampering, record observations.

3. Set up equipment according to the attached Purge and Sample Diagram.

4. Use the attached Purge Volumes and Permanganate Worksheet to record sampling data.

5. The #16 (1/8" x 1/4" x 1/16") size tubing shall be used through the peristaltic pump to collect samples.

   The #14 (1/16" x 3/16" x 1/16") size tubing may be used if necessary to get down to a lower flow, but not less than 50 ml/min. If historical results indicate that 50 ml/min could not be maintained using the #16 tubing, connect the #14 tubing before the pump is started.

   The #15 (3/16" x 3/8" x 3/32") tubing is used for connections only. The #15 tubing is not to be used through the peristaltic pump to collect samples.

6. Preserve a number of VOA vials with one eighth (1/8) of a teaspoon of ascorbic acid crystals.

7. Mark an unpreserved VOA vial (one per sampler) as the vial used to check the approximate permanganate concentration.

8. Install polyethylene sampling tubing if necessary. Set the tubing intake at the middle of the saturated screened interval. Great care must be taken to minimize the disturbance of particulates that can greatly extend the purge time by increasing turbidity. If possible keep the pump intake one to two feet above the bottom of the well to avoid disturbing any sediment on the bottom.

SAMPLING PROCEDURE:

1. Unlock the protective casing or unbolt the flush mount cover of the well.

2. Consult the worksheet for the minimum purge volumes needed for that well. This value represents three tubing volumes based on the depth of the well rather than the current water level.

3. Start the pump at a flow rate consistent with historical purge rates for existing wells. **Pumping rates shall not be less than 50 ml/minute.**

   If no historical data is available start the pump at 50 ml/min. Check the water level. Adjust the pump speed until there is little or no water level drawdown. Air captured in the tubing can usually be removed by elevating the discharge tube and pump to allow the air to continue rising until discharged with the water.

4. Begin purging.

5. **Check for the presence of permanganate.** The water will appear pink in the presence of permanganate. The shade of pink will depend on the concentration. The higher the concentration of permanganate, the deeper the pink.

   If permanganate is present, the approximate concentration shall be noted on the sampling worksheet. The sample requires special preservation and handling as noted below.

   In most situations, a current round of permanganate monitoring will have been performed within one month of the sampling event. However, the sampler should confirm the presence of permanganate while sampling.

6. Purge the well until the minimum purge volume has been reached, regardless of the concentration of any permanganate that may be present when purging begins.

7. Immediately begin sample collection from the pump tubing after the discharge line is purged.

   a. IF PERMANGANATE IS NOT PRESENT:

   If a current round of permanganate monitoring has been completed prior to the sampling event (e.g., within one month), the approximate concentration of permanganate will be known and indicated on **Table 2**. However, if a monitoring well is listed as possibly having permanganate present, but at the time of sampling appears to be at or near zero visible permanganate, the sample should still be collected into an ascorbic acid preserved vial and submitted for headspace analysis.

   The VOC samples should be collected first and directly into 40 ml sample containers preserved with hydrochloric acid, ensuring that there are no air bubbles in the vial by turning the vial upside down and tapping it lightly. All sample containers should be filled by allowing the discharge to flow gently down the inside of the container with minimal turbulence, reduce flow rate if necessary. All other sample containers will then be filled following VOC sample collection. Sample containers must be wiped dry. After collection of the samples, place samples in re-sealable plastic bags and then in loose ice within the cooler. See **Table 3** for proper containers, preservatives, and holding times.

   b. WHEN PERMANGANATE IS PRESENT:

   1) Collect the sample in 40 ml VOA vials preserved with one eighth (1/8) of a teaspoon of ascorbic acid crystals. Add enough sample water to fill the vial approximately one quarter full, gently swirl the vial to remove entrapped air in the ascorbic acid crystals and to help dissolve the crystals. Carefully without swirling the vial, add additional sample to the vial and fill as usual. After the vial is completely filled and capped, there should be no pink color in the sample. If there is pink color in the sample and there are un-dissolved ascorbic acid crystals in the vial, invert the vial repeatedly to help dissolve the ascorbic acid.

If the ascorbic acid does not completely neutralize the permanganate and the sample is still a pink color, additional ascorbic acid will be needed. <u>See the next Section below for the correct procedure.</u>

2) Rinse the empty designated VOA vial with the purge water and then fill the vial. Compare the color in the vial with permanganate color standards to determine the concentration of permanganate.

   Color standards for permanganate shall be in 40 ml VOA vials for comparison, similar to the attached permanganate concentration standards photo.

   Set the standards and the sample on a white piece of paper. Place a separate piece of white paper behind the two vials to eliminate any bias from the bottom or background of the area where comparisons are performed. Compare the concentrations.

3) Record the approximate concentration of permanganate on the worksheet.

4) **If the concentration of permanganate is greater than 100 ppm, after purging the minimum volume, NO SAMPLE will be collected for laboratory analysis.**

5) Put a check mark in the appropriate box on the chain of custody form indicating that ascorbic acid was used for the presence of permanganate.

6) Rinse the designated vial with DI water and keep for re-use.

8. Replace the protective cap or flush mount cover on the well and lock it securely.
9. All non-dedicated equipment must be decontaminated following approved decontamination procedures as outlined in the Decontamination SOP in the SAP.

PROCEDURE WHEN ADDITIONAL ASCORBIC ACID IS NEEDED

If the ascorbic acid does not completely neutralize the permanganate and the sample is still a pink color, additional ascorbic acid will be needed.

Discard the contents of the sample vial on the ground and reuse that vial as a test vial for the following procedure:

1) Add enough ascorbic acid to completely neutralize the permanganate, keeping track of the total amount of ascorbic acid used. The sample should be clear. It is acceptable to have un-dissolved ascorbic acid crystals.

2) Record the total amount of ascorbic acid used to neutralize the sample on the worksheet in the comments section.

3) Discard the test sample vial.

4) Prepare new sample vials with the same amount of ascorbic acid crystals determined above in step 2.

5) Collect the sample as described above.

DOCUMENTATION

The Purge Volumes and Permanganate Worksheet shall be used to document the following information at a minimum:

- Date wells were purged
- Weather conditions
- Name of sampling personnel
- Well identification and location (i.e., inside or outside slurry wall)
- Well depth
- Minimum purge volumes
- Approximate pump speeds
- Note any changes to pump speeds
- Type of samples to be collected (i.e., VOCs 8260B or VOCs Headspace, metals)
- Quality assurance samples (i.e., duplicates and equipment blanks)
- Presence of permanganate and approximate concentration
- Note if ascorbic acid was used to neutralize the permanganate and the quantity used if greater than 1/8 teaspoon
- Any additional comments

DECONTAMINATION

Non-dedicated equipment (i.e., water level) shall be cleaned prior to fieldwork and decontaminated after each sampling location following the approved Decontamination SOP in the SAP.

QUALITY ASSURANCE

See **Table 5** for a list of equipment blanks, duplicate samples and analysis.

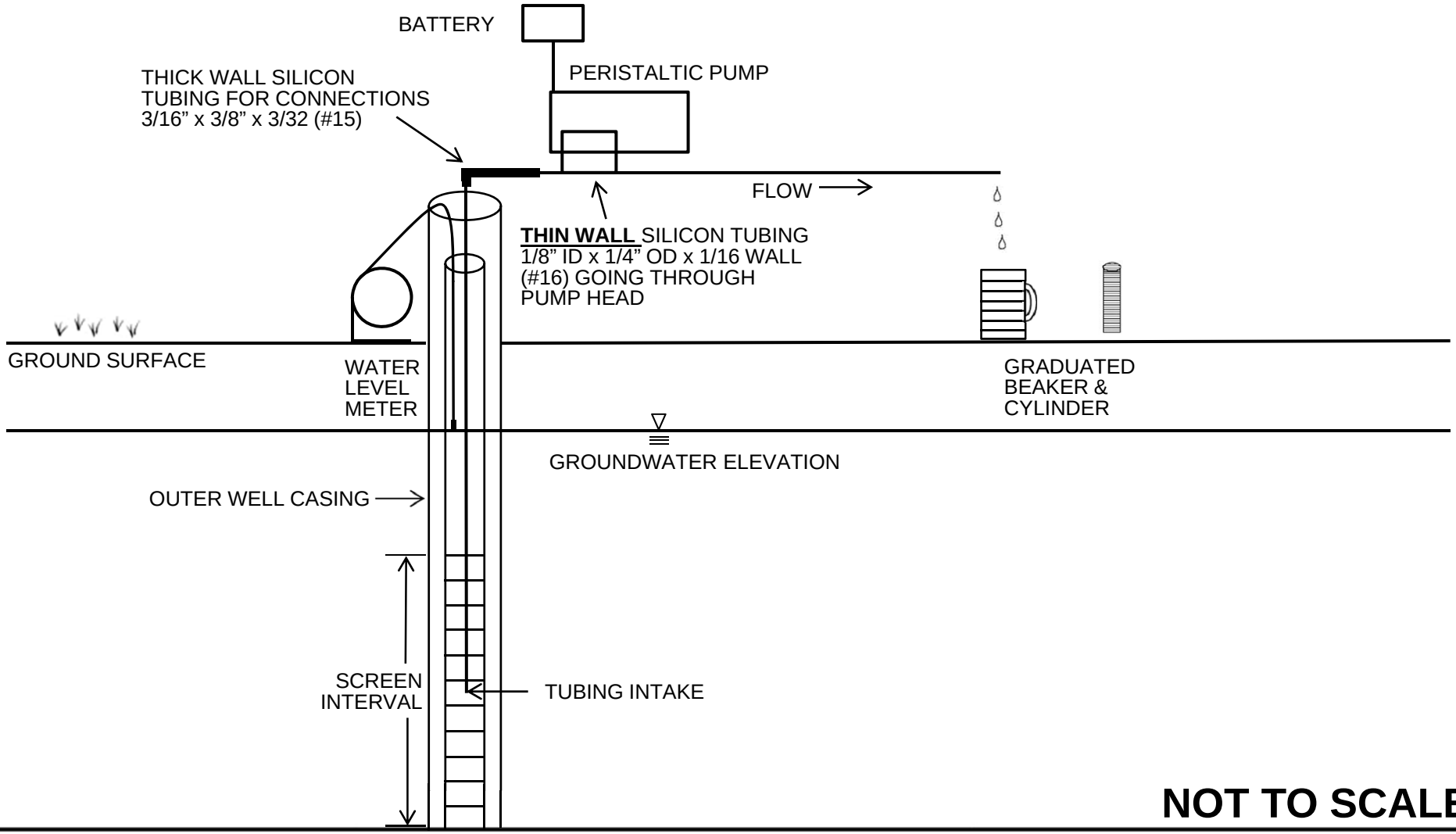
ATTACHMENTS

Purge and Sample Setup Diagram
Purge Volumes and Permanganate Worksheet
Approximate Permanganate Concentration

EQUIPMENT SETUP DIAGRAM

EQUIPMENT SETUP DIAGRAM USING A PERISTALTIC PUMP TO PURGE THREE TUBING VOLUMES

OK Tool Superfund Site, Milford, New Hampshire



NOT TO SCALE

PURGE VOLUMES AND PERMANGANATE WORKSHEET

Purge Volumes & Permanganate Worksheet

OK Tool (OU-1) Superfund Site, Milford, New Hampshire

70 Total Wells: 45 to be analyzed for 8260B (EPA Lab); 25 with possible permanganate to be analyzed for Headspace analysis EPA Lab). 4 wells (not included in the 70) are not scheduled to be sampled due to high permanganate levels. OKT_FH-14 will be collected as a residential sample and analyzed by Method 524

Weather conditions:							
Sampling Personnel:							
Well ID	**Minimum Purge Volume (liters)[1]**	**Approx. Pump Speed[2]**	**Well Depth (feet) Top PVC**	**$NaMnO_4$ Approx. Conc. (ppm)[3]**	**Duplicate Samples**	**Date Sampled**	**Comments [Ascorbic Acid Used (Y/N) and Quantity] Please note any changes to pump speed**
Wells Inside Slurry Wall (28) - VOCs							
OKT_IW-1	**3.0**	2 to 3	103.42				
OKT_IW-2	**2.6**	3	88.55				
OKT_PW-5M	**1.8**	3	63.90				
OKT_PW-5D	**3.1**	3	108.61				
OKT_PW-5R	**3.8**	1	132.77				
OKT_PW-6S	**0.9**	3	32.45		**DUP**		
OKT_PW-6M	**1.5**	3	52.80				
OKT_PW-6MB	**2.1**	3	71.00				
OKT_PW-8M	**1.2**	3	41.71				
OKT_PW-10M	**1.7**	3	57.49				
OKT_PW-10D	**3.1**	3	107.73				
OKT_PW-16M	**1.5**	3	51.60				
OKT_PW-17S	**0.8**	3	27.00				
OKT_PW-17M	**1.3**	3	45.00				
OKT_PW-18M	**1.4**	3	47.60				
OKT_PW-19M	**1.4**	3	46.90				
OKT_PW-19D	**2.0**	3	69.00				
OKT_PW-20S	**1.0**	3	33.40		**DUP**		**Year prior to Five Year Review: Water level equipment blank is collected after use here as required. See Table 5.**
OKT_PW-20M	**2.0**	3	70.30				
OKT_PW-24	**0.8**	3	28.40				
OKT_PW-25S	**0.9**	3	29.40				
OKT_PW-26S	**0.8**	3	28.10	--	--	--	**Well is silted in to top of screen. No sample 2017.**
OKT_PW-27S	**0.8**	3	27.70				
OKT_PW-28	**2.2**	3	74.70				
OKT_RW-1	**1.2**	3	40.94				
OKT_SP-2	**1.8**	3	60.60				
OKT_SVE-2	**0.8**	3	27.40				
OKT_SVE-3	**0.8**	3	28.40				

Purge Volumes & Permanganate Worksheet

OK Tool (OU-1) Superfund Site, Milford, New Hampshire

70 Total Wells: 45 to be analyzed for 8260B (EPA Lab); 25 with possible permanganate to be analyzed for Headspace analysis EPA Lab). 4 wells (not included in the 70) are not scheduled to be sampled due to high permanganate levels. OKT_FH-14 will be collected as a residential sample and analyzed by Method 524

Weather conditions:							
Sampling Personnel:							
Well ID	**Minimum Purge Volume (liters)[1]**	**Approx. Pump Speed[2]**	**Well Depth (feet) Top PVC**	**$NaMnO_4$ Approx. Conc. (ppm)[3]**	**Duplicate Samples**	**Date Sampled**	**Comments [Ascorbic Acid Used (Y/N) and Quantity] Please note any changes to pump speed**
Wells Outside Slurry Wall (18) VOCs							
OKT_B95-13	**1.9**	3	64.23				
OKT_FH-14	**1.2**	3?	42.00	N/A	--	--	**To be sampled at the Fish Hatchery in 2017 as a residential sample, Method 524.**
OKT_MW-2R	**4.8**	2.8	167.00				**Pump speed based on Fall 2016 sampling**
OKT_MW-16C	**2.5**	3	85.50				
OKT_PW-1D	**2.7**	3	95.06				
OKT_PW-2S	**0.9**	3	30.36				
OKT_PW-2M	**1.7**	3	59.86				
OKT_PW-2D	**3.1**	3	107.68				
OKT_PW-2R	**3.9**	1	135.35				
OKT_PW-3D	**2.8**	3	97.77				
OKT_PW-11D	**3.1**	3	108.79				
OKT_PW-12R	**3.9**	1	136.16				
OKT_PW-13S	**0.9**	3	32.06				
OKT_PW-13M	**2.1**	3	72.07				
OKT_PW-13D	**3.1**	3	106.94				
OKT_PW-14S	**0.9**	3	31.97				
OKT_PW-14M	**2.1**	3	72.00		**DUP**		
OKT_PW-14D	**3.0**	3	102.15				

Purge Volumes & Permanganate Worksheet

OK Tool (OU-1) Superfund Site, Milford, New Hampshire

70 Total Wells: 45 to be analyzed for 8260B (EPA Lab); 25 with possible permanganate to be analyzed for Headspace analysis EPA Lab). 4 wells (not included in the 70) are not scheduled to be sampled due to high permanganate levels. OKT_FH-14 will be collected as a residential sample and analyzed by Method 524

Weather conditions:							
Sampling Personnel:							
Well ID	**Minimum Purge Volume (liters)[1]**	**Approx. Pump Speed[2]**	**Well Depth (feet) Top PVC**	**$NaMnO_4$ Approx. Conc. (ppm)[3]**	**Duplicate Samples**	**Date Sampled**	**Comments [Ascorbic Acid Used (Y/N) and Quantity] Please note any changes to pump speed**
Wells Inside Slurry Wall with Possible Permanganate (25) - VOCs Headspace							
OKT_CI	**2.0**	3	68.17				
OKT_IP-3	**2.1**	3	71.66				**Pump speed based on Fall 2016 sampling**
OKT_IP-8	**2.3**	3	79.62				
OKT_IP-9	**2.3**	3	80.29				
OKT_IP-10	**2.0**	3	69.52				
OKT_IP-12	**2.0**	3	68.99				
OKT_IP-13	**1.7**	3	58.52				
OKT_IP-14	**1.7**	3	58.70				
OKT_IP-101	**2.1**	1?	71.90				**Pump speed to be detemined during Fall 2017 sampling**
OKT_IP-102	**2.1**	3	71.57				
OKT_IP-103A	**0.8**	3	26.10		**DUP**		**Pump speed based on Fall 2016 sampling**
OKT_IP-E2A	**1.1**	3	39.29				**Pump speed based on Fall 2016 sampling**
OKT_IP-E3	**2.1**	3	71.66				**Pump speed based on Fall 2016 sampling**
OKT_IP-E4	**2.1**	3	74.09				
OKT_IP-E5	**2.2**	3	75.18				**Pump speed based on Fall 2016 sampling**
OKT_MI-22	**3.3**	2 to 3	114.00				
OKT_NCP	**2.0**	3	68.00				
OKT_PW-6D	**2.9**	3	99.48				
OKT_PW-15M	**1.6**	3	56.30				
OKT_PW-15D	**2.1**	3	73.00				
OKT_PW-16D	**2.3**	3	79.60				
OKT_PW-18D	**1.8**	3	63.00				
OKT_PW-20D	**2.8**	3	98.50				
OKT_PW-22	**0.8**	3	28.00		**DUP**		
OKT_SP-1	**1.9**	3	64.90				

Notes:

$NaMnO_4$ = sodium permanganate

ppm = parts per million

VOC = volatile organic compound

SOP = standard operating procedure

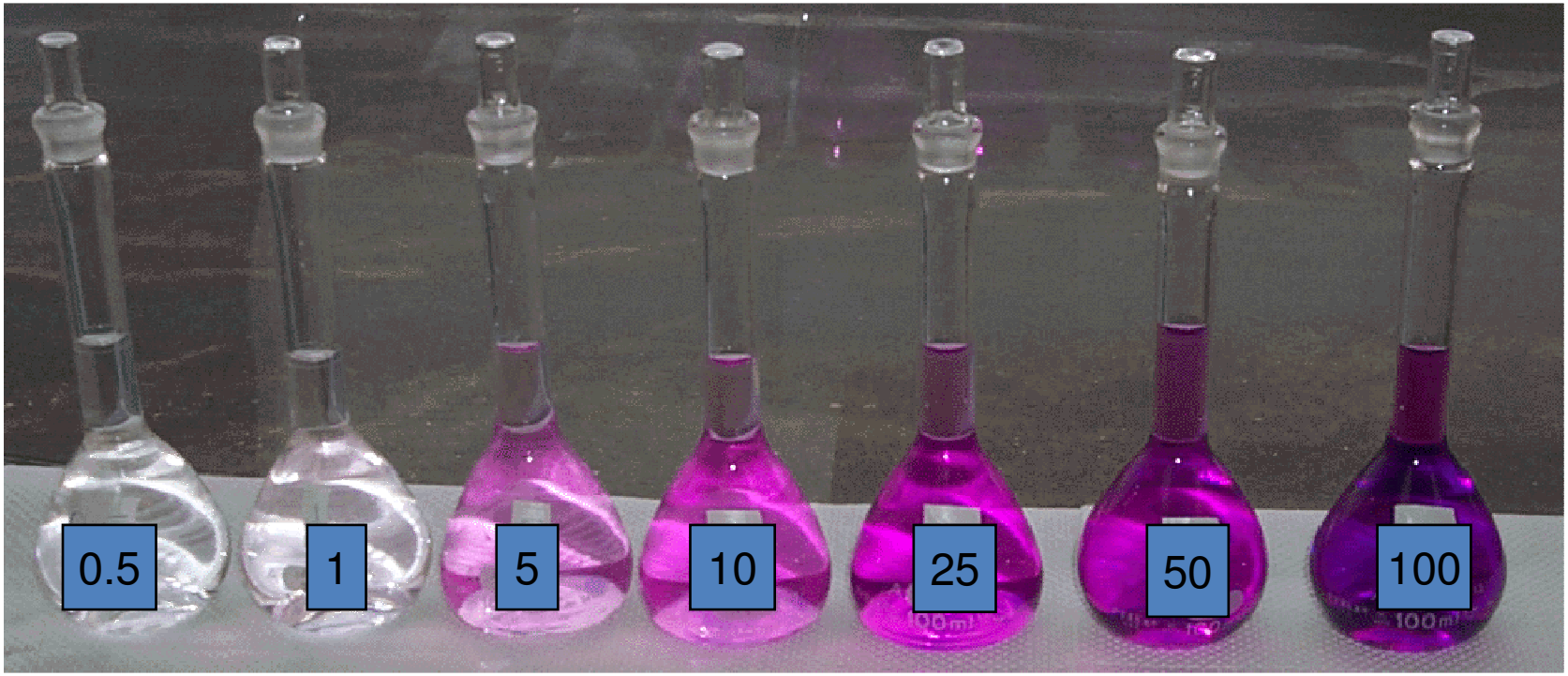
1. Minimum purge volumes are calculated using the following information: Minimum purge volume = well depth x 0.02892
   Factor for 1/4-inch ID tubing is = 9.64 milliliters (mL) for 1 tubing volume
   9.64 mL x 3 tubing volumes = 28.92 mL / 1000 mL/L = 0.02892 L
2. The pump speeds are based on size #16 (1/8 inch by 1/4 inch 1/16 inch) thin wall tubing. Speeds may vary.
   The thick wall tubing size #15 (3/16 inch by 3/8 inch by 3/32 inch) is ONLY used for connections.
3. **All sample containers should be filled by allowing the discharge to flow gently down the inside of the container with minimal turbulence; lower pump speed accordingly before sampling VOCs.**
4. **Permanganate ($NaMnO_4$):** Samples with permanganate need special preservation. See Purging and Sampling Using Peristaltic Pumps SOP for specific details.
   Purge water that contains permanganate will be various shades of pink to purple depending on concentration.

NO SAMPLE WILL BE COLLECTED IF THE PERMANGANATE IS OVER 100 PPM

5. All purge water generated shall be discharged to the ground surface.

APPROXIMATE PERMANGANATE CONCENTRATION STANDARDS PHOTO

Approximate Permanganate Concentration



Permanganate Concentration, milligrams $KMnO_4$ / Liter = ppm

Conversion Factors:

(milligrams $KMnO_4$ / Liter) x (0.8978) = (milligrams $NaMnO_4$ / Liter)

(milligrams $KMnO_4$ / Liter) x (0.7516) = (milligrams MnO_4^- / Liter)

Note: ppm x 10,000 = %

APPENDIX B-3
SAMPLING EQUIPMENT DECONTAMINATION

SAMPLING EQUIPMENT DECONTAMINATION

PURPOSE

The purpose of this Standard Operating Procedure (SOP) *Equipment Decontamination* is designed to provide a procedure for preventing, minimizing, or limiting cross-contamination of environmental samples at the OK Tool (OU-1) Superfund Site in Milford, New Hampshire. This SOP focuses on small equipment decontamination (e.g., water level meters). Removing or neutralizing contaminants from equipment not only minimizes the likelihood of sample cross contamination, but reduces or eliminates transfer of contaminants to clean areas and prevents the mixing of incompatible substances.

Any modifications to this SOP shall be approved in advance by the New Hampshire Department of Environmental Services (NHDES) Project Manager and Quality Assurance (QA) Coordinator, in consultation with the United States Environmental Protection Agency, documented in the field logbook and presented in the final report.

EQUIPMENT AND MATERIALS

The following is a list of equipment and material commonly used for decontamination:

- Appropriate personal protective equipment (e.g., safety glasses, appropriate gloves, boots).
- Informational materials for sampling event: A copy of the current approved site-specific Health and Safety Plan, site-specific Sampling and Analysis Plan (SAP), the current Hazardous Waste Remediation Bureau Master (HWRB) Master QAPP.
- Logbook and pen. **Note: Only ball point pens with black ink shall be used to record field data (e.g., worksheets, log books)**. Sharpies can bleed through pages and smudge, making the documentation hard to read.
- Laboratory-grade deionized (DI) water
- Brushes
- Spray bottles and/or pressurized sprayers
- Drop cloth/plastic sheeting.
- Paper towels

DECONTAMINATION PROCEDURE

The decontamination procedure is summarized as follows:

1. Remove gross contamination from the equipment by brushing, where appropriate, and then rinsing with DI water.

2. Flush the equipment with DI water. If equipment includes pumps, make sure that rinse water is mechanically run through the pump system (see special notes). If equipment includes pore water samplers, a large amount of water is needed for the flush.

3. Air dry equipment.

4. Secure clean equipment.

SPECIAL NOTES

All field activities must be carried out in accordance with a site-specific Health and Safety Plan.

Water level indicator probes shall be decontaminated after each monitoring well and, at a minimum, the length of tape used in that well in accordance with the above described methods.

Sensitive equipment which is not waterproof should be wiped down with a damp cloth.

Solid Waste – Place all solid waste materials generated (e.g., gloves and plastic sheeting) in an approved container.

Liquid Waste – It is anticipated that the levels of contamination of the contaminated rinse liquids are sufficiently low and containerizing and disposal at a hazardous waste facility is not necessary. Based on this, liquid wastes generated shall be discharged to the ground surface.

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

To ensure that decontamination procedures are meeting the expectations/requirements (e.g., removing detectable levels of contamination) equipment blanks may be collected and analyzed as stated in the site-specific SAP. See **Table 5** for QC requirements.

If an equipment blank is analyzed and found to contain a contaminant, possible sources of error will have to be investigated to determine whether or not the decontamination procedures were properly followed. Possible sources of error include: inadequate scrubbing/ washing/ rinsing of equipment; inadequate choice of chemical rinses; use of contaminated detergents or rinse waters; contact with contaminants after decontamination but prior to sampling, and/or, lab error.

RECORDS AND DOCUMENTATION

General decontamination procedures should be documented in the field log book and the final sampling report.

REFERENCES

The Decontamination Procedure found in the current HWRB Master Quality Assurance Project Plan, EQA RFA# 13027.

APPENDIX B-4
DRINKING WATER SUPPLY SAMPLING

DRINKING WATER SUPPLY SAMPLING

PURPOSE

The purpose of this standard operating procedure (SOP) *Drinking Water Supply Sampling* is to describe the procedure for collecting water samples from drinking water supply wells in the area of the Savage Municipal Water Supply Superfund Site in Milford, New Hampshire; and from the Milford Fish Hatchery, if required.

Any modifications to this SOP shall be approved in advance by the New Hampshire Department of Environmental Services (NHDES) Project Manager and Quality Assurance (QA) Coordinator, in consultation with the United States Environmental Protection Agency (EPA), documented in the field logbook and presented in the final report.

Sampling drinking water supply wells can be an essential part to the proper investigation of groundwater contamination at a potential or actual contaminated site for the protection of human health. Each drinking water supply well represents an exposure point concentration that can be used to assess actual or potential risk to receptors and should be factored into the groundwater investigation program.

Table 2 in the Sampling and Analysis Plan (SAP) contains the list of the water supply wells to be sampled. **Table 3** in the SAP contains the analytes and the analytical methods, containers, sample volumes, preservation, and holding times to be used. Refer to **Table 5** in the SAP for all quality assurance/quality control (QA/QC) sample requirements. The water supply wells are located on **Figure 5** in the SAP which is based on Town Tax Maps. Proper notification to homeowners will be made prior to sample collection by project personnel.

Sampling personnel must use common sense prior to and during sampling activities. For instance, samplers should avoid gassing up a vehicle on the day of the sampling event. Sampling personnel should also remember that they are at someone's home and so should not do anything to adversely impact the residence or unnecessarily inconvenience the resident. All samples will be collected prior to any type of water treatment system located within the residence.

EQUIPMENT AND MATERIALS

- Appropriate personal protective equipment (e.g., gloves) and a site-specific Health & Safety Plan.
- Site-specific SAP, which includes sampling location maps, well information, and other project-specific information.
- Trip blanks, sample containers preserved as necessary, labels, cooler and loose ice.
- Re-sealable plastic bags, bubble wrap, to protect and store samples.
- Brass tap apparatus with permanently attached polyethylene tubing section to obtain a

laminar flow when collecting volatile organic compounds (VOCs) from an outside or basement tap. This apparatus is not to be used on kitchen or bathroom faucets.

- Laboratory-grade deionized (DI) water to rinse brass tap apparatus between locations, etc.
- Paper towels.
- Trash bags to containerize solid waste.
- An appropriate container to collect purge water from a tap at the tank in the basement, if necessary, or other restricted spaces. This may require a low-profile container to collect purge water from a low-lying tap (e.g., the top of a small cooler works well). A short piece of laboratory grade silicone tubing may assist in this effort.
- Flashlight (to enter dark basements/cellars), if required.
- Chain-of-Custody forms, field log books, pencil/pen/sharpies. Note: Only ball point pens with black ink shall be used to record field data (e.g., worksheets, log books). Sharpies can bleed through pages and smudge, making the documentation hard to read.
- A step ladder borrowed from the Milford Fish Hatchery in order to collect the samples for Well #1 and the River Well from the tanks there.

PRELIMINARY PROCEDURES

1. The sampler should inquire as to the type of piping used in the residence and record all available information in the field log book.
2. The residential water distribution system must be inspected to determine whether a water treatment system is in place, such as: a cartridge filter, a water softener, pH adjuster, point of entry (POE) treatment system, radon system, carbon system or an ultra violet system. The sample must be collected prior to any type of water treatment system or the system must be bypassed.
3. The sample may be collected from an indoor faucet (e.g., kitchen, bathroom, tap at the holding tank, etc.) or an outside spigot, preferably from the closest spigot to the holding tank in the plumbing system. An outside spigot is preferable to an inside faucet, for convenience, and to prevent unnecessary overloading of the septic system.
4. If sampling from a kitchen or bathroom faucet, remove the aerator. If the aerator cannot be removed, the sample should be collected at a different location. If no other location is available and the aerator cannot be removed it must be documented and included in the final report.
5. If the sample is collected from an outside spigot, or if the outside spigot is used to purge water, the water may be purged through the homeowner's garden hose (with their permission) with the hose outlet directed away from the building foundation and positioned so as not to cause erosion.

6. Remove any hoses or attachments prior to sample collection. It may not be possible to remove all attachments; however; if there is an attachment made of plastic or other material that cannot be removed and could potentially contaminant the sample, the sample should be collected at a different location.

7. If the sample is collected at the tap at the tank in the basement, first purge the well using the outside faucet, then purge water from the tap at the tank itself into an appropriate container (use a low profile container, should the tap be located near the ground) to flush the faucet and connections back to the tank of any debris.

8. Make sure that the sample point is clean (e.g., no grease, lead soldering, or other possible contaminants) and that no possible sources of cross-contamination (gas cans, solvents, etc.) are nearby.

9. Always wear new personal protection gloves at each location when collecting samples.

10. **Please note**: A dwelling may have numerous sampling locations. The NHDES environmental monitoring database (EMD) requires that each specific sampling location have its own unique identification known as a Station ID. For example: the kitchen faucet may be called OKT_DW-1, whereas the outside tap at the same address may be called OKT_DW-2 and the tap at the tank in the basement may be called OKT_DW-3, etc. Refer to **Table 2** for the specific sample identification nomenclature and location. Be sure to correctly identify the sample on the chain-of-custody form.

SAMPLING PROCEDURE

The following steps should be followed once the preliminary steps have been completed.

1. Purge water from the sample location. Turn on the water (cold water) at a high rate of flow for **10-15 minutes (a minimum of 10 minutes)**.

   Running the water will accomplish two goals. First, it will purge the pipes of any stagnant water; second, it will drain the pressure tank and cause the pump to turn on and start pumping the well. This should assure the collection of a fresh and representative sample from the well.

2. While the water is running, record any observations and/or comments about matters pertinent to the sample and/or site in a field logbook.

3. After the water has run for a minimum of 10 minutes, shut the water off. Attach a decontaminated brass tap apparatus to the tap. Turn water back on at a very slow flow rate. Purge a small amount of water through the apparatus to rinse it with the water being sampled. **Do not use the brass tap on kitchen or bathroom faucets.**

4. Remove the cap from the sample container and place it on the plastic sheet or in a location where it won't become contaminated.

5. See **Table 2** for specific samples to be collected. Fill the sample containers based on the following priority order:
   a) VOCs (see special notes)
   b) Total metals as required
   c) Additional parameters as required

   Note: there is a special procedure for collecting samples form the Milford Fish Hatchery if they are required. See separate section below.

6. All sample containers shall be filled by allowing the discharge to flow gently down the inside of the container with minimal turbulence. Cap sample containers securely after filling each bottle. Sample containers must be wiped dry.

7. Field duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples should be collected by filling a separate container for each analysis immediately following the actual field sample collection (e.g. VOC sample, VOC duplicate sample, arsenic sample, arsenic duplicate sample). Duplicate samples are not intended to be blind duplicate samples. They should be designated with a "DUP" after the well designation as indicated in the SAP. Refer to **Table 5** in the SAP for specific QA sampling requirements.

In general most MS/MSD samples will be requested by the laboratory as part of their QA requirements. If that is the case, add a note to the comment section on the chain-of-custody (e.g., "Lab MS/MSD") on the same line used for the regular samples at that location. The number of sample containers will also change to accommodate the extra bottle for the MS/MSD sample. MS samples should not be on a separate line on the chain-of-custody. Refer to the Chain of Custody SOP in the SAP for information on collected Site related MS/MSD samples.

8. Place samples in re-sealable plastic bags and then in loose ice within the cooler. Metal samples, after acidification to a pH less than 2, do not need to be cooled.

9. Once all the samples have been collected, remove the brass tap apparatus and return all plumbing to its original position (aerator on faucet, all sample ports closed, replace hoses and attachments).

10. Rinse the brass tap apparatus with DI water between locations.

<u>Special Considerations for the Collection of Volatile Organic Compound Samples</u>

The proper collection of a sample for volatile organic compound analysis requires minimal disturbance of the sample to limit volatilization and therefore minimize loss of volatiles from the sample. The following VOC procedures should be followed:

1. Open the vial, set cap in a protected place, and collect the sample by allowing the water to flow gently down the inside wall of the container with minimal turbulence. When collecting quality control samples (duplicates and MS/MSD samples), collect them immediately

following the original sample (e.g., VOC sample, VOC duplicate sample, then VOC MS/MSD sample).

2. Do not rinse the vial or excessively overflow it because it likely contains a specific volume of preservative that must not be diluted.

3. Do not collect the initial 10 ml (approximate) of sample in the discharge tubing, as the beginning of the sample has been in contact with air.

4. Be sure the sample flow is laminar and there are no air bubbles in the sample flow.

5. There should be a convex meniscus on the top of the vial prior to capping the vial. The cap may be used to create the convex meniscus for VOC samples, if needed.

   For methane/ethane/ethene and carbon dioxide, the laboratory typically requests that the sample bottle cap is not used to top off the sample vials. These vials should be filled in the shortest time possible and capped immediately. Do not uncap these vials and add more water. Small bubbles are considered normal for these pre-preserved containers; however, every effort shall be made to collect the highest quality (e.g., bubble free) sample possible.

6. Check that the cap has not been contaminated (splashed) and carefully cap the vial.

7. Place the cap directly over the top and screw down firmly. Do not over-tighten and break the cap.

8. Invert the vial and tap gently. If an air bubble appears, uncap and attempt to add a small volume of sample to achieve the convex meniscus without excessively overfilling the vial. If this has to be repeated more than twice, discard the sample and begin again with a new container and preservative. It is imperative that no entrapped air is in the sample vial.

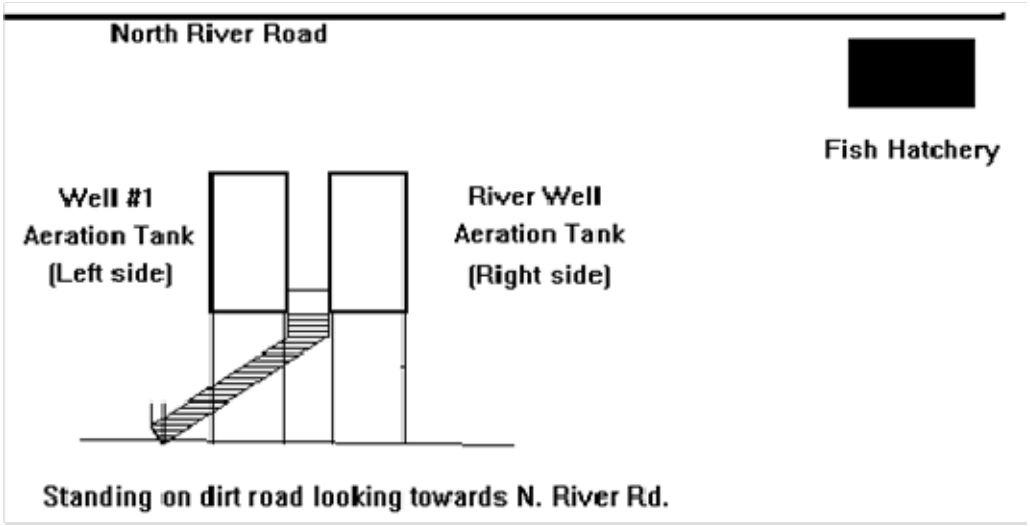
9. Wipe the vial dry and immediately place the vial in a re-sealable plastic bag and then in loose ice in the cooler.

SAMPLING PROCEDURE FOR MILFORD FISH HATCHERY WELLS

Samples may be collected at the Milford Fish Hatchery from two large aeration tanks located on a dirt road off to the right just past the main building: Well #1 and the River Well. Borrow a step ladder from the Fish Hatchery. Place the ladder on the platform at the top of the stairs in order to reach the top of the tanks. The samples must be collected just before the water enters the aeration tanks. Personal safety is vital, use the buddy system when collecting these samples. Special care must be taken in order to not aerate the VOC samples and lose preservatives.

Note: Standing in front of, and looking at the aeration tanks, with the stairs going up diagonally to the right; the River Well is the tank on the right; Well #1 is the tank on the left. See the

diagram below. The Fish Hatchery contact is Theresa Rogers at (603) 673-1416. **See diagram on the next page**.



QUALITY ASSURANCE

See **Table 5** for a list of equipment blanks, duplicate samples and analysis.

An equipment blank is typically collected on the brass tap apparatus once every 5 years, prior to the Five-Year Review (refer to **Table 5**).

DECONTAMINATION

Decontamination of the brass apparatus (DI water rinse) shall be performed before each sample location.

DOCUMENTATION

Document observations or comments in the field log book. See the Chain of Custody SOP in the SAP for minimum information to include on the labels and Chain of Custody Form.

Be sure to add the street address in the comments column on the chain of custody forms if they are not already there.

REFERENCES

Residential Drinking Water Sampling Procedure included in the current Hazardous Waste Remediation Bureau Master QAPP, EQA RFA #13027.

APPENDIX B-5
CHAIN-OF-CUSTODY, SAMPLE HANDLING, AND SHIPMENT

CHAIN-OF-CUSTODY, SAMPLE HANDLING AND SHIPMENT

PURPOSE

This Standard Operating Procedure (SOP) *Chain-of-Custody, Sample Handling and Shipment Procedures* has been established to provide for sample integrity in addition to proper sample labeling and completion of chain-of-custody (COC) forms; and proper sample packaging and shipment for the OK Tool OU1 Superfund Site (OK Tool), in Milford, New Hampshire.

Any modifications to this SOP shall be approved in advance by the New Hampshire Department of Environmental Services (NHDES) Project Manager and Quality Assurance (QA) Coordinator, in consultation with the United States Environmental Protection Agency (EPA), documented in the field logbook, and presented in the final report.

A COC is a legal document designed to track persons who are responsible for the preparation of the sample container, sample collection, delivery, storage, and analysis. The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples. A sample, including empty sample containers, samples and coolers, are under a person's custody if it meets the following requirements:

- It is in the person's possession;
- It is in the person's view, after being in the person's possession;
- It was in the person's possession and it was placed in a secured location; or
- It is in a designated secure area.

Never leave samples, including un-used sample containers, unattended. All samples and un-used sample containers must be in the person's possession or placed in a locked location at all times.

All samples submitted to a laboratory shall be accompanied by a properly completed COC form, packaged and shipped as appropriate. Always check with the selected laboratory-specific requirements regarding COCs.

Failure to maintain possession in the ways outlined in this SOP would constitute a break in sample custody and would likely discredit this sample as use of evidence in court proceedings. The sampler must assume that all samples collected will someday be used as evidence in court and treat the task of sample custody accordingly.

For this project, WESTON will be responsible for delivering/shipping all samples to the appropriate laboratories. Refer to **Table 3** for specific information on laboratories, analysis, containers, preservatives, and hold times. A copy of each laboratory COC is attached.

- Samples going to the New Hampshire Department of Health & Human Services, Division of Public Health Services (NHDPHS) laboratory in Concord, New Hampshire will be transported under the NHDPHS COC.

- Samples going to the US EPA laboratory in Chelmsford, Massachusetts will be transported under the modified NHDPHS COC.
- Other samples, as required, will be delivered to the Absolute Resources Associates (ARA) laboratory in Portsmouth, New Hampshire using the specific ARA COC attached. ARA is the current NHDES contract lab. **NOTE: Please do not use the ARA COC that is automatically supplied with the bottle order as it does not contain the required specific contract and contact information.**

The WESTON Project Manager or Field Operations Lead will coordinate sample delivery arrangements directly with each lab. Refer to the organizational chart in **Appendix A** in the Sampling and Analysis Plan (SAP) for contact information. The laboratory Turn-Around-Time (TAT) requested for all samples will be the standard 10 to 15 business day TAT.

The NHDPHS lab will provide all sample containers and trip blanks for the NHDPHS and EPA labs. Typically a batch of undated trip blanks will be provided with the sample containers in advance of the sampling event. All other labs will provide their own sample containers, trip blanks as necessary, and coolers.

EQUIPMENT AND MATERIALS

The following is a list of equipment and material commonly used for labeling, packaging and shipping samples:

- COC forms/seals
- Bubble wrap or air cushions and packing;
- Re-sealable plastic bags
- Permanent waterproof ink marker
- Black ink pen
- Black ink pen. **Note: Only ball point pens with black ink shall be used to record field data** (e.g., COCs, log books). Sharpies can bleed through pages and smudge, making the documentation hard to read.
- Shipping coolers
- Loose ice
- Sample labels, and packing tape

CUSTODY PROCEDURES

1. The field sampler will review the SAP provided by the project manager for specific COC record-keeping requirements. Note the following key COC related items:

a. Quality Assurance/Quality Control (QA/QC) data package requirements for project-specific data validation needs.

b. Laboratory reporting options, including preliminary results or electronic deliverables.

c. Standard or rush turn-around-time required.

d. Special laboratory requirements including lower detection limits; short hold times; and sample volume issues.

2. The field sampler will label all sample bottles, using waterproof ink, with the following information at a minimum:

   a. Sample ID
   b. Site name/location
   c. Sampler name
   d. Date and time sample was collected
   e. Laboratory analysis and test method requested
   f. Preservative used
   g. WESTON project number.

   Note: If soil volatile organic compound (VOC) samples are collected, no additional labels or tape shall be applied to the sample container, as these are pre-weighed by the laboratory.

3. The unique laboratory COCs will be prepared by either one of the field samplers collecting the samples or the onsite QA officer and include the following information at a minimum:

   a. The site/project name

   b. Town the site is located in

   c. NHDES site number

   d. Unique sample IDs

   e. Time and date of collection

   f. Matrix type

   g. Laboratory analysis and method requested

   h. Number of containers

   i. Preservatives

   j. Name and phone numbers of all samplers and staff involved in filling out the COC forms

   k. Name and phone number of the project contact person

   l. The street addresses corresponding to residential samples shall be included in the comment section for each sample.

m. Specific requirements such as specific reporting detection limits (RDLs)

n. Any special notes or requirements such as the lab account number, OneStop Project ID, etc.

o. All quality assurance/quality control (QA/QC) samples and associated information, such as:

1) **Trip Blanks**:

When a number of trip blanks are given in advance along with the containers from the NHDPHS Lab, the trip blanks will be maintained with the empty containers.

Before placing the trip blank (two VOC vials) in a re-sealable plastic bag, record the date and time on the labels. The trip blank must be placed in the cooler within the loose ice prior to the collection of the first volatile sample.

The trip blank should be designated as "TRIP BLANK" in capital letters on the COC without any other designation and should be recorded on the first line along with the date and time. **Only one trip blank per COC per cooler is acceptable.**

2) **Duplicates**:

Sample duplicates are identified by adding "DUP" (in capital letters) to the end of the station ID (example "OKT_PW-14M DUP"). The duplicate samples should appear on the next line of the COC after the regular samples.

3) **Matrix Spike (MS) Matrix Spike Duplicate (MSD) samples**:

MS/MSD samples are typically collected together at one sampling location. Refer to **Table 5** for specific MS/MSD requirements. Refer to **Table 3** for the number of bottles and analysis required. There are generally two types of MS/MSD samples:

a) Lab QC MS/MSD Samples:

A laboratory may require the collection of extra sample bottles for their internal lab QC. If so, indicate that in the comments section on the COC (e.g., "Lab MS/MSD or "Lab MS/MSD-1,4-Dioxane" specifying the analysis). The lab typically does not report these results. The number of samples containers will also change to indicate the extra bottle(s). These lab QC samples should not be on a separate line on the COC. The NHDPHS lab typically requires extra sample bottles for their internal QC for 1,4-dioxane analysis. Refer to the specific lab and the site-specific SAP for MS/MSD requirements.

b) Site MS/MSD Samples:

A site-specific SAP may require MS/MSD samples to be collected at a specific location, and require the lab to report those results, as part of a site-specific sampling program if matrix interference is suspected. If so, indicate that in the comment section on the COC (e.g., "MS/MSD Report Results" or "MS/MSD-1,4-Dioxane Report Results" specifying the analysis if it is not required for each analysis). The number of sample containers will also change to indicate the extra bottle(s) for the MS/MSD sample. These MS/MSD samples may be on a separate line on the COC. Refer to the specific lab and the site-specific SAP for MS/MSD requirements.

4) **Equipment Blank Samples:**

Equipment blank samples will be designated as "EQUIP BLANK" in capital letters on the COC without any other designation. Add a note to the comment section of the COC indicating what the equipment blank is for (e.g., water level meter, etc.). Refer to **Table 5**.

5) **Temperature Blanks:**

A temperature blank will be included with each shipment cooler to verify that samples have been kept at the required temperature during shipping. Check off the box on the COC to indicate that there is a temperature blank in the cooler. If there is no box, indicate the temperature blank's presence in the comment section of the COC.

4. Prior to leaving the site and before the samples are delivered to the lab, the field sampler or Field Operations Lead will check for errors on the sample label and COC form and verify that all pertinent data is present and correct.

5. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area.

Only one of the field samplers signs the first "relinquished by" line. The person who receives the samples at the laboratory signs the COC last in the "received by" line. In case there are additional steps in the process requiring another person or persons to take custody of the sample, the form has additional lines for signatures. All signatures must be in ballpoint pen and are followed by a date and time that the COC was signed. The last line of the NHDPHS COC is provided for personnel from the laboratory to sign for receiving the sample. The line at the bottom of the page "Data Reviewed By" is for Lab use only. If the samples are taken to the NHDPHS lab via courier the sampler may relinquish the samples to "NHDPHS Laboratory via courier", as appropriate. Pre-approved NHDES personnel may relinquish the samples to "locked storage" in the NHDPHS Lab.

Note: Any errors must be lined out, initialed, dated and the correction written in.

6. If the samples are shipped by public courier (e.g., Federal Express, UPS, etc.) the airbill generally serves as the COC record for that portion of the trip and will be retained by the field sampler and provided to the project manager as part of the permanent documentation.
7. The Field Operations Lead, QA Officer or Project Manager will review the COC to evaluate completeness; holding time or sample volume issues that may impact the validity of the results.

SAMPLE PACKAGING PROCEDURES

After collection, all samples shall be transported to the laboratory in such a manner as to prevent breakage and preserve sample integrity. Sample containers are generally packaged in insulated coolers for shipment or pickup by the laboratory courier. Appropriate packing materials include bubble wrap and air cushions. Sample containers are packed tightly so minimize movement during shipment that may cause breakage.

1. To eliminate the chance of breakage during shipment, approximately one inch of inert material shall be placed in the bottom of the cooler.
2. Include a temperature bank and any necessary trip blanks in **loose ice** in each cooler prior to sample collection.
3. Place each sample container, or set of sample containers (e.g., 3 to 4 VOCs vials; Refer to **Table 3**), inside a re-sealable plastic bag as a precaution against cross-contamination due to leakage or breakage.
4. Place all containers in an upright position into the **loose ice** in the cooler and place all glass containers in such a way that they do not come into contact with each other during shipment.
5. After samples have been packed, **loose ice** will be added to the cooler to ensure temperature preservative is achieved (temperature 4 +/-2 degrees Celsius).
6. Place a completed COC in a re-sealable plastic bag within each cooler. Only one COC per cooler is acceptable. COCs may contain more than one page.
7. Coolers being shipped (not couriered) will be secured with strapping tape in at least two locations for shipment to the laboratory and include a custody seal.
8. Prior to any cooler being shipped that contains environmental samples, the Field Operations Lead, QA Officer or Project Manager is required to evaluate if the samples/sample containers being shipped are considered hazardous. Consult appropriate trained personnel for proper packaging and labeling requirements.

SAMPLE PICKUP/SHIPPING PROCEDURES

Samples shall be properly packaged for shipment to maintain sample integrity and delivered to the analytical laboratory with a separate signed COC form enclosed in each sample cooler. Samples must be delivered in a manner consistent with the requirements of the analytical laboratory with respect for preservation, temperature, and holding times for the particular analytes to be tested. Whenever possible, all samples will be checked into the laboratory performing the analyses on the same day the samples are collected, unless other arrangements have been made. If it is impossible to check in samples at the laboratory the same day, the field team will be responsible for proper secure storage of samples following appropriate protocol for sample preservation (such as cooling to 4 +/- 2°C) until the samples are delivered to the laboratory or handed over to a courier.

Samples will be delivered either every other day, or on Wednesday and Friday of each week, unless holding times require daily delivery, or other prior arrangements were made with each lab. Refer to **Table 3** in the SAP for all holding time requirements. If possible, no samples should be held over the weekend.

Sample Pickup/Delivery

Samples are either delivered directly to the laboratory by the field team or the laboratory provides a courier to transport them. Custody seals shall be used when the cooler is sent to the laboratory by independent courier, unless otherwise specified in the site-specific SAP.

Samples being delivered to these laboratories should arrive before 4 pm unless other arrangements have been made.

Shipping Samples to the Laboratory

Samples requiring shipment (e.g., Microseeps) shall be sent next-day delivery by Federal Express or an equivalent overnight carrier. Field personnel will coordinate directly with the appropriate laboratory in advance for delivery times and requirements, and will notify the laboratory <u>no later than 48 hours</u> prior to sample shipment. Coolers will be secured with strapping tape in at least two locations for shipment and include a custody seal. If the sample is considered hazardous, consult appropriate trained personnel for proper packaging and labeling. The airbill generally serves as the chain-of-custody record for that portion of the trip and will be retained by the field sampler and provided to the Project Manager as part of the permanent documentation.

Refer to the organizational chart in **Appendix A** in the SAP for the contact information for each lab.

If Friday sampling is unavoidable and delivery to the lab late Friday or on Saturday is not possible, samples shall be properly stored (custody and sample preservation must be maintained) over the weekend in the office sample refrigerator. If prompt shipping and laboratory receipt of

samples cannot be guaranteed, the samplers will be responsible for proper storage of samples until adequate transportation arrangements can be made or sample collection schedules can be modified by the Project Manager. If holding times would be exceeded by storing the samples, alternative arrangements must be made by the Project Manager for sample collection and shipment or pickup.

DOCUMENTATION

The original COC record will accompany the cooler and a copy will be retained by the sampler for return to the project manager.

REFERENCES

The Chain-of-Custody, Sample Handling and Shipping SOP found in the current version of the Hazardous Waste Remediation Bureau Master Quality Assurance Project Plan (HWRB Master QAPP), EQA RFA# 13027.

ATTACHMENTS

NHDPHS COC
EPA COC - VOCs - Headspace Analysis
NHDPHS – Residential
ARA COC

NHDPHS LABORATORY CHAIN-OF-CUSTODY

NHDPHS LABORATORY SERVICES LOGIN AND CUSTODY SHEET

(Laboratory Policy: Samples not meeting method requirements will be analyzed at the discretion of the NHDPHS PHL Laboratory.)

Samples must be delivered in a cooler with loose ice.

LAB ACCOUNT (Billing) **State (OU-1) #04-0001501** One Stop (PROJECT) ID# **SUPERFND** DES Site Number **198505002** **Temp. ^{0}C. ____**

Description: **OK Tool (OU-1) Superfund Site** Town: **Milford, NH**

NHDES Contact: Robin Mongeon (603) 271-7378, Sharon Perkins (603) 271- 6805 (Sharon's cell 419-9209)

Comments:

Weston Contact: Jim Soukup (603) 656-5480, Cell: (603) 305-0337

Collected By & Phone#: Lisa Kammer 603-656-5457 (Cell: 603-703-9095); Michael Lavery 603-656-5408 (Cell: 603-568-7938); Michael Argue 603-656-5403 (Cell: 413-281-9572); Justin Warrington 603-656-5452 (Cell: 603-770-5273); Kirsten Stokes 603-656-5409 (Cell: 603-315-0726); George Skala 603-656-5450 (Cell: 678-463-9775);

NHDPHS COC

NOTE: PLEASE CHECK BOX IF ASCORBIC ACID WAS USED FOR THE PRESENCE OF PERMANGANATE IN THAT SAMPLE (Permanganate will be low level and neutralized by Ascorbic Acid)

Sample Location /ID	Date/Time Sampled	# of Containers	Matrix	8260B	Ascorbic Acid Used for Permanganate	Total Arsenic, Antimony, Beryllium, Chromium, Lead & Nickel				Comments	Lab ID # (For Lab Use Only)
			AQ								
			AQ								
			AQ								
			AQ								
			AQ								
			AQ								
			AQ								
			AQ								
			AQ								
			AQ								
			AQ								

Preservation: VOCs = HCL and 4°C +/-2°C (If Permanganate is present, Ascorbic Acid will be used in place of HCL) Metals = HNO_3

☐ Temperature Blank Included in Cooler

Relinquished By_____ Date and Time_____ Received By_____ Matrix: A= Air, S= Soil, SED=Sediments, AQ=Aqueous, Other=____

Relinquished By_____ Date and Time_____ Received By_____

Relinquished By_____ Date and Time_____ **Received For Laboratory By**_____

Page _____ of _____ Data Reviewed By_____ Date_____

Section No.: 22.0
Revision No.: 6 (HWRB)
Date: July 2011

EPA LABORATORY CHAIN-OF-CUSTODY-HEADSPACE

EPA LABORATORY SERVICES LOGIN AND CUSTODY SHEET

(Laboratory Policy: Samples not meeting method requirements will be analyzed at the discretion of the EPA Laboratory.)

Samples must be delivered in a cooler with loose ice.

LAB ACCOUNT (Billing) **State (OU-1) #04-0001501** One Stop (PROJECT) ID# **SUPERFND** DES Site Number **198505002** **Temp. ^{0}C. ____**

Description: **OK Tool (OU-1) Superfund Site** Town: **Milford, NH**

Comments:

NHDES Contact: Robin Mongeon (603) 271-7378, Sharon Perkins (603) 271- 6805 (cell 419-9209)

Weston Contact: Jim Soukup (603) 656-5480, Cell: (603) 305-0337

Collected By & Phone#: Lisa Kammer 603-656-5457 (Cell: 603-703-9095); Michael Lavery 603-656-5408 (Cell: 603-568-7938); Michael Argue 603-656-5403 (Cell: 413-281-9572); Justin Warrington 603-656-5452 (Cell: 603-770-5273); Kirsten Stokes 603-656-5409 (Cell: 603-315-0726); George Skala 603-656-5450 (Cell: 678-463-9775);

EPA COC NOTE: PLEASE CHECK BOX IF ASCORBIC ACID WAS USED FOR THE PRESENCE OF PERMANGANATE IN THAT SAMPLE

HEADSPACE **(Permanganate will be neutralized by Ascorbic Acid)**

Sample Location /ID	Date/Time Sampled	# of Containers	Matrix	Head Space Analysis EIA-FLDVOA2.SOP	Ascorbic Acid Used for Permanganate						Comments	Lab ID # (For Lab Use Only)
			AQ									
			AQ									
			AQ									
			AQ									
			AQ									
			AQ									
			AQ									
			AQ									
			AQ									
			AQ									
			AQ									

Preservation: VOCs = HCL and 4°C +/-2°C (If Permanganate is present, Ascorbic Acid will be used in place of HCL)

☐ Temperature Blank Included in Cooler

Relinquished By_____ Date and Time_____ Received By_____ Matrix: A= Air, S= Soil, SED=Sediments, AQ=Aqueous, Other=____

Relinquished By_____ Date and Time_____ Received By_____

Relinquished By_____ Date and Time_____ **Received For Laboratory By**_____

Page _____ of _____ Data Reviewed By_____ Date_____

Section No.: 22.0
Revision No.: 6 (HWRB)
Date: July 2011

NHDPHS LABORATORY RESIDENTIAL CHAIN-OF-CUSTODY

NHDPHS LABORATORY SERVICES LOGIN AND CUSTODY SHEET

(Laboratory Policy: Samples not meeting method requirements will be analyzed at the discretion of the NHDPHS, PHL Laboratory.)

Samples must be delivered in a cooler with loose ice.

LAB ACCOUNT (Billing) **State (OU-1) #04-0001501** One Stop (PROJECT) ID# **SUPERFND** DES Site Number **198505002** **Temp. ^{0}C. ____**

Description: **OK Tool (OU-1) Superfund Site** Town: **Milford, NH**

NHDES Contact: Robin Mongeon (603) 271-7378, Sharon Perkins (603) 271- 6805 (Sharon's cell 419-9209)

Comments:

Weston Contact Jim Soukup (603) 656-5480, Cell: (603) 305-0337

Collected By & Phone#: Lisa Kammer 603-656-5457, cell phone: 603-703-9095; Michael Lavery 603-656-5408 (Cell: 603-568-7938);

NHDPHS COC

Sample Location / ID	Date/Time Sampled	# of Containers	Matrix	524	Total Arsenic, Antimony, Beryllium, Chromium, Lead & Nickel				Comments	Lab ID # (For Lab Use Only)
Trip Blank		2	AQ							
OKT_DW-29		3	AQ						479 N. River Rd	
OKT_DW-29 DUP		3	AQ						479 N. River Rd	
OKT_DW-30		3	AQ						479 N. River Rd	
OKT_DW-5		3	AQ						544 N. River Rd	
OKT_DW-4		3	AQ						559 N. River Rd	
OKT_DW-3		3	AQ						561 N. River Rd	
OKT_DW-9A		3	AQ						569 N. River Rd	
OKT_DW-2		3	AQ						577 N. River Rd	
OKT_DW-MFH-RW		3	AQ						River Well FH	

Preservation: VOCs = HCL and 4°C +/-2°C Metals = HNO_3

☐ Temperature Blank Included in Cooler

Relinquished By_____Date and Time_____Received By_____ Matrix: A= Air, S= Soil, SED=Sediments, AQ=Aqueous, Other=____

Relinquished By_____Date and Time_____Received By_____

Relinquished By_____Date and Time_____ **Received For Laboratory By**_____

Page _____ of _____ Data Reviewed By_____ Date_____

Section No.: 22.0
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Date: July 2011

ARA LABORATORY CHAIN-OF-CUSTODY

Absolute Resource associates

124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

Company Name: Depart. of Environmental Services, State of New Hampshire

Company Address: 29 Hazen Drive, P.O. Box 95

Report To: Robin Mongeon, P.E.

Phone #: 603-271-7378

Invoice to Email: FundAccounting@des.nh.gov and Robin.Mongeon@des.nh.gov

☐ Hard Copy Invoice Required NHDES Contract No. 1051314

Project Name: OK Tool (OU-1) Superfund Site

Project #: DES # 198505002

Project Location: NH MA ME VT NY _____ Other

Protocol: RCRA SDWA NPDES MCP NHDES OTHER

Reporting Limits: QAPP GW-1 S-1 EPA DW Other SAP

Quote #_____ ☐ NH Reimbursement Pricing

PO # _____

ANALYSIS REQUEST

☒ VOC 8260 NHDES ☐ VOC 8260 MADEP
☐ VOC 8260 ☐ VOC 624 ☐ VOC BTEX ☐ MtBE, only ☐ VOC 8021VT
☐ VPH MADEP ☐ MEGRO ☐ GRO 8015 ☐ 1,4-Dioxane 8260 SIM
☐ VOC 524.2 ☐ VOC 524.2 NH List ☐ Gases- List:
☐ TPH ☐ DRO 8015 ☐ MEDRO ☐ EPH MADEP ☐ TPH Fingerprint
☐ 8270PAH ☐ 8270ABN ☐ 625 ☐ EDB
☐ 8082 PCB ☐ 8081 Pesticides ☐ 608 Pest/PCB
☐ O&G 1664 ☐ Mineral O&G SM5520F
☐ pH ☐ BOD ☐ Conductivity ☐ Turbidity
☐ TSS ☐ TDS ☐ TS ☐ TVS ☐ Alkalinity
☐ RCRA Metals ☐ Priority Pollutant Metals ☐ TAL Metals ☐ Hardness
☐ Total Metals-list:
☐ Dissolved Metals-list:
☐ Ammonia ☐ COD ☐ TKN ☐ TN ☐ TON ☐ TOC
☐ T-Phosphorus ☐ Phenols ☐ Bacteria P/A ☐ Bacteria MPN
☐ Cyanide ☐ Sulfide ☐ Nitrate + Nitrite ☐ Ortho P
☐ Nitrate ☐ Nitrite ☐ Chloride ☐ Sulfate ☐ Bromide ☐ Fluoride
☐ Corrosivity ☐ Reactive CN ☐ Reactive S- ☐ Ignitibility/FP
☐ TCLP Metals ☐ TCLP VOC ☐ TCLP SVOC ☐ TCLP Pesticide
Subcontract: ☐ Grain Size ☐ Herbicides ☐ Formaldehyde
Grab (G) or Composite (C)

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix			Preservation Method					Sampling		
			WATER	SOLID	OTHER	HCl	HNO_3	H_2SO_4	NaOH	MeOH	DATE	TIME	SAMPLER

TAT REQUESTED

Priority (24 hr)* ☐
Expedited (48 hr)* ☐
Standard (10 Business Days) ☐
*Date Needed _____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS Please contact Lisa Kammer at 603-656-5457 for sample questions and Robin Mongeon for all others

REPORTING INSTRUCTIONS ☐ PDF (e-mail address)_ Please send results to Robin.Mongeon@des.nh.gov, Sharon.Perkins@des.nh.gov & Jim.Soukup@westonsolutions.com

☐ HARD COPY REQUIRED ☐ EXCEL

RECEIVED ON ICE ☐ YES ☐ NO

TEMPERATURE _____°C

CUSTODY RECORD

QSD-01 Revision 10/14/15

	Date	Time		Date	Time
Relinquished by Sampler:			Received by:		
Relinquished by:			Received by:		
Relinquished by:			Received by Laboratory:		