FIELD SAMPLING AND QUALITY ASSURANCE PLAN

FOR

UNITED STATES ARMY, FORT MONMOUTH, NEW JERSEY
DIRECTORATE OF PUBLIC WORKS
BUILDING 173
FORT MONMOUTH, NJ 07703

PREPARED BY:

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I INTRODUCTION

ATC Associates has been retained by the Fort Monmouth Directorate of Public Works (DPW) to conduct a sampling event, using low flow purging and sampling, at landfill site M8. All project activities will be conducted in accordance with this Field Sampling and Quality Assurance Plan (FSQAP), and with the *New Jersey Department of Environmental Protection, Site Remediation Program, Technical Requirements for Site Remediation* N.J.A.C. 7.26E, (Technical Requirements).

The data generated during these activities will be used to evaluate the groundwater quality associated with monitoring well M8MW24 for the purpose of confirming the presence of PCBs and elevated metals concentrations.

The NJDEP will be notified prior to the commencement of on-site investigation activities.

This FSQAP, which was prepared following the Technical Requirements and Ground Water Sampling Guidelines for Low Flow Pump Purging and Sampling procedure, will ensure that field sampling procedures, analytical methods selected, and chemical analytical data are of sufficient quality to meet the intended uses. The recommended procedure will, in most situations, provide for the collection of ground water samples with minimum turbidity. This procedure is designed to be used in conjunction with the analyses for the most common types of ground water contaminants (volatile and semi-volatile and semi-volatile organic compounds, pesticides, PCBs, and inorganic compounds).

The site investigation activities will include groundwater sampling in the following area:

1. Landfill M8, monitoring well MW-24.

II EQUIPMENT

Low flow-rate peristaltic pumps will be used. A peristaltic pump is a self-priming suction lift pump, utilized at the ground surface, which consists of a rotor with ball bearing rollers. The liquid being pumped moves totally within the sampling tube, and no part of the pump contacts the liquid, greatly simplifying decontamination procedures.

A cylindrically shaped flow-through cell will be used during the ground water sample collection process. The cell is 6.4 inches in height, 3 inches in diameter and has a volume capacity of 550 milliliters. Ground water will enter the cell at the bottom and will exit at the top. In-line metering probes will be constantly immersed in fresh well water.

Silicone tubing will be used in the pumps. The tubing on either side of the pump will be Teflon® tubing. The Teflon® tubing used in purging and sampling each well will be dedicated to the individual well. The diameter of the tubing will be between ¼ of an inch and 3/8 of an inch.

A water level measuring device with 0.01 floor accuracy, a graduated cylinder, an in-line purge criteria parameter monitoring instrument (for pH, specific conductance, temperature, and dissolved oxygen), a turbidity meter, and a stop watch will be used for flow measurements.

III PRELIMINARY SITE ACTIVITIES

1. Ground water elevation measurements (to 0.01 ft) and total depth of well measurements (to 0.01 ft) will be obtained the day before sampling is actually conducted.

2. Check well for damage or tampering, record pertinent observations.

3. Lay out sheet of polyethylene for monitoring and sampling equipment.

4. Measure VOCs (volatile organic compounds) at the rim of the unopened well with a PID or FID instrument and record the reading in the field logbook.

5. Remove well cap.

6. Measure VOCs within the well casing with a PID or FID instrument and record the reading in the field logbook.

IV SAMPLING PROCEDURE

The equipment specified in Section II of this Guideline will be used to purge and sample the monitoring well. The sampling procedure is as follows:

1. The sampling tube will be lowered slowly into the well to a depth corresponding to the center of the saturated screen section of the well. The end of the tube will be kept above the bottom of the well to prevent mobilization of any sediment in the bottom of the well.

2. The length of tubing between the well and the flow-through cell will be short to prevent heating or cooling of the sample prior to it entering the flow-through cell.

3. The well pumping will start at 200 to 400 milliliters per minute (ml/min). The pumping rate should cause little or no water level drawdown in the well (less than 0.2 ft. and water level should stabilize). The water level will be monitored every three to five minutes during pumping. Care will be taken not to cause pump suction to be broken, or entrainment of air in the tubing. All pumping rate adjustments and depths to water will be recorded. Pumping rates will, if needed, be reduced to the minimum capabilities of the pump to avoid pumping the well dry and/or to ensure stabilization of indicator parameters. If the recharge rate of the well is very low, purging will be interrupted so as not to cause the drawdown within the well to advance to the end of the tube. However, a steady flow rate will commence as soon as the volume in the well has recovered sufficiently to permit collection of samples.

4. During purging of the well, in-line water quality indicator parameters (pH, specific conductance, temperature, and dissolved oxygen) and turbidity will be monitored every three to five minutes. The well will be considered stabilized and ready for sample collection once all the field indicator parameter values remain within +/-10% for three consecutive readings, with the exception of +/-0.05 units for pH. If the parameters have stabilized, but the turbidity is not in the range of the 5-10 NTU goal, then the pump flow rate will be decreased to no more than 100 ml/min. If all the parameters have again stabilized, or if all parameters except turbidity have again stabilized, sampling of the groundwater will commence. No interruptions in flow, or adjustments to flow rate, will occur between purging and sampling once field parameters have stabilized.

5. PCB and TAL metal samples will be collected and placed directly into pre-preserved sample containers. The tubing will be disconnected from the in-line monitoring instrument prior to collecting each sample. All sample containers will be filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

6. As each sample is collected, the sample will be labeled. All samples requiring cooling will be placed into an ice cooler maintained between 3° C and 5° C for delivery to the laboratory.

7. After collection of the samples, the Teflon® tubing will be placed in polyethylene bags labeled with the monitoring well designation and stored for subsequent sampling events. If no future events are planned, the Teflon® tubing will be discarded. The silicone tubing used in the pumps will be discarded after each sample is collected.

8. Following sample collection, a depth to groundwater measurement will be recorded. The well is then secured.

V DECONTAMINATION

Since dedicated tubing will be used, and since groundwater to be sampled will not come into contact with any of the equipment common to all the wells purged, no decontamination of equipment is necessary.

VI FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not affected the quality of the ground water samples. All field quality control samples will be prepared exactly as regular investigation samples with regard to sample volume, containers, and preservation. The following quality control samples will be collected for each batch of samples (a batch will not exceed 20 samples):

- Field duplicate.

VII FIELD LOGBOOK

A field logbook will be kept to document the following:

- Well identification;
- Well depth, and measurement technique;
- Static water level depth, date, time, and measurement technique;
- Field observations of sampling event;
- Weather conditions;
- QA/QC data for field instruments.

VIII SAMPLE IDENTIFICATION

1. Each container will be labeled by the sampler to avoid any possibility of sample misidentification.

2. At a minimum, each label will contain the following information:

- Site Name;
- Sample designation number (field number);
- Sample description (sample type);
- Date sampled;
- Time sampled;
- Sampler's name;
- pH adjustment: acid/base used, pH achieved (preservative);
- Analysis requested.

3. U.S. Army Fort Monmouth Environmental Testing Laboratory (NJDEP Certification ID#13461) will be utilized for sample analysis. Upon arrival at the laboratory, each sample will be assigned a unique laboratory identification number that will be used for analysis assignment, sample tracking, and data reporting while the samples are at the laboratory.

IX SAMPLE CUSTODY

Samples for chemical analysis, which collected on each sampling day, will be considered under custody if:

1. They are in possession.

2. They were in possession and were locked up or sealed in a tamper-proof manner.

3. They are placed in a designated secure area.

Empty, clean, preserved sample containers will be relinquished by the laboratory with a chain-of-custody record. The chain-of-custody record will be used for all samples collected. Any transfer of custody of containers or samples will be noted on the chain-of-custody record. Each sample collected for the project will be entered on the chain-of-custody record and the original chain-of-custody record will accompany the sample containers during transport to document their custody.

The laboratory will assume custody of the samples upon receipt and a designated sample custodian will be charged with sample receipt, completion of custody records, checking correctness of sample documentation, sample log-in, and sample distributions. All samples will be logged in a bound, volume-numbered custody logbook, or into the laboratory information management system.

The following information will be supplied to complete the chain-of-custody record:

a. Project name;

b. Signature of samplers;

c. Sampling station number, date and time of collection, grab or composite sample designation, and brief description of the type of sample; sampling location; and analysis parameters;

d. Signatures of individuals involved in sample transfer, i.e., relinquishing and accepting samples. Individuals receiving the samples shall sign, date, and note the time that they received the sample on the form;

e. In the lower right comment section, the type of carrier service will be indicated.

At the end of the sampling day (for each bottle shipment), all samples and blanks for chemical analysis will be packaged in sample coolers on "wet ice" for delivery to the analytical laboratory. All samples will be logged into the laboratory information management system (LIMS) immediately. The laboratory courier will assume custody of the samples on-site by signing the field Chain-of-Custody form. For the purposes of contractual analytical holding times, this signature will constitute the verified time of sample receipt (VTSR), however; actual time/date of sampling will be used for data evaluation purposes.

STANDARD OPERATING PROCEDURE

SOP No.: SAM-0205
Revision No.: 1
Date Revised: 8/9/99

CATEGORY: Sample Handling
TITLE: Monitor Well Sampling for IRP Sites at Fort Monmouth

1 PURPOSE:

To document current procedures for monitoring well sampling.

2 RESPONSIBILITY:

Designated field samplers who have been properly trained and instructed in NJDEP field sampling procedures and protocol.

3 REFERENCES:

3.1 Field Sampling Procedures Manual, May 1992 (most current). New Jersey Department of Environmental Protection and Energy.

3.2 Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities developed by NIOSH, OSHA, USCG, EPA. Oct. 1985

3.3 NJDEP Field Analysis Manual, July 1994.

3.4 On the World Wide Web: www.state.nj.us/dep or www.state.nj.us/dep/srp.

3.5 Lab SOP: SAM-0200, SAM-0202, OQC-0302

4 SUMMARY:

The procedures, materials, and equipment describe the recommended methods for sampling monitoring wells. Necessary equipment, calibrations, calculations and appropriate QA/QC procedures are also included. These procedures are to be followed by all personnel involved with the sampling and purging of wells at Fort Monmouth. Persons following this SOP are recommended to also refer to the NJDEP Field Sampling Procedures Manual.

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QA Manager / Laboratory Director

5 EQUIPMENT AND MATERIALS:

5.1 Equipment

- 5.1.1 Dissolved oxygen meter
- 5.1.2 HNU photo ionizer
- 5.1.3 Conductivity/pH/temp meter
- 5.1.4 Peristaltic well pumps
- 5.1.5 Pump heads and power cables
- 5.1.6 Water level meter
- 5.1.7 Oil/water interface probe
- 5.1.8 Submersible well pumps
- 5.1.9 Various batteries
- 5.1.10 Buckets
- 5.1.11 Miscellaneous tools, i.e. screwdriver, well wrench, etc.

5.2 Materials:

- 5.2.1 Thick wall silicone tubing ¼ inch diameter,
- 5.2.2 Polyethylene (food grade) tubing ¼ inch diameter,
- 5.2.3 12 inch single sample 1 check stop teflon disposable bailers,
- 5.2.4 Mason string.

6 STANDARDS/REAGENTS:

6.1 Buffer solutions, calibration gases, decontamination materials, and acids for preservation.

- 6.1.1 Buffer solutions:
  - 6.1.1.1 7.00 standard buffer solution
  - 6.1.1.2 10.00 standard buffer solution
  - 6.1.1.3 4.00 standard buffer solution
  - 6.1.1.4 Distilled and deionized water
  - 6.1.1.5 Alconox
  - 6.1.1.6 10 % nitric acid rinse (trace metal or higher grade HNO3 diluted with distilled/deionized (ATSM Type II) H2O)
  - 6.1.1.7 Acetone (pesticide grade)
  - 6.1.1.8 Pure nitrogen 100 ppm Isobutylene cal gas.

- 6.1.2 Acids/materials used in preserving samples:
  - 6.1.2.1 Nitric acid 69, 0-70.0%
  - 6.1.2.2 Sulfuric acid 50% (w/w) solution
  - 6.1.2.3 Hydrochloric acid (trace metal grade)
  - 6.1.2.4 Ice for keeping samples at <4 degrees celcius.

Refer to NJDEP Field Sampling Procedure Manual Table 2-1 Aqueous Sampling Equipment Decontamination (Lab and Field).

7 CALIBRATION:

All instruments used for field readings are calibrated before each day of use. The use of pH meters must start out with a calibration using buffer solution standards to check or calibrate accuracy. HNU's are calibrated with a known calibration gas. Dissolved oxygen meters are checked against a winkler method test weekly. All calibrations for a given day's use are recorded in the log provided for each instrument. Refer to equipment directions for calibration instruction. Likewise, specific conductivity meters are checked against standards regularly. Cooler thermometers are calibrated against an NIST traceable thermometer annually.

8 PROCEDURE:

The following articles document the procedures for sampling monitor wells. They are to be used as a guide, by trained personnel, in conjunction with the NJDEP Field Sampling Procedures Manual.

8.1.1 Preparation: It should be noted that before going out into the field, certain preparations must be made. This includes the selection of PPE, safety plans, proper bottle acquisition for analytes being tested, site entry, map information, and equipment.

8.1.2 Selection of PPE: For adequate protection and prevention of contaminant exposure to workers at hazardous waste sites in all phases of work, PPE is properly used and supplied. Determination of PPE will be outlined in a Health and Safety Plan, and also by preliminary site investigations. Refer to NJDEP Field Sampling Procedures Manual, and the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.

8.1.3 Health and Safety Plans: These plans are developed to encompass all the aspects of site operations. Plans are available to personnel associated with site sampling and a copy is kept on file at the site (in this case, the laboratory). At a minimum, the plan includes all portions of Site Remediation Program's (SRP) Site Safety and Health Standard Operating Procedures deemed appropriate for site, detailed site description, emergency phone numbers, a map and directions to nearest hospital identified on the map, and all PPE needed.

8.1.4 Proper bottle selection: Please refer to QA/QC section 10.1.

8.1.5 Equipment: Please refer to Equipment section 5.

8.1.6 Before purge activities: Certain instruments and meters are calibrated before use. Also, certain measurements and calculations are obtained before any purge activities take place. The following is a list of information/data/steps required prior to the commencement of purge activities. Pertinent information is recorded in log books or on well sheets.

8.1.7 Date, time and weather conditions: Date and time are needed for holding time purposes and general record keeping. Weather conditions may affect ambient conditions at a particular site, therefore said information is recorded. Tidal influences may also be included here, if wells are in a tidal area.

8.1.8 Well number and permit number: These are prominently displayed on the outside of each well in accordance with NJDEP regulations for well construction.

8.1.9 Meter and instrument calibrations: Meters utilized in the course of site sampling activities are calibrated at this time, and the findings recorded in the appropriate logbook. Refer to section 7 for instrument/meter calibration directions.

8.1.10 PID or FID, HNU reading: This is taken from the well inner casing immediately after the cap is removed, findings are recorded.

8.1.11 Free product check: Using ORS meter for interfaces, the presence or absence of free product is determined. Thickness is measured and recorded.

8.1.11.1 Light Non-Aqueous Phase Liquids (LNAPLs) and Dense Non-Aqueous Phase Liquids (DNAPLs): Measurement of thickness for DNAPLs and LNAPLs are performed prior to well purging. An interface probe is used (ORS meter) for this task. If present, LNAPLs are sampled and analyzed for chemical and physical parameters. Sampling is conducted by using a bottom filling bailer which is lowered into the LNAPL layer. DNAPLs are sampled using a dual check valve bailer. If present, DNAPLs are also tested for chemical and physical properties.

8.1.12 Dissolved oxygen, pH, temperature, and specific conductivity: Readings are obtained and recorded on well sheets.

8.1.13 Total depth of well and depth to water: These readings are taken using a depth meter. Total depth of well, depth to water, and depth to screen are measured from the top of the inner casing or surveyors mark. All data is recorded on well sheet.

8.1.14 Calculations: Calculations are made as stated in section 9.

8.2 Purging: When pre-purge activities are complete, the purging of a well can begin. This includes pre-entry to the well and pump setup.

8.2.1 Pre-entry to well: Before tubing (refer to materials section) is inserted into a well, it is wiped down and rinsed with DI water. The tubing is then inserted into the well to a maximum depth of six feet below the water table. During purge activities, the depth of the tubing may be adjusted to prevent the static water level from dropping below the end of the tubing.

8.2.2 Pump setup: Once the battery powered peristaltic pump is set up, purging can begin. Evacuation rates never exceed that of well development, and total volume purged never exceeds 5 times the amount of standing water. Purge water management practices are described in section 10.1.8.

8.3 After Purge: When purging is complete, the pump is removed and tubing is disposed of properly. Data referenced in section 8.3.2 is then taken and recorded.

8.3.1 Pump removal: Tubing is removed from the bottom end while the pump is still running. Tubing is then disposed of. The pump is shut down and decontaminated for its next application.

8.3.2 The following data is recorded on the well sheet: Start and end time of purge, purge method, purge rate, total volume purged, dissolved oxygen, pH, temperature, and specific conductivity readings.

8.4 Field Blank Sample: At this time the field blank sample is collected. A new bailer is opened from its sealed package and field blank water is run over the bailer or sample equipment and collected into the proper sample containers.

8.5 Ground water sampling: Following well evacuation procedures, ground water sampling can begin. In most cases, sampling takes place immediately following purge activities. However, due to certain field conditions, well sampling may be postponed for a period not to exceed 2 hours following completion of purge activities. When multiple wells are being sampled, the least contaminated well is sampled first. Subsequent wells are sampled in order of ascending contamination. Sampling is conducted by using a bottom filling teflon bailer, dedicated to each particular monitoring well. The bailer is lowered slowly into water column until submerged, and then slowly retrieved. The sample is then carefully transferred to the appropriate sample containers. Ground water collected in the first bailing sequence is always used for sampling purposes, it is never discarded.

8.6 Sample order: Samples are collected in the following order:

- 8.6.1 volatile organics (VOA)
- 8.6.2 purgeable organic carbons (POC)
- 8.6.3 purgeable organic halogens (POX)
- 8.6.4 total organic halogens (TOX)
- 8.6.5 total organic carbon (TOC)
- 8.6.6 base neutrals/acid extractables
- 8.6.7 TPHC/oil and grease
- 8.6.8 PCB's/pesticides
- 8.6.9 total metals
- 8.6.10 dissolved metals
- 8.6.11 phenols, cyanide
- 8.6.12 sulfate and chloride
- 8.6.13 turbidity
- 8.6.14 nitrate and ammonia,
- 8.6.15 preserved inorganics
- 8.6.16 radionuclides
- 8.6.17 non-preserved inorganics
- 8.6.18 bacteria

8.7 Dupes and matrix spikes/matrix spike duplicates: These samples are taken in same order at same time. Refer to section 10.2.1.2.

8.8 After sampling: The following data is recorded on well sheets: Start and end time of sampling, dissolved oxygen, pH, temperature, specific conductivity, and sampling method.

9 CALCULATIONS:

Four calculations are made while in the field. The calculations are as follows: linear feet of water (height of water), the volume to be purged, the volume purged not to be exceeded, and purge rate.

9.1 Linear feet of water: This is calculated by knowing the total depth of a well and subtracting the depth to water as measured by a depth meter. These two numbers are measured to within .01 feet. Through this calculation, the linear feet of water is determined.

Equation: (Total well depth – Depth to water = linear feet of water)

9.2 Volume to be purged and volume not to be exceeded: The second calculation is to determine the minimum volume to be purged from a well before sampling. Utilizing the linear feet of water and then multiplying it by the volume per foot for the proper diameter casing (see Figure 1 below) equals the amount of water in casing. Multiplying the amount of water within a casing by 3 equals the minimum volume to be purged. It should be noted that the amount purged should not exceed 5x the amount of standing water in a well.

Equation:
linear feet of water x volume per ft for well diameter = amount of water in casing)
then,
(amount of water in casing x 3 = minimum volume to be purged)

Equation:
(amount of water in casing x 5 = total volume not to be exceeded)

Figure 1: Capacity of Common Casing Diameters
(Pp. 170 in NJDEP FSPM)

Casing Diameter (ft.)	Gallons/linear foot
2 inch (0.1667)	0.1632
4 inch (0.3333)	0.6528
6 inch (0.5000)	1.4688
8 inch (0.6667)	2.6112
10 inch (0.8333)	4.0800
12 inch (1.0000)	5.8752

9.3 Purge rate: The purge rate is determined by calculating the length of time it takes for a pump to fill a 1 gallon bucket with water. The time is then multiplied by the minimum volume to be purged. The gallons being purged is then divided by this number (which also happens to be the length of time the purge will take in minutes) which equals the gallons per minute or purge rate.

Equation:
(time x minimum volume to be purged = length of purge in minutes)
then,
(minimum volume to be purged / length of purge in minutes = gallons per minute or the purge rate)

10 QUALITY CONTROL:

The following QA/QC requirements are established in order to maintain sample integrity. The prime objective is to prevent sample contamination from other sources and ensure potential contaminant concentrations remain stable from sample collection to complete analysis. Refer to the NJDEP Field Sampling Procedures Manual Appendix 2-1 Analytical Methodology Reference Charts, Pp. 24-74. Also refer to SAM-0200 Sample Containers, Preservation and Holding Times.

10.1 Sample Containers: Before sample collection can begin consideration must be given as to what type container will be used to transport and store samples. The lab provides containers based upon requested methodologies. Selection is based on the matrix, potential contaminants, analytical methods, and the laboratory's internal QA/QC requirements. They are selected upon review of the following:

10.1.1 Reactivity of container material with sample. Glass is recommended for hazardous material samples since it is chemically inert to most substances. Plastics may be used when analytes of interest or sample characteristics dictate use instead of glass.

10.1.2 Volume of the container. The volume of sample needed is dictated by the analytical method and the sample matrix. The laboratory supplies bottles that allow for sufficient volumes of sample matrix to be collected.

10.1.3 Color of container. Whenever possible, amber glass is used to prevent photodegradation. If not available, samples are protected from light. One exception is the use of 40 ml clear glass vials which are used for VOA/aqueous analysis.

10.1.4 Container closures. All containers utilized have a leak-proof seal and are constructed out of inert material with respect to sampled materials. The closure may also be separated by a closure liner that is inert to sample material.

10.1.5 Decontamination of containers and chain of custody. Sample containers are laboratory cleaned or purchased as lab cleaned. Bottles being shipped are accompanied by a chain of custody in a cooler with a custody seal. Custody always accompanies containers to the field, during collection, back to lab, and during analysis. This helps to assure no tampering or contamination from outside sources occurs.

10.1.6 Storage and transport. Care is taken to avoid contamination. Clean transport and storage environments are observed. Sample or bottle storage is never near solvents, gasoline, or other equipment that is a potential source of contamination. Samples and chain of custody are secured in coolers or transport, with said chain of custody in with bottles or in the possession of authorized personnel. Also, a temperature blank is included in each cooler to measure temperature of samples on ice (ideally a constant 4 degrees Celsius).

10.1.7 Tubing decontamination: ASTM drinking water grade polyethylene tubing is used and discarded after each use. Care is taken to prevent the pump and tubing from coming into contact with the ground surface. Prior to well purging, all tubing is rinsed/wiped with distilled and deionized water to remove any possible residual materials which may be present.

10.1.8 Disposal of development, purge, pump test, and decon waters: To determine whether waste waters are contaminated, field instrument readings and previous analytical data is used to characterize it. Water not considered contaminated is re-applied directly to ground surface and permitted to percolate back to the water table. Care is taken to avoid nuisance situations where a discharge may cause undue concern. When water is considered contaminated, the water generated is reapplied only if the following conditions are met: ground water is not permitted to migrate offsite, no potential exists for contaminating a previously uncontaminated aquifer, discharge will not cause an increase to ground surface soil contamination. If these conditions are met, the water is re-applied to the ground surface. If these conditions aren't met, than water

is collected, containerized and secured in a single locale. Subsequently, the water is properly characterized and processed for offsite disposal.

10.2 QA/QC samples: These samples are intended to provide control over the collection of environmental measurements and subsequent validation, review, and interpretation of analytical data. Trip blanks are used exclusively for volatile organic analysis, (aqueous sampling only) and their purpose is to measure possible cross contamination of samples during shipment to and from a site. Trip blanks are never opened and travel to a site with the empty sample bottles and back from a site with the collected samples. Contaminated trip blanks may indicate bottle cleaning or blank water of questionable quality. Trip blanks are collected at the rate of one per day. Likewise, the purpose of a field blank is to place a mechanism of control on sample equipment handling, preparation, storage and shipment. Field blanks travel and are stored with the sample bottles. Field blanks are collected in the following manner. Two identical sets of bottles are prepared. One set is filled with laboratory demonstrated analyte free water (same water used for trip and method blanks). All of the filled bottles are shipped with the other empty sample containers. At the field location, in an area where contamination is suspected, the water is passed from the full set of like-bottles through the dedicated or field decontaminated sampling device and into the empty set of like-bottles. Field blanks are preserved identically to samples receiving the same analyses. Field blanks are collected and analyzed for all of the same parameters as the samples collected that day.

10.2.1 Additional QA/QC samples:

10.2.1.1 Duplicate samples: Collection of a dupe provides for evaluation of laboratory performance by comparing the analytical data of two samples from the same location. They are included 1 for every 20 samples (5% or 1 a day/site) and submitted as blind samples. They are obtained by alternately filling sample bottles from the same source/device for each parameter. VOA samples are same bailer and first set filled.

10.2.1.2 Matrix spike/Matrix spike duplicate analyses or MS/MSDS sample: The laboratory is supplied with triple volume in order to perform matrix spike and matrix spike dupes. This does not include trips or field blanks. Additional sample volume for MS/MSDS is taken within every set of 20 field samples.

10.3 Sample preservation: Sample bottles are preserved by lab staff based upon analytical requirements. Please refer to SAM-0200 Sample Containers, Preservation, and Holding Times SOP and also NJDEP Field Sampling Procedures Manual Appendix 2-1 Analytical Methodology reference Charts, Pp. 24-74.