6 III

Final - Volume 3 of 4

U.S. Army Environmental Center

RI/FS SAMPLING AND ANALYSIS PLAN

FORT McCLELLAN, ALABAMA
TASK ORDER 005
Contract Number DAAA15-91-D-0017

FINAL

Volume III: GEOTECHNICAL APPENDICES

Prepared for:

U.S. Army Environmental Center
Installation Restoration Division
Aberdeen Proving Ground, Maryland 21010-5401

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SAMPLING AND ANALYSIS PLAN
FOR
FORT McCLELLAN RI/FS
ANNISTON, ALABAMA

Volume III: GEOTECHNICAL APPENDICES

FINAL

Submitted to:

U.S. Army Environmental Center
Installation Restoration Division
SFIM-AEC-IRB
Aberdeen Proving Ground, Maryland 21010-5401

Submitted by:

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USATHAMA Contract DAAA15-91-D-0017
Task Order 5

SAIC Project No. 01-0827-03-6520-006

April 6, 1994

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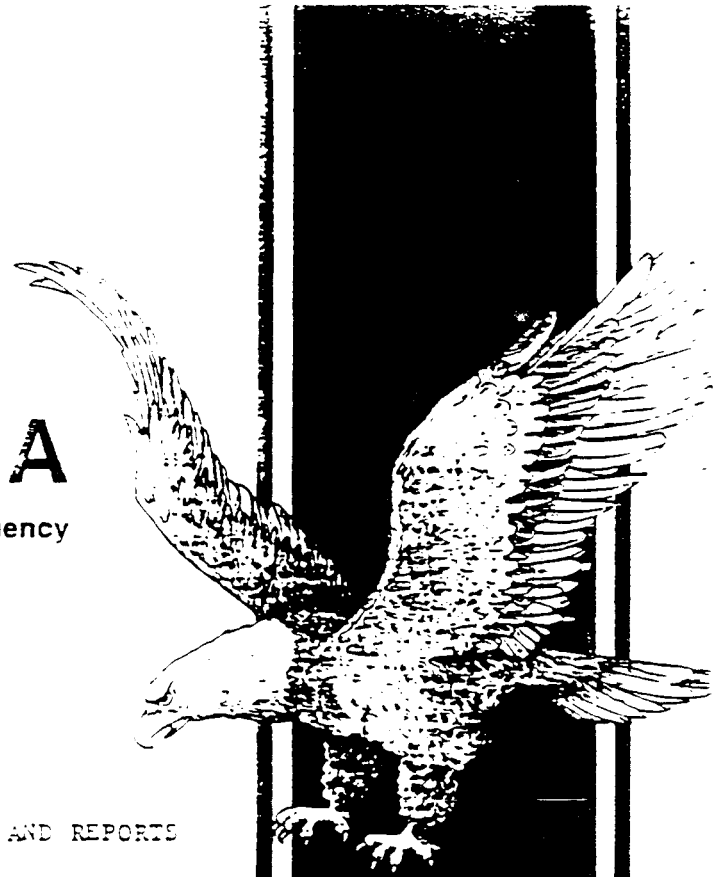
USATHAMA GEOTECHNICAL REQUIREMENTS FOR DRILLING, MONITOR WELLS, DATA ACQUISITION, AND REPORTS

USATHAMA

U.S. Army Toxic and Hazardous Materials Agency



GEOTECHNICAL REQUIREMENTS

FOR

DRILLING, MONITOR WELLS, DATA ACQUISITION, AND REPORTS

MARCH 1987

DEPARTMENT OF THE ARMY

U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY

ABERDEEN PROVING GROUND, MD 21010-5401

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ABERDEEN PROVING GROUND, MD 21010-5401

D I S C L A I M E R

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I. OBJECTIVE.

The objective of these requirements is to set forth the geotechnical criteria and procedures of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). These requirements are used in technical support of the Contracting Officer for geotechnical exploration and reporting. The application of geotechnology to environmental programs should begin with project conception. The Geotechnical Requirements join this application during the design of the field program, after the initial magnitude of the study has been determined and tentative well sites selected. The application of these requirements is intended to provide acceptable technical data and tracking procedures to accurately obtain, describe, and evaluate representative samples of the subsurface environment in terms of geology, hydrology, and groundwater chemistry. This sample-specific data can be merged with site-operational knowledge to characterize and appraise the contaminant potential of the site.

II. GENERAL POLICY.

A. The Geotechnical Requirements shall be a part of and attached to each Request for Proposal or Quotation (RFP/RFQ) involving subsurface exploration and resulting contracts and/or task orders. A verbatim copy of these Requirements, modified by only the initial contract or task order and subsequent amendments, shall be made part of and attached to the contractor's Technical Plan (or equivalent document).

B. The Geotechnical Requirements were written as a generalized document. Application to a specific contract or task is likely to generate obvious or subtle conflicts. When conflicts exist between the Geotechnical Requirements and specific contractual documents; i.e., the RFP/RFQ, contract, task order, or contractual amendments, the latest contractual documents shall take precedence.

C. Technically, the Contracting Officer is the only Governmental agent who has the authority to change a given contract. Some administrative aspects of this authority are usually delegated in writing to certain USATHAMA personnel serving as Contracting Officer's Representatives (COR). These aspects include the approval for use of specified items; e.g., the drilling water, granular filter pack, bentonite, etc., as discussed in the Geotechnical Requirements. USATHAMA's approval of these items is performed through and under the authority of the Contracting Officer. Therefore, the contractor's requests for approval of, variance from, or notification of problems with the technical items within these Geotechnical Requirements shall be directly sent from the contractor to the USATHAMA COR responsible for that contract or task.

D. Any deviation from the contract shall be requested of and approved by the Contracting Officer. Deviations approved for a given contract or task shall not be applicable to any other contract or task unless specified in the approval.

E. These requirements will be updated as required incorporating new technology, experience, and policy.

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appropriate criteria discussed in paragraph III.A.2.c. below. Consideration and a recommendation by USATHAMA will be made during the course of bid/proposal evaluation, prior to contract award.

c. In general, air system plans shall:

(1) Specify the type of air compressor and lubricating oil and require a pint sample of each oil be retained by the contractor, along with a record of oil loss (on the boring log), for evaluation in the event of future problems. The oil sample(s) may be disposed of upon contract/task completion.

(2) Require an air line oil filter and that the filter be changed per manufacturer's recommendation during operation with a record kept (on the boring log) of this maintenance. More frequent changes shall be made if oil is visibly detected in the filtered air.

(3) Prohibit the use of any additive except approved water (III.A.10.b.) for dust control and cuttings removal.

(4) Detail the use of any downhole hammer/bit with emphasis upon those procedures to be taken to preclude residual groundwater sample contamination caused by the lubrication of the downhole equipment.

d. Air usage shall be fully described in the log or associated geotechnical report to include equipment description(s), manufacturer(s), model(s), air pressures used, frequency of oil filter change, and evaluations of the system performance, both design and actual.

3. Recirculation Tanks and Sumps. Portable recirculation tanks are suggested for mud/water rotary operations and similar requirements. The use of dug sumps/pits (lined or unlined) is expressly prohibited.

4. Site Geologist. A geologist shall be present and responsible at each operating drill rig for the logging of samples, monitoring of drilling operations, recording of water losses/gains and groundwater data, preparing the boring logs and well diagrams, and recording the well installation procedures of that rig. Each geologist shall be responsible for only one operating rig. Each geologist shall have onsite sufficient tools and professional equipment in operable condition to efficiently perform his/her duties as outlined in these Geotechnical Requirements and other contractual documents. Items in the possession of each geologist shall include, as a minimum: a copy of the geotechnical portion of the statement of work, the USATHAMA-approved Technical Plan (or equivalent) which incorporates these Geotechnical Requirements, the approved Safety Plan (approved after contract award), a 10X (minimum) hand lens, and a weighted (with steel or iron) tape(s), long enough to measure the deepest well within the contract, heavy enough to reach that depth, and small enough to readily fit within the annulus between the well and drill casing. Each geologist shall also have onsite a water level measuring device, preferably electrical.

5. Permits, Rights-of-Entry, and Licenses. The contractor shall be responsible for securing and complying with any and all boring or well drilling permits and/or procedures required by state or local authorities and

III. SPECIFIC ELEMENTS.

A. Drilling Operations.

1. Drilling Methods.

a. The object of drilling method selection is to use that technique which:

(1) Minimizes subsurface contamination or cross contamination.

(2) Provides representative data.

(3) Minimizes drilling costs.

b. To this end, the following drilling methods are typically used:

(1) Hollow-stem augers.

(2) Water/mud rotary.

(3) Cable tool/churn drill.

(4) Air rotary.

c. Of these, air rotary is the least desirable and is further discussed in section III.A.2. Other methods, like reverse circulation, may have applicability in certain cases. Unless specified in the RFP/RFQ, the drilling method shall be suggested and described by the contractor in his RFP/RFQ response and/or technical plan, for the Contracting Officer's consideration and approval.

2. Air Rotary.

a. Air systems, including bottled gas, shall not be used for drilling, well installation, well development, presample purging, or sampling unless specified in the statement of work. However, when alternative bids or proposals are allowed, the contractor may present as part of the bid/proposal package an alternative using an air system(s) for a given operation(s). The contractor's alternative shall include:

(1) Situation.

(2) Recommendation.

(3) The effect of usage upon groundwater and soil chemical analyses.

(4) Alternatives with cost savings or increases, as appropriate.

b. The above item shall be quantified, costed (in the appropriate section of the bid/proposal package), and shall incorporate the

III.A.10.a.

(1) Brand names(s).

(2) Manufacturer(s).

(3) Manufacturer's address(es) and telephone number(s).

(4) Product description(s) from package label(s)/manufacturer's brochure(s).

(5) Intended use(s) for this product.

b. Water.

(1) The source of any water to be used in drilling, grouting, sealing, filter placement, well installation, or equipment washing must be approved by the Contracting Officer prior to arrival of the drilling equipment onsite. Parameters for approval include:

(a) A deep aquifer origin (ideally, greater than 200 feet below ground surface).

(b) Well head upgradient of potential contaminant sources.

(c) Free of survey-related contaminants by virtue of pretesting (sampling and analysis) by the contractor using a laboratory certified by or in the process of being certified by USATHAMA for those contaminants. Pretesting shall be conducted on duplicate samples, each analyzed at a different time, using separate lots.

(d) The water to be non-treated and non-filtered.

(e) The tap to have 24-hour per day, 7-day per week access with plumbing sufficient to allow the filling of a 500 gallon tank in less than 20 minutes.

(f) The use of only one designated tap for access.

(2) Periodic testing of the approved water source may be required when the water is used to clean the sampling equipment after well installation. A detailed discussion of these requirements is provided in the USATHAMA Quality Assurance Program.

(3) Surface water bodies shall not be used, if at all possible.

(4) If a suitable source exists onsite, the contractor shall be directed to that source. If no onsite water is available, the contractor shall locate a potential source and submit the following data, III.A.10.b.(4)(a)-(h), in writing to USATHAMA (see Figure 2) for the Contracting Officer's approval prior to the arrival of any drilling equipment onsite. Allow three calendar weeks from the time of receipt by USATHAMA for request evaluation and recommendation.

for determining and complying with any and all state or local regulations with regard to the submission of well logs, samples, etc. Submission of these items to state or local authorities shall be coordinated through USATHAMA. The contractor shall telephonically notify USATHAMA immediately in the event of any apparent discrepancy between contractual and state or local requirements. Notification shall include the nature of the discrepancy; the name, agency, and telephone number of the person noting the discrepancy; and the current status. Any rights-of-entry (for off-post drilling) will be obtained for and supplied to the contractor by the Contracting Officer. The contractor shall ensure that all drilling of boreholes, well installation, and topographic surveying is accomplished by companies appropriately licensed in the project State. A copy of each current license (denoting expiration date) shall be provided in the contractor's Technical Plan. If the project State does not require a licensed driller for this project, then a statement to that effect shall be included in the technical plan.

6. Drilling Safety and Underground Utility Detection. The contractor shall be responsible for determining and complying with any and all (to include host installation) regulations, requirements, and permits with regard to drilling safety and underground utility detection. The contractor shall include a discussion of his actions with regard to these items in his proposal and Safety Plan (also see III.A.12.b., III.A.12.d., and III.G.).

7. Lubricants. Only petroleum jelly, teflon tape, lithium grease, or vegetable-based lubricants shall be used on the threads of downhole drilling equipment. Additives containing lead or copper shall not be used. Any hydraulic or other fluids in the drilling rig, pumps, or other field equipment/vehicles shall NOT contain any polychlorinated biphenyls (PCBs).

8. Surface Runoff. Surface runoff; e.g., precipitation, wasted or spilled drilling fluid, and miscellaneous spills and leaks, shall not enter any boring or well either during or after drilling/well construction. To help preclude this, the use of starter casing, recirculation tanks, berms about the borehole, and surficial bentonite packs, as appropriate, are suggested.

9. Antifreeze. If antifreeze is added to any pump, hose, etc., in an area in contact with drilling fluid, this antifreeze shall be completely purged prior to the equipment's use in drilling, mud mixing, or any other part of the overall drilling operation. Only antifreeze without rust inhibitors and/or sealants shall be used. The contractor shall note on the boring log the dates, reasons, quantities, and brand names of antifreeze per above.

10. Materials.

a. Bentonite is the only drilling fluid additive allowed. No organic additives shall be used. Exception is usually made for some high yield bentonites to which the manufacturer has added a small quantity of polymer. The use of any bentonite must be approved by the Contracting Officer prior to the arrival onsite of the drilling equipment (rigs). This includes bentonites (powders, pellets, etc.) intended for drilling mud, grout, seals, etc. The following data, III.A.10.a.(1)-(5), shall be submitted in writing (see Figure 1) through USATHAMA to the Contracting Officer as part of the approval request. Allow six working days from the time of receipt by USATHAMA for request evaluation and recommendation.

(3) Grout shall be placed in the monitor wells as follows:

(a) When a bentonite seal is used as shown in Figures 5 or 6:

(i) Prior to exposing any portion of the borehole above the seal by the removal of any drill casing (to include hollow-stem augers), the annulus between the well casing and drill casing shall be filled with grout.

(ii) The grout shall be placed from within a rigid tremie pipe, located just over the top of the seal.

(iii) The grout shall be pumped through this pipe to the bottom of the open annulus until undiluted grout flows from the annulus at ground surface, forming a continuous grout column from the seal to ground surface. The grout shall not penetrate the well screen or granular filter pack. Disturbance of the bentonite seal should be minimal.

(iv) The drill casing shall then be removed and more grout immediately added to compensate for settlement.

(v) If drill casing (to include hollow-stem auger) was not used, proceed with grouting to ground surface in one, continuous operation.

(vi) After 24 hours, the contractor shall check the site for grout settlement and that day add more grout to fill any settlement depression.

(vii) Repeat this process until firm grout remains at ground surface.

(viii) Incremental quantities of grout added in this manner shall be recorded as added and the data submitted to the Contracting Officer through USATHAMA on the well diagram (or addendum).

(b) When no bentonite seal is used (unusual occurrence requiring specific Contracting Officer approval):

(i) The contractor shall mix, place, monitor, and report grout usage as described above: III.A.10.c.(1) to (3)(a)(viii), but position the rigid tremie pipe just above the granular filter pack.

(ii) Place the grout so as to avoid grout penetration into the underlying granular filter pack and screen.

(4) If field conditions permit, the contractor may incrementally place grout and remove drill casing so as to constantly maintain 10 feet of grout (minimally) within the casing yet to be removed from the ground. Using this method requires at least 20 feet of grout to be within the casing before removing 10 feet of casing.

(a) Owner/address/telephone number.

(b) Location of tap/address.

(c) Type of source (well, pond, river, etc.). If a well, specify static water level (depth), date measured, well depth, and aquifer description.

(d) Type of treatment and filtration prior to tap (chlorination, fluoridation, softening, etc.).

(e) Time of access (24-hours per day, 5-days per week, etc.).

(f) Cost per gallon charged by Owner/Operator.

(g) Results and dates of all available chemical analyses over past two years. Include the name(s) and address(s) of the analytical laboratory(s)

(h) Results and date(s) of duplicate chemical analysis (see III.A.10.b.(1)(c)) for project contaminants by a laboratory certified by or in the process of being certified by USATHAMA for those contaminants.

(5) The contractor has the responsibility to procure, transport, and store the water required for project needs in a manner to avoid the chemical contamination or degradation of the water once obtained. The contractor is also responsible for any heating, thermal insulation, or agitation of the water to maintain the water as a fluid for its intended uses.

(6) The contractor shall enter the chemical and geotechnical data for the approved water source into the Data Management System.

c. Grout.

(1) Materials. Grout, when used in monitor well construction or well abandonment, shall be composed by weight of 20 parts cement (Portland cement, type II or V) up to 1 part bentonite with a maximum of 8 gallons of approved water per 94 pound bag of cement. Neither additives nor borehole cuttings shall be mixed with the grout. Bentonite shall be added after the required amount of cement is mixed with water.

(2) Equipment. All grout materials shall be combined in an above-ground rigid container or mixer and mechanically (not manually) blended onsite to produce a thick, lump-free mixture throughout the mixing vessel. The mixed grout shall be recirculated through the grout pump prior to placement. Grout shall be placed using a grout pump and tremie. The grout pump for recirculation and placement shall be a commercially available product specifically manufactured to pump cement grouts. The tremie pipe shall be of rigid, not flexible, construction. Drill rods, rigid polyvinyl chloride (PVC) or metal pipes are acceptable tremies. Hoses and flexible PVC are unacceptable. Grout placement, via gravity and the grout head, using an elevated grout tank is expressly prohibited.

pipe until undiluted grout flows from the boring/well at ground surface. Any open or ungrouted portion of the annular space between the well casing and borehole shall be grouted in the same manner also. Grout composition, equipment, and placement procedures are covered in section III.A.10.c.

c. After 24 hours, the contractor shall check the abandoned site for grout settlement. That day, any settlement depression shall be filled with grout and rechecked 24 hours later. This process shall be repeated until firm grout remains at ground surface.

d. Normally an abandoned well shall be grouted with the well screen and casing in place. However, a lack of data concerning well construction or other factors may dictate the removal of the well materials and a partial or total hole redrilling prior to sealing the well site.

e. For each abandoned boring/well, a record shall be prepared to include the following, III.A.11.e.(1)-(13), as applicable. Report all depths/heights from ground surface. The original record shall be submitted to USATHAMA within three working days after abandonment is completed.

(1) Boring/well designation.

(2) Location with respect to the replacement boring or well (if any); e.g., 20 feet north and 20 feet west of Well 14.

(3) Open depth prior to grouting and depth to which grout pipe placed. This includes the depth of open hole, open depth to the bottom of the well, and the open depth in the well-borehole annulus.

(4) Casing left in hole by depth, composition, and size.

(5) Copy of the boring log.

(6) Copy of construction diagram for abandoned well.

(7) Drilled and sampled depth prior to decision to abandon site.

(8) Items left in hole by depth, description, and composition.

(9) Description and total quantity of grout used initially.

(10) Description and daily quantities of grout used to compensate for settlement.

(11) Dates of grouting.

(12) Water or mud level (specify) prior to grouting and date measured.

(13) Remaining casing above ground surface: height above ground, size, and composition.

III.A.10.c.

(5) For grout placement at depths less than ten feet in a DRY hole, the grout may be poured in place from ground surface.

d. Granular Filter Pack. For this discussion, refer to section III.C.5.

e. Well Screens, Casings, and Fittings. For a discussion of these materials, see section III.C.2.

f. Well Caps and Centralizers. These items are discussed in sections III.C.3. and 4, respectively.

g. Well Protection. Elements of well protection are covered in section III.C.8.

h. Tracers, dyes, or other substances shall not be used or otherwise introduced into borings, wells, grout, backfill, groundwater, or surface water unless specifically required by contract.

i. Summarize the usage of these and any other drilling/well construction materials which potentially could have a bearing on subsequent interpretation of the analytical results. Include this summary within the geotechnical report. An example summary is provided at Table 1.

11. Abandonment. Abandonment is that procedure by which any boring or well is permanently closed. Abandonment procedures shall preclude any current or subsequent discharges from entering the abandoned boring or well and thereby terminate access to the subsurface environment.

a. The abandonment of any borings or wells not scheduled for abandonment per contract, must be approved by the Contracting Officer prior to any casing removal, sealing, or backfilling. Abandonment requests shall be submitted telephonically through USATHAMA to the Contracting Officer with the following data, III.A.11.a.(1)-(3), plus recommendation. Allow four consecutive hours from the time of receipt by USATHAMA for request evaluation and decision. Frequently, resolution is made within minutes. Infrequent circumstances may preclude a four-hour resolution. A written followup memorandum shall be submitted by the contractor within five working days of the telephonic request. This document shall be forwarded through USATHAMA to the Contracting Officer and contain the following data:

(1) Designation of well/bore in question.

(2) Current status (depth, contents of hole, stratigraphy, water level, etc.).

(3) Reason for abandonment.

(4) Action taken, to include any replacement boring or well.

b. Each boring or well to be abandoned shall be sealed by grouting from the bottom of the boring/well to ground surface. This shall be done by placing a grout pipe to the bottom of the boring/well (i.e., to the maximum depth drilled/bottom of well screen) and pumping grout through this

solid barrel sampler, Denison sampler, etc. These samples shall be extracted from their host environment in as near an intact, undisturbed condition as technically practical. Once at the surface, the sampler shall be opened, sample extracted, peeled, and bottled in as short a time as possible. "Peeling" is a process whereby that portion of the sample which was in direct contact with the sampler, as well as the ends of the sample, are removed and discarded. Samples for volatile analysis shall be peeled, bottled, and capped within fifteen (15) seconds from the time of opening the sampler. Additional acquisition, preservation, and handling criteria for the chemical analysis of soils are found in the current Quality Assurance Program.

f. All soil samples, except those for physical and/or chemical analysis and reference shall remain onsite, neatly stored at a USATHAMA-designated location. The disposition of these samples will be arranged between USATHAMA and the host installation.

13. Rock Core. The preferred method of drilling bedrock is through coring. This method, using a diamond or carbide studded bit, produces a generally intact sample of the bedrock lithology, structure, and physical condition. The use of a gear-bit, tricone, etc., to penetrate bedrock should only be considered for the confirmation of the "top of rock" (where penetration is limited to a few feet), the enlargement of a previously cored hole, or the drilling of highly fractured intervals.

a. The coring of bedrock or any firm stratigraphic unit shall be conducted in a manner to obtain at least 90% intact recovery. The physical character of the bedrock; i.e., fractures, poor cementation, weathering, or solution cavities, may lessen the desired recovery, even with the best of drillers and equipment.

b. While drilling in bedrock, and especially while coring, drilling fluid pressures shall be adjusted to minimize drilling fluid losses and hydraulic fracturing.

c. Rock cores shall be stored in covered wooden boxes in such a manner as to preserve their relative position by depth. Intervals of lost core shall be noted in the core sequence with annotated wooden blocks. Boxes shall be marked inside and out to provide boring number, cored interval, and box number in cases of multiple boxes. The weight of each fully loaded box shall not exceed 75 pounds. No geotechnical data shall appear on or within the box that is not specified on the boring log. As a minimum, the estimated number of boxes required for each boring shall be on hand prior to coring that site.

d. The core within each completed box shall be photographed after the core surface has been cleaned/peeled and wetted. Photos shall be taken using color film (ASA as appropriate), 35mm camera, 55mm (minimum) lens, light meter, with one box per frame. Each photo shall be in sharp focus and contain both a legible scale in feet and tenths of feet (or centimeters) and a USATHAMA-supplied photographic color chart for color comparison. The core shall be oriented so that the top of the core is at the top of the photo. One set of 3 x 5 inch glossy color prints plus all negatives shall be sent to USATHAMA via registered mail within 2 weeks of the last coring. Each photo shall be annotated on the back as to the bore/well designation, box number, and cored

f. Ideally, replacement wells/borings (if any) will be offset at least 20 feet from any abandoned site in a presumed up- or cross-gradient groundwater direction. Site-specific conditions may necessitate variation to this placement.

12. Soil Samples.

a. Unless otherwise specified in the contract, intact soil samples for physical descriptions, retention, and potential physical analyses shall be taken and retained every five feet or at each major change of material, whichever occurs first. The contractor may propose an alternate sampling frequency in his technical plan. These samples shall be representative of their host environment and are to be obtained with driven (e.g., split spoon), pushed (e.g., thin wall), or rotary (e.g., Denison) type samplers. Auger flight or wash samples will not satisfy this requirement.

b. At the detection of any unusual odors off the auger turnings or intact samples, drilling shall cease for an evaluation of their nature and crew safety. After the field crew completes this evaluation and implements any appropriate safety precautions, drilling shall resume. If the odors are judged by the field crew to be contaminant-related, intact samples shall be continuously taken until the odors are no longer detected in the samples. At that time, normal sampling shall resume. Specific procedures shall be detailed in the contractor's proposal and Safety Plan.

c. Representative soil samples from each sampler shall be placed in half- or one-pint glass jars with air-tight, screw-type lids (canning jars). These jars shall be stored in individual compartments in cardboard boxes. A single box shall not contain more than 24 one-pint jars or 48 half-pint jars. For thin wall (shelby) samples, retain a sample from each tube as described above. The remaining portion may be wasted or sealed in the tube, as per testing requirements. Minimum information on each sample container shall include the boring and sample number. No geotechnical data shall appear on the container that is not specified on the boring log. Jars and tubes shall be kept from freezing.

d. Physical soil testing shall be conducted on ten (10) to twenty (20) percent of the soil samples using procedures and equipment described in the current U.S. Army Corps of Engineers Manual, EM 1110-2-1906: Laboratory Soils Testing, or current Annual Book of ASTM Standards, American Society of Testing and Materials, Part 19. Tested samples shall be representative of the range and frequency of soil types encountered. In addition, they shall be obtained from borings that cover the geographic and geologic range within the study area of the host Army installation. The contractor shall select the particular samples. Tests shall include Atterberg Limits, sieve grain size distribution, and assignment of Unified Soil Classification System symbols. Laboratory and summary sheets shall be submitted to the COR within ten working days of final test completion. The contractor shall address any contaminant-related safety precautions for the physical analysis of these samples in his proposal and Safety Plan.

e. Soil samples for chemical analysis taken from borings shall be obtained in a manner to provide intact specimens; using a split spoon or

III.B.

2. Submittal. Each original boring log shall be submitted directly from the field to the Contracting Officer's designated office within three working days after the boring is completed. In those cases where a monitor well or other instrument is to be inserted into the boring, both the log for that boring and the installation diagram must be submitted within three working days after the instrument is installed.

3. Originals. Only the original boring log (and diagram) shall be submitted from the field to fulfill the above requirement. Carbon, typed, or reproduced copies shall not suffice.

4. Time of Recording. Logs shall be recorded directly in the field without transcribing from a field book or other document. This technique reduces offsite work hours for the geologist, lessens the chance for errors of manual copying, and allows the completed document to be field-reviewed closer to the time of drilling.

5. Routine Entries. In addition to the data desired by the contractor and uniquely required by contract, the following information shall be routinely entered on the boring log or attached to the log:

a. Depths/heights shall be recorded in feet and fractions thereof (tenths or inches). Metric measurements are acceptable if typically used by the geologist. The DMS does not accept entries in inches.

b. Soil classifications shall be in accordance with the Unified Soil Classification System (equivalent to ASTM D 2487-69).

c. Soil classifications shall be prepared in the field at the time of sampling by the geologist and are subject to change based upon laboratory tests and/or subsequent review. The mere difference between laboratory and field classification is not sufficient to change the field classification. Additional factors to consider before changing a field determination include the expertise of the field geologist and laboratory personnel, representative character of the tested sample, labeling errors, etc. Any changes made after this consideration shall be discussed and incorporated in the project report(s). The contractor shall also initiate any subsequent corrections to the Data Management System.

d. Each soil sample taken (see III.A.12.) shall be fully described on the log. The descriptions of intact samples shall include the following parameters:

PARAMETER	EXAMPLE
Classification	Sandy Clay
Unified Soil Classification Symbol	CL
Secondary Components and Estimated Percentages	Sand: 25% (Fine sand 5%, Coarse sand 20%)
Color (using Munsell Soil or Geological	Gray: 7.5 YR 5.0 (Munsell)

depths denoted in the photograph. The photos shall be used to enhance the interpretation of core sketches and corresponding narrative descriptions.

e. All rock core, except that for analysis and reference, shall remain onsite, neatly stored at a USATHAMA-designated location. The disposition of these samples will be arranged between USATHAMA and the host installation.

14. Drilling in Contaminated Areas. Many borings and wells are drilled in areas that are clean relative to the deeper horizons of interest. However, circumstances do arise which require drilling where the overlying soils or shallow aquifer may be contaminated relative to the underlying environment. This situation requires the placement of, at least, double casing: an outer permanent (or temporary) casing sealed in place and cleaned of all previous drill fluids prior to proceeding into the deeper, "cleaner" environment. These situations shall be addressed by the contractor on a case-by-case basis in the technical plan.

15. Equipment Cleaning. The steam cleaning of all drilling equipment to include rigs, water tanks (inside and out), augers, drill casings, rods, samplers, tools, recirculation tanks, etc., shall be done prior to project site (installation) arrival followed by onsite steam cleaning with approved water (III.A.10.b.) upon site arrival and between boring/well sites. Prior to use onsite, all casings, augers, recirculation and water tanks, etc., shall be devoid both inside and out of any asphaltic, bituminous, or other encrusting or coating materials, grease, grout, soil, etc. Paint, applied by the equipment manufacturer, need not be removed from drilling equipment. To the extent practical, all cleaning shall be performed in an area that is remote from and surficially cross- or downgradient from any site to be sampled.

16. Work Area Restoration, Disposal of Borehole Cuttings and Well Water. All work areas around the wells and/or borings installed as part of this contract shall be restored to a physical condition equivalent to that of preinstallation. This includes cuttings removal or spreading and rut removal. Borehole cuttings, drilling fluids, and water removed from a well during installation, development, aquifer testing, and presample purging shall be disposed of in a manner approved by the Contracting Officer and the host installation. The contractor shall suggest a disposal procedure and location(s) as part of his technical plan.

17. Physical Security.

a. On Post: While physical security measures are present on most Army properties, the contractor has the ultimate responsibility for securing his own equipment. The contractor shall address any special needs to the onsite installation personnel and include these items in his technical plan.

b. Off Post: For any operations off post, the contractor is totally responsible for his own physical security.

B. Borehole Logging. Each boring log shall fully describe the subsurface environment and the procedures used to gain that description.

1. Format. The format of the boring log shall be determined by the contractor. A suggested format is presented in Figure 4.

III.B.5.g.

Hardness	Soft, Very hard
Degree of Cementation	Poorly cemented, Well cemented
Texture	Dense, Fine-, Medium-, Coarse-grained, Glassy, Porphyritic, Crystalline
Structure and Orientation	Horizontal bedding, Dipping beds at 30°, Highly fractured, Open vertical joints, Healed 30° faults/ fractures, Slickensides at 45°, Fissile
Degree of Weathering	Unweathered, Badly weathered
Solution or Void Conditions	Solid, Cavernous, Vuggy with partial infilling by clay
Primary and Secondary Permeability, include estimates and rationale	Low primary: Well cemented High secondary: Several open joints
Lost Core, interval and reason for loss	50-51', noncemented sandstone likely

h. For rock core, provide a scaled graphic sketch of the core on or with the log denoting by depth the location, orientation, and nature (natural or coring-induced) of all core breaks. Note also the intervals by depth of all lost core and hydrologically significant details. This sketch shall be prepared at the time of core logging, concurrent with drilling.

i. Record the brand name and amount of any bentonite used for each boring along with the reason for and start (by depth) of this use.

j. The drilling equipment used shall be generally described either on each log or in a general legend. Record such information as rod size, bit type, pump type, rig manufacturer and model.

k. Each log shall record the drilling sequence; e.g.:

(1) Opened hole with 8" auger to 9'.

(2) Set 8" casing to 10'.

(3) Cleaned out and advanced hole with 8" roller bit to 15' (clean water, no water loss).

(4) Drove standard sampler to 16.5'.

III.B.5.d.

Society of America (GSA) Rock Color Chart), give both narrative and numerical description and note which chart used.	
Plasticity	Low Plasticity
Consistency (cohesive soil)	Stiff
Density (non-cohesive soil)	Loose
Moisture Content. Use relative term. Do not express as a percentage unless a value has been measured.	Dry, moist, wet, etc.
Texture/Fabric/Bedding and Orientation	No apparent bedding: numerous vertical, iron-stained, tight fractures
Grain Angularity	Rounded
Depositional Environment and Formation, if named	Glacial till, Twin Cities Formation

e. In the field, visual numeric estimates shall be made of secondary soil constituents; e.g., "silty sand with 20 percent fines" or "sandy gravel with 40 percent sand." If such terms as "trace," "some," "several," etc., are used, their quantitative meaning is to be defined on each log or within a general legend.

f. When used to supplement other sampling techniques, disturbed samples; e.g., wash samples, cuttings, and auger flight samples, shall be described in terms of the appropriate soil/rock parameters to the extent practical. "Classification" shall be minimally described for these samples, along with a description of drill action and water losses/gains for the corresponding depth.

g. Rock core shall be visually described for the following parameters:

PARAMETER	EXAMPLE
Classification	Limestone, Sandstone, Granite
Lithologic Characteristics	Shaly, Calcareous, Siliceous, Micaceous
Bedding/Banding Characteristics	Laminated, Thin bedded, Massive, Cross bedded, Foliated
Color (using Munsell Soil or GSA Rock Color Chart), give both narrative and numerical description and note which chart was used.	Mod. brown: 5 YR 3/4 GSA

III.B.5.

u. Record significant color changes in the drilling fluid return, even when intact soil samples or rock core are being obtained. Include the color change (from and to), depth at which change occurred, and a lithologic description of the cuttings before and after the change.

v. Special abbreviations used on a log and/or well diagram shall be defined either in the log/diagram where used, or in a general legend. The general legend, if used, shall be forwarded to USATHAMA with the first log/diagram submittal. An addendum, if required, shall be sent to USATHAMA with the last log/diagram.

C. Well Installation. In the Geotechnical Requirements, the term "monitor well" is used in a generic sense to include observation wells and piezometers. Observation wells differ from piezometers in the length of the open or screened section of the well and location of the well seal (usually bentonite) in relation to the potentiometric or phreatic surface of the aquifer being measured (see Figure 10). Each monitor well is intended for use as a mechanism through which to obtain a representative sample of groundwater and measure the potentiometric surface seen by that well. The installation of either well type is covered by these Requirements. These Requirements are also applicable to other types of hydrogeologic instrumentation; e.g., lysimeters and well points (see Figure 10). The criteria for these and other special instrumentation will be discussed in the specific RFP/RFQ, contract, task, and/or amendment. Any questions regarding these items should be addressed to the COR.

1. Beginning Well Installation.

a. The installation of each monitor well shall begin within 12 consecutive hours of boring completion for holes uncased or partially cased with temporary drill casing. Installation shall begin within 48 consecutive hours in holes fully cased with temporary drill casing. Once installation has begun, no breaks in the installation process shall be made until the well has been grouted and drill casing removed. Anticipated exceptions shall be requested in writing by the contractor to the Contracting Officer through USATHAMA for consideration prior to drilling. Allow three working days from the time of receipt by USATHAMA for request evaluation and recommendation. Data to include in this request are:

(1) Well(s) in question.

(2) Circumstances.

(3) Recommendation and alternatives.

b. In cases of unscheduled delays such as personal injury, equipment breakdowns, sudden inclement weather; or scheduled delays such as borehole geophysics, no advance approval of delayed well installation is needed. In those cases, resume installation as soon as practical. In cases where a partially cased hole into bedrock is to be partially developed prior to well insertion (III.D.11.), the well installation shall begin within 12 consecutive hours after this initial development.

(5) Advanced with 8" roller bit to 30', 15 gallon water loss.

(6) Drove standard sampler to 31.5'.

(7) Hole heaved to 20'.

(8) Mixed 25 pounds of ABC bentonite in 100 gallons of water for hole stabilization and advanced with 8" roller bit to 45', etc.

l. Record all special problems and their resolution on the log; e.g., hole squeezing, recurring problems at a particular depth, sudden tool drops, excessive grout takes, drilling fluid losses, unrecovered tools in hole, lost casings, etc.

m. The dates for the start and completion of borings shall be recorded on the log along with notation by depth for drill crew shifts and individual days.

n. Each sequential boundary between the various soils and individual lithologies shall be noted on the log by depth. When depths are estimated, the estimated range shall be noted along the boundary.

o. The depth of first encountered free water shall be indicated along with the method of determination; e.g., "37.6' from direct measurement after drilling to 40.0';" or "40.1' from direct measurement in 60' hole when boring left overnight, hole dry at end of previous shift;" or "25.0' based on saturated soil sample while sampling 24-26'." Allow the first encountered water to partially stabilize (5 to 10 minutes) and record this secondary level and time between measurements before proceeding. Also describe any other distinct water level(s) found below the first.

p. The estimated interval by depth for each sample taken, classified, and/or retained shall be noted on the log. For each driven (split spoon), thin wall (shelby), and cored sample, record the length of sampled interval and length of sample recovery. Record the sampler type and size (diameter and length).

q. Record the blow counts, hammer weight, and length of hammer fall for driven samplers. For thin wall samplers, indicate whether the sampler was pushed or driven. Blow counts shall be recorded in half foot increments when standard (1 3/8" ID by 2" OD) samplers are used. For penetration less than a half foot, annotate the count with the distance over which the count was taken.

r. When drilling fluid is used, quantitatively record fluid losses and/or gains and the interval over which they occur. Adjust fluid losses for spillage and intentional wasting (e.g., recirculation tank cleaning) to more accurately estimate the amount of fluid lost to the subsurface environment.

s. Record the pumping pressures typically used during all rotary drilling operations.

t. Note the total depth of drilling or sampling, whichever is deeper, on the log.

f. Silt traps (also called "cellars") shall not be used. A silt trap is a blank length of casing attached to and below the screen. Their use fosters a stagnant environment which could influence analytical results for trace concentrations.

g. Joints within and between the casing and screen shall be compatibly threaded. Thermally welded joints or couplings shall not be used. This prohibition includes threaded or slip joint couplings thermally welded to casing by the manufacturer or in the field. Solvent welded joints may be used only to make casing repairs or to adjust casing height. Any glue or solvent usage shall be described on the log or well diagram. During these repairs or adjustments which require solvent/glue usage, a clean rag should be tightly fit into the intact well casing to catch any glue spillage. This rag shall be attached to a strong twine for ease of rag removal and to preclude rag loss down the well. The rag and twine shall be removed upon repair completion.

h. Gaskets shall not be used on monitor wells.

i. The top of each well installed under these Requirements shall be level such that the difference in elevation between the highest and lowest part of the well casing/riser shall be less than or equal to 0.02'.

3. Caps and Vents. The tops of all well casings shall be telescopically capped with loosely fitting PVC, PTFE, or stainless steel covers. These covers shall be constructed to preclude binding to the well casing due to tightness of fit, unclean surface, or frost and secure enough to preclude debris and insects from entering the well. No vents shall be placed in these caps (or well risers/stickup). Therefore, the caps shall be loose enough to allow pressure equalization between the well and atmosphere.

4. Centralizers. Well centralizers, when used, shall be of PVC, PTFE, or stainless steel and attached to the casing via stainless steel fasteners or strapping. Centralizers shall not be attached to the well screen or to that part of the well casing exposed to the granular filter or bentonite seal.

5. Granular Filter Pack.

a. All granular filters must be approved by the Contracting Officer prior to drilling. A one-pint representative sample of each proposed granular filter pack, accompanied by the data below, III.C.5.a.(1)-(6), shall be submitted by the contractor to the Contracting Officer through USATHAMA for consideration prior to drilling. Allow eight working hours for evaluation and recommendation once all of the above data are received by USATHAMA. Each sample shall be described, in writing (see Figure 3), in terms of:

(1) Lithology.

(2) Grain size distribution.

(3) Brand name, if any.

(4) Source, both manufacturing company and location of pit or quarry of origin.

c. Once begun, well installation shall not be interrupted due to the end of the contractor's/driller's work shift, darkness, weekend, or holiday.

d. The contractor shall ensure that all materials and equipment for drilling and installing a given well are available and onsite prior to drilling that well. The contractor shall have all equipment and materials onsite prior to drilling and installing any well if the total well drilling and installation effort is scheduled to take 14 consecutive days or less. ("Consecutive days" refers to the continuous combination of "working" and "nonworking days;" i.e., "calendar days."). For longer schedules, the contractor shall ensure that the above materials needed for at least 14 consecutive days of operation are onsite prior to well drilling. The balance of materials shall be either on order or in transit prior to well drilling.

2. Screens, Casings, and Fittings.

a. Typically, only polyvinyl chloride (PVC), polytetrafluoroethylene (PTFE), and/or stainless steel shall be used. All PVC screens, casings, and fittings shall conform to National Sanitation Foundation (NSF) Standard 14 for potable water usage (or American Society for Testing and Materials (ASTM) equivalent) and bear the appropriate rating logo. If a contractor uses a screen and/or casing manufacturer or supplier who removes or does not apply this logo, the contractor shall include in the Technical Plan a written statement from the manufacturer/supplier (and endorsed by the contractor) that the screens and/or casing have been appropriately rated by NSF/ASTM. Specific materials will be specified in the RFP/RFQ or proposed by the contractor in his RFP/RFQ response for the Contracting Officer's approval. All materials shall be as chemically inert with respect to the site environment as technically possible and practical.

b. All well screens shall be commercially fabricated, slotted or continuously wound, and have an inside diameter equal to or greater than the well casing. For PVC and PTFE screens, their schedule/thickness shall be the same as that of the well casing. Stainless steel screens may be used with PVC or PTFE well casing. No fitting shall restrict the inside diameter of the joined casing and/or screen. All screens, casings, and fittings shall be new.

c. All well screens and well casings shall be free of foreign matter (e.g., adhesive tape, labels, soil, grease, etc.) and washed with approved water prior to use. Pipe nomenclature stamped or stenciled directly on the well screen and/or blank casing within and below the bentonite seal shall be removed (via SANDING). Solvents shall NOT be used for marking removal. Washed screens and casings shall be stored in plastic sheeting or kept on racks prior to insertion.

d. Well screens shall be placed no more than three feet above the bottom of the drilled borehole.

e. All screen bottoms shall be securely fitted with a threaded cap or plug of the same composition as the screen. This cap/plug shall be within 0.5' of the open portion of the screen (see Figures 5 and 6). No solvents or glues shall be permitted for attachment.

SCIENCE APPLICATIONS
READINESS CHECKLIST FOR
AQUIFER PUMP TESTS/SLUG TESTS

Project Name_____ Project Manager_____

Project Location_____ Field Team Leader_____

Project Number_____ Client Contact_____

PRE-MOBILIZATION ACTIVITIES

__ Order/obtain all necessary equipment (see below).

__ Notify post/AEC contacts of readiness.

__ Personnel

The number of personnel is determined on a job-by-job basis. It is dependent on the length of the overall job, number of subcontractor personnel on site, level of personal protection required, and weather. Specific tasks that need to be considered are length of test, location, and number of observation wells.

MATERIALS/EQUIPMENT REQUIRED

__ Logbook(s)

__ Health & Safety Plan (signed by personnel on site)

__ Work Plan

__ Site Maps

__ OSHA Job Safety & Health Protection Poster

__ Well Location Maps

__ Quality Assurance Plan

__ Vehicle Passes

__ Keys to Wells, Storage Areas, Gates, etc.

__ Water Level Indicator

__ Engineer's Tape

__ Check Valve

__ Waterproof Tape - duct and electrical

__ Pressure Transducers

__ Slug

__ Polypropylene or Teflon® Coated Stainless Steel

__ Bailer

__ Pumps, Hardware and Piping, etc.

__ Stop Watch

__ Flow Meter

__ Emergency contacts, phone numbers, route to hospital posted

__ Extension Cords

__ Flash Lights

__ Tripod

__ Control Box

__ Applicable Instruction Manuals

__ Tools (screwdriver, hammer, bolt cutters, wrenches, pliers, ratchet set, knife)

READINESS CHECKLIST FOR AQUIFER PUMP TESTS/SLUG TESTS (CONTINUED)

__ Hermit

__ Computer

__ Adding Machine Paper

__ Ribbon

__ Car Lighter Adapter

__ pH & Conductivity Meters and Standards

__ Field Forms and Clipboard

__ Teflon® Wash Bottles/and or Stainless Steel Sprayer with Teflon® Tubing

__ Stainless Steel Bucket

__ Aluminum Foil

__ White Paper Towels - no ink or dyes

__ Decontamination Solutions:

- Alcohol/Liquinox
- Methanol
- Hexane
- HPLC-Grade Water or ASTM Type II

__ Scrub Brushes

__ Plastic Sheeting

__ Steel Toe Boots

__ Safety Glasses

__ Gloves (PVC, Nitrile, Butyl, Silver Shield)

__ Safety Tape/Barriers

__ First Aid Kit

__ Power Source and Fuel

__ 55-gallon Drums or Tanker

__ Calculator

__ Garbage Bags

__ Camera and Film

__ Packing Tape

SCIENCE APPLICATIONS
READINESS CHECKLIST FOR
SURVEYING WELL LOCATIONS

Project Name_____ Project Manager_____

Project Location_____ Field Team Leader_____

Project Number_____ Client Contact_____

PRE-MOBILIZATION ACTIVITIES

__ Order/obtain all necessary equipment (see below).

__ Notify post/AEC contacts of readiness.

__ Personnel required: Two people if work is performed by SAIC. If subcontracted, one person is required.

MATERIALS/EQUIPMENT REQUIRED

__ Work Plan

__ Health & Safety Plan (signed by personnel on site)

__ Well Location Maps

__ Quality Assurance Plan

__ Logbook(s)

__ Surveying Forms and Clipboard

__ Vehicle Passes

__ Keys to Well, Storage Areas, Gates, etc.

__ Calculator

__ Engineer's Tape

__ Field Glasses

__ Surveying Level

__ Packing Tape

__ Tripod

__ Stadia Rods

__ First Aid Kit

__ Snake Leggings/Hip Wader

__ Bolt Cutters

__ Survey Subcontract

__ USGS Map

__ Previous Survey Documentation

__ Emergency contacts, phone numbers, route to hospital posted

__ Steel Toe Boots

__ Safety Glasses

__ Applicable Instruction Manuals

__ Camera and Film

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SCIENCE APPLICATIONS
READINESS CHECKLIST FOR
SOIL GAS SURVEY

Project Name_____ Project Manager_____

Project Location_____ Field Team Leader_____

Project Number_____ Client Contact_____

PRE-MOBILIZATION ACTIVITIES

__ Order/obtain all necessary equipment (see below).

__ Notify post/AEC contacts of readiness.

__ Personnel

The number of personnel is determined on a job-by-job basis. It is dependent on the length of the overall job, number of subcontractor personnel on site, level of personal protection required, and weather. Specific tasks that need to be considered are decontamination, documentation, QA/QC, and health and safety.

MATERIALS/EQUIPMENT REQUIRED

__ Gas Chromatograph (GC)

__ GC Paper Rolls

__ GC Pens

__ Syringes - 10,000 & 1,000 ml

__ Chem-Wipes

__ Tygon Tubing

__ Scissors

__ Flow Meter

__ Septa

__ Stainless Steel Probes

__ Tedlar Bags

__ Probe Tips

__ Probe Nipples

__ Field Logbook

__ Work Plan

__ Health and Safety Plan

__ Probe to Hammer Pounder

__ Electric Hammer

__ Electric Air Pump

__ Pump Oil

__ Standard Gas Tank

__ Zero-Air Tank

__ Regulator

__ Air Lines for Zero-Air Tank

__ Crescent Wrench

__ Screw Driver

__ Vacuum Chamber

__ Probe to Chamber Coupler

__ Tyvek Suits

__ Photovac AC Adapter

__ Photovac Electrical Cord

__ 100 ft Extension Cords

READINESS CHECKLIST FOR SOIL GAS SURVEY (CONTINUED)

__ Quality Assurance Plan
__ Site Maps
__ Sample Point Locations
__ OSHA Job Safety & Health Protection Poster
__ Vehicle Passes
__ Emergency contacts, phone numbers, and route to hospital
__ Clear Packing Tape
__ First Aid Kit
__ Carbon Paper
__ Fed.Ex. Forms, Pockets
__ Steel Toe Boots
__ Safety Glasses
__ Work Gloves
__ Scrub Brushes
__ Probe Barrel Cleaning Rods
__ Camera and Film
__ Liquinox/Alconox
__ Distilled Water
__ White Paper Towels - no ink and dyes
__ Calculator
__ Garbage Bags
__ Engineer's Tape
__ Applicable Instruction Manuals

__ 2,100 or > Generator
__ Decon Sprayers
__ Coolers
__ Hi Lift Jack
__ Vise Grips
__ Tie Down Straps
__ Concrete Drill Bit
__ Sample Bag Labels
__ Flags
__ Vacuum Chamber Seal
__ Vacuum Chamber Valve
__ Stainless Steel Air Lines
__ Windshield Sun Visor
__ Photovac Vehicle Adapter Cord
__ Plastic Roll
__ Fuel Container
__ 7/16 Inch Probe Tap
__ Metal Detector
__ Ear Protection
__ Soldering Kit
__ Black Ink Pens
__ Respirator and Cartridges

FIELD PROCEDURE FP 2-1

OPERATION AND CALIBRATION OF MSA MODEL 261 COMBUSTIBLE GAS INDICATOR

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Subject	Procedure No.	Rev.	
	FP 2-1	1	Page 1 of 4
OPERATION AND CALIBRATION OF MSA MODEL 261 COMBUSTIBLE GAS INDICATOR	Issue Date		Effective Date
	10/04/93		10/04/93
	Supersedes Procedure Number	Rev.	Date
	630 FP 25	0	
Acceptance - Program QA	Approval - Program Manager		

1.0 PURPOSE

The purpose of this procedure is to define the steps necessary for calibration, operation and maintenance of the Mine Safety Appliances (MSA) Model 261 combustible gas indicator.

2.0 SCOPE

2.1 This procedure applies to the calibration, operation and maintenance of the MSA 261 combustible gas indicator during a field investigation.

2.2 This procedure may also be used in conjunction with the manufacturer's instructions for other combustible gas indicators.

3.0 REQUIREMENTS

Measurement of combustible gases is an important and necessary requirement during field investigations for the health and safety of workers. Detection of combustible gases during field investigations is also a precursor of the presence of contaminants at the site.

4.0 REFERENCES

4.1 *Mine Safety Appliances Model 261 Combustible Gas Indicator Instruction Manual.*

5.0 DEFINITIONS

None.

6.0 RESPONSIBILITIES

The Field Operations Leader is responsible for ensuring that the necessary equipment is available for the calibration, use, and maintenance of the measuring equipment. The Field Operations Leader is also responsible for ensuring that the calibration and methodology is consistent, that workers have

been instructed in the proper use of equipment, and that the calibration and maintenance of the equipment has been properly documented.

7.0 EQUIPMENT

1. MSA Model 261 Combustible Gas Indicator with appropriate sample lines
2. MSA calibration test system
3. Battery charger
4. Screwdriver.

8.0 PROCEDURE

The procedure for calibration prior to daily use, operation, and maintenance of the MSA Model 261 combustible gas indicator is outlined below. Calibration frequencies other than prior to daily use should be specified in the project-specific work plan. If using a different instrument, the owner's manual should be consulted for instructions.

8.1 Calibration

1. Open the instrument lid and turn the center ON-OFF control to HORN OFF position. Both meter pointers will move and one or both alarms may light.

2. The % LEL meter pointer should be set to zero by lifting and adjusting the ZERO LEL control knob. Adjustment should be made within 30 seconds after instrument is turned on to prevent accidental activation of the meter latch circuit.

3. The % OXYGEN meter pointer should be set to 20.8% by lifting and adjusting the CALIBRATE O_2 control knob.

4. Press the ALARM RESET button; the alarm(s) should be reset and the green pilot light should flash.

5. Place a finger over the sample inlet fitting or the end of the sample line probe. Observe the flow indicator float. If the float drops out of sight indicating no flow, the system has a good seal. If the float does not drop, check the system for leaks.

6. Press the CHECK Button and observe the %LEL meter. The pointer must read 80% LEL or higher as marked by the BATTERY zone on the meter. If the pointer reading is less, the battery pack must be recharged; no test should be attempted as the instrument will malfunction.

7. Turn the ON-OFF control know to the ON position. The pilot lamp should light continuously.

8. Attach one end of the sampling line to the unit and the other to the recommended calibration gas (i.e. MSA, PENTANE: 0.75% {by volume} in air, 50% LEL).

9. Open the calibration gas flow control valve.

10. After approximately 15 seconds, the LEL meter pointer should be stable and within the range specified for the calibration gas. If the meter point is not in the correct range, stop the gas flow and remove the right hand side (speaker) panel. Turn on the flow and adjust the "5" control with a small screwdriver to obtain the reading specified for the particular calibration gas.

11. Shut off the gas flow; remove the sampling line from the gas control valve; replace the side panel.

8.2 Operation

1. Open the instrument lid and turn the center ON-OFF control to HORN OFF position. Both meter points will move and one or both alarms may light.

2. The % LEL meter point should be set to zero by lifting and adjusting the ZERO LEL control knob. Adjustment should be made within 30 seconds after instrument is turned on to prevent accidental activation of the meter lath circuit.

3. The % OXYGEN meter pointer should be set to 20.8% by lifting and adjusting the CALIBRATION O_2 control knob.

4. Press the ALARM RESET button. The alarm(s) should reset and the green pilot light should flash.

5. Place a finger over the sample inlet fitting or the end of the sample line probe. Observe the flow indicator float. If the float drops out of sight indicating no flow, the system has a good seal. If the float does not drop, check the system for leaks.

6. Press the CHECK button and observe the % LEL meter. The pointer must read 80% LEL or higher as marked by the BATTERY zone on the meter. If the pointer reading is less, the battery pack must be recharged, no test should be attempted as the instrument will malfunction.

7. Turn the ON-OFF control knob to the ON position. The pilot lamp should light continuously.

8. Accessory equipment such as sampling lines, robes, carrying harness, filters or line traps should be attached as required. Tighten all connections and test for flow indication as described above (see Step 5, above).

9. The MSA Model 261 is now ready for atmospheric sampling.

8.3 Preventive Maintenance

After daily use of the MSA combustible gas indicator for field investigations, the unit shall be inspected for cleanliness and cleaned with soap and water as necessary. Sampling inlet lines shall be examined for cracks, tears and blockage and, if needed, be repaired or replaced. The battery shall be recharged after daily use as a low battery will cause the unit to malfunction.

9.0 ATTACHMENTS

None.

FIELD PROCEDURE FP 2-2

OPERATION AND CALIBRATION OF HNu MODEL PI-101 PHOTOIONIZATION DETECTOR

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Subject	Procedure No.	Rev.	
	FP 2-2	1	Page 1 of 4
OPERATION AND CALIBRATION OF HNu MODEL PI-101 PHOTOIONIZATION DETECTOR	Issue Date		Effective Date
	10/04/93		10/04/93
	Supersedes Procedure Number	Rev.	Date
	630 FP 26		
Acceptance - Program QA	Approval - Program Manager		

1.0 PURPOSE

The purpose of this procedure is to define the steps necessary for calibration, operation and maintenance of the HNu Model PI-101 photoionization detector (PID).

2.0 SCOPE

2.1 This procedure applies to the calibration, operation and maintenance of the HNu Model PI-101 PID during a field investigation.

2.2 This procedure may also be used, in conjunction with the manufacturer's instruction, for other photoionization detectors.

3.0 REQUIREMENTS

Measurement of organic vapors is an important and necessary requirement during field investigations for the health and safety of workers. Detection of organic vapors during field investigations may also be a precursor of the presence of contaminants at the site.

4.0 REFERENCES

4.1 *HNu Model PI-101 Instruction Manual.*

5.0 DEFINITIONS

None.

6.0 RESPONSIBILITIES

The Field Operations Leader is responsible for ensuring that the necessary equipment is available for calibration and maintenance. The Field Operations Leader should also ensure that the calibration methodology is consistent and that workers have been instructed in the proper use of equipment.

7.0 EQUIPMENT

1. HNu Model PI-101 photoionization detector with appropriate probe assembly lamp (10.2 eV or 11.7 eV)
2. Calibration test system
3. Battery Charger
4. Screwdriver.

8.0 PROCEDURE

The procedure for calibration prior to use, operation, and maintenance of the HNu PI-101 PID is outlined below. Calibration frequencies other than prior to daily use shall be specified in the project-specific work plan. If using a different instrument, the owner's manual should be consulted for instructions.

8.1 Calibration

1. Before attaching the probe to the readout module, ensure that the function switch on the control panel is in the "OFF" position.

2. Attach the probe to the meter by plugging the 12-pin plug into the socket on the readout module and rotating it to the lock position.

3. Turn the 6-position function switch to the "BATTERY CHECK" position. The meter needle should read within or above the green battery area on the scale. If it does not, or if the read indicator light located near the function switch, comes on, the battery requires charging.

4. Turn the function switch to any range setting and glance briefly into the end of the probe to see if the ultraviolet light is emitting a purple glow. Avoid prolonged exposure to UV light, it may cause eye damage.

5. Set the function switch to the "STANDBY" position and rotate the "ZERO" knob until the meter reads zero.

6. Connect one end of tubing to the regulator at a pressurized container of calibration gas equipped with a flow control valve, and the other end of the tubing directly to the 8-inch extension tube on the photoionization probe.

7. Open the valve of the pressurized container until a slight flow is indicated on the flow meter. The instrument draws in the volume of sample required for detection, and the flow on the flow meter indicates an excess of sample.

8. Adjust the meter span pot knob so that the instrument is reading the exact value of the calibration gas. If the instrument span setting is changed, the instrument switch should be turned back to the "STANDBY" position and the electronic "ZERO" should be readjusted as necessary.

The calibration gas cylinder is to contain the species of interest made up in an air matrix at or near the concentration to be analyzed. If the component is unstable in air, another matrix is to be used. The final calibration mixture should be similar to the sample the PI-101 will analyze. If the expected concentration is not known, then a concentration should be chosen that will cause a scale displacement of 50 to 80 percent on the X10 range. Calibration on X10 range will provide accurate values on the X1 range as well.

For use on the 0-2000 range, a two-standard calibration is preferred: one at 70 with 85 percent of the linear range and the other at 25 to 35 percent of the linear range. With the linear range of approximately 600 parts per million (ppm) for most compounds these points would lie between 420 to 510 ppm and 150 to 210 ppm, respectively.

The calibration gas must be stable within the cylinder during the period of use. If the calibration is required in the field, then use of a small cylinder is recommended. In addition, the choice of cylinder material in contact with the gas must be considered (steel, aluminum or teflon). If there are any question, the operator should request stability and usage information from the gas supplier.

8.2 Operations

1. Before attaching the probe to the readout module, ensure that the function switch on the control panel is in the "OFF" position.

2. Attach the probe to the meter by plugging the 12-pin plug into the socket on the readout module. Rotate the plug until it is locked into position. Attach the 6-inch meal extension tube to the probe handle by screwing it into its socket.

3. Turn the 6-position function switch to the "BATTERY CHECK" position. The meter needle should read within or above the green battery on the scale. If it does not, or if the red indicator light located near the function switch comes on, the battery requires charging.

4. Turn the function switch to any range setting and glance into the end of the probe briefly to see if the ultraviolet light is emitting a purple glow. Avoid prolonged exposure to UV light, it may cause eye damage. Note that an HNu can be

quickly checked for operability by holding a felt tip pen adjacent to the probe. This should induce a response in the deflection needle.

5. Set the function switch to the "STANDBY" position and rotate the "ZERO" knob until the meter reads zero.

6. Switch the function switch to the proper measurement range. The instrument is calibrated to measure 0-20, 0-200, and 0-2000 ppm benzene in air with the span position set at 9.8. For additional sensitivity, the span potentiometer can be turned counterclockwise (smaller numbers) to increase the gain. By changing the span setting from 10.0 to 1.0, the sensitivity is increased ten-fold. The 0-20, 0-200, and 0-2000 ppm scales become 0-2, 0-20, and 0-200 ppm, respectively.

7. Insert the end of the probe into the atmosphere to be measured and read the organic vapor concentration in ppm directly from the meter. (A small fan is used to draw the vapor past the photoionization sensor. While sampling, use caution no to block the inlet of the probe. If the extension of the probe has been accidently obstructed, the instrument readings or the response time will increase.)

8.3 Preventive Maintenance

After daily use of the HNu PID for field investigations, the unit shall be inspected for cleanliness and cleaned with soap and water as necessary. The battery should be recharged after daily use because a low battery will cause the unit to malfunction. Note that the lamp must be attached in order to charge the unit.

9.0 ATTACHMENTS

None.

FIELD PROCEDURE FP 2-3

OPERATION AND CALIBRATION OF FOXBORO OVA MONITOR

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Subject	Procedure No.	Rev.	
	FP 2-3	1	Page 1 of 3
OPERATION AND CALIBRATION OF FOXBORO OVA MONITOR	Issue Date		Effective Date
	10/04/93		10/04/93
	Supersedes Procedure Number		Rev. Date
	630 FP 27		0
Acceptance - Pfogram QA	Approval - Program Manager		

1.0 PURPOSE

The purpose of this procedure is to outline the steps necessary for calibration, operation and maintenance of the Foxboro Organic Vapor Analyzer (OVA).

2.0 SCOPE

2.1 This procedure applies to the calibration, operation and maintenance of the Foxboro Organic Vapor Analyzer.

2.2 This procedure may also be used in conjunction with the manufacturer's instruction for other organic vapor analyzers.

3.0 REQUIREMENTS

Employee exposure to inhalation of organic vapors can be monitored during the site activities via organic vapor measurements using an organic vapor analyzer (in conjunction with a photoionization detector and/or a combustible gas indicator).

A Century Systems Model OVA-128 Organic Vapor Analyzer or an HNU Model PI-101 Total Organic Vapor Analyzer (reference FP 2-2) will generally be used to monitor organic vapors in the air on investigation sites, and vapors being emitted from boreholes, wells, as well as soil, rock and water samples.

4.0 REFERENCES

Foxboro Century Systems OVA-128 Organic Vapor Analyzer Instruction Manual.

5.0 DEFINITIONS

None.

6.0 RESPONSIBILITIES

The Field Operations Leader is responsible to ensure that the necessary equipment is available for the calibration, use, and maintenance of the measuring equipment. The Field Operations Leader is also responsible to ensure that the calibration and methodology is consistent and that workers have been instructed in the proper use of equipment.

7.0 EQUIPMENT

1. Foxboro Century systems Model OVA-128 Portable Organic Vapor Analyzer

   The OVA-128 is a commonly used, highly sensitive instrument designed to measure trace quantities of organic materials in the air. It is essentially a hydrogen flame ionization detector used for volatile organic compounds with a sensitivity to analyze in the parts per million (ppm) range in air in the presence of moisture, nitrogen oxides, carbon monoxide, and carbon dioxide. The instrument consists of two major assemblies: The Probe/Readout Assembly and the Side Pack Assembly. The instrument is also equipped with two options: a recorder and a gas chromatograph.

2. Probe/Readout Assembly
3. Battery Recharging Unit
4. Strip Chart Recorder
5. Refilling Adaptor Fitting.

8.0 PROCEDURE

The procedure for calibration prior to daily use, operation, and maintenance of the Foxboro OVA Monitor is outlined below. Calibration frequencies other than prior to daily use shall be specified in the project-specific work plan. The owner's manual should be consulted for detailed instructions.

8.1 Calibration

The Century Systems OVA-128 Portable Organic Vapor Analyzer is calibrated, after following the proper procedure to turn the instrument on, by setting the "CALIBRATE" switch to X1 and adjusting the meter to read 1 ppm using the "CALIBRATE ADJUST" (zero) knob. The meter is now ready for use.

8.2 Operation

The operation of the OVA-128 is described in detail in the Instruction and Service Manual provided with the instrument and should be studied before use and utilized during operations. A summary of operation is also mounted ont he inside coup of the instrument. Proper operation of the instrument can be ensured by occasionally examining the response in the deflection of the needle when a volatile (odorous) felt pen is held adjacent to the probe; this will also be an indication to the user whether the flame is still burning.

8.3 Preventive Maintenance

The analyzer must be kept clean for accurate operation. Foreign materials can be rinsed off or blown out of the detector. The internal battery should be fully charged before using every one to four days. The charging interval depends on use, and a battery check indicator on the instrument should be examined routinely. The cord between the analyzer and the recorder should be inspected for visible evidence of damage and replaced if required. All other maintenance should be performed at an authorized service center. Hydrogen should be refilled by a specialist at a gas or welding shop.

9.0 ATTACHMENTS

None.

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FIELD PROCEDURE FP 3-1

DECONTAMINATION OF SAMPLING EQUIPMENT

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Subject	Procedure No.	Rev.	
	FP 3-1	2	Page 1 of 7
DECONTAMINATION OF SAMPLING EQUIPMENT	Issue Date	Effective Date	
	10/04/93	10/04/93	
	Supersedes Procedure Number	Rev.	Date
	630 FP 11	0	
Acceptance - Program QA	Approval - Program Manager		

1.0 PURPOSE

The purpose of this procedure is to provide reference information on the proper decontamination of sampling equipment used to perform field investigations.

2.0 SCOPE

This procedure addresses decontamination of sampling equipment. Personnel decontamination guidelines are presented in the project-specific work plan. Decontamination of monitoring well construction materials is described in Field Procedure FP 3-2, and decontamination of hand tools and drilling equipment is described in FP 3-3.

3.0 REQUIREMENTS

To ensure that chemical analysis results are reflective of the actual concentrations present at sampling locations, equipment used in sampling activities must be properly cleaned and decontaminated. This will minimize the potential for cross-contamination between sampling locations and the transfer of contamination off-site.

4.0 REFERENCES

4.1 HAZWRAP, July 1990. *Quality Control Requirements for Field Methods*, DOE/HWP-69/R1.

4.2 United States Environmental Protection Agency, December 1987. *A Compendium of Superfund Field Operations Methods*, EPA 540/P-87/001.

4.3 USAEC, May 1993. *U.S. Army Environmental Center Guidelines for Implementation of ER 1110-1-263 for USAEC Projects.*

4.4 USATHAMA, January 1990. *U.S. Army Toxic and Hazardous Materials Agency Quality Assurance Program*, USATHAMA PAM 11-41.

4.5 United States Environmental Protection Agency, November 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA SW-846, Third Edition.

4.6 United States Environmental Protection Agency, September 1986. *Resource Conservation and Recovery Act (RCRA) Ground Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1.

5.0 DEFINITIONS

Negative Contamination - Occurs when the measured concentration of the analyte is artificially low as a result of volatilization, adsorption, and related losses.

Positive Contamination - Occurs when the measured concentration of the analyte is artificially high due to leaching or the introduction of foreign matter into the sample.

Cross Contamination - A type of positive contamination caused by the introduction of part of one sample with a second sample during sampling or storage.

Detergent - Standard brand of non-phosphate, laboratory-grade detergent such as Alconox or Liquinox.

Acid Solution - A combination of reagent-grade acid and deionized water.

Solvent - Pesticide-grade solvent.

Tap or Potable Water - Water from an approved municipal water treatment system.

Deionized Water - Volatile-free, ion-free, and organic-free water produced on-site from a deionization chamber equipped with carbon filters.

6.0 RESPONSIBILITIES

6.1 Project Manager

The Project Manager is responsible for ensuring that decontamination procedures for all chemical sampling and field analytical equipment are programmed prior to the actual field effort and that personnel required to accomplish the task have been briefed and trained to execute the task.

6.2 Field Operations Leader

The Field Operations Leader is responsible for ensuring that project-specific plans and the implementation of field investigations are in compliance with this procedure.

7.0 EQUIPMENT

1. Disposable Gloves
2. Laboratory-Grade, Non-Phosphate Detergent
3. Tap Water
4. Ten Percent Nitric Acid Solution
5. Deionized, Volatile-Free Water
6. Aluminum Foil
7. Pesticide-Grade Methanol
8. Pesticide-Grade Hexane
9. Scrub Brushes
10. Five- to 10-gallon Stainless Steel or Plastic Buckets
11. One Percent Hydrochloric Acid Solution
12. Isopropanol.

8.0 PROCEDURE

8.1 Decontamination

Prior to the collection of samples, the equipment used to collect water, soil, sediment, and other samples will be decontaminated by one of the following methods.

Method 1 -- This method is the only AEC-approved method for decontamination:

- Rinse with approved potable water
- Rinse with deionized, analyte-free water or steam clean
- Air dry
- Wrap in aluminum foil (shiny side out) or polyethylene sheeting.

Method 2 -- Decontamination procedure for sampling equipment:

- Wash and scrub with laboratory-grade, non-phosphate detergent
- Rinse with approved potable water

- Rinse with deionized, analyte-free water
- Rinse with isopropanol
- Rinse with deionized, analyte-free water
- Air dry
- Wrap in aluminum foil (shiny side out) or polyethylene sheeting.

Method 3 -- Decontamination procedure for equipment used to collect metal samples only:

- Wash and scrub with laboratory-grade, non-phosphate detergent
- Rinse several times with tap water
- Rinse plastic or Teflon®-coated equipment with 10% nitric acid; rinse stainless steel equipment with 1% hydrochloric acid
- Rinse twice with deionized, analyte-free water
- Air dry
- Wrap in aluminum foil (shiny side out) or polyethylene sheeting.

Method 4 -- Decontamination procedure for equipment used to collect organic samples only:

- Wash and scrub with laboratory-grade, non-phosphate detergent
- Rinse several times with tap water
- Rinse with deionized, analyte-free water
- Rinse with pesticide-grade methanol
- Rinse with pesticide-grade hexane
- Air dry
- Check with HNu or OVA for complete removal of solvents
- Rinse twice with deionized analyte-free water
- Air dry
- Wrap in aluminum foil (shiny side out).

Method 5 -- Decontamination procedure for equipment used to collect samples for both organics and metals analyses:

- Wash and scrub with laboratory-grade, non-phosphate detergent
- Rinse several times with tap water
- Rinse plastic or Teflon®-coated equipment with 10% nitric acid; rinse stainless steel equipment with 1% hydrochloric acid

- Rinse with deionized, analyte-free water
- Rinse with pesticide-grade methanol
- Rinse with pesticide-grade hexane
- Air dry
- Check with HNu or OVA for complete removal of solvents
- Rinse twice with deionized analyte-free water
- Air dry
- Wrap in aluminum foil (shiny side out).

NOTE 1: Sampling Equipment Decontamination Procedures. Sampling equipment, other than down-hole sampling equipment, will be cleaned once a day in a batch so that the final rinsate may be collected for a field equipment blank. This cleaning is in addition to decontamination that will be performed between each sampling. After cleaning, field equipment may be placed temporarily on polyethylene sheeting, but ultimately will be wrapped in aluminum foil. Care will be taken when choosing the site of the staging area to avoid fugitive dust, fuel, oils, gasoline, organic solvents, or any potential airborne source of contamination. If new equipment, such as drill bits and spoons, has been painted at the factory, this paint need not be removed before use.

Down-hole sampling equipment may be decontaminated on-site during drilling activities. The sampling method used will determine where this sampling equipment will be decontaminated.

NOTE 2: Disposal of all wastes generated during the field activities is described in the project-specific work plan.

8.2 Requirements and Limitations

Only Method 1 is an AEC-approved decontamination method. If the other methods are to be used, approval must be received from AEC.

8.2.1 Bailers and Bailing Line

The potential for cross-contamination between sampling points via the use of a common bailer, or its attached line, is high unless strict procedures for decontamination are followed. It is recommended that one bailer and its associated line be used for each sample point. Braided nylon or polypropylene lines may be used with a bailer and will be discarded after each use. Before the initial sampling and after each succeeding sampling point, the bailer must be decontaminated using procedures

outlined for sampling equipment. This procedure does not eliminate the need for decontamination of dedicated bailers.

In addition to these cleaning procedures, the following line and bailer handling procedures are required. Prior to transport, the bailer and bailing line should be wrapped in aluminum foil or polyethylene sheeting. At the site, while the sample(s) is being obtained, care should be taken to prevent the bailer, line, and any other down-hole tubing or pumps from contact with the ground surface.

8.2.2 Sampling Pumps

Most sampling pumps are normally low volume pumps (less than two gpm). These include various types of positive displacement pumps. Pumps that allow air or other gases to come in contact with the sample will not be used. If pumps are used for sampling more than one sampling point, they must be decontaminated between sample locations.

The procedures to be used for decontamination of sampling pumps are generally the same as those described in Method 2. Each of the liquid fractions is to be pumped through the system. The amount of pumping is dependent upon the size of the pump and the length of the intake and discharge hoses.

8.2.3 Filtering Equipment

One aspect of the sampling plan may involve the filtering of groundwater samples and subsequent preservation. Filtering, if required, will be done in the field as soon as the sample is obtained. The sample will be preserved immediately after filtration. Three basic filtration systems are most commonly used: the in-line disposal filter, the inert gas over-pressure filtration system, and the vacuum filtration system.

For the in-line filter, decontamination is not required since the filter cartridge is disposable; however, the cartridge must be disposed of in an approved receptacle, and the intake and discharge lines must still be decontaminated.

For the over-pressure and vacuum filtration systems, the portions of the apparatus which come in contact with the sample must be decontaminated depending on the analyses to be performed.

8.2.4 Water Level Indicators

Water level indicators that consist of a probe that contacts the groundwater must be decontaminated using one of the following methods:

Method 1 -- Decontamination procedure approved by AEC:

- Rinse with deionized, volatile-free water
- Rinse with deionized analyte-free water
- Air dry

Method 2 -- Decontamination procedure that is NOT an AEC-approved method:

- Rinse with deionized, volatile-free water
- Pesticide-grade methanol rinse followed by a pesticide-grade hexane rinse
- Air dry
- Check with HNu or OVA for complete removal of solvents
- Rinse with deionized analyte-free water
- Air dry
- Wrap tip in aluminum foil (shiny side out) for transport.

8.2.5 Probes

Probes (e.g., pH or specific ion electrodes, geophysical probes, or thermometers) that come in direct contact with the sample will be decontaminated using the procedure described in Method 2. For probes which make no direct contact (e.g., OVA equipment) the probe will be wiped with a clean paper towel or cloth wetted with methanol.

8.3 Quality Control Procedures for Decontamination

The effectiveness of field cleaning procedures shall be monitored by following quality assurance/quality control procedures outlined in the project-specific work plan.

9.0 ATTACHMENTS

None.

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FIELD PROCEDURE FP 3-2

DECONTAMINATION OF MONITORING WELL CONSTRUCTION MATERIAL

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Subject	Procedure No.	Rev.	
	FP 3-2	1	Page 1 of 4
DECONTAMINATION OF MONITORING WELL CONSTRUCTION MATERIAL	Issue Date	Effective Date	
	10/04/93	10/04/93	
	Supersedes Procedure Number	Rev.	Date
	630 FP 19	0	
Acceptance - Program QA	Approval - Program Manager		

1.0 PURPOSE

The purpose of this procedure is to provide reference information on the proper decontamination of monitoring well construction materials used in performing field investigations.

2.0 SCOPE

This procedure addresses decontamination of monitoring well construction materials only. Personal decontamination guidelines are presented in the project-specific work plan. Decontamination of sampling equipment is described in Field Procedure FP 3-1 and decontamination of hand tools and drilling equipment is described in FP 3-3.

3.0 REQUIREMENTS

To ensure that chemical analysis results reflect the actual concentrations present at sampling locations, monitoring well construction materials involved in sampling activities must be properly cleaned and decontaminated. This will minimize the potential for cross-contamination between sample locations and the transfer of contamination off-site.

4.0 REFERENCES

4.1 HAZWRAP, July 1990. *Quality Control Requirements for Field Methods*, DOE/HWP-69/R1.

4.2 United States Environmental Protection Agency, December 1987. *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001.

4.3 United States Environmental Protection Agency, November 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, EPA SW-846, Third Edition.

4.4 United States Environmental Protect Agency, September 1986. *Resource Conservation and Recovery Act (RCRA) Ground Monitoring Technical Enforcement Guidance Document*, OSWER-9950.1.

4.5 USAEC, May 1993. *U.S. Army Environmental Center Guidelines for Implementation of ER 1110-1-263 for USAEC Projects.*

4.6 USATHAMA, January 1990. *U.S. Army Toxic and Hazardous Materials Agency Quality Assurance Program*, USATHAMA PAM 11-41.

5.0 DEFINITIONS

Negative Contamination - Occurs when the measured concentration of the analyte is artificially reduced as a result of volatilization, adsorption and related losses.

Positive Contamination - Occurs when the measure concentration of the analyte is artificially high due to leaching or the introduction of foreign matter into the sample.

Cross Contamination - A type of positive contamination caused by the introduction of part of one sample with a second sample during sampling or storage.

Detergent - A standard brand of non-phosphate laboratory-grade detergent such as Alconox or Liquinox.

Acid Solution - Made from reagent-grade acid and deionized volatile-free water.

Solvent - Pesticide grade solvent.

Tap of Potable Water - Water from a municipal water treatment system.

6.0 RESPONSIBILITIES

6.1 Project Manager

The Project Manager is responsible for ensuring that decontamination procedures for all chemical sampling and field analytical equipment are programmed prior to the actual field effort and that personnel required to accomplish the task have been briefed and trained to execute the task.

6.2 Field Operations Leader

The Field Operations Leader is responsible for ensuring that project-specific plans and the implementation of field investigations are in compliance with this procedure.

7.0 EQUIPMENT

1. Portable High-Pressure Steam or Hot Water Generator
2. Insulated Gloves
3. Laboratory-Grade, Non-Phosphate Detergent
4. Tap Water
5. ASTM Type II Water
6. Sheet Plastic
7. Pesticide-Grade Methanol
8. Scrub Brushes
9. Five- to 10-gallon Bucket
10. 10 Percent Nitric Acid Solution
11. One Percent Hydrochloric Acid Solution.

8.0 PROCEDURE

8.1 Construction Materials Decontamination

Prior to drilling, monitoring well construction materials will be decontaminated at a designated area. The cleaning area will be designed to contain decontamination wastes and waste waters, and can be lined excavated pit or a bermed concrete or asphalt pad. For the latter, a floor drain must be provided that is connected to a holding tank. A shallow, above-surface tank may be used, or a pumping system with discharge to a waste tank may be installed.

At certain sites, due to the type of contaminants or proximity to residences, concerns may exist about air emissions from steam cleaning operations. These concerns can be alleviated by utilizing one or more of the following practices:

- Locate the steam cleaning area on-site to minimize potential impacts.
- Enclose steam cleaning operations.

The location of the steam cleaning area will be identified in the project-specific work plan.

Well casings and screens shall be steam cleaned with water from an approved source in the field prior to use. Field rinsate may be tested by field screening methods if available at the site. Critical contamination levels shall be determined prior to field work by the Project Manager and stated in the project-specific work plan.

Concentration levels above those previously determined as critical levels will require field steam cleaning of casings and screens. For the analyses to be conducted, acceptable concentration levels for rinsates and specific rinsate sampling procedures shall be described in the project-specific work plan.

8.2 Additional Cleaning Methods

If critical levels are still not met, the following methods may be utilized only with AEC approval.

Method 1–

1. Wash with detergent (can be through steam cleaner).
2. Steam clean using approved water source.
3. Allow to air dry.
4. Store in plastic sheeting.

Method 2–

1. Wash and scrub with detergent (low phosphate if P is an analyte).
2. Tap water rinse.
3. Rinse with 10 percent nitric acid for PVC casing or a 1 percent HCL acid if stainless steel casing is used.
4. Tap water rinse.
5. Rinse with methanol followed by hexane if oils, greases or PCBs are analytes.
6. Allow to air dry.
7. Check with HNu or OVA to ensure the complete evaporation of hexane.
8. Rinse with deionized analyte-free water.
9. Allow to air dry.
10. Wrap in aluminum foil, shiny side out, for transport.

If metals are not analytes, Steps "3" and "4" may be omitted. If organics are not being sampled, Step "5", "6" and "7" may be omitted. Solvents must be specified as pesticide grade or better. Preferably, all decontamination of equipment should be performed prior to going into the field. If this is not possible, equipment must be cleaned and decontaminated not less than six hours before installation.

9.0 ATTACHMENTS

None.