**UMTRA WATER SAMPLING TECHNICAL
(PEER) REVIEW**

**RESPONSES TO OBSERVATIONS,
COMMENTS, AND RECOMMENDATIONS
SUBMITTED BY DON MESSINGER
(ROY F. WESTON, INC.)**

August 1993

Prepared by

**UMTRA Independent Technical Review
Jacobs Engineering Group Inc.
UMTRA Project Office
Albuquerque, New Mexico**

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

RWR

DISCLAIMER

**Portions of this document may be illegible
in electronic image products. Images are
produced from the best available original
document.**

1.0 INTRODUCTION

At the request of the Office of Independent Technical Review for the U.S. Department of Energy (DOE), Uranium Mill Tailings Remedial Action (UMTRA) Project, an independent technical review (peer review) was conducted during the period of September 15-17, 1992. The review was conducted by C. Warren Ankerberg (Geraghty & Miller, Inc., Tampa, Florida) and Don Messinger (Roy F. Weston, Inc., West Chester, Pennsylvania). The review was held at Jacobs Engineering in Albuquerque, New Mexico, and at the Shiprock, New Mexico, site.

The peer review included a review of written documentation [water sampling standard operating procedures (SOP)], an inspection of technical reports and other deliverables, a review of staff qualifications and training, and a field visit to evaluate the compliance of field procedures with SOPs. The approach of the peer reviewers was to verify that the program meets the following criteria:

- Reported results are traceable to and consistent with recorded data.
- The basic assumptions and acceptance criteria are valid.
- Data are traceable to their origin and to reported analytical results.
- The procedures employed are consistent both internally and externally with written SOPs and regulatory guidelines.
- Inferences and conclusions are soundly based.
- The procedures and/or reports generated present work that satisfies the local, state, and/or Federal regulatory requirements, as applicable.
- The approach is consistent with industry standards and/or state-of-the-art technology, as practical.
- The data generated by activities are legally defensible and technically sound.
- UMTRA staff are adequately trained and qualified for the work.

Upon completion of the peer review in Albuquerque and Shiprock, each reviewer independently prepared a report of findings from the review. The reports listed findings and recommended actions.

This document responds to the observations, comments, and recommendations submitted by Don Messinger following his review. The format of this document is to present the findings and recommendations verbatim from Mr. Messinger's report, followed by responses from the UMTRA Project staff. Included in the responses from the UMTRA Project staff are recommended changes in SOPs and strategies for implementing the changes.

REVIEW FORM

(1)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: General

The SOPs are well written and organized and include signoffs and document control. The majority of the SOPs were written in 1990 or early 1991. It is suggested that SOPs be reviewed, updated and approved on an annual basis with new signature pages added at the time of update and approval.

The Quality Assurance Project Plan (QAPP) and the Project Work Plans defining the Data Quality Objectives (DQOs) of these procedures were unavailable for review. As a result, the SOPs could not be evaluated as to their meeting the needs of the specific objectives of the program. Because sampling staff are rarely given the opportunity to review documents other than the SOPs, it is suggested that the SOPs include more discussion of why certain activities are performed (i.e., the reason for purging to stabilized field parameters) in order to provide a better basis for decision making in the field.

From a technical standpoint, the SOPs reviewed on field measurement of pH, alkalinity, D.O., Redox, temperature and specific conductivity (16.1.10, 16.1.13, 16.1.14, 16.1.16) appear to be consistent with the current literature and the protocols available with the individual field instrument. The procedures for "Soil-Water Sampler Installation and Sample Collection" (16.1.6) also appear to have been taken directly from the manufacturer's instructions.

SECTION 2

Response: By: P. Middlebrooks

Section 5.4 of SOP 8.1.1 describes the annual review process for all SOPs. SOP 8.1.1 also provides an example signoff sheet that shows the quality assurance, technical, and project management staff that must approve the SOPs. The SOPs pertaining to the water sampling program will be reviewed and signed annually in accordance with SOP 8.1.1. When SOPs are reviewed, the review committee will include the Quality Assurance Manager, Hydrogeologic Manager, Groundwater Sampling Program Manager, a senior groundwater sampler, and a site hydrogeologist.

SOPs that include detailed discussion of why certain activities are performed would become overly lengthy and somewhat confusing. More text would detract from the step-by-step instruction sequence currently in use. To achieve a better understanding of the implementation of SOPs, each member of the sampling team has undergone training upon employment. Additional training has been conducted as needed, and the samplers are also given opportunity to receive training from sources outside the UMTRA Project.

REVIEW FORM

(2)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: General

A general statement should be inserted at the beginning of each SOP that prompts sampling staff to document any deviations from the SOP. This statement does appear in various places within the SOPs but also needs to be stated upfront.

SECTION 2

Response: By: P. Middlebrooks

SOP 14.1.5 (FTR Daily Diary) describes documentation of field procedures in logbooks. Any deviations from approved SOPs will be noted in the samplers' logbooks and reported to the Groundwater Sampling Program Manager.

REVIEW FORM

(3)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: General

Turbidity measurements should be included into the SOPs, particularly on sites where total metals are included as part of the analytical suite.

SECTION 2

Response: By: P. Middlebrooks

The collection of turbidity measurements while purging wells will be implemented. The field data forms have been revised to include a column for turbidity measurements. It is recommended that the turbidity readings be taken at the same frequency as pH, Ec, dissolved oxygen (DO), oxidation reduction potential (ORP), and temperature measurements. SOPs 16.1.10 and 16.2.1 will be changed to document procedures for field turbidity measurement.

REVIEW FORM

(4)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: General

Ambient air temperature should also be collected while "stabilizing" field parameters and at the time of sample collection.

SECTION 2

Response: By: P. Middlebrooks

A reason to do this cannot be found in any of the guidance documents for water sampling, and seems to be an unnecessary step. Therefore, this will not become part of the SOPs.

REVIEW FORM

(5)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: General

There does not appear to be any documentation on procedures for "approaching and setting-up" at a monitor well prior to purging or sampling. While many of these procedures are probably "learned in the field" as part of on-the-job-training (OJT), it is important to document the same for future reference and review. Documentation of how things were to be done and actually were done is a prime element of any QA/QC program. An example of these procedures is attached.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. SOPs 16.2.1, 16.2.5, 16.2.6, and 16.2.7 will be revised to include procedures on the setup of field instruments and equipment.

REVIEW FORM

(6)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: General

The procedures by which field data is managed and is officially transferred after a field event should also be incorporated into the existing SOPs.

SECTION 2

Response: By: P. Middlebrooks

Field data management procedures are found in SOP 16.3.3, Section 4.6.4, "Data Management."

REVIEW FORM

(7)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: General

Procedures for collection of water levels should also be integrated into the appropriate SOPs.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. SOPs 16.2.1, 16.2.5, 16.2.6, and 16.2.7 will be revised to include more thorough procedures on the measurement of water levels.

REVIEW FORM

(8)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.10, Field Measurements on Water Samples for Temperature, Conductivity, pH, Alkalinity, and Total Acid

The SOP states that periodic rechecks of the pH meter be performed during the purging operation. Currently rechecks are done between each sample.

Observation/Suggestion: Calibration time between samples can be reduced by using laboratory prepared solutions spiked to known values (an independent check standard). By this method, if the meter accurately displays the correct check standard value between samples, the meter would be considered calibrated rather than calibrating to a series of buffer solutions between samples. A complete calibration would still be performed at the start of each day.

SECTION 2

Response: By: P. Middlebrooks

Calibration of the pH meters takes place before and after sampling. During sampling, periodic checks are made of the pH drift. If drift exceeds 10 percent, the pH meter is recalibrated. Because of the nature of the pH meters used, they will drift over time. Calibrating them once a day would be insufficient. Independent pH check standards will be used at each well, but more as a check of the pH calibration standards.

REVIEW FORM

(9)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

The frequency of Quality Control samples (field blanks, equipment blanks, etc.) should be stated in Subsection 5.2 with a reference to SOP 16.2.8.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. All QC samples will be collected at a frequency of 1 per every 20 sampling locations. This information will be added to the SOP.

REVIEW FORM

(10)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

Para. 5.4. The term stability needs to be explicitly defined. This can be easily done by adding the following kind of statement to the existing SOP:

Purge the well until the temperature (T), conductance (SC) and pH of the purged water all stabilize. Stability is defined as three (3) consecutive readings of T, SC, and pH over a 10- to 15-minute period. Over this period, temperature should vary no more than 1 degree C, pH no more than 0.1 unit, and Specific Conductance no more than 10%.

SECTION 2

Response: By: P. Middlebrooks

Response: Comment acknowledged. Additional wording will be added to the SOP to clarify the meaning of stability. However, the wording used above would not be acceptable at many UMTRA wells, since shallow wells may not take 15 minutes to purge.

REVIEW FORM

(11)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

Water levels should be measured during the purge cycle to access well/aquifer intimacy and performance. The records created from continued measurements with time can be used to determine the "health" of a well and its acceptance for sampling.

SECTION 2

Response: By: P. Middlebrooks

The SOP will be revised to state that water levels will be measured periodically to check for drawdown in wells. This procedure will be used more to determine the proper placement of the pump intakes, and to provide a qualitative assessment of aquifer characteristics, than to determine the "health" of a well.

REVIEW FORM

(12)

SECTION 1

Document: Water Sampling Standard Operating Procedures
Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

Subpara. 5.8.3. The "known" solution which is specified to accompany a sample batch should be better defined as to its purpose (i.e., QA/QC sample, control standard), origin (field vs. laboratory) and makeup.

SECTION 2

Response: By: P. Middlebrooks

"Known" solutions are no longer submitted to the analytical laboratory with each batch of samples. The prescribed use of known solutions will be dropped from this SOP. Laboratory performance evaluation procedures are described in data management SOPs 16.3.2 and 16.3.3.

REVIEW FORM

(13)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

Para. 5.10. Pesticide grade isopropanol is the solvent currently preferred over hexane by the US EPA for decontamination. Hexane is hydrophobic and immiscible with water and is, therefore, not an effective rinsing agent unless the equipment is dry. Nitric acid is preferred by the EPA over hydrochloric acid due to its greater cleaning ability and because it is used in the preservation of metals.

SECTION 2

Response: By: P. Middlebrooks

The SOP will be revised to indicate the use of pesticide grade isopropanol for decontamination *if* the site-specific parameter list includes organic compounds.

REVIEW FORM

(14)

SECTION 1

Document: Water Sampling Standard Operating Procedures
Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

Subpara. 5.10.1. The SOP states that bailers used for sample collection be decontaminated using detergent. It is suggested the following be added:

The detergent used should be a phosphate-free laboratory detergent such as Liquinox.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. The SOP will be changed accordingly.

REVIEW FORM

(15)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.22, Controlled Disposal of Potentially Contaminated Materials

SOP 16.1.22, dated 7/13/92, is an attempt to address a major concern voiced by the UMTRA team throughout the review. Controlled waste disposal at remote sites such as those being sampled at UMTRA is a complex issue. Resolutions will probably need to be made on a site-by-site basis. To paraphrase this SOP,

...upgradient and/or "clean" water from the upper aquifer may be discharged directly onto the ground at both remediated and unremediated sites. Similarly, if the water quality of the lower aquifer is of "better" quality than the upper, it too may be discharged directly onto the ground. Water from downgradient or crossgradient wells, deemed by the SH or through laboratory analysis to be contaminated, should be treated and discharged near where it was withdrawn, discharged on the tailings pile, or transported to an acceptable disposal site.

Prior analytical results should not be used as a basis for the release or discharge of well water (purged or sample) to the ground. Monitor wells which tested clean during a previous period may not be clean during subsequent samplings.

Holding water in remote areas while awaiting analytical results presents a number of problems not the least of which is securing the water-holding receptacles. If the water is held for prolonged periods of time, the site may need to be operated as a storage facility. Under the currently proposed procedures, contaminated water from remediated sites without tailings piles would have to be transported to another site which could require manifesting. This issue should be researched with respect to what might have been done and was acceptable on other programs. Next, the UMTRA team should discuss this issue with the NRC and the various state agencies involved to come to a resolution of the problem. The current practice at Shiprock was to discharge both purge water and decontamination fluids to the ground.

The SOP should address not only the disposition of purge water during groundwater sampling (Subsection 4.1.4), but also the handling of decontamination fluids and calibration solutions.

SECTION 2

Response: By: P. Middlebrooks

With regard to purge water and disposal, four options are suggested for consideration.

Option 1: Historical sample results from previously sampled monitoring wells can be evaluated to determine a contaminant "fingerprint" of the monitoring well network at a given site. Sample results have shown that most of the monitoring wells that are sampled as part of the UMTRA Project yield water containing low levels of contaminants that are below applicable maximum concentration limits (MCL). Purge water from these wells could be pumped into a mobile tank (four-wheel drive pickup truck equipped with a 500-gallon tank). The contents of the tank could then be discharged to the ground at a designated location at the site.

There are a few monitoring wells where historical sample results show contaminant concentrations that are above applicable MCLs. Purge water withdrawn from these wells would have to be containerized and transported to an acceptable disposal facility.

According to the EPA, groundwater should not be considered uncontaminated and be dumped until sample results can verify that the water is clean. This procedure should be followed at all wells, including those found to be uncontaminated in the past.

Option 2: Stage semipermanent holding tanks at each site to store the sum of the purge water withdrawn from each well during the course of one sampling event. The size of each holding tank could be determined by calculating the expected amount of purge water to be generated at each site during one sampling event. A four-wheel drive pickup truck equipped with a 500-gallon tank could be used to collect purge water at each well site and transport it to the main holding-tank site. A high-volume submersible pump [Grundfos, 10 to 12 gallon per minute (gpm)] could be used to transfer purge water into the main holding tank. The purge water withdrawn from all wells sampled at a given site would remain in holding-tank storage until sample results are received from the laboratory. The total concentration of all hazardous constituents contained in the holding tank could be calculated from the laboratory data. If the levels of these constituents are found to be below the corresponding MCLs, the purge water could be safely disposed to the ground. If the levels of these constituents are found to be above the corresponding MCLs, the purge water could be transferred to 55-gallon, polyethylene drums and transported to an acceptable disposal site.

Option 3: Construct a lined evaporation pond at each site. Each pond would be located inside the site perimeter fencing in an area that is free of radioactive

contamination. The size of each pond would be determined by the amount of purge water generated during each sampling shift. The floor of each pond would be concave and lined with a 6- to 8-mil layer of polyethylene. The polyethylene liner would be overlain with a 1-ft thick layer of clay. Each pond would require a rigid top cover, constructed at a sufficient distance above the pond to allow evaporation, to prevent the infiltration of rainwater. A four-wheel drive pickup truck equipped with a 500-gallon tank could be used to collect purge water at each well site and transport it to the pond site. The water could then be discharged by gravity into the pond and be allowed to evaporate over a period of time. Upon completion of the sampling program at a given site, the pond clay could be sampled for hazardous constituents. Sample results would dictate the appropriate disposal method for clay soil.

Option 4: Convert to dedicated low-flow sampling equipment at UMTRA sites to minimize the wastewater generated while purging and sampling wells. By installing a pump across the screened interval of each well, then sampling each well at a rate slower than the recharge of the well, well purging is all but eliminated. The only wastewater created is the stagnant water in the pump and tubing that must be purged prior to sampling and the water used for the alkalinity titrations.

Four other options that have been considered but do not appear to be economically or logistically feasible are 1) drumming all purge water at each site and having a trucking company haul the drums to the appropriate disposal facilities, 2) having a private contractor on the site with a water truck collecting all purge water at the time of sampling, then hauling the water to the appropriate disposal facilities, 3) using a filtration treatment system to purify the water before it is disposed of on the surface, and 4) reinjection of purge water into selected wells. The third option is somewhat more feasible; however, disposal of used filters as hazardous or mixed waste, the fragility of the filtration systems, and the cost of the filters make this option less attractive.

An analysis of the various purge water disposal methods will be conducted, and findings and recommendations will be reported in a TAC action memo. When a final decision is made regarding purge water disposition, the SOPs will be modified.

REVIEW FORM

(16)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

Observation/Suggestion: All purge water, calibration fluids and decontamination water were discharged directly to the ground. This seemed to be in direct contradiction to the SOP which stated that wastewater from contaminated aquifers at remediated sites be held pending laboratory analysis.

SECTION 2

Response: By: P. Middlebrooks

See the previous response for disposal ideas.

REVIEW FORM

(17)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

The sampling plan supplied to the field team contained no information as to which wells were upgradient, downgradient or crossgradient.

SECTION 2

Response: By: P. Middlebrooks

The Groundwater Sampling Program Manager now has the primary responsibility to develop an acceptable "sampling sequence" plan for a particular site prior to the start of each sampling event. The Site Hydrologist will provide the Groundwater Sampling Program Manager with site-specific information regarding the historic contaminant levels in each monitoring well. This includes notifying the Groundwater Sampling Program Manager as to the relative location of wells to the source area. The SOP will be revised to include the requirements of this procedure.

REVIEW FORM

(18)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

Buffer solutions used to calibrate the instruments in the truck cab were dumped into a sink which discharges to the ground about 2 feet from the well. These solutions should be neutralized and stored for later disposal.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. See response to previous comments on disposal of potentially contaminated materials.

REVIEW FORM

(19)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

It is suggested that waste handling and decontamination time can be minimized by using sampling equipment sets (dedicated or generic) at each sample point. Each set would contain pre-cleaned sample tubing, bailers and other equipment which come in contact with the groundwater. Decontamination could therefore be deferred to the end of a sampling effort and be done in a single area. Alternately, sampling equipment could be transported back to the lab for cleaning.

SECTION 2

Response: By: P. Middlebrooks

Generic or dedicated sample kits would be almost impossible to transport to any particular site due to the minimal space available in the UMTRA sampling vehicles. In order to accommodate the many kits required (upwards of 60 for some sites), a trailer or separate vehicle(s) would be needed to transport them. Also, when in the field the samplers are based out of their vehicles and hotel rooms, not out of a laboratory or other large facility, and they would have no room to store or sort out thousands of feet of tubing.

At some well sites, significant seasonal changes in the water level occur that are difficult to predict; thus, the amount of tubing needed for certain wells would be hard to estimate. The use of tubing in separate kits would result in tremendous amounts of tubing that would have to be decontaminated and stored. The decontamination process could also produce large volumes of wastewater that requires containerization and proper disposal. The use of a central decontamination station or a "clean" equipment storage area at some sites may create a situation where vandalism or theft could occur. While the use of "sampling kits" might be feasible under ideal circumstances where unlimited budgets and space are available, they are not feasible for the UMTRA Water Sampling Program.

REVIEW FORM

(20)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.1.11, Sample Collection for Organic Substances

It is suggested that on some sites the groundwater could be returned to the aquifer via injection wells or subsurface trenches or by reinjecting the water into the same well it came from. This idea needs to be explored more with the aforementioned parties.

SECTION 2

Response: By: P. Middlebrooks

These suggestions, while having merit, would be costly and labor/time-intensive on the water samplers. However, as discussed in a previous response to a comment on SOP 16.1.22, this purge water disposal method will be evaluated during the analysis of purge water disposal methods.

REVIEW FORM

(21)

SECTION 1

Document: Water Sampling Standard Operating Procedures
Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Subpara. 5.1.1. This subsection should be more specific as to the contents of the work order plan. At a minimum, this plan should explain the reason for the sampling (i.e., compliance monitoring, routine monitoring, plume delineation or tracking) and a short rationale for each point selected as well as alternative sampling points in the event that the initial points cannot be sampled. Further, sample bottle lot numbers should be recorded on the sampling forms or in a designated field notebook. This is a standard practice on EPA-funded sites under the CERCLA program.

SECTION 2

Response: By: P. Middlebrooks

Issue 1: Comment acknowledged. This section will be revised to state that a rationale for sampling will be included in the work plan. The rationale will not be on a well-by-well basis, but more on a site-wide basis. The work order plan will indicate the relative location of the wells with respect to the source area.

Issue 2: Comment acknowledged. The sample containers purchased by the Water Sampling Program are cleaned according to EPA protocols. The field blank QC samples that are being taken at a frequency of 1 per 20 sampling locations (or 1 per site if there are less than 20 locations) are used to analyze ambient conditions at the time of sampling. The field blanks also provide a spot-check of bottle cleanliness. However, the project should not simply accept the word of a bottle vendor on cleanliness. Vendors have provided unclean bottles that have skewed data. Therefore, the water samplers will list bottle lot numbers on their field forms. Additionally, the project should attempt to purchase bulk shipments of bottles that all have the same lot number.

REVIEW FORM

(22)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 5.4. The Water Sampling Manager should provide the sampling staff with the information suggested in Subsection 5.1.1.

SECTION 2

Response: By: P. Middlebrooks

The Water Sampling Manager provides the sampling staff with a detailed Field Sampling Plan. This plan includes a spreadsheet indicating the analytes to be collected at each individual sampling location. In addition, this "cookbook" method tells the samplers exactly which bottles will be used to hold each analyte and what preservatives are needed. A completed copy of Attachment 16.2.1.3, Work Order Plan, is included with the package given to the samplers, although the Field Sampling Plan is more understandable and usable in the field.

REVIEW FORM

(23)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Subpara. 5.5.1. Required equipment should include backup systems such as extra generators, tygon tubing, pumps and field instruments.

SECTION 2

Response: By: P. Middlebrooks

The water sampling crews carry as much backup equipment with them into the field as possible. This includes extra tubing, replacement parts for pumps, and spare field instruments. Due to space limitations in the sampling vehicles, carrying extra generators and other large pieces of equipment is not possible. An inherent part of field work is that equipment breaks down, and the samplers realize this and take as much spare equipment with them to the field as they can.

REVIEW FORM

(24)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Subpara. 5.5.2. A table of historical water levels, parameter stability trends and results (including turbidity) and well performance (recovery rates) characteristics should be prepared for use in the field by the sampling staff.

SECTION 2

Response: By: P. Middlebrooks

These data are now provided to the sampling staff by the Water Sampling Manager. Historical data provided for each well or sampling location include pH, Ec, DO, ORP, alkalinity, temperature, recovery rates, recommended pumps/bailers, and turbidity (when available). This change became effective January 25, 1993.

REVIEW FORM

(25)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 6.1. Use a clean or freshly decontaminated carboy for a sample container.

SECTION 2

Response: By: P. Middlebrooks

This procedure is followed by the water sampling crews.

REVIEW FORM

(26)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 7.1. The SOP states that "Collect sample first from wells that are likely to be uncontaminated. Then collect samples from wells which could be contaminated." Observation/Suggestion: Procedure 7.1 was not followed at Shiprock. When questioned, the field manager's justification for not following this strategy was that it was not cost effective and probably unnecessary considering the low levels of contaminants at this particular site. Not sampling from least to most contaminated wells, particularly within a program which appears currently to employ minimal decontamination procedures and no field control (QA/QC) sample collection, raises serious questions as to the accuracy and useability of analytical results. While following a contaminant trail may be time consuming, it is much more cost effective than having to resample a site because the data from the initial sampling are questionable.

SECTION 2

Response: By: P. Middlebrooks

The Groundwater Sampling Program Manager is now primarily responsible for developing an acceptable "sampling sequence" plan for a particular site prior to the start of each sampling event. The Site Hydrologist will provide the Groundwater Sampling Program Manager with site-specific information regarding the historic contaminant levels in each monitoring well. The SOP will be revised to include the requirements of this procedure.

REVIEW FORM

(27)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 7.2. Record the specific details of where a domestic sample was taken (*i.e.*, downhole, galvanized pipe with spigot at rear of home, *etc.*). A sample receipt from the occupant should be obtained.

SECTION 2

Response: By: P. Middlebrooks

The exact collection locations of domestic samples are always recorded on the field forms. Access agreements have been arranged with private parties allowing the water sampling crews to collect water, so sample receipts are unnecessary.

REVIEW FORM

(28)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para 7.4. Record any observations of changes in color, odor, etc. during the purging process. Do not place any sampling or measuring device in the well without first getting the written permission of the owner. Once permission is obtained, verify, if possible, total well depth and water levels.

SECTION 2

Response: By: P. Middlebrooks

Changes in color, odor, etc. are noted in the comments section of the field forms. See the previous response concerning access agreements. In general, samples from domestic wells are taken from spigots or faucets and not from downhole. Therefore, it would be extremely rare for any equipment to be placed in a domestic well while sampling.

REVIEW FORM

(29)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 8.0. Details should be added as to approaching, inspecting (for damage), monitoring (air quality), and opening the well. For example, the SOP should state that plastic sheeting must be placed on the ground around the wellhead prior to sampling.

Observation/Suggestion: At Shiprock, this was not done and as a result, excess Tygon tubing was allowed to touch the ground where decon and "contaminated" purge water were disposed. Because of poor decontamination procedures, there is a high probability for cross-contamination to occur. The sampling truck was backed up immediately next to the well without any consideration of wind direction. Further, the generator used to power the pump was filled with gas and run in an upwind position to the well. Although volatiles were not being sampled on the particular wells being observed, this appeared to be a common practice. This poses potential problems with volatile contamination of equipment, bottles and water, especially if the truck were kept running during sampling. Sampling staff should be instructed to consider wind direction when setting up and particularly when sampling.

SECTION 2

Response: By: P. Middlebrooks

Issue 1: The SOP will be revised to state that plastic sheeting will be placed around the wellhead prior to sampling. This practice was implemented by the field sampling crews effective January 25, 1993, but must be incorporated into an SOP.

Issue 2: The reviewer is correct in stating that engines should be downwind in the case of volatile sampling. The field sampling crews are versed in the SOP. However, the UMTRA Project almost never collects volatile samples. It is a standard practice to position the engines downwind for volatile sampling, but when sampling for inorganics the samplers place the engines in the most convenient positions.

REVIEW FORM

(30)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Observation/Suggestion: The probe used to check water levels was deconned by splashing DI water over the outside of the coiled electric tape. The water level tape should be unwound and deconned using a detergent and DI water wash in a basin or bucket followed by a DI water rinse. The case for the water level measuring device was dirty inside, and it was placed on the ground open to the elements. The case needs to be placed in a plastic bag or in the sampling vehicle away from dust and fumes from the generator. The cooler in which the pump was stored was also stained and had no plastic liner. The Tygon hosing was not wrapped in its own separate plastic bag, but was in contact with the pump which had been exposed to the elements. It is not deconned between locations. The hosing was filled with DI/decon fluid from the last location. Prior to putting the Tygon hosing down the well, it was washed by coiling the hose and running DI water over the coil. As was the case with the water level tape, the hosing should be deconned in a series of tubs or buckets to ensure that the entire hose is cleaned. An alternative decon method, using dedicated or pre-packaged and pre-cleaned equipment sets is proposed in later discussions.

SECTION 2

Response: By: P. Middlebrooks

The water level indicator tape that is submerged in the well water will be decontaminated using a detergent wash and distilled/deionized water rinse. The water level indicator will be placed on plastic sheeting near the well when not in use. All pumps and pump hoses will be scrubbed on the outside with a detergent wash then rinsed with distilled/deionized water. The pumps and hoses will be cleaned on the inside by pumping a detergent wash then distilled/deionized rinse through the system. The cleaned hoses and pumps will be kept in cleaned containers or on clean plastic sheeting between wells. If any parts of the hoses or pumps become contaminated prior to installation in the following well, those parts will be recleaned. Sampling kits have been addressed in a previous response.

REVIEW FORM

(31)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 8.2. The SOP states, "Position the pump intake a few feet above the screened interval and as near as possible to the well screen." This is not consistent with currently accepted or required EPA protocols as reported in the *Standard Operating Procedures and Quality Assurance Manual*, February 1, 1991 Environmental Compliance Branch, U.S. EPA Region IV, Section 4.9.3.3.5 "Purging the Entire Water Column," Page 3 of 7. This publication states that the pump should be lowered into the top of the standing water column to "pull" water from the formation through the screened interval and up the well casing, thereby removing the entire static well volume. Placing the pump above the well screen, as directed in the SOP, may not remove the water above the pump which may result in subsequent water samples not being representative of groundwater conditions. Further, the manual states that no more than 3 to 5 feet of hose should be lowered into the well in order to minimize contamination. The pump may need to be lowered into the well to accommodate drawdown.

SECTION 2

Response: By: P. Middlebrooks

SOP 16.2.1, Section 8.2, will be revised to reflect the reviewer's recommendation for the positioning of the pump intake which was based on the U.S. EPA Region IV SOP. In addition, the SOP will be revised to specify that periodic water level measurements be made during purging so the pump can be lowered, as needed, to accommodate potential drawdown in the well. However, if it is known from historical data that a well will purge dry prior to three bore volumes, it will be acceptable to place the pump intake at the bottom of the screen or borehole. In cases where wells purge dry and recover slowly, suction-type pumps may be needed to sample the water.

REVIEW FORM

(32)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Observation/Suggestion: Because of the poor decontamination procedures observed at the Shiprock site, the amount of purge hose placed in the wells should be minimized. Decontamination procedures should be upgraded to be in compliance with EPA and industrial protocols.

SECTION 2

Response: By: P. Middlebrooks

See previous responses concerning equipment decontamination. The SOPs follow the procedures outlined for equipment decontamination as outlined in the DOE's HAZWRAP document.

REVIEW FORM

(33)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

When purging and sampling a well, the pump tubing should be gently placed at the top of the water column, activated, and slowly lowered to a position which is a few feet above the screened interval. This allows the entire static water column to be evacuated while "pulling" water through the screen from the outside formation. This requires a continuous monitoring of drawdown levels in the well. It is important that samples be collected from the same depth within a well.

SECTION 2

Response: By: P. Middlebrooks

This comment contradicts EPA Region IV SOP Section 4.9.3.3.5 "Purging the Entire Water Column" that the reviewer just mentioned. The EPA SOP states "The pump/hose assembly or bailer used in purging should be lowered into the top of the standing water column and not deep into the column." The SOP will be revised as shown in the response to the comment on Section 8.2 of SOP 16.2.1.

REVIEW FORM

(34)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 8.8. The SOP requires that the sampling staff "Clean hoses and pumps" but provides no decontamination procedures or references to an SOP on decontamination procedures.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. The SOP will be revised to include information on decontamination procedures.

REVIEW FORM

(35)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 10.0. The SOP does not specify a bailer rope type. Polypropylene cord with a Teflon coated stainless steel wire lead is the norm for EPA sampling.

SECTION 2

Response: By: P. Middlebrooks

The SOP will be modified to state that for inorganic sampling a polypropylene cord will be used for bailing, and for organic sampling a polypropylene cord with Teflon-coated stainless steel wire lead will be used for bailing.

REVIEW FORM

(36)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

The SOP states that PVC bailers are acceptable for collecting non-organic samples. However, PVC is capable of adsorbing and desorbing certain contaminants and therefore cannot be effectively cleaned (decontaminated). As a result, many EPA regions and state agencies do not find the use of PVC bailers acceptable. We recommend using stainless steel bailers.

SECTION 2

Response: By: P. Middlebrooks

Polyvinyl chloride (PVC) bailers will continue to be used. Since the implementation of stricter decontamination procedures and a QA/QC program starting on January 25, 1993, equipment blanks have found no detectable concentrations of contaminants on the field equipment. Several of the equipment blanks were taken from decontaminated PVC bailers. The EPA and other agencies that find PVC bailers unacceptable are objecting to using the bailers to sample organics. Because nearly all of the UMTRA Project samples are analyzed for inorganic species, the use of PVC bailers will not affect the UMTRA Project groundwater sample quality.

REVIEW FORM

(37)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 10.5. The SOP does not show the setup. A drawing of this set-up should be provided.

SECTION 2

Response: By: P. Middlebrooks

The SOP is self-explanatory in this case and does not need a drawing.

REVIEW FORM

(38)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 12.9. See 8.8 above. A more precise procedure than "clean up field equipment" should be made available to the field sampling staff.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. The SOP will be revised to include information on decontamination procedures.

REVIEW FORM

(39)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Subpara. 12.9.4. The SOP should require the distribution of xerox copies of field forms which should be tracked and documented with a series of signoffs as part of data management and document control.

SECTION 2

Response: By: P. Middlebrooks

The current practice of field form reproduction and distribution by the Groundwater Sampling Program Manager is efficient, and no problems have been noted to date with the current SOP.

REVIEW FORM

(40)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Para. 13.0. The SOP should require recording the temperature (ambient and sample water), pH, and specific conductivity of the water in the jug immediately prior to splitting the sample.

SECTION 2

Response: By: P. Middlebrooks

Split samples are no longer collected, so this section of the SOP is not applicable to the program.

REVIEW FORM

(41)

SECTION 1

Document: Water Sampling Standard Operating Procedures
Reviewer: D. Messinger

Comment: SOP 16.2.1, Sample Collection, Preservation, and Shipment

Observation/Suggestion: The scope of work (sampling plan) for the Shiprock sampling effort is attached. The "plan" basically consisted of a memo from the hydrogeologist to the Sampling Coordinator (SC) and a subsequent memo from the SC to the sampling staff. The memos contain information on the location and physical conditions of the wells to be sampled (well diameter, total drilled depth, screened interval, mean recovery, and the last round of water levels), but contain no rationale as to the objective of the sampling effort, why the particular wells and seeps listed were selected or results or trends in historical field and analytical data. This type of background information is essential to the sampling staff in identifying potential problems and making field decisions or modifications to the scope of work. For example, during sampling of two shallow wells, approximately 100 feet apart on a floodplain, during day 2 of the review, pH stabilized at 6.8 in one well and 10 in the second. This wide variance in pH between wells in such close proximity should have been questioned by the sampling staff as a potential problem. However, the samplers did not appear concerned by the difference and continued to collect the samples. Had they been briefed on historical field and analytical data for this site, they would have had enough background to have questioned the sampling plan and call the SC or site hydrogeologist to determine if another well(s) should have been sampled in their place. Resampling of one or both of these points will be costly and time consuming. Pre-sampling briefings of the Sampling Team and SC in conjunction with the SH are strongly suggested.

SECTION 2

Response: By: P. Middlebrooks

Presampling preparation that includes the review and inclusion of historical field and analytical data for a given site is currently being implemented. This information includes the historical pH, conductivity, dissolved oxygen, reduction/oxidation potential, and alkalinity values for wells and surface water locations. The expected recovery and recommended purge and sample method for each well are also provided. Additionally, as stated in previous responses to comments, information on the relative location of wells to the source and justifications for sampling are also to be included. The information is relayed to the field sampling team by way of the water sampling Field

Sampling Plan prior to their departure to the site. This procedure was implemented on January 25, 1993.

A review of Water Sampling Field Forms from the September 1992 visit to the Shiprock site was conducted to investigate the validity of the reviewer's statement concerning the accuracy of field measurements. The field forms clearly show that the pH measurements from the floodplain wells varied only between 6.59 and 7.29 units. No floodplain well had a pH measurement close to 10. A maximum pH difference of 0.7 units in groundwater from wells spread out over several thousand feet in an alluvial aquifer is acceptable and justifies why the samplers "did not appear concerned."

REVIEW FORM

(42)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.5, Monitor Well Sampling with an Electric Submersible Pump

Water levels should be taken before, during and after purging as well as after sampling to build a record of well performance characteristics.

SECTION 2

Response: By: P. Middlebrooks

Water levels will be taken before purging to obtain information on static conditions and volumes of water to be purged, and will be taken during purging to make sure that the pump intake is positioned properly. Water levels should also be taken prior to sampling to make sure that there is sufficient water to collect all samples, but there is no need to take water levels after sampling.

REVIEW FORM

(43)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.5, Monitor Well Sampling with an Electric Submersible Pump

Para. 4.1. The SOP should require that information initially collected upon opening the well should include ambient air quality readings in the breathing zone and at the wellhead, as well as the physical condition of the well and lock.

SECTION 2

Response: By: P. Middlebrooks

Organics are generally not a concern at UMTRA Project sites, so the use of air monitoring instruments is unnecessary and will not be implemented. The physical condition of the well is noted by the samplers if something is out of the ordinary. If a lock is not functioning, the water samplers will replace it.

REVIEW FORM

(44)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.5, Monitor Well Sampling with an Electric Submersible Pump

Subpara. 4.2.2. The SOP should state that the total well depth is measured for a number of reasons, including: 1) to assist in verifying the identification of the well; 2) to assure that the well is not obstructed and therefore the pump can be installed and removed easily; and 3) to determine sedimentation rates.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. The SOP will be revised accordingly.

REVIEW FORM

(45)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.5, Monitor Well Sampling with an Electric Submersible Pump

Para. 4.4. The SOP should require that the pump be lowered slowly and carefully into the well in order to minimize inducing of turbidity as well as to pull water in from the screen while evacuating the static water in the casing. The SOP should be more specific as to what is considered to be a "clean" pump.

SECTION 2

Response: By: P. Middlebrooks

Studies have shown that no matter how quickly or slowly a pump or bailer is lowered into a well, the stagnant water in the well bore will be agitated and cause a significant increase in turbidity. The only way to eliminate the turbidity is to purge the well for three to five bore volumes, or to sample at low flow rates using dedicated pumps. Therefore, the speed at which the pump is lowered is not a problem. Procedures for decontaminating the pump and hose are outlined in sections 4.11 through 4.13 of this SOP. These decontamination procedures are out of date and will be revised to show updated decontamination procedures of a detergent/water wash with distilled/deionized water rinse.

REVIEW FORM

(46)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.5, Monitor Well Sampling with an Electric Submersible Pump

Para. 4.12. The SOP should require that decontamination of the pump and hose include a rinse and pump-through of DI or potable water and liquinox-type detergent followed by a DI rinse and pump-through. Hosing should be replaced between sample points, although this could be avoided if this hosing were dedicated to a specific sampling point, bagged, labeled and stored for later use.

SECTION 2

Response: By: P. Middlebrooks

Issue 1: See the response to the previous comment concerning proper decontamination procedures.

Issue 2: This comment contradicts a previous comment to SOP 16.1.22, which recommended sampling kits. This suggestion is not really feasible based on the scope and logistics of the UMTRA Project. It would most likely be more expensive and more wasteful than the previous suggestion in SOP 16.1.22. The samplers do not have a base to work from where they can dispose of thousands of feet of pump tubing. Sampling kits and disposable tubing are not feasible for this project. Thorough decontamination and dedicated pumps are the only viable alternatives.

REVIEW FORM

(47)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.6, Monitor Well Sampling with a Bladder Pump

Para. 4.4. The SOP should require that water levels be measured periodically during the purge process, in order to build up a record of well performance. Variances from the normal performance history could then be used to determine when wells need servicing or when the representativeness of prescribed sampling might be questionable.

SECTION 2

Response: By: P. Middlebrooks

See the response to a similar comment on SOP 16.2.5.

REVIEW FORM

(48)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.6, Monitor Well Sampling with a Bladder Pump

Para. 4.11. The SOP should require that bladder pump cleaning include the use of detergent (i.e., Liquinox) in potable or distilled water followed by a distilled water rinse between sample locations.

SECTION 2

Response: By: P. Middlebrooks

The SOP will be revised to show a detergent wash and distilled/deionized water rinse. The UMTRA Project is also considering purchasing low submergence bladder pump logic units. These units would allow the bladder pumps to pump detergent wash and then a distilled/deionized water rinse from buckets through the pump units then through the pump hose. These units would provide a more thorough decontamination and are also excellent for sampling low recovery wells instead of using bailers.

REVIEW FORM

(49)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.7, Monitoring Well Sampling with a Peristaltic Pump

See Comment on Section 8.2 of SOP 16.2.1 concerning purging and placement of the pump intake.

Para. 4.7. The SOP should require that water levels be measured periodically during the purge process, in order to build up a record of well performance. Variances from the normal performance history could then be used to determine when wells need servicing or when the representativeness of sampling should be questionable.

SECTION 2

Response: By: P. Middlebrooks

See the responses to similar comments on SOPs 16.2.5 and 16.2.6.

REVIEW FORM

(50)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.7, Monitoring Well Sampling with a Peristaltic Pump

Para. 4.12. The SOP should require that peristaltic pump cleaning include the use of detergent (i.e., Liquinox) in potable or distilled water followed by a distilled water rinse between sample locations.

SECTION 2

Response: By: P. Middlebrooks

The SOP will be revised to show a detergent wash and distilled/deionized water rinse.

REVIEW FORM

(51)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: SOP 16.2.8. Quality Control Samples for Water Sampling

Observation/Suggestion: Contrary to Section 2.1 of this SOP, no field QC samples were collected during the field visit to Shiprock. In addition, the field team informed the reviewers that QC samples had not been collected over the period of the last few months. When questioned why blanks were not being taken, the reviewers were told that UMTRA was having a hard time securing a supply of DI water. The reviewers suggested that the teams use store-bought DI water and do blanks. The response to this suggestion was that the idea had been suggested earlier in the program and was rejected. Interestingly, later in the field review it was found that the sampling teams were buying DI water from stores. Again, when questioned as to what blanks they would generally take, the sampling team appeared to be unfamiliar with the concept of field or equipment blanks. This is by far the most serious problem seen by the reviewers. The lack of Quality Control field samples (i.e., replicates, duplicates, field and equipment blanks) raises questions as to the validity and useability of analytical data collected without these controls. It is this reviewer's opinion that without proper quality control field samples, analytical results should be considered qualitative at best. This lack of Quality Control samples was also seen as a major concern by the DOE representatives.

SECTION 2

Response: By: P. Middlebrooks

Action has been taken to immediately implement the collection of QC samples as specified in the SOP. Collection of QC samples began on January 25, 1993. QC samples will be taken at a frequency of 1 per 20 sampling locations (or at least 1 per site visit if fewer than 20 locations are sampled). QC samples will consist of field duplicates, field (ambient) blanks, and equipment blanks. The UMTRA Project has set up a Barnstead nanopure water purifying system in the sampling staging area in Albuquerque. The samplers take water from this system to the field in decontaminated carboys and use this water to take the field blanks and equipment blanks. Results from initial QC analyses at several sites show no contamination in either the field blanks or equipment blanks.

Due to a lack of space in the sampling vehicles and the cost of the high purity water, the samplers will not take the high purity water to the field for use in decontamination. They will buy deionized or distilled water in the field to do their decontamination. For the reviewer's information, the samplers were buying deionized and distilled water at Shiprock to use in their decontamination procedure. Also, using deionized water for QC blank samples will result in false hits due to a lack of water purity.

REVIEW FORM

(52)

SECTION 1

Document: Water Sampling Standard Operating Procedures

Reviewer: D. Messinger

Comment: General

There appears to be some confusion in the definition of the various field QA/QC samples between SOPs. For example, field duplicates are not the same as field replicates. A field duplicate consists of splitting a pooled sample into identical, equal aliquots. A field replicate is created by repeating the sample collection process (from the same source and under the same conditions) but not from an intermediate pooled sample. It is strongly suggested that the SOPs be reviewed for consistency in definitions.

SECTION 2

Response: By: P. Middlebrooks

Comment acknowledged. The documents will be reviewed for consistency, and any procedures not in use will be removed.

REVIEW FORM

(53)

SECTION 1

Reviewer: D. Messinger

Comment: Qualification and Training of Sampling Staff

Observation: Sampling staff had at least a 2-year degree and several had Master's degrees. There was no mention of roles being defined by activity (i.e., sampling was not relegated to persons classified as a PL-1). Sampling staff experience varied depending on education and time in the field. It was pointed out to the reviewers that staff recruited directly from school were preferred because they had no prior prejudices as to sampling techniques and were, therefore, easier to train.

Other than mandated Corporate Health and Safety, sampling staff training consisted of approximately 40 hours of assigned reading and on-the-job-training (OJT) with a major emphasis on OJT. Relying on OJT as the main training mechanism generally results in the experience of the sampling staff being more a function of who they learned from and worked with. Further, since each site is unique in its requirements and activities, and more senior staff change over time, sampling staff may not be exposed to the full spectrum of activities of the project.

Suggestion: Formal classroom training should be incorporated into the training program for the sampling staff with hands-on instruction on how and why field data are collected followed by a signoff or testing of training to ensure and document an individual's understanding of the SOPs and the program. Ownership of the program begins in training. The basic course should be available on a routine basis and attendance should be mandatory for all new sampling staff. Annual refresher training should also be considered. All staff should be given copies of the SOPs (and updates when available) and required to read them. Reading assignments should include the appropriate sections of the QAPP, the Work Plan and SAP to again ensure that the field team understand program and project objectives and goals.

In short, the field team is the first line of project Quality Control and as such they must be made more aware of the Quality Assurance program and Data Quality Objectives. It is important to note that DOE also expressed concern about whether the field teams were as well prepared (knowledgeable) as they should be and whether DQOs were properly defined, communicated and met by the various consultants on the project.

SECTION 2

Response: By: P. Middlebrooks

All new employees will be given the applicable SOPs to read prior to engagement in field work. The new employee will then review the SOPs with the Groundwater Sampling Program Manager prior to proceeding to the field. On-the-job training will then commence with an experienced sampler as a mentor. As soon as possible after employment, the new employee will be sent to a groundwater sampling and monitoring course. This course will expose the sampler to the latest technologies, methods, and procedures in the groundwater industry. This information may even allow the new employee to provide new insights on sampling to experienced samplers. In addition, the UMTRA Project geochemists are developing an 8-hour training class for all new and current employees assigned to water sampling. The class will be designed to familiarize personnel with the reason for taking parameter measurements, what the measurements indicate, and how to identify measurement anomalies.

Refresher SOP training will be given to all samplers periodically, and all samplers will be notified immediately of any changes in applicable SOPs.

The samplers will also be given opportunities to receive training in applied hydrogeology so that they have a better understanding of groundwater flow and contaminant transport. This training, combined with training in geochemistry, will allow them to identify problems as they arise while sampling is in progress.

The Groundwater Sampling Program Manager will be responsible for checking the progress of new and experienced samplers. This will include spot checks in the field and on-the-job training sessions.

REVIEW FORM

(54)

SECTION 1

Reviewer: D. Messinger

Comment: Qualifications and Training of Sampling Staff

Observation/Suggestion: One of the interviewees reported that in the two years he had been a sampler, only one audit had been performed. Internal audits and self-assessments need to be done on a regular basis. The SH should also make periodic visits to the site when the teams are sampling as an assurance that sampling is indeed meeting his DQOs.

SECTION 2

Response: By: P. Middlebrooks

The Groundwater Sampling Program Manager will be responsible for checking the progress of new and experienced samplers. This will include spot checks in the field and on-the-job training sessions. In addition, UMTRA Project QA and Data Management staff conduct an annual in-process surveillance of field sampling activities as outlined in Section 4.2 of SOP 16.3.3, Data Management.

REVIEW FORM

(55)

SECTION 1

Reviewer: D. Messinger

Comment: Qualifications and Training of Sampling Staff

DOE representatives want to see a full round of water levels measured at each site whenever sampling is done, as opposed to the current practice of just measuring water levels only on the wells to be sampled. Considering the distances traveled to many of these sites, and the associated costs of the sampling efforts (sampling is currently budgeted at 10.5 hours per well per site), this seems to be a reasonable and technically sound request. DOE and its contractors need to examine current program time and budget constraints to ensure that the request can be implemented within the time and budget allotted for the effort.

SECTION 2

Response: By: P. Middlebrooks

The lead DOE technical representative (Don Metzler) has indicated to the Groundwater Sampling Program Manager this same concern. However, in the past the TAC Site Hydrogeologists have "made the call" on taking water levels in wells. Since the Site Hydrogeologists write the original work orders, the water samplers were only following the instructions given to them. The Groundwater Sampling Program Manager has recommended that water level measurements all be taken on the same day, preferably the first day of the shift, to minimize the effect of weather conditions on water levels. If water level measurements were spread over a week, recharge events could cause variability in water levels. This will be nearly eliminated by measuring water levels during one day.

REVIEW FORM

(56)

SECTION 1

Reviewer: D. Messinger

Comment: Qualifications and Training of Sampling Staff

DOE also expressed concern with what it considered to be escalating sampling costs. DOE felt that efficiency checks and performance standards needed to be incorporated into the program because of the variations in costs on a particular site for the same scope of work. Some of this variation is believed to be due to changes field conditions and difficulties in site access.

SECTION 2

Response: By: P. Middlebrooks

The water sampling staff are professionals and take pride in their work. They would like more frequent field reviews so they can correct any mistakes they might be making. The Water Sampling Program Manager will frequently review the samplers' procedures in the field. The review of costs associated with the water sampling program was not one of the purposes of the peer review as outlined on page 1 of this report. The samplers are efficient and professional and attempt to follow the SOPs to the best of their abilities. Further, the samplers have been very willing and helpful when implementing changes to comply with SOPs. The reviewer had no comments in this peer review concerning the efficiency of the samplers in the field and made no recommendations to improve efficiency. Sampling cost increases are not due to a lack of efficiency in the field.

REVIEW FORM

(57)

SECTION 1

Reviewer: D. Messinger

Comment: Management Review of Field Data

Observation/Suggestion: There is no apparent management review of field data or documentation as to data transfer from the field to office. A formalized system of data tracking including form custody, reviews for completeness and accuracy, and corrections (with signoffs), should be implemented as soon as possible.

SECTION 2

Response: By: P. Middlebrooks

The field forms have been modified to include signature lines for the field representative and the data reviewer. Before a final site visit report is written, all data are reviewed by the Sampling Manager. Additional field data management procedures are found in SOP 16.3.3, Section 4.6.4 "Data Management."