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QUALITY ASSURANCE FIELD AUDIT REPORT FOR VERIFICATION INVESTIGATION NSWC INDIAN HEAD MD

10/1/1995

BROWN AND ROOT ENVIRONMENTAL

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QUALITY ASSURANCE FIELD AUDIT REPORT
FOR
VERIFICATION INVESTIGATION
NAVAL SURFACE WARFARE CENTER (NSWC)
INDIAN HEAD, MARYLAND

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Northern Division
Environmental Branch Code 18
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop 82
Lester, Pennsylvania 19113-2090

Submitted by:
Brown & Root Environmental
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0222

OCTOBER 1995

PREPARED BY:

DEBRA A. SCHEIB
QUALITY ASSURANCE MANAGER
BROWN & ROOT ENVIRONMENTAL
PITTSBURGH, PENNSYLVANIA

TABLE OF CONTENTS

FIGURES

1.0 INTRODUCTION

1.1 OVERVIEW

Under Comprehensive Long-Term Environmental Action-Navy (CLEAN) Contract No. N62472-90-D-1298 (executed in March 1991), Brown & Root Environmental provides to the U.S. Navy a wide range of environmental support services. Also participating in this contract are two Team subcontractors, ENSR Consulting and Engineering (ENSR), and RUST Environment and Infrastructure (RUST).

CLEAN Contract No. N62472-90-D-1298 is administered using three management plans: the Contract Management Plan (CMP), the Quality Control Management Plan (QCMP), and the Health & Safety Management Plan (H&SMP). The QCMP (developed per Attachment G of the contract), prescribes the structure and practices of the contract's Quality Assurance/Quality Control (QA/QC) program; including the development and implementation of the Quality Assurance Standard Operating Guidelines (QA-SOGs).

Within this established CLEAN QA/QC program, an average of six (6) field audits and two (2) file audits are conducted annually. Corrective Action Plans are compiled and administered as deemed necessary by the CLEAN Program and QA/QC Managers.

In accordance with these program requirements, an audit of field activities conducted under Contract Task Order (CTO) No. 0222 Verification Investigation was conducted at NSWC Indian Head, Maryland. Debra Scheib (Brown & Root Environmental; Pittsburgh, Pennsylvania), CLEAN Quality Assurance Manager (QAM), performed the audit on September 16, 1995.

Listed below are documents containing the QA/QC criteria to which the audit was conducted:

- CLEAN QCMP and attached QA-SOGs
- CTO 0222 Project Planning Documents
- Naval Facilities Engineering Services Center (NFESC: formerly NEESA) guidelines:

  "Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program"; NEESA 20.2-047B, June 1988.

Other relevant practices and binding criteria include information disseminated via CLEAN Project Managers' Updates, "common sense", and generally accepted scientific practices.

A CLEAN Audit Program Matrix is provided in Figure 1-1.

This audit was assigned the Brown & Root Environmental audit designation 95-02F.

1.2 PERSONNEL

The Field Operations Leader, Mr. Dave Yost, and field technician Mr. Leeland Marshall (both of the Brown & Root Environmental, Pittsburgh office) participated in the audit; as well as Mr. Ray Willoughby, Ordanance Expert, (Brown & Root Environmental, Stone Mountain, Georgia). A pre-audit meeting and post-audit debriefing was held on-site. The Project Manager, Ms. LeeAnn Sinagoga (Brown & Root Environmental, Pittsburgh), was subsequently debriefed.

1.3 SCOPE

The nature of the field activities varies with the type of project supported. For example, Site Investigations (SIs) likely require different field tasks to be performed than those performed in support of Groundwater Monitoring or Asbestos Abatement Programs. Hence, actual site tasks performed may not encompass all possible environmental field activities. Furthermore, it may not be possible to observe all field tasks conducted over the length of the field activity during the 1- or 2-day audit period.

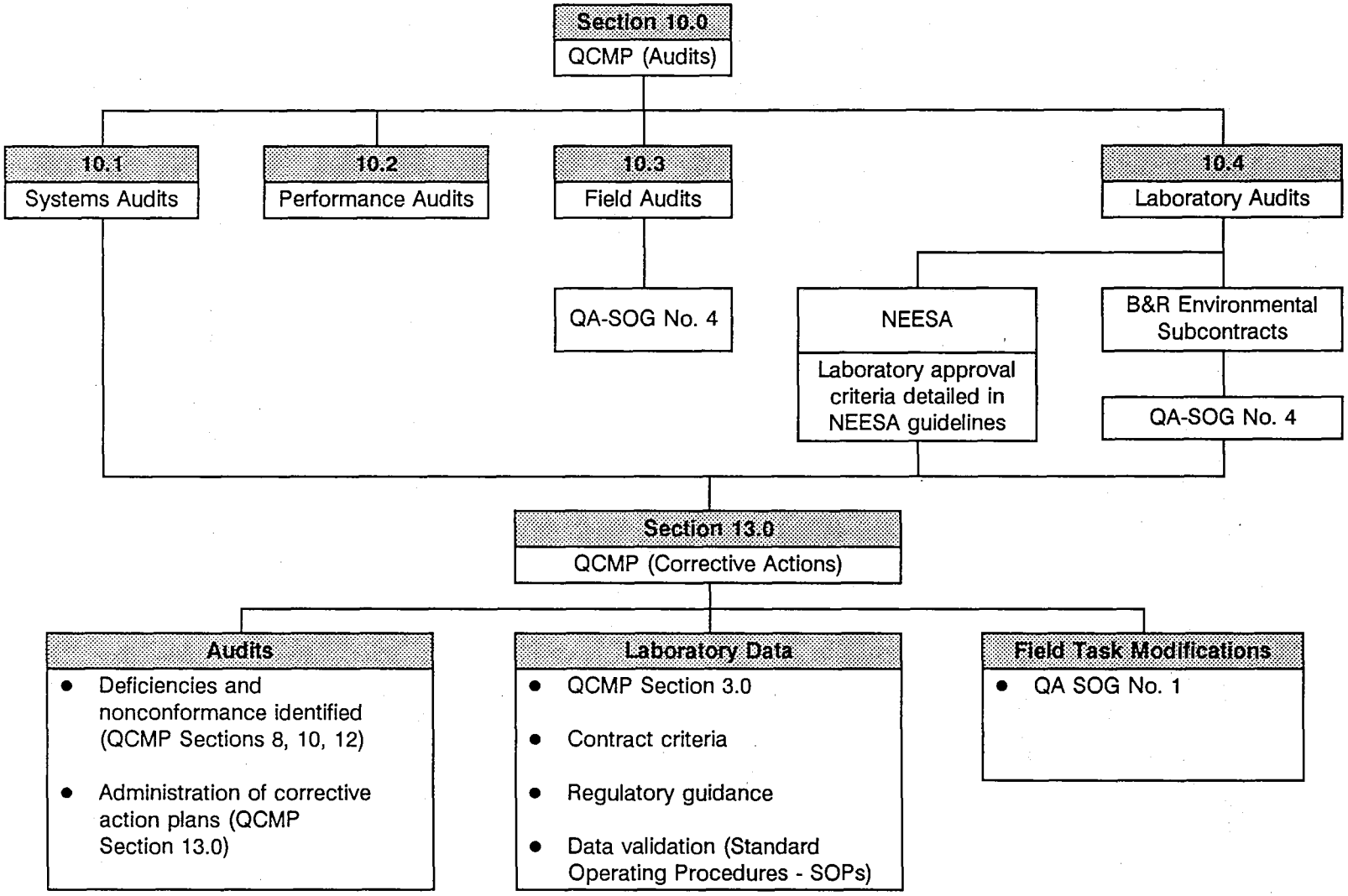
With regard to the field audit of CTO 0222, field documentation was reviewed and use of immunoassay test kits for explosives analysis was observed.

1.4 REPORT ORGANIZATION

The method by which nonconformances are documented is described in Section 2.0 of this report. A summary of the audit findings is provided in Section 3.0. Quality Notices, audit response, and recommended corrective actions are detailed in Section 4.0. Sections 5.0, 6.0, and 7.0 discuss Audit Follow-up, Audit Closeout, and Audit Records, respectively. Quality Notices which were issued are attached as Appendix A. A completed audit checklist is presented as Appendix B.

FIGURE 1-1

CLEAN AUDIT PROGRAM MATRIX/ASSOCIATED REFERENCES



2.0 DOCUMENTATION OF NONCONFORMANCES

It is Brown & Root Environmental policy to informally issue the needed Quality Notices at the post-audit meeting. Formal submission of all Quality Notices issued is accomplished via transmittal of the official audit report. Audit reports and records are principally governed by QCMP Section 14.0, QA-SOG No. 1 (Section 5.0), and QA-SOG No. 4 (Sections 5.3 through 5.7).

2.1 QUALITY NOTICES

Quality Notices are issued under three categories, as follows:

- A: Quality Notice of Deficiency: Identification of a specific requirement (e.g., procedure, process) that has not been followed.
- B: Quality Notice of Observation: Identification of an activity or action where minor departures from requirements have been noted.
- C: Quality Notice of Concern: Identification of an activity or action to alert the project staff of potential problems or unsatisfactory trends which may develop into a deficiency if not corrected.

Copies of the Quality Notices issued for the fied audit of CTO 0222 conducted on September 16, 1995 are contained in Appendix A.

2.2 AUDIT REPORTS

A formal audit report is to be written by the auditor within 2 weeks of the audit.

In accordance with QCMP Section 10.3, copies of the audit report are submitted to the Project Manager, Program Manager, the Navy RPM, and the Navy's Northern Division (NORTHDIV) Head of the Installation Restoration Technical Section.

3.0 FINDINGS AND RECOMMENDED CORRECTIVE ACTIONS

No deficiencies were noted during the audit. However, two (2) Quality Notices of Concern were issued to draw attention to potential problems.

3.1 QUALITY NOTICE 5280-QN1

The audit was conducted near to the start of the field activities; needed paperwork was proactively prepared. Quality Notice of Concern 5280-QN1 was issued because it was observed that no calibration log paperwork had been prepared for the Horiba water quality monitoring instrument. Discussion with the field crew revealed their view that since the Horiba was a self-calibrating instrument (i.e., not checked against an external standard), it was appropriate to simply record performance of the self-calibration check in the Master Site Logbook. (Note: the Horiba instrument had not yet been used on site.)

The auditor and field crew discussed the issue, and the auditor outlined two possible acceptable courses of action: (1) initiate and maintain a calibration log form for the Horiba, or (2) record calibration of the Horiba in the Master Site Logbook and complete a Field Task Modification Record (FTMR; per CLEAN QCMP Section 13.2) documenting the change in calibration documentation procedures. To satisfy 5280-QN1, photocopies of either (1) the Horiba calibration log form, or (2) the site logbook entries and completed FTMR need to be submitted as a component of the audit response.

3.2 QUALITY NOTICE 5280-QN2

During the audit it was noted that the issue of the handling of wastes generated from the use of the immunoassay field test kits was not specifically addressed in the project planning documents. In the absence of specific guidance, Quality Notice of Concern 5280-QN2 was issued to prompt the clarification of proper test kit waste handling procedures. The auditor directed the FOL to separate the solvent waste from the other kit disposables and containerize it pending direction for disposal from the Navy.

To satisfy 5280-QN2, a Field Task Modification Record (per CLEAN QCMP Section 13.2) needs to be completed, documenting the interim procedures taken and summarizing the direction provided by the Navy.

4.0 AUDIT RESPONSE

Per QCMP QA-SOG No. 1, Section 5.1, a formal audit response is due to the auditor within 30 days from the date that the audit report is issued. The exact due date is indicated on page one of each of the appended Quality Notice forms, and also in the transmittal letter attached to the formal audit report. If requested, extensions may be granted by the CLEAN QAM.

The formal audit response is to be submitted to the auditor, only, in the form of a comprehensive letter report. The comprehensive letter report must contain the following:

- A detailed discussion of the specific audit findings
- A thorough presentation of the root cause(s) thereof
- A detailed discussion of the immediate remedial actions taken
- Presentation of a long-term corrective action plan
- Responsible parties for implementation and maintenance of the corrective action plan
- Anticipated date that the long-term corrective action will be implemented/completed

The same information (but abbreviated) is to be provided on the completed Quality Notice forms, which are attached to the formal audit response. Each completed Quality Notice must be signed by the Project Manager. Additionally, the formal audit response may contain documentation to facilitate the auditor's verification that the appropriate correction was taken, and has been effective.

Subsequent audit follow-up and audit close-out are discussed in Sections 5.0 and 6.0, respectively.

5.0 AUDIT FOLLOW-UP

Responses to each Quality Notice issued are evaluated separately. Ultimate responsibility for verifying corrective actions taken and judging their effectiveness lies with the CLEAN Quality Assurance Manager.

If the audit was conducted by someone other than the CLEAN QAM, the auditor (with concurrence from the QAM), determines if each Quality Notice response is satisfactory or not. If the Quality Notice response is deemed satisfactory, that individual Quality Notice is considered to be "closed," and the QAM signs off on that specific Quality Notice form. Conversely, Quality Notices are considered to be "open" when the submitted audit response is deemed unsatisfactory. In this instance, the auditor indicates "unsatisfactory" and "open" on the Quality Notice form (refer to Appendix A).

After evaluation of the audit responses, the QAM (or auditor designee) subsequently prepares an audit follow-up letter. This follow-up letter is issued by the Quality Assurance Manager to the Project Manager, informing him or her of the status of each finding. In the follow-up letter, Quality Notices considered to be closed are listed, and directives for a secondary response to Quality Notices remaining open are detailed. All Quality Notice forms are re-submitted to the Project Manager.

Secondary audit responses are addressed generally in the same manner as the preceding primary audit responses. Usually, extensive discussion occurs between the Project and Quality Assurance Managers in order to arrive at a suitable corrective action plan and implementation time frame. When required, secondary audit responses are to be submitted within 30 days from receipt of the audit follow-up letter.

6.0 AUDIT CLOSE-OUT

After all Quality Notices have been successfully closed, the QAM (or designee) reviews the corrective action program within 30 days of its implementation per QCMP QA-SOG No. 1, Section 5.3. If no areas of concern are noted, the audit itself is closed out.

Audit close-out consists of formal notification to the Project Manager, and submission of all primary and secondary audit responses to the Program Manager, Navy RPM, and the NORTHDIV Head of the Installation Restoration Technical Section.

Often the CLEAN Quality Assurance Manager uses audit findings as a means of quality improvement feedback and, therefore, a basis for issuing CLEAN Project Managers' Updates, or creating and/or revising Standard Operating Procedures (SOPs).

7.0 AUDIT RECORDS

Per QA-SOG No. 4, the Quality Assurance Manager is responsible for maintaining the following records:

- Original monitoring schedules and revisions
- Audit checklists
- Audit reports
- Audit responses and evaluations
- Documentation pertaining to verification of corrective actions
- All follow-up and close-out transmittals

APPENDIX A

QUALITY NOTICES

HALLIBURTON NUS — **QUALITY NOTICE**

DIVISION AUDITED:	AUDIT NO.:	QN NO.:	REPORTABLE PER 10CFR21?
Brown & Root Environmental	95-02F	5280-QN1	☐ YES ☒ NO

PROJECT/PROGRAM: Verification Investigation NAVEODTECHCEN Indian Head, MD NORTHDIV CLEAN

RESPONSE ASSIGNED TO:	DUE DATE:	REPORTED BY:	DATE:
Dave Yost	12/5/95	D. A. Scheib	9/16/95

QN CATEGORY: ☐ DEFICIENCY ☒ OBSERVATION ☒ CONCERN

ACTIVITY: Calibration of Field Monitoring Equipment

PROCEDURE/PROGRAM/DOCUMENT REFERENCE: HNUS SOP ME-11 ; WP 3.2.5.5 (F.A. Checklist No. 59)

REQUIREMENT:

WP 3.2.5.5 : "Each Halliburton NUS field instrument requiring calibration will have a separate equipment calibration log . . . "
"A separate form will be established and maintained for each of the field instruments used during this sampling activity. "

CONDITION OBSERVED:

No calibration log was observed for the Horiba water quality monitoring meter. (Note: use of this piece of field equipment has not yet been called for during the field activity.)

TO BE COMPLETED BY AUDITED ORGANIZATION

CONDITION OBSERVED:

RESPONSE SUBMITTED BY:	DATE:

TO BE COMPLETED BY AUDITED ORGANIZATION

AUDITED ORGANIZATION(S) RESPONSE: (SEE ATTACHED COVER LETTER)

1. ROOT CAUSE ASSESSMENT

2. CORRECTIVE ACTION FOR IMMEDIATE PROBLEM(S)

3. CORRECTIVE ACTION TO PRECLUDE PROBLEM RECURRENCE

4. FIRM SCHEDULE (DATES) FOR CORRECTIVE ACTION COMPLETION

RESPONSE SUBMITTED BY:	DATE:

RESPONSE EVALUATION TO BE COMPLETED BY QUALITY ASSURANCE

FIRST RESPONSE: ☐ SATISFACTORY	☐ UNSATISFACTORY	☐ QN OPEN	☐ QN CLOSED
SECOND RESPONSE: ☐ SATISFACTORY	☐ UNSATISFACTORY	☐ QN OPEN	☐ QN CLOSED

REMARKS:

C/A VERIFIED: ☐ YES ☐ N/A	REVIEWED/APPROVED:	DATE:

HALLIBURTON NUS — **QUALITY NOTICE**

DIVISION AUDITED:	AUDIT NO.:	QN NO.:	REPORTABLE PER 10CFR21?
Brown & Root Environmental	95-02F	5280-QNZ	☐ YES ☒ NO

PROJECT/PROGRAM: Verification Investigation NAVEODTECHCEN Indian Head, MD NORTHERN CLEAN

RESPONSE ASSIGNED TO:	DUE DATE:	REPORTED BY:	DATE:
Dave Yost	12/5/95	D.A. Scheib	9/16/95

QN CATEGORY: ☐ OBSERVATION ☐ DEFICIENCY ☒ CONCERN

ACTIVITY: Handling of IDW

PROCEDURE/PROGRAM/DOCUMENT REFERENCE: Work Plan Sect. 3.1.9

REQUIREMENT:

〈Handling of IDW from field test kits not addressed in Work Plan.〉

CONDITION OBSERVED:

Some residual solvent (acetone) remains after use of field test kits. Raised issue; thought it was inappropriate to discard vials containing residual fluid in regular trash. Instructed field crew to empty acetone into waste jug, then discard vials uncapped (any remaining acetone would evaporate).

TO BE COMPLETED BY AUDITED ORGANIZATION

CONDITION OBSERVED:

RESPONSE SUBMITTED BY:	DATE:

TO BE COMPLETED BY AUDITED ORGANIZATION

AUDITED ORGANIZATION(S) RESPONSE: (SEE ATTACHED COVER LETTER)

1. ROOT CAUSE ASSESSMENT

2. CORRECTIVE ACTION FOR IMMEDIATE PROBLEM(S)

3. CORRECTIVE ACTION TO PRECLUDE PROBLEM RECURRENCE

4. FIRM SCHEDULE (DATES) FOR CORRECTIVE ACTION COMPLETION

RESPONSE SUBMITTED BY:	DATE:

RESPONSE EVALUATION TO BE COMPLETED BY QUALITY ASSURANCE

FIRST RESPONSE: ☐ SATISFACTORY	☐ UNSATISFACTORY	☐ QN OPEN	☐ QN CLOSED
SECOND RESPONSE: ☐ SATISFACTORY	☐ UNSATISFACTORY	☐ QN OPEN	☐ QN CLOSED

REMARKS:

C/A VERIFIED: ☐ YES ☐ N/A	REVIEWED/APPROVED:	DATE:

APPENDIX B

AUDIT CHECKLIST

FIELD AUDIT LEADSHEET

DAS; 5/94

Audit No: 95-02F Site Name: NAVEODTECHCEN Indian Head, MD

CTO No: 222 Project No.: 5280

Auditor(s): D. Scheib

Date(s) Conducted: 9/16/95

Personnel present for pre-audit meeting
[QA-SOG No. 4; 5.2.1]:

Dave Yost - B&R Environmental - Pittsburgh

Personnel present for post-audit meeting
[QA-SOG No. 4; 5.2.4]:

Dave Yost

Project Manager: Lee Ann Sinagoga

On-site?: Yes ____ No ✓

Field Operations Leader: Dave Yost

Site Safety Officer: Ray Willoughby - UXO ~~expert~~ specialist

Site QA/QC Officer [QCMP 13.1.2; QAM designee]:

FOL per Section 4.2 of site QAPP

Date Project Manager debriefed: 9/16/95

Auditable field activities per project planning documents:

FIELD AUDIT LEADSHEET

DAS; 5/94

Tentative Audit Schedule:

Audit briefing
Documentation Review (Field crew marking grid at Range 6
Soil profile
D-Tech sample screening

Specific study areas actually visited during the audit:

Range 6

Field activities actually observed during the audit:

(see above)

Summary of Findings/Quality Notices Issued:

No calibration form established for Horiba

QA of Field Test Kit not addressed in Work Plan. Told field crew 3.1.9
to retain all solvent waste in bottle, and let bottle dwards unscrewed (so any further residue would evaporate). Field crew and PM re-addressing issue with Navy.

FIELD AUDIT LEADSHEET

DAS; 5/94

Summary of Corrective Actions Discussed:

- create Hazbz form or ensure entry (since self-cal) in site logbook
- pursue test kit issue with Navy

Feedback Issues:

none

Notes:

Lee Marshall of B&K Environmental also present on-site as field technician.

Decon pad not set-up yet, but some preliminary samples taken (for test kits). Asked about how decon of equipment to obtain above was handled. (Temporarily kept in Yub; fluids will be transferred to drums when drilling arrive.)

On-site phone # 301.743.6960

Holiday Inn
US 301 & St. Patrick Dr.
Waldorf, MD 20603
301.645.8200
301.843.7945 (fax)

GENERALIZED FIELD AUDIT OUTLINE

DAS; 5/94

I. Pre-audit Meeting

- A. Introductions
- B. Objectives (compliance, corrective action, improvements, feedback, suggestions)
- C. Applicable Criteria Overview
- D. Current Context of Site Activities and Project Personnel Assignments
- E. General Overview and Tentative Schedule

II. Audit

- A. Health & Safety
- B. Borehole Screening
- C. Soil Classification
- D. Headspace Analysis
- E. Sampling Techniques
- F. Field QC Sample Acquisition
- G. Decontamination Procedures
- H. Waste Disposal Procedures
- I. Calibration & Use of Field Instruments
- J. On-site Field Screening Analyses
- K. Sample C-O-C, preservation, packaging and shipping
- L. Evaluating Existing Monitoring Wells
- M. Monitoring Well Installation
- N. Monitoring Well Development
- O. Water-level Measurements
- P. Groundwater Monitoring Point Installation
- Q. Surveying
- R. Soil & Rock Drilling Methods
- S. Excavation of Exploratory Test Pits and Trenches
- T. Field Records

III. Post-audit Meeting

- A. General Comments
- B. Findings and Issuance of Quality Notices (per QCMP 10.3)
- C. Feedback and Suggestions
- D. Summary

IV. Project Manager/PMO Debriefing

FIELD AUDIT CHECKLIST

DAS; 5/94

QA/QC Procedures

1. Where any field observations, deficiencies, nonconformances or complaints recorded by the site QA/QC Officer or other? [QCMP 13.1.2] If so, summarize below.

   No

2. Based on personnel interview, did any variances from the project planning documents occur? If so, what were they? [QCMP 13.2]

   No

3. Were FTMs pertinent to the above initiated? [QCMP 13.2]

   N/A

4. If applicable, were FTMs issued in the appropriate manner? [QCMP 13.2]

   N/A

5. If applicable, were corrective action plans implemented (according to proper procedure)? [QCMP 13.1]

   N/A

6. For IR sites, were field duplicates obtained with a frequency of 10% for NEESA level C & D analyses? [NEESA Guidelines]

   (full scale sampling not yet begun at time of audit)

FIELD AUDIT CHECKLIST

DAS; 5/94

QA/QC Procedures

7. For IR sites, were field duplicates obtained with a frequency of 20% for NEESA level E analyses? [NEESA Guidelines]

(11)

8. For all sites, were field duplicates blinded to the laboratory? [Project Manager's Update No. 4; 9/30/92]

(11)

9. For all sites, are sufficient replicate aliquots of 1/20 samples designated to the laboratory for matrix spike/duplicate analyses? [NEESA Guidelines]

(11)

Health & Safety Procedures

10. Is there a readily available first aid kit on-site? [HNUS SOP HS 08]

Yes

11. If required by the site HASP, is a readily available eyewash on-site? [HNUS SOP HS 08]

Yes

12. If required by the site HASP, is a readily available stretcher on-site? [HNUS SOP HS 08]

N/A

13. If required by the site HASP, is a readily available fire extinguisher on-site? [site-specific HASP]

N/A

FIELD AUDIT CHECKLIST

DAS; 5/94

Health & Safety Procedures

14. Is the escape route to the hospital posted? [site-specific HASP]

Yes - posting at drilling HQS mtg.

15. Is the field operations trailer limited access? [site-specific HASP]

Building on site being used; yes, limited.

Boring Samples

16. Is the appropriate drilling method being used? [WP, FSAP]

17. Are the proper type of sampling devices being used? [HNUS SOP GH-1.4, 5.2.11; WP, FSAP; HNUS SOP GH-1.3, 5.2]

N/A at time of audit

18. Under HNUS SOP GH-1.4, Sect. 4.0, the Site Manager has the authority to change drilling methods if site conditions so dictate. Did any change in drilling methods from that cited in the project planning documents occur? If so, discuss.

19. If a change in drilling methods (from hollow-stem auger) was required, did the Site Manager consider the order of preference detailed in Section 5.2.1?

FIELD AUDIT CHECKLIST

DAS; 5/94

20. Where any field changes initiated by the drilling subcontractor? If so, were the requirements detailed in HNUS SOP GH-1.4, Sect. 4.0 met?

21. Per HNUS SOP GH-1.4, Sect. 5.2.1 (hollow stem auger drilling methods), was the auger plugged until the desired sampling depth was reached? (If the sample is to be taken at a relatively deep point, the auger may be advanced without a plug to within five feet of the sample depth. From hence, the procedure outlined in the SOP must be observed.)

22. If water was used to prevent blowback or plugging of the hollow stem auger, has the following been recorded:

N/A at time of audit

corollary field blank sample identification _____
amount of water introduced _____
amount of water recovered _____
amount of water extracted during well development _____

[HNUS SOP GH-1.4; Sect. 5.2.1]

23. Have all abandoned borings been appropriately backfilled? [HNUS SOP GH-1.4; Sect. 5.2.1, 5.2.3]

24. When applicable, was the casing appropriate cleaned-out before sampling? (In most cases, an inch or two of cuttings may be left in the borehole with little or no problem. However, if more than a few inches for cuttings are encountered, the borehole must be recleaned prior to attempting sampling.)

water wash (disturbed samples above & below water table) ____
clean-out auger (undisturbed samples below water table) ____
dry method (undisturbed samples above water table) _____
[HNUS SOP GH-1.4, 5.4]

FIELD AUDIT CHECKLIST

DAS; 5/94

25. Were any drilling lubricants used? If so, were the procedures cited in HNUS SOP GH-1.4, Sect. 5.5 observed?

_____

_____

26. Per HNUS SOP GH-1.4, Sect. 4.0, were detailed boring logs maintained by the site geologist for each borehole? (Per Sect. 5.1, logging is not applicable if explicitly stated so in the associated FSAP.)

_____

_____

27. Was the following information complete on the borehole logs:

description of materials _____
description of samples _____
sampling method _____
blow counts _____
final location for drilling _____
[HNUS SOP GH-1.4]

28. HNUS SOP GH-1.5, Sect. 5.2 provides for entering borehole information in the site logbook when additional space is needed than that provided on the boring logs.

<u>For soil classification from core samples</u>:

Was the USCS classification indicated per Exhibit 4-2 (attached)? _____

N/A at time of audit

Were the following characteristics indicated per the relevant HNUS SOP GH-1.5 sections (attached)?

color _____
soil type _____
relative density and consistency _____
weight percentages _____
moisture _____
stratification _____
texture/fabric/bedding _____

FIELD AUDIT CHECKLIST

DAS; 5/94

USCS description guide noted as handy with operations paperwork

29. If classification was performed based on soil and rock drill cuttings, were the following observed [HNUS SOP GH-1.5, 5.5.3]:

were cuttings obtained from 5-foot intervals observed? _____
were cuttings preserved in a glass sample jar or ziploc prior to classification? _____
were any changes in color or lithology recorded? _____
were any potential fracture zones observed? _____

30. Which method was used to obtain the soil boring samples... 140 lb. hammer/falling 30 in. (Standard Penetration Test) or 300 lb. weight/falling i8 in. [HNUS SOP GH-1.3, 5.1.2]

_____

31. If the Standard Penetration Test method was employed, were the number of blows required properly recorded? [HNUS SOP GH-1.3, 5.1.2]

_____

32. Were sample aliquots from split-spoon samplers obtained representatively? [HNUS SOP GH-1.3, 5.1.2]

_____

33. For samples acquired by thin-walled Shelby tubes, was at least an inch of soil removed from the upper and lower ends of the tube, an impervious disk inserted at both ends, a half-inch (minimum) wax seal applied, the voids at either ends filled with inert material, plastic endcaps affixed and sealed with wax in accordance with HNUS SOP GH-1.3, 5.1.3?

NA at time of audit

_____

_____

34. Where Shelby tube samples handled in accordance with the following?

up direction marked with indelible ink _____
complete sample information _____
stored vertically with same orientation as in ground _____
stored out of sun _____

Core Samples

5.2.1 USCS Classification

Soils are to be classified according to the Unified Soil Classification System (USCS). This method of classification is detailed in Exhibit 4-2. This method of classification identifies soil types on the basis of grain size and conesiveness.

Fine-grained soils, or fines, are smaller than the No. 200 sieve and are of two types: silt (M) and clay (C). Some classification systems define size ranges for these soil particles, but for field classification purposes, they are identified by their respective behaviors. Organic material (O) is a common component of soil but has no size range; it is recognized by its composition. The careful study of the USCS will aid in developing the competence and consistency necessary for the classification of soils.

Coarse grained soils shall be divided into rock fragments, sand, or gravel. The terms and sand and gravel not only refer to the size of the soil particles but also to their depositional history. To insure accuracy in description, the term rock fragments shall be used to indicate angular granular materials resulting from the breakup of rock. The sharp edges typically observed indicate little or no transport from their source area, and therefore the term provides additional information in reconstructing the depositional environment of the soils encountered. When the term "rock fragments" is used it shall be followed by a size designation such as (1/4 inchΦ-1/2 inchΦ)" or "coarse-sand size" either immediately after the entry or in the remarks column. The USCS classification would not be affected by this variation in terms.

5.2.2 Color

Soil colors shall be described utilizing a single color descriptor preceded, when necessary, by a modifier to denote variations in shade or color mixtures. A soil could therefore be referred to as "gray" or "light gray" or "blue-gray." Since color can be utilized in correlating units between sampling locations, it is important for color descriptions to be consistent from one boring to another.

Colors must be described while the sample is still moist. Soil samples shall be broken or split vertically to describe colors. Samplers tend to smear the sample surface creating color variations between the sample interior and exterior.

The term "mottled" shall be used to indicate soils irregularly marked with spots of different colors. Mottling in soils usually indicates poor aeration and lack of good drainage.

Soil Color Charts shall not be used unless specified by the project manager.

5.2.3 Relative Density and Consistency

To classify the relative density and/or consistency of a soil, the geologist is to first identify the soil type. Granular soils contain predominantly sands and gravels. They are nonconesive (particles do not adhere well when compressed). Finer grained soils (silts and clays) are cohesive (particles will adhere together when compressed).

The density of noncohesive, granular soils is classified according to standard penetration resistances obtained from split barrel sampling performed according to the methods detailed in Standard Operating Procedures GH-1.3 and SA-1.2. Those designations are:

D334901

EXHIBIT 4-2

SOIL TERMS

UNIFIED SOIL CLASSIFICATION (USCS)

COARSE GRAINED SOILS
More than half of material is LARGER than No. 200 sieve size

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 3" & basing fractions on estimated weights)			GROUP SYMBOL	TYPICAL NAMES
GRAVELS 50% (+) > 1/4" Ø	CLEAN GRAVELS (Low % fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	GW	Well graded gravels, gravel sand mixtures, little or no fines
		Predominantly one size or a range of sizes with some intermediate sizes missing	GP	Poorly graded gravels, gravel sand mixtures, little or no fines
	GRAVELS W/FINES (High % fines)	Non plastic fines (for identification procedures see ML)	GM	Silty gravels, poorly graded gravel sand silt mixtures
		Plastic fines (for identification procedures see CL)	GC	Clayey gravels, poorly graded gravel sand clay mixtures
SANDS 50% (+) < 1/4" Ø	CLEAN SANDS (Low % fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	SW	Well graded sand, gravelly sands, little or no fines
		Predominantly one size or a range of sizes with some intermediate sizes missing	SP	Poorly graded sands, gravelly sands, little or no fines
	SANDS W/FINES (High % fines)	Non plastic fines (for identification procedures see ML)	SM	Silty sands, poorly graded sand silt mixtures
		Plastic fines (for identification procedures see CL)	SC	Clayey sands, poorly graded sand clay mixtures

FINE GRAINED SOILS
More than half of material is SMALLER than No. 200 sieve size

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 3" & basing fractions on estimated weights)				GROUP SYMBOL	TYPICAL NAMES
Identification procedures on fraction smaller than No. 40 sieve size					
	DRY STRENGTH (Crushing Characteristics)	DILATANCY (Reaction to Shaking)	TOUGHNESS (Consistency near Plastic Limit)		
SILTS & CLAYS Liquid limit < 50	None to slight	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity
	Medium to high	None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	Slight to medium	Slow	Slight	OL	Organic silts and organic silt clays of low plasticity
SILTS & CLAYS Liquid limit > 50	Slight to medium	Slow to none	Slight to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	High to very high	None	High	CH	Inorganic clays of high plasticity, fat clays
	Medium to high	None to very slow	Slight to medium	OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS	Readily identified by color, odor, spongy feel and frequently by fibrous texture.			Pt	Peat and other organic soils

Boundary classifications: Soils possessing characteristics of two groups are designated by combining group symbols. For example GW-GC, well graded gravel sand mixture with clay binder.
All sieve sizes on this chart are U.S. standard.

DENSITY OF GRANULAR SOILS

DESIGNATION	STANDARD PENETRATION RESISTANCE - BLOWS/FOOT
Very loose	0-4
Loose	5-10
Medium dense	11-30
Dense	31-50
Very dense	Over 50

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNC. COMPRESSIVE STR. TONS/SQ. FT.	STANDARD PENETRATION RESISTANCE - BLOWS/FOOT	FIELD IDENTIFICATION METHODS
Very soft	Less than 0.25	0 to 2	Easily penetrated several inches by fist
Soft	0.25 to 0.50	2 to 4	Easily penetrated several inches by thumb
Medium stiff	0.50 to 1.0	4 to 8	Can be penetrated several inches by thumb
Stiff	1.0 to 2.0	8 to 15	Readily indented by thumb
Very stiff	2.0 to 4.0	15 to 30	Readily indented by thumbnail
Hard	More than 4.0	Over 30	Indented with difficulty by thumbnail

ROCK TERMS

ROCK HARDNESS (FROM CORE SAMPLES)

DESCRIPTIVE TERMS	SCREWDRIVER OR KNIFE EFFECTS	HAMMER EFFECTS
Soft	Easily gouged	Crushes when pressed with hammer
Medium soft	Can be gouged	Breaks (one blow) Crumbly edges
Medium hard	Can be scratched	Breaks (one blow) Sharp edges
Hard	Cannot be scratched	Breaks conchoidally (several blows) Sharp edges

ROCK BROKENNESS

DESCRIPTIVE TERMS	ABBREVIATION	SPACING
Very broken	(V. Br.)	0 - 2"
Broken	(Br.)	2" - 1'
Blocky	(Bl.)	1' - 3'
Massive	(M.)	3' - 10'

LEGEND

SOIL SAMPLES - TYPES

S - 2" O.D. Split Barrel Sample
ST - 3" O.D. Undisturbed Sample
O - Other Samples, Specify in Remarks

ROCK SAMPLES - TYPES

X - NX (Conventional) Core (~2 1/8" O.D.)
Q - NQ (Wireline) Core (~1 7/8" O.D.)
Z - Other Core Sizes, Specify in Remarks

WATER LEVELS

12/18
▽ 12.6' Initial Level w/Date & Depth

12/18
▼ 12.6' Stabilized Level w/Date & Depth

Designation	Standard Penetration Resistance (Blows per Foot)
Very loose	0 to 4
Loose	5 to 10
Medium dense	11 to 30
Dense	31 to 50
Very dense	Over 50

Standard penetration resistance is the number of blows required to drive a split-barrel sampler with a 2-inch outside diameter 12 inches into the material using a 140 pound hammer falling freely through 30 inches. The sampler is driven through an 18-inch sample interval, and the number of blows is recorded for each 6-inch increment. The density designation of granular soils is obtained by adding the number of blows required to penetrate the last 12 inches of each sample interval. It is important to note that if gravel or rock fragments are broken by the sampler or if rock fragments are lodged in the tip, the resulting blow count will be erroneously high, reflecting a higher density than actually exists. This shall be noted on the log and referenced to the sample number. Granular soils are given the USCS classifications GW, GP, GM, SW, SP, SM, GC, and SC (see Exhibit 4-2).

The consistency of cohesive soils is determined by performing field tests and identifying the consistency as shown in Exhibit 4-3. Cohesive soils are given the USCS classifications ML, MH, CL, CH, OL, or OH (see Exhibit 4-2).

The consistency of cohesive soils is determined either by blow counts, a pocket penetrometer (values listed in the table as Unconfined Compressive Strength) or by hand by determining the resistance to penetration by the thumb. The pocket penetrometer and thumb determination methods are conducted on a selected sample of the soil, preferably the lowest 0.5 foot of the sample in the split-barrel sampler. The sample shall be broken in half and the thumb or penetrometer pushed into the end of the sample to determine the consistency. Do not determine consistency by attempting to penetrate a rock fragment. If the sample is decomposed rock, it is classified as a soft decomposed rock rather than a hard soil. Consistency shall not be determined solely by blow counts. One of the other methods shall be used in conjunction with it. The designations used to describe the consistency of cohesive soils are as follows:

Consistency	Unc. Compressive Str. Tons/Square Foot	Standard Penetration Resistance (Blows per Foot)	Field Identification Methods
Very soft	Less than 0.25	0 to 2	Easily penetrated several inches by fist
Soft	0.25 to 0.50	2 to 4	Easily penetrated several inches by thumb
Medium stiff	0.50 to 1.0	4 to 8	Can be penetrated several inches by thumb
Very stiff	1.0 to 2.0	8 to 15	Readily indented by thumb
Hard	2.0 to 4.0	15 to 30	Readily indented by thumbnail
Hard	More than 4.0	Over 30	Indented with difficulty by thumbnail

5.2.4 Weight Percentages

In nature, soils are comprised of particles of varying size and shape, and are combinations of the various grain types. The following terms are useful in the description of soil:

Terms of Identifying Proportion of the Component	Defining Range of Percentages by Weight
trace	0 - 10 percent
some	11 - 30 percent
and or adjective form of the soil type (e.g., "sandy")	31 - 50 percent

Examples:

- Silty fine sand: 50 to 69 percent fine sand, 31 to 50 percent silt.
- Medium to coarse sand, some silt: 70 to 80 percent medium to coarse sand, 11 to 30 percent silt.
- Fine sandy silt, trace clay: 50 to 68 percent silt, 31 to 49 percent fine sand, 1 to 10 percent clay.
- Clayey silt, some coarse sand: 70 to 89 percent clayey silt, 11 to 30 percent coarse sand.

5.2.5 Moisture

Moisture content is estimated in the field according to four categories: dry, moist, wet, and saturated. In dry soil, there appears to be little or no water. Saturated samples obviously have all the water they can hold. Moist and wet classifications are somewhat subjective and often are determined by the individual's judgment. A suggested parameter for this would be calling a soil wet if rolling it in the hand or on a porous surface liberates water, i.e., dirties or muddies the surface. Whatever method is adopted for describing moisture, it is important that the method used by an individual remains consistent throughout an entire drilling job.

Laboratory tests for water content shall be performed if the natural water content is important.

5.2.6 Stratification

Stratification can only be determined after the sample barrel is opened. The stratification or bedding thickness for soil and rock is depending on grain size and composition. The classification to be used for stratification description is shown in Exhibit 4-4.

5.2.7 Texture/Fabric/Bedding

The texture/fabric/bedding of the soil shall be described. Texture is described as the relative angularity of the particles: rounded, subrounded, subangular, and angular. Fabric shall be noted as to whether the particles are flat or bulky and whether there is a particular relation between particles (i.e., all the flat particles are parallel or there is some cementation). The bedding or structure shall also be noted (e.g., stratified, lensed, nonstratified, heterogeneous varved).

- The following information shall be entered under the Remarks Column and shall include, but is not limited by the following:
  - Moisture - estimate moisture content using the following terms - dry, moist, wet and saturated. These terms are determined by the individual. Whatever method is used to determine moisture, be consistent throughout the log.
  - Angularity - describe angularity of coarse grained particles using Angular, Subangular, Subrounded, Rounded. Refer to ASTM D 2488 or Earth Manual for criteria for these terms.
  - Particle shape - flat, elongated, or flat and elongated.
  - Maximum particle size or dimension.
  - Water level observations.
  - Reaction with HCl - none, weak or strong.

0334901

- Additional comments:
  - Indicate presence of mica, caving of hole, when water was encountered, difficulty in drilling, loss or gain of water.
  - Indicate odor and HNu or OVA reading if applicable.
  - Indicate any change in lithology by drawing in line through the lithology change column and indicate the depth. This will help later on when cross-sections are constructed.
  - At the bottom of the page indicate type of rig, drilling method, hammer size and drop and any other useful information (i.e., borehole size, casing set, changes in drilling method).
  - Vertical lines shall be drawn (as shown in Exhibit 4.6) in columns 5 to 8 from the bottom of each sample to the top of the next sample to indicate consistency of material from sample to sample, if the material is consistent. Horizontal lines shall be drawn if there is a change in lithology, then vertical lines drawn to that point.
  - Indicate screened interval of well, as needed, in the lithology column. Show top and bottom of screen. Other details of well construction are provided on the well construction forms.

FIELD AUDIT CHECKLIST

DAS; 5/94

Soil Sampling

35. For surface soil samples obtained by hand auger or scoop or trowel, were the following observed per HNUS SOP GH-1.3, 5.2?

area cleared of loose debris prior to sampling Yes
location marked with numbered stake or pinflag Yes
sketch approximate locations of sample points in site notebook Yes

Brass pin flags also shown on equipment list

Soil Sampling

36. If applicable, describe the method used for composite sampling and indicate if the procedure meets quality standards. [HNUS SOP GH-1.3, 5.2]

N/A

37. If applicable, describe the method used for waste pile sampling and indicate if the quality standards outlined in HNUS SOP GH-1.3, 5.3 are met.

N/A

38. If test pitting is being performed, are plan and profile sketches included in the site notebook? [HNUS SOP SA-1.3, 5.1.1]

N/A

39. When test pitting, did the backhoe operator immediately cease digging if any of the following conditions occurred: encounter of any fluid or seepage; encounter of any drums,

potential waste containers, obstructions, or utility lines; encounter of distinct changes of material. [HNUS SOP SA-1.3, 5.1.3]

N/A

40. Describe how samples were obtained (e.g., from pit via entry, from backhoe bucket, composited in buckets) and indicate if quality standards of HNUS SOP SA-1.3, 5.1.3 were met.

N/A

41. Do the site notebook entries for test pitting operations include the following information per HNUS SOP SA-1.3, 5.2?

N/A

name; work assignment, location of job
date of digging or trenching
surface elevation
depth, surface area, orientation of pit
associated sample numbers
method of sample acquisition
type and size of samples
approximate water levels after stabilization (if below water table)
location and depth of any seeps encountered
description of soil
other pertinent info. (OVA readings, weather conditions)
list of photographs
contractor name, backhoe operatore, sampler
date and type of backfill

Groundwater Sampling

42. Were all monitoring wells properly developed, purged and recovered prior to sampling? [HNUS SOP SA-1.1]

N/A at time of audit

43. Were the precepts for well preparation prior to sampling wells that cannot be evacuated to dryness observed? [HNUS SOP SA-1.1, 5.1]

---

44. When applicable, were well volumes properly calculated per HNUS SOP SA-1.1, 5.3?

---

45. If a peristaltic pump was used to obtain Voltaile Organic Compound (VOC) samples, was it verified that no degassing "bubbles" occurred? [HNUS SOP SA-1.1, 5.5.2]

Groundwater Sampling

N/A at time of audit

46. If acquired by a pump, was the pump lowered to midscreen (middle of open section of uncased wells) for sample acquisition? [HNUS SOP SA-1.1, 5.5.2]

---

47. If sampled via bailers, were only bailers equipped with check balls used? [HNUS SOP SA-1.1, 5.5.2]

---

48. For samples acquired by packer assembly, was the packer positioned just above the screen (or open section for uncased wells), prior to inflating? [HNUS SOP SA-1.1, 5.5.2]

Surface Water and Sediment Sampling

49. In accordance with HNUS SOP SA 1-2, 5.3.1, surface water samples taken from different depths or cross-sectional locations may be compositied. However, samples collected

along the length of the water course or a different times shall not be composited. If composited surface water samples were obtained, was the above rule observed?

50. Per HNUS SOP SA 1-2, 5.3.1; it is preferable to sample larger streams (and rivers) by compositing a sample from (1) just below the surface, (2) at mid-depth, (3) just above the bottom. If applicable, was this practice observed?

51. HNUS SOP SA 1-2, 5.3.1 states that it is preferable to obtain surface water samples from a stream area that is well mixed. If applicable, was this rule observed?

52. For larger streams and river surface watersamples, were DO, pH, temperature, and conductivity recorded for each aliquot as well as the whole composite per HNUS SOP SA-1.2, 5.3.1?

N/A at time of audit

53. If applicable, were lakes, ponds, impoundments, and reservoirs sampled using the vertical composite strategy listed in audit question No. 50 above? [HNUS SOP SA-1.2, 5.3.2]

Were DO, pH, temperature, and conductivity recorded for each aliquot as well as the whole composite? [HNUS SOP SA-1.2, 5.3.2]

Surface Water and Sediment Sampling

54. If applicable, did estuary sampling endeavors include the following:

samples obtained during slack tide _____
vertical salinity measurements (1-5' increments) _____
vertical dissolved oxygen profile _____
vertical temperature profile _____

[HNUS SOP SA-1.2, 5.3.3]

55. At minimum, specific conductance and temperature is to be recorded for each surface water obtained. Did any violation of this practice occur? [HNUS SOP SA-1.2, 5.3.4.0]

_____

_____

56. HNUS SOP SA-1.2, 5.3.5 states that "Even though the containers used to obtain the samples are previously laboratory cleaned, it is suggested that the sample container be rinsed at least once with the water to be sampled before the sample is taken." If applicable, was this practice observed?

N/A at time of audit

_____

_____

57. HNUS SOP SA-1.2, 5.3.5 states that "For sampling running water, it is suggested that the farthest downstream sample be obtained first and that subsequent samples be taken as one works upstream." Furthermore, the SOP states that work should be directed from "zones suspected of low contamination to zones of high contamination". If applicable, where these practices observed?

_____

_____

58. Sampling at the surface should never be performed unless specifically sampling for a known constituent which is immiscible and on top of the water. Sample containers should be inverted, lowered to the approximate sample depth, then

FIELD AUDIT CHECKLIST

DAS; 5/94

positioned at an approximate 45-degree angle with the mouth of the bottle facing upstream in order to acquire the sample. If applicable, per HNUS SOP SA-1.2, 5.3.5, was this technique observed?

Sediment Sampling

(Scoop samplers, Peterson dredges, Eckman dredges, and Ponar dredges are discussed in Section 5.4.2 of HNUS SOP SA-1.2. However, discussion on sample transfer and equipment decontamination is lacking. Consequently, no auditable criteria for these tasks exist at the present time.)

Calibration of Field Monitoring Equipment

59. Were the following calibration criteria observed per HNUS SOP ME-11: *

No records generated yet

calibration according to manufacturer's instructions
calibration only by qualified individuals
calibrated and operationally checked prior to project assignment
use of certified/tracesble standards
calibration documented
if applicable, maintenance documented

60. For Photoionization Detectors (PIDs), is the proper ev lamp (e.g., 9.5, 10.2, 11.7) installed? [HNUS SOP ME-01, 5.2]

Yes

61. Because PIDs will not respond to methane or hydrogen cyanide, confirm that the instrument is not being used for this purpose, or for the detection of combustible gases or oxygen deficiency. [HNUS SOP ME-01, 5.4, 5.6]

Yes

* dedicated calibration sheets were found in the paperwork file. Sheets were available for all MTE 21 except the Horiba (QN-1)

Debriefing discussion - Horiba self cals; this conduct recorded in field notebook

FIELD AUDIT CHECKLIST

DAS; 5/94

Calibration of Field Monitoring Equipment

62. Confirm that Start-up and Shut-down procedures (Attachment A), routine calibration (Attachment G), for use of the PID are conducted as stipulated. [HNUS SOP ME-01]

Not observable at time of audit.

63. If applicable, ensure that PID UV light source window cleaning is conducted per Attachment D of HNUS SOP ME-01.

N/A

64. If applicable, ensure that PID ionization chamber cleaning is conducted per Attachment E of HNUS SOP ME-01.

N/A

65. Is the PID unit recharged after every use? [HNUS SOP ME-01, Attachment B]

Not observable at time of audit.

(An immediate up-date of this Field Audit Checklist is needed to incorporate the following field instrumentation: OVA meter, pH/temperature meter, conductivity meter, turbidity meter.)

Equipment Decontamination Procedures

66. Has an adequate pre-determined area for steam-cleaning of equipment been established? [HNUS SOP GH-1.6, 5.0]

N/A at time of audit

67. Is the decontamination (decon) area lined and/or bermed? [HNUS SOP GH-1.6, 5.0]

established by drilling day of audit

ATTACHMENT A

START-UP AND SHUTDOWN PROCEDURES

Start-up

1. Attach the probe to the readout unit. Match the alignment key, then twist the connector clockwise until a distinct locking is felt.

2. Turn the FUNCTION switch to the battery check position. Check to ensure that the indicator reads within or beyond the green battery arc on the scale plate. If the indicator is below the green arc, or if the red LED comes on, the battery must be charged prior to using.

3. To zero the instrument, turn the FUNCTION switch to the STANDBY position and rotate the ZERO POTENTIOMETER until the meter reads zero. Wait 15-20 seconds to ensure that the zero adjustment is stable. If not, then readjust.

4. Check to see that the SPAN POTENTIOMETER is set at the appropriate setting for the probe being used. Follow procedures in Attachment G in the performance of daily calibrations.

5. Set the FUNCTION switch to the desired ppm range.

6. Listen for the fan operation to verify fan function.

7. Check instrument with an organic point source (such as a magic marker) prior to usage to verify instrument function.

Shut Down

1. Turn FUNCTION switch to OFF.

2. Place the instrument on the charger.

ATTACHMENT G

DAILY CALIBRATION OF HNU PI-101

HNU PI-101 organic vapor meters are to be field calibrated at the beginning of each work day, prior to actual on site usage.

In order to accomplish this, HNUs assigned to jobs shall be accompanied with a calibration gas cylinder, an appropriate fitting, and a flexible connecting hose. The procedure for performing field calibration is as follows:

1. Connect the probe to the instrument and turn it on.
2. Attach the eight-inch extension to the probe.
3. Set the Span Potentiometer to the setting specified on the calibration cylinder.
4. Connect the cylinder fitting to the cylinder.
5. Connect the cylinder and the instrument together with the flexible tubing.
6. Open the cylinder valve and wait 15 seconds.
7. Instrument reading should coincide with the designed reading stated on the calibration cylinder label.
8. If item number 7 does not coincide, adjust the Span Potentiometer until the desired reading is achieved. Any such adjustments must be within the following limits:

Probe	Initial Span Pot. Setting	Maximum Acceptable Span Pot. Adjustment
9.5 eV	5.0	1.0
10.2 eV	9.8	8.5
11.7 eV	5.0	2.0

If these limits are exceeded, the sensitivity and accuracy of the instrument is hindered. At these points, the instruments are to be returned to the NUS Equipment Manager for inspection, necessary cleaning and maintenance, and recalibration.

The manufacturer also recommends that the lamp inside of the probe be checked twice per week (16 hours of use) and cleaned at least weekly. This involves removing any noticeable obstructions or contamination from the lamp by wiping it off with a clean, soft cloth being careful not to scratch the circular window.

ATTACHMENT G
DAILY CALIBRATION OF HNU PI-101
PAGE TWO

In using this instrument to protect NUS employees and subcontractors, it is imperative that it is accurately responding to airborne substances present at the work site. By implementing these procedures, this end will be better achieved.

Additionally, all calibration activities must be documented in field log books, instrument calibration log sheets, or equivalent. This information must include the date inspected, the person calibrating the instrument, the instrument serial or identification number, the probe lamp eV (9.5 , 10.2, or 11.7), identification of calibration gas (gas source stated on the cylinder label), the initial and final Span Potentiometer settings, and the instrument resultant reading. This information must be submitted to the Site Safety officer at the completion of the job.

ATTACHMENT D

CLEANING THE UV LIGHT SOURCE WINDOW

1. Turn the FUNCTION switch to the OFF position and disconnect the sensor/probe from the Read Out/Control unit.

2. Remove the exhaust screw located near the base of the probe. Grasp the end cap in one hand and the probe shell in the other. Separate the end cap and lamp housing from the shell.

3. Loosen the screws on the top of the end cap and separate the end cap and ion chamber from the lamp housing, taking care that the lamp does not fall out of this housing.

4. Tilt the lamp housing with one hand over the opening, so that the lamp slides out of the housing into your hand.

5. The lamp window may now be cleaned with any of the following compounds using lens paper:

   a. HNU Cleaning Compound-All lamps except the 11.7 eV
   b. Carbon tetrachloride-All lamps except the 11.7 eV
   c. Methanol-All lamps

6. Following cleaning, reassemble by first sliding the lamp back into the lamp housing. Place the ion chamber on top of the housing, making sure the contacts are properly aligned.

7. Place the end cap on top of the ion chamber and replace the two screws. Tighten the screws only enough to seal the O-ring. Do Not Overtighten.

8. Line up the pins on the base of the lamp housing with pins inside the probe shell and slide the housing assembly into the shell. It will only fit one way.

ATTACHMENT E

CLEANING THE IONIZATION CHAMBER

1. Turn the FUNCTION switch to the OFF position and disconnect the sensor/probe from the Read Out/Control unit.

2. Remove the exhaust screw located near the base of the probe. Grasp the end cap in one hand and the probe shell in the other. Separate the end cap and lamp housing from the shell.

3. Loosen the screws on the top of the end cap and separate the end cap and ion chamber from the lamp housing, taking care that the lamp does not fall out of this housing.

4. The ion chamber may now be cleaned according to the following sequence:

   a. acetone rinse with agitation (10 min.), then dry (preferably with oven at 100°C).

   b. methanol rinse with agitation (10 min.), then dry (preferably with oven at 100°C).

5. Place the ion chamber on top of the housing, making sure the contacts are properly aligned.

7. Place the end cap on top of the ion chamber and replace the two screws. Tighten the screws only enough to seal the O-ring. Do Not Overtighten.

8. Line up the pins on the base of the lamp housing with pins inside the probe shell and slide the housing assembly into the shell. It will only fit one way.

FIELD AUDIT CHECKLIST

DAS; 5/94

Equipment Decontamination Procedures

68. Are all the required types of equipment decontaminated by steam-cleaning (e.g., transport vehicles, drill rigs, backhoes, downhole tools, augers, well casings, screens)? [HNUS SOP GH-1.6, 5.0]

Not observable at time of audit.

69. Was steam-cleaning of the required equipment conducted:

prior to commencement of field activities? Yes (per question of driller)

between boring/pit locations?

at the end of field activities? ~~Not observable at time of audit~~

70. The sequence of solvents used is contingent upon the target analytes of concern (and Health & Safety considerations). Is the decon sequence outlined in the project planning documents (or HNUS SOP SF-2.3, by default) being strictly observed?

Solvent sequence Sect. 3.1.8.2 of WP.; appropriate solvents on-site

71. Ensure that the following factors have been taken into consideration [HNUS SOP SF-2.3]:

a 10% Nitric acid rinse used when metals being sampled for; *not applicable for stainless steel sampling equipment* Yes

isopropanol can be substituted instead of the acetone/methanol sequence (accepted current practice) N/A

a hexane rinse must be employed when sampling for PCBs, pesticides, or fuels N/A

72. Verify that only high purity solvents are used for decon. (accepted practice)

Yes

FIELD AUDIT CHECKLIST

DAS; 5/94

Equipment Decontamination Procedures

73. Verify that all sampling equipment, not subject to steam-cleaning (e.g., trowels, mixing bowls, bailers, etc.) are subjected to decontamination per the sequence outlined in the project planning documents (or HNUS SOP SF-2.3, by default).

Yes. Since drilling not yet on site. Decon waste stored in tub; will be transferred to drums.

74. Have all water level indicators been decontaminated via (1) potable water rinse, (2) deionized water rinse, (3) acetone/methanol (or by substitution, isopropanol for both), (4) deionized water rinse per HNUS SOP SF-2.3, 5.2.1?

Yes — in warehouse; not yet used on-site

Waste Handling Procedures

75. Were cuttings or fluids disposed of in accordance with project planning documents (i.e., discharged to ground, drummed, or tanked)?

Not observable at time of audit.

76. Do the project planning documents provide for the disposal of Personal Protective Equipment (PPE) by double-bagging and discard?

Yes

By what method are PPE disposed of?

None

FIELD AUDIT CHECKLIST

DAS; 5/94

Waste Handling Procedures

77. If applicable, were spill-containment materials containerized or otherwise acceptably disposed of? [HNUS SOP SF-2.3, 5.2.4]

N/A

Sample Handling

78. Are 60 ml speptum-seal VOA vials being used for volatile organic soil samples? [CLEAN policy]

Appropriate bottleware observed on-site

79. Are samples being iced upon aquisition? [CLEAN policy]

Not observable at time of audit

80. Are samples being shipped within 24-hours of collection? [NEESA Guidelines]

Not observable at time of audit

81. Are the appropriate containers provided by the laboratory being used for each fractional type of sample? [HNUS SOP SF-1.2, 5.1]

(11)

82. Has the laboratory provided Trip Blanks? [CLEAN policy]

"Yes" - will confirm when materials coolers opened

FIELD AUDIT CHECKLIST

DAS; 5/94

Sample Handling

83. Has the laboratory provided Ambient Temperature blanks? [NEESA policy]

CH2

84. Has a Trip Blank been submitted with each cooler of VOC samples? [NEESA guidelines]

Not observable at time of audit

85. Has the Ambient Temperature blank been handled properly and one submitted with each cooler of samples? [NEESA policy]

CH2

86. Have equipment rinsate blanks of the proper type and frequency been obtained? [WP, FSAP, QAPP]

Not observable at time of audit

87. For CLEAN, has the correct type of rinsate blank obtained every other day been marked "hold" on the chain-of-custody report? [NEESA guidelines]

(11)

88. Have Field Blanks been obtained from each water source applicable to the field effort? [NEESA guidelines]

(11)

FIELD AUDIT CHECKLIST

DAS; 5/94

Sample Handling

89. Have the rinsate blanks been designated for the same analyses as the associated samples? [NEESA guidelines]

90. With the exception of certain NEESA level C and all geotechnical analyses, have the Field Blanks been designated for all analyses applicable to the project? [NEESA guidelines]

91. Have all samples been properly preserved in accordance with the project planning documents? [WP, FSAP, QAPP]

Not observable at time of audit

92. When applicable (i.e., when field filtering of sample aliquots for dissolved analyses is conducted), has a non-metallic 0.45 micron filter been used? [HNUS SOP SF-1.3, 5.2.5]

93. When applicable, has the filtration equipment been properly rinsed and used in accordance with HNUS SOP SF-1.3, 5.2.5?

94. When applicable (i.e., when field filtering of sample aliquots for dissolved analyses has occurred), have filtered rinsate blanks been obtained? [HNUS policy]

FIELD AUDIT CHECKLIST

DAS; 5/94

Sample Handling

95. If applicable, have the hazardous sample packaging and shipping procedures outlined in HNUS SOP SA-6.2 been observed?

N/A

96. Has sample custody been maintained with regard to the following criteria [HNUS SOP SA-6.1, 3.0]:

A sample is under an individual's custody if -

- it is in the individual's actual possession
- it is in the individual's view after
- it was locked up to prevent tampering
- it was placed in a designated and identified secure area

(The sample remains in the individual's custody until it is entrusted to a laboratory courier or commercial express carrier.)

Not observable at time of audit

Documentation

97. Are all sample logs complete (i.e., containing all information stipulated in HNUS SOP SA-1.1)?

98. Have chain-of-custody (COC) forms been filled out for all samples, including field quality control samples and samples designated for on-site analysis? [HNUS SOP SA-6.1, 2.0]

Not enforceable for Yeny. Kat use

FIELD AUDIT CHECKLIST

DAS; 5/94

Documentation

99. Have the COC forms been signed by the appropriate individual at each step that the samples are relinquished? [HNUS SOP SA-6.1, 5.3.2]

100. Have the COC forms been filled-out using black waterproof ink? [HNUS SOP SA-6.1, 5.3.2]

101. If the COC form was corrected, was a line drawn through the information and was the change dated and initialed? (Use of white-out or erasure is not permitted.) [HNUS SOP SA-6.1, 5.3.2]

102. Have the appropriate analyses (per the project planning documents) been properly designated for each sample on the chain-of-custody form? [HNUS SOP SA-6.1]

Not observable at time of audit

103. Have all sample labels been filled out appropriately and completely? [HNUS SOP SA-6.1, 5.2.1]

104. Have all sample labels been filled out using indelible ink? [HNUS SOP SA-6.1, 5.3.1]

FIELD AUDIT CHECKLIST

DAS; 5/94

Documentation

105. Have the samples been identified according to the scheme depicted in the project planning documents? [WP, QAPP]

Not observable at time of audit.

106. Do the sample identifications agree between the sample log, field notebook, sample label and chain-of-custody form? [HNUS SOP SA-6.1, 5.3.1]

(Y)

107. Per HNUS SOP SA-6.1, 5.3.1, have the name of the photographer, date, time, site location and site description been entered sequentially into the site logbook as documentative photographs of the sampling been taken?

N/A

108. Where samples have been split with a private party or government agency, have Receipt of Samples forms been filled-out and signed in accordance with HNUS SOP SA-6.1, 5.3.3?

109. Per HNUS SOP SA-6.3, has the following information (at minimum) been recorded in the site logbook:

- arrival/departure of site visitors
- arrival/departure of equipment
- sample pickup, COC form nos., carrier company, time
- sampling activities/sample logsheet nos.
- start/completion of boreholes, trenches, monitoring wells
- health & safety issues

Yes

FIELD AUDIT CHECKLIST

DAS; 5/94

Documentation

110. Per HNUS SOP SA-6.3, is the site logbook a bound notebook with consecutively numbered pages that cannot be easily removed?

Yes

111. Per HNUS SOP SA-6.3, 5.1, does the covver of the site logbook contain the following information?

project name — Yes
project number
contractor (or Teaming firm) name
sequential book number
start date
end date

112. Per HNUS SOP SA-6.3, 5.1, has the following information been recorded at the beginning of each day?

date — Yes
start time
weather conditions
all field personnel present
any visitors present

113. Do the site logbook entries summarize the daily activities and refer to other site notebooks or logsheets where applicable? [HNUS SOP SA-6.3, 5.1]

Yes

114. Have all site logbook entries been made in black indelible ink? [HNUS SOP SA-6.3, 5.1]

Yes

Documentation

115. If the logbook entry was corrected, was a line drawn through the information and was the change dated and initialed? (Use of white-out or erasure is not permitted.)
[HNUS SOP SA-6.3, 5.1]

N/A

116. Per HNUS SOP SA-6.3, 5.1, has the individual making the logbook entry signed it?

Yes

117. Has the Field Operations Leader signed all logbook pages utilized that day at the end of each day?
[HNUS SOP SA-6.3, 5.1]

Yes

118. If applicable, have photographic entries been made in accordance with Section 5.2 of HNUS SOP SA-6.3? (reference checklist question no. 107)

N/A

Auditable Activities Not Addressed by the Current Field Audit Checklist

- wipe sampling [HNUS SOP *Draft*]
- air sampling [HNUS SOP SA-2.2]
- drum sampling [HNUS SOP SA-5.1, SF-2.1]
- radiation sampling [HNUS SOP SA-3.3, 3.4, 3.6]
- lagoon sampling [HNUS SOP SA-5.2]
- tank sampling [HNUS SOP SA-5.3]
- biological/ecological sampling [HNUS SOP SA-4.1, 4.2, 4.3]
- dioxin sampling [HNUS SOP SA-1.4]

- groundwater monitoring point installation [HNUS SOP GH-1.7]
- evaluating existing monitoring wells [HNUS SOP GH-1.2]
- monitoring well installation [HNUS SOP GH-1.7]
- monitoring well development [HNUS SOP GH-1.7]
- water-level measurements [HNUS SOP GH-2.5]
- contour mapping [HNUS SOP GH-2.5]
- geophysical surveys [HNUS SOP GH-3.1, 3.2, 3.3, 3.4, 3.5]
- excavation exploratory test pits & trenches [HNUS SOP GH 1.8]
- rock drilling and coring [HNUS-SOP GH-1.4]

- geologic cross sections [HNUS SOP GH-2.1]
- Packer test [HNUS SOP GH-2.2]
- aquifer pump tests [HNUS SOP GH-2.3]
- in-situ hydraulic conductivity testing [HNUS SOP GH-2.4]
- vertical & horizontal groundwater movement [HNUS SOP GH-2.6]
- measurement stream channel X-section & flow [HNUS SOP GH-2.7]
- resistivity and electromagnetic induction [HNUS SOP GH-3.1]

use of:

- LEL indicator
- oxygen meter [HNUS SOP ME-04]
- combustible gas indicator [HNUS SOP ME-05]
- detector tubes [HNUS SOP ME-06]
- air sampling pumps {HNUS SOP ME-07]
- thermoluminescent dosimeter [HNUS SOP ME-08]
- radiation survey meters {HNUS SOP ME-09]

field screening analyses:

- organic (gas chromatographic) [HNUS SOP *Draft*]
- inorganic (atomic absorption) [HNUS SOP *Draft*]
- inorganic (x-ray fluorescence) [HNUS SOP *Draft*]
- on-site water quality testing [HNUS SOP SF-1.1]
- on-site haz. materials compatibility testing [HNUS SOP SF-1.4]