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Quality Assurance Field Audit Report

for

Remedial Investigation Naval Surface Warfare Center

Naval Weapons Station Earle
Colts Neck, New Jersey

Northern Division
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0231

January 1997

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QUALITY ASSURANCE FIELD AUDIT REPORT
FOR
REMEDIAL INVESTIGATION
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Northern Division
Environmental Branch Code 18
Naval Facilities Engineering Command
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Lester, Pennsylvania 19113-2090

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CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0231

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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, field audits and 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. 0231 Remedial Investigation was conducted at Naval Weapons Station Earle, Colts Neck, New Jersey. J. David Yesso, Ph.D., (Brown & Root Environmental; Pittsburgh, Pennsylvania), CLEAN Quality Assurance Manager (QAM), performed the audit on October 16, 1996.

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

- CLEAN QCMP, attached QA-SOGs, and referenced requirements
- CTO 0231 Project Planning Documents
- Naval Facilities Engineering Services Center (NFESC) guidelines:

  Navy Installation Restoration Laboratory Quality Assurance Guide, NFESC, February 1996.

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 96-02F.

1.2 PERSONNEL

The Field Operations Leader, Mr. Paul Davis, (Brown & Root Environmental, Wayne, PA office), participated in the audit. A pre-audit meeting and post-audit briefing were held on-site. The Project Manager, Mr. Russ Turner (Brown & Root Environmental, Wayne, PA), was subsequently briefed by the FOL and received a follow-up telephone call from the auditor.

1.3 SCOPE

The nature of the field activities varies with the type of project. 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. Consequently, actual site tasks performed may not encompass all possible environmental field activities. Furthermore, it is not generally possible to observe all field tasks that will be conducted over the length of the field activity during a 1- or 2-day audit.

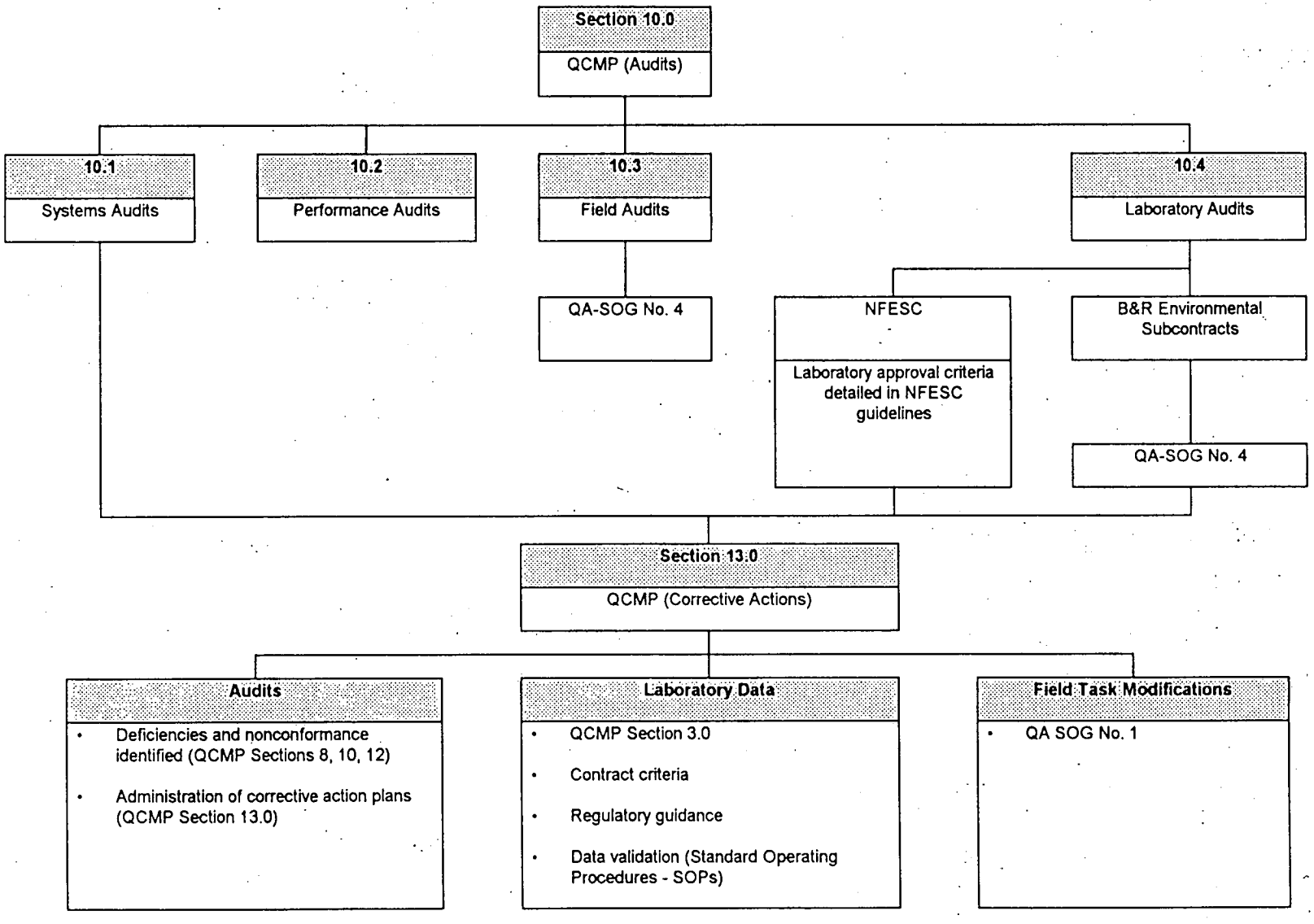
With regard to the field audit of CTO 0231, field documentation was reviewed and cone penetrometer testing was observed.

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 field audit of CTO 0231 conducted on October 16, 1996 are contained in Appendix A.

2.2 AUDIT REPORTS

In accordance with QCMP Section 10.3, a formal audit report is prepared by the auditor and 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

Two (2) Quality Notices of concern were issued to address potential problems.

3.1 Quality Notice QN-5803-1

Overall, the FOL is doing a good job of maintaining the field logbook, carefully recording pertinent information concerning field activities. However, there are some practices that could weaken the ability to readily track the documentation of the work effort. This quality notice is placed in the category of a concern rather than in the more serious category of a deficiency because the most important information is being consistently recorded and the log book is generally well maintained. The most serious problem concerns the failure to label the cover of the book with the information required by SOP SA-6.3. The failure to do so could lead to difficulty in locating the notebook at some future time because of incorrect filing. Another issue is that the FOL did not clearly identify the workers present on site on October 16, 1996. The workers were identified as the work crew of the subcontractor working on-site that day, but not by their names. This hinders the ability to verify the qualifications of personnel working on the project.

The project manager should take care to impress upon field personnel the importance of field notebooks and maintaining them in accordance with requirements.

3.2 Quality Notice 5803-QN-2

The second concern relates to the documentation of sample custody transfers to the on-site mobile lab. For the sampling being conducted during the period of the audit, samples were being analyzed at an on-site mobile laboratory. Samples were being hand carried to the laboratory by the FOL or the laboratory analyst. Samples were typically delivered one or two at a time. The FOL was recording the appropriate information on a chain-of-custody (COC) form but was not requiring the analyst to acknowledge the custody transfer for each sample. The information for all samples transferred during the day was recorded on a single COC form and the analyst signed the form at the end of the day as if all samples collected during the day had been transferred at one time. The FOL believed that because so few samples were transferred at one time and the lab was on-site, it would save time and be simpler if only one COC were completed for all transfers in a day. While it would be time consuming to complete a COC for transfers of single samples, the FOL's approach failed to satisfy the requirement to track and document sample custody and transfers.

The auditor and the FOL agreed that it would be acceptable to complete only one COC for all samples transferred to the on-site mobile lab in a day with the provision that each custody transfer was recorded and acknowledged individually. This would be done by having the lab analyst signing the custody form adjacent to the individual sample information.

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 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

BROWN & ROOT ENVIRONMENTAL — QUALITY NOTICE

DIVISION AUDITED:	AUDIT NO.:	QN NO.:
Brown + Root Environmental NDIV CLEAN	96-2F	5803-QN-1

PROJECT/PROGRAM: RI - NWS Earle - NORTHDIV CLEAN

RESPONSE ASSIGNED TO:	DUE DATE:	REPORTED BY:	DATE:
R. Turner	2/15/97	D. Yesso	10/16/96

QN CATEGORY: ☐ DEFICIENCY ☒ OBSERVATION CONCERN

ACTIVITY: Field Logbooks

PROCEDURE/PROGRAM/DOCUMENT REFERENCE: B&RE SOP SA-6.3, Section 5.1.1

REQUIREMENT:
Section 5.1.1 of SOP SA-6.3 defines requirements for labeling the front cover of the field notebook and minimum information that must be entered.

CONDITION OBSERVED:
Field Logbook is not being maintained in conformance to requirements. Specific issues include:
a.) Some pages were partially blank with no indication that entries on that page were completed
b.) The FOL's logbook did not have the required information on the cover
c.) For 10/16/96, the logbook did not have a list of all personnel on site

TO BE COMPLETED BY AUDITED ORGANIZATION

CONDITION OBSERVED:

RESPONSE SUBMITTED BY:	DATE:

n:\data\bbre946\files\forms\quality.doc

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:

BROWN & ROOT ENVIRONMENTAL — QUALITY NOTICE

DIVISION AUDITED:	AUDIT NO.:	QN NO.:
Brown + Root Environmental NDIV CLEAN	96-2F	5803-QN-2

PROJECT/PROGRAM: RI - NWS Earle - NORTHDIV CLEAN

RESPONSE ASSIGNED TO:	DUE DATE:	REPORTED BY:	DATE:
R. Turner	2/15/97	D. Yessu	10/16/96

QN CATEGORY: ☐ DEFICIENCY ☒ OBSERVATION CONCERN

ACTIVITY: Sample Custody Transfer

PROCEDURE/PROGRAM/DOCUMENT REFERENCE: CTO-231 QAPP and FSP

REQUIREMENT:
Chain-of-Custody (COC) forms are to be used to document all transfers of sample custody, including transfers to mobile, on-site labs. Each transfer must be acknowledged by the receiving individual who must sign the form.

CONDITION OBSERVED:
The FOL was not documenting custody transfers by completing COCs for each sample transferred to the mobile lab. Instead, sample information was recorded on a COC and this was signed at the end of the day as if all samples were transferred at one time.

TO BE COMPLETED BY AUDITED ORGANIZATION

CONDITION OBSERVED:

RESPONSE SUBMITTED BY:	DATE:

n:\data\bbre946\files\forms\quality.doc

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 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.

   None

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]

   NA

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

   NA

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

   NA

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

   NA - Sampling Activities not initiated

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]

   NA

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

   NA

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

   NA

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]

    Not required

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

    Not required.

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

    Yes

FIELD AUDIT CHECKLIST

DAS; 5/94

Health & Safety Procedures

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

Yes

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

NA - no field ops trailer

Boring Samples

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

yes - CPT activity only during audit period

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]

Yes - originally ~~planned~~ attempted to use cone sieves; these were unsuccessful, so bailers were used. This conforms to WP.

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.

No

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? NA

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?

None

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.)

NA

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

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

[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]

Yes, bentonite for all holes <25 ft; grouting for >25 ft.

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) NA
dry method (undisturbed samples above water table)
[HNUS SOP GH-1.4, 5.4] No casings were used

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?

No lubricants used.

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.)

NA - CPT provides lithology chart; no other logging is possible

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

description of materials NA
description of samples
sampling method
blow counts
final location for drilling NA
[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)? NA

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 NA
texture/fabric/bedding

FIELD AUDIT CHECKLIST

DAS; 5/94

NA

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?

    _____
    _____

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 _____

NA

NA

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 cohesiveness.

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 noncohesive (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:

NA

D334901

<12>

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% or more larger than No. 4 sieve size	CLEAN GRAVELS (Little or no 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 WITH FINES (Appreciable amount of 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% or more smaller than No. 4 sieve size	CLEAN SANDS (Little or no 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 WITH FINES (Appreciable amount of 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					
SILTS & CLAYS Liquid limit < 50	DRY STRENGTH (Crushing characteristics)	DILATANCY (Reaction to shaking)	TOUGHNESS (Consistency near Plastic Limit)		
	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
U - 3" O.D. Undisturbed Sample
O Other Samples, Specify in Remarks

ROCK SAMPLES - TYPES

A NX (Conventional Core (~1 1/4" O.D.))
B BQ (Wireline) Core (~1 3/4" O.D.)
Z Other Core Sizes, Specify in Remarks

WATER LEVELS

12-16
9.0' Immediately on Completion of Drilling
12-18
9.0' Stabilized Level - Clayey Silt

EXHIBIT 4-2

Subject	Number	Page
BOREHOLE AND SAMPLE LOGGING	GH-1.5	16 of 26
Revision 2	Effective Date 05/04/90	

NA

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

NA

NA

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).

NA

NA

- 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.

D334901

- 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.

NA

FIELD AUDIT CHECKLIST

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NA – no soil sampling during audit

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 NA
    location marked with numbered stake or pinflag _____
    sketch approximate locations of sample points in site notebook NA

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]

    _____

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.

    _____

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]

    _____

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,

NA

NA

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

_____

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.

_____
_____
_____
_____

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

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 _____

NA

Groundwater Sampling

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

Only screening samples collected at this time, purging not required per W.P. + EPA agreement

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]

NA

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

NA

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]

NA

Groundwater Sampling

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]

NA - no pumps used

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

Yes

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]

NA

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

NA - NO SW or sediment sampling

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?

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]

NA

FIELD AUDIT CHECKLIST

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NA - No sw & sediment sampling

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?

_____

_____

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

NA

NA

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

NA

(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:

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

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]

used appropriately

FIELD AUDIT CHECKLIST

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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]

Could not observe during

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

No cleaning during audits

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

NA

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

yes

(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]

Not needed; CPT truck has an integral steam cleaning system

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

NA

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

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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]

Yes

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

prior to commencement of field activities? Y
between boring/pit locations? Y
at the end of field activities? Y

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?

NA

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* NA

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

a hexane rinse must be employed when sampling for PCBs, pesticides, or fueld NA

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

DI water used; no other solvents

FIELD AUDIT CHECKLIST

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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).

O.K. - Disposable bailers - steam cleaned and rinsed w/ DI water before use

74. Have all water level indicators been contaminated 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?

NA. no water-level indicators used.

Waste Handling Procedures

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

NA - None generated

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

~~yes~~ NA for work in progress during audit

By what method are PPE disposed of?

NA

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]

NA

Sample Handling

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

NA - No soils collected during audit period

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

yes

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

yes

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

yes

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

yes

FIELD AUDIT CHECKLIST

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Sample Handling

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

yes

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

yes

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

yes

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

yes

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]

NA - only one day of sampling prior to and during audit

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

yes

FIELD AUDIT CHECKLIST

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Sample Handling

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

yes

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]

yes

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

yes

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]

NA

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

NA

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

NA

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?

NA

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.)

yes

Documentation

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

yes

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]

No - for on-site analysis; FOL was holding COC until end of day rather than completing for each sample transfer

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]

Not for on-site, see item 98 above.

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

yes, except as described in 98.

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]

NA

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]

yes

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

yes

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

yes

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

yes

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]

yes

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?

N/A

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

The names of all site were not recorded for day of audit

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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 cover of the site logbook contain the following information? No information was on book cover

project name
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	yes
weather conditions	yes
all field personnel present	no - see 109
any visitors present	yes

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

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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]

yes

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]

NA notebook used signed by FOL.

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)

NA