Metcalf & Eddy

September 13, 1993

Ms. Barbara Driscoll
U.S. EPA, Region 6 (6H-PN)
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

0424
General

Re: TES X Work Assigment R06031 - Los Alamos National Laboratory Quality Assurance Project Plan (which includes the Field Sampling Plan) and Health and Safety Plan

Dear Ms. Driscoll:

Please find enclosed one copy of the Quality Assurance Project Plan (QAPjP) and Health and Safety Plan (HSP) for the above referenced Work Assignment. The (QAPjP) presents the quality assurance requirements applicable to the technical enforcement support provided by the TES X Contractor to the U.S. EPA for the Los Alamos National Laboratory in Los Alamos, New Mexico.

The HSP, based on site-specific information provided to the TES X Contractor, presents the measures to be taken to ensure the protection of Metcalf & Eddy personnel or our subcontractor. The HSP addresses all applicable regulatory requirements.

If you have any questions regarding these submittals, please feel free to contact me at your earliest convenience.

Sincerely,

METCALF & EDDY, INC.

Pamela D. Jones

Pamela D. Jones
Contractor Project Manager

Enclosure

pdj

xc: Dr. Michael Dennis - QA Officer
RPMO File

\R031cov.ltr

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Environmental Protection Agency
Technical Enforcement Support
at Hazardous Waste Sites

TES X

Contract No. 68-W9-0007
Work Assignment No. R06031

Quality Assurance Project Plan

for

Oversight Sampling Program

at

Los Alamos National Laboratory
Los Alamos, New Mexico

Phase I RFI Oversight
(Revision 00)

U.S. EPA Region 6

Metcalf & Eddy, Inc.
Project No. 163031.0001

Work Performed by:

Metcalf & Eddy, Inc.
5600 Northwest Central Drive, Suite 102
Houston, Texas 77092

September 13, 1993

QUALITY ASSURANCE PROJECT PLAN
FOR
OVERSIGHT SAMPLING PROGRAM
AT

LOS ALAMOS NATIONAL LABORATORY
Los Alamos, New Mexico

September 13, 1993

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Steven D. Sanders
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Metcalf & Eddy, Inc. (M&E)

Purpose and Scope

The purpose of this Quality Assurance Project Plan (QAPjP) is to document the quality assurance requirements applicable to the technical enforcement support provided by the Technical Enforcement Support (TES) X Contractor and its subcontractors to the U.S. Environmental Protection Agency (EPA) for the Los Alamos National Laboratory (LANL) site Resource Conservation and Recovery Act (RCRA) facility investigation (RFI). This plan describes the requirements of the QAPjP for organizing, planning, performing, reviewing and documenting activities which affect the quality of work conducted on the LANL project by personnel and/or subcontractors of the TES X Contractor. The scope of this plan includes field sampling, analysis, and reporting.

The LANL site QAPjP as presented herein applies to all work performed by the TES X Contractor and/or its subcontractors as authorized by the EPA, whether performed at the field site or in any office, as well as the services or items provided by the TES X Contractor personnel which affect the quality of elements in the authorized work.

Distribution Control

This QAPjP and all documents that affect the referenced investigative protocol quality assurance requirements are controlled documents. The Contractor Project Manager (CPM) is responsible for control of the distribution and accountability of all documents within the TES X Contractor and its subcontractors relating to this project. He/she issues all copies and revisions of documents relating to the site QAPjP and maintains a record of distribution.

Acknowledgement of receipt of the documents, and of receipt of revisions to the documents, are recorded by the document holder signing an appropriate Receipt Acknowledgement Form and returning it to the CPM for inclusion in the project files. The Form must be signed by the person to whom the document or revision is assigned.

The holder of each controlled document has the responsibility to : 1) keep the latest revised copy; 2) destroy or appropriately mark as "SUPERSEDED" or "VOID" all old copies or revisions replaced; 3) sign and return the Receipt Acknowledgement Form to the CPM; and 4) return his copy when his need for the document no longer exists because of reassignment from the project, retirement, termination of employment, or cancellation by the CPM.

The tentative distribution list for the approved QAPjP is as follows:

1. Barbara Driscoll, EPA Region 6 Work Assignment Manager
2. Quality Assurance Officer, EPA Region 6
3. Steven D. Sanders, Metcalf & Eddy, Inc., TES X Region 6 Manager
4. Dr. Michael W. Dennis, Metcalf & Eddy, Inc., TES X Quality Assurance Officer
5. Pamela D. Jones, Metcalf & Eddy, Inc., TES X Contractor Project Manager
6. TES X Field Team, Metcalf & Eddy, Inc.

ACKNOWLEDGEMENT OF RECEIPT OF QAPjP MEMO

TO: Pamela D. Jones, Metcalf & Eddy, Inc.
TES X Contractor Project Manager, Los Alamos National Laboratory

FROM:

RE: Acknowledgement of Receipt of QAPjP for the Los Alamos National Laboratory Project

By my signature affixed below, I hereby acknowledge receipt of Revision No.__, for the subject QAPjP. I further acknowledge that previous copies of the QAPjP in my possession have either been marked "SUPERSEDED" or "VOID", or have been destroyed.

ACKNOWLEDGED BY: _____ _____
(Signature) (Date)

PLEASE RETURN THIS COMPLETED ACKNOWLEDGEMENT TO:

Pamela D. Jones
Metcalf & Eddy, Inc.
5600 Northwest Central Dr., Suite 102
Houston, Texas 77092

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1.0 PROJECT DESCRIPTION

1.1 Introduction

Under the TES X contract, Metcalf & Eddy, Inc. (M&E) has been assigned the task of providing technical and administrative support to the U.S. EPA in performing Oversight Activities. The TES X Contractor shall ensure that all RCRA Field Investigation activities are conducted in accordance with all applicable guidance documents. The University of California (U.C.) is acting as the Department of Energy's (DOE) contractor to conduct the sampling at LANL. As part of enforcement oversight, the TES X contractor, M&E, will collect oversight samples during the first phase of the RFI. Oversight samples will be used to check the sampling and analytical procedures used by DOE's contractor and laboratory. This quality assurance project plan (QAPjP) presents the procedures which will be implemented by M&E in the collection, documentation, and analysis of oversight samples and evaluation of the oversight data. The sampling techniques and collection locations of the oversight samples are described in the Field Sampling Plan prepared by M&E (Appendix A).

Oversight samples will be collected of soils from subsurface borings. Due to the potential presence of radioactive material, all of the samples will be considered radioactive in nature. These samples are required to be sent to a laboratory which can handle mixed hazardous wastes. All samples will be screened on site for the degree of radioactivity in each sample, before shipment to the laboratory. Samples collected from Technical Area 49 (TA-49), Material Disposal Area (MDA) AB, Area 2 will be sent to M&E's contracted laboratory and analyzed for RCRA metals. The samples collected from TA-54, MDA L will be analyzed for volatile and semi-volatile organic compounds, RCRA metals, pesticides and PCBs, and cyanide. A list of each of the compounds to be analyzed and the required detection limits are presented in Tables 1 through 5.

Although the oversight samples will not be analyzed through the Contract Laboratory Program (CLP), a CLP-type quality assurance/quality control (QA/QC) data package will be supplied to M&E from the laboratory.

1.2 Site Description and Background

The LANL site is 43 square miles in size and is located on a mesa and canyon landscape at Los Alamos, New Mexico. As part of Phase I of the RCRA Facility Investigation (RFI), portions of TA-49, MDA AB, Area 2 and TA-54, MDA L are to be sampled.

Technical Area-49, MDA AB was the location of hydronuclear and related experiments performed from late 1959 to mid-1961. MDA AB comprises six separate experimental areas (1,2, 2A, 2B, 3, and 4). All of these areas, except Area 3) contain significant TRU and heavy metal contamination. The hydronuclear and related experiments involved high-explosive dispersal of significant quantities of uranium-235 and plutonium-239 as well as lead, beryllium, and uranium-238 at

the bottom of the shafts. As a result, MDA AB is believed to contain about 40 kg of plutonium, 93 kg of uranium-235, 170 kg of uranium-238, 11 kg of beryllium, and perhaps 90,000 kg or more of lead. Approximately 0.20 kg of americium-241 has grown in from decay of plutonium-241. Experiments in Areas 2, 2A, 2B, and 4 were distinguished from those in Areas 1 and 3 by the use of a pulse neutron source and radiochemical sample recovery techniques. Some Area 2 experiments also used a downhole neutron source, that expended a total of a few curies of tritium, now decayed through almost three half-lives.

Technical Area-54, MDA L was historically used as a disposal site for hazardous chemicals. Land disposal stopped in 1985. It is presently used for RCRA-permitted chemical waste storage and treatment, and for mixed waste storage under interim status authority. There are 13 identified Solid Waste Management Units (SWMUs) within MDA L; however, MDA L is treated as a single SWMU Aggregate for the purpose of investigation under LANL's Environmental Restoration Program. Materials treated or stored at MDA L have included the following: solid hazardous waste; chemical waste; PCB-contaminated wastes, cylinders of containerized gases classified as mixed, hazardous, and nonhazardous wastes; barium-contaminated sand; lead stringer, steel rods filled with irradiated lead and concrete; liquid hazardous waste; waste oil; treated salt solutions, such as ammonium bifluoride and electroplating wastes; and lithium hydride.

1.3 Target Compounds

The compounds and analytes to be investigated during oversight split sampling for the RFI include RCRA Appendix IX volatile and semivolatile compounds, RCRA metals, pesticides/PCBs, and cyanide.

Required detection limits for the oversight sample analysis are listed in Tables 1 through 5.

Table 1

Method Detection Limits for RCRA Metals

Parameter	Method[a]	Estimated Detection Limit (µg/kg)
Arsenic	7060	500
Barium	6010	1000
Cadmium	6010	250
Chromium	6010	500
Lead	7421	150
Mercury	7471	10
Selenium	7740	250
Silver	6010	500

Note:

[a] EPA SW-846 Methods for inorganic analysis

Table 2

Quantitation Limits for RCRA Appendix IX Volatile Compounds by Method 8240 Gas Chromatography/Mass Spectrometry [a,b]

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-Level Soil (µg/kg)
Acetone	100	100
Acetonitrile	100	100
Acrolein	100	100
Acrylonitrile	100	100
Benzene	5	5
Bromodichloromethane	5	5
Bromoform	5	5
Bromomethane	10	10
Carbon Disulfide	100	100
Carbon Tetrachloride	5	5
Chlorobenzene	5	5
2-Chloro-1,3-Butadiene	100	100
Chloroethane	10	10
Chlorodibromomethane	5	5
Chloroform	5	5
Chloromethane	10	10
3-Chloropropene	40	40
1,2-Dibromo-3-Chloropropane	100	100
Dibromomethane	5	5
trans-1,4-Dichloro-2-butene	100	100
Dichlorodifluoromethane	5	5
Dibromoethane	20	20

Table 2 (cont'd)

Quantitation Limits for Volatile Compounds

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-Level Soil (µg/kg)
1,1-Dichloroethane	5	5
1,2-Dichloroethane	5	5
trans-1,2-Dichoroethene	5	5
1,1-Dichloroethylene	10	10
Dichloromethane	10	10
1,2-Dichloropropane	5	5
cis-1,3-Dichloropropene	5	5
trans-1,3-Dichloropropene	5	5
1,4 Dioxane	10	10
Ethyl benzene	5	5
Ethyl methacrylate	5	5
2-Hexanone	10	10
Iodomethane	10	10
Isobutyl alcohol	100	100
Methacrylonitrile	100	100
Methyl Ethyl Keytone	10	10
Methyl methacrylate	5	50
4-Methyl-2-pentanone	50	50
Styrene	5	5
1,1,1,2-Tetrachloroethane	5	5
1,1,2,2,-Tetrachloroethane	5	5
Tetrachloroethene	5	5

Table 2 (cont'd)

Quantitation Limits for Volatile Compounds

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-level Soil (µg/kg)
Toluene	5	5
1,1,1-Trichloroethane	5	5
1,1,2-Trichloroethane	5	5
Trichloroethene	5	5
Trichorofluoromethane	10	10
1,2,3-Trichloropropane	5	5
Vinyl Acetate	50	50
Vinyl Chloride	10	10
Xylene	5	5

Notes:

[a] EPA SW-846 Methods for organic analysis

[b] Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

Table 3

Quantitation Limits for RCRA Appendix IX Semi-Volatile Compounds by Method 8270 Gas Chromatography/Mass Spectrometry Capillary Column Technique[a,b]

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-Level Soil (µg/kg)
Acenaphthene	10	660
Acenaphthylene	10	660
Acetophenone	10	1300
2-Acetylaminofluroene	20	1300
4-Aminobiphenyl	20	1300
Aniline	10	1300
Anthracene	10	660
Aramite	20	1300
Benzo[a]anthracene	10	660
Benzo[b]fluoranthene	10	660
Benzo[k]fluoranthene	10	660
Benzo[ghi]perylene	10	660
Benzo[a]pyrene	10	660
Benzyl alcohol	20	1300
Bis(2-chloroethoxy)methane	10	660
Bis(2-chloroethyl)ether	10	660
Bis(2-chloroisopropyl)ether	10	660
Bis(2-ethylhexyl)phthalate	10	660
4-Bromophenyl phenyl ether	10	660
Butyl Benzyl phthalate	10	660
2-sec-Butyl-4,6-dinitrophenol	100	1300
p-Chloroaniline	20	1300

Table 3 (cont'd)

Quantitation Limits for Semi-Volatile Compounds

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-Level Soil (µg/kg)
Chlorobenzilate	10	1300
p-Chloro-m-cresole	10	1300
2-Chloronaphthalene	10	660
2-Chlorophenol	10	660
4-Chlorophenyl phenyl ether	10	660
Chrysene	10	660
o,m,p,-Cresol	10	1300
Diallate	10	1300
Dibenzofuran	10	660
Di-n-butyl phthalate	10	1300
Dibenz[a,h]anthracene	10	1300
o-Dichlorobenzene	10	660
m-Dichlorobenzene	10	660
p-Dichlorobenzene	10	660
3,3-Dichlorobenzidine	20	1300
2,4-Dichlorophenol	10	660
2,6-Dichlorophenol	10	660
Diethyl phthalate	10	660
Dimethoate	20	1300
p-(dimethylamino)azobenzene	10	1300
7,12-Dimethylbenz[a]anthracene	10	1300
3,3-Dimethyl benzidine	10	1300

Table 3 (cont'd)

Quantitation Limits for Semi-Volatile Compounds

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-Level Soil (µg/kg)
α,α-Dimethylphenethylamine	20	1300
2,4-Dimethylphenol	10	660
Dimethyl phthalate	10	660
m-Dinitrobenzene	20	1300
4,6-Dinitro-o-cresol	20	1300
2,4-Dinitrophenol	50	3300
2,4-Dinitrotoluene	10	660
2,6-Dinitrotoluene	10	660
Di-n-octyl phthalate	10	660
Diphenylamine	10	3300
Di-n-propylnitrosamine	20	3300
Ethylmethanesulfonate	20	1300
Fluoranthene	10	660
Fluorene	10	660
Hexachlorobenzene	10	660
Hexachlorobutadiene	10	660
Hexachlorocyclopentadiene	10	660
Indeno(1,2,3-cd)pyrene	10	660
Isophorone	10	660
Isosafrole	10	1300
Methapyrilene	100	3300

Table 3 (cont'd)

Quantitation Limits for Semi-Volatile Compounds

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-Level Soil (µg/kg)
3-Methylcholanthrene	10	1300
Methyl methanesulfonate	10	1300
2-Methylanphthalene	10	660
Naphthalene	10	660
1,4-Naphthoquinone	10	1300
1-Naphthylamine	10	1300
2-Naphthylamine	10	1300
o-Nitroaniline	50	3300
m-Nitroaniline	50	3300
p-Nitroaniline	10	3300
Nitrobenzene	10	660
o-Nitrophenol	50	3300
p-Nitrophenol	50	3300
4-Nitroquinoline-1-oxide	40	3300
N-Nitrosodi-n-butylamine	10	660
N-Nitrosodiethylamine	20	660
N-Nitrododimethylamine	10	660
N-Nitrosodiphenylamine	10	660
N-Nitrosomethylethylamine	10	660
N-Nitrosomorpholine	10	660
N-Nitrosopiperidine	50	1300
N-Nitrosopyrrolidine	40	1300

Table 3 (cont'd)

Quantitation Limits for Semi-Volatile Compounds

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-Level Soil (µg/kg)
5-Nitro-o-toluidine	10	1300
Pentachlorobenzene	10	1300
Pentachloroethane	10	1300
Pentachloronitrobenzene	20	1300
Pentachlorophenol	50	3300
Phenacetin	20	3300
Phenanthrene	10	660
Phenol	10	660
p-Phenylenediamine	10	660
2-Picoline	20	1300
Pronamide	10	660
Pyrene	10	660
Pyridine	10	660
Safrole	10	660
1,2,4,5-Tetrachlorobenzene	10	660
2,3,4,6-Tetrachlorophenol	10	660
o-Toluidine	10	660
1,2,4-Trichlorobenzene	10	660
2,4,5-Trichlorophenol	10	660
2,4,6-Trichlorophenol	10	660
0,0,0-Triethyl-Phosphorothioate	10	660
Sym-Trinitrobenzene	10	660

Table 3 (cont'd)

Quantitation Limits for Semi-Volatile Compounds

Parameter	Practical Quantitation Limits	
	Water(µg/l)	Low-level Soil (µg/kg)

Notes:

[a] EPA SW-846 Methods for organic analysis

[b] Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

Table 4

Quantitation Limits for the Target Compound List of Organochloride Pesticides and PCBs by Method 8080[a]

Compound	Quantitation Limit[b] for Soil (ug/kg)
alpha-BHC	1.7
beta-BHC	1.7
delta-BHC	1.7
gamma-BHC (Lindane)	1.7
Heptachlor	1.7
Aldrin	1.7
Heptachlor epoxide	1.7
Endosulfan I	1.7
Dieldrin	3.3
4,4'-DDE	3.3
Endrin	3.3
Endosulfan II	3.3
4,4'-DDD	3.3
Endosulfan sulfate	3.3
4,4'-DDT	3.3
Methoxychlor	17.0
Endrin ketone	3.3
Endrin aldehyde	3.3
alpha-Chlordane	1.7
gamma-Chlordane	1.7
Toxaphene	170.0
Aroclor-1016	33.0
Aroclor-1221	67.0
Aroclor-1232	33.0
Aroclor-1242	33.0

Table 4 (cont'd)

Quantitation Limits for the Target Compound List

Compound	Quantitation Limit[b] for Soil (ug/kg)
Aroclor-1248	33.0
Aroclor-1254	33.0
Aroclor-1260	33.0

Notes:

[a] EPA SW-846, Methods for Organic analyses

[b] Sample quantitation limits are highly matrix-dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

Table 5

Method Detection Limits for Cyanide by Method 9010 [2]

Parameter	Quantitation Limit for Soil (mg/kg)
Cyanide	5.0

Notes:

[2] EPA SW-846 Method for Total Cyanide Analysis

1.4 Project Objectives

1.4.1 Specific Objectives

As part of the enforcement oversight support activities, the TES X Contractor, M&E, as directed by the U.S. EPA, will split at a minimum approximately 25 percent of samples collected from two 150-foot boreholes scheduled for completion at TA-49, MDA AB, Area 2 and approximately 50 percent of samples collected from two 300-foot boreholes scheduled for completion at TA-54, MDA L. Oversight sampling will serve as an external quality assurance check on the sampling and analytical procedures used by LANL's laboratory. The QAPjP presents the procedures which will be implemented by the TES X Contractor, M&E, in the collection, documentation, and analysis of the oversight samples and the evaluation of the oversight data. The sampling techniques and collection locations of the oversight samples are described in the Field Sampling Plan prepared by M&E (Appendix A).

1.4.2 Data Utilization

Data derived from oversight sampling will be used to determine the reliability of data obtained from LANL contractor's sampling and analyses activities. Determination of the criteria by which the data will be evaluated will be the responsibility of U.S. EPA, Region 6.

1.4.3 Data Quality Objectives

The data quality objectives are to obtain oversight data of sufficient accuracy and precision that they will be useful in achieving the specific objectives and the intended data usages described above. Level IV analytical support data quality objectives will be attained. Quantitative data quality objectives are specified in section 3.0 of the QAPjP.

1.5 Sample Network and Rationale

The sampling locations, determined by the U.S. EPA, are identical to the locations that LANL's contractor will sample so the comparisons of data can be made. Refer to Table 3 in Appendix A for samples matrices, parameters, and frequency of collection.

1.6 Project Schedule

A tentative field schedule, obtained from LANL personnel, is presented in Figure 1. Metcalf & Eddy will collect oversight samples during this phase of the RFI. Information obtained from these samples will serve to support the overall RFI activities.

Figure 1

Scheduled Phase I RFI Activities*

Beginning Date	Sampling Location
November 1, 1993	TA-49, MDA AB, Area 2
October 11, 1993	TA-54, MDA L

* Schedule subject to change based on PRP prerogative.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The oversight sampling program at the LANL facility in Los Alamos, New Mexico, will be conducted by M&E under the TES X Contract 68-W9-0007. Figure 2 presents the essential project organization.

The M&E Contract Project Manager (CPM) will be Pamela Jones. She has overall responsibility for the project and for execution of the requirements of the Sampling Plan and QAPjP. She is responsible for the final report and its contents including an account of oversight activities, results of any audits, and a final assessment of the data.

The M&E Quality Assurance Officer will be Dr. Michael Dennis. His responsibilities include quality assurance review and approval of project reports, implementing audits, recommending and checking on execution of corrective actions.

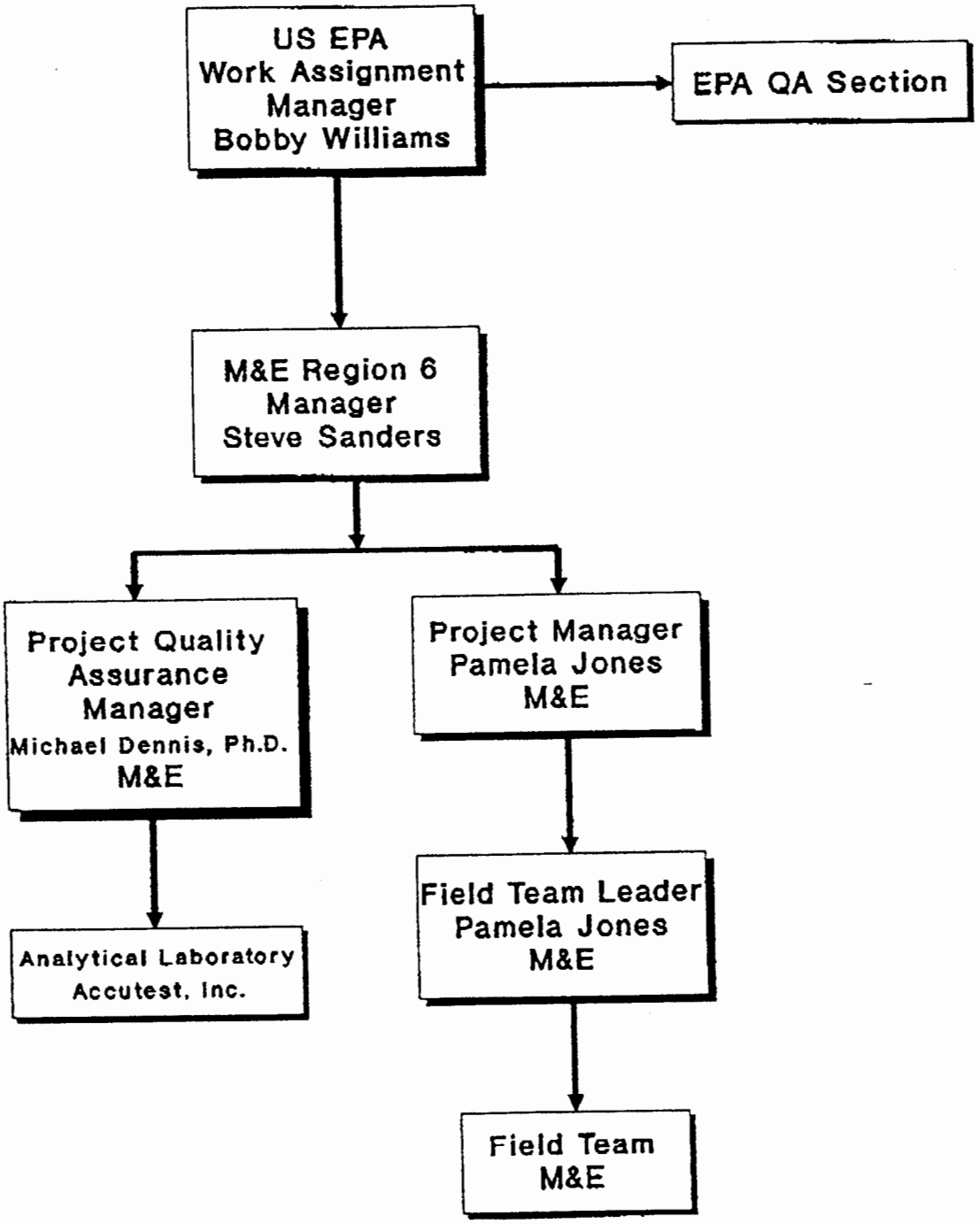
The field team leader will be Pamela Jones. She will oversee field activities, ensure that parts of the QAPjP relevant to field activities are adhered to, and coordinate sample collection and shipping activities. The field crew is expected to consist of Andrew Ellison, Wallace O'Rear and Timothy Temple.

The U.S. EPA Region 6 Work Assignment Manager (WAM) for this project is Barbara Driscoll. She has operational responsibility involving execution and direct management of the technical and administrative aspect of this project. Other responsibilities include review and approval of the QAPjP.

The U.S. EPA Region 6 Quality Assurance (QA) Officer has final responsibility for final review and approval of the QAPjP including approval of the QA program and the test procedures.

Figure 2

Los Alamos National Laboratory
Oversight Project Organization Chart



3.0 QUALITY ASSURANCE OBJECTIVES FOR ANALYTICAL DATA

The overall quality assurance objective is to ensure that the oversight data are of known and acceptable quality. They must be sufficiently precise and accurate to be used in a comparison with the data generated by DOE. This oversight sampling program will serve as an external quality assurance measure to check the sampling and analytical procedures utilized by the LANL contractor and their laboratory.

3.1 Definitions of Characteristics of Data Quality

The U.S. EPA specifies, and this project requires, that five major characteristics of data quality be addressed during development of the project-specific environmental sampling and analytical plan.

3.1.1 Accuracy

Accuracy is the degree of agreement of a measurement (or measurement average) with an accepted reference of true value. It is a measure of system bias and is usually expressed as a percentage of the true value.

3.1.2 Precision

Precision is a measure of agreement among individual measurements of the same property under similar conditions. It is expressed in terms of relative percent difference between replicates in terms of the standard deviation when three or more replicate analyses are performed.

3.1.3 Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount expected to be collected under normal correct conditions. It is usually expressed as a percentage.

3.1.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a data population, process condition, a sampling point, or an environment. Representativeness is a qualitative parameter most dependent on proper design of the sampling program. It is also dependent on proper sample collection techniques which can be evaluated through the analysis of field duplicate samples.

3.1.5 Comparability

Comparability expresses the confidence with which one data set can be compared to another. To achieve comparability in this

project, the data generated will be reported using standard concentration units (e.g., ug/l or mg/l). Analytical results will be comparable to those produced by similar laboratories using the same instrumentation and methodology. Standard Reference Materials will be used to document traceability of calibration standards and allow comparison of data among laboratories performing analyses.

Metcalf & Eddy will collect split samples from DOE's contractor. All split samples will be from identical locations and/or composites simultaneously collected by LANL contractor personnel. All attempts will be made to collect homogeneous samples; however, non-homogeneous matrices (e.g., soils) may result in different analytical results between laboratories.

3.2 Specific Data Quality Objectives for Laboratory Activities

The specific objectives for precision and accuracy for organic and inorganic analyses are stated in SW-846 and will be adhered to for this investigation.

The completeness objective for sample data for oversight samples is 100 percent for this project.

3.3 Specific Data Quality Objectives for Field Quality Control Samples

Metcalf & Eddy will not be performing any field measurements as part of this oversight effort. However, to assist in assessing whether the overall quality assurance objectives have been met, analyses of specific field quality control samples will be required. These quality control samples include field blanks and field duplicates. The frequency of each of these types of samples is shown in Table 3 of Appendix A of this QAPjP.

Field blanks will monitor contamination during all phases of sample collection, handling, storage, and analysis. They are distinct from method or laboratory blanks that do not monitor contamination introduced in the field during sample collection and handling. Trip blanks will be analyzed only for volatile organic compounds. The analytical results obtained from trip blanks serve as a baseline measurement of volatile organic contamination introduced during sample shipment and storage. Field blank and trip blank data will be judged according to the same acceptance criteria applied to method blanks. These are stated in Exhibit E of the CLP Inorganic SOW (SOW ILM02.0) and the CLP Organic SOW (SOW OLM01.0).

Field duplicate results will be used to assess the precision of the sample results. They will be used to monitor overall precision, including the reproducibility of sampling and analytical procedures, as distinct from the precision of analyses of laboratory replicates. The precision objectives for field duplicates will be the same as those for laboratory replicates as referenced in Section 3.2 above. For those organic compounds not part of the matrix spike mix used by the laboratory to spike

matrix spike/matrix spike duplicate (MS/MSD) samples, the precision objective for field duplicates will be as follows: Relative Percent Difference (RPD) = 20 percent for volatile organics and RPD = 50 percent for semivolatile organics. The RPD is defined in section 12.0 of this QAPjP.

4.0 SAMPLING PROCEDURES

All information regarding sampling procedures and documentation is contained in the Field Sampling Plan prepared by M&E (Appendix A).

5.0 SAMPLE CUSTODY

Sample custody guidelines are designed to provide documentation of sample collection, shipping and storage procedures and sample possession from collection to analysis. The chain-of-custody record will be initiated in the field by the sample collector, who will have primary responsibility for sample documentation and custody until arrival of the sample at the laboratory. A final evidence file will be kept and include a description of the file contents and specify a file custodian.

5.1 Field Specific Custody Procedures

The sample documentation and custody procedures that will be followed in the field are described below.

5.1.1 Field Procedures

(a) The field sampler is primarily responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

(b) All bottles will be labeled with sample number and locations. Each sample will be secured with chain-of-custody tape, to detect any tampering with the sample from the time of collection to analysis.

(c) Sample labels are to be completed using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because the ballpoint pen would not function in freezing weather.

(d) The contractor's site manager must review all field activities to determine whether proper custody procedures were followed during the field work and decide if additional samples are required. He or she should notify the U.S.

EPA WAM of a breach or irregularity in chain-of-custody procedures.

5.1.2 Field Logbooks/Documentation

Data collecting activities will be recorded in field logbooks. All activities will be described in as much detail as possible so that persons going to the site can reconstruct a particular situation without reliance on memory.

Field logbooks will be bound, field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

* Person to whom the logbook is assigned.

* Logbook number.

* Project name.

* Project start date.

* End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection gear used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel and the purpose of their visit will be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station, which includes compass and distance measurements, shall be recorded. The number of the photographs taken at the station, if any, will be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in the Field Sampling Plan included as Appendix A of this QAPjP. The equipment used to collect samples will be

noted, along with the time of sampling, sample description, depth at which the sample was collected, volume and number of containers. Sample identification numbers will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under samples description.

5.1.3 Transfer of Custody and Shipment Procedures

(a) Samples are accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring samples, the individuals relinquishing and receiving possession will sign, date, and note the time on the form. This form records and documents transfer of custody of samples from the sampler to another person, to a mobile laboratory, to a permanent laboratory, or to/from a secure storage area.

(b) Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for anlysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals will be covered with clear plastic tape.

(c) Whenever samples are split with a source or government agency, a separate Sample Receipt is prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the "Received by" space.

(d) All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment and a copy will be retained by the sampler for recordkeeping.

(e) If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the

custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

5.2 Laboratory Custody Procedures

Once samples are received by the analytical laboratory (Accutest), chain-of-custody procedures will follow the Accutest Quality Assurance Program Plan (QAPP), as presented in Appendix B.

5.3 Final Evidence File Custody Procedures

The contractor maintains the TES X Work Assignment file for the LANL site, which includes all RFI files along with all relevant records, reports, logs, field notebooks, photographs, subcontractor reports, and the laboratory support files in a secured, limited access area and under custody of the contractor's site manager.

6.0 CALIBRATION PROCEDURES

6.1 Laboratory Instrument Calibration Procedures

All instruments must be calibrated prior to use as a measurement device to establish the instrumental response to known reference materials. The types of laboratory analytical instruments to be used depend on the required analytical methods. Detailed documentation of calibration as well as records of routine maintenance will be kept for each instrument by the laboratory.

For all analyses, routine calibrations will be in accordance with the methods presented in the contracted laboratory's QAPP, which will be submitted under separate cover.

6.2 Field Instrument Calibration Procedures

LANL's field personnel will perform all required field measurements including radioactivity, pH, and conductivity. Radioactivity will be measured using the PHOSWICH or FIDLER meter. Calibration of the instrument will be conducted annually at a specialized facility. Calibration of the pH instrument will consist of pre-measurement and post-measurement verification using two standard reference solutions for each. Field conductivity measurements will include daily calibration of the instrument using standard solutions of known conductivity. Calibration procedures for the field equipment are provided in the LANL "Environmental Restoration Program Standard Operating Procedures" (SOP) for field activities, May 1991. Metcalf & Eddy oversight sampling personnel will document field calibration and record measurements in the field notebook.

7.0 ANALYTICAL PROCEDURES

All soil samples will be analyzed for inorganic parameters (RCRA metals). In addition, the soil samples collected from MDA L will be analyzed for semivolatile parameters (RCRA,

Appendix IX list), volatile parameters (RCRA, Appendix IX list), pesticides/PCBs, and cyanide.

Inorganic samples will be analyzed for the following RCRA metals: arsenic, barium, cadmium, lead, mercury, selenium, and silver. All analytical procedures, quality control requirements, and calibration procedures will be conducted in accordance with the CLP Inorganic SOW (SOW ILM02.0) and the contracted laboratory's QAPP. The methods to be used for the inorganic analyses are listed in Tables 1 and 2.

Samples will be analyzed for the RCRA Appendix IX list of volatiles and semivolatiles using the analytical procedures, quality control requirements, and calibration procedures given in the CLP Organic SOW (SOW OLM01.0) and the contracted laboratory's QAPP. The RCRA Appendix IX volatile and semivolatile parameters are listed in Tables 3 and 4.

Analysis of the pesticides and PCBs will be by methods listed in Table 5 and will follow QA/QC requirements stated in the CLP Organic SOW (SOW OLM01.0) and the contracted laboratory's QAPP.

Samples will be analyzed for cyanide using the analytical procedures, quality control requirements, and calibration procedures given in the CLP Inorgainc SOW (SOW ILM02.0) and the contracted laboratory's QAPP. The method to be used and the quantitation limit are listed in Table 6.

8.0 DATA REDUCTION, VALIDATION AND REPORTING

8.1 Data Reduction

Data reduction consists of the procedures required to transform the raw data obtained from the analytical instrument to the final concentration units of the parameters of concern. Data reduction is the responsibility of the laboratory analyst. The complexity of the data reduction depends on the analytical method and the number of discrete operations (extraction or digestion, dilutions) involved in obtaining a sample that can be analyzed. The calculations involved in reducing the raw data to the final reporting units may be performed manually by the analyst or the analytical instrument may include data processing capabilities that permit direct acquisition and processing of raw data by computer. A record should be maintained of all calculations, whether performed manually or automatically, that are used to obtain the analytical results in their final reporting units.

No field measurements will be made by the oversight personnel. Therefore, no data reduction of field measurements will be required.

8.2 Data Validation

Data validation is a final review of the quality and validity of the analytical data and consists of a review of the results of quality control sample analyses (method blanks, matrix spikes, laboratory replicates, laboratory control samples, surrogate standard spikes), instrument calibration performance, calculations as well as a check of chain-of-custody records, adherence to required holding times, proper

samples preservation, and the use of correct sample containers. The data validator makes a judgement about the usability of the data based on the findings of the data quality assessment.

Data validation for the analyses of these oversight samples will be the responsibility of M&E personnel. Analytical data will be validated in accordance with the following U.S.EPA guidance documents.

* Laboratory Data Validation, Functional Guidelines for Evaluating Organic Analyses, February, 1988.

* Laboratory Data Validation, Functional Guidelines for Evaluating Inorganic Analyses, July, 1988.

8.3 Data Reporting

Analytical data will be reported by the laboratory using the CLP forms as specified in the CLP Inorganics SOW (SOW ILM02.1) and the CLP Organics SOW (SOW OLM01.0). The deliverable package will also include supporting documentation (e.g., chain-of-custody forms and chromatograms) as specified in those documents.

No field measurements will be made by the oversight personnel. Reporting of field data by the oversight personnel will consist of reporting the field measurements made by the owner/operator field personnel. The final measurements will be reported along with an account of the calibration procedures followed for pH and conductivity meters.

9.0 INTERNAL QUALITY CONTROL

9.1 Laboratory Quality Control Analyses

Laboratory quality control procedures will include the analysis of several types of quality control samples. Method or preparation blanks will monitor contamination during all phases of the analytical procedures. Laboratory replicates will monitor precision of the analytical procedures. Accuracy will be assessed through the analysis of external reference standards and of matrix-spiked samples. Analysis of matrix-spiked samples will also monitor the effect of specific sample matrices on the recovery of the analyte of interest.

The laboratory will adhere to specific internal quality control measures dictated by the analytical methods cited in the contracted laboratory's QAPP.

9.2 Field Quality Control Analyses

Field quality control procedures will include the collection of quality control samples. Field duplicates will monitor precision of sample collection in addition to laboratory analytical procedures. Field blanks will monitor contamination during

all phases of sample collection, handling, storage, and analysis. Trip blanks will monitor volatiles contamination during sample shipping and storage. The data quality objectives for analyses of these samples are stated in Section 3.0 of QAPjP.

All field measurements will be performed by LANL's contractor. Specific internal quality control checks applicable to these measurements (i.e., duplicate readings or use of check standards) are described in the LANL "Environmental Restoration Program Standard Operating Procedures" (SOP) for field activities, May 1991.

10.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits may be conducted to verify adherence to the procedures specified in this QAPjP. Audits may cover both field and laboratory activities.

10.1 Field Audits

Internal audits of field activities may be implemented by the oversight contractor. An audit may be implemented by the QA Manager or the TES X Regional Manager. It would involve an on site visit and include a thorough review of all oversight field activities including sample collection and handling procedures and documentation of field activities. Not more than one field audit will be scheduled for this oversight project.

External audits of field activities may be conducted by the U.S. EPA Region 6 representative to review operation of the oversight field program and resulting documentation.

10.2 Laboratory Audits

The oversight contractor does not choose or make arrangements with the laboratory for conducting internal audits of the laboratory performing the analysis of the oversight samples.

Metcalf & Eddy reserves the right to perform one external systems audit of the laboratory performing analysis of these oversight samples. Duplicate and field blank samples collected during field activities also serve as an audit of the laboratory's procedures and ability to reproduce analytical results.

11.0 PREVENTIVE MAINTENANCE

11.1 Laboratory Equipment Maintenance

Laboratory equipment will be maintained according to manufacturer's specifications and in such a way that the quality control requirements of the CLP will be met for all analyses performed. Requirements are given in the CLP RAS Inorganic SOW (SOW ILM02.0) and the CLP RAS Organic SOW (SOW OLM01.0).

11.2 Field Equipment Maintenance

Field equipment will be maintained by LANL contractor personnel as specified in the LANL "Environmental Restoration Program Standard Operating Procedures" (SOP) for field activities, May 1991.

12.0 DATA ASSESSMENT PROCEDURES

All analytical data will be evaluated for precision, accuracy and completeness by M&E personnel. The acceptability of the analytical precision and accuracy will be determined by comparing them to the control limits recommended in the Accutest QAPP and in SW-846. The required precision, accuracy, and completeness limits are also referenced in Section 3.0 of this QAPjP. Data determined to be insufficiently precise or accurate will be subject to the corrective action prescribed by the Accutest QAPP and in SW-846. The quality control samples used in the determination of precision and accuracy have been described in Section 9.0. Specific equations used to calculate precision, accuracy and completeness are presented below.

Precision will be expressed in terms of relative percent difference (RPD).

$$RPD = \frac{\text{Concentration (1) - Concentration (2)}}{\text{(Concentration (1) + Concentration (2))/2}} \times 100$$

Accuracy as determined from the analysis of an external reference standard will be expressed as percent recovery (%R).

$$\%R = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Accuracy as determined from the analysis of a spiked sample will also be expressed as percent recovery.

$$\%R = \frac{\text{Spiked Sample Concentration - Sample Concentration}}{\text{Concentration of Spike Added}} \times 100$$

Completeness will describe the number of usable analytical results as a percentage of the total number of samples submitted for analysis.

$$\%\ \text{Complete} = \frac{\text{Number of usable results}}{\text{Number of samples submitted}} \times 100$$

13.0 CORRECTIVE ACTIONS

13.1 Field Activities

Corrective action must be taken any time a situation develops that threatens data quality. Corrective action may be required if field or laboratory audits reveal unacceptable deviations from approved procedures. In this case, the auditor (Project QA Manager or TES X Project Manager) would be the initiator of the corrective action.

Corrective action may also be required when unforeseen field problems of an accidental nature occur (e.g., sample breakage). In such cases, the person detecting the problems is responsible for initiating the corrective action. This person might be any person involved in the project from a field team member to the Project Manager.

Required corrective action may vary from the routine (e.g., recollecting a sample following container breakage) to the extreme. Routine corrective actions should be noted in field logs and the field team leaders should be informed. A final QA report will contain a record of these corrective actions, but the QA Manager and Project Manager need not grant approval before such routine corrective actions are taken.

Corrective actions initiated in response to serious errors or problems or on discovery of deviations from accepted procedures will also be fully described in the field log book. The Project Manager and QA Manager will be consulted and will determine the appropriate corrective action after discussing the problem with the project's EPA WAM. A written report of the occurrence and corrective actions taken or recommended will be submitted to the WAM. Documentation of problems and resulting corrective actions will include:

* Identification of person or persons identifying the problem or procedural deviation;
* Description of the problem or procedural deviation;
* Description of the corrective action proposed/taken;
* Schedule for completing the corrective action.

It will be the responsibility of the QA Manager and Project Manager to verify that a recommended corrective action has been completed and that the results are satisfactory. If the corrective action has not produced satisfactory results, it will be their responsibility to discuss the situation with the WAM; they must determine alternate corrective actions that may be pursued to ensure that data usable for the WAM purposes can be obtained in spite of problems encountered.

13.2 Laboratory Activities

Corrective action may be required if laboratory audits reveal unacceptable deviations from approved CLP procedures. The responsibility for audits of the laboratory is discussed in Section 10 of this QAPjP.

Corrective action may also be required when unforeseen laboratory problems occur (e.g., accidents or breakdowns). It may be required any time duplicate or spiked sample analyses exceed the quality control limits or when blank analyses indicate unacceptable levels of contamination. Corrective action may include resampling and reanalysis of a few samples or the cessation of all analyses with subsequent reanalysis of all samples upon resolution of the problem. Specific analytical corrective actions are described in the Accutest QAPP and in SW-846 and will be adhered to by the laboratory.

A quality control problem that cannot be solved by immediate corrective action must be thoroughly investigated to determine the extent of the problem and to ensure that all samples affected by the problem are identified and reanalyzed. It is the responsibility of the laboratory manager and/or QA Officer to notify the Metcalf & Eddy Quality Assurance Officer concerning any problems requiring major corrective actions such as resampling or actions such as unexpected repeat analyses that may delay delivery of analytical results.

14.0 QUALITY ASSURANCE REPORTS

Metcalf & Eddy personnel will be responsible for validating the analytical data and will prepare a QA report. The usefulness of the data for its intended purpose will be assessed based on the data validation summary. Results of performance and system audits will be reported along with any corrective action taken or proposed.

The QA report will be submitted with a field sampling report to the U.S. EPA WAM. This report will specify any problems identified during sample collection, packing, shipping, and any other pertinent information regarding the sampling event.

REFERENCES

Los Alamos National Laboratory, May 1991. "Environmental Restoration Program Standard Operating Procedures," Vols. I, II, and III, Los Alamos, New Mexico.

U.S. Department of Energy, 1983. "EML Procedures Manual," HASL-300, 26th edition, Environmental Measurements Laboratory, Washington, D.C.

U.S. Environmental Protection Agency, December 1987. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, proposed update package for third edition, Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency, "Statement of Work for Organics Analysis", Document Number OLM01.0, including revisions OLM01.1 (December 1990), OLM01.2 (January 1991), OLM01.3 (February 1991), OLM01.4 (March 1991), OLM01.5 (April 1991), OLM01.6 (June 1991), OLM01.7 (July 1991), and OLM01.8 (August 1991).

U.S. Environmental Protection Agency, "Statement of Work for Inorganics Analysis", Document Number ILM02.0, including revision ILM02.1 (September 1991).

APPENDIX A

Field Sampling Plan

for

Oversight Sampling Program

at

Los Alamos National Laboratory
Los Alamos, New Mexico

Environmental Protection Agency
Technical Enforcement Support
at Hazardous Waste Sites

TES X

Contract No. 68-29-0007
Work Assignment No. R06031

Field Sampling Plan

for

Oversight Sampling Program

at

Los Alamos National Laboratory
Los Alamos, New Mexico

Phase I RFI Oversight
(Revision 00)

U.S.EPA Region 6

Metcalf & Eddy, Inc.
Project No. 163031.0001

Work Performed by:

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September 13, 1993

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1.0 INTRODUCTION

This Field Sampling Plan (FSP) has been prepared to establish the proper documentation and sample collection and handling procedures for obtaining environmental samples at the Los Alamos National Laboratory (LANL) site in Los Alamos, New Mexico. These sampling activities are being conducted as a part of a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) as mandated under the Hazardous and Solid Waste Amendments Module of the LANL RCRA Part B permit (U.S. EPA, 1990). The U.S. EPA's Work Assignment Manager (WAM) has requested that the Technical Enforcement Support (TES X) Contractor, Metcalf & Eddy (M&E), collect oversight split environmental samples during the Phase I of the RFI.

Oversight samples will be collected of soils, sediment, and surface water. Due to the suspected presence of low levels of radionuclides within these materials, all samples will be considered radioactive in nature. As a result, the oversight samples will not be analyzed through the Contract Laboratory Program (CLP), but will be sent to a laboratory which can handle mixed hazardous wastes. Samples will be analyzed for inorganic constituents (RCRA metals), RCRA Appendix IX list of volatiles and semivolatiles, pesticides and PCBs, and cyanide.

The oversight samples will be used as an external quality assurance check on the sampling and analytical procedures used by DOE's contractor and their laboratory.

2.0 SITE DESCRIPTION, BACKGROUND AND HISTORY

The LANL site is 43 square miles in size and is located on a mesa and canyon landscape at Los Alamos, New Mexico. As part of Phase I of the RCRA Facility Investigation (RFI), portions of TA-49, MDA AB, Area 2 and TA-54, MDA L are to be sampled.

Technical Area-49, MDA AB was the location of hydronuclear and related experiments performed from late 1959 to mid-1961. MDA AB comprises six separate experimental areas (1,2, 2A, 2B, 3, and 4). All of these areas, except Area 3) contain significant TRU and heavy metal contamination. The hydronuclear and related experiments involved high-explosive dispersal of significant quantities of uranium-235 and plutonium-239 as well as lead, beryllium, and urnaium-238 at the bottom of the shafts. As a result, MDA AB is believed to contain about 40 kg of plutonium, 93 kg of urnaium-235, 170 kg of uranium-238, 11 kg of beryllium, and perhaps 90,000 kg or more of lead. Approximately 0.20 kg of americium-241 has grown in from decay of plutonium-241. Experiments in Areas 2, 2A, 2B, and 4 were distinguished from those in Areas 1 and 3 by the use of a pulse neutron source and radiochemical sample recovery techniques. Some Area 2 experiments also used a downhole neutron source, that expended a total of a few curies of tritium, now decayed through almost three half-lives.

Technical Area-54, MDA L was historically used as a disposal site for hazardous chemicals. Land disposal stopped in 1985. It is presently used for RCRA-permitted chemical waste storage and treatment, and for mixed waste storage under interim status authority. There are 13 identified Solid Waste Management Units (SWMUs) within MDA L; however, MDA L is treated as a single SWMU Aggregate for the purpose of investigation under LANL's Environmental Restoration Program. Materials treated or

stored at MDA L have included the following: solid hazardous waste; chemical waste; PCB-contaminated wastes, cylinders of containerized gases classified as mixed, hazardous, and nonhazardous wastes; barium-contaminated sand; lead stringer, steel rods filled with irradiated lead and concrete; liquid hazardous waste; waste oil; treated salt solutions, such as ammonium bifluoride and electroplating wastes; and lithium hydride.

3.0 SAMPLING METHODOLOGY

The sample locations and collection methodology for soil are contained in the RFI Work Plans for TA-49 and TA-54, Solid Waste Management Units Aggregate Sampling Plans, MDA AB and MDA L, respectively (May 1992). The TES X Contractor will collect all oversight samples using the following procedures:

* For soils, have LANL's contractor collect and composite each sample according to procedures described in the RFI Sampling Plan (May 1992), then have LANL's contractor place sample directly into EPA sample bottles held by TES X Contractor or LANL's contractor,
* Add preservatives, if appropriate,
* Cap sample containers,
* Label sample container with appropriate sample labels,
* Package sample container using hazard guidelines, if necessary, and
* Place sample in cooler for shipment.

3.1 Sample Frequency

The TES X Contractor will collect oversight samples during the Phase I RFI field investigation. Approximately 25 percent of samples collected from two 150-foot boreholes scheduled for completion at TA-49, MDA AB, Area 2 and approximately 50 percent of samples collected from two 300-foot boreholes scheduled for completion at TA-54, MDA L will be split by the TES X Contractor. Specific locations are described in the RFI Work Plans. The exact location of each split sample will be determined by the on-site TES X Contractor. An attempt will be make to collect split samples from both "clean" and "dirty" areas as determined by field screening methods.

3.2 Sample Handling

All samples will be collected, handled, and stored in such a way that sample integrity will be maintained. Samples will be preserved, labeled, and cooled promptly after collection. Coolers will be maintained at 4° C $\pm$ 2° C.

Volatile organics containers for soil will be completely filled and packed. Samples will be collected as grab samples and not composited.

Table 1 lists the appropriate containers, preservatives, and holding times for each analytical parameter for soil samples.

Table 1

Soil Sample Containers, Preservatives, and Holding Times
Los Alamos National Laboratory
Los Alamos, New Mexico

Parameter	Container	Preservative	Maximum Holding Time
RCRA Appendix IX Volatiles	2 @ 4 oz. wide[a] mouth glass jar	Cool to 4° C	14 days (analysis)
RCRA Appendix IX Semivolatiles	1 @ 8 oz. wide[b] mouth glass jar	Cool to 4° C	7 days (extraction) 40 days (analysis)
Pesticides/PCBs	1 @ 8 oz. wide[b] mouth glass jar	Cool to 4° C	7 days (extraction) 40 days (analysis)
RCRA Metals	1 @ 8 oz. wide[c] mouth glass jar	Cool to 4° C	28 days
Cyanide	1 @ 8 oz. wide[d] mouth glass jar	Cool to 4° C	14 days

Notes:

[a] Samples for volatiles will be collected at triple the usual volume for matrix spike/matrix spike duplicate analysis (3 @ 4 oz. wide mouth jars).

[b] Samples for semivolatiles will be collected at triple the usual volume for matrix spike duplicate analysis (3 @ 8 oz. wide mouth glass jars).

[c] Samples for metals analyses will be collected at triple the usual volume for matrix spike duplicate analysis (3 @ 8 oz. wide mouth glass jars).

3.3 Sample Packaging

The following steps will be followed when packing samples for shipment to the laboratory.

* Enclose sample containers in clear plastic bags.
* Using freezer packages or ice sealed in plastic bags, cool samples to 4° C.
* Surround contents of cooler with non-combustible absorbent packing material.
* Tape paperwork in plastic bags under cooler lid.
* Seal cooler with strapping tape and attach custody seals.

3.4 Sample Documentation

Field personnel are responsible for labeling sample labels and filling out associated paperwork in an organized and consistent manner. All sample labels will be prepared by the TES X Contractor and will include the project code, date, time, name of sample collector, sample number, sample matrix, analysis to be performed, and preservative (if applicable). Paperwork related to sampling will be obtained from the laboratory. Each sample will be assigned an unique sample number. Duplicate samples will be submitted blind to the laboratory; thus, a duplicate sample will also have a unique sample number. Annotation of the original sample and its corresponding duplicate sample number will be kept only in the field log book and in the field sampling log sheet, not on the sample labels or chain-of-custody forms. It is the responsibility of the sample collector to indicate which sample will be for matrix spike analyses so that the laboratory staff cannot spike field or trip blanks. Inorganic samples to be matrix spiked will have 'matrix spike" marked on the sample labels. Organic samples to be analyzed for matrix spike and matrix spike duplicate will have "matrix spike" and "matrix spike duplicate" marked on the labels of the appropriate sample containers. The sample numbering scheme is described as follows:

93(1) ME(2) 02(3) A(4) NN(5)

(1) Indicates federal fiscal year of the sampling report.

(2) Two character alphabetic code designating the TES X Contractor (i.e., Metcalf & Eddy).

(3) Two character numeric code unique to the sampling event. (02 indicates this is the second sampling event for M&E for FY92).

(4) One character alphabetic code designating sample as follows:

S: indicates investigative samples, including field blanks and rinsate which will be submitted blind to the laboratory,

R: indicates blank samples (i.e., trip blanks),

D: commonly used to indicate a duplicate sample; however, for this sampling event, duplicates will be submitted to the laboratory bearing the investigative sample code **S** (i.e., as blind duplicates).

(5) Two character numeric code indicating the sampling station number which is sequentially assigned.

Examples are as follows: samples from four soil sampling locations including a duplicate will be labeled 92ME02S01, 92ME02S02, 92ME02S03, 92ME02S04, 92ME02S05. Example field blank, rinsate, and trip blank(s) will be labeled 92ME02S06, 92ME02S07, and 92ME02R01. The actual sample station number may vary depending upon the sequence of sampling events.

Sampling procedures will be recorded in a field logbook, including sample collection, handling, storage, and chain-of-custody procedures. The following information will be recorded for each sample in the field logbook:

* Sample number,
* Sample site,
* Sample description,
* Sampling date and time,
* Person collecting sample,
* Analysis to be performed, and
* Type of sample preservation, if any.

3.5 Equipment Decontamination

The TES X Contractor will not need to decontaminate any sampling equipment. Equipment decontamination will be performed by LANL's contractor as described in the RFI Work Plan. Properly decontaminated bottles to collect/contain split samples will be provided by M&E's contracted laboratory.

3.6 Chain-of-Custody

The ability to demonstrate that samples have been obtained from the locations stated and that they have reached the laboratory without alteration is accomplished through chain-of-custody records. A chain-of-custody record will identify each sample and the individuals responsible for sample collection, preparation, shipment, and receipt.

Sample custody will be initiated by field personnel upon collection of samples. Documents specifically prepared for such purposes will be used for recording

pertinent information about the type and number of samples collected and shipped for analyses.

The sample documentation and custody procedures that will be followed in the field are those prescribed by SW-846, Volume II, Field Manual.

3.7 Field Quality Control Samples

Quality control samples generally consist of field blanks, rinsates, trip blanks, and field duplicates. Rinsates will not be collected during split sampling of the Phase I of the RFI. Table 3 contains a summary of the oversight sampling design.

Field blank samples will be prepared in the area where the samples are collected. A set of sample containers will be filled in the field with deionized water. These samples will be preserved and otherwise handled as if they contained real samples. The field blanks will not be identified as such to the laboratory.

Duplicates will be collected from each of the sampled media and will be prepared in the field by filling an additional set of sample containers from a given sample location. The field duplicate will not be identified as such to the laboratory.

TABLE 2

Summary of Soil Boring Sampling and Analysis Program for MDA L Los Alamos National Laboratory Los Alamos, New Mexico

Laboratory Parameter	Investigative Samples	Field Duplicates	Field Blanks	MS/MSD[a,b]	Matrix Total
RCRA Appendix IX Volatiles	16	2	4	3/3	28
RCRA Appendix IX Semivolatiles	16	2	4	3/3	28
RCRA Metals[c] (except Mercury)	16	2	2	2/2	24
Mercury[d]	16	2	4	3/3	28
Pesticides/PCBs	16	2	4	3/3	28
Cyanide	16	2	4	3/3	28

Notes:

[a] Matrix spike/matrix spike duplicate samples (MS/MSD) are required for organic soil analyses.

[b] Matrix spike/laboratory duplicate analyses will be performed for inorganic soil analyses.

[c] Because the metals have an extended holding time, samples can be held by the analytical laboratory until sampling of a particular boring is complete so the number of batches run by the analytical laboratory can be reduced.

[d] Because Mercury has a shorter holding time than the other metals, it will have to be analyzed in a more timely manner and will require more QA/QC samples.

TABLE 3

Summary of Soil Boring Sampling and Analysis Program for MDA AB, Area 2 Los Alamos National Laboratory Los Alamos, New Mexico

Laboratory Parameter	Investigative Samples	Field Duplicates	Field Blanks	MS/MSD[a]	Matrix Total
RCRA Metals[b] (except Mercury)	9	2	2	2/2	17
Mercury[c]	9	2	2	3/3	19

Notes:

[a] Matrix spike/laboratory duplicate analyses will be performed for inorganic analyses.

[b] Because the metals have an extended holding time, samples can be held by the analytical laboratory until sampling of a particular boring is complete so the number of batches run by the analytical laboratory can be reduced.

[c] Because Mercury has a shorter holding time than the other metals, it will have to be analyzed in a more timely manner and will require more QA/QC samples.

4.0 SAMPLE ANALYSIS

All soil samples will be analyzed for RCRA metals (i.e., arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). In addition, samples from MDA L will also be analyzed for RCRA Appendix IX volatiles and semivolatiles, pesticides and PCBs, and cyanide.

Information concerning analytical methods and laboratory quality assurance/quality control procedures is contained in the Quality Assurance project Plan for oversight sampling during this monitoring program.

Appendix B

Accutest Laboratory

Quality Assurance Program Plan
(QAPP)

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QUALITY ASSURANCE MANUAL

ACCUTEST *Environmental Laboratories*

CORPORATE HEADQUARTERS

2235 Route 130
Building B
Dayton, NJ 08810
(908) 329-0200

NEW ENGLAND LABORATORIES

495 Technology Center West
Building One
Marlborough, MA 01752
(508) 481-6200

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Standard Operating Procedure Manual
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Company Statement of Confidentiality
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Sample Disposal
Hazardous Waste Disposal

Section 4: QA/QC Procedures

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ACCUTEST'S STATEMENT OF QUALITY

Accutest strives to maintain the highest level of quality and client satisfaction for all services offered. This is accomplished by a program based on accepted Quality Assurance and Quality Control practices and procedures.

1) Definition of Quality Assurance and Quality Control:

   a) Quality Assurance is defined as: all procedures deemed necessary to demonstrate confidence in any product or activity that can influence the product. This includes, but is not limited to, compliance with the Client's requirements, to state and federal requirements, and Accutest's internal operating procedures.

   b) Quality Control is defined as : Those measurements used to determine if results obtained from an analytical system are free from analytical bias due to external factors. This includes, but is not limited to, contamination, method accuracy, method precision, matrix accuracy and matrix precision and instrument performance.

   Accutest's Quality Assurance program is designed to monitor those aspects of laboratory operations that impact on analytical measurement and the resulting data traceability and defensibility. If a deficiency is identified, an investigation is conducted and a course of corrective action is formulated by the management team. If the conclusion is that the occurrence has affected analytical results, clients for all affected samples are contacted.

2) Definition of responsibility:

   a) The Quality of any product or service offered by Accutest is the direct responsibility of the manager who presides over the group producing the product or service. This includes interim product or services that are used by other individuals or groups within Accutest. This makes the area manager responsible to schedule all necessary quality control and to evaluate quality control.

   b) It is the responsibility of the Quality Assurance manager in conjunction with the management team, to define the parameters and monitor the Quality system. It is the responsibility of Quality Assurance to inform management and administration as to the status of the quality system.

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ACCUTEST'S STATEMENT OF QUALITY

c) It is the responsibility of Administration to provide sufficient resources for the accomplishment of goals in compliance with the specifications of the quality system.

3) We the undersigned are committed to the above policy and the commitment to total quality management as it applies to all facets of Accutest's operations and to the satisfaction of our Client's:

Vincent J. Pugliese President	William Sherding VP of Lab. Operations
Brian Davis QA Manager	

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ACCUTEST'S STATEMENT OF CONFIDENTIALITY

Accutest will maintain our Client's confidentiality for any information disclosed to Accutest. This includes information Accutest has received by means of verbal communication, electronic media, paper documents data and documentation created by Accutest by request of the Client.

Accutest will assure confidentiality for all situations where information is under the control of Accutest. All data and documents forwarded to Clients or to a third party at the request of the Client by means of public networks or in the form of magnetic media will be the responsibility of the Client once Accutest has relinquished control of the information.

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LIST OF AUTHORIZED SIGNATORIES FOR FINAL REPORTS

Name	Title	Signature
Vincent J. Pugliese	President	
William Sherding	Vice Pres./Lab Dir.	
Robert F. Smith	Project Manager/DCO	

LIST OF ALTERNATES FOR MANAGERS

Laboratory Director	Wen Wen Chi (Organics Mgr.)
QA Manager	Nancy Cole (Inorganics Mgr.)
Orgainics Manager	Wahied Bayoumi (Organics Sup.)
Inorganics Manager	Jasbir Sandhu (Inorg. Sup.)
Wet Chemistry Manager	Mary O'Brian (Wet Chem Sup.)
Sample Manager	Nick Popow (Sample Custodian)

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Personnel Training and Analyst Proficiency

Accutest strives to have the highest level of competency in our personnel. To accomplish this, Accutest has instituted a policy of in-house training and proficiency testing.

1.0 Training

1.1 Upon being hired, or upon a change of responsibility all employees are considered to be trainees until such time that the area manager is satisfied with the employees ability to perform the responsibilities.

1.2 All trainees will work under the direct supervision of there manager or manager's appointee.

2.0 Proficiency

2.1 An analyst must complete and pass a proficiency test prior to performing sample analysis without direct supervision. This will include, but is not limited to, the following:

2.1.1 The ability to analyze a blind QC sample following the procedures as dictated in the SOP. This QC sample must come from a verified source and have acceptance statistics available.

2.1.2 The ability to perform and evaluate all required quality control.

2.1.3 Demonstrate an understanding of the analytical procedures and of all applicable sections of the QA Manual.

3.0 Documentation

3.1 All aspects of training and proficiency testing must be documented by the employee's manager, or manager's appointee, and placed into that employee's personnel file. This includes:

3.1.1 The employee's resume.

3.1.2 All training and notable experience obtained while employed at Accutest.

3.1.3 All proficiency testing that the employee has attempted.

5.5 The first request for change of custody is from metals prep. The sample custodian, Frank Doe, retrieves the samples, E999991-E999993, and relinquishes custody to Jane Smith, the metals prep. specialist. If you look at the example internal chain of custody, you will see the date, time, the relinquished by, received by printed name and signature and the purpose of change of custody.

5.6 After the digestion procedure has been completed, there are 3 "samples" for each sample received, the original sample, and two digestates, one for ICP/Flame AA and one for Furnace AA. The internal chain of custody for "metals" will be kept on file in the metals lab. Both digestates are added to the internal chain of custody by filling out the "SAMPLE NO." and the "ALIQUOT/EXTRACT NO." In this case there will be two entries, one for the ICP/Flame digestate and one for the furnace digestate. The digestate containers must be marked with the same notation as is used in the "ALIQUOT/EXTRACT NO." field of the internal chain of custody.

5.7 The internal chain of custody shows that Jane Smith returned the original samples back to the sample custodian, and gave the digestates to George Peters. Upon receipt of the digestates, George will review the internal chain of custody and verify that the internal chain of custody is complete and correct. George Peters has responsibility in the Metals lab for custody of the digestates, he acts as the sample custodian for the metals laboratory. Each laboratory area will have at least one designated person responsible for sample derivative custody.

5.8 The next change of custody comes when Sam Jonston and Mary Gamble need the digestates to perform ICP and furnace analysis. The internal chain of custody shows that George Peters relinquishes custody of the digestates to Sam and Mary.

5.9 Upon completion of analysis for the day, Sam and Mary return the digestates to George and amend the internal chain of custody to reflect the change in custody.

5.10 After all analysis are completed and George Peters needs to clear out the active digestate shelves to make room for new digestates, George will relinquish custody of the digestates to the Sample Custodian for ambient storage and final disposal.

5.11 As you can see from the example, the samples and digestates are always under the custody of an individual. If custody is ever broken during the life of a sample, the results reported from this lab could be deemed suspect by regulatory agencies and courts. This procedure is very important and requires the cooperation of anyone who handles samples in any way.

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Sample Custodian Authorized Signatory List

The purpose of the list is to establish who is authorized to sign samples in and out of custody for the Sample Custodian. It is the Sample Custodians responsibility to maintain custody of samples at Accutest. This lists primary goal is to establish coverage for the Sample Custodian during non-business hours or any time the Sample Custodian is unavailable.

Authorization Date	Printed Name	Signature

I as Sample Custodian do Authorize the above people to sign for internal custody purposes for all samples under my responsibility. The people listed above do understand that this authorization is only in affect when they have properly signed into the Sample Custodian Refrigerator log, and that there responsibility is limited to those times indicated on the log.

Sample Custodian

Name (Printed): _____
Signature: _____
Date Signed: _____

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Sample Custodian Refrigerator Log

The purpose of this log is to show who had Sample Custodian authorization on any given day during any given time. All people on the log must be on the current Sample Custodian Authorized Signatory List. Only the Sample Custodian or persons listed below may relinquish custody of samples from the Sample Custodian for the dates and times given.

IN Date	Time	Printed Name	Signature	OUT Date	Time
	:__				:__
	:__				:__
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