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WORK PLAN
DOE DISPOSAL BOX EXCAVATION AND SAMPLING

LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH (LEHR)
UNIVERSITY OF CALIFORNIA AT DAVIS

Prepared for:

Battelle Pacific Northwest Laboratory
Richland, Washington

September 1995

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MEMORANDUM

U. C. Davis LEHR D&D Project
Davis, CA

November 5, 1996

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- UC Davis LEHR D&D Project Work Plan (Vol. 1 & 2)
- Work Plan, DOE Disposal Box Excavation and Sampling
- Work Plan, Limited Field Investigation
- Work Plan, DOE Disposal Box Excavation and Disposal

c: Doc. Dist.
T. Grummitt
R. Swatek

WORK PLAN
DOE DISPOSAL BOX EXCAVATION AND SAMPLING
U.C. DAVIS LEHR FACILITY
DAVIS, CALIFORNIA

Prepared for:

Battelle Pacific Northwest Laboratory
Richland, Washington

Prepared by:

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September 1995

Copy No. 02

Issued to Dawn Mitchelle Date 10/25/95

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DOE DISPOSAL BOX EXCAVATION AND SAMPLING
U.C. DAVIS LEHR FACILITY
DAVIS, CALIFORNIA

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List of Acronyms

AA	Atomic Absorption
C	Centigrade
C-14	Carbon 14
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COC	Chain of Custody
CQC	Contractor Quality Control
DAC	Derived Air Concentration
D&D	Decontamination and Decommissioning
DOE	Department of Energy (United States)
DOT	Department of Transportation (United States)
EPA	Environmental Protection Agency (United States)
EM	Electro Magnetics
EML	Environment Monitoring Laboratory
EZ	Exclusion Zone
FC	D&D Field Coordinator
GFAA	Graphite Furnace Atomic Absorption
GPR	Ground Penetrating Radar
H-3	Tritium
HNO_3	Nitric Acid
HSO	Health and Safety Officer
HSP	Health and Safety Procedure
HWP	Hazardous Work Permit
IATA	International Air Transport Association
ICAP	Inductively Coupled Argon Plasma
ID	Identification
IT	IT Corporation
LEHR	Laboratory for Energy Related Health Research
PID	Photoionization Detector
PM	Project Manager
PNL	Pacific Northwest Laboratories (Battelle)
PPE	Personal Protective Equipment
PQAS	Project Quality Assurance Specialist
QA/QC	Quality Assurance/Quality Control
Ra	Radium
RCM	Radiological Control Manager
RCRA	Resource Conservation and Recovery Act
RCT	Radiation Control Technician
SCBA	Self Contained Breathing Apparatus
SOP	Standard Operating Procedure

List of Acronyms (Continued)

SQP	Standard Quality Procedure
SR	Strontium
TCLP	Toxic Characteristic Leaching Procedure
TSM	Tailgate Safety Meeting
UCD	University of California at Davis
VOA	Volatile Organics Analysis

1.0 Introduction

This Work Plan has been prepared for locating and sampling the DOE Disposal Box buried at the Laboratory for Energy-Related Health Research (LEHR) at the University of California at Davis (UCD). The LEHR site is located southeast of the main campus on a 15-acre site leased from the University of California (Figure 1-1). The site consists of 16 buildings, including a Main Administration and Office Building, two animal hospitals, a laboratory and support buildings, waste storage facilities, numerous animal pens, and trench burial areas (Figure 1-2). The DOE Disposal Box was reported to have been a steel box or dumpster, which may contain solids (i.e., gravel) contaminated with low-level radioactive material from prior animal research activities, that was buried at the LEHR site.

The objective of this Work Plan is to outline the activities which will be undertaken to locate, expose and sample the DOE Disposal Box contents so that both the Box and its contents can be properly disposed. The activities required to perform these activities are described in this Work Plan.

1.1 DOE Box Background

A review of the literature concerning burials at the LEHR site makes no mention of the DOE Disposal Box. However, it has been reported that this Box was used by researchers at LEHR, to dispose of materials contaminated with low level radioactivity. As part of a site investigation conducted by Dames and Moore in 1994, several significant anomalies were identified using Ground-penetrating Radar (GPR), Electro Magnetics (EM), and a magnetometer in an area believed to be the burial site for the Box. This area is located on the west side of the asphalt road separating the two dog pen areas at the southern end of the LEHR site (Figure 1-3). The area is also located slightly to an north of an area where known burial of radioactive materials has been identified at LEHR (Figure 1-2). A visual examination of the general area shows a depression on the surface of the ground, indicating signs of uneven settlement in this area. The area had been previously disturbed as part of an investigation performed by Wahler and Associates in February of 1988. Pictures of the area taken during this investigation indicate the expected boundaries of the Box. As part of Dames and Moore's investigation, five soil gas probes were placed in the general area of the depression (Figure 1-3). They reported no indication of any volatiles being present in the

area. A survey of the ground surface in this general area using radiological instruments indicated no activity above background.

1.2 Proposed Project Activities

The following is a list of the proposed field activities which will be performed to locate and sample the DOE Box at LEHR. These activities include:

- Locate the Box
- Expose the Box
- Conduct a radiological and chemical survey of the Box's exterior
- Expose the Box contents
- Collect radiological and chemical measurements of the contents within the Box
- Sample the Box contents
- Install a wooden cover over the Box
- Backfill the excavation
- Erect a temporary fence around the excavation
- Collect radiological measurements above the excavation
- Evaluate analytical data for waste characterization and disposal.

It should be noted that during the execution of the above activities, provisions will be made at each step of the way to stop work at any time should radiological or industrial hygiene field measurements indicate an unsafe situation.

Based on the data obtained as a result of the above field activities, a new Work Plan will be prepared for the removal and disposal of the DOE Box and its contents.

1.3 Schedule of Proposed Activities

The above work will be performed in three phases: Location, Sampling, and Backfill. The anticipated start date for the above field work is October 1995. The field activities are anticipated to be completed within a two-week period. The actual start of work will be dependent on the approval of this Plan.

1.4 Organization

The project organization for this work is shown on Figure 1-4.

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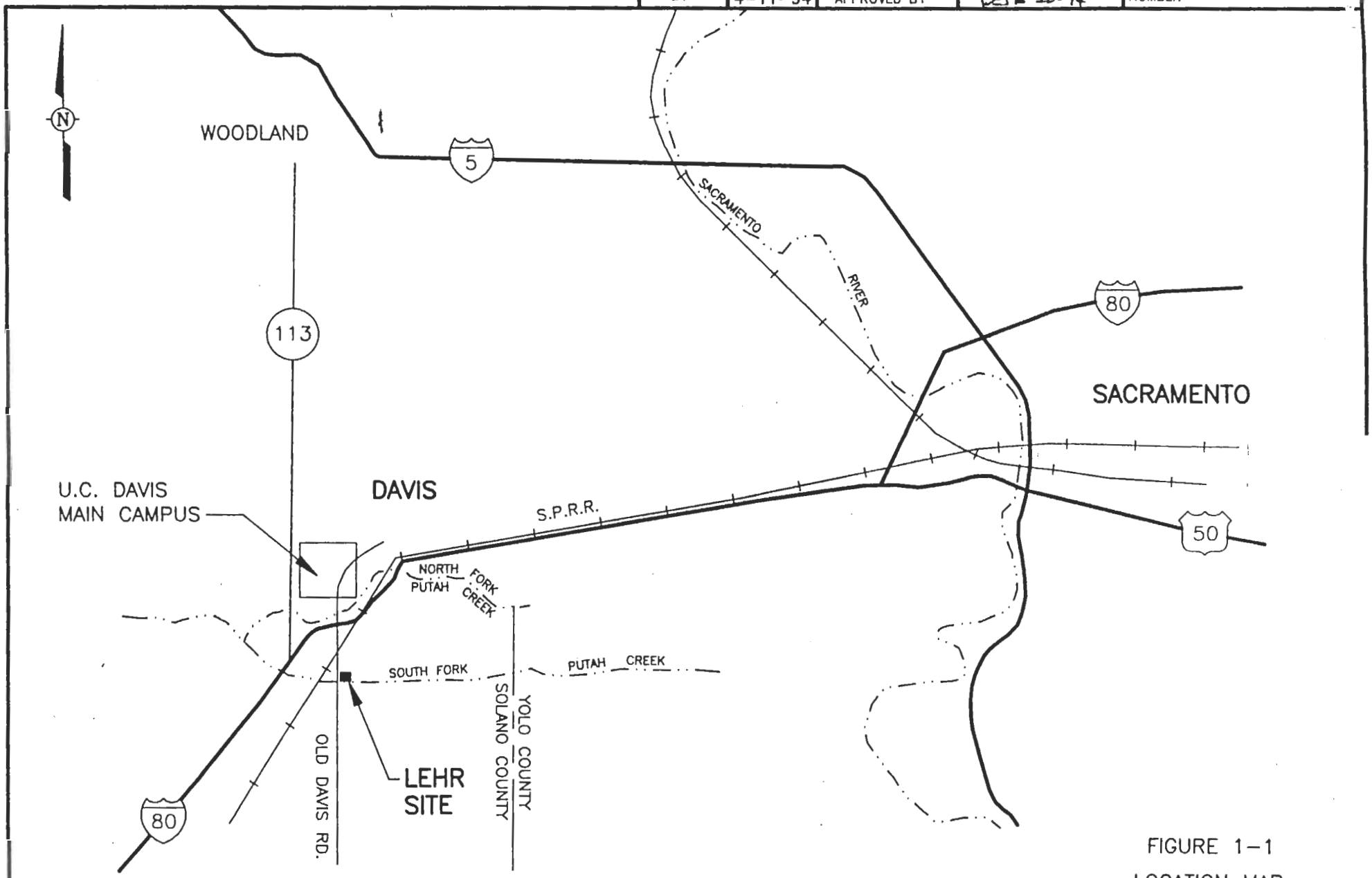

FIGURE 1-1

LOCATION MAP

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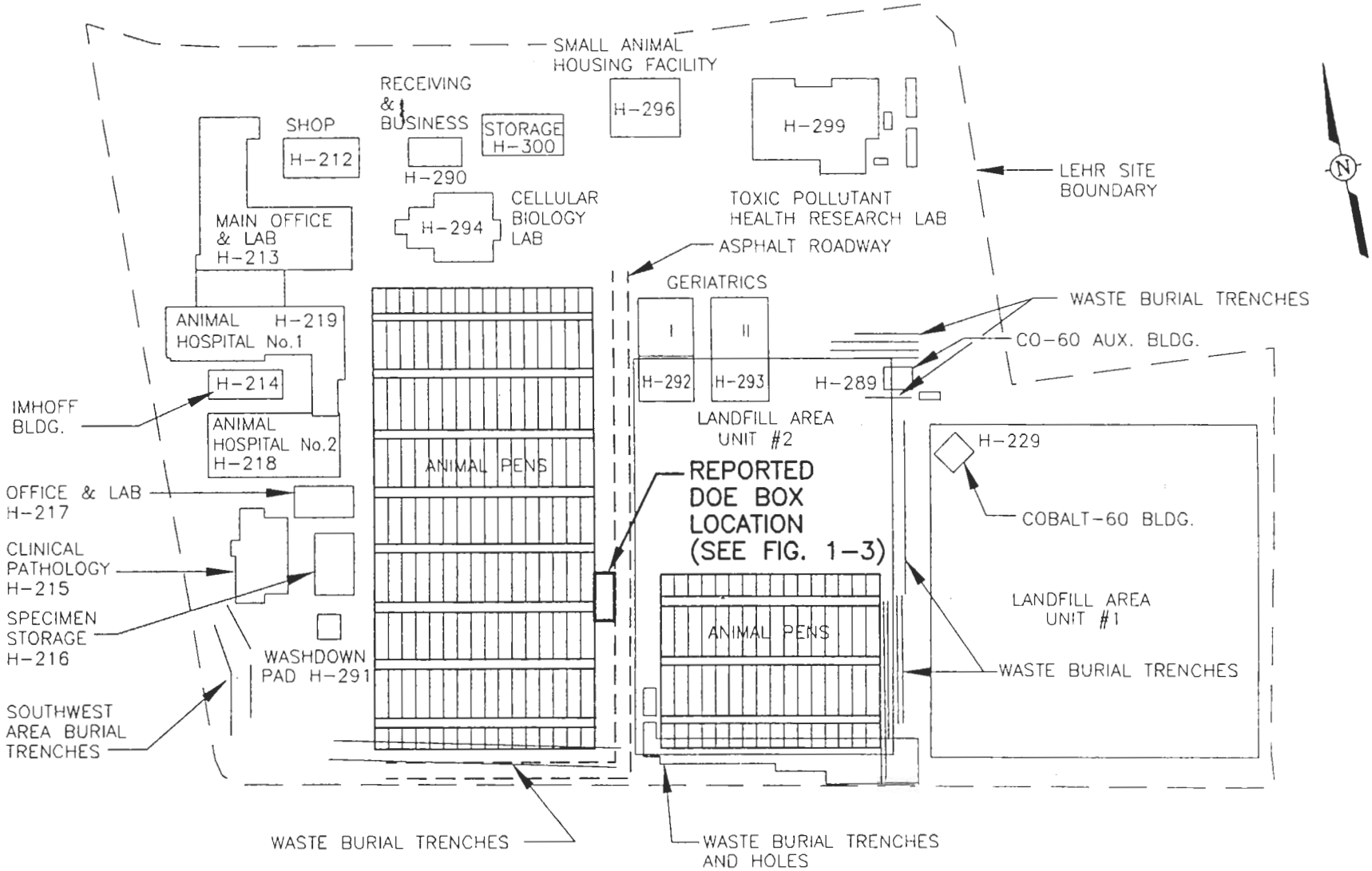

FIGURE 1-2

SITE PLAN

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LE-RB01(LE3)

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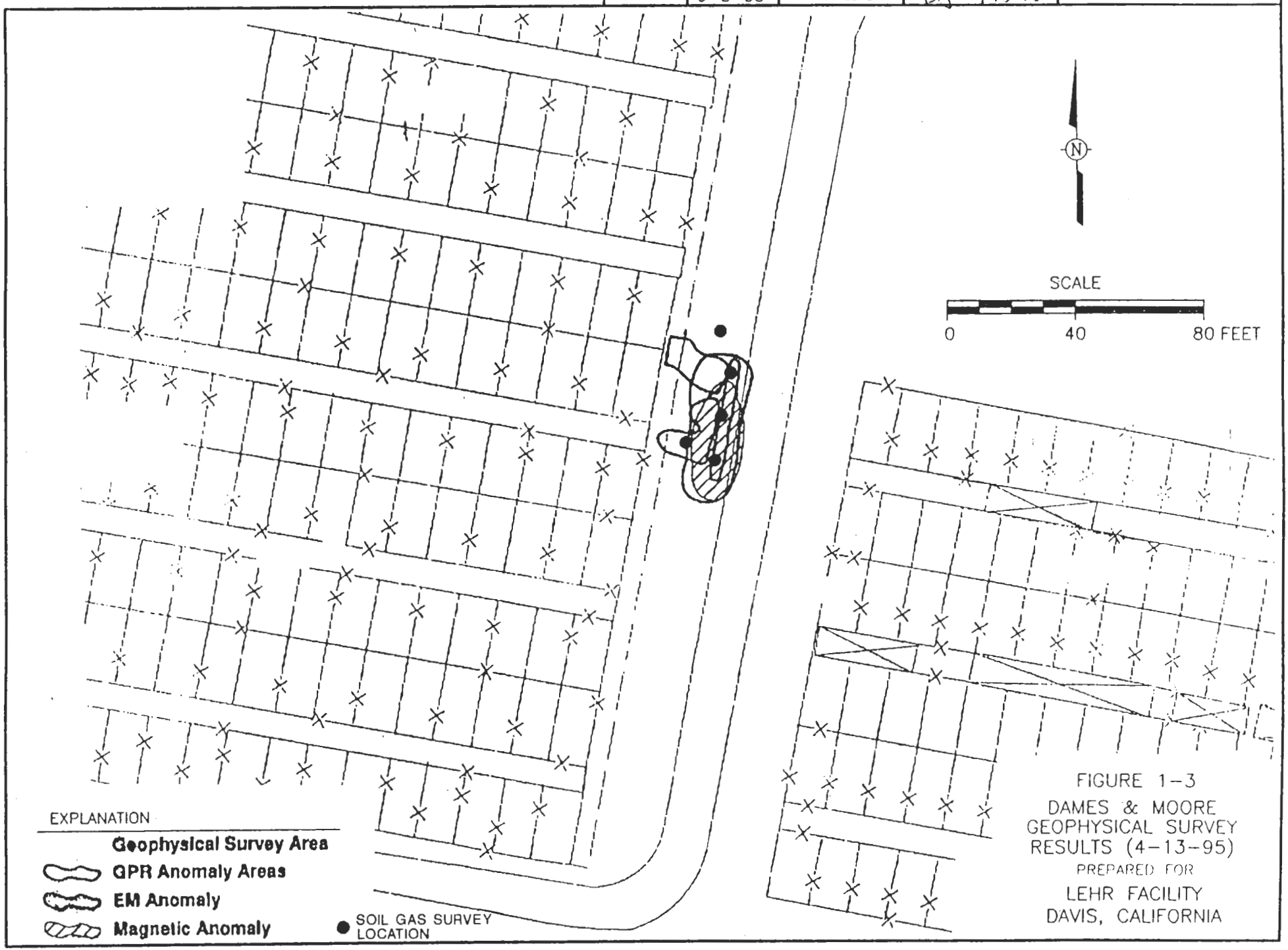

FIGURE 1-3
DAMES & MOORE
GEOPHYSICAL SURVEY
RESULTS (4-13-95)
PREPARED FOR
LEHR FACILITY
DAVIS, CALIFORNIA

LE-DOE1(LE3)

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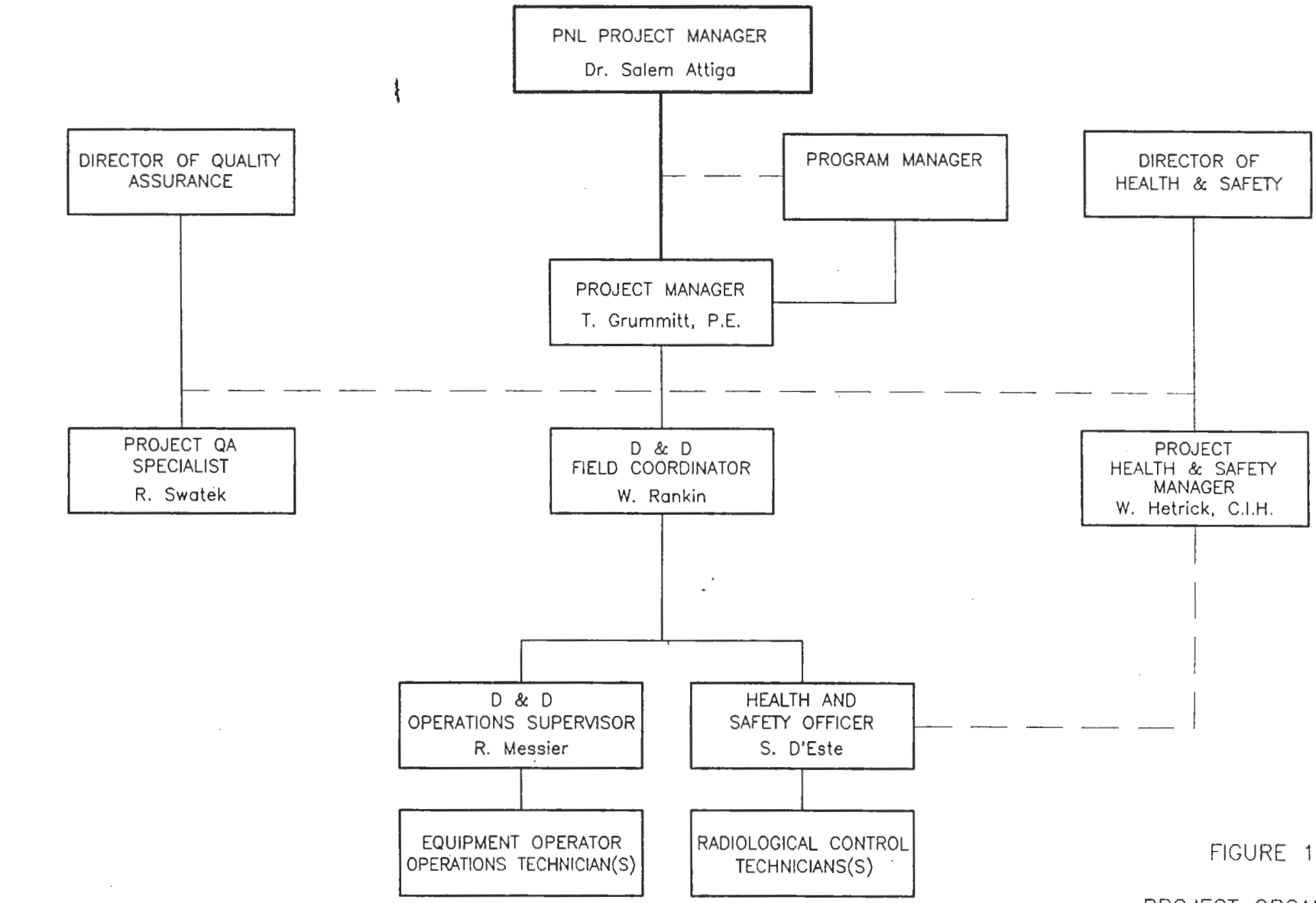

FIGURE 1-4

PROJECT ORGANIZATION
PREPARED FOR
LEHR FACILITY
DAVIS, CALIFORNIA

——— DENOTES LINE OF RESPOSIBILITY

— — — DENOTES LINE OF COMMUNICATION

LE-ORB1(LE3)

trench. Should a third trench be required, it shall be located approximately five feet to the south of the first trench following the same procedure. Once the Box is located, the backhoe will continue to trench until the footprint of the Box is determined. All trenches which are outside of the Box's footprint will be backfilled to eliminate accumulating large spoil piles.

2.2 Expose the Box

Having determined the footprint of the DOE Box, the next step will be to expose the top and the sides of the Box so the integrity of the Box as well as the height of the Box can be determined. For reasons of safety, these activities will be conducted by the backhoe operator, the Leadman and a Radiological Controls Technician (RCT), in the Level B PPE described in Section 4.2.4. Until radiological and chemical measurements (including surface readings and air samples) indicate a reduced level of PPE, only the above individuals will conduct the excavation.

All excavation work will be performed from the ground surface since no confined space entry is anticipated during the exposure of the Box. First, the overburden over the top of the Box will be removed down to the Box lid or cover. Should no lid or cover be present and the Box appears to be filled with soil or gravel, the excavation will not penetrate inside the Box at this time. However, the excavation will continue around each of the four sides of the Box so that the structural integrity of the Box as well as the height of the Box can be determined. All excavated material will be piled on a poly sheeted area adjacent to the road. Radiological readings of the excavated soil will be randomly made at the spoil pile to determine the extent of any radiological hazards. Should at any time a radiological hazard in excess of 10 times the values specified in Table 2.2 of the "LEHR Radiological Control Manual" (Reference 5.1) or an unsuspected industrial hygiene hazard be determined as being present, all excavation activities will cease, and the excavation will be placed in a safe condition. A determination as to how to proceed will be made by the Health & Safety Officer (HSO), and the Field Coordinator (FC) in conjunction with the PNL Project Manager (PM). A visual inspection of the Box's construction, size, and orientation will be made. Results of this inspection will logged in the field logbook per Section 3.3.2, "Field Logbook."

2.3 Conduct a Radiological Survey of the Box's Exterior

Once the Box has been exposed on all four sides and on the top, a radiological survey of the Box will be performed from the ground surface using both dose rate instrumentation as well

as alpha and beta/gamma contamination monitors. The survey will be performed in the trenches adjacent to the Box and along the sides of the excavation to determine if any activity is present. Should radiological activity be present in excess of 10 times the values in Table 2.2 of Reference 5.1, all work will cease and the excavation will be placed in a safe condition. A determination as to how to proceed will be made by the Health & Safety Officer (HSO), and the Field Coordinator (FC) in conjunction with the PNL PM.

Results of radiological survey shall be documented in accordance with the Operating Procedure, "OP-02, Radiological Surveys and Instrumentation" (Reference 5.2) and Section 3.3.2, "Field Logbook."

2.4 Expose the Box and Inspect Contents

Following the radiological survey of the Box and the determination that conditions are safe to proceed, the next step will be to remove the Box's lid, if present, and expose the Box contents. The lid removal will be performed by using the teeth on the edge of the backhoe bucket to lift and remove the lid, if practical.

If this method is not feasible, the FC will evaluate the situation and determine an alternate approach for removing the lid without performing a confined space entry. Should the Box have no lid or cover and be filled with soil or gravel, a radiological survey of the surface material will be taken to ensure there are no radiological issues to prevent the removal of this material.

Once the lid is removed or contents exposed, a visual inspection will be performed of the contents of the box. Results of this inspection shall be logged as described in Section 3.3.2, "Field Logbook."

2.5 Collect Radiological Measurements of the Box Contents

Once the contents of the Box have been exposed, radiological measurements will be taken of the Box contents to determine the appropriate safety precautions that will be required to sample the contents. Surveys will be performed using dose rate instrumentation as well as alpha and beta/gamma contamination monitors. An evaluation of the appropriate level of PPE required for the remaining field activities will be performed based on the results of these surveys. If, for some reason, the level of activity of the Box contents are higher than 10

times the values specified in Table 2-2 of Reference 5.1, the Box will be covered and backfilled.

Results of radiological surveys shall be documented in accordance with the procedures defined in Reference 5.2 as well as in the field logbook.

2.6 Sample the Box Contents

Following the radiological measurements of the Box contents, which are assumed to be small sized solids (i.e., gravel), samples shall be collected from a representative number of locations. The number and location of samples will be dictated by the size and configuration of the Box as well as the type of material encountered. A sampling methodology, as described in Section 3.3, will be used to sample the Box contents. All sampling activities will be logged in the field logbook, as described in Section 3.3.2.

To ensure that the data obtained from this sampling effort is accurate, two standardized sampling procedures will be used to control sample collection, handling, custody and shipment. These Sampling Procedures (SP's) are contained in Appendix A.

2.7 Construct and Install a Wooden Cover Over the Box

Following the sampling of the Box's contents, a wooden cover will be constructed and placed over the exposed Box. This cover will be constructed of 3/4" plywood and reinforced with 2"x6" dimensional lumber and is intended to protect the Box during subsequent backfilling activity. The cover is not intended to support a load other than that of the backfill material.

2.8 Backfill the Excavation

Following the installation of the wooden cover, the excavation will be backfilled using the same material previously removed from the excavation. Sufficient material will be placed on top of the plywood cover to secure it in place. Any excess material will be placed over the excavation and crowned to allow runoff to flow away from the excavation.

2.9 Erect Temporary Fence

Following the backfill of the excavation, a temporary fence will be erected around the limits of the excavation to prevent personnel and vehicles from accessing the area. The fence will

be erected using standard steel fence posts and wire fencing. This fenced area will be posted with signs to preclude entry by unauthorized personnel.

2.10 Evaluate Analytical Data for Waste Characterization and Disposal

The laboratory data will be evaluated to determine if the Box's contents are a mixed, radiological, or hazardous waste. Once the contents are characterized, an evaluation of each disposal facility which could potentially accept this material will be made. Based on this evaluation, a disposal facility will be selected. All records for subsequent disposal will then be initiated by Battelle PNL.

3.0 Sampling Activities

This Section describes the sampling methodology and procedures to be followed in sampling the Box. The sampling objective is to characterize the Box contents so that both the Box and its contents can be properly disposed.

3.1 Chemical and Radiological Analysis

The characterization of the Box's contents is required to correctly identify the disposal facility and requirements. In order to accomplish this, it will be necessary to identify all known and suspected chemical and radiological constituents.

The contents of the Box will be analyzed for RCRA characteristic and the listed constituents. The analytical method will be the Toxic Characteristic Leaching Procedure (TCLP) for each constituent of concern shown in Table 3-1. Representative samples will be analyzed at an accredited laboratory using standard analytical techniques.

Radiological characterization of the Box's contents will also be required to ensure compliance with transportation requirements and disposal facility waste classification criteria. Samples will be analyzed at an accredited laboratory for the analytes specified in Table 3-1.

3.2 Sampling Methodology

The number of samples and their locations will be dictated by a number of factors including:

- Size of the box
- Construction of the box
- Volume of the box's contents
- Orientation of the waste in the box
- Waste Matrix
- Accessibility to sampling.

Samples will be obtained in such a manner as to ensure the representativeness and accuracy of the resultant data.

TABLE 3-1

DOE BOX ANALYTICAL SAMPLE REQUIREMENTS

Analytical Parameter	Analytical Technique	Sample Volume	Sample Container	Preservation Method	Hold Time
TCLP Volatiles	Method 8240	40 ml.	40 ml. Glass, Septum lined with Teflon	Cool ≤4°C	14 Days
TCLP Semivolatiles	Method 8270	1 Liter	1 Liter Amber Glass, with Teflon lid	Cool ≤4°C	14 Days
TCLP Metals	Method 7470	1 Liter	1 Liter Polyethylene	HNO_3 pH ≤2.0	28 Days
TCLP Pesticides/PCB	Method 8080	8 oz.	8 oz. Wide mouth Amber Glass, with Teflon lid	Cool ≤4°C	14 Days
TCLP Inorganics	Method 6010, ICAP, GFAA, Flame AA	1 Liter	1 Liter Polyethylene	HNO_3 pH ≤2.0	180 Days
TCLP Herbicides	Method 8150	8 oz.	8 oz. Wide mouth Amber Glass, with Teflon lid	Cool ≤4°C	14 Days
Corrosivity	EPA 150.1	50 ml.	100 ml. Glass	None	Upon receipt of sample
Ignitability	Method 1010	60 ml.	100 ml. Glass	None	None
H-3 / C-14 / Ra-226 / 5_-90	EML Procedures Manual	8 oz.	8 oz. Wide mouth with Teflon lid	None	6 Months
Gamma Spec	EML Procedures Manual	8 oz.	8 oz. Wide mouth with Teflon lid	None	6 Months
Gross Alpha & Gross Beta	Method 9310	8 oz.	8 oz. Wide mouth with Teflon lid	None	6 Months

In order for individual samples to be representative of the entire contents of the Box, samples will be taken at various locations within the Box, homogenized and the resultant composite mixture sampled. The Box was reported to have been a steel box or dumpster, which is expected to contain solids contaminated with low-level radioactive material from prior animal research. Since the exact nature of the Box's contents is unknown, one of the following two scenarios will be followed, dependent upon if the waste matrix found is determined to be uniform or non-uniform.

Uniform Waste Matrix See variance (next page)

If the waste matrix is solid and uniform, such as soil or gravel, and is uniformly distributed within the Box, individual samples will be obtained from areas approximating 1 meter squares. These samples will be combined and the composited material sampled. The number of composite samples will be based on the surface area of the waste matrix and taken every 5 square meters. Based on the depth of the waste matrix, composite samples will be collected, following the methods described above, at depth increments of 1 meter. The sample locations from which individual samples making up the composite are collected, along with the sample numbers and other observations, will be logged in the sample logbook.

Non-uniform Waste Matrix

If the waste matrix is non uniform, discrete samples of apparent individual wastes will be taken. These samples will be handled and taken as described in this document. A description of the individual waste matrixes, location, and the corresponding sample number will be logged in the field logbook.

Any condition which becomes relevant to the sampling methodology, such as the presence of liquid or stratification of wastes within the container will be noted in the field logbook. In these cases, the FC in conjunction with the LEHR Radiological Controls Manager (RCM) will make a determination as to adjusting sample locations, numbers and methods to ensure the samples are representative of the waste stream.

3.3 Sample Documentation

The usability of the data obtained during this sampling effort will depend on it's quality. A number of factors relate to quality of data. Sample collection methods are as important to consider as the methods used for sample analysis. Properly following procedures for both

VARIANCE NO. 039

VARIANCE

PROJECT NO. 191226 PAGE 1 OF 1

PROJECT NAME UC Davis LEHR D&D DATE: 10/31/95

VARIANCE (INCLUDE JUSTIFICATION) REQUESTED BY: Bill Rankin

Work Plan DOE Disposal Box Excavation and Sampling, Laboratory for Energy-Related Health Research (LEHR) University of California at Davis

Section 3.2, Fourth paragraph - Uniform Waste Matrix

Existing Text: • The number of composite samples will be based on the surface area of the waste matrix and taken every 5 square meters.

Revised to read: • The number of composite samples will be based on the surface area of the waste matrix and taken every 10 square meters.

Justification for change: The surface of the waste matrix was determined to be approximately 9' x 40' during excavation. Sufficient samples can be taken from a 10 square meter grid system to ensure that the results of the sampling are representative of the waste.

APPLICABLE DOCUMENT:

Work Plan DOE Disposal Box Excavation and Sampling, Laboratory for Energy-Related Health Research (LEHR) University of California at Davis

C: APPROVED BY: Tony Lemmett DATE: 10/31/95

CONCUR with Project Manager

sample collection and analysis reduces sampling and analytical error. To ensure sample integrity, complete chain-of-custody documentation along with following sample preservation techniques, holding times, and proper shipment methods are required. Obtaining valid and comparable data also requires adequate QA/QC procedures and documentation.

The components of the sample documentation and custody system will include the following:

- Chain of Custody (COC) Form
- Field Logbook
- Sample Numbers
- Sample Labels
- Sample Seals.

3.3.1 Chain of Custody

Chain of Custody (COC) forms will be completed by the sample team members to track sample custody as well as to specify the requested analysis. COC forms will be completed in accordance with the requirements of "SQP-12, Chain of Custody" (Reference 5.3).

3.3.2 Field Logbook

Descriptions and observations made during field and sampling activities will be documented in the Field Notebook. The following will be recorded in the Field Logbook:

- Project name and number
- Location of site
- Purpose of sampling
- Description of field activities
- Names of sampling personnel
- Date and time of entries
- Sample matrix
- Date and time of sample collection
- Sample locations, ID number and methodology
- Field observations
- Results of field measurements
- Results of field calibrations for instruments used.

3.3.3 Sample Numbers

All sample numbers will begin with a unique identifier (LEHR) and be numbered sequentially. The matrix of the sample will be identified by a letter in the middle of the

sample number such as L-liquid or S-solids. LEHR-S-10 is an example of the tenth solid sample obtained at LEHR.

3.3.4 Sample Labels

Sample labels will be attached to individual sample containers and will contain the following information:

- Project number
- Sample ID number
- Date and time collected
- Initials of sampler
- Requested analytes.

3.3.5 Sample Seals

Sample seals will be used to detect tampering and will be placed over the lid of the container and annotated with the following information:

- Project number
- Sample ID number
- Date and time
- Initials of sampler.

3.4 Sampling Procedures

The following methodology will be followed in order to collect the samples described in this Plan.

A sample preparation area will be established adjacent to the excavation. The sample preparation area will be set up on an elevated work surface such as a table. This work surface will be covered with poly sheeting to minimize the spread of any contamination. The following equipment will then be staged in the vicinity of the work area:

- Spill kit
- Sample containers
- Demineralized water
- Sampling tools
- Sample seals and custody forms
- Preservatives as required.

Samples will be collected from the appropriate locations, as determined in Section 3.2, "Sampling Methodology," following the sampling procedures (SP) in Appendix A of this Work Plan.

Note: Confined Space entry will not be required during the performance of sampling activities. When necessary, structural planking will be used to allow worker access over the excavation and facilitate sampling.

4.0 Health and Safety Considerations

The Health and Safety Plan contained in Appendix D of "Work Plan for the Decontamination and Decommissioning of the Imhoff Building, Cobalt-60 Building, and Tank Trailer at the Laboratory for Energy Related Health Research, University of California at Davis" (Reference 5.4) shall be followed during the field activities outlined in this Work Plan. A hazard analysis for these activities as well as specific additional controls measures to be followed are described below. This Section is intended to supplement the requirements of Reference 5.4 and in all cases the most restrictive requirements will apply.

4.1 Hazard Analysis

The job hazard analysis identifies potential safety, health and environmental hazards and provides for the protection of personnel, the community, and the environment. Due to the lack of definitive information concerning the Box, a conservative approach will be taken to ensure that excavation and sampling safety concerns are met. During excavation and sampling activities, the Field Coordinator (FC) and Health and Safety Officer (HSO) will monitor the site for any changes in conditions which would require modification of work conditions (i.e., PPE). In the event that changes arise in radiological or industrial health and safety conditions warrant, this Work Plan will be modified in accordance with the procedures contained in "SQP-07, Control and Distribution of Plans, Procedures and Variances" (Reference 5.5).

4.1.1 Confined Space Entry

Confined space entry will not be required during the performance of any excavation or sampling activities. All activities have been engineered such that the excavation will not be entered. In the event that the need arises to perform activities within a confined space, as defined by 29 CFR 1910.146, "Permit Required Confined Space." IT Health and Safety Procedure HSP-26, "Confined Spaces" (Reference 5.4) will be followed.

4.1.2 Radiological Exposure

The Box is reported to contain solids (i.e. gravel) contaminated with low-level radioactive material from prior animal research activities. The predominant nuclides used during these activities were Ra-226, Sr-90 and various others in trace quantities. The excavation and

heat stress are specified in Section 4.2.14, Appendix D (Health and Safety Plan), of Reference 5.4. The HSO shall ensure that all workers are aware of the signs and symptoms of heat stress, engineering control measures, and the need to replenish body fluids will be re-emphasized during morning tailgate safety meetings (TSM). Integrated heat stress monitoring will be performed daily to determine the proper work/rest regiment.

4.2.2 Boundaries

The work area will be enclosed by plastic fencing supported with portable stations. The placement of the stations and fencing will be controlled by the FC to facilitate access to the work area for the excavator. The boundaries will enclose the anticipated Box location as well as the location of the spoil pile. Boundaries of the exclusion zone (EZ), will be posted with signs stating "Contamination Area, Authorized Personnel Only."

4.2.3 Hazardous Work Permit

A Hazardous Work Permit (HWP), will be used to control work in the exclusion zone. The HWP will be issued in accordance with the procedures specified in "HSP-52, Hazardous Work Permits" (Reference 5.6). The following information will be described on the HWP:

- Scope of work to be performed
- Anticipated radiological, safety and industrial hygiene conditions
- PPE and respiratory protection requirements
- Radiological and industrial hygiene monitoring requirements
- Dosimetry requirements
- Period for which the HWP is valid
- Additional requirements for entry.

4.2.4 PPE

Workers in the support zone will wear Level D PPE in accordance with the PPE selection Matrix in Appendix D, Section 5.4 (Health and Safety Plan), of Reference 5.4.

Workers in the exclusion zone will wear Level B PPE until radiological, and chemical conditions are established and a lesser level of protection is determined to be adequate by the FC and HSO in conjunction with the LEHR Radiological Control Manager (RCM). Level B PPE will consist of:

- Hard hat, ANSI approved

- Steel-toed impermeable PVC boots
- Coated Tyvek hooded coveralls
- Chemical resistant gloves
- Full tape of wrists, ankles and hood.

4.2.5 Training

Personnel performing activities associated with the excavation of the Box will receive training covering this Work Plan. All on-site project personnel shall have completed at least 40 hours of hazardous waste operations-related training, as required by OSHA Regulation 29 CFR 1910.120. All field employees receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Those personnel who completed the 40-hour training more than 12 months prior to the start of the field activities shall have completed an 8-hour refresher course within the past 12 months. The FC shall have completed an additional 8 hours of relevant supervisory health and safety training. In addition, any workers who will enter radiological control zones shall have successfully completed Radiological Worker II training and site-specific Radworker training. All site workers shall receive training covering the LEHR site contingency plan. Personnel performing activities within the exclusion zone will receive the training in accordance with the requirements specified in Section 4.2 of "SQP-02, Indoctrination and Training" (Reference 5.7) for the specific job assignments.

4.2.6 Buddy System

The buddy system will be utilized to protect personnel in the work area. The system will be implemented in the following manner:

- At least two persons will be required to be in the work area when work is conducted in the exclusion zone which might result in worker contamination.

The buddy system is a method of organizing employees into work groups and is designed to provide those employees with assistance when needed. Each employee in a work group is designated to be observed by at least one other person. Assignment of designated partners should take place during the Tailgate Safety Meeting (TSM).

conducted in accordance with procedures HSP-54, "Air Surveillance Program," and HSP-55, "Airborne Radioactivity Monitoring" (Appendix E, Reference 5.4).

If the general area air samples indicate that workers may be exposed to airborne radioactive contaminants that are ≥10% of the gross activity derived air concentration (DAC), listed in 10 CFR 835, Appendix A, then personal air samples will be used to monitor workers exposure. DAC hours of exposure will be logged. DAC's have been established to limit radiation exposure to workers through inhalation of radionuclides. All personal air samples, grab samples and direct reading instrumentation readings collected for the purpose of determining appropriate H&S precautions will be collected/taken in the approximate "breathing zone" of site personnel.

5.0 References

5.1 LEHR Radiological Controls Manual

5.2 OP-02, Radiological Surveys and Instrumentation (Appendix A, Reference 5.4)

5.3 SQP-12, Chain of Custody (Appendix C, Reference 5.4)

5.4 Work Plan For the Decontamination and Decommissioning of the Imhoff Building, Cobalt-60 Building, and Tank Trailer at the Laboratory for Energy Related Health Research University of California at Davis.

5.5 SQP-07, Control and Distribution of Plans, Procedures and Variances (Appendix C, Reference 5.4)

5.6 HSP-52, Hazardous Work Permits (Appendix E, Reference 5.4)

5.7 SQP-02, Indoctrination and Training (Appendix C, Reference 5.4)

APPENDIX A

DOE DISPOSAL BOX SAMPLING PROCEDURES (SP)

SP No. 1.0 Shallow Subsurface Sampling

SP No. 2.0 Sample Handling, Packaging and Shipping

SHALLOW SUBSURFACE SAMPLING

SAMPLING PROCEDURE

1.0 Purpose

This Sampling Procedure (SP) establishes guidelines and procedures for use by field personnel in the collection and documentation of shallow subsurface (6 inch to 6 feet in depth) samples for physical and chemical analysis. Proper collection procedures are necessary to assure the quality and integrity of all surface and shallow subsurface soil samples. Additional specific procedures and requirements will be provided in the project work plans.

2.0 References

2.1 EPA, September 1987, Compendium of Superfund Field Operations Methods, EPA 540/P-87/001a, OSWER 9355.0-14.

2.2 EPA, August 1988, EPA Guidelines for Conducting Remedial Investigation and Feasibility Studies under CERCLA, Interim Final OSWER Directive 9355.3-01.

2.3 SP 2.0 - Sample Handling, Packaging and Shipping (Appendix A)

2.4 SQP 12 - Chain of Custody (Appendix C, Reference 2.5)

2.5 Work Plan for the Decontamination and Decommissioning of the Imhoff Building, Cobalt 60 Building, and Tank Trailer at the Laboratory for Energy Related Health Research, University of California at Davis

3.0 Definitions

3.1 Subsurface Soil Sample

Soil collected at any depth interval greater than 6 inches.

3.2 Disturbed Soil Sample

A soil sample whose in situ physical structure and fabric has been disturbed as the direct result of sample collection.

3.3 Undisturbed Soil Sample

A soil sample where in situ physical structure and fabric has not been disturbed as the result of sample collection.

3.4 Grab Samples

Representative disturbed soil sample that is collected by using such devices as a shovel, stainless steel spoon, etc.

4.0 Procedure

This section contains both the responsibilities and procedures involved with subsurface soil sampling. Proper sampling procedures are necessary to insure the quality and integrity of the samples. The details within this SP will be used in conjunction with the project work plan. The project work plan will generally provide the following information:

- Sample collection objectives
- Locations and depths of samples to be collected
- Numbers and volumes of samples to be collected
- Types of analyses to be conducted for the samples
- Specific quality control (QC) procedures and sampling required
- Any additional shallow subsurface sampling requirements or procedures beyond those covered in this SP, as necessary.

At a minimum, the procedures outlined below will be followed.

4.1 Responsibilities

4.1.1 The Field Coordinator will be responsible for ensuring that all sample collection activities are conducted in accordance with this SP and any other appropriate procedures. This will be accomplished through staff training and by maintaining quality assurance/quality control (QA/QC).

4.1.2 The Project Quality Assurance Specialist (PQAS) will be responsible for periodic review of field generated documentation associated with this SP. The PQAS will also responsible for implementation of corrective action (i.e., retraining personnel, additional review of work plans and procedures, variances to QC sampling requirements, issuing nonconformances, etc.) if problems occur.

4.1.3 Field personnel assigned to sampling activities will be responsible for completing their tasks according to specifications outlined in this SP and other appropriate procedures. All staff will be responsible for reporting deviations from procedures to the Field Coordinator, IT Project Manager, or the PQAS.

4.2 Surface Sampling Equipment

A number of devices are available for the collection of surface soil samples. These include, but are not limited to: core samplers, hand augers, spoons, scoops, trowels, shovels, triers, etc. These devices are constructed of a number of materials including, but not limited to, stainless steel, brass, glass, teflon, etc.

The sampling and analytical requirements, as well as site characteristics, must be taken into account when determining the proper surface soil sampling equipment to use.

At present, the method commonly used for the collection of surface samples and shallow subsurface samples, both disturbed and undisturbed, is a core sampler. The core sampler is usually a hollow, stainless steel cylinder, tapered at the leading end. A sample sleeve (brass, stainless steel, lexan, etc.) is inserted into the trailing end. The trailing end is then connected to a piston-type drive hammer. The core is driven into the soil by the hammer so that a

relatively undisturbed sample is collected in the sleeve. The sample is then handled and shipped in the sample sleeve.

When a core sample is not feasible or planned, a sample can be collected by using such devices as a shovel, hand auger, trowel, or stainless steel spoon, etc. The soil is transferred from the collection device into decontaminated sample containers (commonly glass jars). The project work plan will specify the type of sampling equipment to be used. The sample containers to be used will also be specified in the project work plan.

4.3 Subsurface Sample Collection

4.3.1 The common method to collect subsurface samples is to use a hand auger to bore to the desired sampling depth and then retrieve the sample with a core sampler. The hand auger might also be used to recover the sample for direct transfer into glass jars. The exact methodology to be used will be specified in the project work plans.

For subsurface samples of less than 18 inches in depth, successive drives of the core sampler may potentially be used to recover shallow subsurface soil samples. In all methods cited above, borehole stability should be maintained to prevent the recovery of slough in the samples. If sloughing cannot be controlled, then another sampling methodology may have to be considered.

4.3.2 Prior to sampling and between sampling locations, decontaminate the sample equipment according to procedures outlined in the project work plan.

4.3.3 Ensure that all subsurface soil sampling locations have been appropriately cleared of all underground utilities and buried objects per the project work plans. Review all forms and diagrams documenting the location of the cleared sampling locations, as well as that of any underground utilities or lines, or other buried objects.

4.3.4 As required, calibrate any health and safety monitoring equipment according to the instrument manufacturer's specifications. Calibration results will be recorded on the appropriate form(s), as specified in the project work plans. Instruments that cannot be

calibrated according to the manufacturer's specifications will be removed from service and tagged.

4.3.5 Don appropriate personal protection equipment as specified in the project work plan.

4.3.6 If using the coring device, place the sleeve into the device and drive the assembly into the soil using the drive hammer. Drive the device into the soil until the trailing end of the sleeve is at the soil surface.

4.3.7 Retrieve the device; check to see that soil recovery is adequate in the sample sleeve. If there is sufficient recovery, mark or note the leading end of the sample sleeve.

4.3.8 If using a different sample collection device (other than the coring device), use the other device to scoop or collect soil and directly transfer the soil into the sample container (e.g., glass jar, brass sample sleeve, etc.). Fill the sample container such that little to no head-space exists.

4.3.9 If using sample sleeves, place teflon tape over each end of the sleeve and seal each end with plastic end caps. With a permanent marker, write a "T" for top on the trailing end and a "B" for bottom on the leading end. Place custody tape over each end cap so that any attempt to remove the cap will cause the tape to be broken.

If using glass jars, cap or seal the jars appropriately and place custody tape over the cap so that any attempt to remove the cap will cause the tape to be broken.

4.3.10 Appropriately label and number the sample containers per the project work plan. The label will be filled out with waterproof ink and will contain, at a minimum, the following information:

- Project number
- Sample number
- Sample location
- Sample depth
- Sample type

- Date and time of collection
- Parameters for analysis
- Sampler's initials.

4.3.11 Document the sampling event and any pertinent field observations, conditions or problems in the Field Logbook. Any encountered problems or unusual conditions should also be immediately brought to the attention of the Field Coordinator.

4.3.12 Appropriately preserve, handle, package, and ship the samples per the project work plan. The samples shall also be maintained under custody per SQP 12, "Chain of Custody," of the LEHR D&D Work Plan.

5.0 Records

5.1 Records generated as a result of this SP will be controlled and maintained in the project record files.

SAMPLE HANDLING, PACKAGING AND SHIPPING

SAMPLING PROCEDURE

1.0 Purpose

This Sampling Procedure (SP) outlines the methods and responsibilities for field personnel to use in the packaging and shipping of environmental samples, hazardous materials and hazardous waste samples for chemical and physical analysis.

2.0 References

2.1 EPA, September 1987, Compendium of Superfund Field Operations Methods, EPA 540/P-87/001a, OSWER 9355.0-14.

2.2 EPA, August 1988, EPA Guidelines for Conducting Remedial Investigation and Feasibility Studies under CERCLA, Interim Final OSWER Directive 9355.3-01.

2.3 Code of Federal Regulations, DOT 49 CFR parts 100 to 177, Revised October 1, 1992.

2.4 Dangerous Goods Regulations, IATA, January 1, 1994.

2.5 SP 1.0 - Subsurface Sampling (Appendix A).

2.6 Work Plan for the Decontamination and Decommissioning of the Imhoff Building, Cobalt 60 Building, and Tank Trailer at the Laboratory for Energy Related Health Research, University of California at Davis.

3.0 Definitions

3.1 Environmental Sample

A limited quantity, low concentration sample that does not require Department of Transportation (DOT) or International Air Transporation Association (IATA) hazardous waste labelling as a hazardous waste or material.

3.2 Hazardous Waste Sample

Medium or high concentration sample requiring either DOT or IATA labelling as a hazardous waste or material.

3.3 Hazardous Waste

Any substance listed in 40 CFR Subpart D (260.30 et seq.) or otherwise characterized as ignitable, corrosive, reactive, or toxic as specified in Subpart C (261.20 et seq.) that would be subject to manifest and packaging requirements specified in 40 CFR 262. Hazardous waste is defined and regulated by the Environmental Protection Agency (EPA).

3.4 Hazardous Material

A substance or material in a quantity or form which may pose an unreasonable risk to health, safety, and/or property when transported in commerce. Hazardous material is defined and regulated by DOT (49 CFR 173.2 and 172.101) and IATA (Section 4.2).

3.5 Sample

Physical evidence collected from a facility or the environment which is representative of conditions at the point and time at which the sample is collected.

4.0 Procedure

4.1 Responsibilities

4.1.1 Compliance with this procedure is the responsibility of project management, site management, health and safety, and field personnel.

4.1.2 Project Manager - is responsible for the development and review of site-specific work plans which address the specific sample handling, packaging, and shipping requirements for

the project. Review the project specific documentation forms to ensure they are appropriate for the field activities.

4.1.3 Field Coordinator (FC) - is responsible for seeing that field personnel receive proper training and maintain quality assurance/quality control (QA/QC). The FC is additionally responsible for approving, coordinating, and supervising all field activities associated with this work plan.

4.1.4 Project Quality Assurance Specialist (PQAS) - is responsible for the periodic review of documentation generated during sample handling, packaging, and shipping and the periodic review and audit of field personnel as they perform the work.

If problems arise, the PQAS is also responsible for swift implementation of corrective action (i.e., retraining personnel, additional review of work plans and procedures, variances to requirements, issuing nonconformances).

4.1.5 Health and Safety Officer (HSO) - is responsible for ensuring complete compliance with the Health and Safety Plan by all personnel on site. He is responsible for ensuring all appropriate protective measures are identified and implemented to adequately protect site workers.

4.1.6 Radiological Controls Technician (RCT) - is responsible for assisting the HSO in the performance of monitoring, posting and evaluation of worksite safety and radiological controls conditions.

4.2 Sample Handling

4.2.1 Inspect the sampling containers (obtained from the analytical laboratory prior to the sampling event) to ensure that they are appropriate for the samples being collected, correctly preserved, and undamaged.

4.2.2 When collecting a sample always use approved/site specific personal protective equipment (e.g., gloves, etc.) to prevent cross-contamination from sample to sample but also as a health and safety requirement.

4.3 Field Packaging

4.3.1 Collect the samples in accordance with the site-specific work plans and Sampling Procedure No. 1 (Appendix A).

4.3.2 As soon as possible after sample collection, tightly seal the container, and place a piece of custody tape over or around the cap. The custody tape should be placed over the cap so that any attempt to remove the cap will cause the tape to be broken. Do not place custody tape over a volatile organic analysis (VOA) vial septum.

4.3.3 Place all containers in separate, appropriately sized, airtight, seam sealing polyethylene bags (e.g., Ziploc™). Seal the bag, removing any excess air.

4.3.4 Place the bagged container inside an insulating shipping container, "cooler." This cooler should have frozen blue ice inside to assure samples remain cool, "4°," during transit from field to the packaging location.

4.3.5 Because blue ice does not maintain the 4°C standard required for sample shipping, it should only be used while in the field collecting samples.

4.3.6 Maintain the samples under chain of custody (COC) (Attachment 6.1) in accordance with the site-specific work plans and appropriate SOPs.

4.4 Sample Packaging

Environmental samples shall be packaged in the following manner. Additional packaging requirements for samples identified as containing a known hazardous material or hazardous waste are contained in References 2.3 and 2.4. The FC shall determine the appropriate hazard classification and shall identify any additional packaging requirements and ensure that they are completed.

4.4.1 Inspect the integrity of the shipping container. The container is generally a "cooler" constructed of heavy plastic or metal with appropriate insulating properties so that variations in temperature during shipping are minimized. Also make sure that the drain plug has been sealed with nylon reinforced strapping tape or mailing tape.

4.4.2 Place two to four inches of absorbent packaging material (e.g., Vermiculite™) in the bottom of the shipping container.

4.4.3 Carefully check the COC record against the collected sample labels and containers to ensure that the sample numbers, sample description, date and time of collection, container type and volume, preservative, and the required analytical methods are correct and in agreement.

4.4.4 Place the samples in the shipping container, allowing sufficient room between the samples to place ice and/or packing material.

4.4.5 Double bag and seal crushed or cubed ice in heavy-duty polyethylene bags. Place these bags of ice on top of and between samples. Blue ice should not be used for sample shipping; it does not maintain the 4°C temperature necessary for regulatory compliance. Include a VOA vial of tap water clearly labeled "temperature check" so that the laboratory can verify the temperature of the samples upon receipt. The remaining space will be filled with packing material.

4.4.6 All samples requiring temperature preservation stated at 4°C will be acceptable "as in" within the range of 4°C ± 2°C. The laboratory should record the temperature of receipt upon the COC. For all samples received from 6°C to 10°C, the sample(s) and temperature (in 1°C increments) will be noted on the COC and then analyzed. For samples with temperatures greater than 10°C, the samples will be rejected by the laboratory for analysis and immediately reported to the Project Manager. For VOA samples below 0°C, the samples will be rejected and also reported.

4.5 Sample Shipping

Environmental samples shall be shipped in the following manner. Additional shipping requirements for samples identified as containing a known hazardous material or hazardous waste are contained in References 2.3 and 2.4. The FC shall identify any additional shipping requirements and ensure that they are completed.

4.5.1 The person in charge of sample custody will time, date, and sign over relinquishment of custody on the COC. When a common carrier is to be used for sample shipment, also record the air/waybill number (tracking number) and the name of the carrier on the COC record. Place the original copy of the COC record in a sealed, clear plastic envelop or bag and tape the COC record envelope to the inside lid of the shipping container. Retain a copy of the COC record for tracking purposes.

4.5.2 Using nylon reinforced strapping tape or mailing tape, seal the shipping container.

4.5.3 Place custody tape over opposite ends of the lid.

4.5.4 Mark the container "THIS END UP," or apply arrow labels that indicate the proper position to be maintained during shipping.

4.5.5 Apply a label stating the name and address of the shipper and the receiving laboratory on the outside of the cooler.

4.5.6 Turn the sample over to the courier or carrier for delivery to the laboratory. All samples should be shipped by the fastest available method to the laboratory as soon as possible after sample collection.

NOTE: The courier or carrier is not responsible for sample custody and is not required to sign the COC.

4.5.7 Contact the appropriate laboratory personnel to advise them of the sample shipment.

4.5.8 Review the COC and sample collection forms for completeness and turn them over to site or project management.

5.0 Records

5.1 Records generated as a result of implementation of this procedure will be controlled and maintained in the project record files.

6.0 Attachments

6.1 Analysis Request and Chain of Custody Record

MZ/09-19-95/UCDAVIS/SP2.0

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No. 368244
Page 1 of ____

Project Name/No. [1]
Sample Team Members [2]
Profit Center No. [3]
Project Manager [4]
Purchase Order No. [6]
Required Report Date [11]

Samples Shipment Date [7]
Lab Destination [8]
Lab Contact [9]
Project Contact/Phone [12]
Carrier/Waybill No. [13]

Bill to: [5]

Report to: [10]

ONE CONTAINER PER LINE

Sample Number [14]	Sample Description/Type [15]	Date/Time Collected [16]	Container Type [17]	Sample Volume [18]	Pre-servative [19]	Requested Testing Program [20]	Condition on Receipt [21]	Disposal Record No. [22]

Special Instructions: [23]

Possible Hazard Identification: [24]
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal: [25]
Return to Client ☐ Disposal by Lab ☐ Archive (mos.)

Turnaround Time Required: [26]
Normal ☐ Rush ☐

QC Level: [27]
I. ☐ II. ☐ III. ☐ Project Specific (specify):

1. Relinquished by [28] (Signature/Affiliation)	Date: Time:	1. Received by [28] (Signature/Affiliation)	Date: Time:
2. Relinquished by (Signature/Affiliation)	Date: Time:	2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:	3. Received by (Signature/Affiliation)	Date: Time:

Comments: [29]

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

ATTACHMENT 6.1

SOP NO. 2.0
REVISION NO. 0
DATE: 09/15/95

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U. C. DAVIS LEHR D&D PROJECT

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Work Plan, DOE Disposal Box Excavation and Sampling Laboratory for Energy Related Health Research (LEHR) University of California at Davis Variance 039	0

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