8041
TA-3

Los Alamos National Laboratory

Environmental Restoration Project

EXPEDITED CLEANUP PLAN

for

SOLID WASTE MANAGEMENT UNIT 3-056(c)

June 1995
Revision 0

Environmental
Restoration

5459

ACRONYMS

AR	administrative requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
COPC	chemical of potential concern
DOE-LAAO	Department of Energy Los Alamos Area Office
EC	expedited cleanup
EPA	US Environmental Protection Agency
ER	Environmental Restoration
HASP	health and safety plan
Laboratory	Los Alamos National Laboratory
PCE	tetrachloroethylene
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act facility investigation
SAL	screening action level
SOP	standard operating procedure
SSHASP	Site-Specific Health and Safety Plan
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TCA	trichloroethane
TSCA	Toxic Substance Control Act
TSD	treatment, storage, and disposal
UTL	upper tolerance limit
VOC	volatile organic compound
WAC	waste acceptance criteria
XRF	x-ray fluorescence

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1.0 INTRODUCTION

This Expedited Cleanup (EC) Plan addresses Solid Waste Management Unit (SWMU) 3-056(c), located in the northwest portion of Los Alamos National Laboratory (the Laboratory), in Los Alamos, New Mexico (Figure 1-1). This EC Plan is being proposed as part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) process described in the Operable Unit (OU) 1114 RFI Work Plan (LANL 1993, 1090).

SWMU 3-056(c) is included in Table A of the Hazardous and Solid Waste Amendments (HSWA) module of the Laboratory's RCRA permit.

SWMU 3-056(c) is an inactive electrical equipment storage area located at Technical Area (TA)-3. Preliminary results from the Phase I RFI sampling efforts indicate that soils within the SWMU boundaries contain elevated levels of polychlorinated biphenyls (PCBs). These data indicate that this soil contamination may pose an immediate threat to the environment and possibly to worker safety. Wastes generated by the cleanup of SWMU 3-056(c) may be classified as a Toxic Substance Control Act (TSCA)-regulated waste.

Activities comprising this EC include the removal of PCB-contaminated soil from the SWMU. The level of effort required from initial transmittal of the plan to EPA for review, through implementation, to the completion of the final project report is identified in this EC Plan. In the development of this EC Plan, the following assumptions were made:

- The PCB concentrations and expected volume of PCB-contaminated soil are consistent with interpretations based on the existing data;
- Based on current Laboratory land use planning, future land use at the location of this SWMU will continue to be for industrial purposes;
- Minimal delays in EC operations will be experienced as a result of inclement weather and site access problems. Delays that may result from the acquisition and scheduling of heavy equipment and from waste acceptance at a permitted disposal facility cannot be anticipated and, therefore, are not considered within this plan;
- A Site-Specific Health and Safety Plan (SSHASP) and Waste Management Checklist will be developed specifically to address contaminants of concern (COCs) identified in this EC Plan. Deviations from the anticipated concentrations and locations of COCs may necessitate adjustments to both plans;
- Any comments generated by agencies for public review may necessitate adjustments to the scope of this EC Plan. Activities will be performed on a continuous basis during regular business hours, weather permitting, until verification samples indicate that all cleanup levels are met; and
- Cost estimates are based on completing the proposed cleanup by removing contaminated soil to a depth of approximately 18 inches.

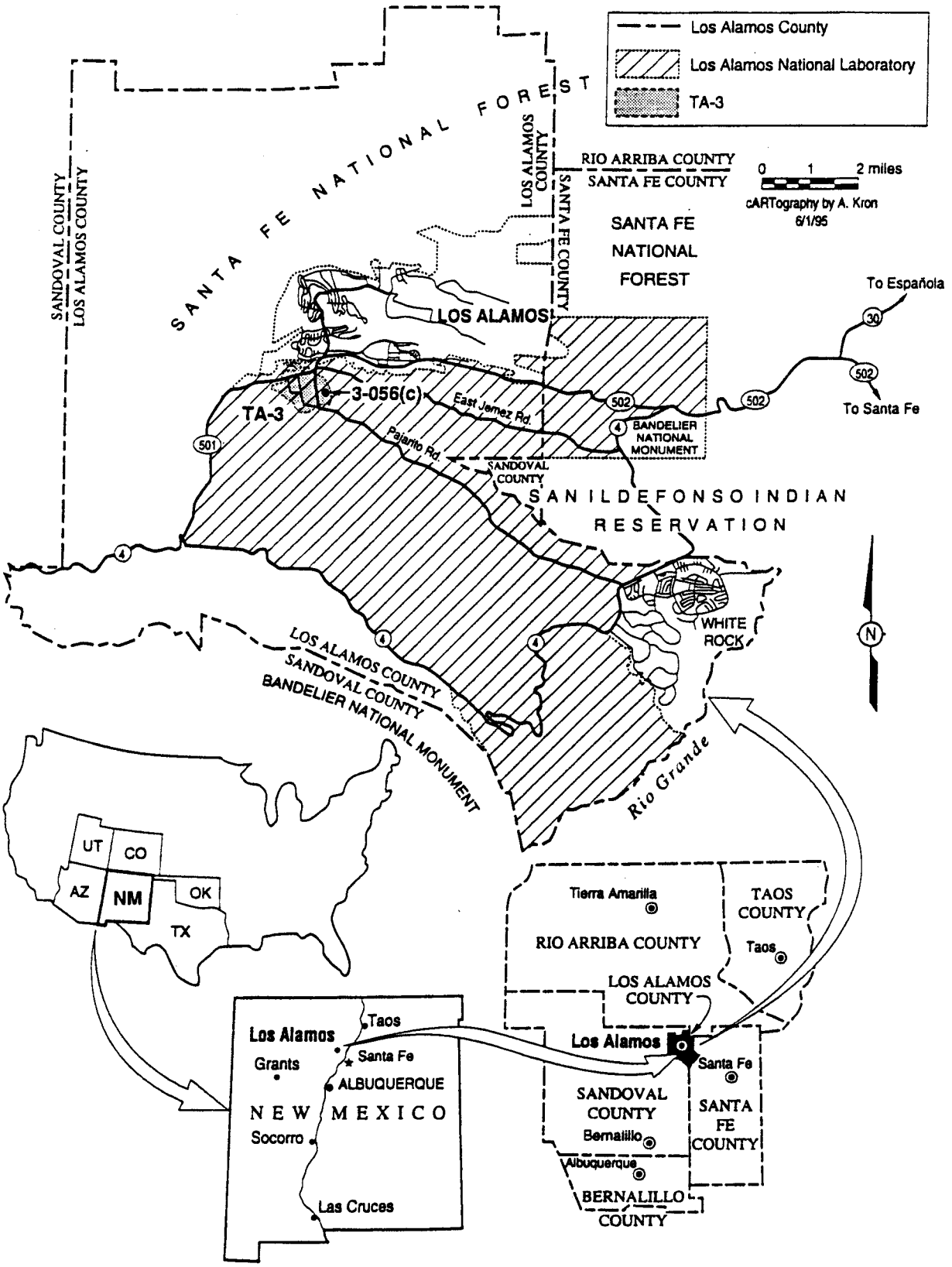


Figure 1-1. Regional location map.

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING

2.1 Detailed Description of SWMU 3-056(c)

SWMU 3-056(c) is an inactive storage area located on the north side of a Utilities Shop, TA-3-223 (Figure 2-1). The SWMU extends along the length of TA-3-223, and is bounded by a fence to the north and TA-3-223 to the south. Included within the SWMU boundary is an area downgradient from the storage area that drains to a tributary of Sandia Canyon. A small portion of this area (located north of northeast corner of TA-3-223 near the fenceline) was used as a storage area for electrical equipment. Items previously stored in this area include capacitors and transformers with PCB-containing dielectric fluids as well as unmarked drums that may have contained waste oils and solvents (LANL 1993, 1090).

2.1.1 Operational History

SWMU 3-056(c) was used as a storage area for electrical equipment, new and used dielectric fluids, and waste solvent from 1967 to approximately 1992. Solvents were used to clean electrical equipment; the types of cleaning solvents potentially used and stored at the site include an unknown solvent from 1967 to approximately 1981 and Viking R30 (trichloroethane - TCA) from 1981 to 1990. Since 1990, a nonhazardous citrus-based solvent has been used to clean electrical equipment. Transclene (tetrachloroethylene - PCE) may have been stored at the site as it was used by an electrical equipment maintenance subcontractor to retrofill transformers in the field. The subcontractor was responsible for the disposal of all waste materials from this activity; hence no wastes were returned to the SWMU 3-056(c) storage area. In 1991, approximately one to two feet of clean fill was placed on the site and surrounding area to correct drainage patterns. The SWMU 3-056(c) storage area was decommissioned in 1992 (LANL 1995, 3-1232).

2.1.2 Physical Setting

SWMU 3-056(c) is located on Sigma Mesa on the southern flank of Sandia Canyon in Los Alamos County. Los Alamos County has a semi-arid, temperate mountain climate. Precipitation at the site averages approximately 18 inches per year. Recorded extremes in precipitation range from 6.8 to 30.3 inches per year. Snowfall averages 51 inches per year.

The prevalent soil type on the mesa top is the Carjo loam, which consists of moderately deep, well-drained soils that formed in material weathered from tuff. Pleistocene ash flows of the Bandelier Tuff directly underlie the soil at depths ranging from 1.5 to 3.5 feet. The depth to the main aquifer is estimated to be from 950 to 1200 feet below ground surface.

SWMU 3-056(c) lies entirely on US Department of Energy (DOE)-owned land, and is removed from public access roads. In the foreseeable future, it is anticipated that the land will continue to be used for industrial purposes (Laboratory operations) based on current Laboratory land use planning (LANL 1994, 1171).

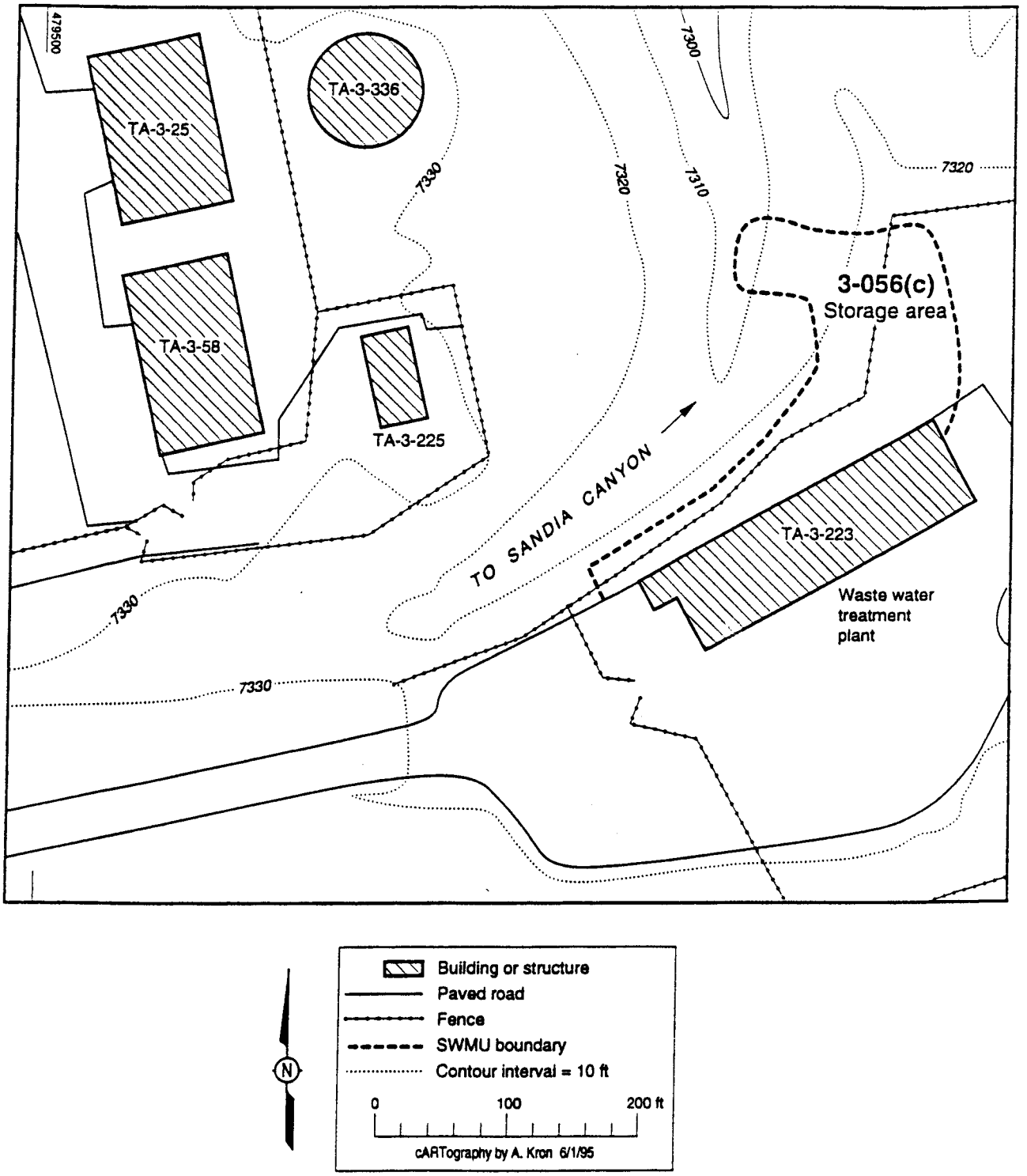


Figure 2-1. Location map for SWMU 3-056(c).

2.2 Summary of Investigations

2.2.1 Investigations Prior to RFI

In November 1991, five surface (0 to 3 inches) soil samples were collected along the fence north of TA-3-223 as part of an interim action reconnaissance survey prior to initiation of a slope stabilization project (LANL 1991, 3-498). The approximate locations of these samples are shown on Figure 2-2. The soil samples were screened for gross alpha, beta, and gamma radioactivity before submittal for metals, tritium, and volatile organic compounds (VOCs) analyses. Analytical results from the interim action reconnaissance survey indicated that PCB concentrations in one sample (PF-223-5) were 9600 ppm and the mercury concentration in one sample (PF-223-1) was 0.471 ppm.

2.2.2 RCRA Facility Investigation

In August 1994, SWMU 3-056(c) was sampled as part of the Phase I RFI for OU 1114. The sampling approach was designed to determine the extent of PCB contamination. Information from the RFI Work Plan for Operable Unit 1114 (LANL 1993, 1090) and results from field test kit analyses and the previous investigation were utilized to assist in the selection of 18 sample locations. These 18 sample locations are shown on Figure 2-2. These locations were sampled from depths ranging from 0 to 36 inches; the soil/tuff interface was encountered before reaching a depth of 36 inches at several locations. Samples were submitted to a fixed laboratory for one or more of the following analyses: Appendix VIII metals, PCB/pesticides, semivolatile organic compounds (SVOCs), and/or volatile organic compounds (VOCs). Twenty-two samples were submitted for analysis of metals, 13 samples were submitted for analysis of PCBs/pesticides/SVOCs, and 11 samples were submitted for analysis of VOCs. Specific details of sampling locations, sample intervals, and associated analyses are outlined below:

- Samples collected from the 0- to 6-inch interval at locations 3-2200 through 3-2206 and from the 0- to 18-inch interval at locations 3-2207 through 3-2217 were submitted for analysis of Appendix VIII metals.

- Samples collected from the 0- to 6-inch interval and the 12- to 18-inch interval at locations 3-2207, 3-2208, 3-2209, 3-2212, 3-2213, and 3-2214 were submitted for analysis of PCBs/pesticides/SVOCs and VOCs, respectively.

- Samples collected from the 0- to 6-inch interval and the 18- to 24-inch interval at location 3-2200 and were submitted for analysis of PCBs/pesticides/SVOCs; the 18- to 24-inch interval was also submitted for analysis of Appendix VIII metals.

- Samples collected from the 0- to 6-inch interval and the 12- to 18-inch interval at location 3-2201 were submitted for analysis of PCBs/pesticides/SVOCs; the 12- to 18-inch sample interval was also submitted for analysis of Appendix VIII metals.

- Samples collected from the 0- to 6-inch interval, the 12- to 18-inch interval, and the 30- to 36-inch interval at location 3-2202 were all submitted for analysis of PCBs/pesticides/SVOCs. In addition, the 12- to 18-inch sample interval was submitted for analysis of Appendix VIII metals, and the 30- to 36-inch sample interval was submitted for analysis of Appendix VIII metals and VOCs.

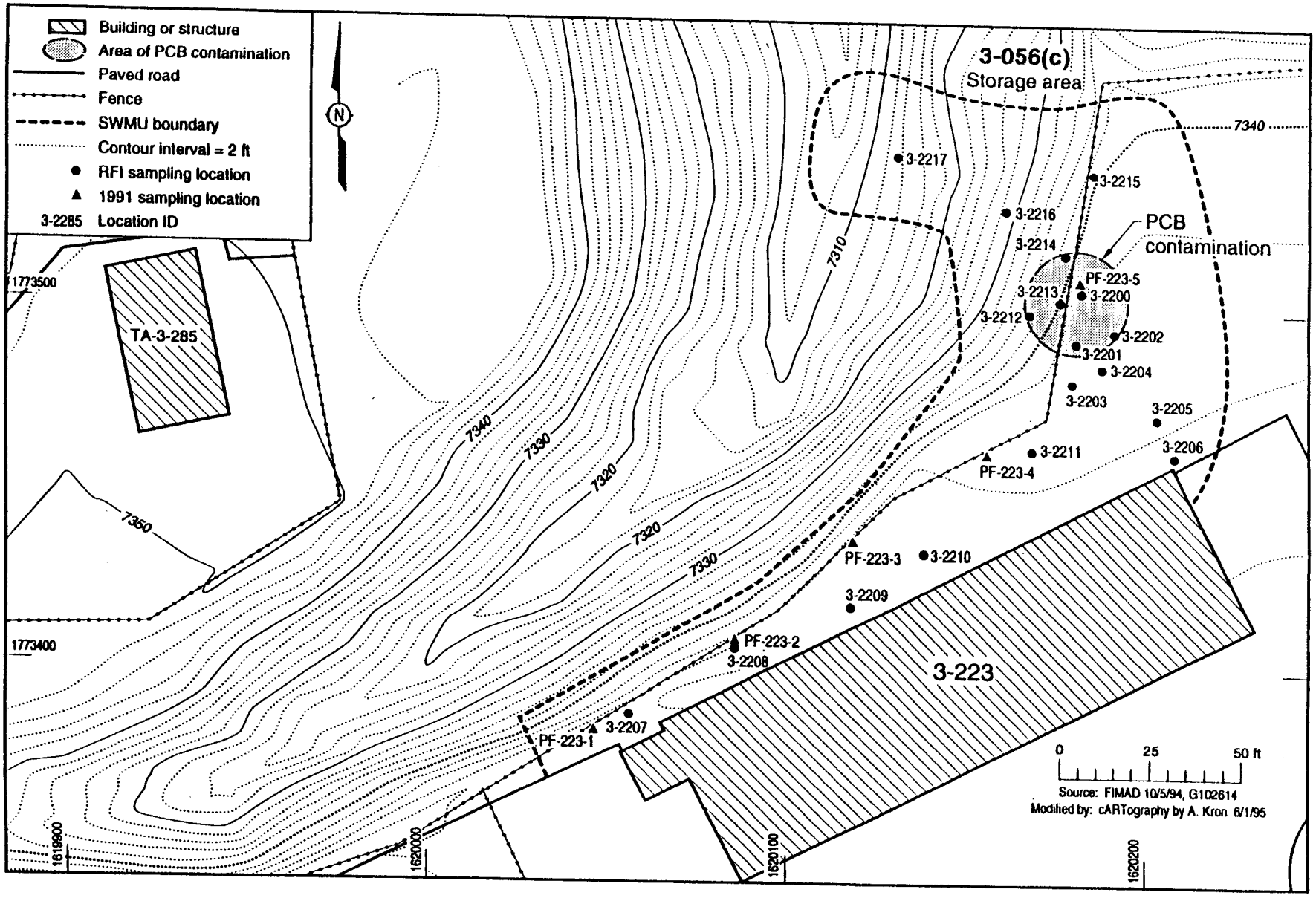


Figure 2-2. SWMU 3-056(c) site sketch.

- A sample collected from the 12- to 18-inch interval at location 3-2205 was submitted for analysis of VOCs.

- Samples collected (based on field-screening) from the 12- to 18-inch interval, 18- to 24-interval, and the 30- to 36-inch interval at location 3-2206 and were submitted for analysis of VOCs.

2.2.3 Summary and Evaluation of Results

Annex 6.9 presents a summary of the RFI analytical sampling results reported above detection limits for all RFI samples collected at the site. The detected concentrations, screening action levels (SALs), and upper tolerance limits (UTLs) for background concentrations in soil are also presented for comparison. Based on preliminary review of the RFI sampling data, the results are summarized as follows:

- PCBs were detected at eight of the 18 sample locations on the mesa and north of the fence on the slope; the PCB compounds detected include Aroclors 1242, 1254, and 1260. The PCBs were detected in the same vicinity as the high PCB concentration detected (PF-223 #5) from the interim action reconnaissance survey. The highest concentrations (980 ppm maximum at location 3-2201) occur in surface soils (0 to 18 inches) and diminish dramatically with depth. The areal extent of PCB contamination is shown on Figure 2-2.

- Tetrachloroethylene (PCE) was detected significantly below the Laboratory screening action level (SAL) of 1 ppm at locations 3-2202 and 3-2206 at concentrations of 0.044 and 0.009 ppm, respectively. These concentrations were detected at a depth interval of 30 to 36 inches in each sample and are not collocated with high PCB concentrations.

- Mercury was detected in three samples significantly below the Laboratory SAL of 24 ppm at locations 3-2201, 3-2207, 3-2216 at concentrations of 0.04, 1.7 and 0.2 ppm, respectively. These concentrations were detected to a depth of 18 inches.

Results from the previous investigations indicate that PCBs are the COCs for this site and require remediation. Based on the site history presented in Section 2.1 and the limited detections of PCE and mercury at concentrations below SALs and established cleanup levels, these constituents should not pose an unacceptable risk to human health and the environment.

2.3 Types and Volumes of Waste Present

The nature of the wastes expected to be generated by the proposed cleanup is presented in Table 2-1.

Surface and subsurface soil samples revealed the presence of elevated levels of PCBs in soils to a depth of approximately 18 inches. Once excavated, the soil will be considered TSCA-regulated waste. As described in Section 3.3, PCB-contaminated soils will be excavated and placed directly into bulk containers on site prior to transport to and disposal at a permitted chemical waste landfill.

In addition, a small volume of solid and liquid wastes will be generated from verification sampling; this activity is described in Section 3.5. Wastes associated with this effort include disposable sampling equipment, personal protective equipment (PPE), and decontamination water. Pending characterization, these waste materials will be handled in accordance with the site-specific Waste Management Checklist as potentially PCB-contaminated (TSCA-regulated) waste.

TABLE 2-1
ANTICIPATED WASTE VOLUMES

Item	Type	Anticipated Volume
Sampling waste/PPE	solid - potentially PCB contaminated	6 cubic feet
Contaminated soils	solid - PCB contaminated	740 cubic feet
Decontamination waste	liquid - potentially PCB contaminated	35 cubic feet

2.4 Potential Impacts on Public Health and the Environment

Receptors of possible PCB contamination include animals and humans. Potential exposure routes to receptors include the following:

- Dermal contact with PCB-contaminated soil or sediment;
- Inhalation of PCB-contaminated soil or sediments; and
- Ingestion of PCB-contaminated soil or sediments.

2.4.1 Potential Pathways

2.4.1.1 SWMU In Place

If the contaminated soil remains in place, several mechanisms are available to transport contaminants from their current location. These mechanisms include:

- surface water runoff (across the contaminated area);
- erosion of soil and sediments; and
- wind dispersion.

Because PCB contamination was also detected downgradient of the area where electrical equipment was stored (north of the fence), the primary mode of migration appears to be via sediment transport in surface water runoff. The relative insolubility of PCBs limits migration via dissolution into surface water runoff and infiltration.

2.4.1.2 SWMU Remediation

Potential pathways for PCB migration during remediation/excavation of the soils are generally the same as those described above in Section 2.4.1.1. While excavation activities will increase the potential for sediment transport and wind dispersion, precautions will be taken to minimize these pathways during remediation/excavation activities. Appropriate dust suppression techniques will be utilized to prevent contaminants from becoming airborne. Covered storage containers for excavated materials and plastic sheeting covering the excavated area will prohibit rainwater and/or runoff from contacting potentially contaminated material.

2.4.2 Future Land Use

SWMU 3-056(c) lies entirely on DOE-owned land on Sigma Mesa. The entire area is used strictly for industrial purposes and is expected to remain so for the foreseeable future, as stated in the Laboratory's *Site Development Plan Annual Update 1994* (LANL 1994, 1171).

2.4.3 Cleanup Levels

Results from the previous investigations indicate that PCBs are the only COCs for this EC, and therefore, cleanup levels have been determined for these compounds. Based on the site history presented in Section 2.1, and the limited detections at concentrations below SALs and established cleanup levels, the PCE and mercury at this site should not pose an unacceptable risk to human health and the environment. Also, the reported low concentrations are at locations and depths that should allow for the remediation of soils contaminated with PCBs above cleanup levels without triggering additional waste management and disposal requirements.

For PCBs, the cleanup levels identified are based on the 28 October 1994 position paper prepared by the ER Assessments Council entitled *Guidance for Evaluation and Cleanup of PCBs in Soil* (LANL, 1994) and the TSCA PCB Spill Cleanup Policy. A PCB cleanup level of 25 ppm is proposed for the portion of the area to the north of TA-3-223 where access is restricted by a fence (see Figure 2-2), which meets the definition of an "other restricted access area" under 40 CFR 761.123. For portions of the SWMU located north of the fence, but still on Laboratory property and designated for continued industrial use, a PCB cleanup level of 10 ppm is proposed, in accordance with requirements for "commercial non-restricted access areas."

As previously discussed in Section 2.1, releases of PCBs from electrical equipment stored at this site likely occurred predominantly from 1964 through approximately 1992. Some of these releases appear to have occurred after 11 May 1987 since many of the PCB detections were located in fill material that was placed within the fenced yard in approximately 1991. Although the PCB Spill Cleanup Policy described in Subpart G of TSCA applied to spills which occur after 11 May 1987, the policy has also been used in the cleanup of historical spills, particularly in the context of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation. According to the preamble of EPA's proposed PCB rules dated 6 December 1994, "it has been the Agency's experience that the essential features of the 1987 TSCA policy are workable and yield protective cleanup results for historical spills of PCBs."

Attainment of these cleanup levels will be considered achieved when the upper 95% confidence level of the mean concentration of PCBs remaining in the excavated area, as demonstrated by verification sampling, is equal to or less than the established cleanup levels.

3.0 EXPEDITED CLEANUP

3.1 Overview and Rationale

Phase I RFI sampling results indicate that PCBs exceeding cleanup levels exist in the surface soils on the north side of building TA-3-223, and the excavated soils will be classified as a TSCA-regulated waste. Excavation of PCB-contaminated soils at the site will be conducted to prevent the contaminants from spreading beyond the current location. This action will minimize the potential risk to human health and the environment. Verification samples will be collected to confirm that the PCBs have been removed and disposed in accordance with this plan.

3.2 Permitting, Approval, and Notification Requirements

An excavation permit will be prepared and submitted for approval before execution of this plan.

Documentation will be prepared in accordance with Laboratory Environmental Restoration (ER) Administrative Procedure (AP) LANL-ER-AP-05.1, Rev. 0, Readiness Review for Environmental Restoration Program Field Activities (LANL 1993, 0951). Key documents to be prepared for this review include a Site-Specific Health and Safety Plan (SSHASP) and site-specific Waste Management Checklist. Personnel training requirements will be specified and will require completion prior to implementation of this EC Plan. Site workers must have received all required training for this project as specified in the SSHASP.

3.2.1 Regulatory Notification/Permit Modifications

SWMU 3-056(c) is included in Table A of the original HSWA Module. Implementation of this EC will require a Class III modification to the Laboratory's HSWA Module. EPA and the New Mexico Environment Department (NMED) have been notified of this project, and a request for a permit modification has been submitted. Implementation of this EC will proceed after receipt of EPA approval.

3.2.2 DOE Approval

If the Laboratory intends to implement this EC prior to receiving EPA approval, DOE approval must be documented through receipt of the signed Field Work Approval Form (Annex 6.7).

3.3 Cleanup Activities

Excavation, transportation, and disposal of PCB-contaminated soil from this site will be conducted by an approved and permitted waste treatment, storage, and disposal (TSD) subcontractors currently under contract with the Laboratory. Site access, preparation, and restoration will be arranged and completed by JCI, the Laboratory maintenance subcontractor.

Prior to excavation, soil samples will be collected from approximately 10 locations at the site to confirm, 1) the areal extent of PCB contamination, and 2) that the reported existence of low levels of PCE at depth do not pose an unacceptable risk to human health and the environment. Soil samples will be collected around the perimeter of the identified PCB contamination (atop the mesa and on the slope) as well as in the vicinity of the two PCE detections (locations 3-2202 and 3-2206). Samples will be collected from surface and near-

surface soils (0- to 18-inch depth) for analysis of PCBs while samples will be collected from the soil/tuff interface for analysis of VOCs (i.e., PCE). During sample collection, three headspace screening analyses will be conducted along the length of each sample core to confirm the presence or absence of VOCs. These samples will be field-analyzed in a mobile analytical laboratory using EPA Method (SW-846) 8080 for PCBs and EPA Method (SW-846) 8260 for volatile organic compounds (VOCs), respectively. All analytical tests and reports will include EPA Level 3 data. Any additionally identified PCB contamination will be marked for excavation. If VOCs are detected, additional samples will be collected and field-analyzed to determine nature, concentrations, and extent; these results will be evaluated to determine whether an unacceptable risk exists. Based on the RFI Phase I analytical results, the PCBs and PCE are not collocated; hence, the cleanup of PCB contamination will proceed as proposed in this EC Plan.

Based on the RFI Phase I analytical results, the PCB contamination exceeding the cleanup levels at this site extends to a maximum depth of 18 inches (both atop the mesa and on the slope). PCB-contaminated soil will be removed in the proposed cleanup area using a backhoe or shovels, as required by site conditions and as determined by the approved waste TSD subcontractor. The expected volume of PCB-contaminated soil to be excavated, transported, and land disposed is approximately 30 cubic yards (740 cubic feet). During excavation activities, samples from bulk soils will be collected and analyzed in accordance with the waste acceptance criteria (WAC) of the TSD subcontractor (to ensure waste is properly characterized). Initial verification samples will be collected on the nodes of a 5-ft. by 5-ft. grid within the excavated area; these samples will be submitted for on-site field laboratory analysis of PCBs and VOCs (by the methods described above). Additional soil will be excavated in 6-inch lifts where results indicated that PCB cleanup levels have not been met, until field laboratory analytical results indicate that any remaining PCB concentrations meet the cleanup criteria. Final verification samples will be collected and submitted for fixed laboratory analysis of PCBs and VOCs, as described in Section 3.5.

VOCs (i.e., PCE) are not anticipated to be encountered during sampling. However, if VOCs are detected, additional samples will be collected and field-analyzed to determine nature, concentrations, and extent. The VOC results will be used to evaluate, 1) whether further VOC characterization is required, 2) an unacceptable risk exists and cleanup is required, or 3) specific VOC cleanup criteria are already met. These results will also be used to ensure that all waste management, disposal, and health and safety issues have been addressed. If cleanup is required, the soil cleanup level for PCE is 31 mg/kg. This level was set at a concentration that would result in an estimated noncarcinogenic hazard index of one or less for the occupational exposure scenario. The equation and assumptions used for the calculation of this cleanup level is provided in Annex 6.10. It should be noted that this cleanup level is based on an excess cancer risk of 1E-06, which is conservative given that exposure is highly unlikely due to the restricted access of this area. Attainment of this cleanup level will be considered achieved as described in Section 2.4.3.

3.4 Waste Management Issues

As discussed in Section 2.3, wastes to be generated during this EC include contaminated soil, used personal protective equipment (PPE), and decontamination rinse water. Solid wastes will be disposed at a permitted chemical waste landfill, as arranged by the waste TSD subcontractor, and decontamination rinse water will be characterized in accordance with the site-specific Waste Management Checklist.

3.4.1 Characterization of Materials for Disposal

Previous analyses and/or field laboratory analytical results from samples collected will be used to initially profile the excavated soils, PPE, and sampling equipment in accordance with the site-specific Waste Management Checklist and waste acceptance criteria (WAC) for the

TSD facility. During excavation activities, samples from bulk soils will be collected and analyzed in accordance with the waste acceptance criteria (WAC) of the TSD subcontractor (to ensure waste is properly characterized prior to transportation offsite).

3.4.2 Treatment, Storage, and Disposal Plans for Waste

The excavated soils, PPE, and sampling equipment will be transported to a permitted chemical waste landfill facility for final disposal, as arranged by the waste TSD subcontractor. No treatment of these solid wastes is required. Decontamination rinse water will be disposed in accordance with the site-specific Waste Management Checklist. These liquid wastes may require treatment and disposal at the Laboratory Wastewater Treatment Facility (TA-50).

3.5 Verification Plan

The verification plan prepared for this EC Plan is based upon the guidance outlined in the EPA guidance document entitled *Verification of PCB Spill Cleanup by Sampling and Analysis* (EPA 1985). The applicable section of this document are in Annex 6.11. The geometry of the PCB contamination is approximately circular and centered along the fenceline. The sampling strategy will employ grab samples collected according to a hexagonal grid pattern as proposed in the guidance document. A seven-point grid will be used to collect samples located equidistant from each other within the excavated area representing the area of contamination.

Soil samples collected during the RFI detected PCBs oriented in a circular area approximately 28 feet in diameter and centered along the fenceline. The EPA verification guidance proposes that the distance, *s*, between sampling points be calculated according to the following formula:

$$s = (0.87)\ R$$

where R is the radius of the sampling circle.

The distance between sampling points for SWMU 3-056(c) is calculated to be 12.2 feet, when R for this site is 14 feet. Seven grab samples are considered sufficient coverage for verification since the distribution of residual PCBs has been spread over several years due to water transport and erosion. A summary of verification samples and analysis for SWMU 3-056(c) is presented in Table 3-1. Samples will be collected from these seven locations and submitted for fixed laboratory analysis of PCBs; VOC analysis will also be performed to ensure that all waste management and disposal issues have been addressed.

3.6 Site Restoration

When verification sample results confirm that the site has been remediated in accordance with this plan, the excavated area will be returned to the original grade and revegetated if necessary. Backfill material will consist of uncontaminated soil excavated from the site and clean backfill obtained from the Laboratory maintenance contractor.

3.7 Acceptance Inspection

The Laboratory proposes an Acceptance Inspection as the mechanism for DOE and EPA to assess that the Laboratory has implemented this EC Plan effectively. A minimum of 10 days' notification will be provided to the agencies before the start of field activities. At this time, a tentative date for the inspection will be agreed upon.

TABLE 3-1
SUMMARY OF VERIFICATION SAMPLES AND ANALYSES FOR SWMU 3-056(c)

Sample Description	Field Screening					Field Laboratory Analysis					Fixed Laboratory Analysis					
	Beta-Gamma	Alpha	Organic Vapor (head space)	Radiological Smear & Swipe Techniques	XRF	PCBs	VOCs (SW 8260)*	SVOCs (SW 8270)*	Metals (ICPES)	Gross Gamma, Alpha, Beta	PCBs	VOCs (SW 8260)*	Metals (SW 6010/7000)*	SVOCs (SW8270)*	Total Uranium	Gamma Spectrometry
Initial Soil Samples			30			10	10									
Surface Soil Samples						35	35				7	7				
Duplicate						2	2				1	1				
Decontamination Water						1	1									
Excavation Equipment																

Note: Additional samples may be taken based on field surveys and observations.
*: Applicable EPA SW 846 methods.

An inspection checklist will be used to document the scope of the inspection and will become part of the EC Report. The checklist and the timing of the inspection will be developed by the Laboratory and agreed to by the other agencies. This inspection checklist will contain specific items, components, and requirements agreed upon by all parties to be inspected that will constitute acceptance of remediation activities. Possible checkpoints at which the inspection is conducted are: during excavation, at completion of verification sampling, or after final site restoration.

3.8 Final Report

After field activities are completed and all analytical results from the verification samples obtained a final report on the EC will be prepared. This report will outline the EC process and the "as left" condition of the site. A proposed outline for this report is presented as Annex 6.8. The final report will be submitted to EPA within 14 days of receipt of verification sample results.

4.0 PROJECT MANAGEMENT

Overall implementation of this EC will be managed by Garry Allen, the Field Unit One Project Leader (FPL). Derek Faulk will serve as Field Team Manager (FTM) for the EC field activities

4.1 Staff and Resource Requirements

Total anticipated cost for the EC is $60,200 as detailed below:

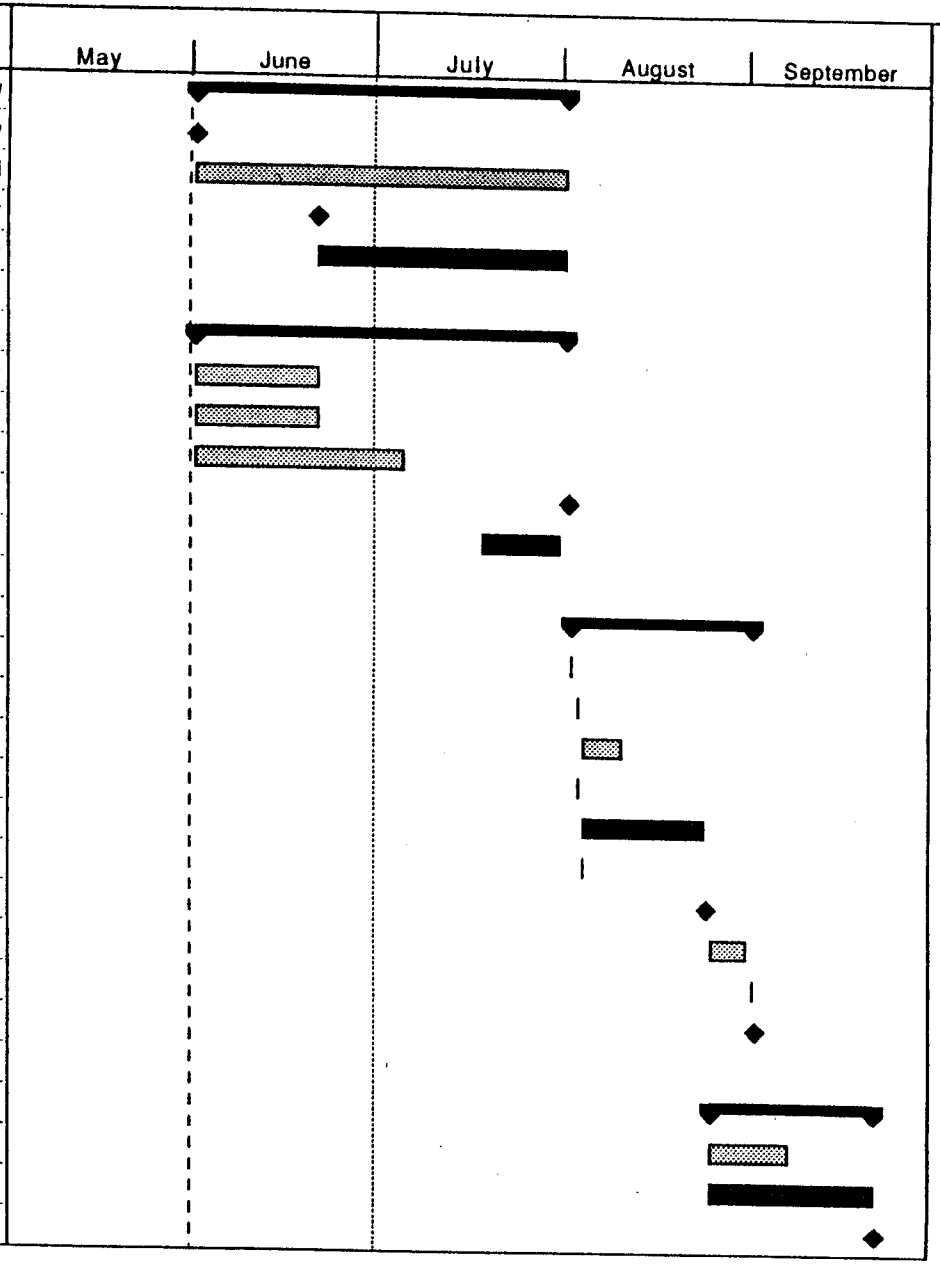
Pre-Field Activities		
Preparation of Waste Management Checklist		$2,500
Preparation of Site-Specific Health and Safety Plan		2,500
Site Preparation/Subcontracting Scheduling		3,500
Subtotal		$8,500
Field Activities		
TSD Subcontractor (excavation, transportation, disposal of waste)		$21,000
Site restoration		3,600
Subtotal		$24,600
Personnel Costs		
FTL	$70/hr x 5 days	$2,800
Site Health & Safety Officer	$70/hr x 5 days	2,800
Sample Technician	$60/hr x 5 days	2,400
Subtotal		$8,000
Analytical Costs		
Mobile analytical van	$2000/day x 5 days	$10,000
Verification sampling	8 samples x ($125 + $200)	2,600
Subtotal		$12,600
Post-Field Activities		
Acceptance Inspection (including preparation of checklist)		$4,000
Final Report		2,500
Subtotal		$6,500
TOTAL ESTIMATED COST		**$60,200**

4.2 Schedule

The proposed EC schedule is shown in Table 4-1. The submittal of this EC Plan to EPA in June 1995 will initiate the 60-day public review/comment period. No sooner than 15 days after the start of this period, a public meeting will be held. Preparation for field work will be conducted concurrent to the public review period. Field work will be initiated within 10 days of agency and public approval or receipt of EPA temporary authorization to proceed.

TABLE 4-1 PROPOSED SCHEDULE - SWMU 3-056(c)

ID	Name	Duration
1	1.0 PUBLIC ACCEPTANCE	8.77ew
2	1.1 SUBMIT EC PLAN TO EPA	0 w
3	1.2 PUBLIC COMMENTS	44d
4	1.3 PUBLIC MEETING	0ew
5	1.4 RESPOND TO PUBLIC COMMENT	6 w
6		
7	2.0 PLANNING	8.77ew
8	2.1 PREPARE/REVISE HEALTH AND SAFETY PLAN	3 w
9	2.2 PREPARE/REVISE WASTE MANAGEMENT CHECKLIST	3 w
10	2.3 FIELD WORK PLANNING	5 w
11	2.4 FIELD WORK APPROVAL FORM SIGNED	0 w
12	2.5 10-DAY NOTIFICATION OF FIELD WORK	2 w
13		
14	3.0 IMPLEMENT EXPEDITED CLEANUP	4.34ew
15	3.1 MOBILIZATION	0.2w
16	3.2 INITIAL SAMPLING	0.2w
17	3.3 PERFORM EXCAVATION	1 w
18	3.4 VERIFICATION SAMPLING	0.2w
19	3.5 VERFICATION ANALYSIS	3 w
20	3.6 ACCEPTANCE INSPECTION	0.2w
21	3.7 ANALYSIS COMPLETE	0 w
22	3.8 SITE RESTORATION	1 w
23	3.9 DEMOBILIZATION	0.2w
24	3.10 COMPLETE EC	0 w
25		
26	4.0 REPORT PREPARATION	3.91ew
27	4.1 VALIDATE SAMPLE DATA	2 w
28	4.2 PREPARE FINAL REPORT	4 w
29	4.3 SUBMIT REPORT	0 w



Project:
Date: 5/31/95

Critical
Noncritical
Progress
Milestone
Summary

Los Alamos National Laboratory

4.3 Stakeholder Notifications

Stakeholder notifications are an integral part of the procedure for conducting ECs. ER Project personnel will notify state and local governments, external and internal stakeholders, and individuals on the ER Project mailing list of the availability of the EC Plan. The EC Plan will be available to the stakeholders at the Laboratory Community Reading Room in Los Alamos; the document repositories at the public libraries in Los Alamos, Espanola, and Santa Fe; and the San Ildefonso Pueblo Governor's office.

The submission to EPA of this EC Plan will trigger publication of a public notice starting a 60-day comment period.

5.0 REFERENCES

EPA (US Environmental Protection Agency), 1985. "Verification of PCB Spill Cleanup by Sampling and Analysis," EPA-560/5-85-026, Washington, DC. (EPA, 1985).

EPA (US Environmental Protection Agency), 1991. "Development of Risk-Based Preliminary Remediation Goals," RAGS, Part B, Washington, DC. (EPA, 1991).

LANL (Los Alamos National Laboratory), May 29, 1995. "Interviews with JCI Electrical Maintenance Personnel at TA-3-223, Re: Operating History of Storage Area SWMU 3-056(c)," Memorandum prepared by ERM (Environmental Resources Management) under contract 9-X52-F2078-1, Los Alamos, NM. (LANL 1995, 3-1232).

LANL (Los Alamos National Laboratory), November 26, 1991. "An Environmental Restoration Interim Action (ERIA) Reconnaissance Survey on the North Side of Building TA-3-223," Los Alamos National Laboratory memorandum EM-8:91-650 to R. Gonzales (EM-13) from P. Fresquez (EM-8), Los Alamos, NM. (LANL 1991, 3-498).

LANL (Los Alamos National Laboratory), January 1993. "Los Alamos National Laboratory Environmental Restoration Program Standard Operating Procedures," prepared by Los Alamos National Laboratory, Los Alamos, NM. (LANL 1993, 0875).

LANL (Los Alamos National Laboratory), April 1993. "Administrative and Quality Procedures for Environmental Restoration," prepared by Los Alamos National Laboratory, Los Alamos, NM. (LANL 1993, 0951).

LANL (Los Alamos National Laboratory), November 1993. "Installation Work Plan for Environmental Restoration," Revision 3, Los Alamos National Laboratory report LA-UR-93-3987, Los Alamos, NM. (LANL 1993, 1017).

LANL (Los Alamos National Laboratory), November 1990. Solid Waste Management Units Report," Vol. I - IV, Los Alamos National Laboratory report LA-UR-90-3400, prepared by IT Corporation under Contract No. 9-XS8-0062R-1, Los Alamos, NM. (LANL 1990, 7511)

LANL (Los Alamos National Laboratory), February 17, 1995. "Los Alamos National Laboratory Environmental Restoration (ER) Project Health and Safety Plan (HASP)." Los Alamos, NM. (LANL, 1995)

LANL (Los Alamos National Laboratory), June 1993. "RFI Work Plan for Operable Unit 1114," Los Alamos National Laboratory report, Los Alamos, NM. (LANL 1993, 1090).

LANL (Los Alamos National Laboratory), October 28, 1994. "Guidance for Evaluation and Cleanup of PCBs in Soil," position paper prepared by the Environmental Restoration Assessments Council, Los Alamos National Laboratory Los Alamos, NM. (LANL, 1994).

LANL (Los Alamos National Laboratory), 1994. "Site Development Plan Annual Update 1994," Los Alamos National Laboratory report, Los Alamos, NM. (LANL 1994, 1171)

6.0 ANNEXES

6.1 Implementation SOPs

See Environmental Restoration Standard Operating Procedures, Volumes I and II (LANL 1993, 0875).

6.2 Quality Assurance Plan

See Quality Program Plan and Quality Assurance Project Plan for Environmental Restoration (LANL 1993, 0951).

6.3 Site-Specific Health and Safety Plan

See Los Alamos National Laboratory ER Project Health and Safety Plan (HASP) (LANL, 1995).

6.4 Records Management Plan

See Installation Work Plan for Environmental Restoration, Records Management Program Plan, Chapter IV (LANL 1993, 1017).

6.5 Public Involvement Plan

See Installation Work Plan for Environment Restoration, Public Involvement Program Plan, Chapter V (LANL 1993, 1017).

6.6 Waste Management Checklist

6.7 Field Work Approval Form

6.8 Proposed Outline for Expedited Cleanup Final Report

6.9 RFI Analytical Results

6.10 Risk-Based Cleanup Level Calculations

6.11 Verification of PCB Spill Cleanup by Sampling and Analysis

ANNEX 6.7

FIELD WORK APPROVAL FORM

ANNEX 6.7

FIELD WORK APPROVAL FORM

This form must be completed prior to starting remediation field work for Expedited Cleanups that do not have an EPA-approved plan.

I, _____, DOE-LAAO, APPROVE the field work as proposed in the accompanying Expedited Cleanup Plan for SWMU _____.

I, _____, DOE-LAAO, DO NOT APPROVE the field work as proposed in the accompanying Expedited Cleanup Plan for SWMU _____.

The following reasons reflect the decision for disapproval:

Signed: _____ Date:_____

ANNEX 6.8

PROPOSED OUTLINE FOR EXPEDITED CLEANUP REPORT

ANNEX 6.8 PROPOSED OUTLINE FOR EXPEDITED CLEANUP REPORT

1.0 Introduction

- 1.1 Overview
- 1.2 Expedited Cleanup

2.0 Discussion of Sampling and Analysis

- 2.1 Verification Sampling and Analysis
  - 2.1.1 Sampling Objectives
  - 2.1.2 Quality Assurance/Quality Control
  - 2.1.3 Sampling Activities
- 2.2 Site Restoration

3.0 Modifications to the EC Plan

4.0 Quantities and Types of Waste Generated

5.0 Outstanding Problems from the Acceptance Inspection

6.0 Problems Encountered and Lessons Learned

<u>Appendices</u>

A Analytical Data
B Acceptance Inspection Checklist
C Waste Stream Inventory
D Photographs
E Certification of Completion

ANNEX 6.9

RFI ANALYTICAL RESULTS

03-056(c) Detects
Soil samples

Location ID	Depth of sample	Sample ID	Analyte	Results	Units	SAL	UTL
03-2200	0.0 - 0.5 ft.	AAB5960	Aluminium	8870 (J)	MG/KG	n/a	123000
			Barium	145	MG/KG	5600	1143
			Calcium	1990	MG/KG	n/a	54362
			Chromium	11 (J)	MG/KG	n/a	34.2
			Copper	5.6	MG/KG	3000	15.7
			Iron	11200	MG/KG	n/a	35586
			Lead	16.3	MG/KG	400	39
			Magnesium	1580	MG/KG	n/a	16147
			Manganese	164	MG/KG	11000	1030
			Potassium	1140	MG/KG	n/a	6179
			Vanadium	11.7	MG/KG	560	66
			Zinc	59.8	MG/KG	24000	101
03-2200	0.0 - 0.5 ft.	AAB5977	Aroclor 1242	680 (J)	MG/KG	1	n/a
			Aroclor 1254	34	MG/KG	1	n/a
			Aroclor 1260	48	MG/KG	1	n/a
			Benzo[b]fluoranthene	0.56 (UJ)	MG/KG	1	12.2
03-2200	1.5 - 2.0 ft.	AAB5983	Aluminium	5770 (J)	MG/KG	n/a	123000
			Aroclor 1242	10 (J)	MG/KG	1	n/a
			Aroclor 1254	2.4	MG/KG	1	n/a
			Aroclor 1260	3.7	MG/KG	1	n/a
			Barium	57	MG/KG	5600	1143
			Calcium	2150	MG/KG	n/a	54362
			Chromium	6.9 (J)	MG/KG	n/a	34.2
			Iron	8110	MG/KG	n/a	35586
			Lead	12.1	MG/KG	400	39
			Manganese	242	MG/KG	11000	1030
			Zinc	33.2	MG/KG	24000	101
03-2201	0.0 - 0.5 ft.	AAB5961	Aluminium	5860 (J)	MG/KG	n/a	123000
			Barium	48.2	MG/KG	5600	1143
			Calcium	1330	MG/KG	n/a	54362
			Chromium	6.6 (J)	MG/KG	n/a	34.2
			Copper	16.8	MG/KG	3000	15.7
			Iron	9350	MG/KG	n/a	35586
			Lead	15.8	MG/KG	400	39
			Magnesium	1130	MG/KG	n/a	16147
			Manganese	251	MG/KG	11000	1030
			Zinc	96.7	MG/KG	24000	101
03-2201	0.0 - 0.5 ft.	AAB5975	Aluminium	6980 (J)	MG/KG	n/a	123000
			Barium	69.1	MG/KG	5600	1143
			Calcium	1820	MG/KG	n/a	54362
			Chromium	8.2 (J)	MG/KG	n/a	34.2
			Copper	10	MG/KG	3000	15.7
			Iron	9870	MG/KG	n/a	35586
			Lead	15.1	MG/KG	400	39
			Magnesium	1250	MG/KG	n/a	16147
			Manganese	260	MG/KG	11000	1030
			Zinc	67.5	MG/KG	24000	101
03-2201	0.0 - 0.5 ft.	AAB5978	Aroclor 1242	880 (J)	MG/KG	1	n/a
			Aroclor 1254	24	MG/KG	1	n/a

03-056(c) Detects
Soil samples

Location ID	Depth of sample	Sample ID	Analyte	Results	Units	SAL	UTL
			Aroclor 1260	76	MG/KG	1	n/a
03-2201	1.0 - 1.5 ft.	AAB5981	Aluminium	3690 (J)	MG/KG	n/a	123000
			Aroclor 1242	120 (J)	MG/KG	1	n/a
			Aroclor 1254	17 (J)	MG/KG	1	n/a
			Aroclor 1260	47 (J)	MG/KG	1	n/a
			Chromium	3.9 (J)	MG/KG	n/a	34.2
			Iron	6780	MG/KG	n/a	35586
			Lead	12.8	MG/KG	400	39
			Manganese	336	MG/KG	11000	1030
			Mercury	0.04	MG/KG	24	0.1
			Zinc	35.3	MG/KG	24000	101
03-2202	0.0 - 0.5 ft.	AAB5962	Aluminium	5500 (J)	MG/KG	n/a	123000
			Barium	60	MG/KG	5600	1143
			Chromium	5.3 (J)	MG/KG	n/a	34.2
			Iron	9320	MG/KG	n/a	35586
			Lead	15	MG/KG	400	39
			Manganese	189	MG/KG	11000	1030
			Zinc	93.4	MG/KG	24000	101
03-2202	0.0 - 0.5 ft.	AAB5979	Aroclor 1242	12 (J)	MG/KG	1	n/a
			Aroclor 1254	5.1 (J)	MG/KG	1	n/a
			Aroclor 1260	14 (J)	MG/KG	1	n/a
03-2202	1.0 - 1.5 ft.	AAB5982	Aluminium	4170 (J)	MG/KG	n/a	123000
			Aroclor 1242	3.9 (J)	MG/KG	1	n/a
			Aroclor 1254	2.8	MG/KG	1	n/a
			Aroclor 1260	6.3	MG/KG	1	n/a
			Calcium	1360	MG/KG	n/a	54362
			Chromium	2.9 (J)	MG/KG	n/a	34.2
			Iron	7960	MG/KG	n/a	35586
			Lead	7.8	MG/KG	400	39
			Manganese	125	MG/KG	11000	1030
			Zinc	24.5	MG/KG	24000	101
03-2202	2.5 - 3.0 ft.	AAB5985	Aluminium	5480 (J)	MG/KG	n/a	123000
			Aroclor 1260	2.5	MG/KG	1	n/a
			Calcium	2120	MG/KG	n/a	54362
			Chromium	5.8 (J)	MG/KG	n/a	34.2
			Iron	8830	MG/KG	n/a	35586
			Lead	10	MG/KG	400	39
			Manganese	140	MG/KG	11000	1030
			Tetrachloroethylene	0.044 (J)	MG/KG	5.9	n/a
			Zinc	36	MG/KG	24000	101
03-2203	0.0 - 0.5 ft.	AAB5963	Aluminium	5510 (J)	MG/KG	n/a	123000
			Chromium	3.9 (J)	MG/KG	n/a	34.2
			Iron	9410	MG/KG	n/a	35586
			Lead	14.2	MG/KG	400	39
			Manganese	160	MG/KG	11000	1030
			Zinc	38.9	MG/KG	24000	101
03-2204	0.0 - 0.5 ft.	AAB5964	Aluminium	6110 (J)	MG/KG	n/a	123000
			Calcium	1310	MG/KG	n/a	54362
			Chromium	5.9 (J)	MG/KG	n/a	34.2

03-056(c) Detects
Soil samples

Location ID	Depth of sample	Sample ID	Analyte	Results	Units	SAL	UTL
			Iron	9250	MG/KG	n/a	35586
			Lead	18.9	MG/KG	400	39
			Manganese	155	MG/KG	11000	1030
			Zinc	30.1	MG/KG	24000	101
03-2205	0.0 - 0.5 ft.	AAB5965	Aluminium	5750 (J)	MG/KG	n/a	123000
			Barium	44.8	MG/KG	5600	1143
			Calcium	1250	MG/KG	n/a	54362
			Chromium	5.2 (J)	MG/KG	n/a	34.2
			Iron	8370	MG/KG	n/a	35586
			Lead	22	MG/KG	400	39
			Manganese	344	MG/KG	11000	1030
			Zinc	79.2	MG/KG	24000	101
03-2206	0.0 - 0.5 ft.	AAB5966	Aluminium	5030 (J)	MG/KG	n/a	123000
			Chromium	4.8 (J)	MG/KG	n/a	34.2
			Iron	9170	MG/KG	n/a	35586
			Lead	17.5	MG/KG	400	39
			Manganese	226	MG/KG	11000	1030
			Zinc	62.4	MG/KG	24000	101
03-2206	2.5 - 3.0 ft.	AAB5974	Tetrachloroethylene	0.009	MG/KG	5.9	n/a
03-2207	0.0 - 0.5 ft.	AAB5994	Aroclor 1242	0.44	MG/KG	1	n/a
			Aroclor 1260	0.25	MG/KG	1	n/a
03-2207	0.0 - 1.5 ft.	AAB5988	Aluminium	8420 (J)	MG/KG	n/a	123000
			Barium	116	MG/KG	5600	1143
			Calcium	2770	MG/KG	n/a	54362
			Chromium	7.3 (J)	MG/KG	n/a	34.2
			Copper	8.7	MG/KG	3000	15.7
			Iron	12600	MG/KG	n/a	35586
			Lead	8.8	MG/KG	400	39
			Magnesium	1780	MG/KG	n/a	16147
			Manganese	406	MG/KG	11000	1030
			Mercury	1.7 (J)	MG/KG	24	0.1
			Vanadium	15.5	MG/KG	560	66
			Zinc	35.7	MG/KG	24000	101
03-2207	1.0 - 1.5 ft.	AAB6000	Methylene chloride	0.007	MG/KG	5.6	n/a
03-2208	0.0 - 0.5 ft.	AAB5995	Aroclor 1242	0.043	MG/KG	1	n/a
			Aroclor 1260	0.046	MG/KG	1	n/a
03-2208	0.0 - 1.5 ft.	AAB5989	Aluminium	6160 (J)	MG/KG	n/a	123000
			Barium	59.5	MG/KG	5600	1143
			Calcium	2860	MG/KG	n/a	54362
			Chromium	7.2 (J)	MG/KG	n/a	34.2
			Iron	7880	MG/KG	n/a	35586
			Lead	12.1	MG/KG	400	39
			Magnesium	1700	MG/KG	n/a	16147
			Manganese	188	MG/KG	11000	1030
			Zinc	43.4	MG/KG	24000	101
03-2209	0.0 - 1.5 ft.	AAB5990	Aluminium	6940 (J)	MG/KG	n/a	123000
			Calcium	1350	MG/KG	n/a	54362
			Chromium	17 (J)	MG/KG	n/a	34.2
			Iron	10400	MG/KG	n/a	35586

03-056(c) Detects
Soil samples

Location ID	Depth of sample	Sample ID	Analyte	Results	Units	SAL	UTL
			Lead	6.1	MG/KG	400	39
			Manganese	210	MG/KG	11000	1030
			Zinc	32.4	MG/KG	24000	101
03-2209	0.0 - 1.5 ft.	AAB5993	Aluminium	6260 (J)	MG/KG	n/a	123000
			Arsenic	2.7	MG/KG	n/a	11.6
			Chromium	16.1 (J)	MG/KG	n/a	34.2
			Iron	10300	MG/KG	n/a	35586
			Lead	8.4	MG/KG	400	39
			Manganese	235	MG/KG	11000	1030
			Zinc	36	MG/KG	24000	101
03-2210	0.0 - 1.5 ft.	AAB5991	Aluminium	6000 (J)	MG/KG	n/a	123000
			Barium	47.2	MG/KG	5600	1143
			Calcium	1220	MG/KG	n/a	54362
			Chromium	10.9 (J)	MG/KG	n/a	34.2
			Iron	9950	MG/KG	n/a	35586
			Lead	7.4	MG/KG	400	39
			Manganese	210	MG/KG	11000	1030
			Zinc	34.3	MG/KG	24000	101
03-2211	0.0 - 1.0 ft.	AAB5992	Aluminium	7055	MG/KG	n/a	123000
			Aluminium	7010 (J)	MG/KG	n/a	123000
			Arsenic	2	MG/KG	n/a	11.6
			Barium	51.8	MG/KG	5600	1143
			Barium	53	MG/KG	5600	1143
			Beryllium	0.84	MG/KG	n/a	3.31
			Cadmium	0.48	MG/KG	80	2.7
			Calcium	1420	MG/KG	n/a	54362
			Calcium	1479	MG/KG	n/a	54362
			Chromium	14.8	MG/KG	n/a	34.2
			Chromium	16.1 (J)	MG/KG	n/a	34.2
			Cobalt	2.1	MG/KG	n/a	51.1
			Copper	3.7	MG/KG	3000	15.7
			Iron	12108	MG/KG	n/a	35586
			Iron	12500	MG/KG	n/a	35586
			Lead	10	MG/KG	400	39
			Lead	11	MG/KG	400	39
			Magnesium	1148	MG/KG	n/a	16147
			Magnesium	1170	MG/KG	n/a	16147
			Manganese	237	MG/KG	11000	1030
			Manganese	245	MG/KG	11000	1030
			Nickel	3	MG/KG	1600	26.7
			Potassium	940	MG/KG	n/a	6179
			Sodium	118	MG/KG	n/a	1884
			Vanadium	10.4	MG/KG	560	66
			Vanadium	11.3	MG/KG	560	66
			Zinc	45.4	MG/KG	24000	101
			Zinc	45.4	MG/KG	24000	101
03-2212	0.0 - 0.5 ft.	AAB6007	Aroclor 1242	4.7 (J)	MG/KG	1	n/a
			Aroclor 1254	1.5	MG/KG	1	n/a
			Aroclor 1260	6.5	MG/KG	1	n/a

03-056(c) Detects
Soil samples

Location ID	Depth of sample	Sample ID	Analyte	Results	Units	SAL	UTL
03-2212	0.0 - 1.5 ft.	AAB6001	Aluminium	7460 (J)	MG/KG	n/a	123000
			Barium	82.4	MG/KG	5600	1143
			Calcium	4060	MG/KG	n/a	54362
			Chromium	7.1 (J)	MG/KG	n/a	34.2
			Iron	10900	MG/KG	n/a	35586
			Lead	14.5	MG/KG	400	39
			Magnesium	1590	MG/KG	n/a	16147
			Manganese	229	MG/KG	11000	1030
			Potassium	1050	MG/KG	n/a	6179
			Vanadium	11.9	MG/KG	560	66
			Zinc	67.1	MG/KG	24000	101
03-2213	0.0 - 0.5 ft.	AAB6008	Aroclor 1242	6.2 (J)	MG/KG	1	n/a
			Aroclor 1254	6.4	MG/KG	1	n/a
			Aroclor 1254	6.4	MG/KG	1	n/a
			Aroclor 1260	19	MG/KG	1	n/a
03-2213	0.0 - 1.5 ft.	AAB6002	Aluminium	6770 (J)	MG/KG	n/a	123000
			Barium	61	MG/KG	5600	1143
			Calcium	2490	MG/KG	n/a	54362
			Chromium	6 (J)	MG/KG	n/a	34.2
			Iron	10300	MG/KG	n/a	35586
			Lead	12.5	MG/KG	400	39
			Magnesium	1160	MG/KG	n/a	16147
			Manganese	201	MG/KG	11000	1030
			Vanadium	11.5	MG/KG	560	66
			Zinc	36.5	MG/KG	24000	101
03-2214	0.0 - 0.5 ft.	AAB6009	Aroclor 1242	4.3 (J)	MG/KG	1	n/a
			Aroclor 1254	15 (J)	MG/KG	1	n/a
			Aroclor 1260	58	MG/KG	1	n/a
			Benzo(b)fluoranthene	0.4	MG/KG	1	12.2
			Chrysene	0.45	MG/KG	96	19.5
			Fluoranthene	0.45	MG/KG	3200	32.5
			Pyrene	0.88	MG/KG	2400	12.8
03-2214	0.0 - 1.5 ft.	AAB6003	Aluminium	6250 (J)	MG/KG	n/a	123000
			Barium	54	MG/KG	5600	1143
			Calcium	1840	MG/KG	n/a	54362
			Chromium	7.1 (J)	MG/KG	n/a	34.2
			Copper	6.6	MG/KG	3000	15.7
			Iron	10800	MG/KG	n/a	35586
			Lead	23.2	MG/KG	400	39
			Magnesium	1180	MG/KG	n/a	16147
			Manganese	226	MG/KG	11000	1030
			Zinc	133	MG/KG	24000	101
03-2215	0.0 - 1.5 ft.	AAB6004	Aluminium	6910 (J)	MG/KG	n/a	123000
			Calcium	1700	MG/KG	n/a	54362
			Chromium	5.8 (J)	MG/KG	n/a	34.2
			Iron	11400	MG/KG	n/a	35586
			Lead	9.7	MG/KG	400	39
			Manganese	193	MG/KG	11000	1030
			Zinc	50.9	MG/KG	24000	101

03-056(c) Detects
Soil samples

Location ID	Depth of sample	Sample ID	Analyte	Results	Units	SAL	UTL
03-2216	0.0 - 1.5 ft.	AAB6005	Aluminium	5340 (J)	MG/KG	n/a	123000
			Barium	43.9	MG/KG	5600	1143
			Calcium	1330	MG/KG	n/a	54362
			Chromium	6.2 (J)	MG/KG	n/a	34.2
			Copper	8.4	MG/KG	3000	15.7
			Iron	9510	MG/KG	n/a	35586
			Lead	17.1	MG/KG	400	39
			Manganese	102	MG/KG	11000	1030
			Mercury	0.16 (J)	MG/KG	24	0.1
			Zinc	64.3	MG/KG	24000	101
03-2216	0.0 - 1.5 ft.	AAB6014	Aluminium	5200 (J)	MG/KG	n/a	123000
			Barium	53.8	MG/KG	5600	1143
			Calcium	1260	MG/KG	n/a	54362
			Chromium	5.7 (J)	MG/KG	n/a	34.2
			Copper	7.7	MG/KG	3000	15.7
			Iron	9030	MG/KG	n/a	35586
			Lead	14.9	MG/KG	400	39
			Manganese	89.5	MG/KG	11000	1030
			Mercury	0.15	MG/KG	24	0.1
			Mercury	0.2 (J)	MG/KG	24	0.1
			Zinc	56.1	MG/KG	24000	101
03-2217	0.0 - 1.0 ft.	AAB6006	Aluminium	7040 (J)	MG/KG	n/a	123000
			Barium	52.6	MG/KG	5600	1143
			Calcium	2020	MG/KG	n/a	54362
			Chromium	6.7 (J)	MG/KG	n/a	34.2
			Copper	7.3	MG/KG	3000	15.7
			Iron	9640	MG/KG	n/a	35586
			Lead	18.2	MG/KG	400	39
			Manganese	175	MG/KG	11000	1030
			Potassium	1200	MG/KG	n/a	6179
			Zinc	65.3	MG/KG	24000	101

03-056(c) Detects above SAL and/or UTL
Soil samples

Location ID	Depth of sample	Sample ID	Analyte	Results	Units	SAL	UTL
03-2200	0.0 - 0.5 ft.	AAB5977	Aroclor 1242	680 (J)	MG/KG	1	n/a
			Aroclor 1254	34	MG/KG	1	n/a
			Aroclor 1260	48	MG/KG	1	n/a
03-2200	1.5 - 2.0 ft.	AAB5983	Aroclor 1242	10 (J)	MG/KG	1	n/a
			Aroclor 1254	2.4	MG/KG	1	n/a
			Aroclor 1260	3.7	MG/KG	1	n/a
03-2201	0.0 - 0.5 ft.	AAB5961	Copper	16.8	MG/KG	3000	15.7
03-2201	0.0 - 0.5 ft.	AAB5978	Aroclor 1242	880 (J)	MG/KG	1	n/a
			Aroclor 1254	24	MG/KG	1	n/a
			Aroclor 1260	76	MG/KG	1	n/a
03-2201	1.0 - 1.5 ft.	AAB5981	Aroclor 1242	120 (J)	MG/KG	1	n/a
			Aroclor 1254	17 (J)	MG/KG	1	n/a
			Aroclor 1260	47 (J)	MG/KG	1	n/a
03-2202	0.0 - 0.5 ft.	AAB5979	Aroclor 1242	12 (J)	MG/KG	1	n/a
			Aroclor 1254	5.1 (J)	MG/KG	1	n/a
			Aroclor 1260	14 (J)	MG/KG	1	n/a
03-2202	1.0 - 1.5 ft.	AAB5982	Aroclor 1242	3.9 (J)	MG/KG	1	n/a
			Aroclor 1254	2.8	MG/KG	1	n/a
			Aroclor 1260	6.3	MG/KG	1	n/a
03-2202	2.5 - 3.0 ft.	AAB5985	Aroclor 1260	2.5	MG/KG	1	n/a
03-2207	0.0 - 1.5 ft.	AAB5988	Mercury	1.7 (J)	MG/KG	24	0.1
03-2212	0.0 - 0.5 ft.	AAB6007	Aroclor 1242	4.7 (J)	MG/KG	1	n/a
			Aroclor 1254	1.5	MG/KG	1	n/a
			Aroclor 1260	6.5	MG/KG	1	n/a
03-2213	0.0 - 0.5 ft.	AAB6008	Aroclor 1242	6.2 (J)	MG/KG	1	n/a
			Aroclor 1254	6.4	MG/KG	1	n/a
			Aroclor 1254	6.4	MG/KG	1	n/a
			Aroclor 1260	19	MG/KG	1	n/a
03-2214	0.0 - 0.5 ft.	AAB6009	Aroclor 1242	4.3 (J)	MG/KG	1	n/a
			Aroclor 1254	15 (J)	MG/KG	1	n/a
			Aroclor 1260	58	MG/KG	1	n/a
03-2214	0.0 - 1.5 ft.	AAB6003	Zinc	133	MG/KG	24000	101
03-2216	0.0 - 1.5 ft.	AAB6005	Mercury	0.16 (J)	MG/KG	24	0.1
		AAB6014	Mercury	0.15	MG/KG	24	0.1
		AAB6014	Mercury	0.2 (J)	MG/KG	24	0.1

03-056(c) Detects
Water samples

Location ID	Depth of sample	Sample ID	Analyte	Results	Units
03-N/A	N/A	AAB7615	Aroclor 1242	1.3 (J)	UG/L

ANNEX 6.10

RISK-BASED CLEANUP LEVEL CALCULATIONS

Chemical	EPA Cancer Class	Risk Range			Cleanup Level mg/kg Occupational Scenario Carcinogenic Range			Noncarc.
Arsenic	A	1.00E-04	-	1.00E-06	250	-	2	613
Barium	D							7,530
Cadmium	B1	1.00E-04	-	1.00E-06	2,523	-	25	2,044
Chromium VI	A	1.00E-04	-	1.00E-06	378	-	4	10,220
Copper								75,628
Manganese								793
Mercury	D							279
Nickel	A							40,880
Silver	D							10,220
Thallium								164
Vanadium								14,308
Zinc	D							613,200
Benzene	A	1.00E-04	-	1.00E-06	277	-	3	
cis-1,2-Dichloroethene								20,440
Methylene Chloride	B2	1.00E-04	-	1.00E-06	2,508	-	25	11,545
Tetrachlorethene	B-C	1.00E-04	-	1.00E-06	3,088	-	31	20,440
1,1,1-Trichloroethane	D							7,259
Trichloroethene	B-C	1.00E-04	-	1.00E-06	1,347	-	13	
Benzo[a]pyrene	B2	1.00E-04	-	1.00E-06	78	-	1	
PCBs	B2	1.00E-04	-	1.00E-06	74	-	1	
2,4-DNT	B2	1.00E-04	-	1.00E-06	842	-	8	4,088
2,6-DNT	B2	1.00E-04	-	1.00E-06	842	-	8	2,044
HMX								102,200
PETN								40,880
RDX	C	1.00E-04	-	1.00E-06	5,203	-	52	6,132
TNT	C	1.00E-04	-	1.00E-06	19,077	-	191	1,022

Residential PRGs are based on the following assumptions:

Carcinogenic averaging time (years) =	70
Non carcinogenic Averaging time (years) =	30
Exposure frequency (days/year) =	350
Age adjusted soil ingestion factor (mg-yr/kg-day) =	114
Age adjusted inhalation factor (m^3-yr/kg-day) =	13

Occupational PRGs are based on the following assumptions:

Adult body weight (kg) =	70
Carcinogenic averaging time (years) =	70
Non carcinogenic Averaging time (years) =	25
Exposure frequency (days/year) =	250
Exposure duration (years) =	25
Soil ingestion rate (mg/day) =	50
Workday inhalation rate (m^3/day) =	20
Particualte emission factor (m^3/kg) =	1.11E+07

Recreational PRGs are based on the following assumptions:

Carcinogenic averaging time (years) =	70
Non carcinogenic Averaging time (years) =	20
Exposure frequency (days/year) =	28
Age adjusted soil ingestion factor (mg-yr/kg-day) =	93
Age adjusted inhalation factor (m^3-yr/kg-day) =	9.5

$$C = \frac{TR \times AT \times 365\ days/year}{(SF_o \times 10^{-6}\ kg/mg \times EF \times IF_{soil}) + [SF_i \times EF \times IF_{air} \times (1/Y)]}$$

$$C = \frac{THI \times AT \times 365\ days/year}{((1/RfD_o) \times 10^{-6}\ kg/mg \times EF \times IF_{soil}) + [(1/RfD_i) \times EF \times IF_{air} \times (1/Y)]}$$

$$C = \frac{TR \times BW \times AT \times 365\ days/year}{EF \times ED \times [(SF_o \times 10^{-6}\ kg/mg \times IF_{soil}) + (SF_i \times IF_{air} \times (1/Y))]}$$

$$C = \frac{THI \times BW \times AT \times 365\ days/year}{EF \times ED \times [((1/RfDo) \times 10^{-6}\ kg/mg \times IR_{soil}) + ((1/RfDi) \times IR_{air} \times (1/Y))]}$$

$$C = \frac{TR \times AT \times 365\ days/year}{(SF_o \times 10^{-6}\ kg/mg \times EF \times IF_{soil}) + [SF_i \times EF \times IF_{air} \times (1/Y)]}$$

$$C = \frac{THI \times AT \times 365\ days/year}{((1/RfD_o) \times 10^{-6}\ kg/mg \times EF \times IF_{soil}) + [(1/RfD_i) \times EF \times IF_{air} \times (1/Y)]}$$

Y = VF for volatiles; PEF for nonvolatiles

	EPA					
	Cancer	Carcinogenic Slope Factors (kg-day/mg)		Chronic RfDs (mg/kg-day)		VF
Chemical	Class	Oral	Inhalation	Oral	Inhalation	m^3/kg
Arsenic	A	1.75	15	0.0003		
Barium	D			0.07	0.00014	
Cadmium	B1		6.3	0.001		
Chromium VI	A		42	0.005		
Copper				0.037		
Manganese				0.14	0.000014	
Mercury	D			0.0003	0.00009	
Nickel	A			0.02		
Silver	D			0.005		
Thallium				0.00008		
Vanadium				0.007		
Zinc	D			0.3		
Benzene	A	0.029	0.029			5700
cis-1,2-Dichloroethene				0.01		4600
Methylene Chloride	B2	0.0075	0.0016	0.06	0.86	2900
Tetrachlorethene	B-C	0.052	0.002	0.01		6000
1,1,1-Trichloroethane	D			0.09	0.29	5100
Trichloroethene	B-C	0.011	0.006			5800
Benzo(a)pyrene	B2	7.3				
PCBs	B2	7.7				
2,4-DNT	B2	0.68		0.002		
2,6-DNT	B2	0.68		0.001		
HMX				0.05		
PETN				0.02		
RDX	C	0.11		0.003		
TNT	C	0.03		0.0005		

ANNEX 6.11

VERIFICATION OF PCB SPILL CLEANUP BY SAMPLING AND ANALYSIS

United States Environmental Protection Agency

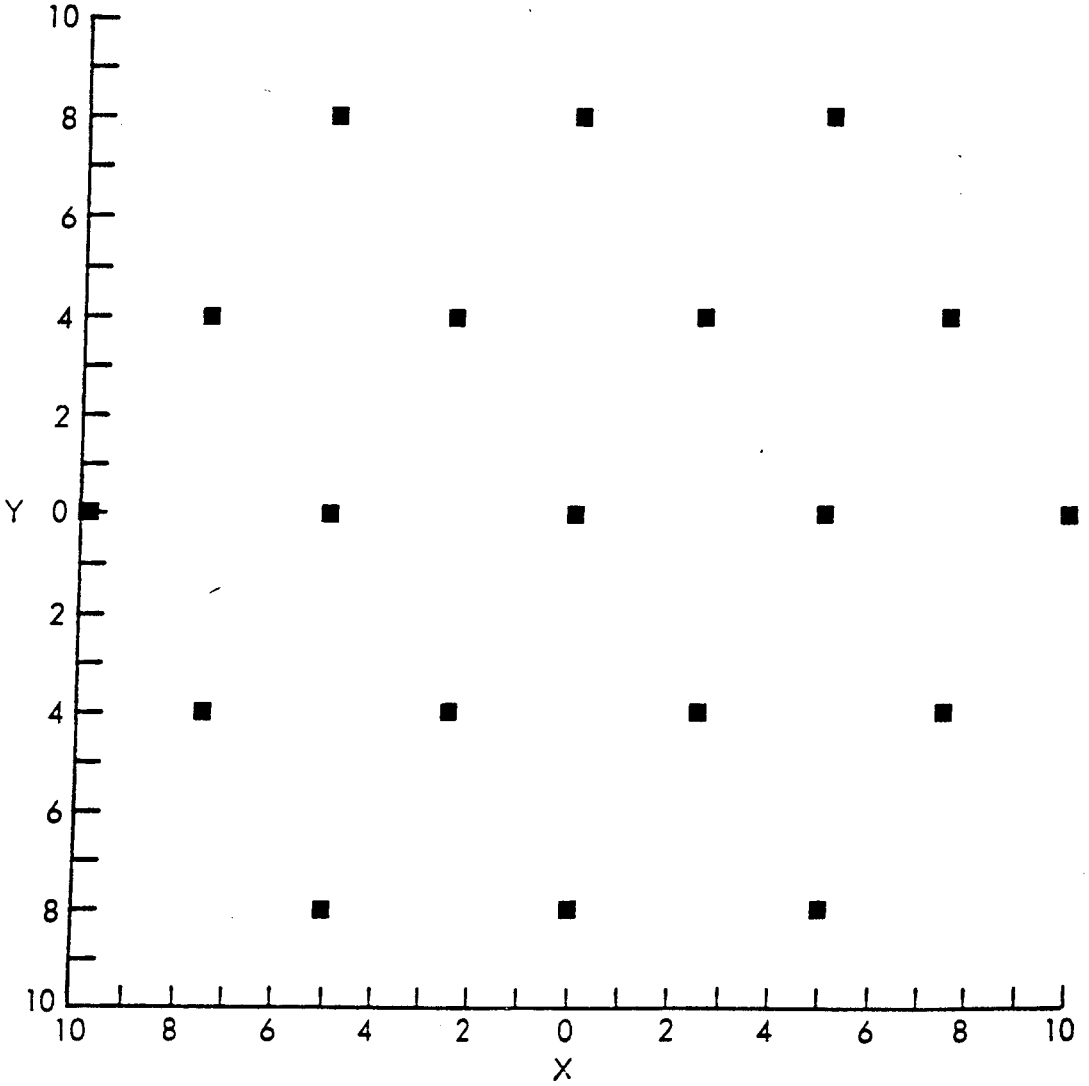
Office of Toxic Substances
Washington DC 20460

EPA-560/5-85-026
August, 1985

Toxic Substances

EPA

VERIFICATION OF PCB SPILL CLEANUP BY SAMPLING AND ANALYSIS



PUBLIC SERVICE CO. OF COLO.
CHEMISTRY DEPARTMENT

VERIFICATION OF PCB SPILL CLEANUP BY SAMPLING AND ANALYSIS

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INTERIM REPORT NO. 2
WORK ASSIGNMENT 37

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WCG Subcontract to Battelle Columbus Laboratories
No. F4138(8149)435

Prepared for:

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IV. GUIDELINES ON SAMPLING AND ANALYSIS

Reliable analytical measurements of environmental samples are an essential ingredient of sound decisions for safeguarding public health and improving the quality of the environment. Effective enforcement monitoring should follow the general operational model for conducting analytical measurements of environmental samples, including: planning, quality assurance/quality control, verification and validation, precision and accuracy, sampling, measurements, documentation, and reporting. Although many options are available when analyzing environmental samples, differing degrees of reliability, dictated by the objectives, time, and resources available, influence the protocol chosen for enforcement monitoring. The following section outlines the factors critically influencing the outcome and reliability of enforcement monitoring of PCB spill cleanup.

A. Sampling Design

This section presents a sampling scheme, for use by EPA enforcement staff, for detecting residual PCB contamination above a limit designated by EPA-OPTS after the site has been cleaned up. Two types of error traceable to sampling and analysis are possible. The first is false positive, i.e., concluding that PCBs are present at levels above the allowable limit when, in fact, they are not. The false positive rate for the present situation should be low, because an enforcement finding of noncompliance must be legally defensible; that is, a violator must not be able to claim that the sampling results could easily have been obtained by chance alone. Moreover, all sampling designs used must be documented or referenced.

The second type of error possible is a false negative, i.e., failure to detect the presence of PCB levels above the allowable limit. The false negative rate will depend on the size of the contaminated area and on the level of contamination. For large areas contaminated at levels well above the allowable limit, the false negative rate must, of course, be low to ensure that the site is brought into compliance. The false negative rate can increase as the area or level of contamination decrease.

1. Proposed Sampling Design

In practice, the contaminated area from a spill will be irregular in shape. In order to standardize sample design and layout in the field, and to protect against underestimation of the spill area by the cleanup crew, sampling within a circular area surrounding the contaminated area is proposed. Guidance on choosing the center and radius of the circle, as well as the number of sample points to be used is provided in Section 2 below.

The detection problem was modeled as follows: try to detect a circular area of uniform residual contamination whose center is randomly placed within the sampling circle. Figure 1 illustrates the model. The figure depicts a sampling circle of 10 ft centered on a utility pole (site of the spill). After cleanup, a residually contaminated circle remains. However, in choosing locations at which to sample, the sampler has no knowledge of either the location of the circle or the level of contamination. This

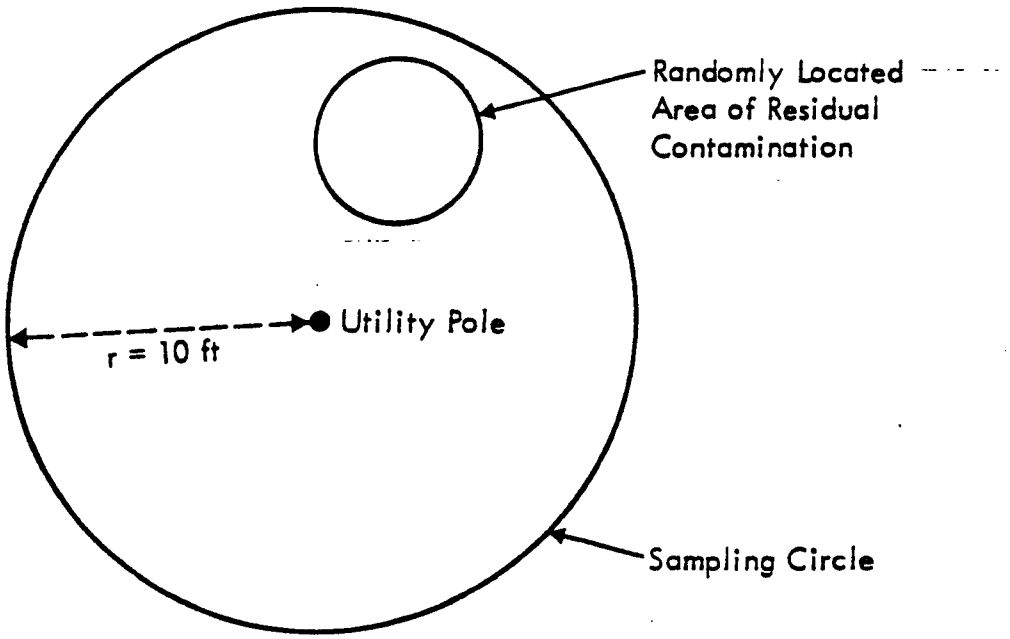


Figure 1. Randomly located area of residual contamination within the sampling circle.

lack of knowledge was modeled by treating the sampling locations as fixed and the center of the contaminated circle as a randomly located point in the circle of radius 10 ft. The implicit assumption that residual contamination is equally likely to be present anywhere within the sampling area is reasonable, at least as a first approximation (Lingle 1985). This is because more effort is likely to have been expended in cleaning up the areas which were obviously highly contaminated.

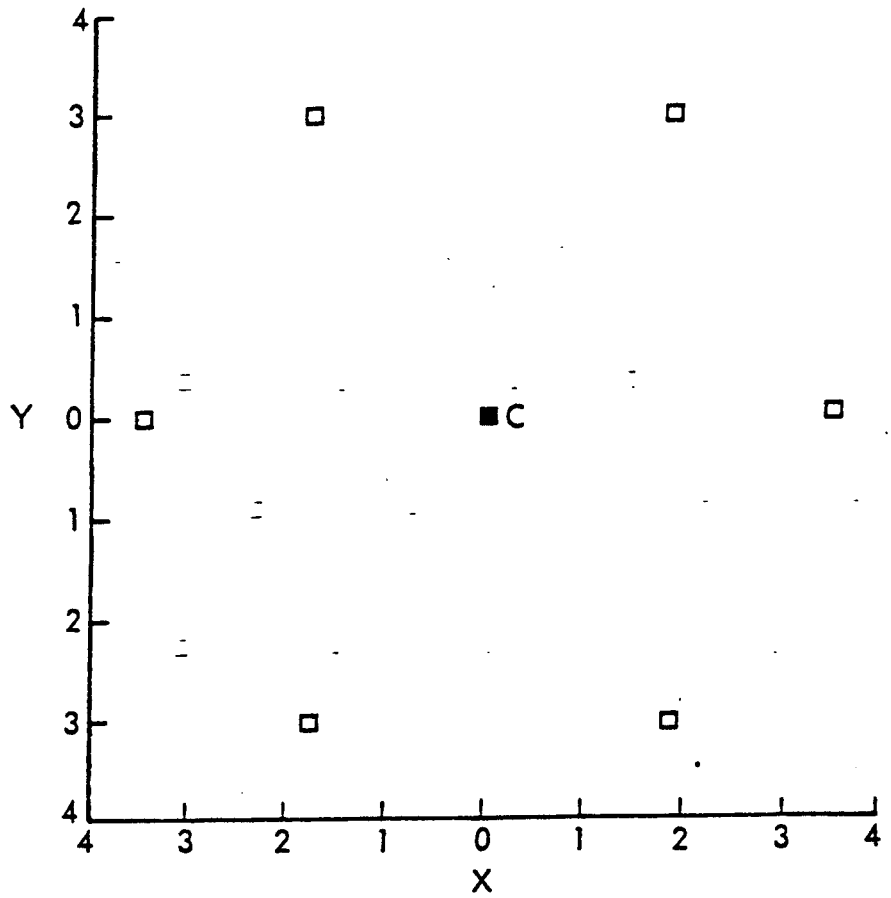
Two general types of design are possible for this detection problem: grid designs and random designs. Random designs have two disadvantages compared to grid designs for this application. First, random designs are more difficult to implement in the field, since the sampling crew must be trained to generate random locations onsite, and since the resulting pattern is irregular. Second, grid designs are more efficient for this type of problem than random designs. A grid design is certain to detect a sufficiently large contaminated area while some random designs are not. For example, the suggested design with a sample size of 19 has a 100% chance to detect a contaminated area of radius 2.8 ft within a sampling circle of radius 10 ft. By contrast, a design based on a simple random sample of 19 points has only a 79% chance of detecting such an area.

Therefore, a grid design is proposed. A hexagonal grid based on equilateral triangles has two advantages for this problem. First, such a grid minimizes the circular area certain to be detected (among all grids with the same number of points covering the same area). Second, some previous experience (Mason 1982; Matern 1960) suggests that the hexagonal grid performs well for certain soil sampling problems. The hexagonal grid may, at first sight, appear to be complicated to lay out in the field. Guidance is provided in Section 2 below and shows that the hexagonal grid is quite practical in the field and is not significantly more difficult to deploy than other types of grid.

The smallest hexagonal grid has 7 points, the next 19 points, the third 37 points as shown in Figures 2 through 4. In general, the grid has $3n^2 + 3n + 1$ points. To completely specify a hexagonal grid, the distance between adjacent points, s, must be determined. The distance s was chosen to minimize, as far as possible, the size of the residual contaminated circle which is certain to be sampled. Values of s so chosen, together with number of sampling points and radius of smallest circle certain to be sampled are shown in Table 2. For example, the grid spacing for a circle of radius 20 ft for the 7-point design is $s = (0.87)(20) = 17.4$ ft. For a given size circle, the more points on the grid, the smaller the residual contamination area which can be detected with a given probability.

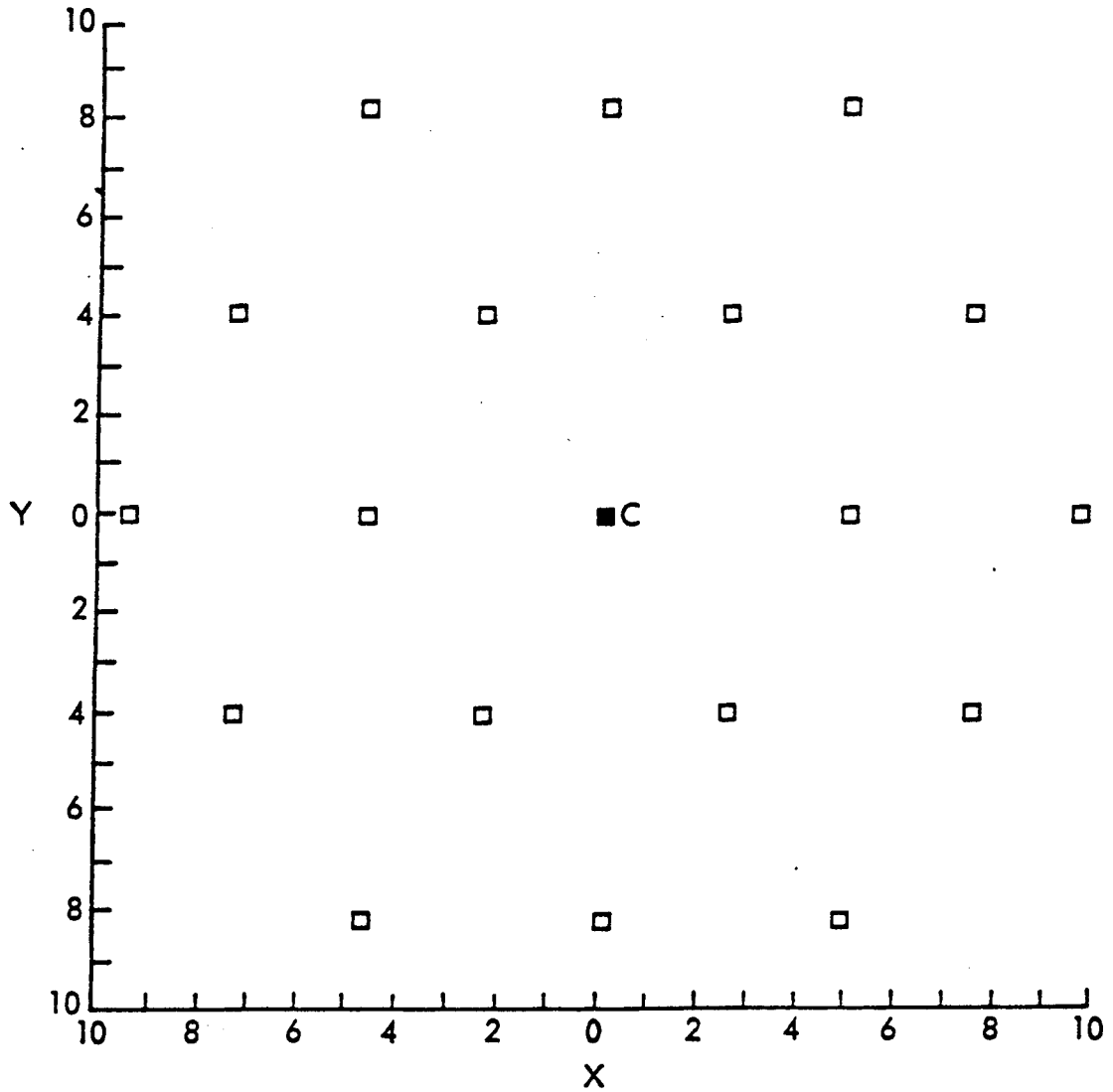
Table 2. Parameters of Hexagonal Sampling Designs for a Sampling Circle of Radius r Feet

No. of points	Distance between adjacent points, s (ft)	Radius of smallest circle certain to be sampled
7	0.87r	0.5r
19	0.48r	0.28r
37	0.3r	0.19r



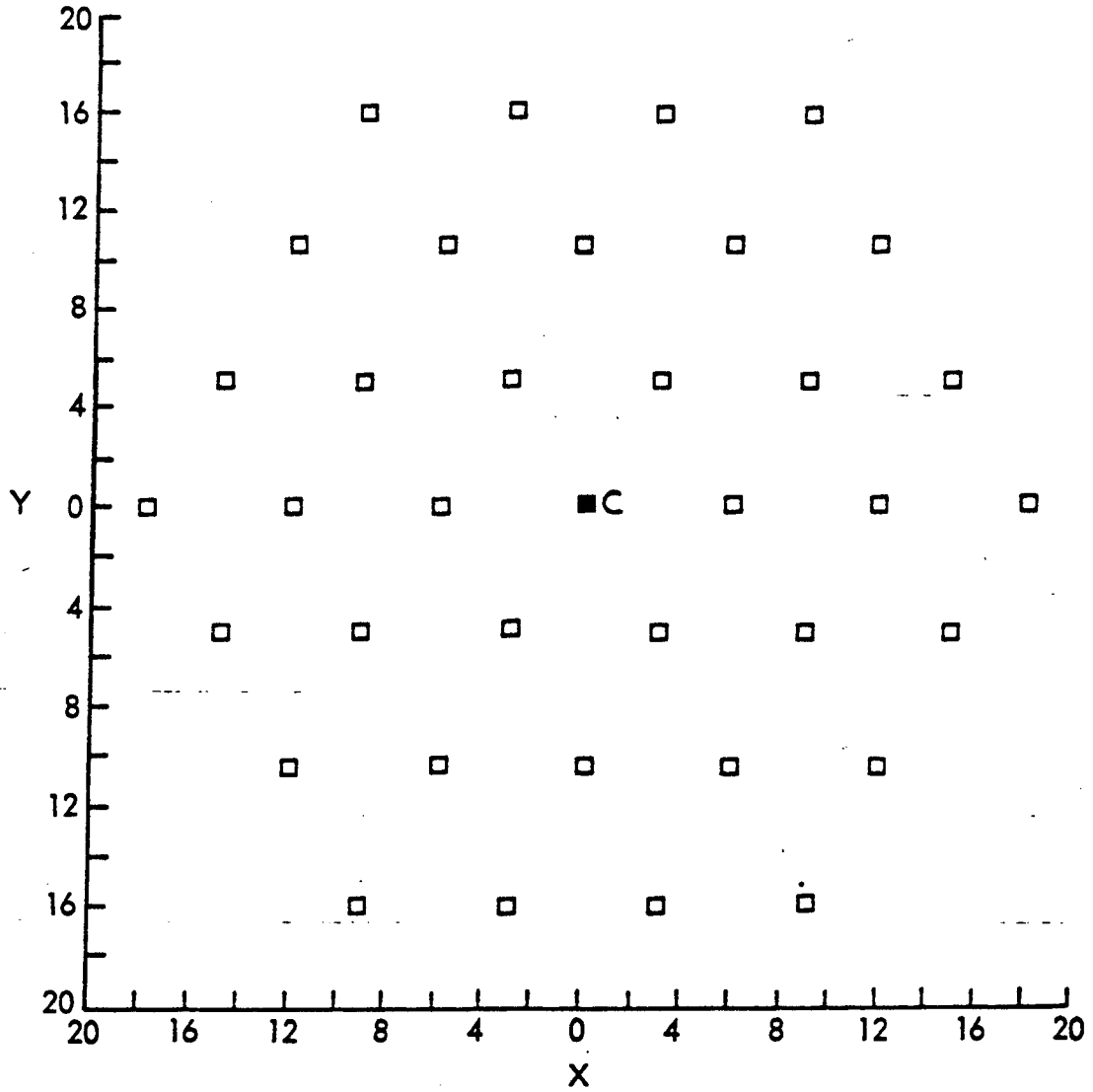
The outer boundary of the contaminated area is assumed to be 4 feet from the center (C) of the spill site.

Figure 2. Location of sampling points in a 7-point grid.



The outer boundary of the contaminated area is assumed to be 10 feet from the center (C) of the spill site.

Figure 3. Location of sampling points in a 19-point grid.



The outer boundary of the contaminated area is assumed to be 20 feet from the center (C) of the spill site.

Figure 4. Location of sampling points in a 37-point grid.

The first three hexagonal designs are shown in Figures 2 to 4, for a sampling circle radius of r = 10 ft. The choice of sample size depends on the cost of analyzing each sample and the reliability of detection desired for various residually contaminated areas. Subsection 2 below provides some suggested sample sizes for different spill areas, based on the distribution of spill areas provided by the Utility Solid Waste Activities Group (USWAG 1984; Lingle 1985).

2. Sample Size and Design Layout in the Field

a. Sample Size

The distribution of cleanup areas for PCB capacitor spill sites, based on data collected by USWAG (1984; Lingle 1985) is shown in Table 3. The smallest spill recorded in the USWAG database is 5 ft^2, the largest 1,700 ft^2. The median cleanup area is 100 ft, the mean 249 ft^2; the wide discrepancy between the mean and the median reflects the presence of a small percentage of relatively large spills in the database.

Recommended sample sizes are given in Table 4. Several considerations were involved in arriving at these recommendations. First, the maximum number of samples recommended for the largest spills is 37, in recognition of practical constraints on the number of samples that can be taken. Even so, it is important to note that not all samples collected will need to be analyzed. The calculations in Section 5 below show that, even for the 37 sample case, no more than 8 analyses will usually be required to reach a decision. Since the cost of chemical analyses is a substantial component of sampling and analysis costs, even the 37-sample case should not, therefore, be prohibitively expensive. Second, the typical spill will require 19 samples. Small spills, with sampling radius no greater than 4 ft, will have 7 samples, while the largest spills, with sampling radius 11.3 ft and up, will require 37 samples. It should be noted that only capacitor spills are represented in Table 3. Transformer spills, however, would be expected to be generally smaller than capacitor spills because energetic releases are less likely from transformers. Thus, one would expect the smaller sample sizes to be relatively more likely for transformer spills than capacitor spills.

Table 3. Distribution of PCB Capacitor Spill Cleanup Areas Based on 80 Cases

Cleanup area (ft^2)	Percent of cases
≦ 50	32.5
51-100	18.8
101-200	15.0
201-300	12.5
301-400	3.8
401-700	7.5
701-1,300	8.8
≧ 1,300	1.3

Source: Lingle 1985.

Table 4. Recommended Sample Sizes

Sampling area (ft^2)	Radius of sampling circle (ft)	Percent of PCB capacitor spills	Sample size
≦ 50	≦ 4	32.5	7
51-400	4-11.3	50.0	19
> 400	> 11.3	17.5	37

The final consideration in recommending sample sizes was to achieve roughly comparable detection capability for different size spills. The radius of the smallest contaminated circle certain to be sampled at least once by the sampling scheme is used for comparative purposes (see Table 2). Table 5 presents some calculations of this quantity. The absolute detection capability of the sampling scheme is seen to be relatively constant for different spill sizes. This means that a given area of residual contamination is about as likely to be detected in any sized spill.

Table 5. Detection Capability of the Recommended Sampling Schemes

Sampling area (ft^2)	Radius (ft)	Sample size	Radius of smallest circle to be sampled (ft)
50	4.0	7	2.0
150	6.9	19	1.9
400	11.3	19	3.2
875	16.7	37	3.2

b. Design Layout in the Field

Figure 5 presents a typical illustration of design layout in the field. The first step is to determine the boundaries of the original cleanup area (from records of the cleanup). Next, find the center and radius of the sampling circle which is to be drawn surrounding the cleanup area. The following approach is recommended:

(a) Draw the longest dimension, L_1, of the spill area.

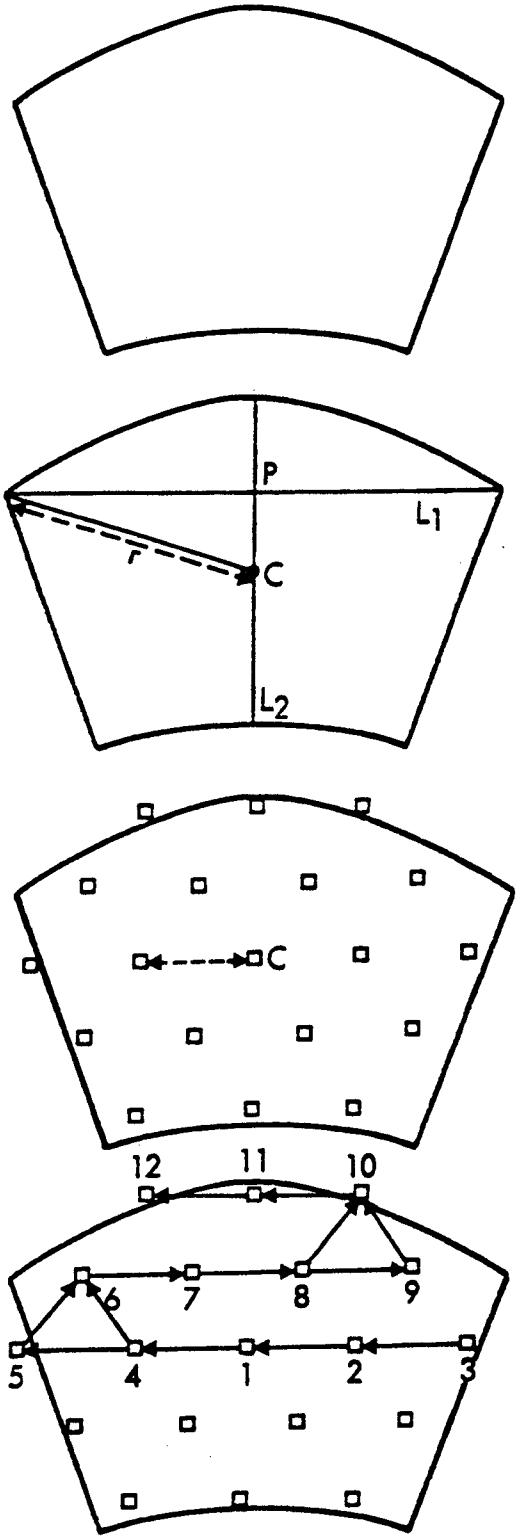
(b) Determine the midpoint, P, of L_1.

(c) Draw a second dimension, L_2, through P perpendicular to L_1.

(d) The midpoint, C, of L_2 is the required center.

(e) The distance from C to the extremes of L_1 is the required radius, r.

Figure 5 shows an example of the procedure; Figure 6 demonstrates how the center is determined for several spill shapes. Even if the center determined is slightly off, the sampling design will not be adversely affected.



(a) Original cleanup area

(b) Locating the center of the sampling circle

(c) Centering the hexagonal grid

(d) Staking out the grid points

Figure 5

Once the sampling radius, r, has been found, the sample size can be selected based on Table 4.

Example: Suppose r = 5 ft. From Table 4, a sample size of 19 should be used.

Having selected the sample size, the grid spacing can be calculated from Table 2.

Example (continued): For a 19-point design with radius r = 5, the grid spacing is s = 0.48r = (0.48)(5) = 2.4 ft.

The procedure for laying out a 19 point design is as follows. The first sampling location is the center C of the sampling circle, as shown in Figure 5. Next, draw a diameter through C and stake out locations 2 through 5 on it as shown; adjacent locations are a distance s apart. The orientation of the diameter (for example east-west) used is not important; it may be chosen at random or for the convenience of the samplers. The next 4 locations, Nos. 6-9, are laid out parallel to the first row, again a distance s apart. The only difficulty is in locating the starting point, No. 6, for this row. To accomplish this the sampler needs two pieces of rope (or surveyor's chain, or equivalent measuring device) of length s. Attach one piece of rope to the stake at each location 4 and 5. Draw the ropes taut horizontally until they touch at location 6. Once the second row is laid out, the third and final row of 3 locations in the top half of the design is found similarly, starting with number 10. In the same way, the bottom half of the design is staked out. The 7-point or 37-point designs are laid out in an analogous fashion.

Once the sampling locations are staked out the actual samples can be collected. In the example in Figure 5, three of the sampling locations fall outside the original cleanup area. Samples should be taken at these points, to detect contamination beyond the original cleanup boundaries. This verifies that the original spill boundaries were accurately assessed.

In practice, various obstacles may be encountered in laying out the sampling grid. Many "obstacles" can be handled by taking a different type of sample, e.g., if a fire hydrant is located at a point in a sampling grid otherwise consisting of soil samples, then a wipe sample should be taken at the hydrant, rather than taking a sample of nearby soil. The obstacle most likely to be encountered is a vertical surface such as a wall. To determine the sampling location on such a surface, draw taut the ropes (chains) of length s attached to two nearby stakes and find the point on the vertical surface where their common ends touch. See Figure 7 for an illustration of the procedure. If more samples from the vertical surface are called for, the same principle may be applied, always using the last two points located to find the next one.

3. Judgemental Sampling

The inspector or sampling crew may use best judgement to collect samples wherever residual PCB contamination is suspected. These samples are