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0925.5330

Part I: Complete all fields; indicate if not applicable or appropriate; please write legibly.

DOCUMENT TO: — DOCUMENT DATE: 06-28-88

ORIGINATOR NAME: Tom Buhl ORGANIZATION: —

SYMBOL: — PAGE COUNT: 10

SUBJECT/TITLE: Clean-up of two Firing Site at TA-33

RECORD TYPE (Circle relevant type for primary record; type of attachments should be selected on *Keywords List*):

Analytical Data	FAX	Map	Plan	Study
Chain-of-Custody	Figure	Memo	Procedure	Telephone Record
Computer Output	Form	Microform	Purchase Request	Transcription
Contract	Interview	Notebook	Receipt Acknowledgment	Video
Controlled Distribution	Letter	Personal Notes	(Report)	Work Plan
Drawing	Logbook	Photo	Review	Other ____

RECORD CATEGORY: P
(P for Programmatic or R for Reference)

RECORD PACKAGE #: —

RECORD FILMED (Y/N): Y

RECORD LOCATION: —
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Part II: Complete all fields; indicate if not applicable or appropriate; please write legibly. Use *ER Record Index Form Attachment Sheet* if needed.

ATTACHMENTS FILMED (Y/N): Y
(Were attachments to this record filmed?)

LOCATION: —
(Indicate location of attachments.)

TECH AREA(S)	ADS NO(S)	WBS NO(S)	STRUCTURE NO(S)/MDA
LIST RELEVANT TECH AREA(S).	LIST RELEVANT ADS NO(S).	LIST RELEVANT WBS NO(S).	LIST RELEVANT STRUCTURE NO(S)/MDA.
TA-33	1122	1.5.16	33-97
54	1148	1.5.24	33-118
			33-134
			AREA-E

34368

Letter
Limit
Lines
Liquid
List
Log
Logbook

Magazine
Management
Manhole
Map
Material
MDA (Material Disposal Area)
Media
Meeting
Memo
Mercury
Metal
Microform
Minimization
Minutes
MIS (Management Information System)
Mixed Waste
MOA (Memo of Agreement)
Model
Modification
Money (Allocation, Appropriation, Budget, Cost, Funding, etc.)
Monitoring
Monthly Report
Mortar Impact Area
MOU (Memo of Understanding)
MSA (Major System Acquisition)

NEPA (National Environmental Policy Act)
NFA (No Further Action)
Nitrate
NMED (New Mexico Environment Department)
NMEID (New Mexico Environmental Improvement Division)
NOD (Notice of Deficiency)
Nonexplosive
Notebook
Notification
NPDES (National Pollutant Discharge Elimination System)
NRC (Nuclear Regulatory Commission)
Nuclear

Observation
Off-gas
Oil
Open
Open Burning
Operation
Order
Organic
Organization
OSHA (Occupational Safety & Health Administration)
OU (Operable Unit)
Outfall
Outline

Pad
PA/RFA (Preliminary Assessment /RCRA Facility Assessment)
PCB (Polychlorinated Biphenyl)
Permit
Personal Notes
Personnel
Personnel Qualification
Photo
Pilot Study
Pipe
Pit
Plan
Plant
Plutonium
Pollution
Polonium
Polaroid
Potential
Presentation
Prevention
Priority
Procedure
Program
Programmatic
Project
Project Leader
Propellant
Property
Proposal
Protection
Protocol
PRS (Potential Release Site)
Public
Pump
Purchase Request

Quality
QA (Quality Assurance)
QP (Quality Procedure)
Quarterly Report

Radioactive
Radiochemistry
Radionuclide
Radium
Rationale
RCRA (Resource, Conservation, and Recovery Act)
Reactor
Receipt Acknowledgment
Recommendation
Reconnaissance
Records
Recovery
Recycle
Reduction
Reference
Regulation
Release
Remediation
Removal
Report
Request
Requirements
Research
Resin Bed
Resolution
Resource
Respirator
Response
Restoration
Restriction
Results
Review
Revision
RFI/RI (RCRA Facility Investigation/Remedial Investigation)
Risk
RPF (Records Processing Facility)

Safety
Salamander
Salvage
Sample
Sampling Plan
Sanitary
Satellite
Schedule
Scope
Scrap
Scrap Detonation Site
Screening
Scrubber
Search
Security
Seep
Seminar
Semivolatile
Septic
Sewer
Shaft
Sheet
Shell
Shot
Silver
Site
Sludge
Soil
Solid
Solvent
SOP (Standard Operating Procedure)
SOW (Statement of Scope of Work)
Specific
Spill
Stack
Standard
Statistics
Steamline
Steel
Storage
Strontium
Structure
Study
Subcontractor
Subsurface
Summary
Sump
Support
Surface
Surveillance
Survey
Swipe
SWMU (Solid Waste Management Unit)
System

Table
Tank
Task
TCLP (Toxicity Characteristic Leaching Procedure)
TDD (Technical Document Description)
Technical
Technical Team
Technology
Telephone Record
Test Area
Testing
TLD (Thermoluminescent Dosimeter)
TOC (Table of Contents)
Townsite
Toxic
Tracking
Training
Transcription
Transfer
Transformer
Transport
Treatment
Trench
Trip Report
Tritium
TRU (Transuranic)
TSCA (Toxic Substances Control Act)
Tuballoy
Tuff

Underground
Uranium
Urine
USGS (United States Geological Survey)
UST (Underground Storage Tank)
Utility

Validation
Variance
VE (Value Engineering)
Ventilation
Verification
Video
Volatile
Volume

Warehouse
Waste
Water
WBS (Work Breakdown Structure)
Weapon
Well
Work
Working Group

Zinc

TOM BUHL
JUNE 28, 1988

Thomas Buhl HEC-8, 7-2476
Original is in his files. Deadly Head says that unreadable text to the right should be Buhl.

02-038

(10)

CLEAN-UP OF TWO FIRING SITES AT TA-33

Introduction

From September 12, 1994, to September 30, 1994, surface clean-up was conducted at two firing sites in the TA-33 area. The clean-up consisted of removal of two large recovery chutes, several smaller recovery chutes, a microwave tower, cable tray, utility poles, elevator, inactive equipment, transformer cage, and associated surface debris, as well as the filling of two unused underground chambers.

The great majority of the material found at the two firing sites was uncontaminated. This material either was taken to salvage if it was felt to have any value, or was placed in one of two specially designated areas at the firing sites. These areas were later covered with soil and contoured. Plans now call for the areas to be seeded with native grasses during the Spring.

All contaminated material was taken to the Laboratory's disposal areas for radioactive and hazardous materials at TA-54. The contaminated material consisted of:

- soil containing pieces of uranium metal
- a large concrete block with pieces of uranium metal imbedded in a metal plate attached to the concrete
- a piece of equipment with internal contamination
- oil and drum containing PCB's.

Project Plan

The scope of the clean-up project was outlined in the March 7, 1994 memo from Nick Mezins of ENG-4 to C.G. Adams, Jr., Associate Director for Technical Support. A copy of the memo is provided in Appendix A of this report.

The memo contains a 19-point plan that calls for removal of all recovery chutes, utility poles, deteriorated buildings, old equipment, and associated surface debris. Two unused underground chambers would be filled with clean soil. The disturbed area was to be covered with topsoil and seeded. Initially the work was estimated to require approximately two and one half months and cost $119,000.

Because of shortage of funds, the project as described in the Mezins memo did not begin as scheduled on May 21, 1994. Funds were later identified that allowed the project to start on September 12, 1994, to be completed as much as possible by the end of the fiscal year on September 30, 1994.

Contaminant Identification Based on Historical Background

The historical background of the firing sites at TA-37 was obtained by a search of Laboratory records and by interviewing individuals who had worked in programs at TA-37. Of particular importance was the interview of Mr. Harlow Russ that was conducted by Mr. John Ahlquist, a staff member of HSE-8. A copy of the report describing the interview is attached as Appendix B.

A map showing the areas included in the clean-up is given in Figure 1. Table 1 lists the structures shown in Figure 1 by their identification number.

Mr. Russ indicated that tests on artillery shells took place in the firing area near Waste Area D, for convenience called FS-1 in this report (see Appendix B). Potential contaminants included uranium, beryllium, beryllium carbide, tungsten, and tungsten carbide. Some tests also involved plutonium.

The firing area near Waste Area E, called FS-2 in this report, also potentially contained uranium, beryllium, beryllium carbide, tungsten, and tungsten carbide contamination. Some work with tritium was also performed in this area.

The third area covered in the clean-up program was a storage area for an elevator building. No contamination was expected in this area.

While several contaminants were potentially present as seen by the discussion above, the major contaminant expected for the area was uranium.

Clean-Up Guidelines Used in the Project

Guidelines for clean-up under the U.S. Department of Energy's (USDOE) Formerly Utilized Sites Remedial Action Program were developed by a collaboration of Los Alamos National Laboratory, Argonne National Laboratory, The USDOE's Oak Ridge Operations Office, and Bechtel National, Inc. (USDOE 1985). For the radionuclides of concern at this location, uranium (U-234, U-235, and U-238), and possibly plutonium (Pu-238, Pu-239/240, and Pu-241) and americium (Am-241, a decay product of Pu-241), the concentration guidelines are given in Table 2. Any radionuclide concentration(s) that is below the guideline given in this Table is considered to be present in "a trace amount" and to have negligible potential hazard.

TABLE 2

Radionuclide	Surface Soil Guideline

	(pCi/g above background)
U-234	150
U-235	150
U-238	150
Pu-238	100
Pu-239/240	100
Pu-241	800
Am-241	20

Radioactive contamination was identified using a gross alpha and gross beta counting system that had been used in past decontamination projects at the Laboratory. The minimum levels of detection for these instruments are 25 pCi/g for gross alpha (Pu-239) and 10 pCi/g for gross beta (Sr-90). Clean-up to non-detectable radioactivity means that any remaining contamination is at least as small as these limits.

Non-radiological contamination was not found in any location during the clean-up program. As a result, all non-radiological constituents are at naturally-occurring background concentrations, and no clean-up guidelines were necessary.

Pre-Operational and Post-Operational Surveys

Before the clean-up operations at TA-33 began, routine surveys were performed by staff from HSE-1, HSE-3, HSE-5, and HSE-8 for radiological contaminants, safety hazards including the presence of high explosive, non-radiological contaminants, and environmental concerns respectively. The results of these surveys are summarized in the reports in Appendix C.

Radioactive contamination that required disposal at TA-54 was detected in an instrument in building TA-33-127 (see figure 2) and on a concrete block and surrounding soil at the nearby firing site TA-33-97 (see figure 3). The instrument in building TA-33-127 read 0.5 mR/hr with a G-M counter with the window open, and background with the window closed. No detectable removable surface contamination was found on the instrument. The elevated reading was hypothesized to be due to uranium deposited in the instrument.

The small firing site area near TA-33-97 had visible uranium contamination. A large concrete block had fragments of uranium imbedded in the metal plack attached to its side (see figures 4 and 5). These fragments read up to 14 mR/hr at contact with a G-M counter with the window open. Uranium fragments coated with a bright yellow uranium oxide

were found in the soil surrounding the concrete block (see figure 6).

Because of the short time available to perform the clean-up program, there was not time to check for non-radiological contamination of the firing site areas. Such a check would involve laboratory analysis of soil samples for non-radiological constituents, particularly beryllium, a procedure that requires several weeks at the minimum to perform. As a result, it was conservatively assumed that areas contaminated with uranium could also contain possible non-radiological contaminants. Work in these areas was carried out as if these non-radiological contaminants were present.

Phoswich Survey. In order to locate areas of radiological contamination (and possible non-radiological contamination), HSE-8 personnel performed phoswich surveys of the areas scheduled for clean-up. The phoswich (phosphor sandwich) is an instrument designed at Los Alamos to detect low energy gamma rays and x-rays that are typically emitted by actinides such as plutonium and uranium. This instrument is ideally suited for detection of these radionuclides in the field.

Survey points were based on a grid and separated at regular intervals. Maps showing the phoswich readings in the surveyed areas are presented in figures 6-10.

Soil Sampling. Soil was also sampled to support the phoswich measurements. The soil samples were counted for gross alpha and gross beta levels. Soil samples having a gross alpha level higher than 25 pCi/g (above background) or a gross beta level higher than 10 pCi/g (above background) were considered to have detectable contamination. These decision levels for gross alpha and gross beta had been successfully used in many decontamination projects in the past at the Laboratory, and accordingly also were adopted for this project.

The results of the pre-operational soil sampling are given in Table 2. Sampling locations are shown in Figures 11 and 12.

Non-radiological Sampling. One soil sample was submitted for beryllium analysis before the clean-up program was begun. As explained earlier, the sample result was not available for two weeks due to the long time needed for the chemical analysis. The soil sample, which was chosen because it contained visible uranium contamination and so was felt to be a good candidate for beryllium contamination, was found to have 10 +- ? ppm of beryllium, which is only slightly higher than a typical background concentration of 1.5 +- ppm.

PCB contamination was found in oil contained in a abandoned drum at the far east end of FS-1. The PCB level was sampled by HSE-7 personnel and found to be 125.1 ppm.

Description of Clean-Up at Each Designated Site

TA-33-97. As expected, the phoswich survey found definite contamination in the small firing site area near TA-33-97 (figure 6). Phoswich readings were as much as 11543 counts/ 20 seconds. Background phoswich readings ranged from 700 to 950 counts/20 seconds, depending on the soil type that was being measured.

TA-33-118 and TA-33-136. The survey of the two large recovery chutes (see figures 13 and 14) detected only background readings, although there was an indication of readings on the inside of the chutes being slightly higher than those on the outside. Phoswich measurements of the sawdust and vermiculite floor of these chutes were only 50% to 80% of those of background soil, due to the absence of photon-producing nuclides in these materials.

Wood chips taken from the inside surface of the chutes were analyzed for uranium, and compared with wood taken from the interior of the sample beam. The results of the sampling, which are presented in Table 3, showed that the surface samples did indeed have slightly higher amounts of uranium, but that the uranium was present only in trace amounts. For the purpose of comparison, additional wood samples were taken from a similar wood structure that was not located in a firing site area. As can be seen in Table 3, uranium concentrations are smaller than those found in the surface wood samples from the recovery chutes. Uranium concentrations in all wood samples, however, was quite small.

Four samples of sawdust/vermiculite were collected from the recovery boxes and counted for gross alpha and gross beta. As shown in Table 2, the activities for these samples were less than the detection limits.

Four soil samples were taken of the soil and the sandbag barricade directly behind the recovery chutes. Gross alpha and gross beta measurements of these samples found no detectable above-background radioactivity.

Clean-up of the area consisted of the removal of the sandbags, the recovery chutes, their steel supports, and the sawdust/vermiculite fill (see figures 15 and 16). No material was contaminated except for possible trace amounts that would have insignificant hazard potential. The steel supports were cut off at the base and sent to surplus. All

remaining materials were placed in the disposal area specially constructed at F3-1.

After the completion of the clean-up, a phoswich survey was performed of the area based on a 3 meter grid. Soil samples were taken at four survey locations, including the location giving the highest phoswich reading. The area was also surveyed with a micro-R/hr meter.

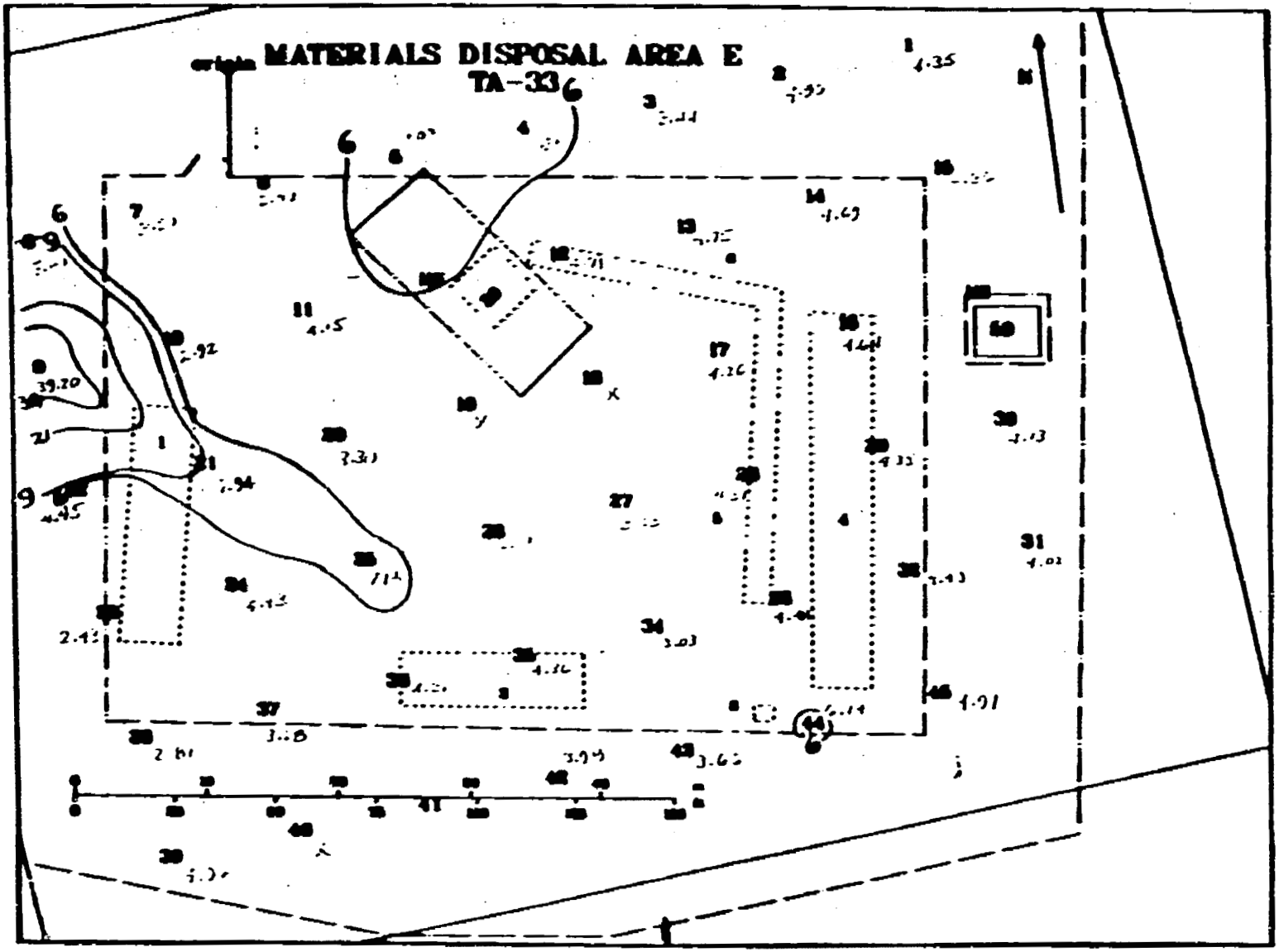
The post-clean-up phoswich survey showed no residual contamination. Survey results, which are shown in Figure 17, were plotted on log-normal probability paper. As seen in Figure 18, the phoswich readings follow a log-normal distribution consistent with natural background.

The soil samples were analyzed for uranium, plutonium, beryllium, and tungsten. A gamma scan was also performed on all samples. No above-background radiological or non-radiological contaminant was found in any of the soil samples.

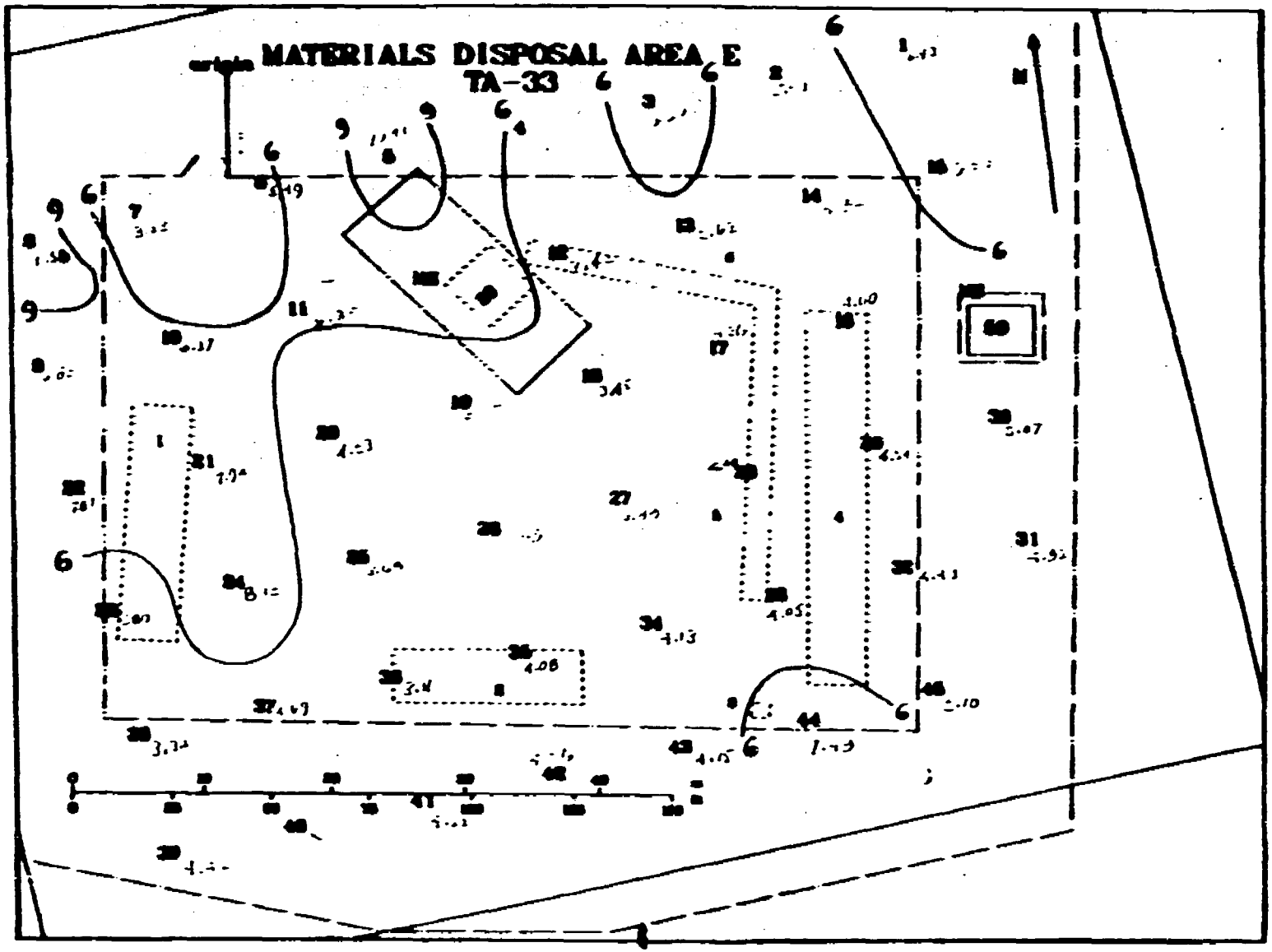
The survey with the micro-R meter found only external radiation levels consistent with natural background.

As a result of these measurements, we consider that this area is clean of residual contamination, except for trace amounts.

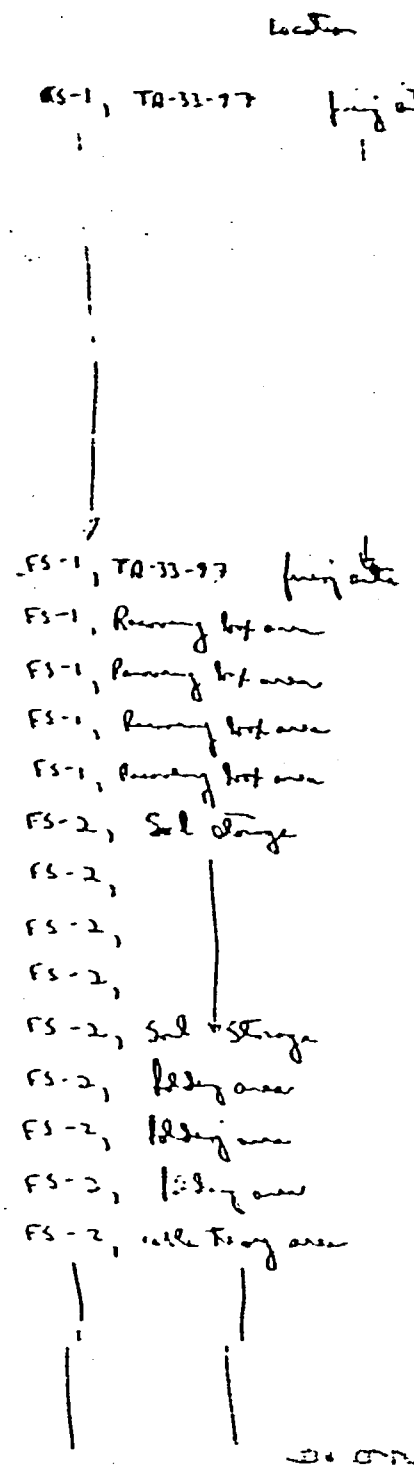
'83 Total U 1-10 cm
in μg/g



'83 Total U 0-1 cm
in μg/g



1	883	3.74 ± 0.30	0.0034 ± 0.0032	0.0037 ± 0.0017	< 3.0
2	813	2.77 ± 0.25			
3	832	3.38 ± 0.25	0.0117 ± 0.0015	0.0063 ± 0.0027	< 3.0
4	829	3.64 ± 0.30			
5	921	3.81 ± 0.30			
6	1602	31.8 ± 2.0	0.0119 ± 0.0014	0.0051 ± 0.0020	10.0 ± 3.0
7	1557	27.2 ± 2.0	0.0099 ± 0.0030	0.0038 ± 0.0020	24.0 ± 3.0
8	2455	182 ± 9.0	0.0016 ± 0.0037	0.0016 ± 0.0007	36.0 ± 3.0
9	3954	181.0 ± 9.0	0.0012 ± 0.0013	0.0152 ± 0.0046	35.0 ± 3.0
10	3764	32 ± 16	0.0020 ± 0.0015	0.0037 ± 0.0011	9.0 ± 3.0
11	768	4.18 ± 0.30			
12	864	3.63 ± 0.30	0.0033 ± 0.0020	0.0024 ± 0.0012	< 3.0
13	801	3.48 ± 0.25			
14	803	3.11 ± 0.20	0.0096 ± 0.0021	0.0038 ± 0.0013	< 3.0
15	873	7.63 ± 0.50			
16	1004	5.64 ± 0.40			
17	1226	6.39 ± 0.45	0.0055 ± 0.0019	0.0178 ± 0.0032	4.0 ± 3.0
18	1127	4.12 ± 0.30	0.0041 ± 0.0024	0.0069 ± 0.0024	< 3.0
19	920	7.39 ± 0.60			
20	1084	14.25 ± 0.90			
21	858	26.6 ± 1.5			
22	1057	10.46 ± 0.70	0.0044 ± 0.0010	0.0163 ± 0.0012	< 3.0
23	1026	16.1 ± 1.0			
24	1140	19.9 ± 1.5	0.0050 ± 0.0025	0.0251 ± 0.0052	40 ± 3.0
25	1085	19.9 ± 1.5			
26	1019	18.3 ± 1.6			



	1084	14.25 ± 0.90				FS-2, [illegible]
	858	[illegible] 6 ± 1.5				FS-2, [illegible]
	1057	10.46 ± 0.70	[illegible]	[illegible]	<3.0	FS-2, [illegible]
	1026	16.1 ± 1.0				FS-2, [illegible]
	1140	19.9 ± 1.5	[illegible]	[illegible]	9.0 ± 3.0	
	1085	19.9 ± 1.5				
	1019	28.3 ± 1.6				
	1060	15.8 ± 1.0				
	1028	25.9 ± 1.7				
	1122	9.19 ± 0.70	0.0015 ± 0.0016	0.0102 ± 0.0035	3.0 ± 3.0	
	998	15.0 ± 1.0				
	1136	66.9 ± 3.0	0.0011 ± 0.0011	0.0312 ± 0.0045	3.0 ± 3.0	FS-2, [illegible]