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0324 General

GROUP H-8 SOLID RADIOACTIVE WASTE MANAGEMENT GUIDELINES

I. Responsibilities for solid radioactive waste management.

A. Radioactive waste management operations including solid waste burial and retrievable storage are the responsibility of Group H-8.

Group Leader: LaMar Johnson
OHL Building, MS 490
Phone: 5021

B. Questions concerning waste disposal practices and special waste disposal problems should be directed to the Waste Management Section of Group H-8.

Alternate Grp. Leader: Keith J. Schiager
CMR Building, MS 737
Phone: 5862

1. John L. Warren is in direct charge of the burial ground and storage area operations.

Location: CMR Building, MS 737
Phone 5862, Room 1217

2. Questions concerning routine disposal practices should, as in past practice, be directed to John Enders.

Location: CMR Building, MS 737
Phone: 6095, Room 1221

12008

II. Establishment of standard operating procedures.

The Laboratory Policy calls for the establishment of Standard Operating Procedures (SOP) in the implementation of the Policy, such procedures to be established by the Laboratory unit having the operational responsibility. These procedures should include all steps from the initial generation of the waste, segregation procedures necessary, types of containers, methods of shipment, and procedures for special problems.

1. Group H-1 will serve as an immediate interface between the Waste Management Section and the Operating Groups. The H-1 Group Leader will have responsibility for the approval of such procedures from the standpoint of radiation safety.

2. Group H-8 will be the approving authority for waste management aspects of procedures relating to waste characteristics, packaging and subsequent waste handling within H-Division

3. H-1 will coordinate SOP review and approval.

III. Waste Categories

Four categories of LASL-generated solid waste have been identified and are segregated according to their actual or potential content of radioactive materials.

A. Materials for which there is assurance that no radioactive materials are present are taken by the Zia Company to the sanitary landfill operated by Los Alamos County.

B. Wastes which are, or are judged to be, contaminated with radioactive isotopes other than the transuranics, and/or with transuranic activity concentrations less than 10 nCi/g (100 nCi/g for ^{238}Pu) do not require storage for later retrieval. These wastes are buried in the LASL burial ground at Mesita del Buey (TA-54).

C. Wastes which are contaminated, or judged to be contaminated with transuranic elements to levels greater than 10 nCi/g (100 nCi/g for ^{238}Pu) require retrievable storage.

   1. The volume of waste over which the 10 nCi/g can be averaged is taken to be the volume of waste package (container) in which a measurement or estimate is made.

   2. Procedures shall be estimated to accomplish segregations of small batches of waste material so that the retrievable portions can be handled separately.

   3. Highly contaminated wastes shall not be deliberately diluted to circumvent this criterion.

D. Individual batches of wastes which contain unusual levels or types of radioactive and/or chemical contaminants are to be handled on an individual basis.

IV. Waste Packaging

A. Solid radioactive waste disposed of nonretrievably

All radioactive solid wastes which are to be disposed of nonretrievably shall be provided with appropriate packaging by the originator.

1. Room-type trash should be packaged in cardboard boxes and/or plastic bags.

2. Transuranic contaminated chemical treatment sludge that is <10 nCi/g (<100 nCi/g ^{238}Pu) should be packaged in a minimum .127 mm (5 mil) plastic bag, sealed in a 210-liter (55-gallon) drum.

3. Larger and/or heavier wastes require more substantial packaging such as wooden crates. The Waste Management Section can advise with regard to packaging this type of waste.

4. In those instances where all contamination is fully contained within the waste material, no additional packaging may be required. The Waste Management Section should be consulted in this matter.

B. Solid transuranic waste stored retrievably

1. Wastes which are to be sent to retrievable storage should be packaged, by the originator, in white painted 210-liter DOT 17C (55-gallon) drums containing a 2.29 mm (90 mil) high density polyethylene liner. Both the drums and liners are available from LASL Chemical Stock (SM-31).

   DOT 17C 210-liter drum - Stock #LG 1103/West Dock
   2.29 mm liner - Stock #LG 3738/West Dock

2. There are locations and situations at LASL where the 210-liter (55-gallon) drum cannot be used because of space limitations and/or waste form. The packaging other than with the 210-liter (55-gallon) drums should be made by agreement between the waste originator and the Waste Management Section of H-8

V. Radioactive Waste Package Labeling

All packages of radioactive solid waste destined for disposal or storage must be clearly labeled as containing radioactive material. Tape and signs appropriate for this purpose are obtainable through LASL Safety Stock (SM-30).

A. Package Labeling Requirements

1. "CAUTION RADIOACTIVE WASTE" tape (Stock Number CM-3263/8G-38) should be used to mark all boxes and bags of waste to be disposed of by burial.

2. All drums containing waste, whether designated for burial or retrievable storage should have attached a "RADIOACTIVE MATERIAL" tag (Form 743) properly filled out.

3. Crates that contain retrievable transuranic waste must have attached a 15.2 cm by 15.2 cm (6"x6") aluminum tag, properly filled out. These tags can be obtained through LASL Safety Stock.

4. All crates containing waste designated for nonretrievable disposal should have affixed the above stated aluminum tag.

5. All retrievable transuranic solid waste packages are to have a serially numbered identification tag permanently attached. These tags will be provided by the H-8 Waste Management Section. The tag number for each package is to be recorded as the reference to the permanent records for that package.

6. Other specific markings and package labeling requirements are required of different waste types. These package marking requirements are to be found in existing LASL Waste Management SOP's.

B. Responsibility for Labeling

1. The individual packaging the waste is responsible for obtaining the required labeling material and for labeling and marking the package properly.

2. The H-1 representative of the area where the package originates is responsible for checking waste packages for compliance with the labeling requirements.

3. The Waste Management facility operator assigned to the solid radioactive waste disposal area will check packages as they are off-loaded at the area to assure that proper labeling and other markings are present.

VI. Records Requirements for Radioactive Solid Waste

In order for the Waste Management Section to maintain the required records system for waste disposal, a LASL Solid Radioactive Waste Disposal Permit will be required with each waste item or shipment, as indicated.

1. For radioactive solid wastes to be disposed of nonretrievably, a properly completed Disposal Permit must accompany each consignment.

2. For transuranic solid waste to be stored retrievably, a properly completed Disposal Permit must accompany each package.

VII. Special Waste Lots

Special lots of materials such as were described under Section III. D. shall require special notification and handling. When such materials are encountered, the following information should be forwarded to the Waste Management Section of H-8 in the form of a memo which will serve as a part of the record.

a. Number, size and nature of containers

b. Waste matrix materials in each container

c. Identify and give the quantity of each radioisotope in each container

d. Condition of the container

e. Copy of authorization, by responsible organization to dispose as waste by burial/storage.

The Waste Management Section will review the information, assure any special review and requirements for criticality safety and/or retrievable storage, assess the overall impact of the storage or disposal method to assure that safety will be maintained, and then, implement disposal.

VIII. Waste Volume Reduction

Efforts should be made by LASL Operating Groups in coordination with the Waste Management Section to reduce the volume of radioactive solid waste that is generated. To minimize the quantities of radioactive waste sent to burial, it is suggested that SOP's and physical separation should, wherever feasible, be used as means to delineate work areas which are noncontaminated. Wastes from such areas can be sent to a sanitary landfill rather than to the radioactive solid waste disposal area. Such procedures should specify the controls which are to be exerted by the operating supervision to assure that materials or objects contaminated with radioactivity are not inadvertently placed in the clean disposal containers or dumpsters. These controls should be enforced to assure that the risk of disposing of a contaminated object or material to a noncontaminated landfill is minimal.

APPENDIX E

ENGINEERING DRAWINGS

AREA A

#	Date	Title
ENG-C 2076	1/24/45	Installation No. "1" Tank Site
ENG-C 2077	1/24/45	Installation No. "1" Tank Site
ENG-C 2078	1/24/45	Installation No. "1" Tank Site
ENG-C 2213	5/30/45	Sanitary Sewers and Drains
ENG-C 2337	8/45	Sanitary Sewers
ENG-C 2338	8/22/45	Special Sewers
ENG-R 185	6/7/56	Materials Waste Pit "A" TA-21
ENG-R 3640	no date	Materials Disposal Areas, Area "A", DP-Site, TA-21
ENG- 6250		
ENG- 1266	12/22/70	Materials Disposal Areas, Area "A", DP-Site, TA-21
ENG-21-31, Sheet 2	5/24/74	Materials Disposal Areas, Area "A", TA-21
ENG-R 4457	6/4/74	Materials Disposal Areas, Area "A", DP Site, TA-21

AREA T

ENG-C 2215	6/11/45	Laboratory Sump DPW-81, 84, 87, 89 DPE-173
ENG-C 2217	6/13/45	Waste Disposal Facilities - Bldgs. 2, 3, 4 & 5
ENG-C 2337	8/45	Sanitary Sewers
ENG-C 2338	8/22/45	Special Sewers
ENG-C 2563	4/15/52	Contaminated Waste Drainage System
ENG-C 2564	4/15/52	Contaminated Waste Drainage System

#	Date	Title
ENG-R 185	6/7/56	Materials Waste Pit Area "A", TA-21
ENG-R 1852		
ENG-R 1853		
ENG-C 35571	7/31/68	Contaminated Waste Disposal, Area T TA-21
ENG-C 35572	7/31/68	Contaminated Waste Disposal, Area T TA-21
ENG-R 3561	6/1/70	Materials Disposal Area, Area "T", DP Site, TA-21
ENG-21-30	5/15/74	Material Waste Area, Area "T", TA-21
ENG-21-31	5/15/74	Materials Disposal Areas, Area "T", TA-21
ENG-R-4475	6/4/74	Materials Disposal Areas, Area "T", DP Site, TA-21

AREA B

ENG-R 186	6/7/56	Materials Waste Pit, Area "B" TA-21
ENG-C 26147	11/27/63	DP Site Area, TA-O
ENG-C 3641	no date	Materials Disposal Areas, Area "B", DP Road, TA-O
ENG-R 1265	12/22/70	Materials Disposal Areas, Area "B", DP Road, TA-O

AREA C

ENG-R 187	6/7/56	Materials Waste Pit, Area "C", TA-O
ENG-R 104	6/7/56	Pit Number 5, Materials Waste Pit, Area "C", TA-O
ENG-R 117	4/10/62	Materials Waste Pits, Location Materials Waste Shafts Area "C", TA-O
ENG-R 3642	no date	Materials Disposal Areas, Area "C", Pajarito Road, TA-O

#	Date	Title
ENG-R 1264	12/22/70	Materials Disposal Areas, Area "C", Pajarito Road, TA-O
ENG-R 4459	6/4/74	Materials Disposal Areas, Area "C", Pajarito Road, TA-O

AREA D

ENG-R 188	6/7/56	Materials Waste Pits, Area "D" TA-33
ENG-R 3643	no date	Materials Disposal Areas, Area "D", HP Site, TA-33
ENG-R 4460	6/4/74	Materials Disposal Areas, Area "D", HP Site, TA-33

AREA E

ENG-R 189	6/7/56	Materials Waste Pit, Area "E", TA-33
ENG-R 3644	no date	Materials Disposal Areas, Area "E", HP Site, TA-33
ENG-R 4461	6/4/74	Materials Disposal Areas, Area "E", HP Site, TA-33

AREA F

ENG-R 190	6/7/56	Materials Waste Pit, Area "F", TA-6
ENG-R 3645	no date	Materials Disposal Areas, Area "F", TM Site, TA-6
ENG-R 4462	6/4/74	Materials Disposal Areas, Area "F", TM Site, TA-6

ENGINEERING DRAWINGS

AREA G	DATE	TITLE
ENG-C 18462	2-26-57	Materials Waste Pits Master Plan and Topography Mesita del Buey
ENG-R 1634	2-20-57	Materials Waste Pits Topography East Area Mesita del Buey TA-0
ENG-R 1635	2-20-57	Materials Waste Pits Topography East Area Mesita del Buey TA-0
ENG-R 1636	2-20-57	Materials Waste Pits Topography East Area Mesita del Buey TA-0
ENG-R 1637	2-20-57	Materials Waste Pits Topography East Area Mesita del Buey TA-0
ENG-R 1638	2-20-57	Materials Waste Pits Topography East Area Mesita del Buey TA-0
ENG-R 1639	2-20-57	Materials Waste Pits Topography East Area Mesita del Buey TA-0
ENG-C 18463	2-26-57	Materials Waste Pits Standard Specifications Mesita del Buey TA-0
ENG-R 3646	No date	Materials Disposal Areas, Area "G" Mesita del Buey TA-0
ENG-R 3639	No date	No title
ENG-R 3638	No date	Materials Disposal Areas Shaft Covers
ENG-R 3637	No date	Materials Disposal Areas Standard Pit Specifications TA-0

AREA G	DATE	TITLE
ENG-C 25699	7-27-65	Materials Disposal Areas FY 66 Areas "G", "H" and "J" Pit No. 5 Area "G" Mesita del Buey TA-0
ENG-C 25700	7-27-65	Materials Disposal Areas FY 66 Areas "G", "H" and "J" Area "G" Shafts Mesita del Buey TA-0
ENG-C 25703	7-27-65	Materials Disposal Areas Standard Pit Specifications TA-0
ENG-C 36152	9- 3-68	New Contaminated Waste Disposal Pit - Area "G"
ENG-R 3332	12- 5-69	Materials Disposal Area "G" Mesita del Buey TA-54
ENG-R 1262	12-22-70	New Contaminated Waste Disposal Pit - Area "G"
ENG-R 1263	12-22-70	Materials Disposal Areas, Area "G" Mesita del Buey TA-0
ENG-54-1	3- 5-71	Materials Disposal Areas Area "G" Pits 8-23
ENG-54-3	8- 5-71	Materials Disposal Areas, Area G Pit Sections Pit No. 17 TA-54
ENG-54-4	9-24-71	Materials Disposal Areas, Area "G" Pit Sections Pit No. 21 TA-54
ENG-54-5	10-18-71	Materials Disposal Areas, Area G Pit Sections Pit No. 8 TA-54
ENG-54-6	10-18-71	Materials Disposal Areas, Area G Pit Sections Pit No. 12 TA-54
ENG-54-7	10-19-71	Materials Disposal Areas, Area "G" Pit Sections Pit No. 16 TA-54
ENG-R 2505	2-10-72	Structure Location Plan TA-54 Waste Disposal Site

AREA G	DATE	TITLE
ENG-54-8	3-14-72	Materials Disposal Area Area "G" Pit Elevations TA-54
ENG-C 42212	10-29-73	Retrievable Storage of 238 Contaminated Waste, Area G; Civil - Plans and Details Mesita del Buey TA-54
ENG-R 4464	6- 4-74	Materials Disposal Areas Area "G" Mesita del Buey TA-54
ENG-R 4463	6- 4-74	Materials Disposal Areas Area "G" Mesita del Buey TA-54

APPENDIX F

PHOTOGRAPHS OF DISPOSAL AREAS

(A, B, C, D, E, F, G, AND T)

EXPLANATION

LAPL: Los Alamos Photographic Laboratory

CN: Color Negative (Photos black and white unless preceded by CN

First 2 digits of photo number equal year taken.

PUB: Public Information Office

LADC: Los Alamos Document

USGS: United States Geological Survey

PHOTOGRAPHS OF DISPOSAL AREAS A, B, C, D, E, F, G, AND T

LAPL # 660625	Photo of "Location Plan Materials Disposal Areas"	J. Enders

AREA A

Photograph #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL732349	3/5/73	Parts of building 12 at TA-21 being put into it	R. Garde
LAPL738047 738046	5/24/73	Same building (TA-21-12)	R. Garde
LAPL738076	6/26/73	Same building (TA-21-12)	R. Garde
LAPL5713-71 5713-40 5713-39		Aerial view Area B, T, A, & V " " " " " " " " " " " " " " " "	B. Purtymun " "
LAPL696067 (Ref. 1.)		S. wall of pit showing soil zone, tuff and joints, 1st layer of waste and access road.	M. Rogers
LAPL696066 (Ref. 1.)		N. wall of pit showing soil zone, tuff and joints, and 1st layer of waste	M. Rogers

AREA B

LAPL5713-71 LAPL5713-40 LAPL5713-39		Aerial view Area B, T, A, & V " " " " " " " " " " " " " " " "	B. Purtymun " "

AREA C

CN733540	late 1973	Aerial view from E	J. Enders & M. A. Rogers
CN734448	late 1973	Aerial view from the NW	M. A. Rogers & C. L. Warner
CN734449	late 1973	Aerial view from the NE	M. A. Rogers
CN734450	late 1973	Aerial view from the W	M. A. Rogers
CN734451	late 1973	Aerial view from the SW	M. A. Rogers
CN734452	late 1973	Aerial view W end Area C from the S	M. A. Rogers
CN734453	late 1973	Aerial view W end Area C from the SE	M. A. Rogers

AREA C cont

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL583494		Pit 6	J. Enders
LAPL583497		Pit 6 (Ref. 2.)	J. Enders
LAPL583498		Pit 6 in background	J. Enders
LAPL583500		Pit 6 (Ref. 2.)	J. Enders
LAPL583502		Pit 6, difference in weathering of packaging materials	J. Enders
LAPL583511		Pit 6	J. Enders
AREA D & E			
LAPL5713-1		Aerial view Area D & E	B. Purtymun
LAPL5713-8		" " " " " "	
LAPL (no #)		Taken with 35 mm and blownup, aerial photo upper left quarter is Area D —	B. Purtymun
AREA F			
	NO EXISTING PHOTOS		
AREA G			
PUB71 195-6 PUB71 195-4 PUB71 195-1		Aerial photos before pits #7, #24 dug	B. Purtymun
AREA G, PIT 1			
LAPL59425		Trash being covered	M. Rogers & J. Enders
LAPL59424		Trash being covered[2]	" " "
LAPL59423		Trash being covered	" " "
LAPL59422		" " "	" " "
LAPL59421		" " "	" " "

AREA G, PIT 1 cont

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL59420		Bird's eye view of where C. Blackwell fell into pit and fractured his leg. Gives a good idea of what trash/fill ratio is in some of the pits	M. Rogers & J. Enders
LAPL59419		Past practice: backing truck to side of pit and unloading from tailgate. Past practice because C. Blackwell slipped and fell into pit doing it.	M. Rogers & J. Enders
LAPL59418		Location of C. Blackwell's fall	" "
LAPL59417		" " " " "	" "
LAPL59416		" " " " "	" "
LAPL59415		Looking south. Note firebox from old M. Bldg. TA-1 at top of pit on right side	M. Rogers, J. Enders
LAPL583499		Looking south. Shows burning trench in center of pit.	J. Enders

AREA G, PIT 2

LAPL594830 (Ref. 3.)		Infiltration study, S. wall	B. Purtymun
LAPL594829 (Ref. 3.)		Infiltration study 3000 gal. water tank	B. Purtymun
LAPL594828 (Ref. 3.)		Infiltration study, "tipping bucket" assembly as shown installed in infiltration pit	B. Purtymun
LAPL635849	10/23/63	"Scaler and neutron moisture probe in moisture access tube to solid waste horizon	B. Purtymun

AREA G, PIT 3

LAPL635856	10/23/63	Looking south	B. Purtymun

AREA G, PIT 4

LAPL67357	Early 1967	Looking west[2]	M. Rogers & J. Ende
LAPL67359	Early 1967	Past practice: drums no longer off-loading as photo shows	" "

AREA G, PIT 5

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL67358 (Ref. 2.)		Looking west: center excavation may have been due to "extra money" or "still burning trash"	J. Enders
LAPL7012986 thru 3-15,16-71 LAPL7013018		Recovery operation: Container of tritiated chemical compound	J. Enders

AREA G, PIT 7

LAPL CN733313 thru LAPL CN733326	9/12/73	North wall of pit	M. A. Rogers
LAPL CN733327 thru LAPL CN733339	9/13/73	South wall of pit	M. A. Rogers
LAPL CN733303	9/12/73	West end of Pit showing pond in bottom	M. A. Rogers
LAPL CN733304	9/12/73	Looking east	M. A. Rogers
LAPL CN733305	9/12/73	North wall approx. 357 ft. from West end	M. A. Rogers
LAPL CN733306	9/12/73	North Wall Approx. 471 ft. from West end	M. A. Rogers
LAPL CN733307	9/12/73	Close-up of North Wall behind Auger Hole #3 Approx. 357 ft from west end of pit	M. A. Rogers
LAPL CN733308	9/12/73	Looking SW shows area of ponding after Sept. 10-11 rains	M. A. Rogers
LAPL CN733309	9/13/73	Close-up S Wall approx. 268 ft. from W end. Shows highest ponding level after Sept. 10-11 rains	M. A. Rogers
LAPL CN733310	9/13/73	Close-up S wall. Shows mud streak as a result of water movement thru Joint #34 and associated joints approx. 344 ft. from west end of pit	M. A. Rogers
LAPL CN733340	9/13/73	Looking West	M. A. Rogers
LAPL CN733341	9/13/73	Shows water mark along S wall after Sept. 10-11 rains	M. A. Rogers

AREA G, PIT 7 Cont

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL CN733342	9/13/73	Close-up of fracture filling. Joint #52 on South Wall	M. A. Rogers
LAPL CN733343	9/13/73	Open joint, Joint #30 N Wall Ruler rests on jack handle ≈49" long	M. A. Rogers
LAPL CN734193	11/8/73	Close-up of fracture near soil-bedrock interface.	M. A. Rogers
LAPL CN734194	11/8/73	Close-up of weathering in joints #51 South Wall joint plane	M. A. Rogers
LAPL CN734195	11/8/73	Weathering phenomenon along horizontal fracture. S Wall between Joints #33 and #34	M. A. Rogers
LAPL CN734196	11/8/73	Watermark at base of North Wall near Joint #43. Root sample for #C dating taken below watermark	M. A. Rogers
LAPL CN734182	11/8/73	Looking east between Pit 7 and Pit 24	M. A. Rogers
LAPL CN74670	1/16/74	View of pipes for neutron moisture probe looking east	M. A. Rogers
LAPL CN74671	1/16/74	View of pipes #4 and #1 for neutron moisture probe on S wall Hole #4 is 3' from wall, 256' from west end of pit, and 50' deep. Hole #1 is 3-1/2' from wall, 117' from west end of pit, and 117' deep	M. A. Rogers
LAPL CN74672	1/16/74	View of pipe for neutron moisture probe, N wall.	M. A. Rogers
LAPL CN74673	1/16/74	View of pipes #2 and #3 for neutron moisture probe along North wall Hole #2 is 3' from wall, 223' from west end of pit, and 50' deep. Hole #3 is 3' from wall, 353' from west end of pit, and 50' deep	M. A. Rogers
LAPL CN74674	1/16/74	" " "	M. A. Rogers
LAPL CN74675	1/16/74	View of pipes for neutron moisture probe looking West.	M. A. Rogers

AREA G, PIT 8

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL CN712272		Virgin	B. Purtymun
LAPL CN721277	4/72	North side of drums	J. Enders
LAPL CN721276		Looking NW, shows way drums stacked	J. Enders
LAPL CN721275		S. side of drums	J. Enders
LAPL CN721274		Looking south at drums in pit	J. Enders
LAPL732556	2/73	Drums done in support of corrosion study[4]	J. Warren
LAPL732555	"	" " "	"
LAPL732554	"	" " "	"
LAPL732552	"	" " "	"
LAPL732551	"	" " "	"
LAPL732549	"	" " "	"
LAPL732548	"	" " "	"
LAPL732547	"	" " "	"
LAPL732546	"	" " "	"
LAPL732545	"	" " "	"
LAPL732544		(Detailed labeling of all photos + Memo +	
LAPL732543		photomicrographs, See Margaret Anne Roger's files)	
LAPL732542			
LAPL732541			
LAPL CN73808	"	" " "	"
LAPL CN73809	"	" " "	"
LAPL CN73810	"	" " "	"
LAPL CN73811	"	" " "	"
LAPL CN73812	"	" " "	"
LAPL CN73813	"	" " "	"
LAPL CN73815 thru LAPL CN73847	"	" " "	"
LAPL CN733311	9/12/73	Watermark in pit after Sept. 10-11 rains. West Wall	M. A. Rogers
LAPL CN73312	9/12/73	Shows capillary rise from pended water along West Wall	M. A. Rogers
LAPL CN733344	9/12/73	North end and ramp showing pond, delta, and runnels	M. A. Rogers
LAPL CN74683	1/18/74	Placing access tube for coring tuff on NW corner of drums	M. A. Rogers
LAPL CN74684	1/18/74	" " "	"

AREA G, PIT 8 Cont

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL CN74685	1/18/74	Placing access tube for coring tuff on NW corner of drums	M. A. Rogers
LAPL CN74686	1/18/74	Placing monitoring access tubes on northwest corner of drums. These tubes were bent and buried during filling operation.	"
LAPL CN74687	1/18/74	Closeup of drill rig augering neutron moisture probe hole.	"
LAPL CN74688	1/18/74	Closeup of base of northeast corner (of drums) access monitoring tubes. Neutron access tube was connected in place.	"
LAPL CN74689	1/18/74	View of Zia off-loading filter plenum on eastside north of drums. Looking south.	"
LAPL CN74690	1/18/74	View of Zia off-loading filter plenum on eastside north of drums.	"
LAPL CN74691	1/18/74	View of Zia off-loading filter plenum on eastside north of drums.	"
LAPL CN74692	1/18/74	View of Purtymun's drill rig on N side of drums. Northeast set monitoring access tubes in place.	"
LAPL CN741069	2/ /74	Monitoring access tubes in place. Pit being filled with waste.	"
LAPL CN741070	2/ /74	View of Riggers placing crates into pit N of sludge drums. View is from the NW Edge of pit.	"
LAPL CN741071	2/ /74	View of sampling pipes emplaced at S side of sludge drums. View is from W edge of pit.	"
LAPL CN741072	2/ /74	View of sampling pipes emplaced along north side of sludge drums. Bulkhead material (CMR filter plenums) shown at left side of picture. View is from W edge.	"

AREA G, PIT 12

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSISSION
LAPL CN712274		Virgin	B. Purtymun

AREA G, PIT 16

LAPL CN712276		Virgin	B. Purtymun

AREA G, PIT 17

LAPL CN712278		Virgin	B. Purtymun
LAPL CN712280		Shot of wall	J. Enders, B.Purtymun

AREA G, PIT 21

LAPL CN712282		Virgin	B. Purtymun
LAPL 734854	4/2/73	Parts of building (TA-21-12)	R. Garde

AREA G, PIT 24

PHOTOGRAPH #			
LAPL CN734138 thru LAPL CN734153	11/8/73	North wall of pit	M. A. Rogers
LAPL CN734154 thru LAPL CN734167	11/8/73	South wall of pit	M. A. Rogers
LAPL CN734168	11/8/73	Looking Northwest. Pit 7 in background.	M. A. Rogers
LAPL CN734169	11/8/73	Looking west	M. A. Rogers
LAPL CN734170	11/8/73	East ramp. Clay swelling out of joint perpendicular to Joint #73 - Joint #3.	M. A. Rogers
LAPL CN734171	11/8/73	East Ramp. Weathering halo along a joint.	M. A. Rogers
LAPL CN734172	11/8/73	East Ramp. Intersection Joint and another joint.	M. A. Rogers
LAPL CN734173	11/8/73	North Wall. Layered effect of material filling Joint #66.	M. A. Rogers
LAPL CN734174	11/8/73	North Wall. Dessication cracks in material fill Joint #70a.	M. A. Rogers
LAPL CN734175	11/8/73	North Wall. Material filling Joint #70a.	M. A. Rogers

AREA G, PIT 24 Cont

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL CN734176	11/8/73	North Wall. Closeup watermark between Joints #64 and #65a neither of which show in photo.	M. A. Rogers
LAPL CN734177	11/8/73	North Wall. Closeup watermark between Joints #65a and #65 neither of which show in photo.	M. A. Rogers
LAPL CN734178	11/8/73	North Wall. Closeup completely altered pumice fragment and other weathering effects along Joints #8 and #8a.	M. A. Rogers
LAPL CN734179	11/8/73	North Wall. Closeup watermark which is bounded by Joint #65 on the east.	M. A. Rogers
LAPL CN734180	11/8/73	North Wall. Looking obliquely at Joint #70a.	M. A. Rogers
LAPL CN734181	11/8/73	North Wall. Closeup to show luster of clay particles forming water-mark.	M. A. Rogers
LAPL CN734182	11/8/73	Looking East between Pit 7 and Pit 24.	M. A. Rogers
LAPL CN734183	11/8/73	North Wall. Closeup of fracture filling along Joint #37.	M. A. Rogers
LAPL CN734184	11/8/73	Looking obliquely at North Wall. Shows pinkish mound-shaped weathering phenomenon at base of wall.	M. A. Rogers
LAPL CN734185	11/8/73	North Wall between Joints #41 and #42. Closeup Rock hammer rests on contact between pinkish tuff and normal unweathered tuff.	M. A. Rogers
LAPL CN734186	11/8/73	South Wall. Joint #74 fracture filling shows gradation from weathered to slightly weathered material.	M. A. Rogers
LAPL CN734187	11/8/73	South Wall. Closeup Joints #26, #28 and #29 with hole in face of Joint #28.	M. A. Rogers
LAPL CN734188	11/8/73	South Wall. Roots which grew in the tuff between Joints #35 and #36. They did not grow in a joint plane.	M. A. Rogers

AREA G, PIT 24 Cont

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL CN734189	11/8/73	South Wall. Closeup water-mark on Joint #65.	M. A. Rogers
LAPL CN734190	11/8/73	Alteration rim on pumice fragment near Joint #39.	M. A. Rogers
LAPL CN734191	11/8/73	South Wall. Closeup of hole along Joint #67 through which water has flowed.	M. A. Rogers
LAPL CN734192	11/8/73	South Wall. Closeup of hole along Joint #67 through which water has flowed.	M. A. Rogers
LAPL CN73676	1/16/74	View of pipe looking east.	M. A. Rogers
LAPL CN73677	1/16/74	View of pipe for neutron moisture probe, N wall.	M. A. Rogers
LAPL CN74678	1/16/74	View of pipe looking west.	M. A. Rogers
AREA G, SHAFTS			
LAPL 67852		Truck backing into position to unload transport cask into shaft. Metal flanged hole cover to keep truck from caving in sides of shaft.	J. Enders
LAPL 67851		Truck positioned over disposal shaft (probably Shaft 2). About to pull drawer so waste can fall in hole.	J. Enders
LAPL 67853		Close-up shows bottom movable drawer on transport cask open.	
AREA G, SHAFT 34 (Ref. 5)			
LAPL CN692569	3/13/70	Southwest wall at about 15' showing pumice zone above moderately welded tuff.	B. Purtymun
LAPL CN692573	3/13/70	Looking down hole from ∿25'.	B. Purtymun
LAPL CN692568	3/13/73	NW wall showing joint in moderately welded tuff, ∿25'.	B. Purtymun
LAPL CN692567	3/13/73	NW wall below pumice zone, showing blocks of tuff out of wall along joints about 20'.	B. Purtymun

AREA G, SHAFT 34 (Ref. 5) Cont

PHOTOGRAPH #	DATE	DESCRIPTION	IN WHOSE POSSESSION
LAPL CN692571	3-13-70	West wall at about 20' showing joints in moderately welded tuff.	B. Purtymun
LAPL CN692566	3-13-70	NW wall below pumice zone showing blocks of tuff out of wall along joints, about 15'.	B. Purtymun
LAPL CN692572	3-13-70	West wall at about 20' showing joints in moderately welded tuff.	B. Purtymun
LAPL CN692570	3-13-70	West wall at about 15', showing pumice zone above moderately welded tuff.	B. Purtymun
LAPL CN702255 thru CN702265		Proofs, shafts, probably #39 Area G.	B. Purtymun
LAPL CN702247 thru CN702254		" " " " "	B. Purtymun

LAPL CN702259, CN702260, CN702261, CN702262, CN702263, CN702264, CN702257, CN702256, CN702255, CN702253, CN702251, CN702249, CN702250 are in Mr. Purtymun's possession and are identifiable as Shaft #39 which shows up on Zia Logs as Shaft #49. The shaft dimensions are 6' diam., 61' deep.

AREA G SHAFTS

LAPL CN734299	11-21-73	Plugging shaft #58.	J. Enders

^{238}Pu STORAGE FACILTIY

PHOTOGRAPH #

Trench A, Area G:

LAPL CN74679	1-18-74	Looking S. augering holes at S end of trench.	M. A. Rogers
LAPL CN74680	1-18-74	Zia augering holes	
LAPL CN74681	1-18-74	S end, augering holes for casks	M. A. Rogers
LAPL CN74682	1-18-74	Same as above	M. A. Rogers
LAPL CN741075	2- -74	View of W side of wall, caliche and soil horizon shown	M. A. Rogers
LAPL CN741074	"	Closeup view of 2' deep, 3' diam holes drilled in bottom of trench.	M. A. Rogers
LAPL CN741073	"	View looking N. Drilled holes show staggered arrangement for casks (to be set into holes). Caving of holes primarily due to joints in the tuff.	M. A. Rogers
LAPL CN741079	"	Zia laborers & rigger placing lid on concrete cask. Zia riggers loading casks with 30-gal. drums (C. O. Martinez, H-8)	M. A. Rogers
LAPL CN741077	"	" " " " " " " (C. O. Martinez recording drum #'s)	M. A. Rogers
LAPL CN741078	"	30-gal. drum being lowered into cask. Casks sealed with plastic cement.	M. A. Rogers
LAPL CN741306	"	Filled casks in trench	J. Warren
LAPL CN741302	"	Casks being placed in trench	J. Warren

LAPL CN734300	11-21-73 thru 11-27-73	C. O. Martinez plugging shaft 58.	J. Enders
LAPL CN734301	"	" " plugging shaft 75, shafts 72,73,74 freshly plugged.	J. Enders
LAPL CN734302	"	Closeup of C. O. Martinez plugging the shaft.	J. Enders
LAPL CN734303	"	C. O. Martinez plugging shaft 75 looking west.	J. Enders
LAPL CN734304	"	Closeup C. O. Martinez plugging the shaft.	J. Enders
LAPL CN734305	"	Observing concrete dumped into shaft 39.	J. Enders
LAPL CN734306	"	C. O. Martinez plugging Shaft 39.	J. Enders
LAPL CN734307	"	Concrete being dumped into shaft 72.	J. Enders
LAPL CN734308	"	Concrete being dumped into shaft 39.	J. Enders

AREA T

LAPL CN59-311 LAPL CN59-312 LAPL CN59-313 LAPL CN59-314 LAPL CN59-315 LAPL CN59-316 LAPL CN59-317 (Ref. 5) LAPL CN59-318 LAPL CN59-325 LAPL CN59-327 LAPL CN59-328 LAPL CN59-329 LAPL CN59-342 LAPL CN59-343 LAPL CN59-344 LAPL 594772 LAPL 595219		Closeup series of photos of caisson 30' deep, 6' wide, and 12' long dug about 6' north-northeast of the eastern quarter of Pit #1, Area T for study to determine if waste products moved with water.	B. Purtymun
LAPL 5713		Aerial view, Area B,T,A,V	B. Purtymun
LAPL 5713-40		" " " "	B. Purtymun
LAPL 5713-39		" " " "	B. Purtymun

AREA T, SHAFT 22 (60' deep, 8' diam.)

LAPL CN701628	4-6-70	South wall showing large clay filled joint extending thru 2 units of tuff ∿10'.	B. Purtymun
LAPL CN701627	4-6-70	South Wall showing large clay filled joint at about 15'.	B. Purtymun
LAPL CN701622	4-6-70	North wall showing few pumice fragments and hairline joint at about 30'.	B. Purtymun
LAPL CN701634	4-6-70	SW wall showing near vertical joint at about 20'.	B. Purtymun
LAPL CN701638	4-6-70	View from top of shaft, looking south showing contact between 2 joints and tuff and clay-filled joints.	B. Purtymun
LAPL CN701639	4-6-70	East wall showing termination of joint at 55'.	B. Purtymun
LAPL CN701642	4-6-70	East wall showing large white pumice fragments in tuff, few closed minor joints ∿45'.	B. Purtymun
LAPL CN701620	4-6-70	North wall showing contact between 2 units of tuff ∿10'.	B. Purtymun
LAPL CN701624	4-6-70		B. Purtymun
LAPL CN701633	4-6-70	Rotary bucket rig used to drill shafts.	

AREA T, SHAFT 24 (60' deep 8' diam.)

LAPL CN701426	3-13-70	East wall showing reworked sediments and boulders beneath light pinkish pumiceous tuff.	B. Purtymun
LAPL CN701429	"	North wall showing reworked sediments, cobbles and boulders overlying moderately welded tuff with near vertical joint ∿29'.	B. Purtymun
LAPL CN701430	"	South wall showing termination of concrete filled joint at about 36'.	"
LAPL CN701431	"	South wall showing joint filled with concrete sludge beneath reworked sediments.	"
LAPL CN701432	"	South wall looking up hole showing concrete filled joint in moderately welded tuff.	"

LAPL CN701423	3-13-70	South wall showing joint filled with concrete sludge, depth 29-32'.	B. Purtymun
LAPL CN701424	"	West wall channel cut along joint in moderately welded tuff filled with reworked sediments at about 25'. Note: large tuff boulder in reworked sediments.	B. Purtymun
LAPL CN7-1427	"	South wall showing N 5° E striking joint filled with concrete sludge squeezed from adjacent hole beneath reworked sediments. Joint extends from about 29-36'.	B. Purtymun
LAPL CN7-1428	"	East wall showing non-to moderately welded tuff underlain by reworked sediments and boulders.	"
LAPL CN7-1425	"	West wall showing reworked sediments cobbles and boulders, depth ∿28'.	"
LAPL 704510	"	Tar coating the shaft.	"
LAPL 704507	"	" " " "	"
LAPL 704506	"	" " " "	"
LAPL 704508	"	" " " "	"
LAPL 704509	"	" " " "	"
LAPL 704512	"	" " " "	"
LAPL 704513	"	" " " "	"
LAPL 704511	"	" " " "	"
LAPL 704514	"	" " " "	"

AREA T, SHAFT 32 (18' deep, 8' diam.)

LAPL CN701621	4-6-70	West wall at about 10'.	"
LAPL CN701623	"	North wall showing closed joints in brown non-no moderately welded tuff.	"
LAPL CN701637	"	Southwest wall at about 8'.	"
LAPL CN701625	"		"

LAPL CN701626	"	South wall showing closed joints in brown, non-to moderately welded tuff.	B. Purtymun
LAPL CN701629	"	NE wall at about 8'.	"
LAPL CN701632	"	SE wall at about 8'.	"
LAPL CN701630	"	Shows two stages: 4' hole, 8' reamed.	"
LAPL CN701631	"	Being coated w/asphalt.	"
LAPL CN701635	"	North wall at about 10'.	"
LAPL CN701636	"	North wall of shaft showing about 2' of fill material overlying tuff.	"
LAPL CN701640	"	At 10', showing latite inclusion (gray) in tuff.	"
LAPL CN701641	"	View to SE down shaft.	"

APPENDIX G

SLIDES OF DISPOSAL AREAS

(A, B, C, D, E, F, G)

and

MISCELLANEOUS LOCAL GEOLOGICAL INFORMATION

EXPLANATION

LAPL:	Los Alamos Photographic Laboratory
CN:	Color Negative (First 2 digits of slide number equal year taken)
L:	After number means Lantern-size slide
USGS:	United States Geological Survey

Slide Number	Date	Description	In Whose Possession
12 Color #34	1-64	"Showing general stratigraphic relations of main map units in Los Alamos area".	B. Purtymun
#35	"	Geologic map Los Alamos area.	"
#36	"	"Probable stages of development of Rio Grande Depression and Jemez Mts. volcanic series (Generalized)".	"
#37	"	X-Section, W-E, Jemez Mts. to Sangres.	"
#38	"	Appears to be same as #35.	"
8 B & W (metal rimmed)			"
		a. Geologic map-appears to be same map as #35 above.	"
		b. Stratigraphic chart-appears to be same map as #35 above.	"
		c. Close-up of "b".	"
		d. X-Section from Jemez Mts. to Rio Grande.	"
		e. L.A. area drainage map.	"
		f. L.A. area water table map.	"
		g. L.A. well field map.	"
LAPL 612364 L		"Los Alamos Environs" shows USGS-LASL River sampling points.	"
LAPL 612365 L		"Environmental Monitoring Program Los Alamos, NM" map water sampling points.	"
17 Color	3-72	Aerial shots L.A. area.	"
17 Color	4-73	Water Sampling	"
18 Color	3-72	Aerial Shots	"
19 Color	3-72	Aerial Shots	"
21 Color	3-72	Aerial Shots	"
LAPL CN 731948 S		Los Alamos & DP Canyons Geologic map	"

CN731947 S			Mortandad Canyon geologic map	B. Purtymun
7 Color	#12	3-60	Relief map of east side of Jemez Mts.	"
	#14	"	Relief map of Jemez Mts.	"
	#15	"	" " " " "	"
	#16	"	" " " East side Jemez Mts.	"
	#17	"	" " " " "	"
	#19	"	" " " East flank Valles Caldera	"
	#20	"	" " " " "	"
9 B & W - S (Ref.)				
			a. Sketch showing details of infiltration pit 10-Site	"
		9-21-29/59	b. Sketch showing movement of water beneath infiltration pit. Ten-Site	"
			c. Soil moisture curves showing relation of water content to the size of pores in samples of tuff-laundry Pit (Area V) and Old Road location.	"
			d. Idealized drawing showing area penetrated by horizontal holes DPW Site (Area T). Face of south wall shown.	"
			e. Plan view of infiltration at end surrounding Area Mesita del Buey (Area G, Pit 2).	"
			f. Quantity of water removed from Bandelier tuff with 2 different porous cups: Hydrologic Lab.	"
			g. General range of activity in water samples collected in Acid and Pueblo Canyons 1958-59. Activity in water samples collected in Acid and Pueblo Canyons on 7-14, 15-1959.	"

		h. General range of activity in soil samples collected in Acid & Pueblo. Canyons, 1958-59 (c/m/dry gram). Activity in soil samples collected in Acid and Pueblo Canyons Nov.-Dec. 1958, after a spill (c/m/dry gram)	B. Purtymun
		i. Activity in soil samples collected in Mortandad Canyon 1956-58 (c/m/dry gram)	B. Purtymun
LAPL660625 L		Location plan, materials disposal areas.	J. Enders
LAPL741540 L		Location plan, materials disposal areas	M. A. Rogers

AREA A

No slides exist

AREA B

No slides exist

AREA C

LAPL 16540L		Pit 5, off-loading	J. Enders
LAPL 583494L		Pit 6, dumpster unloading	"
LAPL 583496L		" " " "	"
LAPL 583497L		" " " "	"
LAPL 583498L		Gates, Pit 6, in background	"
LAPL 583500L		Pit 6, SEE PHOTOGRAPHS...	"

AREA C, SHAFTS

LAPL 592205L		Disposal in shafts between Pits 1 & 2 using Dural Cup	"
LAPL 592206L		" " " "	
LAPL 592207L		" " " "	
37 Color	9-68	Slide #9, #8 of canyon north Area D	"

AREA F

No slides exist

AREA G, PIT 1

LAPL 583499L		See Photographs... for detailed descriptions of these slides of Pit 1.	J. Enders
LAPL 59424L			"
LAPL 59423L			"
LAPL 59422L			"
LAPL 59421L			"

AREA G, PIT 2

LAPL 626849L LAPL 626848L		Pouring cement into drums before tritiated water (glass vial) inserted.	"
LAPL 626846L		South wall, with drums containing tritium lined up.	"
LAPL 626845L		" " " " " " " "	
11 Color	10-63	#12 neutron scattering probe counting crushed tuff seal on solid waste disposal pit. Corresponds to photo LAPL 635849 Pit 2, Area G.	B. Purtymun

AREA G, PIT 3

No slides exist

AREA G, PIT 4 (See photographs...for detailed descriptions of these)

LAPL 67360L		Building material being dumped	J. Enders
LAPL 67359L			"
LAPL 67357L			"

AREA G, PIT 5

10 Polaroids - L		Excavation on Pit 5	J. Enders
LAPL 67358L		See Photographs...	"

AREA G, PIT 6

No slides exist

AREA G, PIT 7

LAPL CN733303 L	9-12-73	See photograph CN733303	M. A. Rogers
LAPL CN733304 L	9-12-73	See photograph CN733304	"
LAPL CN733305 L	9-12-73	See photograph CN733305	"
LAPL CN733306 L	9-12-73	See photograph CN733306	"
LAPL CN733309 L	9-13-73	See photograph CN733309	"
LAPL CN733310 L	9-13-73	See photograph CN733310	"
LAPL CN733321 L	9-12-73	See photograph CN733321	"
LAPL CN733332 L	9-13-73	See photograph CN733332	"
LAPL CN733334 L	9-13-74	See photograph CN733334	"
LAPL CN733338 L	9-13-73	See photograph CN733338	"
LAPL CN733341 L	9-13-73	See photograph CN733341	"
LAPL CN733342 L	9-13-74	See photograph CN733342	"
LAPL CN733343 L	9-13-73	See photograph CN733343	"
LAPL CN734193 L	11- 8-73	See photograph CN734193	"
LAPL CN734194 L	11- 8-73	See photograph CN734194	"
LAPL CN734195	11- 8-73	See photograph CN734195	"
LAPL CN734196	11- 8-73	See photograph CN734196	"
Slide #			J. Enders
LAPL CN74670	1-16-74	View of pipe for neutron moisture probe looking east.	
LAPL CN74671	1-16-74	View of pipes #4 and #1 for neutron moisture probe on S wall. Hole #1 is 3 1/2' from wall, 117' from westend of pit and 117 deep. Hole #4 is 3' from wall, 256' from westend of pit and 50' deep.	
LAPL CN74672	1-16-74	View of pipe #2 for neutron moisture probe, N. wall.	

LAPL CN74689	1-18-74	View of Zia, off-loading filter plenum eastside north of drums looking south.	J. Enders
LAPL CN74690	"	View of Zia off-loading filter plenum on eastside north of drums.	"
LAPL CN74691	"	View of Zia off-loading filter plenum on eastside north of drums.	"
LAPL CN74692	"	View of Purtymun's drill rig on N side of drums.	M. A. Rogers
LAPL CN741070	2-74	View of Riggers placing crates into pit N of sludge drums. View is from the NW edge of pit.	"
LAPL CN741071	"	View of sampling pipes emplaced at S side of sludge drums. View is from W edge of pit.	"
LAPL CN741072	"	View of sampling pipes emplaced along north side of sludge drums. Bulkhead material (CMR filter plenums) shown at left side of picture. View is from W edge.	"

Pit 24 Slides

LAPL CN734150 L	11- 8-73	See photograph CN734150	"
LAPL CN734151 L	"	" " CN734151	"
LAPL CN734157 L	"	" " CN734157	"
LAPL CN734158 L	"	" " CN734158	"
LAPL CN734161 L	"	" " CN734161	"
LAPL CN734163 L	"	" " CN734163	"
LAPL CN734169 L	"	" " CN734169	"
LAPL CN734170 L	"	" " CN734170	"
LAPL CN734171 L	"	" " CN734171	"
LAPL CN734172 L	"	" " CN734172	"
LAPL CN734173 L	"	" " CN734173	"
LAPL CN734174 L	"	" " CN734174	"
LAPL CN734175 L	"	" " CN734175	"

AREA A Center, all caps

General Information

Area A is located in TA-21, a quarter of a mile east of the intersection of DP Road and the north perimeter road of TA-21. Specifically it is centered on LASL* coordinate* E. 165+00 between coordinates N. 85+00 and N. 87+50 (see Fig. A-1), ~~It occupies most of the area between coordinates N. 85+00 and N. 87+50,~~ and ~~between~~ coordinates E.167+50 and E.162+50. Surveyed corners in clockwise direction beginning with the northeast corner are: N.86+58; E.167+18; N.85+14; E.166+88; N.85+42; E.165+35; N.85+78; E 164+88; N.86+00; E.163+80; N.86+13; E.163+11; N.86+33; E.162+91; N.87+34; E.163+07 and N.87+16, E.164+04. It can also be located by township and range: SE 1/4 sec. 14, T. 19 N., R. 6 E.[8] Total area is 5058.6 m^2 (1.25 acres).

The history of Area A consists of two stages. The first involves the construction and use of pits and storage tanks between 1944 and 1947, and the second involves the construction and use of a pit between April 1969 and present (1975).

Geology and Hydrology

Area A is located on a narrow eastward-trending mesa which is part of the Pajarito Plateau. The land surface slopes north about a hundred yards and then breaks into steep bench and slope topography down to the channel of DP Canyon. The channel is approximately a hundred feet below the top

* LASL coordinates are the original Manhattan Engineering Project grid system.

of the mesa.

All excavations in Area A were made in Unit 3 of the Tshirege member of the Bandelier tuff. Unit 3 is approximately 36.6 m (120 ft)[10] thick in this locale. The lower part of the unit consists of a nonwelded tuff which grades upward into the moderately welded tuff of the upper part.[10] It is unlikely that any excavation cut through the upper part of Unit 3. Soil covr ranges from 0.6 to 1.5 m (2 to 5 ft) in thickness.[10]

> The attitude of most of the major joints ~~are~~ is near vertical to vertical ranging from 70 to 90 degrees measured from the horizontal. Some of the joints were slightly curved, open in places and closed in others. All of the joints were filled with dark brown clay beneath the soil zone while at depth were filled or plated with dark-brown or gray clay.
>
> The orientation and distribution of the major joints in the horizontal plane of the north and south walls of the pit are shown on a rose diagram (Fig. A-2). Three point sets occur true north to N 10°W, N 40°E to N 60°E and N 80°E. Though all the joint sets do not intersect at 60 degrees as they would if formed in a homogeneous liquid as it cooled, the predominance of the three joint sets and near vertical attitude of the joints suggest that the joints formed as the ash flow tuff of Unit 3 cooled after emplacement.[10]

Will find original in my Area A file — I rept. was done by Partyka

Surface drainage of Area A is north into DP Canyon. There are approximately 350.5 m (1150 ft) between the top of the mesa at Area A and the top of the zone of saturation (water table) in the Puye formation.[10] The Bandelier tuff is estimated to be 243.8 m (800 ft) thick in this locality and is thought to contain no perched water.[10]

AREA A

PIT AND STORAGE TANK DESCRIPTIONS

Early Stage (1944 to 1947)

Background

The early pits were dug in the eastern part of the area in late 1944 or early 1945. From a memo[17] dated July 5, 1945:

> The pits at DP Site are currently being filled at such a rate that they will be filled to capacity by the early part of August. This rate is far greater than was anticipated when [the pits were] requested last December, and because of the construction in this area there is no room for further pits to be dug. Nor, for that matter, is it desirable to dig any more pits anywhere in the DP area because of the dust problems that would be created.[17]

The early pits were closed by July 1946.[171]

In the western part of the area are the two storage tanks built in 1945 and called the "General's Tanks" after General Leslie R. Groves. They are identified as TA-21-107 and TA-21-108. The last time liquids were added to one of them was 1947.[9]

Type of Waste

The early pits in the eastern end of Area A are thought to contain solid wastes with alpha contamination accompanied by slight amounts of beta and gamma.[12,13] The principal alpha contamination is said to be either long-life[13] or polonium[171] (short-life) with the possibility of trace amounts of ^{239}Pu (long-life).[171] The estimated volume of buried material is 1019.5 m^3 (4000 yd^3).[171]

The General's Tanks, in the western end of the Area, contain liquid wastes as recorded in L.A. Notebooks 1595 and 1766.

No, that was what memo said

> Champion's records which were made at the time solutions were transferred into the tanks, on the basis of radioassay (total alpha) of the individual trailer tank loads, showed a total of 334 grams, (author's note: considered to be 344 g of ^{239}Pu by D. D. Meyer, personal communication, 1974, into the two tanks.)[173]

Dark: author's note to be set up like footnotes - e.g.

trailer tank loads, showed a t
334 grams.

Author's note: Considered to be 344 ^{239}Pu by D. D. Meyer, personal commu 1974, into the two tanks.

I like the italics if you machine will do it?

Records were kept to the nearest 0.01 g.[173] In 1950 or 1951 a corroborative sample from each tank was taken.

> ...the results were in good enough agreement with the above so that no corrections were thought to be necessary. So far as [is known], no records of this sampling are still in existence, but...the NaOH supernatant tank had about 180 grams in 50,000 gallons, and the NH_4OH tank had about 160 grams in 35,000 gallons.[173]

Another reference[14] states that the tanks were checked in the early 1950's and estimated to contain 160 to 1000 g of plutonium. In 1973 an estimate of the amount of radioactivity was

> an equivalent amount of about 230 grams of ^{239}Pu (about one-third of which is ^{241}Am)... Furthermore, only 0.7% of the radioactivity is in solution so that any leakage would have probably stayed very close to the tanks.[9]

The volume is 151 424 ℓ (40 000 gal) in one tank and 34 070 ℓ (9000 gal) in the other.[9]

Mode of Disposal

Four pits are shown in the eastern end of Area A on Engineering Drawing ENG-1266. An arrow pointing to them has the note: "Scaled from W. C. Kruger map 'Special Sewers DP Site Construction Sheet O Outside Services 4,' 8-22-45." The pits are depicted as 38 m (125 ft) long by 5.5 m (18 ft) wide with rounded corners. Probably a more accurate depiction of the pits is on ENG-C 2076 (Fig. A-3). On this drawing there are two pits which are rectangular, covering 4007 m^2 (0.99 acres).

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ation,

> At the present time [June 1949] the solid contaminated wastes are buried. Since the start of the project we have filled six pits. Three of these are located between the trailer camp and the CMR laundry,(1) two on the tank area near DP East [1974 designation is materials disposal Area A] and one at the Alpha Site Dump [1974 designation is materials disposal Area C]. The present dump [Area C] has been in use for one year and during that time we have filled one pit.[12]

---

(1) Author's note: 1974 designation for the ~~3-pit location is materials disposal Area~~ 3-pit location is materials disposal Area B; for the CMR laundry is materials disposal Area V.

Dates?

The previous quotation implies (1) Area A was not in use June 14, 1949, and (2) only two pits were excavated. Another reference to only two pits was "The excavated tuff was piled over two sealed disposal pits (see LASL ENG. Drawing 6250)."[10]

The General's Tanks, TA-21-107 and TA-21-108, are two 189 280 ℓ (50 000 gal) cylindrical steel storage tanks. The following description of the construction of the tanks is taken from Engineering Drawing END-C 2076.

The tanks are 3.7 m (12 ft) in diameter and 19.1 m (62 ft 10 in.) long. They were placed 6.1 m (20 ft) apart in pits 3.7 m (12 ft) deep, 4.6 m (15 ft) wide, and probably 21.0 m (86 ft 10 in.) long on four concrete piers. Each pier was 1.5 m (4 ft 10 in.) high with the bottom 0.6 m (2 ft) below the bottom of the pit. Each tank rested on the piers 0.3 m (1 ft) above the bottom of the pit. Sand was placed in the bottom of the pit up to the top of the piers--a depth of 0.5 m (1 ft 10 in..

Thoroughly packed earth filled the area between the tank and most of the rest of the pit. Directly above the tanks loose earth ~~fill~~ fill was specified. A concrete slab 20.3 cm (8 in.) thick, 17.1 m (56 ft) wide and 21.0 m (68 ft 10 in.) long was poured 0.5 m (1.5 ft) above the tanks. Approximately 1.5 m (5 ft) of earth fill was placed above the concrete slab. This final earth fill formed a mound 0.7-1.8 m (2.25-5.75 ft) above grade. On the north end of each tank a vent extended 4.6 m (1~~6~~5 ft) above the mound. On the south end of each tank the fill pipe is enclosed in a concrete box with outside dimensions 0.9 m (2 ft 10 in.) high, 0.9 m (2 ft 10 in.) wide, and 1.3 m (4 ft 4 in.) long. The box extended 0.3 m (1 ft) above the mound.

Late Stage (1969 to 1975)

Background

In April 1969[10] a large pit was dug between the older pits to the east and the storage tanks to the west. A request[16] for the expansion of this pit, dated November 9, 1972, was met by steepening the slopes of the existing pit (J. L. Desilets, personal communication, 1974).

Type of Waste

This latest and largest pit, located in the center of the area, contains building debris from demolition work at TA-21. This building debris is contaminated by ^{239}Pu, ^{238}Pu, ^{235}U, and depleted uranium along with decay products and other radioactive isotopes which are found with these materials (D. D. Meyer, personal communication, 1974). The first layer of waste was buried by June 30, 1969.[10] January 4, 1971,[171] the volume of debris in the pit was given as 2166 m^3 (8500 yds^3). The pit was not

used from January 1, 1972 through June 30, 1972.[172] After it was enlarged in late 1972 or early 1973, debris from the demolition of TA-21-12 was placed in it.

Mode of Disposal

This pit had proposed dimensions of 45.7 m (150 ft) long by 15.2 m (50 ft) wide by 9.1 m (30 ft) deep (ref: LASL Engineering Drawing ENG-SK 6250, January 1969). The pit described by Purtymun in 1969[10] may have been 45.7 m x 12.2 m x 6.7 m (150 ft x 40 ft x 22 ft).

The pit was excavated in a near east-west direction leaving steep ramps on each end (see Fig. A-4). The excavated tuff was piled over two sealed solid disposal pits (see LASL ENG. Drawing 6250). An access road to the bottom of the pit was cut along the south wall. Parts of the north and south walls are nearly vertical with the remainder sloping at about 1 to 5. The walls at present are stable, though several small blocks were dislodged during construction.[10] (See Figs. A-4, A-5, and A-6.)

November 9, 1972,[16] the pit was reported to be 12.2 m (40 ft) wide, and 6.7 m (22 ft) deep. Some time after November 9, 1972,[16] the original pit was enlarged. This enlargement may have provided the approximately 1529 m^3 (6000 yds^3) of additional burial space requested[16] for building materials from TA-21-12. The enlargement would have extended the surface dimensions of the original pit if that pit's dimensions were 45.7 m x 6.7 m (150 ft x 40 ft x 22 ft) (D. D. Meyer and J. Desilets, personal communication, 1974). In March 1974, the existing pit could have been two-thirds full. It was placed on an engineering drawing for reference, May 1974. The drawing shows the pit to be 52.4 m (172 ft) by 40.8 m (134 ft).

Centered, All Caps

AREA A

Studies and Monitoring

The Environmental Studies Group, H-8, monitoring points in the vicinity of Area A are not designed to be Area A specific.

The General's Tanks were checked in the early 1950's for content;[14,173] the last sample was taken June 1952 (L. Emelity, personal communication, 1974). They were again checked in 1973.

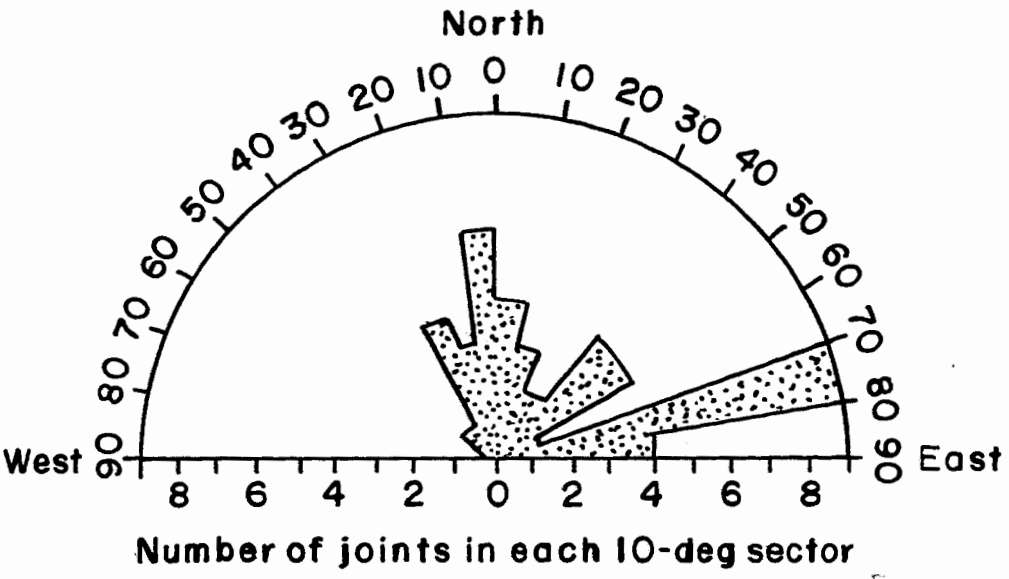

Fig. A-2. Orientation of joints in North and South walls of pit.

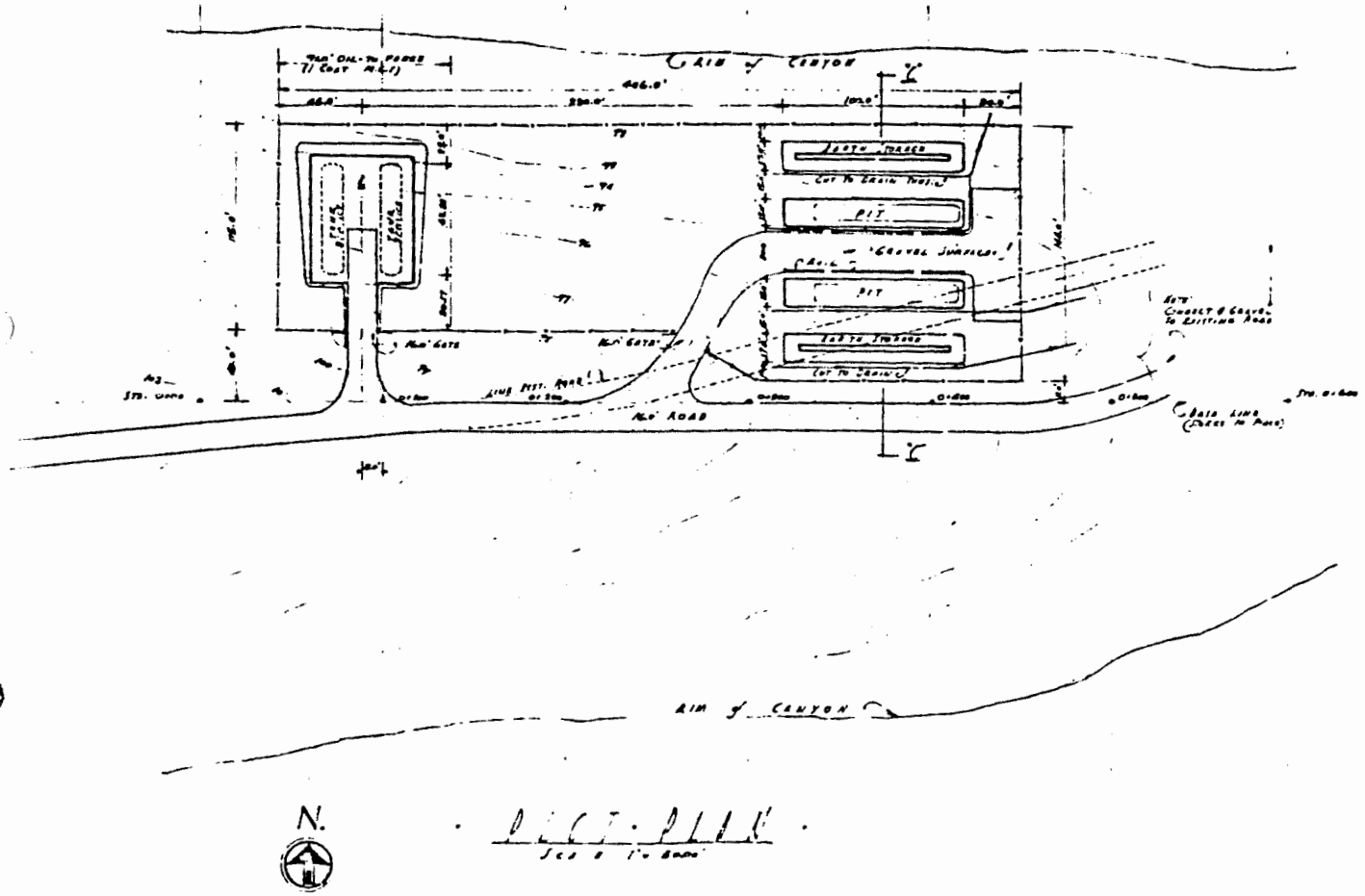

Fig. A-3.

Fig. A-3

Title: Construction plan for Area A (January 24, 1945)

This illustration is being redrawn.

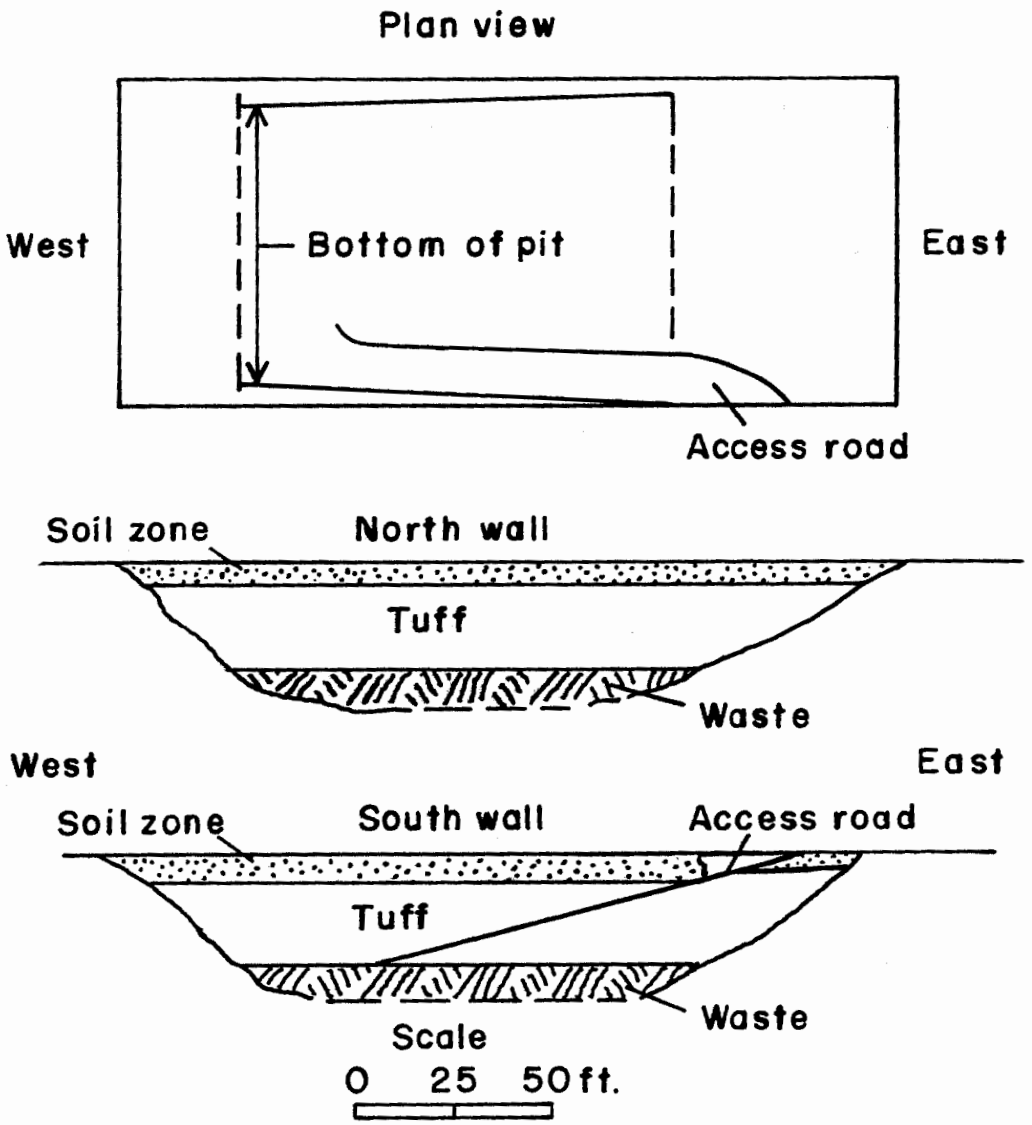

Fig. A-4. Sketch of pit showing plan view and North and South walls.

Barb - quotes must be made in "original form", i.e., no updated abbreviations, etc

Although surveillance of these tanks has been, to say the least, minimal in the past, there has been no leakage determinable by our present information. The volume 40 000 gals. in one tank and 9 000 gals. in the other as well as chemical concentrations is comparable to the record data.

It is planned to transfer this solution to Bldg. 257 [TA-21-257] for treatment. This will take some time because we will have to rely on dilution to handle the anions which are quite high, e.g., NO_3^- at 130 000 ppm for which the MPC is 45 ppm.[9]

Start new page

AREA B

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General Information

Area B is located on the south side of DP Road approximately 488 m (1600 ft) east of the intersection of DP Road and Trinity. It is east of the old trailer court area and west of TA-21 (see Fig. B-1). By LASL coordinates it is E.145+00, E.120+00, N.90+00, N.95+00. Surveyed corners, clockwise from the northeast corner are N.91+92, E.143+35; N.90+72, E.142+96, N.93+90, E.134+08; N.92+45, E.123+06; N.91+00, E.123+14; N.91+08, E.122+35; N.93+64, E.122+38; and N.95+09, E.133+28. It can also be located by township and range--SE 1/4 sec. 15, T. 19 N., R. 6 E., and SW 1/4 sec. 14, T. 19 N., R. 6 E. Approximate acerage is 6.03.[18] The western two-thirds of Area B is presently covered by a layer of asphalt and is leased by Los Alamos County for storage of privately-owned boats and trailers.

Area B probably was the first common solid waste burial ground for LASL. It appears on Engineering Drawing ENG-R 4458 as one large pit; no individual pits are shown within the area. However, from old memos dated July 5, 1945 through January 31, 1952, it would appear that Area B is acutally a series of pits. The July 5, 1945, memo[17] is a request for the provision of a new pit for disposal of contaminated trash from CM-Division laboratories.

> ...suggest that a trench 15 ft wide and 300 ft long be bulldozed out as deep as practical before hard rock is encountered, starting just east of the now covered CM[R] disposal pits located SE of the coal storage yard, and running parallel to and about 40 or 50 ft north of the DP power lines. This trench should have a parking bumper along its north edge with a gravelled 20-ft clearing for truck access, and of course a fence surrounding the whole area.
>
> Such a trench in the suggested location would, ... be a realistic solution to the contaminated trash disposal problem and would have the further advantage that it could be progressively filled and covered from the west end toward the east, and if necessary be extended for several hundred yards should the need arise.[17]

By July 12, 1945,[20] the pit had been located, staked out, and a work order issued for completion by August 1, 1945. On July 30, 1945,[21] there was a request to extend the completion date for the new pit. The request asked, "...that work on the new pit be continued until a 12' depth is reached, or until September first whichever is sooner."[21] A penciled note on this memo notes completion August 8th.

A January 10, 1947,[24] memo states:

> The present contaminated materials disposal ditch is judged by the CMR Division maintenance engineer to be adequate for approximately three months from date. Past experience also indicates the necessity of starting the preparation of a new ditch of that size not less than a month before actual usate. It is therefore felt necessary to start digging about March 1.

11

> The present site is probably too small for expansion unless the south fence is moved closer to the canyon edge, or the east fence moved farther in that direction. Either of these moves would be a somewhat temporary expedient, and we suggest the assignment of a larger area permitting reasonable expansion. Perhaps east of the DP-East Site.[24]

There are several notes on this memo. A typed note from H. R. Hoyt, Assistant Associate Director, sent this memo to the Maintenance Group on January 13, 1947, with the statement "for necessary action." A penciled note dated February 5, 1947, says "...will issue job order to enlarge ditch until some decision has been reached by the Director." At the top of the January 10, 1947, memo is another penciled notation indicating that someone could not decide whether the memo was discussing what is now called Area A or Area B. (Area B is the pertinent area because the south fence of Area A would not have been near the canyon edge.) This memo is the first record of discussion to find a new location for the common burial ground; however, it was the May 3, 1948, fire in Area B which initiated construction of Area C.

Have no idea what director's decision was. Included here because gives some idea of what might have happened.

Geology and Hydrology

Area B is located on the same narrow eastward trending mesa as Areas A and T. The south side of Area B is approximately 30 m (100 ft) from a canyon tributary to Los Alamos Canyon. The Area B pits are probably cut in Unit 3a of the Tshirege member of the Bandelier tuff.

The thickness of the Bandelier tuff beneath the disposal pits is estimated to exceed 243.8 m (800 ft).[26] The tuff is in the zone of aeration with the zone of saturation (water table) at a depth of ap-

proximately 365.8 m (1200 ft) below the surface of the mesa.[26]

PIT DESCRIPTIONS

Background

The question of how many pits and where they are located in Area B cannot be answered by available information. Area B probably is the first Materials Waste Disposal Area at LASL.

yes

> Letters in the CMR-12 files indicate that sometime in 1944 a pit located in the fenced area [Area B] between the Trailer Court and the CMR laundry [Area V] was in use. When this pit was filled two more were dug in the area now known as the General's Tank Area [Area A]. When these were filled (1945) three more pits were dug in the area between the Trailer Court and the CMR laundry. Space in this area was exhausted in 1948 and new pits were started at the present location [Area C] on Pajarito Road.[22]

The 1944 "pit located in the fenced area"[22] could well be "the now covered [as of July 5, 1945] CM disposal pits located southeast of the coal storage yard."[17] Three pits, constructed and filled after July 5, 1945, are referred to in memos dated June 14, 1949,[12] and January 31, 1952.[22] In a June 12, 1964, memo[27] Review Of Preliminary Drawings: "Materials Disposal Areas" comment 6 states that

> There is a covered shallow trench in Area B (ENG-R 3641) which was used for disposal of hazardous materials. The trench was three feet in depth, two feet wide and about 40 feet long. It lies parallel to the south fence line E.140+00 and below line N.92+50. It extends about half the distance to E.142+50.[27]

This "shallow trench"[27] lies in the extreme eastern end of Area B and therefore cannot be "the now covered CM disposal pits located southeast of the coal storage ~~year~~ yard"[17] which would have had to have been located in the extreme western end of Area B in order to have had 91.4 m (300 ft) long pits located to the east of them. It would thus seem that there are a minimum of five pits located in Area B.

> I am sure that the area contains six pits: two in the west end running north and south making the 'L' shape to the fence and four running east and west in the area parallel to DP Road. There was at least one small, shallow trench which was used by CMR-DO safety personnel to dispose of hazardous chemicals.[1]

---

[1] Written communication, D. D. Meyer, Fall 1974.

Type of Waste

Solid waste placed in Area B was logged in LA Notebooks 1743 (January 6, 1947 through November 23, 1948) and 2587 (November 24, 1948 through April 28, 1950).[23] Opinions on the waste vary. January 30, 1952,[13] the waste was said to be predominately long-life alpha accompanied by slight amounts of beta and gamma. January 31, 1952,[22] the following was stated:

> The contamination on materials in these pits consists of all types of radioactive materials used at Los Alamos. Some of the known types of activity are: plutonium, polonium, uranium, americium, curium, RaLa [radium/lathanum], acitinium, and waste products from the Water Boiler. No attempt has been made to keep the various materials separated.[22]

January 4, 1971,[19] information was given that

> The total volume of the pits, after deducting the three foot of cover material, is 28,000 cubic yards. These pits actually contain very little Plutonium. At the time they were in use

Pu was scarce and only that which was present as contamination was buried. [It is ~~[D. D. Meyer] would~~ estimated] that the entire pit area contains no more than 100 grams of ^{239}Pu.[19]

Approximately 90% of the contaminated waste consisted of paper, rags, rubber gloves, glassware, and small metal apparatus placed in cardboard boxes by the waste originator and sealed with masking tape.[12] "The rest of the material consists of metal such as airducts and large metal apparatus. This type of material is placed in wood boxes or is wrapped with paper."[12] There is also reference to large quantities of wood from temporary storage cabinets used by the Quantity Control Department, several live storage batteries,[25] and contaminated or toxic chemicals.[22]

Mode of Disposal

In the literature[26] and in conversation Area B is frequently referred to as a single pit with an approximate depth of 6.1 m (20 ft). Area B does not appear to be a single pit. Whether some of the pits in the area have a depth of 6.1 m (20 ft) is open to speculation. It could well be the 6.1 m (20 ft) is an estimate based on the average depth of most pits excavated in Areas C and G.

For reasons already stated, the depiction of Engineering Drawing ENG-R 4458 of Area B as one continuous pit is wrong. Consistent reference has been made through the years[12,22,19] to a series of pits in Area B. One might assume their construction to be similar to the 1945 Pit (4.6 m [15 ft] wide, 91.4 m [300 ft] long, and 3.7 m

brackets

[12 ft] deep), with the exception of the hazardous materials pit which was described as a trench 0.6 m (2 ft) wide, 12.2 m (40 ft) long, and 0.9 m (3 ft) deep.

When area B was in use, waste was handled in the following manner.

> The waste disposal program requires three men. Two of these work on the contaminated truck and are furnished by the Zia Company. The third man is a CMR-12 monitor. This monitor supervises the handling of material. Before loading he checks the boxes for external contamination and keeps records of any accountable property that is buried.
>
> The equipment used consists of a truck and a sedan. The material in the pits is covered once a week. This requires the use of a bulldozer and operator one day a week.[12]

Unlike the current LASL practice of layering waste in pits, waste filled the depth and width of the pits in Area B before it was covered by fill dirt. As a result, subsidence occurred. Shortly after Area B was closed subsidence over the pits was remedied by using the Area for disposal of noncontaminated concrete and dirt from construction sites. (Written communication D. D. Meyer, Fall 1974.)

Centered, All Caps

Studies and Monitoring

A fire broke out in Area B at approximately 10:20 am, May 3, 1948.[25] When the fire department arrived,

> ...[they] found sixty percent of the open portion of the dump ablaze and flames shooting approximately fifty feet into the air. The firemen had little trouble in subduing the blaze, but persistent efforts to put it out were of little avail because of the loaded condition of the dump area in which the blaze was confined. Dense, low-hanging smoke prevailed in large volume.
>
> At approximately 10:35 am, ~~J.~~ James Tribby was notified of the fire, in the ab-

sence of other Health Group personnel, and with representatives of the Safety Department went immediately to the scene of the blaze and took charge with H. Drager. Because of the dense smoke which scattered throughout the area, due to the condition of shifting winds, all areas east and west of the dump, from the food warehouses to the DP laundry, were evacuated of personnel. Respiratory protection was provided for all persons at the scene, and it was necessary to close the DP road to traffic.[25]

At 11:15 am, May 3, 1948, our monitoring section [H-2] drove to the DP contaminated dump section to assist the CMR group in surveying the extent of contamination, if any.

General air count proved negative with A Pee Wee alpha survey meter....

We later helped check personnel in and around the area including firemen and security guards. The grounds and vehicles in the area were also checked. All proved negative excepting one security car windshield which had about 50 c/m and one spot on the west fence had 200 c/m. The security car is believed contaminated from former contamination trouble or from accompanying a 'hot' run. The fence is believed contaminated from dust blown from the dump because it was localized in one spot only.

The smoke drifted west and close to the ground near the food storage plant corner of Trinity and DP road. The east wall was checked. No activity found.

It is believed there could not have been an air count present due to the absence of any deposit on local objects.[184]

By 12:15 pm, the fire had been extinguished except for two very small, isolated points and there was no longer any hazard from smoke. Fire department personnel were dismissed at 1:15 pm, but a stand-by crew of two men and one piece of apparatus were left until 5:30 pm to watch for rekindling of the fire.

H.A. Note that ref #s indicate this quote was taken from 2 sources (25 & 184). Is this correct?

All quoted material but 2 accounts of same incident

Investigation has failed to disclose any obvious cause for the blaze, and it is presumed that it started by spontaneous combustion. The area in which the blaze occurred had not had any trash dumped into it for about three days, and much of the trash in the fire area had been in the dump for three weeks. The trash included large quantities of wood from temporary storage cabinets used by the Quantity Control Department, several "live" storage batteries, large quantities of miscellaneous scrap metals, discarded contaminated clothing and boxed laboratory waste. The conditions were ideally suited for spontaneous combustion.

(one only as material is already a quote)

During the fire, there was some evidence that chemicals had been disposed of in the dump in an unauthorized manner in cardboard containers used for the regular disposal of common laboratory waste. Several cartons of waste gave off minor explosions, and upon one occasion a cloud of pink smoke arose from the debris in the dump. Whether this was due to the heat of the fire, the action of the water or chemical reaction in not known. The condition certainly did not help in keeping the fire under control.

This most recent dump fire should serve as an object lesson in many respects. It should point to the hazards of having the dump located in areas near or in line with living and working areas where toxic smokes and vapors can create an emergency condition. Even though we are presently short of dump space, it is poor policy to leave the dump uncovered for extended periods of time. If it is not practical to cover the trash with a light layer of dirt as a temporary measure before covering over any portion completely, it is suggested that the dump be wet down with large quantities of water at least twice a week until such a time as more adequate precautions can be taken.

As a result of the fire, there were no doubt many other changes besides the relocation of the common burial ground.

The following is from a February 1963 USGS report.[8] "The highest concentration of gross alpha in soil samples collected in June 1955 a short distance downgradient in the canyon south of the pit [Area B] was 48 disintegrations per minute per dry gram."[8] There is no map showing the precise location of the sampling point (which may have been closer to Area V than it was ~~in~~ to Area B).

The USGS was asked to do a study of Area B in 1966.

> Expansion of laboratory facilities and increased growth of the community of Los Alamos has caused a re-evaluation of present land use to determine if the land is being utilized in the best possible way. It was proposed by the Los Alamos Scientific Laboratory and the U. S. Atomic Energy Commission that a portion of the filled-in contaminated waste pit, outside the radius of 1050 ft from TA-21 (an area approved for commercial property), be leveled, filled where necessary, and sealed with asphalt, and used for a storage area for trailers and boats. It is thought that a seal of asphalt will prevent any contamination from reaching the surface of the storage area.[26]

The USGS drilled test holes, 7.6 - 15.2 m (25-50 ft) deep, around the perimeter of Area B (see Fig. B-2). Moisture content of the soil and tuff penetrated by the test holes was determined by neutron scattering moisture probe. Samples of the drill cuttings were analyzed for gross alpha and gross beta-gamma, plutonium, and uranium. The results of ths study were reported[26,29] in 1966. (See Table B-I.) The study concluded

> Distribution of moisture in five test holes indicated some lateral movement of water, probably from the contaminated waste pit.* The amount of water moving through the tuff was well below the estimated effective porosity of the tuff. Radiochemical analyses of the soil and tuff from the test holes showed no indication of radioactive ~~contamination. A much larger amount of contamination. A much larger amount of water than occurs from precipitation would be required to move radioactive~~
>
> contamination. A much larger amount of water than occurs from precipitation would be required to move radioactive contaminants from the waste pit into the adjacent soil and tuff. An asphalt covering on the pit with adequate drainage could prevent any movement of radioactive contaminants from the waste pit.[26]

---

*The USGS considered Area B to be one large pit.

A beta gamma survey of the material waste pit at TA-21 was conducted on September 16, 1966. Dose rate measurements were taken at a distance of twenty inches from the surface of the black topping with an Eberline Mod. E-112-B Geiger counter. No appreciable reading above the normal background of 0.07 mr/hr was detected.[30]

TABLE B-I

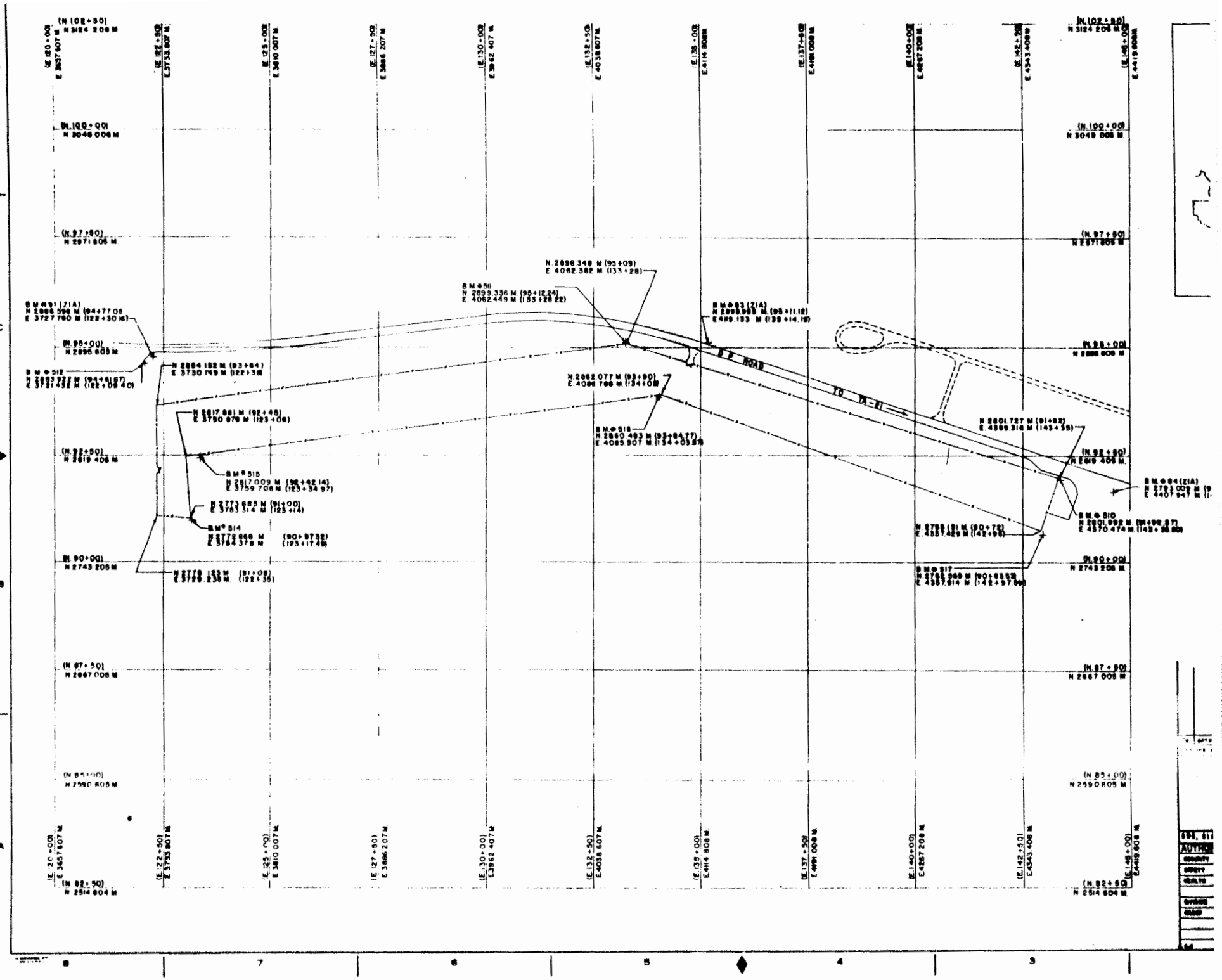
DATA FROM 1966 USGS TEST HOLES DRILLED ON THE PERIMETER OF AREA B

USGS Designation	Date	AEC & LASL Coordinates	Diameter (in.)	Depth (ft.)	Altitude (ft. above mean sea level)	Log: Soil (ft.)	Log: Bandelier Tuff (ft.)	Moisture Content Placed by Volume	Gross Alpha (dmg)	Gross Betagamma (dmg)	Plutonium (dmg)	Uranium (μgg)
DPS 1	2/7/66	N 95 + 13 E132 + 97	4	50	7,190	3	47	4-12.5	.2-0.7	.0- 6.0	<.4	<.5
DPS 2	2/7/66	N 94 + 78 E130 + 56	4	25	7,191	3	22	6-23	.3-0.9	.3- 9.1	<.4	<.5
DPS 3	2/7/66	N 94 + 43 E127 + 87	4	50	7,194	3	47	4-22	.9-1.2	.9-12.6	<.4	<.5
DPS 4	2/7/66	N 94 + 16 E125 + 89	4	25	7,202	3	22	7-29	.9-1.1	.9- 4.9	<.4	<.5
DPS 5	2/7/66	N 93 + 80 E122 + 85	4	50	7,214	3	47	5-23	.1-1.0	.0- 7.6	<.4	<.5
DPS 6	2/8/66	N 92 + 58 E122 + 10	4	50	7,216	6	44	11-30	.2-1.2	2.7- 6.1	<.4	<.5
DPS 7	2/8/66	N 94 + 41 E135 + 69	4	25	7,185	3	22	5-25	.2-1.2	1.3- 5.5	<.4	<.5
DPS 8	2/8/66	N 93 + 66 E138 + 06	4	50	7,181	6	44	4-24	.1-0.6	1.0- 5.8	<.4	<.5
DPS 9	2/9/66	N 93 + 66 E135 + 19	4	25	7,180	4	21	4-12	.3-0.7	1.0- 3.7	<.4	<.5
DPS 10	2/9/66	N 93 + 66 E131 + 55	4	35	7,182	4	31	4-16	.2-1.0	.7- 4.3	<.4	<.5
DPS 11	2/9/66	N 93 + 21 E128 + 50	4	50	7,192	4	46	4- 9.5	.3-0.9	1.2- 4.0	<.4	<.5
DPS 12	2/9/66	N 92 + 79 E125 + 21	4	36	7,192	3	33	8-35	.3-0.8	.0- 3.0	<.4	<.5
DPS 13	2/9/66	N 91 + 39 E122 + 72	4	35	7,210	2	33	4-11	.4-1.0	.0- 4.3	<.4	<.5

Compiled from data in Purtymun and Kennedy[26] and John, Enyart, and Purtymun.[29]

The accompanying map showed the survey was down the center of the storage area portion of Area B.

November 10, 1971, the asphalt was surveyed with an alpha counter, Ludlem Model 193, and beta-gamma counter Model E-112-B. "No alpha contamination was detected, and the beta count was background."[28]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N 3124 206 M
(N 100+00)
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(N 97+50)
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(N 95+00)
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(N 92+50)
N 2819 405 M
(N 90+00)
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(N 87+50)
N 2667 005 M
(N 85+00)
N 2590 805 M
(N 82+50)
N 2514 604 M
(E 120+00)
E 3657 607 M
(E 122+50)
E 3733 807 M
(E 125+00)
E 3810 007 M
(E 127+50)
E 3886 207 M
(E 130+00)
E 3962 407 M
(E 132+50)
E 4038 607 M
(E 135+00)
E 4114 808 M
(E 137+50)
E 4191 008 M
(E 140+00)
E 4267 208 M
(E 142+50)
E 4343 408 M
(E 145+00)
E 4419 608 M
N 2898.348 M (95+09)
E 4062.382 M (133+28)
B M # 511
N 2899.336 M (95+12.24)
E 4062.449 M (133+28.22)
B M # 63 (21A)
N 2899.995 M (95+11.12)
E 4119.133 M (135+14.19)
B M # 91 (21A)
N 2895.598 M (94+77.09)
E 3727.760 M (122+30.16)
B M # 512
N 2897.237 M (94+81.87)
E 3731.432 M (122+09.40)
N 2884.152 M (93+84.)
E 3730.149 M (122+38)
N 2862.077 M (93+90)
E 4066.766 M (134+08)
B M # 516
N 2860.493 M (93+84.77)
E 4065.907 M (134+03.28)
N 2817.881 M (92+48)
E 3780.878 M (123+06)
B M # 515
N 2817.009 M (92+42.14)
E 3759.706 M (123+34.97)
N 2773.865 M (91+00)
E 3763.314 M (123+74)
B M # 514
N 2773.866 M (90+97.32)
E 3764.378 M (123+17.49)
N 2778.153 M (91+00)
E 3778.238 M (123+35)
N 2801.727 M (91+92)
E 4389.316 M (143+35)
B M # 84 (21A)
N 2793.909 M (9
E 4401.947 M (1
B M # 510
N 2801.992 M (91+92.87)
E 4370.474 M (143+
N 2788.181 M (90+73)
E 4387.429 M (142+98)
B M # 517
N 2788.369 M (90+83.53)
E 4387.914 M (142+97.90)
TO TA-II
B P ROAD
D
C
B
A
8
7
6
5
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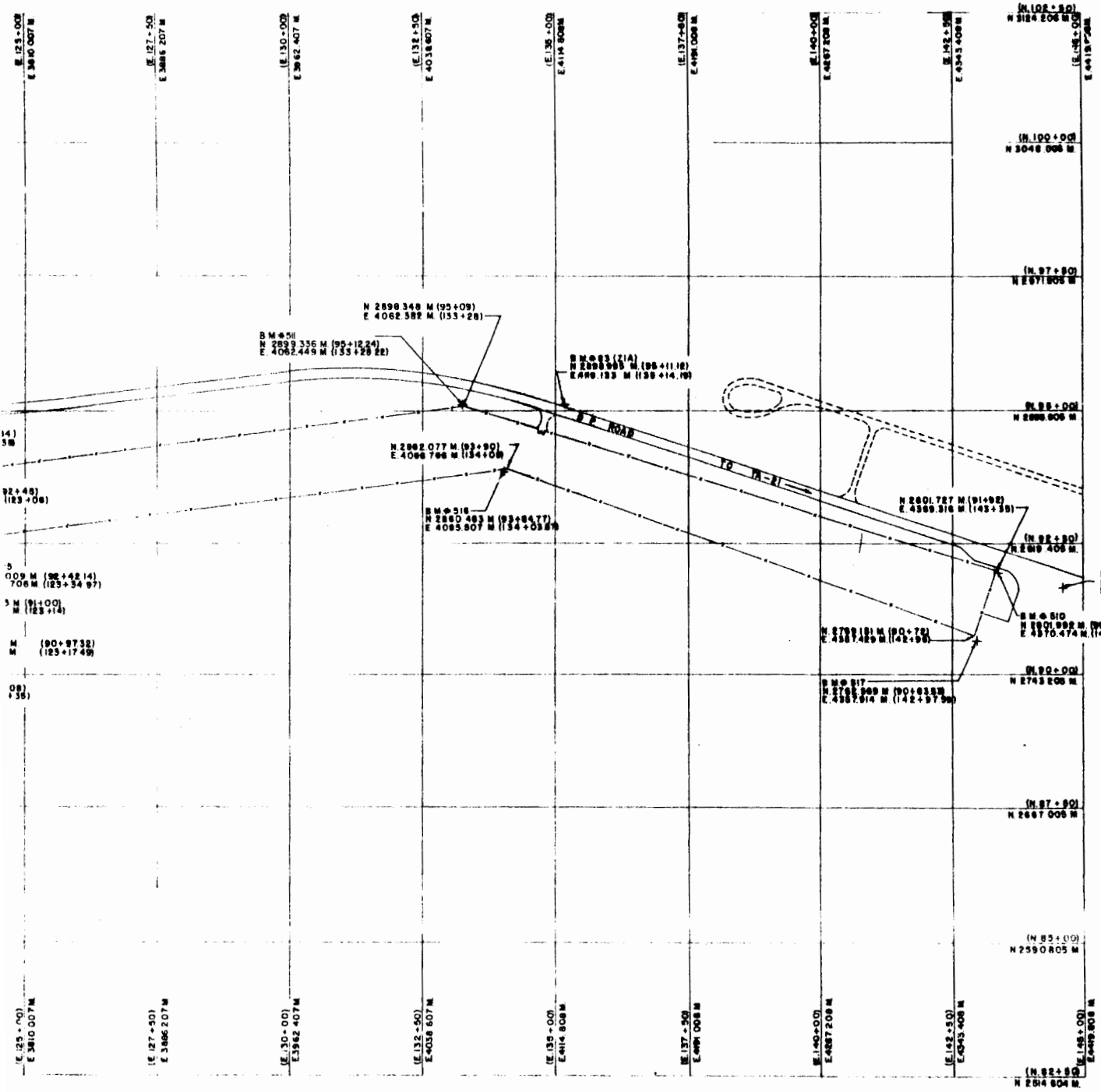
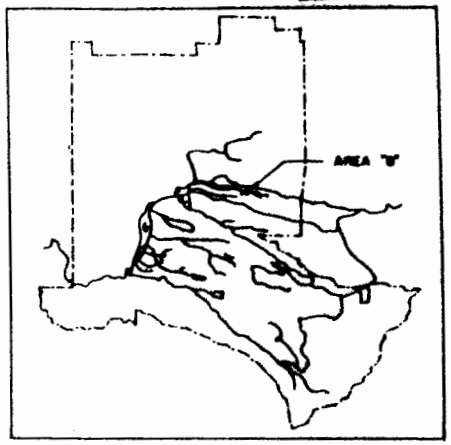
3

SI METRIC DRAWING





LOCATION PLAN

SCALE
1"=100' (1:1200)

NO.	DATE	CLASS. DESIGN.	REVISIONS	BY	DRWN.	DSGN.	T.O.	TRACE.	CK.

THIS JOB SHEET OF INSPECTED AND ANY CHANGES APPROVED BY ENG. & MAINT.

LOS ALAMOS SCIENTIFIC LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

ENG. DESIGNATION: H TITLE: d

AUTHORIZATION FOR:
QUANTITY
SPECY
CALC.TO

MATERIALS DISPOSAL AREAS
AREA "B"
DP ROAD TA-0

DRAWING
DSGN.
DRAWN
TRACED
CHECKED
APPR.
DATE
SCALE
LAS MT. DRAWING
TA-0
DWG. B 4848

Fig. B-1

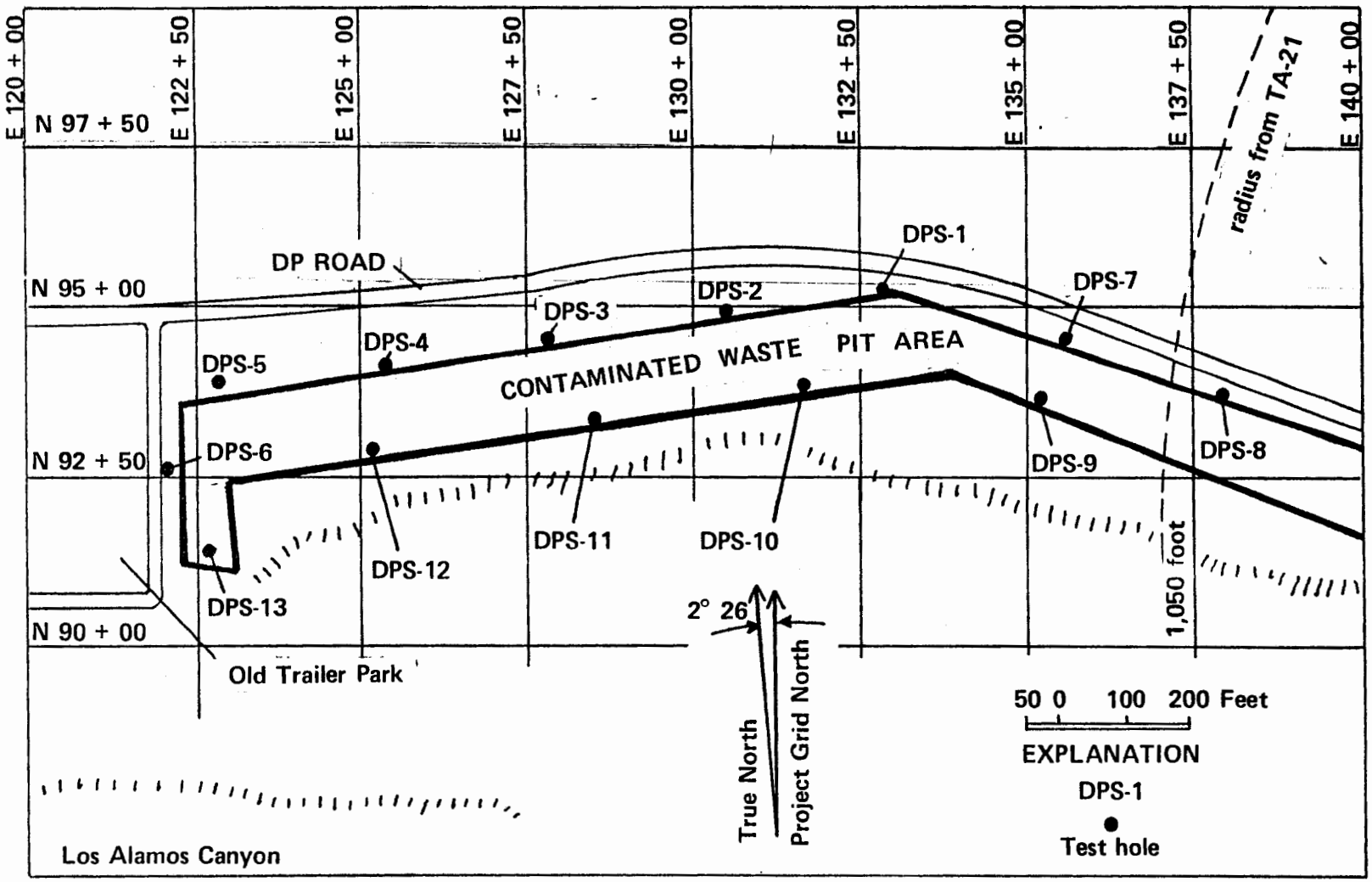


Fig. B-2. Location of test holes drilled near the contaminated waste pit west of TA-21.

Start new page

Center, all caps

AREA C

General Information

C-1

Area C is located on Pajarito Road (see Fig. C-1), to the south of TA-50, east of Pecos Drive, and north of Pajarito Road. It is defined by LASL coordinates (beginning with the northeast point and moving in a clockwise direction) N.28+93, E.101+05; crooked N.26+70, E.100+79; N.26+74, E.100+43; N.24+55, E.100+18; N.25+36, E.93+23; N.27+37, E.89+31; N.28+64, E.87+52; and N.30+36, E.88+52. Its location can also be given using township and range as on the mesa in the E 1/2 sec. 22, T. 19 N., R. 6 E.[8] The approximate ~~acerage~~ acreage for Area C is 11.80.[35]

F. C-1

A memo[86] dated seven days after the May 3, 1948, fire in Area B stated

> On May 6, 1948 we forwarded an X priority # 153078 to the Zia company...for the construction of a new contaminated dump. The work of digging the ditch commenced Friday morning, May 7, and was continued through Saturday, May 8th. Work is being resumed this morning, Sunday work having been skipped.
>
> The location for this new contaminated dump has been agreed to by authorized Safety and Health personnel and by CMR Division. Since it is located near the Junction of the Alpha Site Road and the Pajarito Road, we are for record purposes considering it as part of the Alpha Site installation.[86]

Selection of the location of Area C is reportedly the first involvement of the USGS in disposal site approval (personal communication, D. D. Meyer 1974). There are a total of 6 pits, a chemical pit, and 107 numbered shafts in Area C.

Geology and Hydrology

The mesa at Area C slopes gently eastward. Canyons approximately 304.8 m (1000 ft) north and south of the area are 30.5-45.7 m (100-150 ft) deep.[8] Ten-Site Canyon heads immediately northeast of the area about 45.7 m (150 ft) north of Pit 5. The soil covering is approximately 0.9-1.5 m (3-5 ft) thick above the Tshirege member of the Bandelier tuff.[8] There are two prominent, nearly vertical, joint sets which intersect at approximately 60°.[91] Most major joints are filled with sediments or altered material to a depth of approximately 3.0 m (10 ft)[91] and spaced 3.0 m (10 ft) apart.[8] All of the pits[91] and probably all of the shafts are dug in the Tshirege member.

> The soil cover on the surface of the mesa prevents most of the water on the surface from infiltrating underlying tuff. Where the soil has been removed or disturbed, water might infiltrate the underlying tuff and open joints in the tuff. Beneath the soil there is about 850 ft of the Bandelier tuff which consists of a series of ash fall and ash flows of a friable to welded rhyolite tuff. This tuff is underlain by about 575 ft of volcanic debris of the Puye Conglomerate. The main zone of saturation occurs in the Puye at a depth of about 1300 ft. Perched water may occur above the main zone of saturation, although none was encountered in test well 8 located 1.5 miles northeast of Area C.[92]

PIT AND SHAFT DESCRIPTION

Background (written communication, J. Enders, 1974)

Pit 1 was put in use June 10, 1948.* June 14, 1949,[12] it was reported "the present dump [Area C] has been in use for one year and during that time we have filled one pit. We are now using the last pit and it should last until June 1950."[12] The "last pit" referred to in the previous quote could be Pit 2, Pit 3, or Pit 4. Pits 2 and 3 show use dates from April 1950 through April 1953.[23] Pit 4 shows a use date from April 1950 through February 1955.[23] Pit 5 shows a use date from April 1953[23] through November or December 1964.[72,73] Pit 6 shows a use date from February 1956 through August 1959.[56] The chemical pit was probably dug in the first part of 1960[87] and closed out in the summer of 1946.[90] In the second quarter of 1957, Area G had been located and Pit 1 of that area had been dug.[53]

Footnotes should be handled differently to avoid confusion. Ask me about this when you read this. Barbara

Twelve shafts were dug from February 29, 1958 through October 29, 1959.* (written communication, J. Enders, 1974) The first shafts were for the use of the CMB-DO-GS (known as the CMB dogs). These first 12 shafts are numbered 56-67.** (The shafts were renumbered in Nov. 1962; per written communication, J. Enders, 1974) By the third quarter of 1959 an additional 55 shafts were ordered dug.[56] These shafts are numbered 1-55. Twenty new shafts, numbered 68-87, were dug the last half of 1962.[65] During the first quarter of 1964 an additional 20 shafts, numbered 88-107, were dug.[70] In an April 23, 1965, memo[74] the statement appears: "It is understood that when these new shafts are all filled no new wells will be drilled in this Area." Table C-1 shows the use dates for the 107

page 3 of Rough Draft.

I

TABLE C-~~1~~

AREA C SHAFTS

Prepared By: John Enders, H-7

SHAFT #	FIRST LOG ENTRY	LAST LOG ENTRY	LA NOTEBOOK #	& PAGE #
1	11/10/59	11/10/59	9593	120;121 122;123
2	11/30/59	3/23/60		
3	1/ 7/60	2/23/60		
4	2/11/60	9/20/60		
5	4/ 6/60	11/ 1/60		
6	4/14/60	12/22/60		
7	5/10/60	2/21/61		
8	5/10/60	3/24/61		
9	7/19/60	11/10/60		
10	7/25/60	7/25/60		
11	7/29/60	11/10/60		
12	10/ 3/60	10/ 3/60		
13	10/13/60	11/28/60		
14	10/ 5/60	4/18/61		
15	11/28/60	4/18/61		
16	11/30/60	6/ 5/61	11363	130;131
17	1/13/61	4/25/61		
18	1/27/61	2/21/61		
19	3/23/61	3/23/61		
20	3/28/61	3/28/61		
21	4/18/61	4/18/61	9593	123
22	6/ 5/61	6/ 5/61	11363	130;131
23	5/ 2/61	6/ 5/61	11363	130;131
24	5/10/61	5/26/61	11363	130;131
25	5/22/61	2/ 8/62	11363	136;137
26	6/ 6/61	2/26/62	11363	136;137
27	6/ 6/61	6/26/61	11363	131;132
28	6/16/61	6/16/61	11363	131;132
29	6/26/61	7/16/61	11363	132;133
30	7/ 7/61	7 7/61	11363	132;133
31	7/17/61	7/24/61	11363	132;133
32	7/26/61	3/20/62	11363	138;139
33	8/14/61	2/ 5/62	11363	136;137
34	10/31/61	1/ 5/62	11363	136;137
35	12/26/61	12/26/61	11363	134;135
36	12/28/61	12/28/61	11363	134;135
37	12/29/61	12/29/61	11363	134;135
38	1/ 3/62	1/ 3/62	11363	136;137
39	1/ 4/62	1/ 5/62	11363	136;137
40	1/ 4/62	1/ 5/62	11363	136;137
41	1/ 5/62	2/ 6/62	11363	136;137
42	1/15/62	1/18/62	11363	136;137
43	1/18/62	3/20/62	11363	138;139
44	2/ 7/62	2/ 7/62	11363	136;137
45	3/22/62	4/25/62	11363	138;139
46	2/ 6/62	2/ 8/62	11363	136;137
47	4/20/62	5/ 8/62	11363	138;139
48	5/ 3/62	6/ 5/62	11363	110;111
49	7/17/62	7/17/62	11363	110;111
50	6/ 6/62	7/26/62	11363	110;111
51	7/ 3/62	8/ 7/62	11363	110;111
52	8/ 7/62	9/19/62	11363	112;113
53	8/24/62	9/25/62	11363	112;113
54	9/25/62	10/ 3/62	11363	112;113
55 (old #1)	12/13/62 (Storage Shaft)	5/26/67	11363	118;119

TABLE C-1 (continued)

AREA C SHAFTS

SHAFT #	FIRST LOG ENTRY	LAST LOG ENTRY	LA NOTEBOOK #	& PAGE #	
56	2/28/58	2/28/58	9593	120	First Shaft dug in Area C 2' x 12' deep
57 ("2)	7/ 3/58	7/ 3/58	9593	120	
58 ("3)	9/22/58	9/22/58	9593	120	
59 ("4)	11/20/58	12/ 3/58	9593	120	
60 ("5)	12/10/58	2/ 4/59	9593	120	
61 ("6)	5/26/59	5/26/59	9593	120	
62 ("7)	7/ 8/59	7/ 8/59	9593	120	
63 ("8)	7/10/59	7/10/59	9593	120	
64 ("9)	7/10/59	7/10/59	9593	120	
65 ("10)	9/19/59	9/10/59	9593	120	
66 ("11)	9/16/59	10/15/59	9593	129	
67 ("12)	10/20/59	10/29/59	9593	120	
68	10/ 8/62	11/ 2/62	11363	114;115	
69	10/23/62	11/ 1/62	11363	114;115	
70	11/ 6/62	12/13/62	11363	118;119	
71	11/ 8/62	4/ 9/63	11363	118 & #12442 Page 6:7	
72	2/15/63	3/ 1/63	12442	2;3	
73	3/ 5/63	4/ 8/63	12442	6;7	
74	4/ 8/63	5/27/63	12442	6;7	
75	4/10/63	7/ 9/63	12442	6;7;8;9	
76	5/ 2/63	7/ 9/63	12442	6;7;8;9	
77	6/12/63	7/19/63	12442	6;7;8;9	
78	7/ 5/63	7/17/63	12442	8;9	
79	6/ 6/63	7/30/63	12442	8;9	
80	7/18/63	10/ 7/63	12442	8;9;10;11	
81	8/20/63	10/24/63	12442	8;9;10;11	
82	8/27/63	8/30/63	12442	8;9	
83	9/ 4/63	12/20/63	12442	10;11	
84	9/16/63	1/10/64	12442	10;11;14;15	
85	10/30/63	2/27/64	12442	10;11;14;15	
86	1/27/64	5/14/64	12442	14;15;16;17	
87	4/ 6/65	7/ 9/64	12442	14;15;16;17	
88	5/21/64	12/ 9/64	12442	16;17;20;21	
89	4/23/64	4/23/64	12442	14;15	NOTE: This shaft used to "store" 235V in pipe to be filled 4/1974
90	8/19/64	1/ 4/65	12442	22;23	
91	8/19/64	3/30/65	12442	16;17;24;25	
92	8/19/64	5/13/65	12442	16;17;24;25	
93	8/19/64	2/29/68	12442	16;17;46;47	
94	8/19/64	4/20/65	12442	16;17;28;29	
95	5/19/65	10/ 6/65	12442	26;27;28;29	
96	5/19/65	7/12/66	12442	26;27;36;37	
97	5/19/65	4/14/66	12442	26;27;34;35	
98	8/18/64	9/23/64	12442	16;17;20;21	
99	11/18/64	4/20/65	12442	20;21;24;25	
100	7/26/65	10/24/66	12442	26;27;38;39	
101	8/24/65	10/12/65	12442	28;29;39;31	
102	11/ 5/65	4/18/66	12442	34;35	
103	1/17/67	10/17/67	12442	40;41;46;47	
104	10/27/67	4/ 1/68	12442	46;47;48;49	
105	12/12/68	12/12/68	12442	50;51	
106	8/24/65	10/12/65	12442	28;29;30;31	
107	2/11/66	2/11/66	12442	34;35	

shafts in Area C.

The history of Area C extends from May 7, 1948, the date the first pit was started, through April 8, 1974,*** the date the last shaft was filled and plugged with concrete. It is sometimes felt that the last routine radioactive contaminated waste placed in Area C, December 1958,[54] marks the closing of Area C and the opening of Area G. Neither idea is true. Area G pits had received nonroutine radioactive waste before that date and Area C pits continued to receive nonroutine radioactive contaminated waste until Pit 6 was filled August 1959[56] and Pit 5 was filled November or December 1964.[72,73] Since quarterly and annual reports on solid radioactive waste disposal fail to mention Area C after 1968, it can be assumed the area was not in regular use past that time. The plugging of the last Area C shaft, 89, on April 8, 1974, marked the formal closing of the area.

Type of Waste

Records of solid radioactive waste going into Area C can be found in LA Notebooks 2587, 3478, 4644, 6030, 7277, 8453, 9293, 9593, and 12442.[23] These notebooks are used to log information on type, date, location, and volume of waste placed in the disposal area. "...records prior to 1954 are incomplete."[8]

During the pit history of Area C hazardous chemicals and ~~non~~uncontaminated classified materials were buried with radioactive contaminated materials. Routine radioactive contaminated trash for the period

consisted of cardboard boxes 33 cm x 33 cm x 61 cm (13 in. x 13 in. x 24 in.), ~~and~~ 5-mil plastic bags, 33 cm x 61 cm (13 in. x 24 in.) and 256 cm x 61 m (40 in. x 24 in.) of material generated in the chem labs, and 0.20 m^3 (55 gal) barrels of sludge from the waste treatment plants at Bldg. 35, DP West, and at TA-45. Nonroutine contaminated waste included debris from the demolition of Bayo Site and TA-1, classified materials, and tuballoy chips from the shops.

The following preliminary values are decay corrected from original magnitude to that as of January 1, 1973. In the disposal pits of Area C there are 25 Ci of uranium which includes isotopes 234, 235, 236, and 238; 26 Ci of ^{239}Pu; and 149 Ci of ^{241}Am ~~32~~ (ref. 32). In the shafts of Area C there are 49 136 Ci of ^{3}H ~~280~~ (ref. 280), 40 Ci of ^{22}Na, 20 Ci of ^{60}Co, 31 Ci of $^{90}Sr/^{90}Y$, 1 Ci of ^{226}Ra, (personal communication, M. Wheeler, 1974) 5 Ci ^{233}U, < 0.1 Ci of uranium (including isotopes 234, 235, 236, and 238), 50 Ci of fission products, and 200 Ci of induced activity.[32] Total number of curies for the pits is 196 and total number of curies for the shafts is 49 483.

An earlier report[134] listed the following figures for Area C: D-38, 34 445 lbs; ^{238}U, 0.0 g; ^{235}U, 13 853 g; ^{239}Pu, 2 063 g; ^{233}U, 1467 g; and ^{3}H, 10 g (for Areas C and G, based on estimated curies and 9 600 Ci ≅ 1 g ^{3}H).

It seems appropriate to comment on the establishment of the Hazardous Chemical Area in Area C. As pit use was phasing out in Area C and beginning in Area G, the idea of separate disposal for hazardous nonradioactive chemicals (which were responsible through the years for many [personal com-

N.A. - should be written 38D or spelled out — it is unknown what is meant and I don't know what it is. 'D' is not an element symbol

move to position indicated (see next pg)

H-7,1914

munication, J. Enders] fires in the disposal areas) was accepted. There is no indication[54,56,87] that Pit 6 of Area C was, at any time during its history, dedicated to the exclusive disposal of hazardous nonradioactive chemicals. A memo[87] dated November 12, 1959, suggests it was proposed that part of Pit 6 be used for the "permanent chemical disposal area," but another memo[56] dated November 2, 1959, states covering of Pit 6 to ground level began September 24th and finished October 2nd. Apparently, the chemical pit south of Pit 6 was dug in early 1960.[87]

> A brief review of the use of this pit shows that a variety of chemicals, pyrophoric metals, hydrides and powders, sealed vessels containing sodium-potassium alloy or compressed gases, and equipment not suitable for salvage, public dump or the contaminated dump have been placed in the pit. No high explosives have ever been disposed of in this pit. Normal uranium powders and hydrides have been disposed of in this pit. Inadvertently, some plutonium-contaminated objects were placed in the pit but have long since been covered. Because of the uranium disposed it should be assumed that the pit is mildly alpha contaminated.[90]

The Hazardous Chemical Disposal Area was fenced off from the rest of Area C. When the Hazardous Chemical Disposal Area was closed out in Area C it moved to Area L, Mesita del Buey.

Another disposal practice, disposing of nonradioactive classified waste with contaminated waste, was under discussion about the same time as separate disposal for nonradioactive hazardous chemicals.

> It was rather disappointing to learn during the course of our inquiries on this matter that, despite the general agreement some two years ago [1957], burial in contaminated pits would essentially be a last resort method of disposing of classified waste, nevertheless, a substantial part of the capacity of the existing pit [probably Pit 6] in Area C has been taken up with materials which are not contaminated, not of obvious security interest, and which it would seem could be disposed of by some other method. For example, I [P. F. Belcher, Assistant Director for Classification and Security] am informed that something more than seventy yards has been taken up by Security Branch, LAAO, for the dumping of technical badges. It would seem to me that badges can be chopped up and disposed of in some other manner. I will concede that it perhaps is a tedious job, but in view of the fact that we have only a limited amount of real estate for disposal of classified waste it does not seem to me proper to dispose of badges by burial simply because it is easiest.
>
> By the same token it appears that there have been large quantities of safety film from various laboratory operations placed in the contaminated pits at Area C. Again, it would seem that there must be alternate methods of disposing of safety film which would not involve using up the limited space available in contaminated waste disposal dumps.[185]

Eventually, Area H, Mesita del Buey, was designated as the nonradioactive classified waste disposal area; dug for the disposal of beta-gamma active waste by the CMB-DO-GS at Ten-Site. Originally the shafts in Area C were Shafts were to be used by many other groups for disposal and storage. Appendix A lists the contents of the 107 shafts in Area C.

Mode of Disposal

Pits 1-4 are located in the southwest quarter of the area. (See Fig. C-1.) These pits are 185.9 m (610 ft) long by 12.2 m (40 ft) wide. On Engineering Drawing ENG-R

1264 these are shown as scaled dimensions. Apparently, the Engineering Department was neither asked to stake these pits before they were dug nor asked to survey these pits while open, as there is no record of it being done. Pit 5, located to the north of Pits 1-4, is 33.5 m (110 ft) wide by 214.9 m (705 ft) long and has a maximum depth of approximately 5.5 m (18 ft). Pit 6, in the northwest quarter of Area C is 30.5 m (100 ft) wide by 153.9 m (505 ft) long with a maximum depth of approximately 7.0 m (23 ft). The chemical pit is 7.6 m (25 ft) wide by approximately 54.9 m (180 ft) long and may be 3.7 m (12 ft) deep.[87]

~~Numbers on the 107 disposal shafts in Area C do not reflect their excavation or use dates. The first shafts, 56-67, are located between Pit 4 and Pit 5; they are~~

Numbers on the 107 disposal shafts in Area C do not reflect their excavation or use dates. The first shafts, 56-67, are located between Pit 4 and Pit 5; they are numbered from west to east. The next shafts, 1-55, are between Pit 1 and Pit 3; they are numbered from east to west. They were followed by Shafts 68-107 which run south to north immediately past the western ends of Pits 1-4. Shafts 98-107 parallel shafts 68-97; they are numbered from south to north. Shafts 68 and 98 are 6.1 m (20 ft) from the southwest fence of Area C.

The shafts are located on 2.3 m (7 ft 6 in.) centers. Like the pits, they vary

in size and depth. Shafts 56-67 are 0.3 m (2 ft) in diam by 3.0 m (10 ft) deep.[54] Shafts 1-55 are 0.3 m (2 ft) in diam by 4.6 m (15 ft) deep.[56] Shafts 68-107 include both 0.9-m (3-ft) diam, 30.5-cm (12-in.) thick, concrete-lined 0.3-m (2-ft) shafts and 0.3-m (2-ft) diam shafts. ~~Ten of the last 20 shafts~~ are concrete lined. In shafts 68-107 the depth may vary from 6.1 m (20 ft) to ~~6.4~~ 7.6 m (25 ft).[8]

A ^{90}Sr disposal shaft, no number, is located a few feet from the south fence corner designated by LASL coordinates N.25+36, E.93+23.

The fence, which runs north-northeast across the western half of Area C, was erected to end confusion over which part of Area C was used for radioactive contaminated waste disposal and which part was used for hazardous chemical disposal (personal communication, J. Enders, H-8). At the time the fence was erected it was common practice for hazardous chemicals to be placed in the chemical disposal pit and then burned. People frequently reported the contaminated dump to be on fire. Therefore, the fence was erected to end the confusion of what was on fire.

> A meeting was held on December 28, 1950, concerning contaminated dump. It was decided at that time that H-1 Monitoring would be responsible for Rad-Safety of all persons entering the dump commencing January 5, 1951.
>
> Our responsibilities are as follows:
> 1. Furnish full protective clothing including respirator to George Yates, Zia Co., who covers the trash every Friday. Yates has to be monitored after each job and nose swipes takne. He is scheduled for routine Health Pass

test. By copy of this memo I'm [Carl Buckland] requesting that Glenn Vogt write monthly work orders to cover the bulldozer work. The maintenance man of D-Bldg. formerly took care of this detail.

2. H-1 Monitoring will be notified, upon arrival of highly active beta-gamma contaminates requiring a knowledge of tolerance times. We will also be notified upon arrival of hot filters from DP Site. This advance information will assist us in case of fire for which we are responsible.

3. Film badges and pocket chambers should be issued in cases of high beta-gamma activity.

CMR-Safety and CMR-12 will continue to dump chemicals in the proper place and contaminated items in another. Dean Meyer has stated that if at any time we feel that things are not dumped where we think they should, to contact him.[186]

Numbered reference posts for waste record purposes were used for the first time July 19, 1951 (written communication, J. Enders, H-8).

A February 5, 1957, memo[110] entitled, "Covering Contaminated Trash at Contaminated Dump," reflects some operational changes as follows:

It is my [John Enders] understanding that the dump [referring to a single pit] was formerly covered once per week. This was done at a time when trash was piled into the dump and covering once per week was a means of reducing the danger of fire.

At present, it seems that the Dump is covered whenever: (a) requested by ENG-4, (b) ~~when~~ there is a slack period for Zia Roads Section. After talking to Mr. Anglin and Mr. Raper of the Zia Roads Section, I find that they point out that the more frequent the covering, the more fill dirt is used.

At present, the trash is placed into the Dump in single layers of boxes, etc., which cover about one-half of the width of the Dump. The fire hazard is reduced because the fire department's efforts to extinguish a fire in a single layer should be successful.

Therefore, I am suggesting that the routine dump covering operation should be done only after a single layer of trash is placed into the Dump - the width of the layer to be about one-half the width of the Dump.[110]

In 1956[52] collection of trash from laboratories was done in the following way. Zia janitors removed trash from lab hot-waste cans and put the trash into cardboard boxes. The boxes were then sealed and set outside the building for pickup by truck. June 27, 1957,[53] Dempster Dumpster boxes were delivered to Wings 2 and 4 of the CMR Building. "It is planned to put boxed contaminated trash in these boxes and deliver the filled boxes to the Dump."[53] (See Fig. C-2.) By the end of 1957[95] Dempster Dumpster boxes were also placed at TA-2 (Omega Site) and TA-35 (Ten Site). At the start of the third quarter of 1958[98] Dempster Dumpster boxes were put into service at nearly all Laboratory Sites where radioactive trash was picked up. All Dempster Dumpster boxes were painted on the interior and the doors marked FOR RADIOACTIVE TRASH ONLY. "A yellow band was painted around the top of the box with black wording designating the site location of the box."[97]

C-2 Fig. C-2

think correct

During the third quarter of 1957[94] a trial use of 5-ml thick plastic bags began. The bags were not placed[21] into cardboard boxes before being taken to the burial ground. Waste during this time was not covered weekly. To demonstrate differences in weathering, a cardboard box and a plastic bag containing laboratory waste were marked with the date and left exposed in the burial pit for approximately 3 months (Fig. C-3). The cardboard box weathered considerably and broke open. The plastic bag was still in tact.

C-3 Fig. C-3

The following excerpt is from the "Annual Report for 1958 on Disposal of Contaminated Solid Waste."[54]

> At the CMR-Bldg. and at Sigma Bldg. loose office and change room trash is now being packaged in plastic bags. Seven six-bushel capacity trash dollies have been purchased for this operation. Five-mill (thickness) 40" x 24" plastic bags are used as liners for the trash dollies. When these bags are filled they are sealed with masking tape and placed into the Dempster Dumpster containers. It is estimated that one plastic bag will hold more trash than four or five 13" x 13" x 24" cardboard boxes. The time spent by Zia Janitors in preparing the bags, filling and sealing them is about one-half that needed to do the same operation using cardboard boxes. It has been observed that these bags are more easily emptied at the disposal pit from the Dempster Dumpster containers than are the cardboard boxes which have a tendency to hang up inside the containers. At the disposal pit the bags also withstand the effects of weathering much better than the cardboard boxes.
>
> Prior to putting the trash dollies into use, the plastic bags used in the labs for holding contaminated trash were 2 mil thick. The bags were removed, sealed, and placed into cardboard boxes. After the trash dolly system was started, these bags are also being placed into the trash dolly and because of this it was felt that an additional safety factor would be needed so 5-mil thick bags were issued as liners for the trash cans in the laboratories.[54]

[redacted]

The 1959 Annual Report[57] states:

> Cardboard boxes located in the utility corridors of the CMR Bldg. laboratory wings are being replaced with metal cans provided with a plastic bag liner. The changeover was made in order to provide a more fireproof container for solid radioactive waste.[57]

Trucks were still in use to haul 0.2 m^3 (55-gal) sludge drums from the waste treatment plants at TA-45 and TA-21 to Area C at the end of 1958.[54] (See Fig. C-4.) In March 1959 Dempster Dumpster trucks using skip-type containers began to haul the sludge drums to the burial ground.[57] Trucks continued to be used to haul nonroutine contaminated waste to the disposal area.

C-4

Fig. C-

Early shaft disposal was described in the Annual Report for 1958 on Disposal of Contaminated Solid Waste.[54]

> At infrequent intervals, CMB-DO-GS group at Ten Site has beta-gamma active waste material that must be buried. In the past the material was taken to the Disposal Pit where a hole was dug into the ground and the material thrown into the hole and covered with dirt. In February, 1958, an order was submitted to have a dozen holes drilled measuring 2 feet in diameter and about 10 feet deep. The holes were located between Pits 4 and 5, Area C. These holes are now being used for disposal of the gamma active waste from Ten Site. Space* is available at this location for at least 30 to 50 more holes for future disposal.
>
> The technique used by CMB-DO-GS for handling this waste is briefly as follows: (1) the material to be thrown away is evaporated to dryness in a hot cell at Ten Site and then placed inside a Dural container. This container is then sealed and placed inside a steel container which is in turn sealed. (2) The steel container is then removed from the hot cell and placed into a lead transfer case which is thick enough to handle up to 40 curies of material. (3) The transfer case is po-

sitioned on the back of a 1 1/2 ton truck and fastened securely with a chain. (4) The truck is then driven to the disposal area and positioned above one of the holes. (5) A tripod with a long boom arm attached is used to transfer the material from the transport case to the hole. The steel container is pulled up out of the case by means of a string to which is attached a rope that runs through a pulley on the end of the boom. When the container is over the hole, the string is cut and a few shovels of dirt are shoveled on top of the container so as to reduce the gamma radiation at ground level to less than 1 mr/hr.[54]

*More shafts were not drilled because it was not possible to drive any further east along the border between Pits 4 and 5. (Written communication, J. Enders, H-8.)

A modification of the procedure was reported in the Annual Report for 1959 on Disposal of Solid Radioactive Waste.[57]

This year 10-Site personnel modified the equipment used for containing and shielding their waste material during transit to the disposal area. This modification included an improved container and a tuballoy cask that is provided with a trap door in the bottom that permits dropping the waste material (sealed in the canister) from the cask directly into the disposal well through a hole in the truck bed. This design improvement has permitted handling of wastes that range up to 400 curies of activity with very little personnel exposure. CMB 11 (DP West) has plans to use this equipment when possible for their waste disposal from the hot cells.[57]

Permanent markers, metal stakes with numbered tags, were placed by each shaft in 1959.[57] Deliveries to any shaft were logged.[57] In 1961

...metal covers were fabricated and installed over the 'active' disposal wells and wood covers were obtained for use on unused wells. At each corner of the wooden covers metal stakes have been located so as to prevent movement of the covers.[62]

In 1967 Solid Waste Operations personnel proposed that H-1 seal the disposal shafts.[111]

> Often it is highly desirable for radiation safety and/or security reasons (or both) to seal items placed in the shafts immediately with concrete. It is now standard practice to seal filled disposal shafts with concrete.
>
> The current procedure of obtaining Ready-Mix cement for the above operations is to (1) write a memo to ENG-4, through H-1 Group office, requesting the work to be done, (2) ENG-4, upon receiving the memo, may or may not issue a work order, apparently depending on whether ENG-4 thinks the request is necessary or not. There have been instances where the H-1 Group office has had to repeat the request and by the time the Ready-Mix finally arrives there has been a time lag of (in some cases) several months.
>
> The simple logistics of the operation are also involved in that the Ready-Mix truck, ENG-4 representative, H-1 representative all need to be at the Area at the same time--and this has also been difficult at times. In the event of an 'emergency delivery' it would be almost impossible to schedule delivery of Ready-Mix to the disposal shaft.[111]

The proposal to purchase a small cement mixer, some cement and one wheelbarrow so that H-1 could do the job themselves was accepted. (Written communication, J. Enders, H-8.)

> While burial of contaminated waste was the method of disposal, it was recognized that other ideas should be investigated. Dr. Jette decided that sea burial should be considered. A number of large steel containers were fabricated with gasketed lids and sea cocks. These were used for a period of time; however, when they were filled, the cost of transportation and fabrication of more boxes was so high that the idea was dropped and the full boxes were placed in pits in Area C.[108]

In 1961[62] six Standard Operating Procedures were prepared on waste disposal operations. Three additional S.O.P.'s were written to cover nonroutine disposal operations.

Center, All caps

Studies and Monitoring

There are reports of five fires at Area C. The first took place at 8:35 a.m., November 7, 1950.[187]

> An air sample was taken with the hand air sampler. Its negative results were reported to headquarters. There was no detectable beta or gamma in the pit or at its edge so two firemen, in full protective clothing and respirators, entered the area with hoses from the tank truck which had just arrived. While steam was rising from the fire, a second air sample was taken in the steam and smoke cloud. It too was found to be negative. The fire was brought under control using two tank trucks full of water.[187]

The second fire was reported June 5, 1952 (written communication, J. Enders, H-8). LA Notebook 4664, p. 70, records: "When boxes were being unloaded, one box caught fire and was immediately put out by T. Gomez."

The third fire occurred at 4:25 pm, March 24, 1953.[188] The burial ground had been checked at approximately 3:00 pm when the crew left after the last delivery. Later, smoke was seen coming from the burial ground.

> Upon arriving at the dump we [C. D. Blackwell and J. Oakes] discovered a fire that had burned itself out with the exception of several barrels of paraffin which were boiling and burning to a small extent... . Two 5-gallon cans of foam were used to completely blanket the fire, and it was completely out by 5:25 pm. The wind was from the west and brisk, so that smoke was carried east and traveled a path between

> Ten Site and Beta Site... The dry box from the Omega Fast Reactor, which had been placed in the dump on March 23, 1953, had been completely burned, leaving only the steel frame. The dump had last been covered on March 20, 1953, so that the results of only 2-days hauling were exposed to the fire. No one could determine the cause of the fire, but it was generally believed to have been caused by chemicals being accidentally placed in the boxes with some of the trash. A survey was made around the dump on the morning of March 25, 1953, to check for possible contamination from the smoke. The area east of the pit and parts of the canyon from Beta Site to Ten Site ~~was~~ were checked, but no trace of contamination could be found. Any contamination that may have gotten into the air was well diluted and carried away rather than being deposited in the vicinity.[188]

The fourth fire was reported April 22, 1953 (written communication, J. Enders, ~~H-7~~ 1974 ~~H-8~~). LA Notebook 4644, p. 148, records: "One box from Sigma Building was smoking while being thrown into dump. Was put out with fire extinguisher."

The fifth fire took place November 28, 1958, in Pit 6.[~~189~~]

> Two boxes were found burning during a covering operation. It is suspected a volatile, flammable chemical was involved, as near the boxes...a flask [was found] that possibly had been used to hold acetone.[189]

The USGS did an infiltration study north of Pecos Drive near Area C (personal communication, W. Purtymun, 1974 ~~H-8~~). Two[61] infiltration pits, Pit A and Pit B, 0.6 m (2 ft) in diam by 0.3 m (1 ft) deep were constructed during September 1956.[190]

The 1958 study, which seems to have been conducted September through October, used Pit A. Pit A had three access tubes spaced 0.6 m (2 ft) apart with access tube No. 2 centered in the pit.[51] "Cores for natural moisture-content determination were collected at the site on October 10, 1958."[51] Water supply was intermittent during the 1958 study.[51] It was difficult to determine precisely how the 1958 study was conducted from the USGS report[51] of it. Data are shown in Fig. C-5.

C-5

The 1959-1960 study, September 21, 1959 through September 2, 1960,[190] used Pit B.[51]

> The high moisture content beneath the pit before infiltration started was due in part to heavy rains in August, 1959, and the relatively poor drainage in the sandy surface soil.[51] [See Fig. C-6.] — brackets
>
> The soil is similar to that on Frijoles Mesa; it is about 6 feet thick and is underlain by welded tuff. The area is moderately well drained. A testhole 20 feet deep was drilled in the center of the infiltration pit and a 2-inch plastic pipe was installed so that it projected about 1 foot above the pit. Soil and tuff were packed around the casing to prevent seepage down alongside the casing. Moisture measurements were made prior to application of water. Water was introduced into the pit and a constant head maintained at three-quarters of a foot for 99 days. — brackets
>
> The wetted front [Fig. C-6] moved to a depth of about 4 1/2 feet during the first 2 days of infiltration and to a depth of about 6 1/2 feet during the next 97 days, but water did not move through the transition zone into the tuff, except in the lower moisture range. The moisture content decreased with depth from a maximum of about 38 percent in B zone of the soil to less than 4 percent within a foot of the surface of the tuff.
>
> Water apparently was perched on the C zone of the soil and the moisture con-

C-6

f. C-5

f. C-6

tent within the B zone approached saturation. After the first several days of infiltration, most movement of water probably was lateral, as indicated by measurements in a series of holes around another infiltration pit [Pit A] nearby. Some water undoubtedly was lost by evaporation and transpiration.

Although the quantity of water used during the study was equivalent to almost 50 years of precipitation on the Pajarito Plateau, the moisture content in the A and B zones had returned to nearly normal after 8 months of drainage; the moisture content in the C zone and top 2 feet of tuff was slightly higher than before the experiment, and the moisture content of tuff between 8 and 20 feet was unchanged. However, conditions during this study cannot be considered normal because the clogging or silting of pores probably was greatly accelerated when this volume of water moved into the soil within a period of 99 days without the normal seasonal distribution which involves alternate percolation and drainage.[190]

The 1960-1961 study,[51] September 2, 1960 through October 2, 1961, used Pit B. No water infiltrated the pit other than precipitation.

The May 19, 1961, measurements were high because of snowmelt, and the October 2, 1961 measurements were low because of low precipitation. [See Fig. C-6.]

The fact that water did not penetrate the dense transition zone between the soil and tuff during the study [1959-60] or in the following year [the 1960-61 study] indicates that the soil cover will impede vertical movement into the underlying tuff. Capillary rise, evaporation, and transpiration were perhaps the principal reasons that the water did not penetrate the underlying tuff, rather than the low permeability of the transition zone.[51]

In 1962[92] the question of 18.3-m (60-ft) deep shafts at Area C was considered.

There is no serious objection to the burial of radioactive waste in holes 60 feet deep at Area C, although several precautions should be taken. They are: (1) Solid wastes should be packaged for normal underground burial; (2) Liquids and sludges should be contained so no leakage occurs; (3) The soil zone on the mesa should be disturbed as little as possible near present and future waste disposal areas. After the holes are filled, the surface should be sealed with 2 to 3 feet of packed clayey soil; (4) Adequate erosion and drainage maintenance should be provided; (5) The holes should be drilled at least 100 ~~feet from the edge of the mesa at Area C. The principal concern is to prevent~~

feet from the edge of the mesa at Area C. The principal concern is to prevent water from carrying the radioactive materials to the underlying bodies of ground water.[92]

A fluid dynamics study was reported in progress in 1966.[29] The study was conducted across Ten-Site Canyon from Area C. The study area was approximately 137.2 m (450 ft) north of the east end of Pit 5. Eight holes were augered to study the behavior of gas injected into the rock; and 12 holes were augered to study the behavior of liquid injected into the rock (see Fig. C-7 and Tables C-II and C-III).

C-7

TC-II, III

April 29, 1971,[109] the results of test drilling and penetration tests in the west end of Area C were reported. The purpose of the tests was to help establish the location for the meteorological tower (see Figs. C-8, C-9, and C-10). ~~All cuttings~~ were monitored.

C-8, C-9, C-10

~~No radioactive contamination was detected.~~ Tests at the 120 SW guy indicated that the location is underlain by a disposal pit, probably the chemical pit. No holes were drilled of the 240 N guy, the 120 N guy or the 120 SE guy.[109]

TABLE C-2

Site 1, TA-52, Air-injection Test Holes

USGS Hole Designation	USGS Location	AEC-LASL Designation (structure number)	AEC-LASL Coordinates	Drilling Date	Altitude of land surface (ft above mean sea level)	Diameter (in.)	Depth (ft)	Type of Drilling
I	19.6.22.441a	TA-52-25	N. 24 + 08 E.124 + 57	Dec 1964	7168.8	5	97	Auger
NW-1	19.6.22.441b	TA-52-24	N. 24 + 10 E.124 + 53	Dec 1964	7169.1	5	97	Do.
SE-1	19.6.22.441c	TA-52-26	N. 23 + 90 E.124 + 66	Dec 1964	7167.4	5	97	Do.
NE-1	19.6.22.441d	TA-52-23	N. 24 + 15 E.124 + 67	Dec 1964	7169.2	5	97	Do.
NE-2	19.6.22.441e	TA-52-22	N. 24 + 53 E.124 + 69	Oct 1965	7171.5	4	295	Rotary-air

Note: Holes I, NE-1, SE-1 and NW-1 have steel casing 6-inches in diameter cemented into top of tuff, near surface.

John, Enyart, and Purtymun, 1966[29]

TABLE C-3

Site 1, TA-50 Air Injection Test Holes

Location

USGS Hole Designation	USGS Location Number	AEC-LASL Designation (structure number)	AEC-LASL Coordinates	Drilling Date	Altitude of land Surface (ft above mean sea level)
E-1	19.6.22.321a	TA-50-29	N. 34 + 08 E. 99 + 89	Nov 1964	7240.4
N-1	19.6.22.321b	TA-50-25	N. 34 + 16 E. 99 + 62	Nov 1964	7241.8
W-1	19.6.22.321c	TA-50-27	N. 34 + 08 E. 99 + 48	Nov 1964	7241.7
W-2	19.6.22.321d	TA-50-26	N. 34 + 05 E. 99 + 22	Nov 1964	7241.7
I	19.6.22.321e	TA-50-28	N. 34 + 07 E. 99 + 64	Nov 1964	7241.6
S-1	19.6.22.321f	TA-50-30	N. 33 + 86 E. 99 + 65	Nov 1964	7239.7
S-2	19.6.22.321g	TA-50-31	N. 32 + 89 E. 99 + 81	Nov 1964	7231.6
S-3	19.6.22.321h	TA-50-32	N. 31 + 63 E. 99 + 77	Nov 1964	7218.3

John, Enyart, and Purtymun, 1966[29]

TABLE C-3 (continued)

Site 1, TA-50, Air Injection Test Holes (continued)

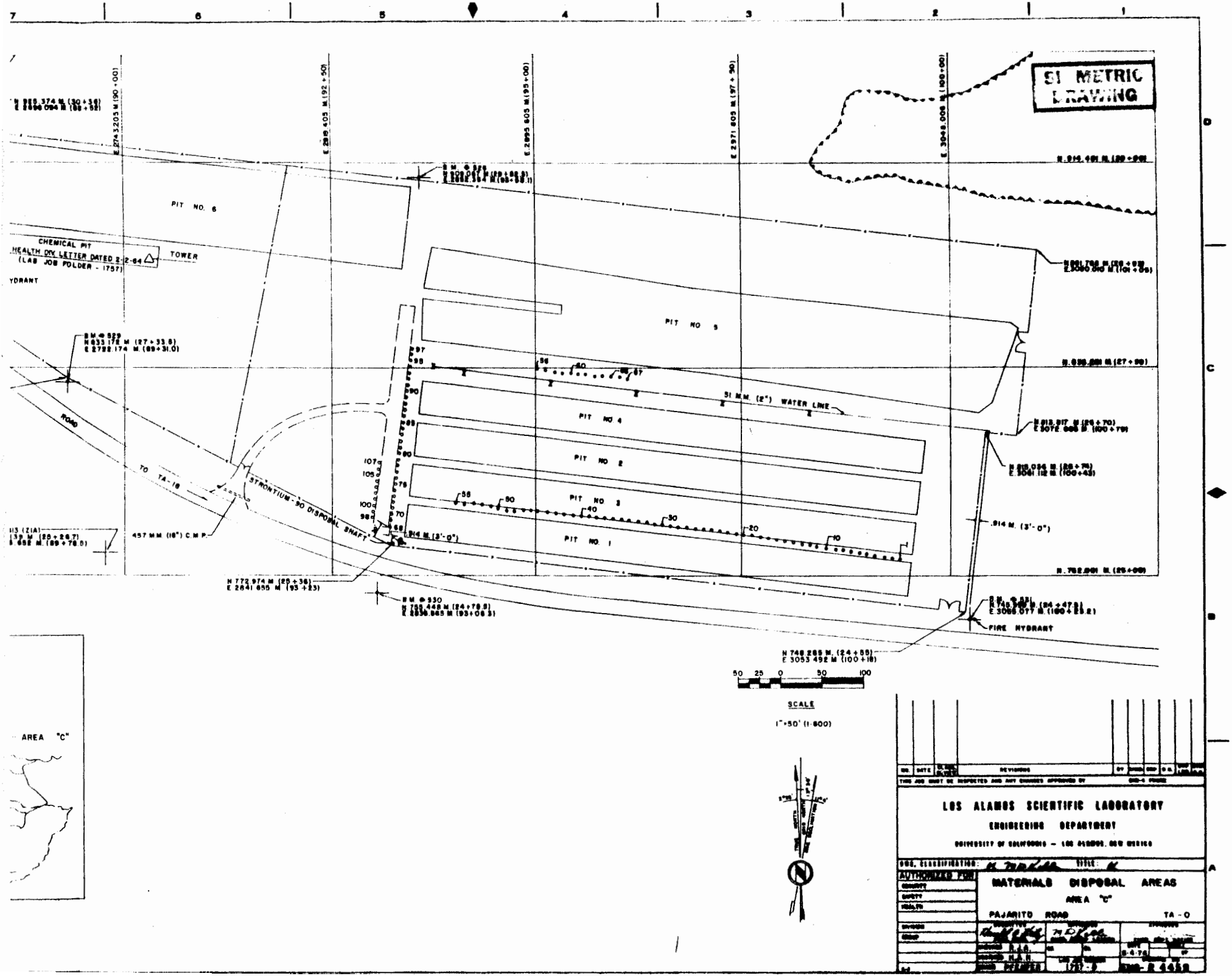
Construction

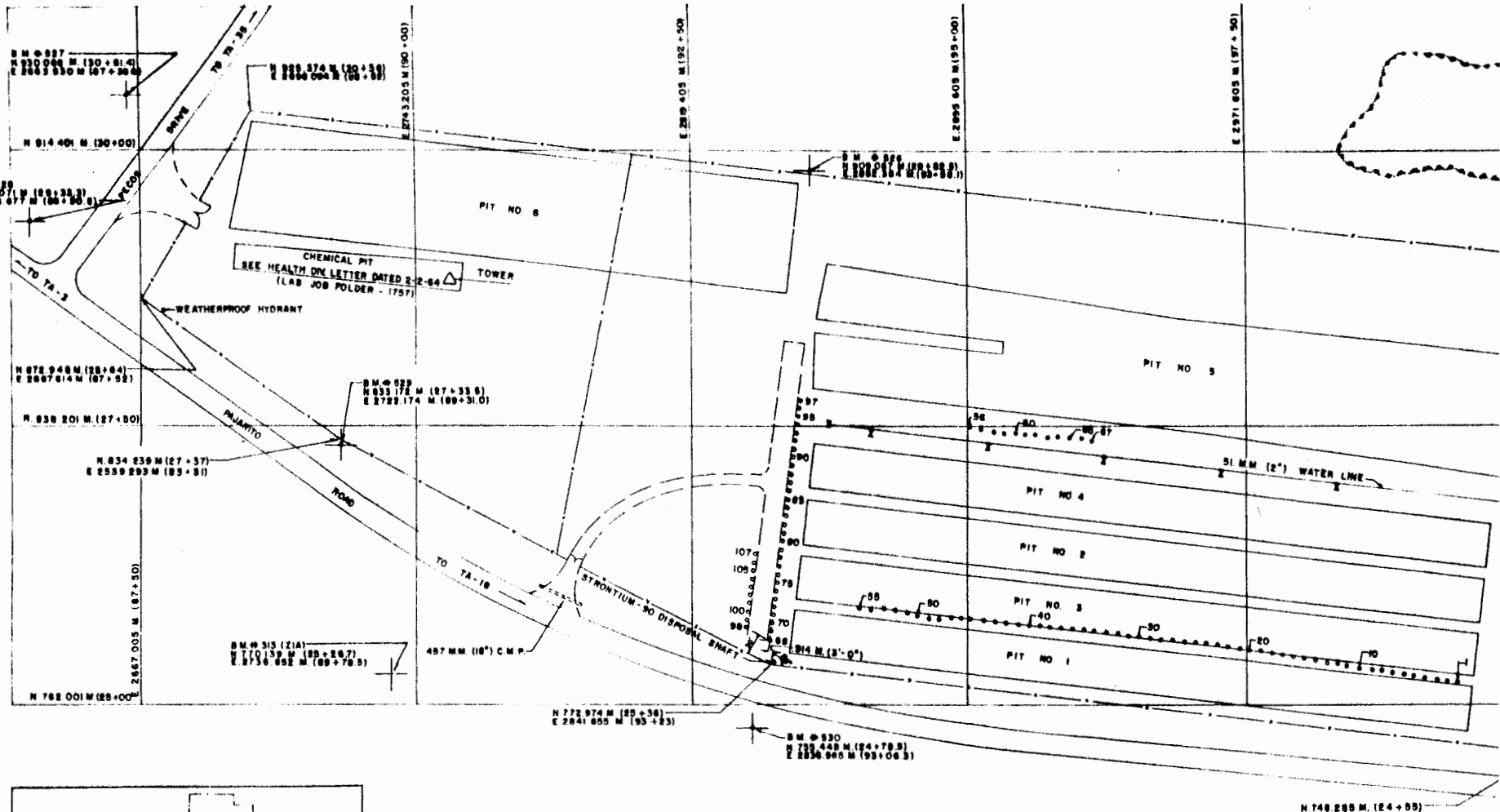
USGS Hole Designation	Diameter (in.)	Depth (ft.)	Depth Injection Zone No. 1	Depth Injection Zone No. 2	Depth Injection Zone No. 3	Depth Injection Zone No. 4	Type of Drilling	Remarks
E-1	3	86	3- 8	37- 43	69-74	81-86	Rotary-air	Monitoring tubes
N-1	5	94	3- 6	25- 30	54-60	86-94	Auger	Injection and monitoring tubes
W-1	3	91	3- 8	39- 44	69-74	86-91	Rotary-air	Monitoring tubes
W-2	3	114	3- 8	109-114	-	-	do.	do.
I	5	60	3- 8	25- 30	55-60	-	Auger	Injection and monitoring tubes
S-1	5	90	3- 8	24- 29	50-55	83-90	do.	do.
S-2	5	56	49-56	-	-	-	do.	Water injection test
S-3	5	43	-	-	-	-	do.	Open hole

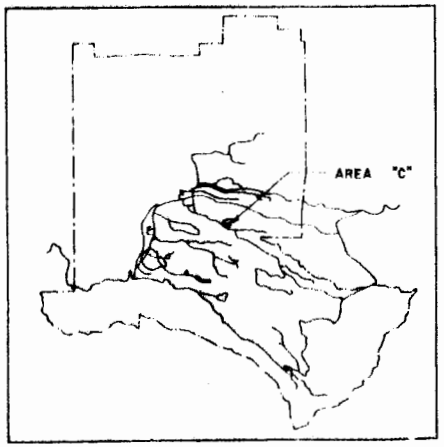
Note: Injection zone consists of 3/8" diameter gravel. Monitoring tube is 1/2 inch plastic tubing perforated about 1 foot from bottom. Injection tube is 3/4" plastic tubing perforated about 3 feet from bottom. Perforations in each tube are separated from those in the other tube by lead plate. Tubes are cemented into the gravel-pack intervals.

The Ecology Section of the Environmental Monitoring Studies Group is studying honeybees as a potential environmental contaminant indicator organism.[281] as Honeybees ~~do~~ accumulate tritium from the environment.[281] November 1, 1973, vegetation surrounding TA-35 (north and east of Area C) and in Area C was sampled and analyzed for tritium.[282]

> Maximum concentrations (pCi ^{3}H/m/plant moisture) surrounding 10-Site [TA-35] measured about 250 pCi/ml for 10 sampling locations. Maximum concentrations in Area C vegetation measured about 185 500 pCi ^{3}H/ml for eight sampling locations. The ^{3}H concentration in Mortandad Canyon [the major canyon north of Area C] bees on this date measured 2630 pCi/ml. While 10-Site vegetation did not contain sufficient concentrations to account for levels in bees, Area C vegetation did. It seems evident that some of the ^{3}H buried in Area C is available to vegetation and hence honeybees.[282]


SI METRIC DRAWING
PIT NO. 6
CHEMICAL PIT
HEALTH DIV LETTER DATED 2-2-64
(LAB JOB FOLDER - 1757)
TOWER
YDRANT
PIT NO 5
PIT NO 4
PIT NO 2
PIT NO 3
PIT NO 1
51 M.M. (2") WATER LINE
ROAD TO TA-18
STRONTIUM-90 DISPOSAL SHAFT
457 MM (18") C.M.P.
.914 M. (3'-0")
FIRE HYDRANT
N 772 974 M (25+36)
E 2841 855 M (93+23)
N 748 265 M. (24+55)
E 3053 492 M (100+18)
50 25 0 50 100
SCALE
1"=50' (1:600)
AREA "C"
LOS ALAMOS SCIENTIFIC LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA – LOS ALAMOS, NEW MEXICO
MATERIALS DISPOSAL AREAS
AREA "C"
PAJARITO ROAD
TA - 0
8-4-76
R 445a





LOCATION PLAN

Profile I
September 1958

○ Moisture content from core sample collected before infiltration tests

⌒ Moisture content before infiltration tests

■ or □ Hole 1

● or ○ Hole 2

▲ or △ Hole 3

Solid symbols indicate conditions after 14 days of drainage

Open symbols indicate conditions after 6 hours of infiltration after 14 days of drainage

Profile II
October 1958

■ or □ Hole 1

● or ○ Hole 2

▲ or △ Hole 3

Solid symbols indicate conditions after 19 days of drainage

Open symbols indicate conditions after 23 days of infiltration after 19 days of drainage

Profile III
September 1958

Moisture content ~~of tuff~~ after 14 days of drainage

Moisture content ~~of tuff~~ after 6 hours of infiltration following 14 days of drainage

Moisture content ~~of tuff~~ after 19 days of drainage following 6 hours of infiltration

Moisture content ~~of tuff~~ after 1 day of infiltration following 19 days of drainage

Moisture content ~~of tuff~~ after 3 days of infiltration following 19 days of drainage.

Moisture content ~~of tuff~~ after 23 days of infiltration following 19 days of drainage

Note: All measurements made in hole 1

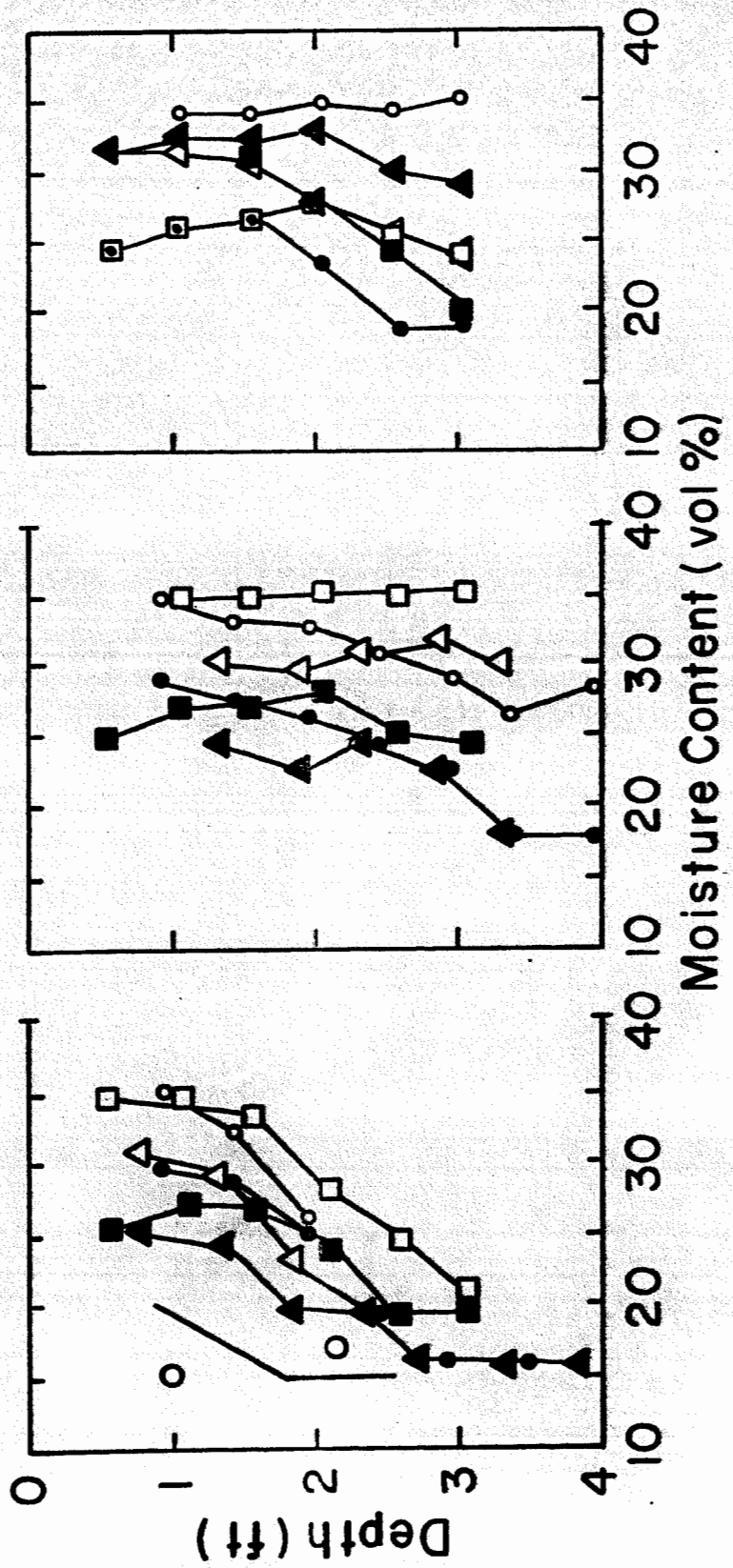
C-5

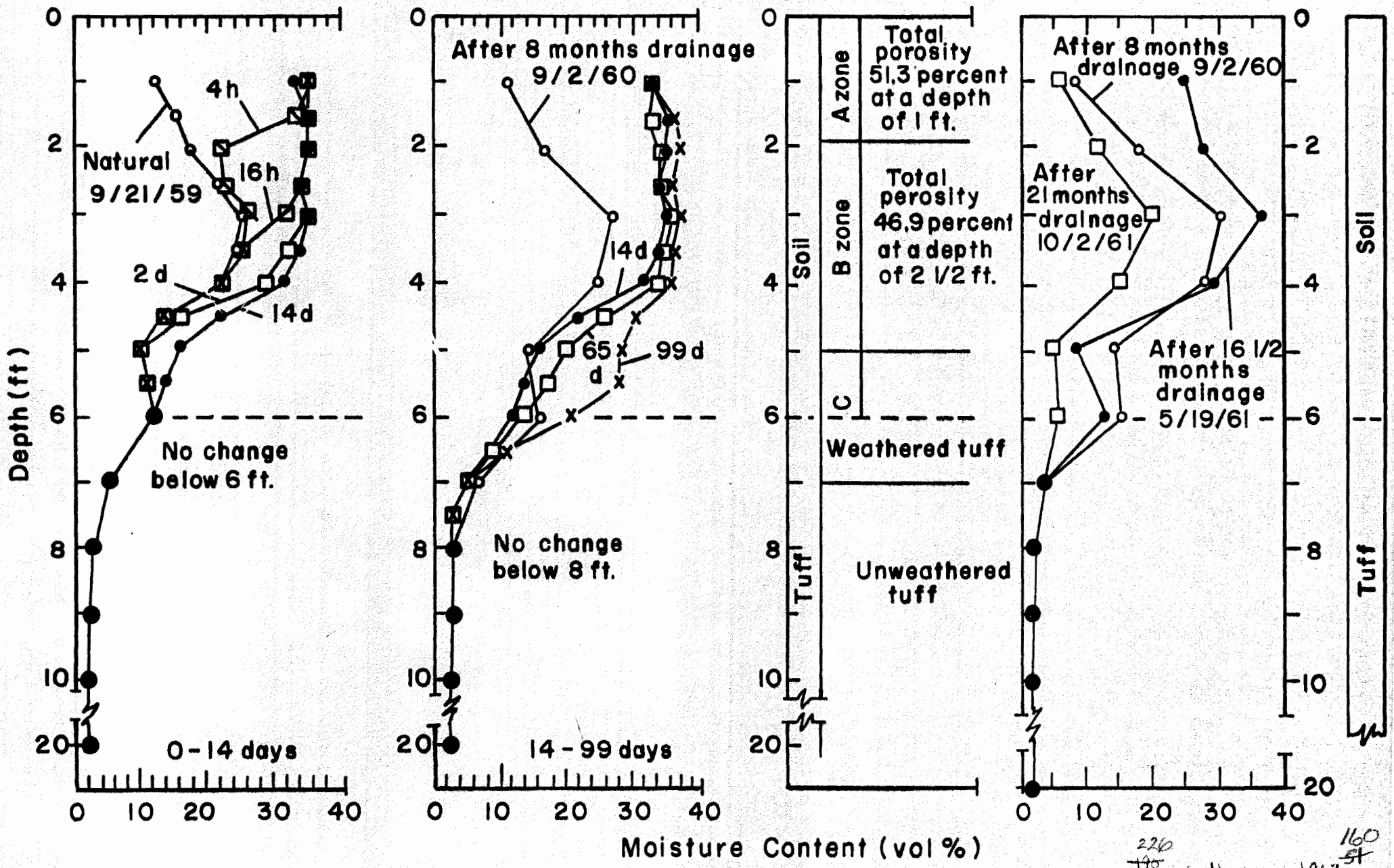
Figure ~~12-A~~ B-. Moisture content beneath infiltration pit A ~~at Site 4~~ [near Area C] during intermittent infiltration and drainage, 1958.

~~[Area C]~~

Abrahams, 1963 51

← Drawing goes up here →



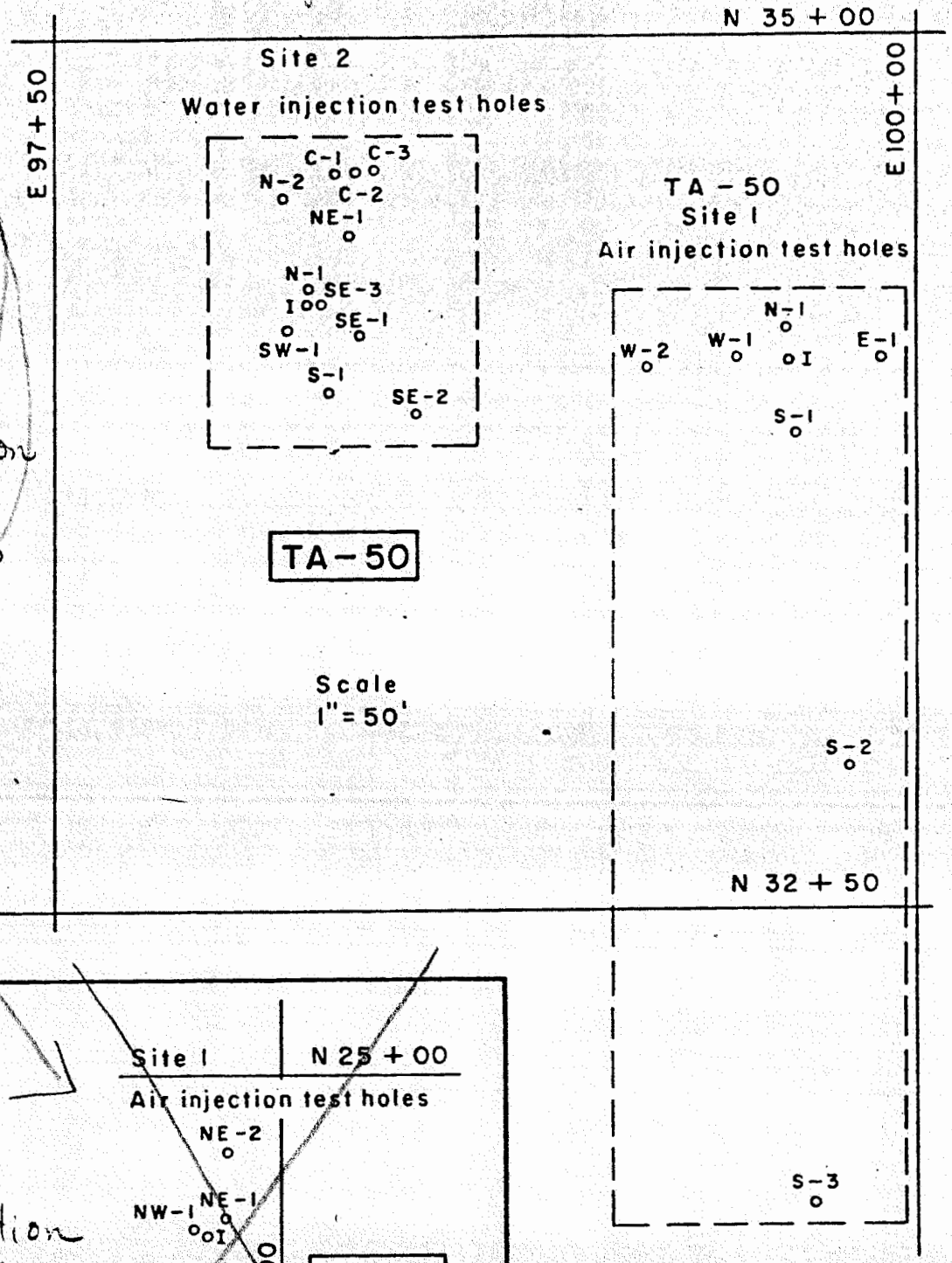


modified from Abrahams, Weir and Portymun, 1961 and Abrahams, 1963

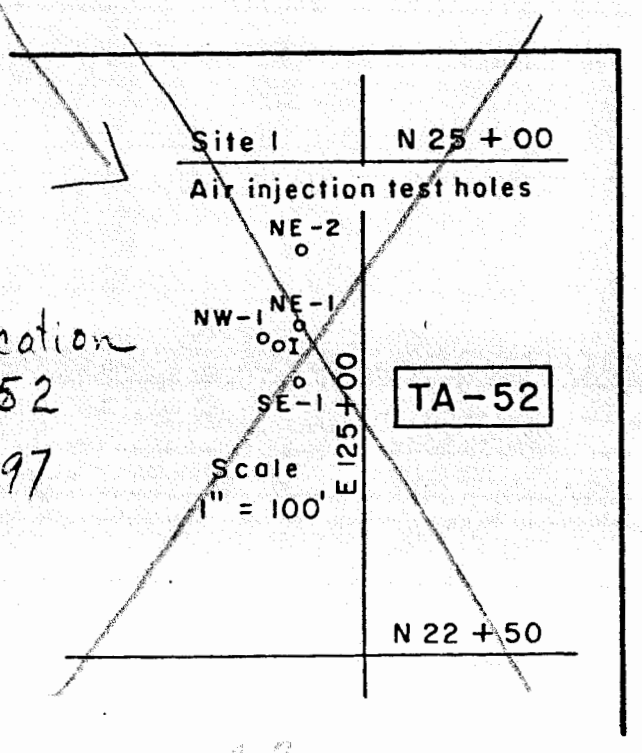
A-6

Area C
Use as is.

Note:
TA 50 test holes shown on Structure Location Plan TA-50, ENG-R-2493

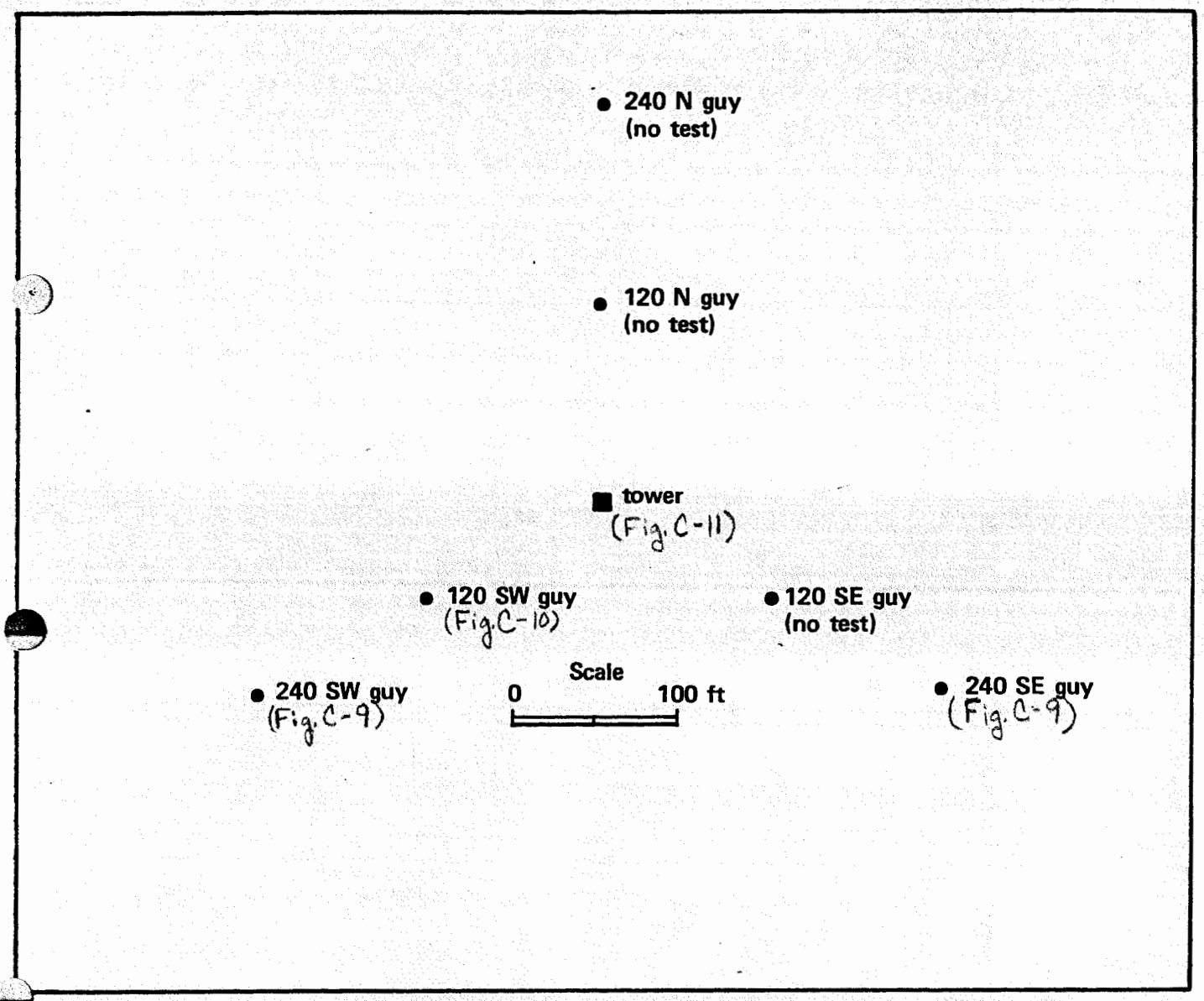


TA 52 test holes shown on Structure Location Plan TA-52 ENG-R 2497



John, Enyart, and Portymun, 1966

Figure 9.--Location of test holes at site 1 and 2, north of Area C TA-50 ~~and site 1, TA-52.~~



Layout of guy and tower at Area "C"

Fig. C-8

Purtymun, 1971

No. no-shored possibly go between 7 & 8

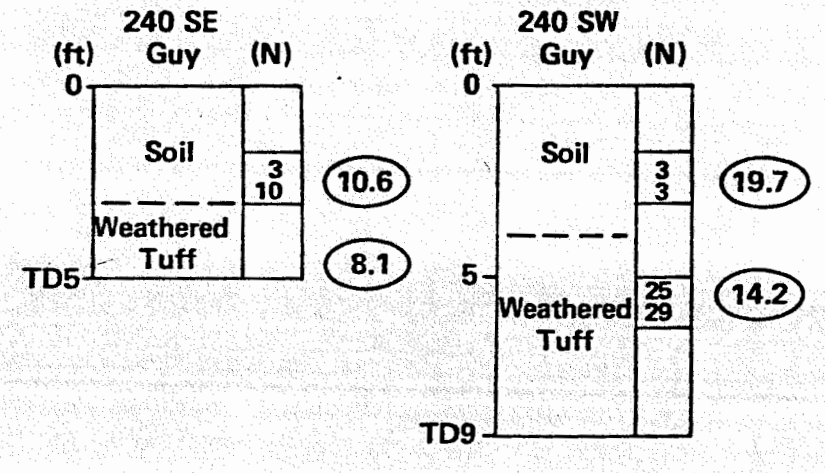
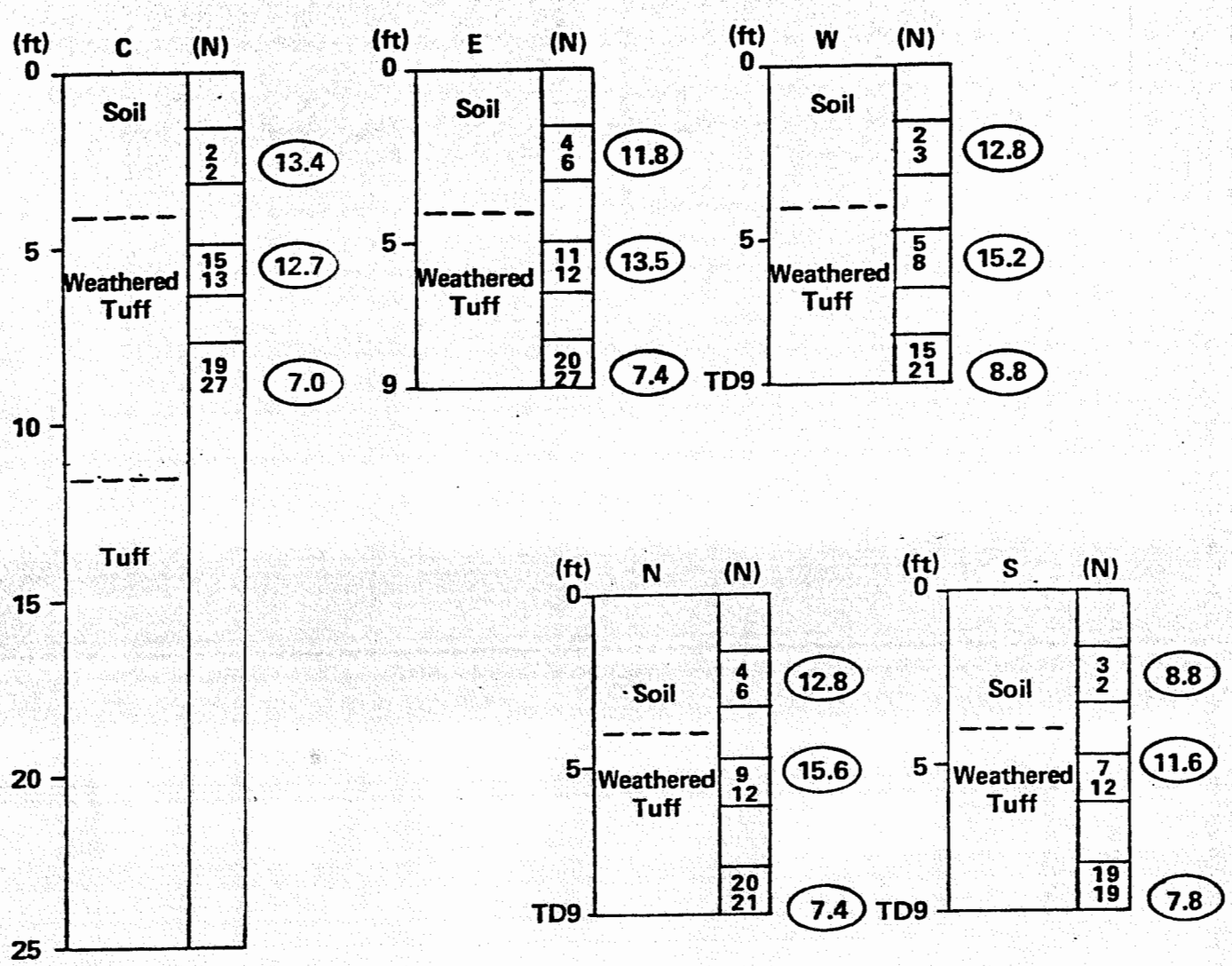


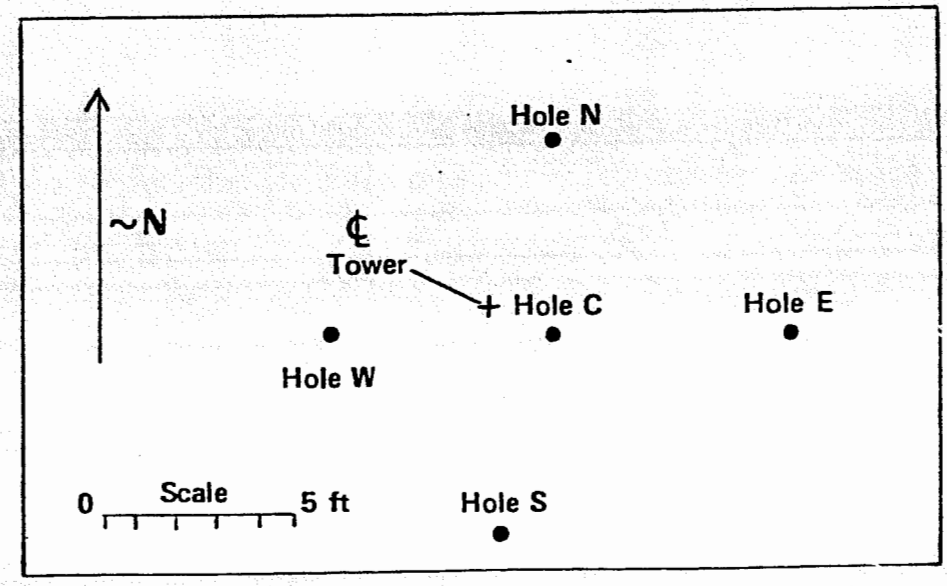
Fig. C-~~8~~ 9

Purtymun, 1971 ~~104~~ 227

Title: Geologic logs including penetration tests and moisture content of soil and tuff at 240 SE Guy and 240 SW Guy of meteorological tower in Area C.

Title: Geologic logs including penetration tests and moisture content of soil and tuff at meteorological tower base in Area C





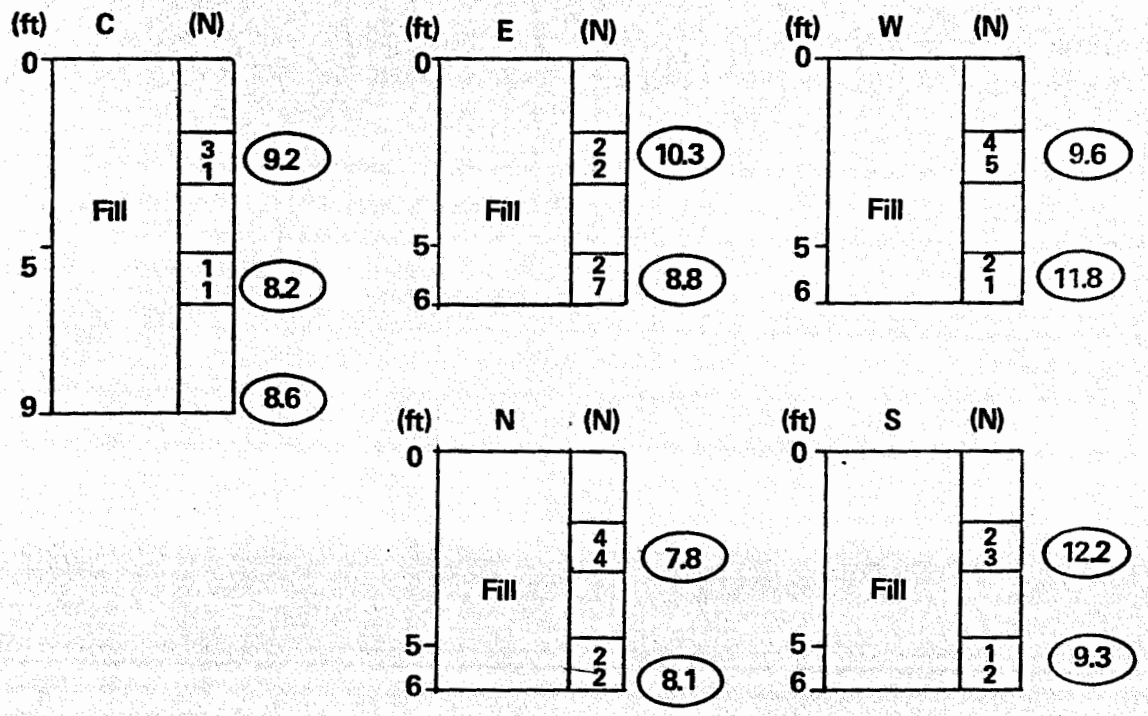
Planview of Hole at Tower Base

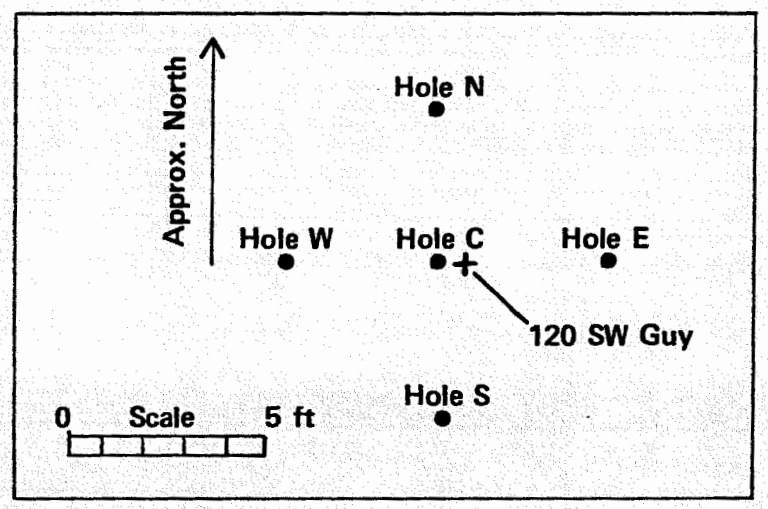
Fig. C-9 11

Portymun, 1971

227
~~109~~

Title: Geologic logs including penetration tests and moisture content of fill at 120 SW Guy of meteorological tower in Area C





Planview of Holes at 120 SW Guy

Portymuns, 1971

227
~~109~~

Fig. C-10

all caps centered

AREA D

General Information

Area D is located at TA-33, 2.9 km (1.8 miles) east of the guard station (Fig. D-1). By the LASL coordinate system it is located between coordinates S.287+50 and S.282+50, and E.310+00 and E.305+00. The location by township and range is SW 1/4 20, T. 18 N., R. 7 E.[8]

Two underground chambers have been designated as Area D. ENG-3 memo[33] dated May 23, 1967, states that Area D is two open areas 6.1 by 9.1 m (20 by 30 ft).

Barb — No you have not lost your mind about capitalizing the first letter of the second word in the names of geologic units. We have changed once. Sorry! J.

Geology and Hydrology

Area D is located on top of a mesa formed by Ancho Canyon and White Rock Canyon of the Rio Grande. (See Fig D-2) The surface appears flat and is underlain by the Tshirege member of the Bandelier tuff. The soil cover is thin. The site is approximately 304.8 m (1000 ft) above the Rio Grande and about 243.8 m (800 ft) above the bottom of Ancho Canyon.

CHAMBER DESCRIPTIONS

Background

Underground Chamber 1 is HP-4; underground Chamber 2 is HP-6. An experiment had been detonated in HP-4 before July 22, 1948.[191] Excavation of HP-6 began August 25, 1948, and was completed September 5, 1948.[192] The experiment in chamber 2 was detonated at 9:00 pm, December 23, 1948.[193]

Type of Waste

According to a 1963 USGS report,[8] the Area D underground chambers were contaminated with explosives containing ^{238}U.

Health Physics, H-1, considers the chambers to have been contaminated by polonium and perhaps a trace amount of uranium. (Personal communication, C. Blackwell, ~~H41~~ 1974.) A trace amount of ^{60}Co from a fired projectile may be present at the site. (Personal communication, D. D. Meyer, ~~H-14~~ 1974)

Mode of Disposal

The HP-6 shaft was 1.8 m x 2.4 m (6 ft x 8 ft) with a depth of 14.0 m (46 ft).[194] It was completely shored with 5.1-cm x 30.5-cm (2-in. x 12-in.) timbers.[194] The octagon-shaped chamber, 4.3 m (14 ft) wide with a 3.7-m (12-ft) ceiling, is concrete reinforced with steel and extends southeast from the bottom of the shaft.[194] The door of the chamber

[redacted]

> ...was made of steel plate and wood filled. The edges of the door were wedgeshaped, so that the more pressure applied on the door from within, the tighter the door would be closed. The door was secured by a steel latch 3/8" thick and 3" - 4" wide, operated by a handle on the outside of the door.[194]

HP-4 was probably very similar in construction to HP-6.

No equipment in HP-6, except half of the hemisphere which had a count of approximately a million centimeters, was brought to the surface because of the high level of contamination.[194]

^{238}Pu STORAGE FACILITY

SLIDE #

Trench A, Area G:

LAPL CN 74679	3-74	Looking S, augering holes at S end of trench.	J. Enders
LAPL CN 74680	"	Zia augering holes	"
LAPL CN 74681	"	S end, augering holes for casks	"
LAPL CN 74682	"	Same as above.	"
LAPL CN 741075	"	View of W side of wall, caliche and soil horizon shown.	"
LAPL CN 741074	"	Closeup view of 2' deep, 3' diam holes drilled in bottom of trench.	"
LAPL CN 741073	"	View looking N. Drilled holes show staggered arrangement for casks (to be set into holes). Caving of holes primarily due to joints in the tuff.	"
LAPL CN 741079	"	Zia laborers & rigger placing lid on concrete cask.	"
		Zia riggers loading casks with 30-gal. drums (C. O. Martinez, H-8)	"
LAPL CN 741077	"	" " " " " "	
		(C. O. Martinez recording drum #'s)	"
LAPL CN 741078	"	30-gal. drum being lowered into cask. Casks sealed with plactic cement.	"

Filter Queen Samples for 1 h 9 min	During Shot	After Shot
#1 West side 40 ft from shaft	730 c/m	.0936 c/m/l
#2 East side 40 ft from shaft	460 c/m	.0590 c/m/l
#3 South side 40 ft from shaft	95 c/m	.0122 c/m/l
#4 Personnel area 1000 ft from shaft (1 h 2 min)	10 c/m	.0014 c/m/l[194]

MA - Is this table a quote or quote reference

A polonium analysis of soil samples was reported November 15, 1952.[195] Seven samples from Area D were analyzed. Sample A - 50,000 c/m/25 g; Sample B - no polonium; Sample C - 150 c/m/25 g; Sample D - 25 c/m/25 g; Sample E - 5 c/m/25 g; Sample F - 5 c/m/25 g; Sample G - no polonium. These samples may have been centered over Chamber 2 (see Fig. D-~~2~~3 for sample location).

Protection Rel 195

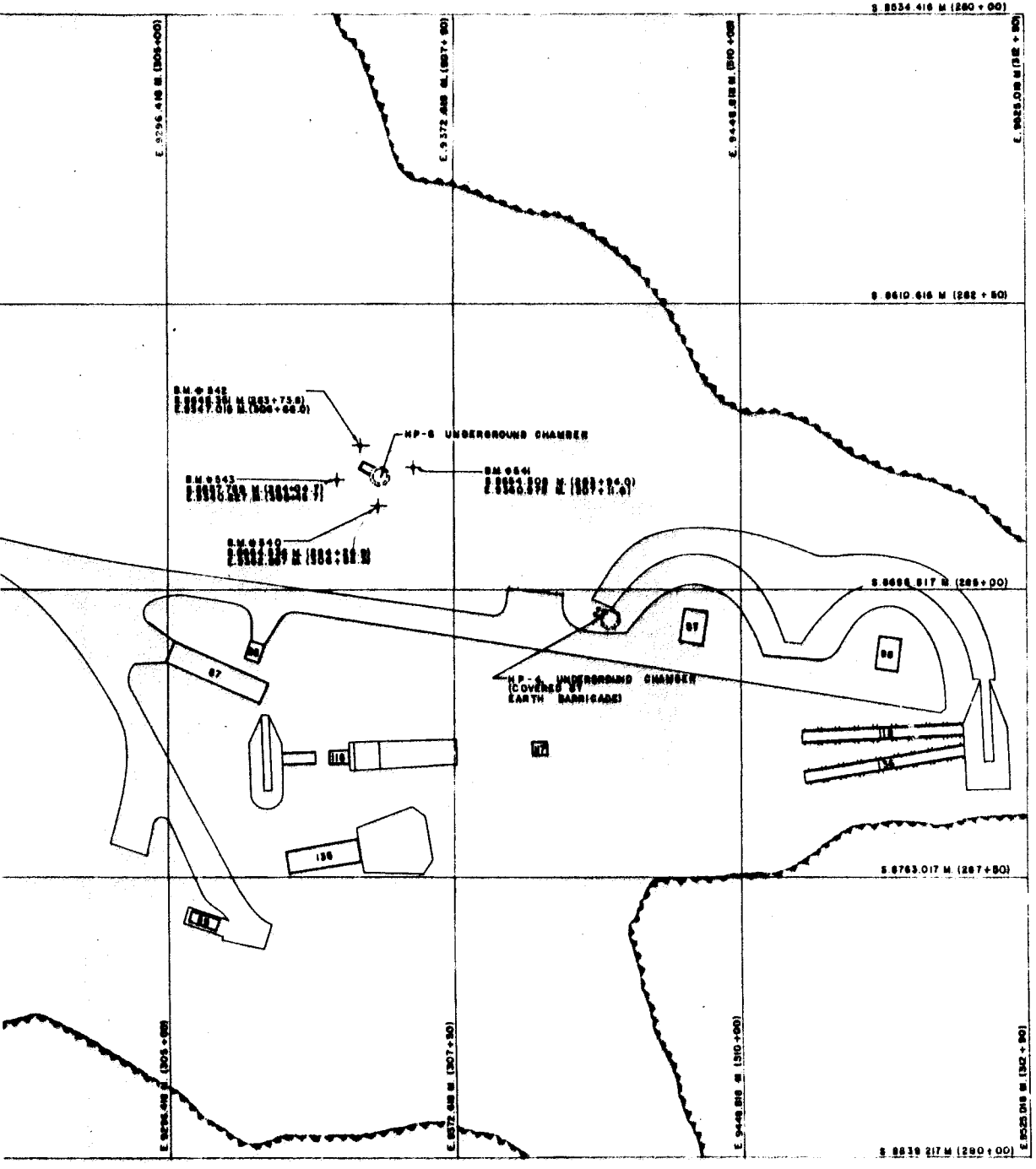
MA - need ref. somewhere where for Fig D-2.

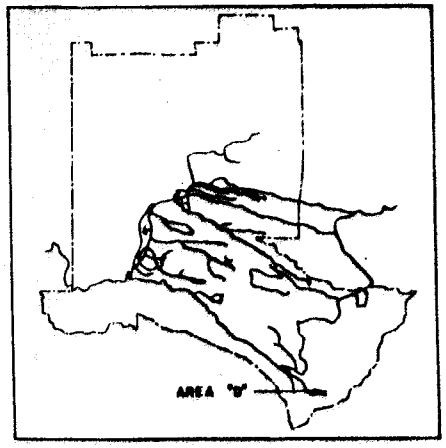
On August 24, 1953, a contamination survey was made within the fenced-in area of underground Chamber #2 at Hot Point at TA-33. This survey was made to establish the alpha contamination level within the area and results were to be used as a guide in determining the safety precautions to be used in clearing the area of debris, removing existing mounds of dirt, and filling the open pits so that the area could be made level for building purposes.

VII (Analysis of soil samples 24-M)

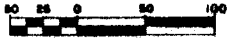
The surface of the ground showed no detectable alpha contamination, but some of the timbers in the area gave counts ranging up to 500 c/m. Some dirt was removed around the large open pit and soil at a depth of 2 ft gave a reading of 500 c/m.

The crater of underground Chamber #2 appears to be large enough to hold all the contaminated dirt and all mounds of dirt found to be contaminated could be pushed directly into the crater. Then a layer of dirt ~~from~~ free from contamination could be used to leave all exposed surfaces without detectable counts.[104]





LOCATION PLAN



SCALE

(1" = 50' (1:600))

NO.	DATE	REVISED BY	REVISIONS	BY	CHKD	ENG	R.E.	MGR	R.E.

THIS DWG MUST BE INSPECTED AND ANY CHANGES APPROVED BY ENG-4 PRIOR

LOS ALAMOS SCIENTIFIC LABORATORY

ENGINEERING DEPARTMENT

UNIVERSITY OF CALIFORNIA – LOS ALAMOS, NEW MEXICO

DOE, CLASSIFICATION: U TITLE: U

AUTHORIZED FOR:

GEOLOGY

SAFETY

HEALTH

ENGINEER

DRAFT

MATERIALS DISPOSAL AREAS

AREA "B"

HP SITE

TA - 53

DRAWN R.L.S.

REVIEWED H.A.H.

DRAWN PFEUFER

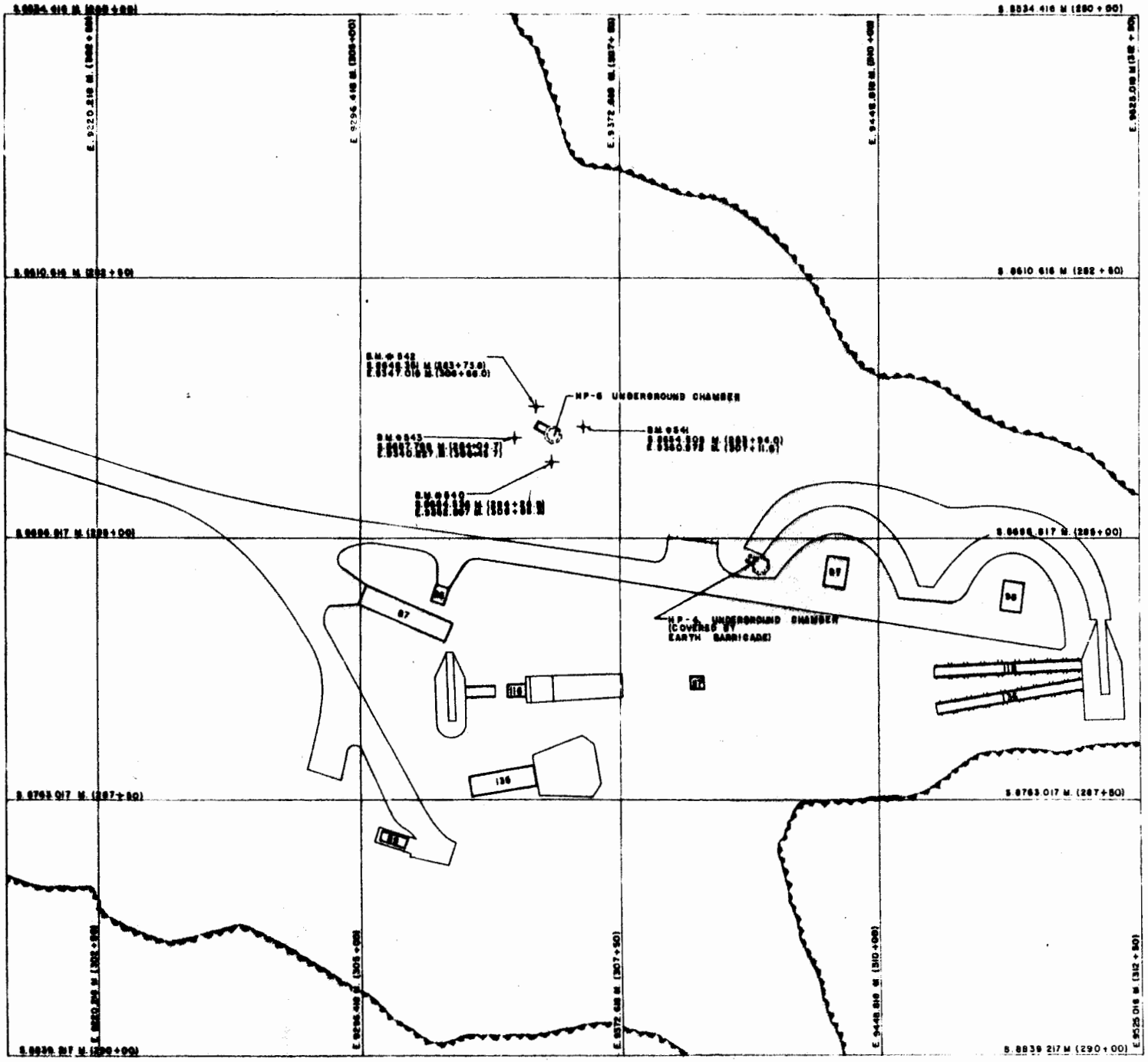
DATE 6-4-74

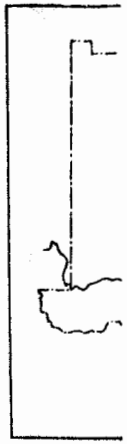
SCALE

SHEET OF

ENG- R 4460

Fig D-1





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AUTHORIZED FOR
SECURITY
SAFETY
HEALTH

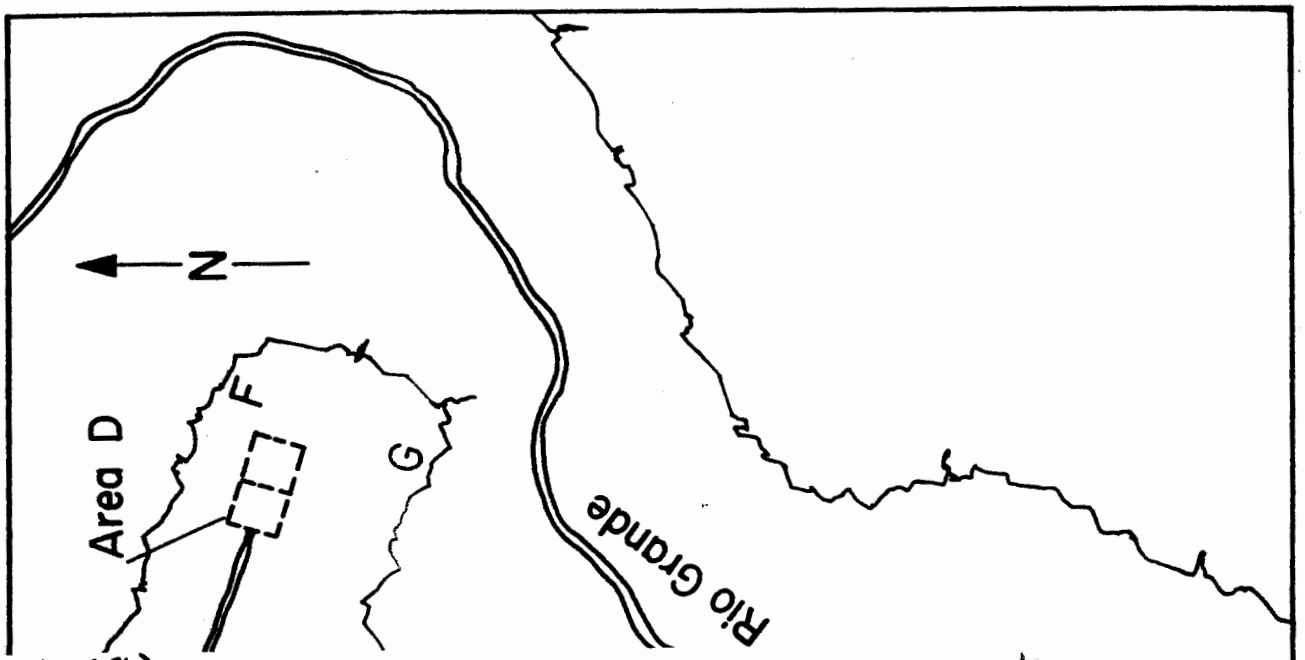


Fig. D-3 (9-14-76)

Po analysis of soil samples from different locations at ~~of the~~ TA-33 area,

D

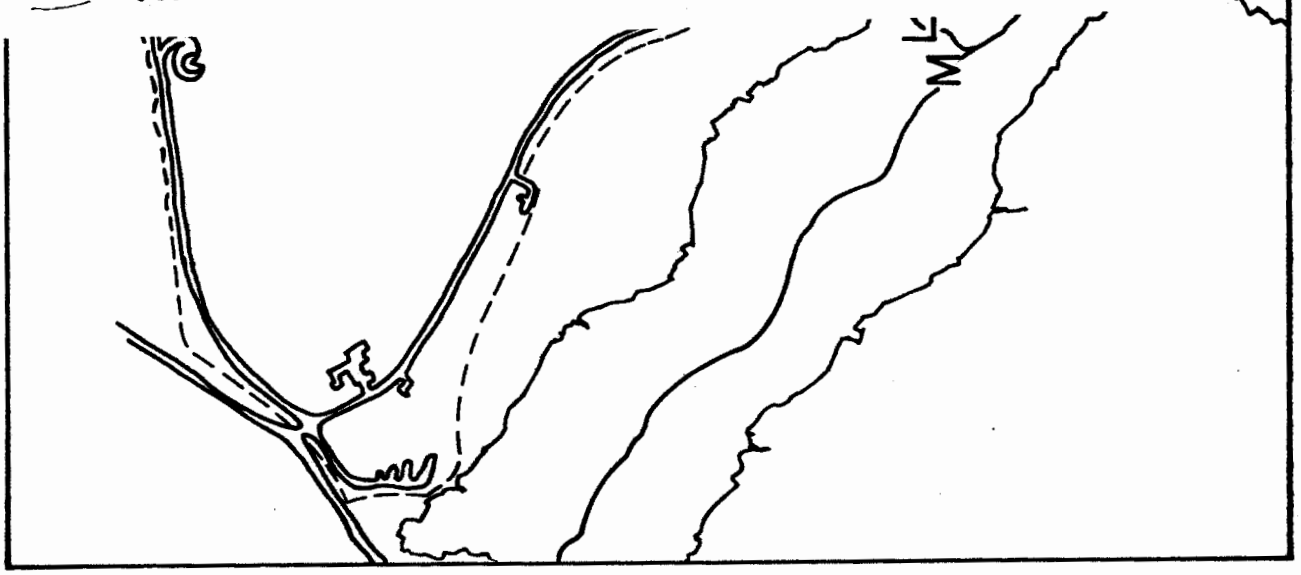
Sample	A	50,000c/m/25gm
	B	no Po
	C	150c/m/25gm
	D	25 "
	E	5 "
	F	5 "
	G	no Po
	H	no Po
	I	no Po
	J	no Po
	K	no Po
	L	22c/m/25gm
	M	17c/m/25gm
	N	52c/m/25gm
	O	23c/m/25gm
	P	450c/m/25gm
	R	1500c/m/25gm
	S	48c/m/25gm
	T	650c/m/25gm
	U	2300c/m/25gm

near Area E

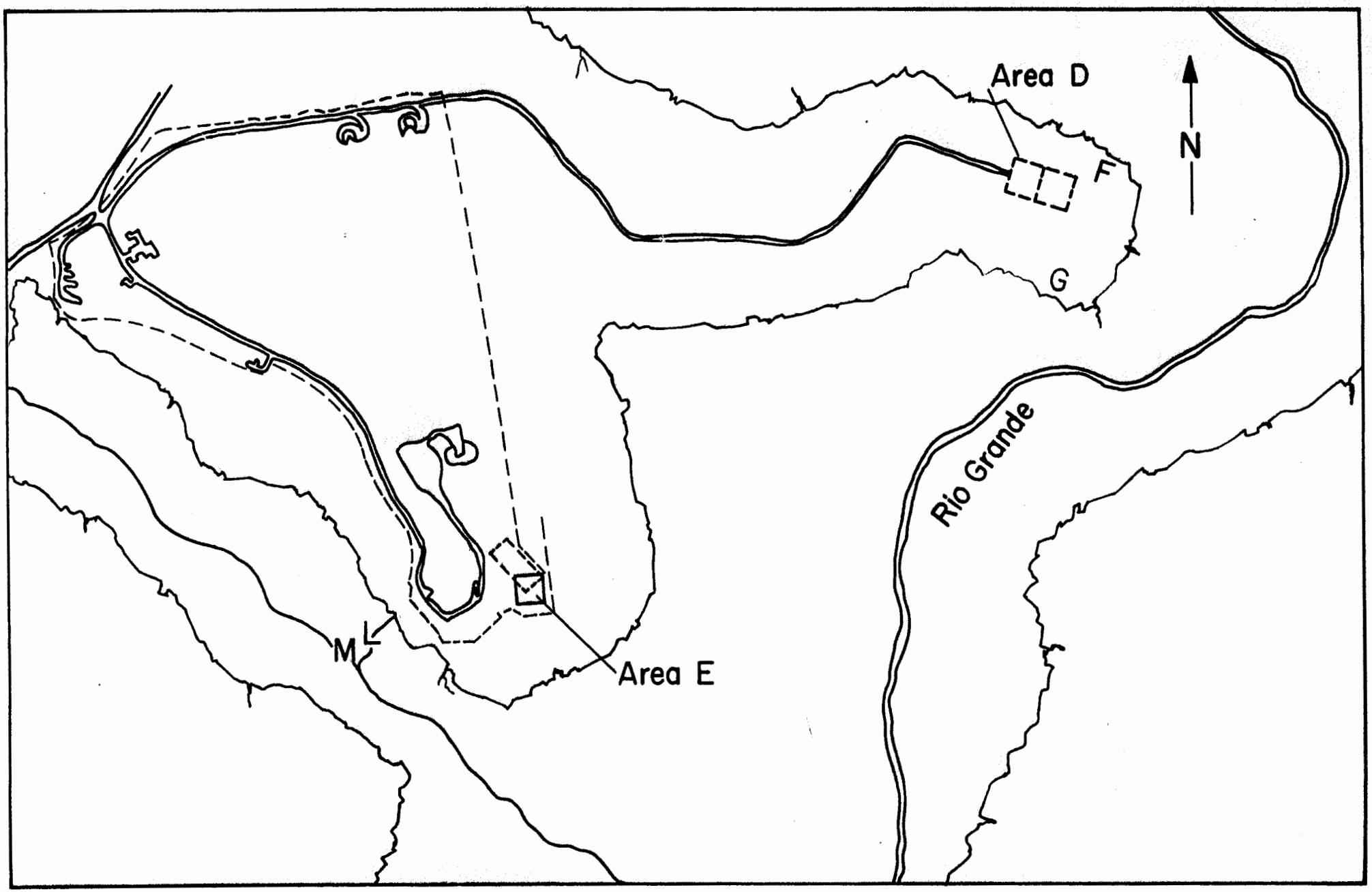
near Area K

Fig. will be reduced to fit above legend

Ref: 235



needs letters



On October 21, 1953,[196] the area around Chamber #2 was bulldozed. A radiation survey was then made and the results were negative. "The contamination that had been in the area has been reduced by normal decay and some will be buried under a heavy layer of dirt in the area."[196]

A preliminary survey of local wind conditions with primary emphasis on terrain effects under relatively light wind conditions was reported May 2, 1955.[197] Area D is now referred to as the "New Area."

> This area is located in the eastern portion of TA-33 and is surrounded on the south, east, and north by relatively deep and rugged canyons. In addition there are two bunkers surrounding the firing pads. In this area the wind flow is much more complicated than that in Areas 6 [probably Area K] and 7 [probably Area E]... The flow in New Area will be marked by turbulent eddies and erratic changes in direction. No confidence could be placed in a persistence forecast of an observed wind direction.[197]

Barb - Per discussion w/ Almira J. confirms each area write-up will start a new page to facilitate getting the text put together.

all caps centered

AREA E

General Information

Area E is located at TA-33, 1.9 km (1.2 mile) south of the guard station (see Fig. E-1). It is located between LASL coordinates S.292+50 and S.295+00, and E.250+00 and E.245+00. Specifically, the coordinates of the fenced area in clockwise direction beginning with the northeast corner are: S.292+96, E.249+16; S.294+36, E.249+15; S.294+35, E.247+15; and S.292+91, E.247+16. Location by township and range is SE 1/4 sec. 2~~5~~4, T. 18 N., R. 6 E. It has an approximate acreage of 0.69.[33]

Geology and Hydrology

Area E lies on a point formed by Cha-

quehui Canyon and one of its tributaries. It is on the mesa approximately 122 m (400 ft) above the bottom of the canyon. The surface of the mesa slopes gently to Chaquehui Canyon approximately 6 m (20 yards) to the south of Area E.[8] The soil cover is very thin and supports little or no vegetation. The joint pattern is variable and joints are not prominent or persistent.[8] The Tshirege member of the Bandelier tuff crops out within a few feet of the burial ground.

PIT DESCRIPTIONS

Background

The history of Area E is not well known. According to Engineering Drawing ENG-R-2457, underground Chamber 3, TA-33-29, was destroyed in 1950. Pits 1 through 4 were used. It is not clear whether Pits 5 and 6 were used. According to Engineering Drawing ENG-R-3644 Pit 1 was inactive July 1951; Pit 2 was reported November 7, 1962[106] as open; Pit 3 was closed September 1951; and Pit 4 was still active when Engineering Drawing ENG-R-3644 was drawn in the sixties. A 1963 USGS report[8] states that the area was used between 1949 and 1955.

Mode of Disposal

Chamber 3, HP-29, is probably constructed similarly to Chamber 2, HP-6, at Area D. It has been back-filled. Underground Chambers HP-70 and HP-71 are north of the Area E fence. These chambers were not used and remain open today.

The pits are probably shallow. The USGS reported in 1963[8] that there were four pits, each 1.8-2.1 m (6-7 ft) deep. Pit 1, located along the west fence line, is ap-

proximately 5 m (15 ft) wide and 23 m (75 ft) long. Pit 2, located along the south fence line, is approximately 5 m (15 ft) wide and 14 m (45 ft) long. Pit 3, located near the southeast corner, is approximately 1.5 m (5 ft) in diameter. Pit 4, located near the southeast along the east fence line, is approximately 5 m (15 ft) wide and 30 m (100 ft) long. Pit 5 and Pit 6 intersect. They are located west and north of Pit 4. Pit 5 is approximately 4 m (12 ft) wide and 24 m (80 ft) long. Pit 6 is approximately 4 m (12 ft) wide and 19 m (63 ft) long.

Type of Waste

"Area E at TA-33 has been used as a storage area and for burial of low-level radioactive contaminated equipment."[106] The area contains several hundred kg of ^{238}U (Ref. 8). Another source[108] also states the burial pits contain ^{238}U and ^{238}U alloys.

Chamber 3, HP-29, is contaminated by the device which was fired in it. Pit 1 contains LC, LE miscellaneous polonium-beryllium fired targets with a total of 240 curies. Pit 2 contains Wally, 60 curies. Pit 3 contains a GI can of beryllium dust immersed in kerosene. Pit 4 contains Button and miscellaneous hot material. There is no information available on the contents of Pit 5 or Pit 6 (Ref: Engineering Drawing ENG-R-3644).

11 copies entered

Studies and Monitoring

February 28, 1952,[198] two 50-g soil samples were taken from Chaquehui Canyon west of Area E. They were analyzed for polonium. The approximate values for both in

counts per minute (50% geometry) were 100.

The analysis of soil samples (H thru M, Fig. D-2) was reported on November 15, 1952.[195] Samples L and M were probably taken in the same place as the February 28th samples. The analysis was for polonium. Sample L had 22 c/m/25 g; and Sample M had 17 c/m/25 g. Samples H thru K showed no polonium.

A fire was reported early in the morning of April 15, 1953, in Pit 4 at Area E.[199] Shortly after 8:00 a.m. H-Division, W-3, and Fire Department personnel arrived.

> It was apparent that some oily rags covered with loose earth were smouldering and causing small quantities of smoke to rise. The Fire Department was then called in to flood the small smouldering portion of the pit with water. Respirators and coveralls were worn during the initial inspection and water application.[199]

~~On April 20, 1954,[200] soil samples were collected for uranium analysis by the fluorophotometric method. "New Hot~~

On April 20, 1954,[200] soil samples were collected for uranium analysis by the fluorophotometric method. "New Hot Point" on Fig. E-2 probably includes Area E. Sample 7 and Sample 15 (each 25 ml samples) had values of 35 mcgs/sample and 22.7 mcgs/sample, respectively.

A preliminary survey of local wind conditions with primary emphasis on terrain effects under relatively light wind conditions was reported May 2, 1955.[197] Area E is referred to as Burial Area 7.

~~This area is located o~~

~~The [illegible] is located on the western rim of~~

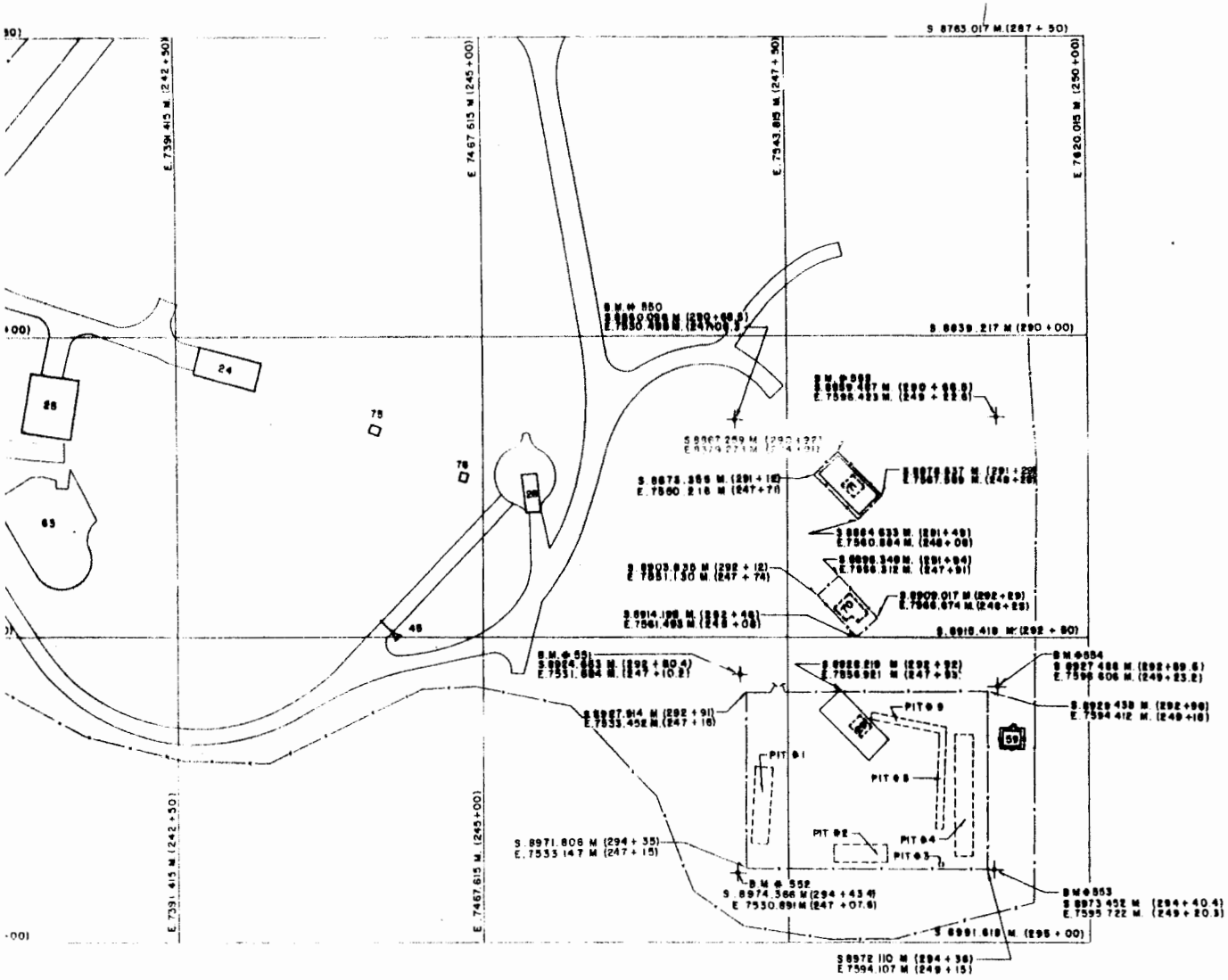
> This area is located on the west rim of a canyon oriented generally north-south and opening to the south... Dominant flow in Burial Area during the major part of the afternoon will be from the south-southwest. These conditions will be fairly persistent and a high degree of confidence could be placed in continuation of an observed direction of flow.[197]

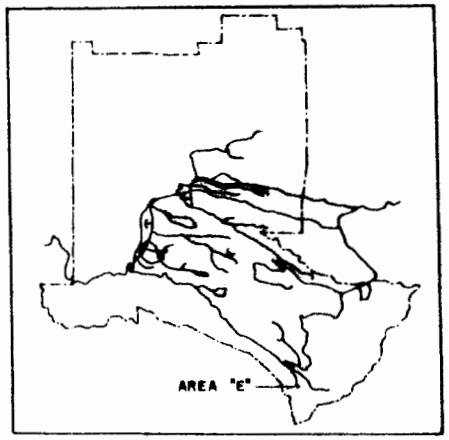
In 1962[106] it was observed that

> At the time of...inspection, the area was enclosed with a three-strand barbed wire fence, with six signs on the fence indicating that the area is contaminated. The gate was open and the area is becoming a junk yard. [It was suggested] (1) The gate should be repaired and kept locked. (2) New signs should be placed on each side. The signs should read 'contaminated area - do not enter' and should use the radiation symbol and radiation colors. (3) The open pit on the south side of the area [Pit 2] is full and should be covered with at least two feet of dirt. (4) The material in the area should be monitored and if not needed it should be sent to the contaminated waste disposal area on Mesita del Buey. If the material is of value it should be sent to ~~the contaminated waste disposal area on Mesita del Buey. If the material is of value it should be sent to~~ decontamination...and (5) The wooden building just outside the gate should be cleaned out and monitored.[106]

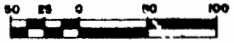
A 1963 USGS report stated "The fill probably should be compacted and mounded to minimize erosion and ponding of water around the pits."[8]

Tape to here





LOCATION PLAN



SCALE

(1" = 50') 1:600

NO.	DATE	BY	REVISIONS	BY	SYMB	ORIG	D.O.	TRAC	DATE

THIS JOB MUST BE INSPECTED AND ART CHANGES APPROVED BY — CHIEF PHONE

LOS ALAMOS SCIENTIFIC LABORATORY

ENGINEERING DEPARTMENT

UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

SEC. CLASSIFICATION: U TITLE U

AUTHORIZED FOR: SECURITY, SAFETY, HEALTH

MATERIALS DISPOSAL AREAS

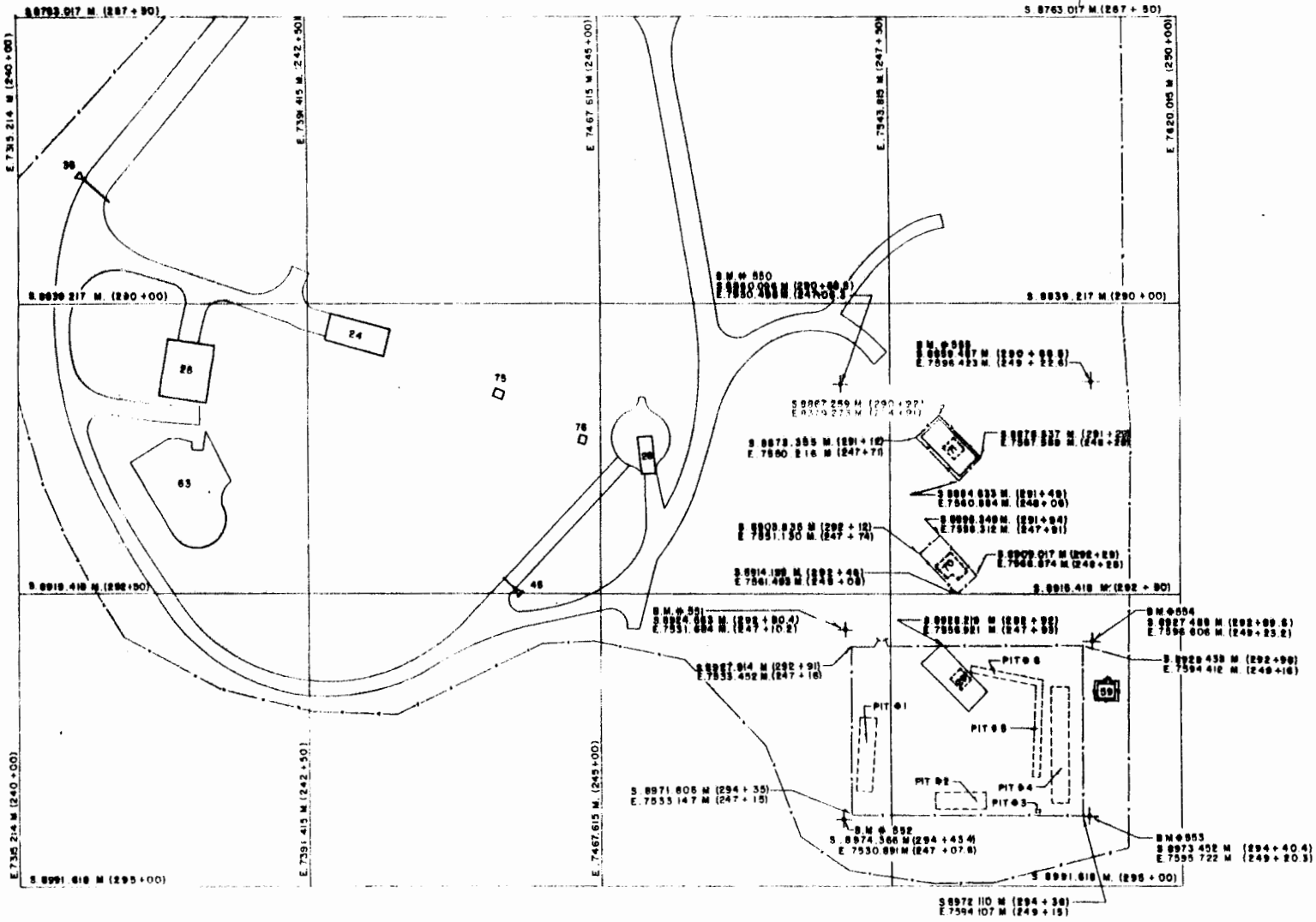
AREA "E"

HP SITE — TA - 35

DRAWN R.A.A. — CHECKED E.A.H. — DATE 9-4-74

LAS JOB NUMBER 1767-B — DWG. NUMBER Dwg.-R 4461

19.
E-1


S. 8793.017 M. (287 + 90)
S. 8763.017 M. (287 + 50)
E. 7315.214 M. (240 + 00)
E. 7391.415 M. (242 + 50)
E. 7467.615 M. (245 + 00)
E. 7543.815 M. (247 + 50)
E. 7620.015 M. (250 + 00)
S. 8839.217 M. (290 + 00)
S. 8919.418 M. (292 + 50)
S. 8991.618 M. (295 + 00)
B.M. # 550
B.M. # 551
B.M. # 552
B.M. # 553
B.M. # 554
PIT # 1
PIT # 2
PIT # 3
PIT # 4
PIT # 5
PIT # 6
24
26
28
36
46
63
75
76
78
S. 8867.259 M. (290 + 27)
S. 8873.355 M. (291 + 12)
E. 7560.216 M. (247 + 71)
S. 8914.199 M. (292 + 45)
E. 7561.493 M. (248 + 05)
S. 8907.914 M. (292 + 91)
E. 7533.452 M. (247 + 16)
S. 8971.605 M. (294 + 35)
E. 7533.147 M. (247 + 15)
S. 8974.366 M. (294 + 43.4)
E. 7530.891 M. (247 + 07.8)
S. 8972.110 M. (294 + 38)
E. 7594.107 M. (249 + 15)
S. 8973.452 M. (294 + 40.4)
E. 7595.722 M. (249 + 20.3)
S. 8927.489 M. (292 + 89.5)
E. 7596.606 M. (249 + 23.2)
S. 8929.439 M. (292 + 98)
E. 7594.412 M. (249 + 16)

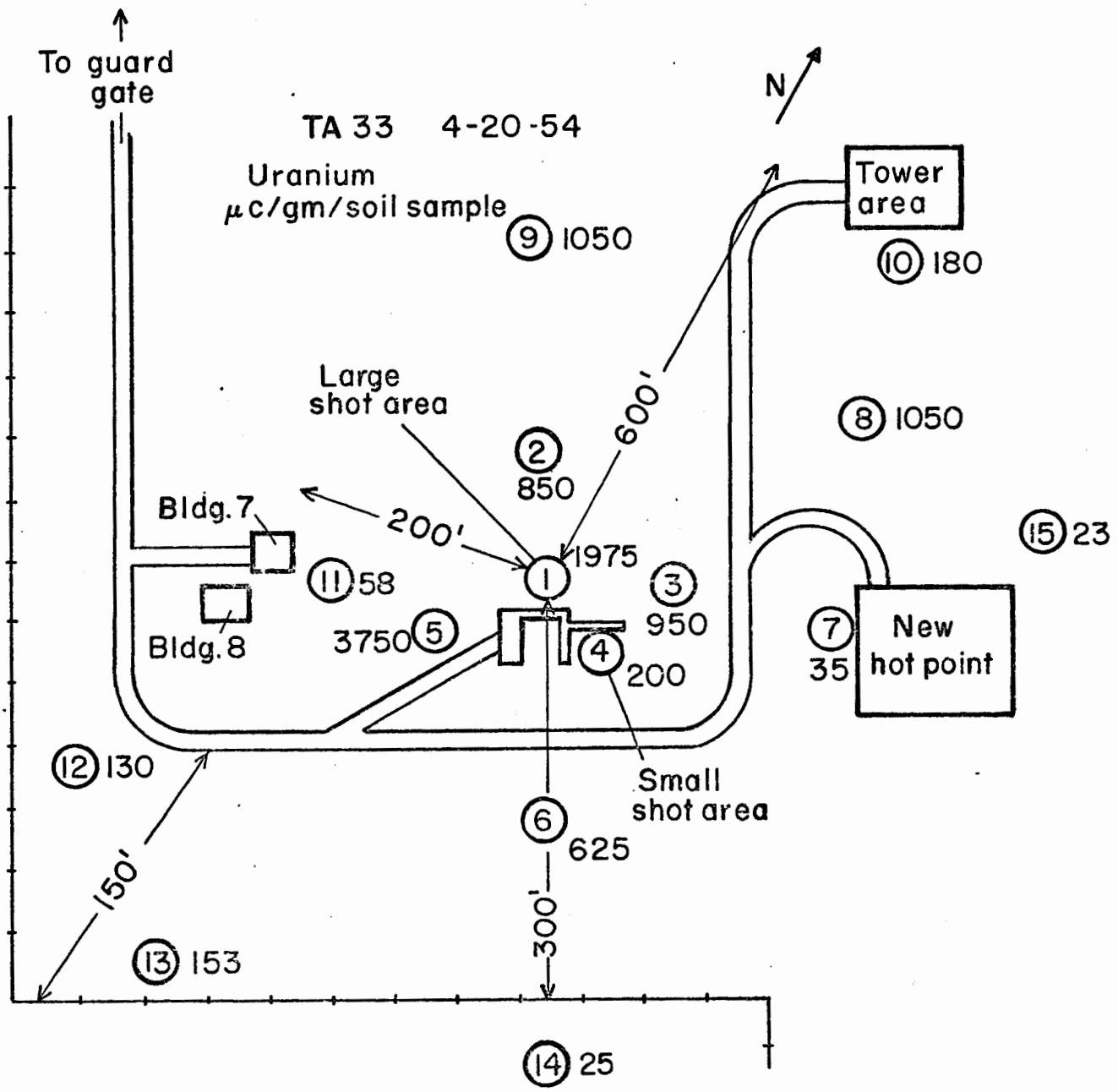

To guard gate
TA 33 4-20-54
Uranium
μc/gm/soil sample
N
Tower area
9 1050
10 180
Large shot area
600'
8 1050
2
850
Bldg. 7
200'
1975
15 23
11 58
1
3
950
Bldg. 8
3750 5
4
200
7
35
New hot point
12 130
Small shot area
6
625
150'
300'
13 153
14 25

Fig. E-2.

Centered, All caps

(Barb-Almira says 'road' should be lc unless name is "official" - this apparently is not).

AREA F

General Information

Area F is located on Two-Mile Mesa Road 2.1 km (1.3 miles) east of the intersection of Two-Mile Mesa Road and West Road (see Fig. F-1). It is north of Two-Mile Mesa Road within LASL coordinates N.35+00 and N.30+00, and E.12+50 and E.7+50. The boundaries of Area F are not strictly defined. There are two burial sites. The small one, closest to the road, has coordinates (beginning with the northeast corner and moving in a clockwise direction) of N.31+68, E.9+54; N.31+25, E.9+46; N.31+30, E.9+00; and N.31+82, E.9+13. The larger site, to to the east and north of the smaller one, has coordinates of N.32+70, E.11+94; N.32+37, E.11+96; N.32+51, E.10+26; and N.32+86, E.10+28. Location by township and range is described as near the center of sec. 20, T. 19 N., R. 6 E. The approximate acreage for Area F is 0.18.[33]

Geology and Hydrology

Two-Mile Mesa is formed by tributaries of the northern branch of Pajarito Canyon. Area F is centered between the tributary canyons. It is at a distance of approximately 457 m (1500 ft) from either canyon and lies about 24 m (80 ft) above the canyon floors. Soil cover for the smaller site is approximately 0.6 to 0.9 m (2 to 3 ft) thick. For the larger area it is approximately 0.3 to 0.6 m (1 to 2 ft) ~~t)~~ hick.[8] The surface of the smaller site is level while the surface of the larger pit slopes gently north. Excavations at both sites are in the Tshirege member of the Bandelier tuff. A 1963 USGS report[8] notes

~~Bandelier tuff. A 1963 USGS report[8] notes~~ that there is little indication of erosion over the smaller site; however, sheet erosion is evident near the larger site and a small wash has been cut at the west end of the site. "Blocky tuff with no apparent joint pattern and a northward slope of less than 5% crops out between the fenced area [larger site] and the south fork of Two-Mile Canyon a few hundred feet north."[8]

PIT DESCRIPTIONS

Background

May 15, 1946,[107] the Director of LASL wrote a memo to division and group leaders concerning a disposal pit at TA-site D (see Fig. F-2). TD-site on the memo is crossed out, and Two-Mile Mesa is penciled in. Another penciled note says the pit was completed May 7, 1946.

Type of Wastes

No reliable information on the waste materials has been found to date. In 1952, J. Bolton, Assistant Director for Engineering, reported "Dump F contains some alpha contamination but is essentially used for disposal of toxic compounds."[13] The USGS reported in 1963[8] that there were beta-gamma emitters buried in Area F. In January 1973, D. Meyer of H-1 stated[108] that the burial pits contain a very small burial of equipment contaminated ~~by ^{90}Sr and ^{137}Cs. In March 1974, R. Reider of H-3~~

of equipment contaminated by ^{90}Sr and ^{137}Cs. In March 1974, R. Reider of H-3
said his sources of information indicate that the sites contain no radioactively contaminated material but that the smaller

site does contain HE contaminated material and that the larger site may contain HE contaminated material.

Mode of Disposal

On Engineering Drawing ENG-R-4462(9) Area F is shown as two distinct sites. The smaller site is considered to have several pits within it. It approximates a square of 13.4 m (44 ft). The larger site is rectangular, approximately 10.7 m (35 ft) by 52.4 m (172 ft). After visiting Area F, the larger site appears to be 9.1 m (30 ft) by 118.3 m (385 ft).

Studies and Monitoring

None known. Area F was described in the 1963 USGS report "Geologic and Hydrologic Environment of Radioactive Waste Disposal Sites at Los Alamos, New Mexico."[8]

TA-6-H

May 15, 1946

AREA 'F'

Covered over, now located near Conc. the bowl

To: Division and Group Leaders

From: N. E. Bradbury

Subject: Disposal Pit at ~~TA-6-H~~ Two Mile Mesa

Completed May - 1946

An obsolete material pit for the disposal of classified objects and shapes has been prepared at TA-6 site where such material will be made secure by burying. This pit will be open until 1 June. It is urged that divisions and groups "clean house" of obsolete, non-usable, but classified material by the use of this pit.

Division and group leaders desiring to use the pit will notify Security Office, Ext. 541, prior to their delivery of the obsolete classified material. The Security Office will record and locate such material in the pit.

N. E. Bradbury
Director

[illegible]

Fig. 7-2

AREA T

General Information

Area T is the DP-West absorption bed area located east of buildings TA-21-286 and TA-21-288, and west of building Ta-21-257 (Fig. T-1). It can be reached from the north perimeter road and is less than a quarter mile from the intersection of the north perimeter road and DP Raod. The axis of the area runs southeast. Most of the area is found within LASL coordinates N.87+50 and N.90+00, and E.157+50 and E.160+00. Area T is an open area with approximate acreage of 0.88.[35]

Engineering Drawing ENG-C 2217, June 13, 1945, shows the absorption bed area enclosed by a fence. Latest engineering drawings show no boundaries for the area, but locate points within the area. The job history given on May 11, 1967, request for survey service[34] states,

> Location of Area T has been established and coordinates computed. Brass caps cannot be set in the area until the DP rehab has been completed, and this work isn't expected to be completed for two years, so this request should be closed. Disposal area caps can be included with the DP site brass caps when the rehab has been completed.[34]

Geology and Hydrology

> The pits [absorption beds] are probably excavated in Unit 3 of the Tshirege member of the Bandelier tuff. The lower part of this unit is nonwelded tuff grading up to a moderately welded tuff which underlies the pits. Joints are more numerous in the upper part of the unit due to the denser welding. Most of the joints are oriented vertical or near vertical. The total thickness of the unit is about 110'. It is underlain by moderate to dense welded tuff.

My name

The total thickness of the Bandelier tuff underlying the mesa at Building 35* exceeds 800 ft. The tuff is in the zone of aeration; the top of the main zone of saturation is about 1150' below the surface of the mesa.[36]

*author's note: Building 35, TA-21-35, has been removed. It was located immediately south of the absorption beds. (Ref: Engineering Drawing ENG-C-35571).

With the construction of the disposal shafts which are principally located between Absorption Beds 2 and 4, new geologic data were acquired. Two cross-sections were drawn based on information from Shafts 3, 11, 18, 19, 26, and 27. These shafts range in depth from 4.6-19.8 m (15-65 ft). The cross-sections show three units with the following description.

The lower unit is a light gray moderately welded tuff with an approximate thickness of 100'; it is overlain in part by reworked tuff which is deposited in a channel, or low relief cut into the lower light gray tuff unit. The upper unit forming the surface of the mesa of the disposal area is a light brownish-gray moderately welded tuff.[40] (See Figs. T-2 and T-3.)

[The reworked tuff and pumice contain contain cobbles and boulders in the lower part and]...was deposited by gaseous forces accompanying the emplacement of the upper ash flow. The cobbles and boulders occur in tabular shapes, or if in mass, show faceted sides as if deposited by sliding rather than rolling as one would expect with water-laid material. The blast caused by the expanding gases accompanying the emplacement of the upper ash flow deposited the larger materials (cobbles and boulders) into areas of low relief in the upper surface of the lower unit. As the upper unit and reqorked tuff were emplaced contemporaneously they have cooled as a single unit thus the contact between the two is gradational and not very distinct. A sharp contact is found between the reworked tuff and lower gray unit.[40]

December 17-18, 1974 [illegible] data were collected for the [illegible] Stratigraphy, [illegible] Bed 3.

RETRIEVABLE WA[illegible]

ABSORPTION BED ~~AND~~ SHAFT DESCRIPTION

Background

Area T is one of the first disposal areas used at the Laboratory. Construction of four absorption beds for disposal of DP-West liquid waste was completed in 1945. Untreated waste from the processing of plutonium at TA-21 was released to the pits from 1945 to 1952.

In April 1947 plans were submitted to the post engineers to connect all the TA-21 and DP-Site contaminated effluent lines into a central line and disposal plant.[37] It is not clear whether the 1947 proposed disposal plant initiated planning for the DP-West disposal treatment plant, Building TA-21-35, however, TA-21-35 was installed in 1952 to remove plutonium and other radionuclides.[36] The reason for this installation was that "the tuff had become clogged with suspended solids."[38] When the amount of wastes discharged to the absorption beds had reached the order of several thousand gallons per day, the beds had to be abandoned. At infrequent intervals, a few hundred gallons of treated wastes from TA-21-35 were released to the absorption beds from 1952 until 1967. From 1965 through 1967, Absorption Beds 1 and 2 also received low-level radioactive wastes from DP East (written communication, L. A. Emelity, H-7, 1974). A few treatment plant, TA-21-257, was built in 1967. Since mid-1968, treated wastes from TA-21-257 are mixed with cement and pumped down shafts augered between the south absorption beds and the north absorption beds. Effluents from TA-21-257 are discharged to the canyon north of the plant, as were the effluents from TA-21-35. Beginning December 31, 1975[294] treated wastes from TA-21-257 which contain >10n Ci/[illegible] are mixed with cement and pumped into 6m x 2.75m (20ft x 30in) [illegible] inch pipe (CMP) storage in a pit dug between Absorption [illegible] and Bed 3.

Type of Waste

The amount of untreated waste released into the absorption beds during the period 1945 to 1952 was on the order of 53 000 m^3 (14 000 000 gal) (written communication, L.A. Emelity, H-7, 1974).

> The concentration of plutonium in effluents during this period has been estimated at 60 c/m/ml (counts per minute per milliliter) [120 dis/min/ml] with an average fluoride concentration (associated with the waste) of 160 ppm (parts per million). In addition, 10 450 gallons (39.6 m^3) of effluent, highly concentrated with ammonium citrate, was released into the beds from June 1951 to July 1952. The plutonium concentration of this waste averaged about 7000 c/m/ml [14 000 dis/min/ml] and the fluoride concentrations were about 200 ppm.[36]

From 1953 through 1967 16 000 m^3 (4 300 000 gal) of effluent went into the absorption beds (written communication, L.A. Emelity, H-7, 1974). Of this amount, 7 500 m^3 (2 000 000 gal) came from DP East (see Table T-I). It was still possible to release treated wastes to Absorption Bed 4 as of July 1974.[6]

J.T-I

As of January 1973,[32] the absorption beds contained 4 Ci of ^3H and 10 Ci of ^{239}Pu. These values were decay corrected from the original magnitude to that as of December 31, 1972.

There are ~~49~~ ~~57~~ 62 disposal shafts in Area T. The wastes going to the shafts are mixed with cement.

> Various wastes such as the neutralized americium 'strip', alkaline fluoride and plant sludge are being mixed with cement in a pug mill operation and the slurry is being pumped to deep holes [shafts] on the site. This procedure was started on May 1, 1968.[41]

Also, 0.9-m (3-ft) diameter experimental

II

TABLE T-~~I~~

SHAFT DISPOSAL OF RADIOACTIVE WASTE BY GROUP H-7 AT AREA T

Shaft Number	Status	Approximate Depth Ft. (m)	Cement Paste in Liters	Equivalent ^{239}Pu in g	Number Spheres and g of ^{239}Pu
Shaft 1*,[180]	Filled on 10-25-73	18.7 ft (5.7 m)	67,440	0.28 C: ^{238}Pu 0.91 C: ^{239}Pu 70.76 C: ^{241}Am	
Shaft 2**,[43]	Filled on 10-14-70	21.0 ft (6.4 m)	23,919	111.15	
Shaft 3[41,42]	Filled on 4-10-69	27.0 ft (8.2 m)	10,750	10	3 spheres 290 g ^{239}Pu
Shaft 5[176]	Filled on 9- 9-71	61.8 ft (18.8 m)	87,200	905.68	
Shaft 6	Augered on 3-20-75	26.8 ft (8.2 m)			
Shaft 8	Augered on 6- 6-74	66.8 ft (10.4 m)			
Shaft 9[174]	Filled on 2-16-70	63.0 ft (19.2 m)	88,775	1142.62	
Shaft 10[176]	Filled on 7-20-71	23.2 ft (7.1 m)	18,660+	158.52++	
Shaft 11[42]	Filled on 11-19-69	28.0 ft (8.5 m)	18,953+++	147 +++	
Shaft 13	Augered on 9-13-73	65.0 ft (19.8 m)			
Shaft 17[41,42]	Filled on 4-10-69	50.0 ft (15.2 m)	87,240	1237	9 spheres 342 g ^{239}Pu
Shaft 18[42]	Filled on 11- 6-69	59.0 ft (18.0 m)	83,442	713	3 spheres 134 g ^{239}Pu
Shaft 19[41,42]	Filled on 9- 5-68	65.0 ft (19.8 m)	80,280	241	3 spheres 245 g ^{239}Pu
Shaft 20[175]	Filled on 2-11-71	63.0 ft (19.2 m)	89,540	1182.72	
Shaft 21[177]	Filled on 6-12-72	62.3 ft (19.0 m)	87,293	841.06	
Shaft 22[43]	Filled on 8-10-70	64.0 ft (19.5 m)	88,758	908.20	

II

TABLE T-~~I~~ (continued)

SHAFT DISPOSAL OF RADIOACTIVE WASTE BY GROUP H-7 AT AREA T

Shaft Number	Status	Approximate Depth Ft. (m)	Cement Paste in Liters	Equivalent ^{239}Pu in g	Number Spheres and g of ^{239}Pu
Shaft 23[175]	Filled on 5-25-71	62.7 ft (19.1 m)	80,699	1182.64	
Shaft 24[174]	Filled on 5- 6-70	61.0 ft (18.6 m)	84,103	1066.95	
Shaft 25[43]	Filled on 9-15-70	16.0 ft (4.9 m)	23,458	490.14	
Shaft 26[174]	Filled on 3-16-70	15.0 ft (4.6 m)	21,306	175.73	3 spheres 210 g ^{239}Pu
Shaft 27[41,42]	Filled on 11-22-68	58.0 ft (17.7 m)	82,770	906	
Shaft 28[309]	Filled 3-13-74 ~~Augered on 9- 5-73~~	67.0 ft (20.4 m)	81840	2063	
Shaft 29[177]	Filled on 6-12-72	60.7 ft (18.5 m)	87,847	795.22	
Shaft 30[43]	Filled on 11- 5-70	62.0 ft (18.9 m)	87,086	678.98	
Shaft 31[177]	Filled on 2-18-72	18.3 ft (5.6 m)	25,900	113.78	
Shaft 32[43]	Filled on 6- 3-70	15.0 ft (4.6 m)	22,509	413.11	
Shaft 33[41,42]	Filled on 8-14-69	64.0 ft (19.5 m)	90,486	1352	
Shaft 34[177]	Filled on 2- 7-72	60.3 ft (18.4 m)	89,265	815.15	
Shaft 35[178]	Filled on 8-10-72	62.3 ft (19.0 m)	87,725	1058.36	
Shaft 36[178]	Filled on 3- 2-72	61.3 ft (18.7 m)	89,410	956.31	
Shaft 41[178]	Filled on 10- 4-72	62.0 ft (18.9 m)	68,600	913.67	
Shaft 42[43]	Filled on 12- 8-70	21.0 ft (6.4 m)	32,731	101.23	

TABLE T-~~I~~ II (continued)

SHAFT DISPOSAL OF RADIOACTIVE WASTE BY GROUP H-7 AT AREA T

Shaft Number	Status	Approximate Depth Ft. (m)	Cement Paste in Liters	Equivalent ^{239}Pu in g	Number Spheres and g of ^{239}Pu
Shaft 43 [294]	Filled 4-3-75 ~~Augered on 8-22-74~~	62.0 ft (18.9 m)	89,000	2000	
Shaft 44 [176]	Filled on 11-12-71	62.9 ft (19.2 m)	87,890	917.52	
Shaft 46 [179]	Filled on 2-23-73	65.8 ft (20.1 m)	82,540	1510.57	
Shaft 47 [294]	Filled 5-13-75 ~~Augered on 8-23-74~~	25.0 ft (7.6 m)	35,100	880	
Shaft 48 [294]	Filled on 5-6-74 ~~Augered 10-31-72~~	63.0 ft (19.2 m)	65,760	1520	
Shaft 49	Filled 12-5-74 ~~Augered on 9-12-74~~	62.0 ft (18.9 m)	92,100	2374	
Shaft 50 [179]	Filled on 3-28-73	65.3 ft (19.9 m)	72,290	1052.64	
Shaft 51 [294]	Filled 4-5-74 ~~Augered on 8-20-73~~	30.0 ft (9.1 m)	[illegible]	672	
Shaft 52 [179]	Filled on 2-23-73	23.3 ft (7.1 m)	32,740	699.61	
Shaft 53 [180]	Filled on 12- 6-73	15.8 ft (4.8 m)	71,610	0.50 C: ^{238}Pu 7.03 C: ^{239}Pu 114.21 C: ^{241}Am	
Shaft 54 [179]	Filled on 5-23-73	62.8 ft (19.1 m)	90,630	1542.28	
Shaft 55 [294]	Filled 8-25-74 ~~Augered on 9-12-73~~	62.0 ft (18.9 m)	10,600	1533	
Shaft 56 [179]	Filled on 6-22-73	63.0 ft (19.2 m)	83,870	1332.57	
Shaft 57 [294]	Filled 4-22-75 ~~Augered on 8-23-74~~	25.0 ft (7.6 m)	37,200	700	
Shaft 58 [179]	Filled on 1-17-73	22.3 ft (6.8 m)	31,950	388.98	
Shaft 59 [294]	Filled 2-7-72 ~~Augered on 9-17-74~~	54.0 ft (16.5 m)	77,400	1780	

out of date 9-17-16

TABLE T-~~I~~ II (continued)

SHAFT DISPOSAL OF RADIOACTIVE WASTE BY GROUP H-7 AT AREA T

Shaft Number	Status	Approximate Depth ft(m)	Cement Paste in Liters	Equivalent ^{239}Pu in g	Number Spheres and g of ^{239}Pu
Shaft 60[180]	Filled on 8- 3-73	19.1 ft (5.8 m)	90,460	0.69 C:^{238}Pu 5.37 C:^{239}Pu 111.10 C:^{241}Am	- 1102
Shaft 6-15	Augered on 3-25-75	66.5 ft (20.3 m)			

*"Shaft was used for wash waters for 21 PMR runs and contains an unknown amount of activity from these washings."[180]

**"Shaft 2 received wash water of 33 runs. Wash water contains unaccounted activity."[43]

+Plus about 14,200 liters of solids from washdown.[176]

++Does not include radioactivity from washdown solids.

+++"Cement paste only. Remainder of shaft about 21,300 liters, was filled with washdown residue over a period of about 8 months (21 pug mill runs). Equivalent ^{239}Pu in the residue is probably greater than the ^{239}Pu in the cement paste added to this shaft."[42]

(f) [illegible] for rinse water from 13 Pug Mill Runs and contains an unknown amount of rinse solids [illegible]

10

(h) Contains washing from 63 PMR runs and contains an unknown amount of activity from these runs

Also, 0.9-m (3-ft) diameter experimental bathyspheres have been placed in shafts--three to a layer and at various depths.[41] Besides ^{239}Pu, ^{238}Pu, ^{241}Am, and ^{235}U, the shafts contain some mixed fission products which are mostly strontium and cesium.[41] Table T-~~2~~ II gives the equivalent ^{239}Pu, in grams, in each shaft. As of ~~January~~ July 1978, the disposal shafts contained ~~2 Ci of~~ $^{90}Sr/^{90}Y$, 7 Ci of ^{233}U, ~~30~~ 47 Ci of ^{238}Pu*, ~~131~~ 191 Ci of ^{239}Pu* (~~material generally consisting of approximately 94 wt% ^{239}Pu and 6 wt% ^{240}Pu~~), ~~and 2345~~ 3761 Ci of ^{241}Am. These values have been decay corrected from the original magnitude to that as of December 31, 1974.[5]

3 Ci of Mixed Fission Products.

* These totals for ^{238}Pu and ^{239}Pu do not include the years 1964 thru 1971 because the actual values for these years are not determinable. It is estimated the amount of ^{238}Pu and ^{239}Pu for 1964 thru 1971 is relatively small. (personal communication J.L. Warren, 11/1/76)

Twenty-eight CMP have been filled in the Retrievable Waste Storage Area. Table T-III gives curies of ^{238}Pu, ^{239}Pu and ^{241}Am in each pipe.

Mode of Disposal

The construction of the absorption beds is shown on Engineering Drawing ENG-C 2217. The four beds are numbered--1, southwest bed; 2, southeast bed; 3, northwest bed; and 4, northeast bed. Each bed is 36.6 m (120 ft) long, 6.1 m (20 ft) wide, and 1.2 m (4 ft) deep. The east and west sides of the beds were sloped so that only the center 30.5 m (100 ft) of each bed has a depth of 1.2 m (4 ft). The north and south sides of the beds appear on ENG-C 2217 as vertical cuts. The bottoms of the beds were cut level. The distance between the centers of Beds 1 and 3 and Beds 2 and 4 is 24.4 m (80 ft).

The original surface of the site sloped to the north at 12 to 1. Therefore, embankments were placed to the north of the beds and surface water interceptors were cut to the south of the beds. Probably the two embankments were built from material derived from the escavation of the beds.

Each embankment had a minimum width of 3.1 m (10 ft) and a minimum height of 0.6 m (2 ft). One embankment extended across the west end of Bed 1, the north sides of Beds 1 and 2, and across the east end of Bed 2. The other extended across the west end of Bed 3, the north side of Beds 3 and 4, and across the east end of Bed 4. The surface water interceptors were cut approximately 0.6 m (2 ft) deep and 0.9 m (3 ft) wide, 3.1 m (10 ft) from the south sides of each pit.

The beds are sometimes referred to as covered pits. This is misleading because the beds were never roofed. They were filled with stone, gravel, sand, and earth. The bottoms of the beds were to be trimmed and cleared of earth and loose material before filling. The bottom 61.0 cm (24 in.) of fill was stone, to be clean and free from dirt, which ranged in size from ± 7.6 to 25.4 cm (± 3 to 10 in.). The stone was to be graded from large at the bottom to small at the top in order to form a deck for the gravel. The next 15.2 cm (6 in.) of fill was gravel followed by 15.2 cm (6 in.) of sand. The top layer of fill was 30.5 cm (12 in.) of earth. The total thickness of graded fill was 1.2 m (4 ft).

Liquid waste moved through 15.2-cm (6-in.) iron pipe from DP West Buildings 2, 3, 4, and 5 to a distribution box between Beds 1 and 2. The distribution box was 1.2 m (4 ft) long, 0.9 m (3 ft) wide, and 1.2 m (4 ft) deep with 15.2-cm (6-in.) walls. It

was built of concrete, and the interior was painted with two coats of Inertal Standard Black, or equal. The box had a 5.1-cm (2-in.) creosoted wood cover which was hinged to the concrete and equipped with a hasp and heavy lock. One 15.2-cm (6-in.) round plug 61.0 cm (24 in.) long was provided with the distribution box. The plug was probably used to divert waste into either Bed 1 or Bed 2 instead of allowing waste to flow to both. The floor drain from building 12*, TA-21-12, emptied into a 15.2-cm (6-in.) iron pipe leading into Bed 1. Overflow pipes of 15.2-cm (6-in.) iron connected Beds 1 and 3 and Beds 2 and 4. The overflow pipes were positioned in Beds 1 and 2 at the top of the stone layer, i.e., 0.6 m (2 ft), above the bottom and in Beds 3 and 4 at the bottom. All piping was standard weight steel pipe cut in 1.5-m (5-ft) lengths and coated with jennite. All joints were threaded.

"Report[edly] more water [liquid waste] moved into pits [Beds] 1 and 3 than moved into 2 and 4, and at times some of the pits became clogged and overflowed, the overflow moving northward toward a canyon."[8] However, overflow from the beds never reached the canyon (personal communication, C. W. Christenson, H-7, 1974).

Sixty 2.4-m (8-ft) diam disposal shafts were located in the site, principally between Beds 2 and 4. Forty-nine of these shafts have been augered using a 1.2-m (4-ft) diam bucket auger and reaming to a 2.4-m (8-ft) diam (Fig. T-4). The shafts are on 3.7-m (12-ft) centers. Shafts 4, 6, 7, 14, 15, 16, 37, 38, 39, 40, and 45 have not been augered.

Fig. T-4

Shafts 14-16 will not be augered because of a power line. Shafts 37-40 are aligned where the overflow pipe is between Beds 2 and 4. Table T-3 gives the following information on individual shafts: dates shafts were completed and filled, shaft depths, and type of rock encountered during augering. The table is composed of data obtained from the Zia Company and Group H-7.

The waste treatment plant, TA-21-257, is located east of the shaft field. Sludge goes from a holding tank to a pug mill where cement is added on a continuous basis. This mixture is then pumped down the 2.4 m x 18.3 m (8 ft x 60 ft) asphalt-lined shafts. Irregularities in the substrate prevent all shafts from reaching a depth of 18.3 m (60 ft) (Figs. T-5 and T-6).

---

*Filter Building TA-21-12 was removed in 1973.

Addition 1 (9-17-76)

done 3-24-76

IV 9-17-76

TABLE T-~~III~~

EIGHT-FOOT (2.4 m) and five-foot (1.5m) DIAMETER SHAFT DETAIL AT AREA T

Shaft Number	Date Completed	Date Filled	Approximate Depth	Substrate and Comments
Shaft 1	5-17-71	10-25-73	18.7 ft. (5.7m) H-7 62.0 ft. (18.9m) Zia	Dirt to 18 ft. (5.5m) Tuff 18-65 ft. (5.5-19.8m)
Shaft 2		10-14-70	21.0 ft. (6.4m) H-7 23.0 ft. (7.0m) Zia	Boulders at 20 ft. (6.1m)
Shaft 3		4-10-69	27.0 ft. (8.2m) H-7	
Shaft 5		9- 9-71	61.8 ft. (18.8m) H-7 64.0 ft. (19.5m) Zia	Tuff
Shaft 6	3-20-75	8-1-75	25.8 ft. (8.2m) H-7 21.94 (6.7m) Zia	3.0 ft. (1.0m) pilot hole Reamed in 1975
Shaft 8	6- 6-74		66.8 ft. (20.4m) H-7	
Shaft 9		2-16-70	63.0 ft. (19.2m) H-7 64.0 ft. (19.5m) Zia	3-4 ft. (0.9-12.m) Boulder at 18-20 ft (5.5-6.1m)
Shaft 10		7-20-71	23.2 ft. (7.1m) H-7 26.0 ft. (7.9m) Zia	Boulders at 25 ft. (7.6m) Boulders on NE side
Shaft 11		11-19-69	28.0 ft. (8.5m) H-7	
Shaft 13	9-18-73	7-2-74	65.0 ft. (19.8m) Zia	Tuff at 15 ft. (4.6m) Dirt to 15 ft. (4.6m)
Shaft 17		4-10-69	50.0 ft. (15.2m) H-7	
Shaft 18		11- 6-69	59.0 ft. (18.0m) H-7	
Shaft 19		9- 5-68	65.0 ft. (19.8,) H-7	
Shaft 20	11-25-70	2-11-71	63.0 ft. (19.2m) H-7 62.0 ft. (18.9m) Zia	Tuff. Hard from 10-20 ft. (3.9-6.0m), easy on down.
Shaft 21		6-12-72	62.3 ft. (19.0m) H-7 63.0 ft. (19.2m) Zia	Tuff. Hard about 35 ft.(10.7m)
Shaft 22	4- 9-70	8-10-70	64.0 ft. (19.5m) H-7 63.0 ft. (19.2m) Zia	Tuff. Hard for 45 ft (13.7m) No boulders.
Shaft 23	12- 1-70	5-25-71	62.7 ft. (19.1m) H-7 63.0 ft. (19.2m) Zia	Tuff to 18 ft. (5.5m) 18-28 ft. (5.5-8.5m) boulders. Tuff on down.
Shaft 24	3-13-70	5- 6-70	61.0 ft. (18.6m)	Boulders at 18-29 ft. (5.5-8.8m). Boulder layer 2 ft. (0.6m) thick on N side and 11 ft. (3.4m) thick on SW side. Hot material 29-33 ft. (m)
Shaft 25	8-26-70	9-15-70	16.0 ft. (4.9m) H-7 18.0 ft. (5.5m) Zia	Boulders at 21 ft. (6.5m)
Shaft 26		3-16-70	15.0 ft. (4.6m) H-7	
Shaft 27		11-22-68	58.0 ft. (17.7m) H-7	
Shaft 28	9- 5-73	8-13-74	67.0 ft. (20.4m) Zia	Tuff. Reamed to 64 ft. (19.5m)
Shaft 29	4-19-71	6-12-72	60.7 ft. (18.5m) H-7 65.0 ft. (19.8m) Zia	Tuff.

TABLE T-~~II~~ III (continued)

EIGHT-FOOT (2.4m) and [illegible] foot (1.8)m DIAMETER SHAFT DETAIL AT AREA T (continued)

Shaft Number	Date Completed	Date Filled	Approximate Depth	Substrate and Comments
Shaft 30	8- 7-70	11- 5-70	62.0 ft. (18.9m) H-7 62.5 ft. (19.1m) Zia	Tuff. Hard from 25-30 ft. (7.6-9.1m)
Shaft 31	5- 3-71	2-18-72	18.3 ft. (5.6m) H-7 23.0 ft. (7.0m) Zia	Boulders from 16-23 ft (4.9-7.0m)
Shaft 32	4- 6-70	6- 3-70	15.0 ft. (4.6m)	Boulders about 1/4 of hole.
Shaft 33		8-14-69	64.0 ft. (19.5m) H-7	
Shaft 34	5- 6-71	2- 7-72	60.3 ft. (18.4m) H-7 60.0 ft. (18.3m) Zia	Boulders from 16-32 ft. (4.9-9.8m) Toff to 60 ft. (18.3m)
Shaft 35	6- 2-72	8-10-72	62.3 ft. (19.0m) H-7 62.0 ft. (18.9m) Zia	Tuff. Easy
Shaft 36	4-22-71	3- 2-72	61.3 ft. (18.7m) H-7 65.0 ft. (19.8m) Zia	Tuff hard to 30 ft. (9.1m)-easy on down.
Shaft 41	5-12-71	10- 4-72	62.0 ft. (18.9m)	
Shaft 42	8-28-70	12- 8-70	21.0 ft. (6.4m) H-7 23.0 ft. (7.0m) Zia	Boulders at 23 ft. (7.0m)
Shaft 43	8-22-74	4 3-75	62.0 ft. (18.9m) Zia	Pilot hole 65 ft (19.8m) deep
Shaft 44	4-28-71	11-12-71	62.9 ft. (19.2m) H-7 66.0 ft. (20.1m) Zia	Hard tuff to 35 ft. (10.7m)-Soft to 65 ft. (19.8m)
Shaft 46	9-11-72	2-23-73	65.8 ft. (20.1m) H-7 66.0 ft. (20.1m) Zia	Boulders at 16-27 ft. (4.9-8.2m) Hard tuff to 46 ft. (14.0m). Tuff to 66 ft. (20.1m).
Shaft 47	8-23-74	5-13-75	25.0 ft. (7.2m) Zia	Boulders in bottom
Shaft 48	10-31-72	5-16-74	63.0 ft. (19.2m)	Tuff. Hard from 15-35 ft. (4.5-10.7m)
Shaft 49	9-12-74	[illegible]	62.0 ft. (18.9m)	Pilot hole 66 ft (20.1m) deep Hard from 15-40 ft (4.6-12.2m)
Shaft 50	9-25-72	3-28-73	65.3 ft. (19.9m) H-7 47.0 ft. (14.3m) Zia	4 ft. (1.2m) hole to 65 ft. (19.8m) Hot hole.
Shaft 51	8-20-73	4-5-74	30.0 ft. (9.1m)	Tuff to 18 ft. (5.5m). Boulders 18-30 ft. (5.5-9.1m)
Shaft 52	8-21-72	2-23-73	23.3 ft. (7.1m) H-7 23.0 ft. (7.0m) Zia	Boulders at 17 ft. (5.2m)
Shaft 53	8-24-73	12- 6-73	15.8 ft. (4.8m) H-7 48.5 ft. (14.8m) Zia	Dirt to 17 ft. (5.2m) Boulders to 25 ft. (7.6m) Tuff to 65 ft. (19.8m). Boulder in pilot hole.
Shaft 54	10-20-72	5-23-73	62.8 ft. (19.1m) H-7 63.0 ft. (19.2m) Zia	Tuff. Hard from 15-35 ft. (4.5-10.7m)

TABLE T-~~II~~ III (continued)

EIGHT-FOOT (2.4m) and Six-Foot (1.8m) DIAMETER SHAFT DETAIL AT AREA T (continued)

Shaft Number	Date Completed	Date Filled	Approximate Depth	Substrate and Comments
Shaft 55	9-12-73	8-23-74	66.0 ft. (20.1m) Zia 62.0 ft. (18.9m) H-7	Dirt to 15 ft. (4.6m) Tuff to 66 ft. (20.1m)
Shaft 56	10- 6-72	6-22-73	63.0 ft. (19.2m) Zia	Boulders 18-22 ft. (5.5-6.7m) Tuff to 65 ft. (19.8m)
Shaft 57	8-23-74	4-20-75	25.0 ft. (7.6m) Zia	Boulders in bottom
Shaft 58	8-28-72	1-17-73	22.3 ft. (6.8m) H-7 24.0 ft. (7.3m) Zia	Boulders in 18-22 ft. (5.5-6.7m)
Shaft 59	9-17-74	8-1-75	54.0 ft. (16.5m) Zia	Boulders 15-20 ft (4.6-6.1m)
Shaft 60	10-16-72	8- 3-73	19.1 ft. (5.8m) H-7 63.5 ft. (19.4m) Zia	Tuff. Hard 15-35 ft. (4.6-10.7m)

SIX-FOOT (1.8m) DIAMETER SHAFT DETAIL AT AREA T

Shaft ~~6-15~~ 75	3-25-75		66.5 ft. (20.3m) H-7	4 ft. (1.2m) pilot hole

This table is composed of data from the Zia Company and Group H-7.

STUDIES AND MONITORING

Some of the earliest environmental monitoring surveys at LASL include data on Area T. In "Survey of Los Alamos and Pueblo Canyon for Radioactive Contamination and Radioassay Tests Run on Sewer-Water Samples and Water and Soil Samples Taken from Los Alamos and Pueblo Canyons,"[181] LAMS-516, data on fluid and soil are presented for Absorption Beds 1 and 2.

Two-liter samples were taken for the fluid analysis and 50 g samples were taken for the soil analysis. Analytical procedures are given on pages 5-7 of the report; see Fig. T-7 for location of Oct.-Nov. 1946 soil samples.

In April 1947 collection began of effluent samples from the DP-Site chemical sewer outlets, to be performed at 2-month intervals.[37] Samples were assayed for plutonium, polonium, and uranium. The first report was made October 20, 1947.[47]

> These water samples (a to e)*, in addition to being radioassayed, were submitted to the analytical group for a fluorine analysis. (Samples from the same sewer were taken at 3 different times of the day.)[47]

The result of the fluorine analysis for "DP West seepage, main drain," Area T, in mg of fluorine per 100 mc, was 4.2. "As soon as repair work on the hood is finished, all water samples will be prepared for a spectrographic analysis and radioassay will be continued."[47] The monthly report for October 21 to November 20, 1947,[48] gives a radioassay in c/m/l as 59 836 for plutonium and 5.8 for polonium. Samples collected September 26-30, 1947, were reported January 2, 1948.[49] "As expected the highest activity due to plutonium was found at DP-

Absorption Bed Tables on separate sheet

add material from back of this page at end of quote as indicated by red line.

W Seepage Pit Main Drain ("B") with 65 639 d/m/1."[49] The January 2, 1948, report[49] also included the analytical procedures for (1) polonium in water samples and soil samples, (2) plutonium in water samples and soil samples, and (3) uranium.

Records on studies and monitoring at Area T from 1948 to 1953 are not available at this time. In 1953 the USGS conducted a study[278] at Los Alamos to determine "the fate of plutonium contained in liquid wastes discharged onto or just below the surface of the earth."[278] Area T was one of the sites chosen. Five test holes were drilled in and around the absorption beds (Fig. T-8). Effort was made to gather samples at 0.3-m (1-ft) intervals. All samples were analyzed for plutonium, while three were selected for determination of ion-exchange capacity (Table T-~~IV~~ VI).

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> Despite the shortcomings of the sampling techniques, the patterns of plutonium concentrations from the various borings were reasonably good and each pattern may be considered as representative of the particular sample hole. Furthermore, certain characteristics concerning the travel of plutonium through the earth, sand, gravel, and rock media are indicated. These are:
>
> 1. No appreciable horizontal movement of the plutonium occurs in the first 20 feet of depth.
>
> 2. The plutonium is readily retained by the various earth media (sand, clay, gravel, and rock).
>
> 3. Apparently retention of the plutonium is greater in the finer materials.
>
> 4. Penetration of the plutonium into the underlying strata is not to be expected.[278]

V (9-17-76)

TABLE T-~~III~~ ~~IV~~

PLUTONIUM CONCENTRATIONS IN SAMPLES FROM 1953 TEST HOLES

(Table modified from Hermann 1953[278])

Date	Depth Below Surface	Description	Plutonium dpm/dry g	Notes
		DPW-1		
August 25-27, 1953	Surface	Very fine sandy soil	70	
	1'	Very fine sandy soil	8	
	2'	Very sandy soil	4	
	3'	Sandy soil	8	
	4'	Coarse sand and clay	4	
	5'	Sand	4	
	6'	Sand	4	
	6' - 10'	Sand	2	
	10' - 14'	Sand	2	
	15'	Sand	4	
		DPW-2		
August 25-27, 1953	Surface	Very fine sandy soil	9	
	1'	Very fine sandy soil	4	
	2'	Sandy soil	3	
	3'	Sandy soil	1	
	4'	Sand	2	
	5'	Sand	3	
	6'	Sand	2	
	7'	Sand and clay soil	4	
	8'	Sand	1	
	9'	Sand	3	
	10'	Very coarse sand	4	
	11'	Fine sand, some gravel	4	
	12'	Fine sand	3	
	13'	Fine sand	3	
	14'	Sand	3	
	15'	Sand	2	
	16'	Sand	4	
	17'	Sand	3	
	18'	Sand	2	
	19'	Sand	3	
	20'	Sand	3	
		DPW-3		
August 28, 1953	Surface	Very fine sandy soil	32	Hole drilled on a 45° slant extending under adjacent absorption bed. Depths given are slant depths.
	1'	Very fine sandy soil	5	
	2'	Very fine sandy soil	9	
	3'	Very fine sandy soil	7	
	4'	Sandy soil	8	
	5'	Sand	6	
	6'	Very sandy soil	4	
	7'	Very sandy soil	7	
	8'	Very sandy soil	3	
	9'	Sand and clay	3	
	10'	Fine sand	2	
	11'	Sand	2	
	12'	Loose tufaceous sand	450*	*Point of intersection with absorption bed.
	12.5'	Loose tufaceous sand	1510	
	13'	Loose tufaceous sand	1330	

TABLE T-~~III~~ IV (continued)

PLUTONIUM CONCENTRATIONS IN SAMPLES FROM 1953 TEST HOLES

(Table modified from Hermann 1953[278])

Date	Depth Below Surface	Description	Plutonium dpm/dry g	Notes
		DPW-4		
September 21, 24, 25, 30 and October 1, 1953	Surface	Sandy soil	8	
	1'	Sand and gravel, some clay	400	
	2'	Sand and gravel, some clay	36,100	
	3'	Sand and gravel, some clay	45,600	
	12'	Very fine loose tuff	1,400	
	15'	Fine sand	5,000	
	16'	Fine sand	5,100	
	17'	Loose tuff	720	
	18'	Sandy loose tuff	24	
	19'	Loose tuff	12	
	20'	Broken tuff core	12	
		DPW-5		
September 21, 24, 25, 30 and October 1, 1953	Surface	Sand and clay soil	410	
	1'	Sand and clay soil	600	
	2'	Sand and clay soil	10	
	3'	Sand and gravel	80	
	4'	Sand and gravel	3,400	
	5'	Solid tuff core from a boulder	530	
	6'	Solid tuff core from a boulder	80	
	7'	Friable tuff core	1,800	
	8'	Fine sand and clay	40	
	9'	Fine sand and clay	380	
	15'	Fine sand	2,400	

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TABLE T-~~IV~~

ION EXCHANGE CAPACITY OF SAMPLES

FROM THREE OF THE 1953 TEST HOLES

(Table modified from Hermann 1953 [278])

Sample Depth	Megascopic Description	Minerals Present (parts in ten)			Ion Exchange Capacity (me/kg)
DPW-3 at 12 ft. (slant)	Sandy to silty clay and gravel composed of gray pumiceous Bandelier tuff (probably Tshirege member). Due to 45° dip of hole, vertical depth of sample is 8.5 ft.	Clay <2 μ	Feldspar	4	17
			Montmorillonite	3	
			Hydrous mica	2	
			Kaolin		
			Cristobalite		
			Tridymite		
			Quartz		
		Silt 2-62 μ	Feldspar	4	
			Cristobalite	4	
			Tridymite	1	
			Quartz		
DPW-4 at 19 ft.	Gray tuff of Tshirege member of Bandelier tuff. Contains some bit-broken fine particles.	Clay <2 μ	Feldspar	4	7
			Cristobalite	4	
			Tridymite		
			Quartz		
		Silt 2-62 μ	Feldspar	5	
			Cristobalite	4	
			Tridymite	1	
			Quartz		
DPW-5 at 5 ft.	Dark gray to white pumiceous tuff. Apparently cored from a boulder.	Clay <2 μ	Feldspar	5	32
			Montmorillonite	2	
			Cristobalite		
		Silt 2-62 μ	Feldspar		
			Tridymite		
			Cristobalite		

a. DP West Laundry, Seepage Pit [Area V]
b. DP West Seepage, main drain [Area T]
c. DP East Seepage, main drain [Area U]
d. DP East drain from precipitron, actually carrying water from sprinkler system.
e. Tech Area Acid Sewer No. 3

A joint USGS[51]/LASL[38] study to determine distribution of plutonium previously discharged to the absorption beds was begun in October 1959 with the construction of a caisson 9.1 m (30 ft) deep, 1.8 m (6 ft) wide, by 3.6 m (12 ft) long, on the northeast corner of Absorption Bed 1.

> Horizontal holes 3 inches in diameter were drilled at 2 foot depth intervals to a depth of 12 feet so as to terminate at about the center of the seepage pit. At each 2 foot interval two holes were drilled 2 feet apart horizontally. In one hole, a 2 1/4 inch diameter plastic pipe was inserted with the far end sealed; ground tuff was inserted in the area between the pipe and the solid tuff. This hole was used for measurements of moisture. The companion hole was used for collection of liquid samples. Detail of the collection cup system is shown in Fig. T-9. A porous ceramic cup was inserted to the end of the drilled hole; the hole was back filled with ground tuff. Clay was inserted and capped with a molded cement plug at the caisson face around the vacuum release tubes.[38] See Fig. T-10). Table T-~~V~~ VII

A 17.8-cm (7-in.) long core sample for each 0.6 m (2 ft) of horizontal depth was taken when the holes were drilled. Part of each core was assayed for gross alpha (Table T-~~V~~). ~~II~~ VIII 10-29-76

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~~VII~~
~~VII~~
T. T-~~V~~

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TABLE T-~~V~~

CORE RECORD

Depth (ft)	No. Cores	Average Gross α (c/m/dry gram)	Gross α - All Cores (Max.)	(Min.)
6	10	3003	6613	4
8	7	1306	2850	11
10	8	1143	1872	12
12	6	821	1729	414
14	9	749	2094	1
16	9	732	1305	3
18	4	517	923	141
20	7	183	506	45
22	4	15	20	11
24	8	402	1038	175
26	10	13	88	2
28	6	28	155	2

~~Christenson and Thomas, 1962~~[38]

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In late 1960, after the first infiltration study, six deep holes were drilled at the periphery of Absorption Bed 1 ranging from 23.2 m to 30.2 m (76 ft to 99 ft) deep. They were lined with 6.4-cm (2.5-in.) plastic pipe. The holes were augered using compressed air to remove cuttings. Samples of cuttings were taken at 1.5-m (5-ft) intervals. "This core sampling procedure leaves much to be desired but results did indicate gross variations."[38] (See Fig. T-11 and Table T-~~VI~~ IX.)

The infiltration study for 1960 was done in the summer. DP-West raw waste flowed directly to Absorption Bed 1 for 1 month at an average rate of 32.9 m^3 (8700 gal) per day. The following month tap water was applied at a rate of 25 m^3 (6600 gal) per day. Moisture data were collected during and after these discharges. This was a preliminary study.

The 1961 infiltration study was similar to the 1960 one. Twenty-four cubic meters (6400 gal) per day of raw waste went into Absorption Bed 1 from June 30 to August 1. From August 2 through August 26, 26.9 m^3 (7100 gal) per day of tap water was applied. Sampling continued for an additional week after the application of tap water.

> Samples were collected, at each sampling depth, continuously during each day until 50 mls was obtained or 8 hours had elapsed. Five daily samples were then composited and used as the weekly sample.[38] (See Table T-~~VII~~ X.)

The objectives of the present study were to determine if and where water moved beneath a disposal pit and to ascertain if waste products moved with the water.[51]

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TABLE T-~~VI~~

DEEP HOLE CORE RECORDS

(Samples from "Wagon Drill" - Air Blown to Surface)[38]

Hole No.	No. Cores	Depth (ft.)	Gross α (c/m/dry gram) (Avg.)	(Max.)	(Min.)
1	10	76	2	3	1
A-1	10	83	24	34	9
2	11	93	698	3722	142
3	11	99	3	7	2
4	13	99	1.5	2	1
5	7	92	3	6	1

Christenson and Thomas, 1962[38]

TABLE T-~~VII~~ 11

ANALYSES OF 1961 SAMPLES

		Filt. Gross α c/m/ml	Milli-pore Filter Gross α c/m/ml	pH Un-Filt.	pH Filt	Phen. Alk.	Tot. Alk.	Total Hard-ness	Ca	Mg	Cl^-	NO_3^-	$SO_4^=$	Filt. Total Solids	Filt. Vol. Solids 400°C
Avg F	Wkly Raw Comp*	584		6.0	6.9	45	136	170	57	7	70	139	36	17,036	316
Avg F	Comp. #6	48			11.0	714	1381	161	32	20	102	146	44	11,808	
Avg W		6			8.6	22	261	190	52	14	17	9	18	3,868	2,012
Avg T		24			9.7	329	759	177	43	17	66	70	29	7,888	2,012
Avg F	Comp. #8	14			4.3	0	0	369	49	57	61	305	227	4,467	1,056
Avg W		14			6.4	0	175	510	64	84	77	356	272	6,286	1,012
Avg T		14			5.5	0	97	443	57	72	70	333	252	5,477	1,769
Avg F	Comp. #10	28			4.3	0	0	1820	74	393	73	350	288	8,417	752
Avg W		10			7.0	0	223	420	88	48	63	292	140	5,992	2,569
Avg T		18			5.8	0	124	1042	82	201	67	318	206	7,070	2,266
Avg F	Comp. #12	9			9.2							290		7,504	
Avg W		6			8.9	440	1720	325	70	36	180	363	140	9.768	1,988
Avg T		7			9.0	440	1720	325	70	36	180	345	140	8,636	1,988
Avg F	Comp. #14	165	148		3.7	0	0	4161	344	793	1112	436	355	34,622	8,548
Avg W		126	108		4.0	0	0	4190	256	852	838	406	413	32,340	7,131
Avg T		143	122		3.8	0	0	4177	295	826	960	419	387	33,386	7,367
Avg F	Comp. #16	11			7.2	35	390	994	80	191	60	310	47	5,156	552
Avg W		6			8.8	72	855	310	80	33	102	208	73	7,822	1,491
Avg T		8			8.1	56	648	614	80	99	83	253	61	6,637	1,335
Avg F	Comp. #18	79	70		3.8	0	0	7375	625	1395	1526	446	603	52,232	14,036
Avg W		36			5.4	0	84	3290	284	619	610	432	343	34,616	12,874
Avg T		55			4.7	0	47	5106	436	964	1017	438	460	42,445	13,068
Avg F	Comp. #20	0			4.7	0	15	2948	254	555	202	410	96	13,999	2,808
Avg W		15			4.4	0	0	3580	346	654	132	419	167	20,013	5,218
Avg T		11			4.5	0	7	3299	304	609	158	415	141	17,340	4,812
Avg F	Comp. #22	8			3.9	0	0	6188	431	1186	370	464	543	40,733	11,152
Avg W		10			3.0	0	0	5510	436	1061	212	470	341	34,127	11,097
Avg T		9			3.9	0	0	5602	436	1116	282	467	431	27,063	11,106
Avg F	Comp. #24	127	107		4.0	0	0	3103	244	598	160	463	300	20,958	3,968
Avg W		47			4.7	0	13	3300	252	641	159	451	310	20,951	5,555
Avg T		83			4.4	0	7	3212	248	622	160	459	350	20,956	5,289
Avg F	Comp. #26	20			4.5	0	0	4775	346	939	204	463	342	31,430	7,120
Avg W		4			4.5	0	2	4610	408	862	167	455	219	24,718	7,691
Avg T		11			4.5	0	1	4683	380	896	181	459	266	27,718	7,596
Avg F	Comp. #28	19			5.5	8	150	5470	239	1170	169	457	271	22,344	7,464
Avg W		1			7.7	2	137	900	112	149	65	330	115	8,086	2,388
Avg T		9			6.7	4	143	2931	168	602	111	386	184	14,395	3,234

Code: F = Waste: W = Water: T = Total

*Unfilt. Gross α (c/m/ml) - 565: Unfilt. Tot. Solids - 5454
Unfilt. Vol. Solids (400°C) - 396:
Unfilt. Vol. Solids (600°C) -1868

Ref. 36

Filt. Vol. Solids 600°C	F^-	Na	K	Surface Tension Dynes/cm	C.O.D.
10,596	200	197	1245	45.5	73
2,605	230	942	2927	42.3	322
3,619	76	138	118	52.7	50
3,168	144	494	1366	48.1	171
2,359	33	801	112	32.8	353
4,048	36	1127	84	51.0	705
3,297	34	982	96	51.6	548
2,851	48	1878	271	52.2	278
6,218	52	790	104	51.8	392
4,500	50	1273	156	52.0	339
2,940	220				
2,772	280				
2,856	265				
17,175	233	3620	1006	53.2	67
16,478	228	3825	1203	53.2	219
16,788	230	3734	1115	53.2	152
1,769	153	1005	709	51.5	136
2,916	280	1099	2518	46.1	461
2,406	223	1057	1714	48.5	271
24,017	245	5900	1531	56.0	76
24,630	220	3274	1488	54.2	208
24,357	231	4441	1551	54.8	158
5,789	123	1610	477	53.2	52
9,647	228	2216	920	56.9	99
7,932	181	1989	747	55.5	81
18,541	245	4794	895	42.1	358
18,770	280	3682	895	57.1	308
18,680	264	4176	895	54.9	327
8,565	173	3729	675	54.3	242
9,813	188	2646	898	53.3	470
9,289	181	3127	799	53.7	368
15,268	240	3472	628	52.0	291
14,086	208	2642	704	57.5	201
14,612	222	2953	675	56.0	227
10,608	175	3083	371	55.1	302
5,161	76	1008	1260	55.7	85
7,583	120	2391	851	55.3	253

The 1961 study was reported by both the USGS and LASL. The USGS report[51] stated

> [1]...that waste water movement may have changed some of the physical properties of the tuff, such as pore and particles sizes. [2] Some of the wastes discharged in the east end of the disposal pit may have moved laterally through the sand material (Bed A on Sketch C and D, Fig. T-10) along the sloping top of the tuff and then vertically into the tuff. [3] The lower moisture values...seem to coincide with areas of tuff in which the greatest amount of staining had occurred. The stained areas may indicate a different stage of weathering than that at the clay layer due to alternate wetting and drying cycles...

Fig. T-10

no 9

> [4] The tuff is extensively jointed (Fig. T-10), and the tendency for a liquid to move through the joints is indicated by higher gross alpha count of a 1000 per minute per dry gram at the 20' depth... [5] [There were] several open joints...below a depth of 25 ft. Waste water had penetrated the fineline joints to depths of at least 22 feet and subsequently altered the tuff adjacent to the joint as much as one-quarter inch. Clays developed locally and impeded drainage so that the joints retained water to the extent that the moisture content of the tuff was locally as much as 35%....

no 9

> [6] ...Water in the low moisture range apparently moved to depths greater than 90 feet. Water in unknown quantities moves through open joints or joints enlarged by solvents in the waste.

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no ¶ [7] ...Below a depth of about 15-20 feet the alpha activity was low, except for local areas of high alpha activity where water carried the activity along the joints. Rapid movement of water through joints was substantiated during infiltration studies....[51]

The LASL report[38] stated (1) a high concentration of potassium salts affects the movement of plutonium. (2) A low concentration of aluminum and silicon in the samples of liquid removed indicates that plutonium was not being transported on colloidal clay of such a size as to escape filtration by the tuff.

[3] ...total hardness and total solids may be correlated with alpha activity. [4] That both total solids and total hardness tend to increase with depth ...suggests solution or resolution of previously deposited material...

no ¶ [5] There is some indication of an inverse relationship between gross alpha content and pH...

no ¶ [6] ...It has been deduced from the irregularity of the curves obtained from data for holes 1, A-1, and 2, that percolating groundwater may be perched,... or may travel rapidly along fissures as seen by a sudden decrease in percent moisture which indicates rapid drainage from the area. These two factors will exert a marked influence on the accumulation and sorption of radionuclides in the areas involved...

no ¶ [7] ...Under field conditions, plutonium species have been shown to penetrate to at least 28 feet. That this penetration takes place along fissures is indicated by moisture data, rates of flow of liquid and by physical inspection...

no ¶ [8] ...It is apparent that one cannot extrapolate from laboratory studies on intact core sample to conditions which prevail in the field....[38]

Before the excavation of the shaft field at Area T, a reconnaissance study[36] was made of the absorption beds, in January 1967. Water samples were collected for radiochemical analysis from DPW-1A, DPW-3, the caisson (see Fig. T-8), and a sample of weathered tuff beneath the gravel fill of Absorption Bed 1 near the caisson. The water samples showed only background amounts of gross alpha and gross beta-gamma and no plutonium or uranium. Tritium analysis of the water samples gave approximations for DPW-1A as 462 DPM, for DPW-3 as background, and for the caisson as 2000 DPM. The sample of weathered tuff had a gross alpha count of 978 c/min/g (1956 dis/min). Observations in January 1967 are as follows:

> Effluents from DP-East have at times partially filled the shaft [caisson] near Pit 1 [Absorption Bed 1] thus creating a more localized point for infiltration for liquids. Test holes DPW-1A and DPW-3 contained some effluent at the time of observation. It is supposed that the water in DPW-3 moved down the outside of the casing from water ponded in the pit.[36]

Moisture contents of the tuff were logged in holes DPW-1, DPW-2, and DPW-5 at selected depths.

> A comparison of the moisture content with previous moisture measurements (March 1961 prior to the addition of 389 thousand gallons of tap water and effluents in August 1961 during the study) is shown in Table T-VIII.

> The January 1967 measurements at hole DPW-1 show the effect of the 1.9 million gallons of effluent from DP-East in which the maximum concentrations of water have moved from the depth of 12 feet (40 percent, August 1961) to 40 feet (41 percent, January 1967). The hole is next to the shaft [caisson].

XI 10-29-76

TABLE T-~~VIII~~ ~~IX~~ X

MOISTURE CONTENT OF TUFF ADJACENT TO TEST HOLES

DPW-1				DPW-2				DPW-5			
Depth (ft.)	Percent Moisture (by volume) 3-17-61	8-23-61	1-30-67	Depth (ft.)	Percent Moisture (by volume) 3-18-61	8-23-61	1-30-67	Depth (ft.)	Percent Moisture (by volume) 3-19-61	8-25-51	1-30-67
1	22	28	34	1	26	34	39	1	20	20	36
5	24	34	37	4	25	38	40	5	16	16	26
8	18	38	39	8	30	24	30	10	19	20	26
12	13	40	22	12	25	50	30	15	20	25	29
16	14	34	22	16	22	60	28	20	17	22	25
20	16	35	40	20	16	50	18	25	13	19	18
24	18	30	34	24	24	50	28	30	12	16	15
28	16	27	36	28	25	50	50	35	13	18	20
32	28	36	39	32	22	50	50	40	13	20	18
36	18	29	41	36	20	50	47	45	11	16	16
40	14	23	41	40	10	44	16	50	13	21	20
44	14	27	36	44	10	46	16	55	12	19	20
48	14	29	30	48	10	42	17	60	12	14	16
52	16	34	30	52	12	44	22	65	12	15	17
56	14	28	19	56	14	40	25				
60	13	23	16	60	15	28	22				
64	13	22	26	64	12	24	17				

Note: Water level DPW-1A 1-30-67 24.2 feet
Water level DPW-3 1-30-67 50.3 feet
DPW-4 Destroyed
Depth of DPW-1, 76 ft; DPW-2, 93 ft; DPW-5, 92 ft.
Logging length of cable - 65 feet in 1967.

Purtymun, 1967

> The moisture measurements in DPW-2 and DPW-5 show a general decrease in moisture content of the tuff from August 1961 to January 1967. The indication is the most of the effluents released into Pit 1 [Absorption Bed 1] have moved down in the area of the shaft, a focal point for collection and infiltration of effluents into the tuff.[35]

On the basis of previous studies and this reconnaissance, it was concluded that

> ...the movement of the effluents in the tuff underlying the seepage pits [absorption beds] is mostly downward beneath the pits. The plutonium moves with the effluents and the data indicate that most of the plutonium is retained by absorption in the upper 20 feet of the tuff. Some, however, may move to greater depths through open joints.[36]

An average of 10 cuttings samples per shaft have been taken from most of the shafts augered at Area T. These samples are analyzed for tritium and plutonium. Most of these data are unpublished to date.

In March 1974[182] a survey to gather surface and subsurface data for the proposed location of the retrievable waste storage facility was begun. The retrievable waste storage facility is a pit dug between Absorption Beds 1 and 3, west of the shaft field. The pit is dug to within 1.5 m (5 ft) of Absorption Bed 3 and to within approximately 6 m (20 ft) of Absorption Bed 1, and extends several feet west of both of them.

March 22, 1974, the plutonium-americium surface contamination and external radiation survey[183] was completed. Three monitoring stations were over Absorption Bed 1; six monitoring stations were over the proposed pit; and one monitoring station was over Absorption Bed 3. A LAFPHA/FIDLER sys-

tem was used to measure the plutonium-americium surface contamination. External radiation levels were measured by a calibrated Reutor Stokes high-pressure ionization chamber dosimetry system, Model RSS-111. The basic conclusions of the survey were:

1. There is no Pu surface contamination (less than approx. 1.2 $\mu Ci/m^2$) within the boundaries of the fenced site.*

2. Americium-241 was detected in Pit # 1 [Absorption Bed 1], but at a level of only 1.1 Ci/m^2 assuming surface contamination.

3. No significant levels of external radiation could be attributed to the radioactivity with the waste pits 1 and 2 of Area T.**

*The "fenced site" is the part of Area T which does not include the shaft field.
**Typographical error. Should read Absorption Beds 1 and 3.

Seven holes were augered in April 1974, within the boundaries of the proposed pit. The depth of the holes was 12 m (40 ft). Samples were collected at 0.8-m (2.5-ft) intervals from 0.3 to 3 m (1-10 ft) and at 1.5-m (5-ft) intervals from 3 to 12 m (10-40 ft). Samples were analyzed for moisture content, gross alpha, gross beta-gamma, tritium, and plutonium ~~238, 239~~ 238/239. Complete analyses are not yet available.

Six holes were augered in the shaft field in May 1974. They were located so as to encounter a "boulder bed" which occurs at a depth of 4.5 - 7.6 m (15-25 ft) below the surface. The samples were collected at the same intervals and analyzed for the same things as those from the seven holes augered in April. Complete analyses are not yet available.

Fig. T-1. Map of Area T showing LASL coordinates

This is missing (have it)
if you know Eng. Drug #s
please write it
in so I can order it.

June 1974
Area T map
see Harold Hidy

Check your own materials.
I brought that map of le
date just before left works;
and look it in to your
office. Reduced map on
mylar

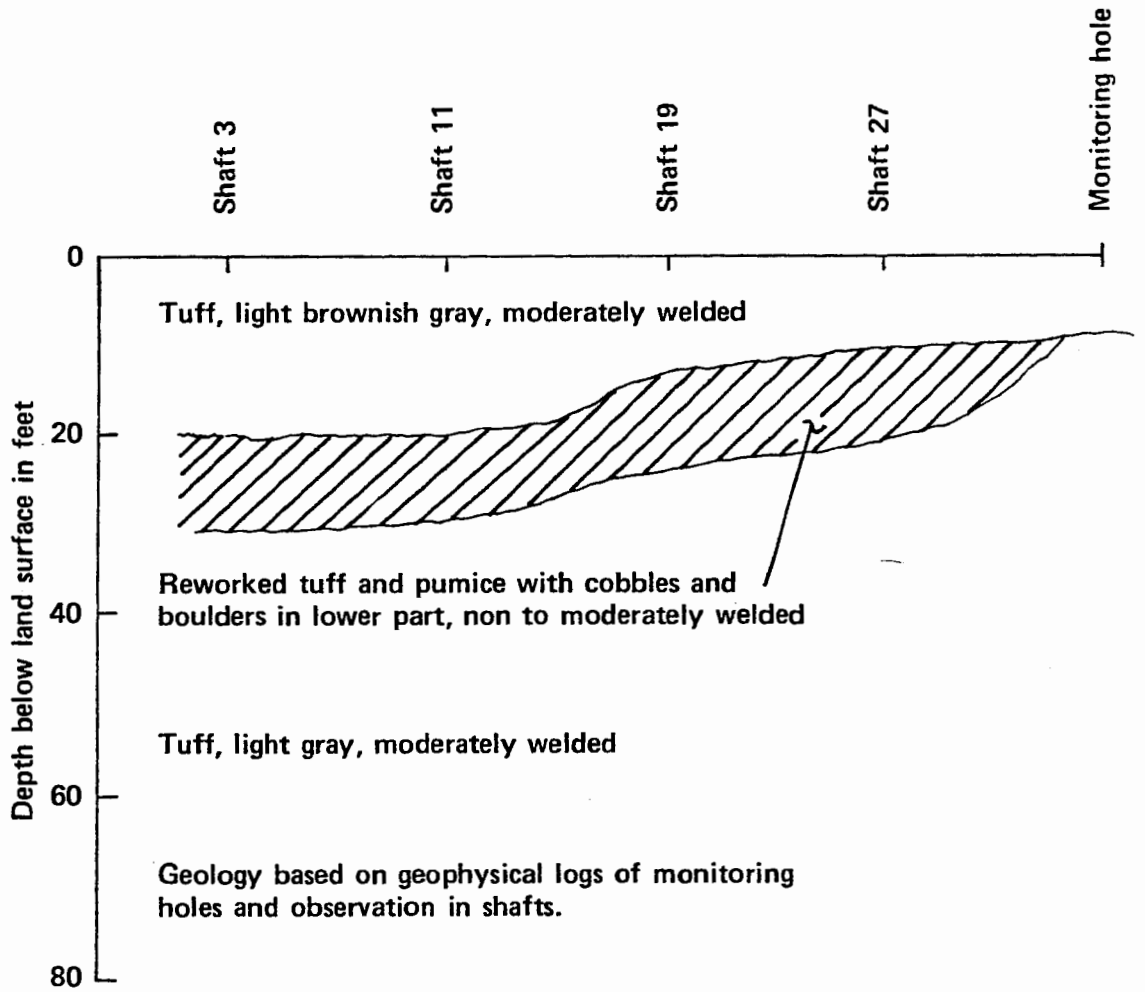

Fig. T-2. Section from Shaft 3 to Shaft 27

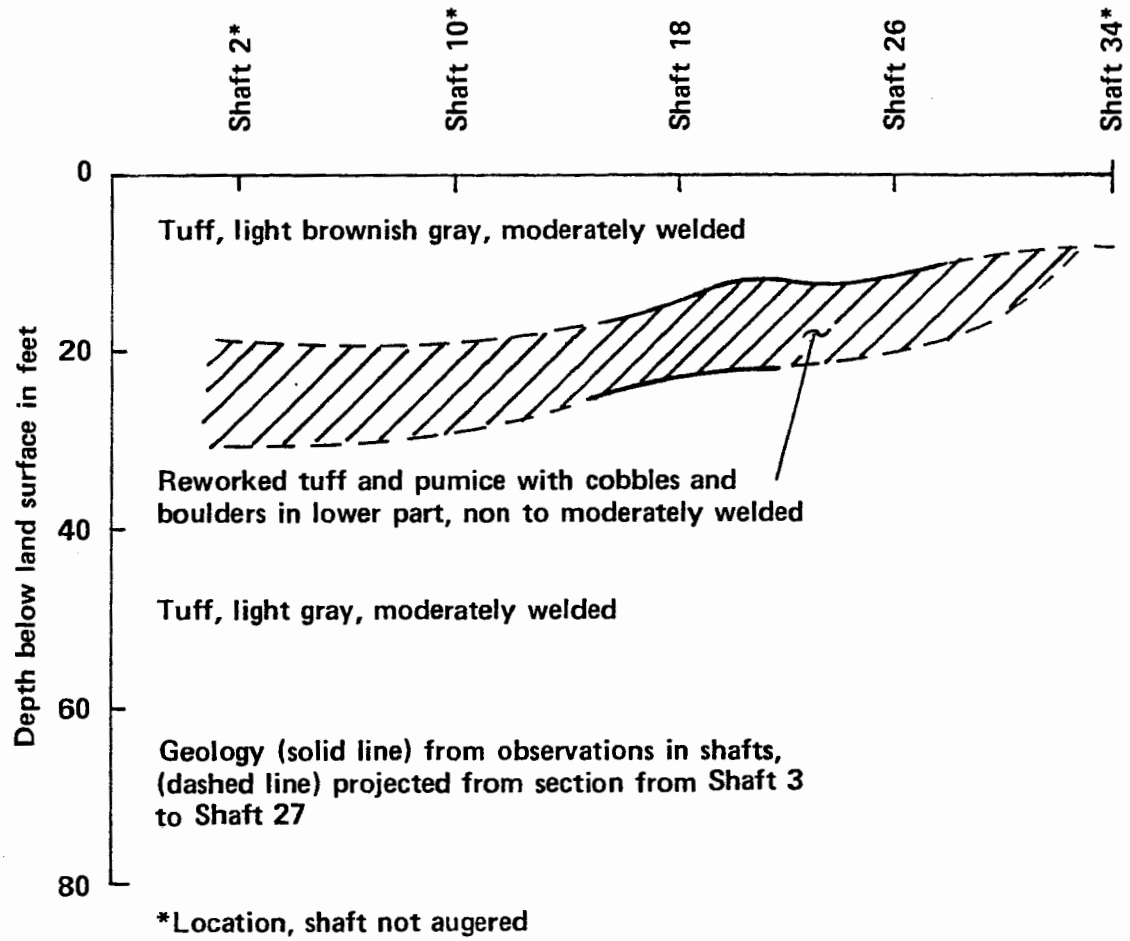

Fig. T-3. Section from Shaft 2 to Shaft 34.

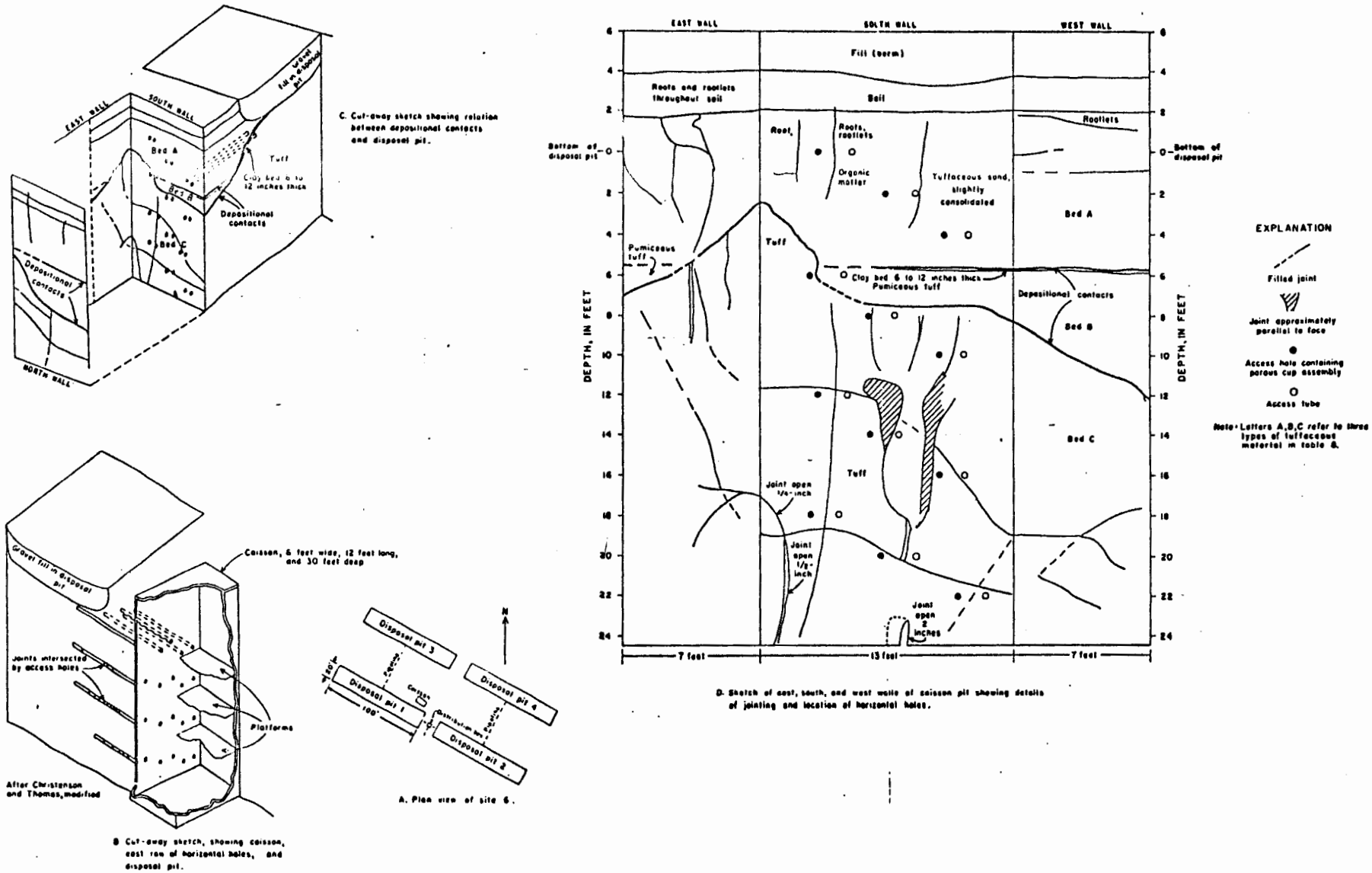

Fig. ~~T-8~~ 10. Diagrammatic sketches of installations and caisson pit at ~~Site 6.~~

Abrahams, 1963[51]

(has been redrawn)

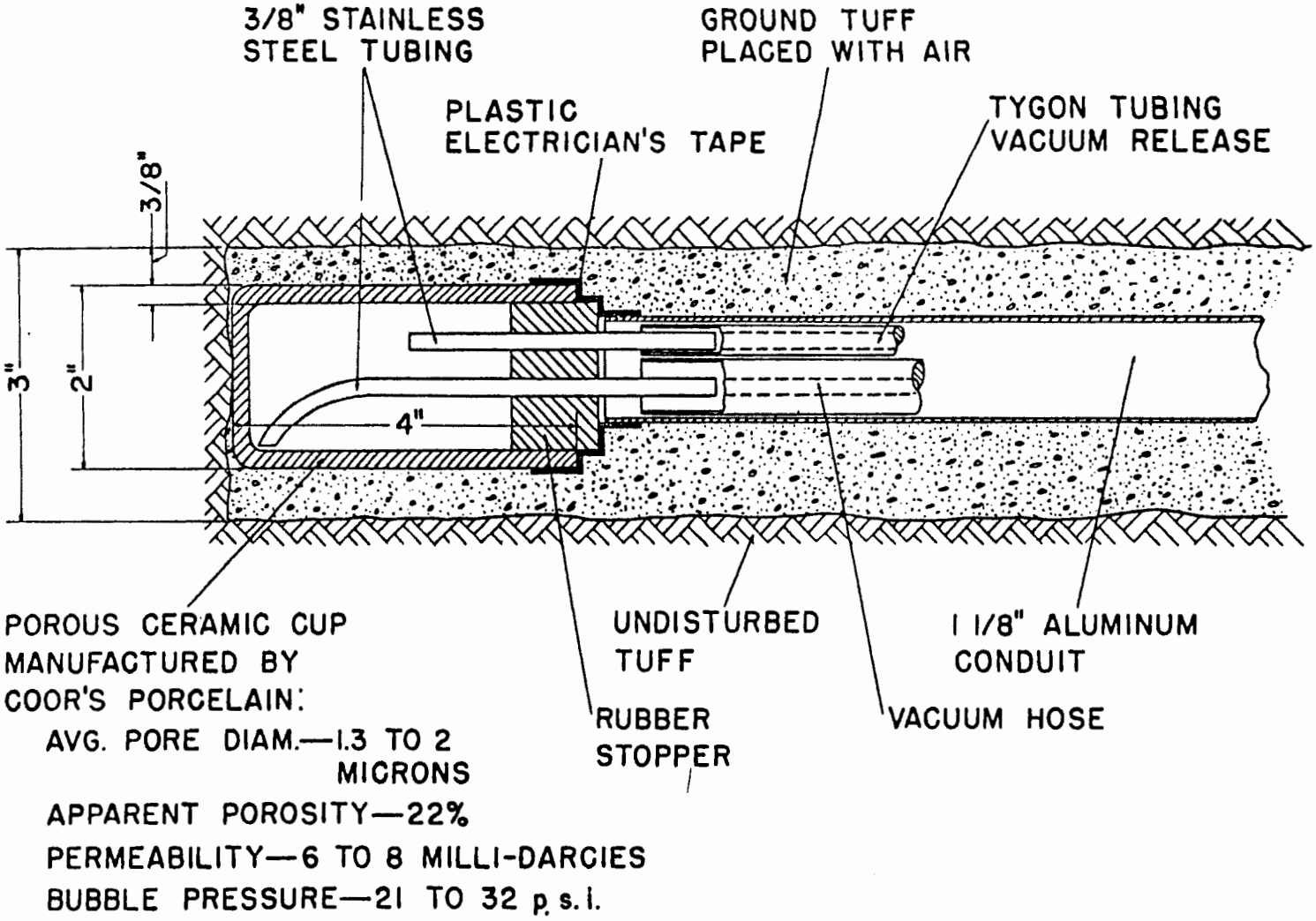

Fig. T-9. VACUUM CUP SYSTEM

Note:
Not yet [illegible] to [illegible] type C.

APPENDIX A

Current Waste Disposal Practices For Routine and Non-routine Waste

All solid waste generated in all designated contaminated areas is disposed of in the radioactive disposal areas of the Laboratory. Since August 1972 Laboratory generated wastes taken to Area G, TA-54, have been segregated according to their radioactive contaminants and radioactive level before being placed in disposal pits or disposal shafts. Waste contaminated with transuranic radionuclides at concentrations above 10 nCi/g for ^{239}Pu, ^{241}Am, and ^{233}U or above 100 nCi/g for ^{238}Pu are placed in 20 year retrievable storage per AECM 0511. These wastes constitute about 10% of the Laboratory total. Waste contaminated with transuranic radionuclides at concentrations less then 10 nCi/mg for ^{239}Pu, ^{241}Am, and ^{233}U or less than 100 nCi/g for ^{238}Pu; with uranium; with fission products; with induced activities; and with tritium are not required to be stored retrievably; however, they are segregated prior to disposal.

PACKAGING

In general, the LASL packaging policy for solid radioactive waste is that wastes must be packaged so they will not contaminate transport containers or contaminate or irradiate personnel during transport. When necessary, special cases are checked to assure that Department of Transportation (DOT) regulations are met. After disposal packaging is not expected to remain intact with the exception of that for retrievable transuranic wastes. Packaging guidelines are listed in current waste disposal operating procedures

Routine Non-Retrievable Transuranic Waste

Routine non-retrievable transuranic (TRU) waste consists mainly of laboratory generated trash such as cheesecloth, paper, gloves, metal, glassware, and other small laboratory items. Most of this waste type is generated at the CMR Building, TA-3, and at DP-West, TA-21.

In the CMR Building laboratories this waste is placed in plastic-lined, $0.06m^3$ ($2\ ft^3$) cardboard boxes held in metal fireproof containers or in plastic-lined, metal, flip-top cans. The small plastic bags from the flip-top cans are removed when filled, sealed with masking tape, and deposited in the $0.06m^3$ ($2\ ft^3$) cardboard boxes. Waste packages are marked with tape reading "Caution - Radioactive Waste". They are also marked combustible or noncombustible and with the room and wing number and the date. Before the packages are loaded into a Dempster Dumpster labelled "Radioactive Trash Only" they may be monitored by a Health Physics Surveyor.

At DP-West this waste is collected in plastic-lined, $0.06m^3$ ($2\ ft^3$) cardboard boxes held in 115 ℓ (30 gal) drums. When full, the boxes are taped shut and monitored with the Multienergy Gamma Assay System (which permits monitoring of the x-ray region for the sub-10 nCi/gm activity levels) before being placed in marked Dempster Dumpsters (see Fig. 1).

The other major source of routine non-retrievable TRU waste is the product of liquid radioactive waste treatment. De-watered sludge from the Liquid Waste Treatment Plant at TA-50 is batch assayed to determine whether it is retrievable or non-retrievable. If non-retrievable, the material is

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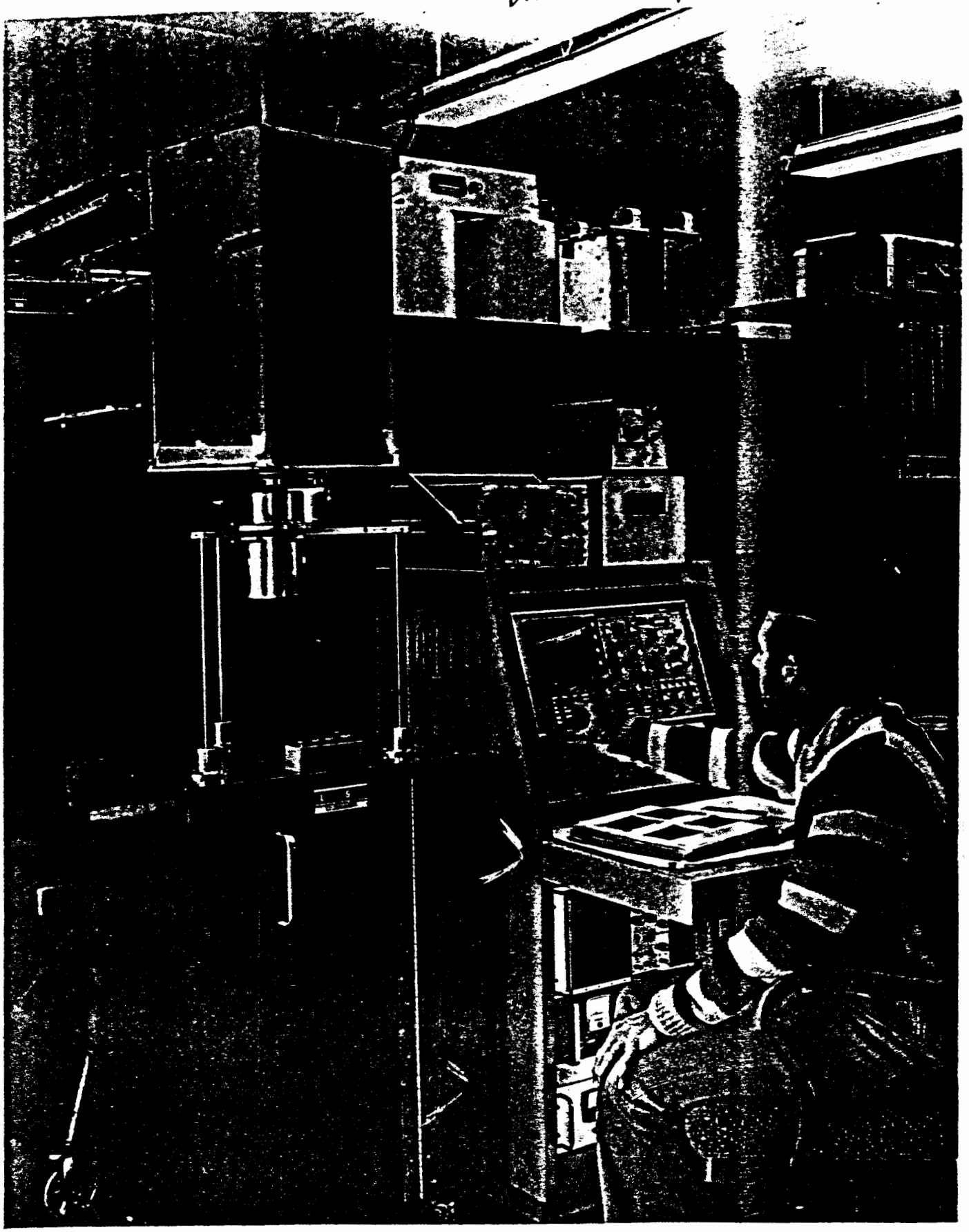

Fig. 1

packaged in 5 mil plastic-lined 210 ℓ (55 gal) mild steel drums which are loaded onto a skip-type Dempster Dumpster for transport to Area G. At the TA-21 Liquid Waste Treatment Plant batch assay also segregates non-retrievable from retrievable waste. Non-retrievable waste is mixed with cement to form a past which is pumped down shafts augered in the tuff at Area T.

Routine Retrievable Transuranic Waste

Routine retrievable TRU waste is generated at a rate of 280-420 m^3 (10 000-15 000 ft^3/yr.) at DP-West, TA-21; the CMR Building, TA-3, and the Liquid Waste Treatment Plants, TA-21 and TA-50. This waste consists of ^{239}Pu (weapons grade) contaminated residues and trash, ^{238}Pu contaminated residues and trash which were once shipped to the Savannah River Plant as "scrap", and $^{239}Pu/^{241}Am$ cement paste and de-watered sludge produced as a result of liquid waste treatment. Most of this waste (by volume and activity levels) comes from gloveboxes, hoods, and equipment in processing and research and development areas.

Much of this waste is packaged in Department of Transportation (DOT) 17C and H 115 and 210 ℓ (30 and 55 gal) drums. Generally, the drums are lined with several layers of 5-10 mil plastic. In the case of drums used to hold de-watered sludge, a 90 mil high=density crosslinked polyethylene liner is used. All drums are sprayed with Texaco Rust Proof CPO-L immediately prior to storage.

Items too bulky to be placed in drums are packaged in fiberglass-coated wooden crates. Size of crates used varies from 1.2m x 1.2m x 2.4m (4' x 4' x 8') to 1.5m x 2.4m x 9.1m (5' x 8' x 20'). The fire-retardant fiberglass coating on the

crates is approximately 0.32 cm (1/8 in) thick.

In the processing and recovery areas at DP-West, retrievable TRU waste from the glovebox lines is placed in a 12 mil polyvinyl chloride (PVC) tubing and sealed at both ends by wire and tape before it is cut off. The PVC packages are put in 10 mil polyethylene (PE) bag-lined 115 or 210 ℓ drums. All drums are then assayed on a boron trifluoride (BF_3) assay system which has a sensitivity of about 0.1 g/drum (see Fig. 2).

Retrievable TRU cement paste from the Liquid Waste Treatment Plant at TA-21 (TA-21-257), which is about 10% of the total Laboratory waste volume, is pumped into 76.2 cm (30 in) diameter, 6.1 m (20 ft) long corrugated metal pipes. Each pipe has a 0.6 m (2 ft) "cold" concrete plug at both ends.

Routine Low-Level Beta-Gamma Waste

Routine low-level beta-gamma waste in the CMR Building is packaged similarly to routine non-retrievable TRU waste. The filled cardboard boxes are monitored by a Health Physics Surveyor to assure the radiation level on the outside of the package does not exceed 5 R/hr.

Routine High-Level Beta-Gamma Waste

Routine high-level beta-gamma waste from the hot cells of Wing 9, CMR Building, is packaged in 3.8 ℓ (1 gal) metal cans placed in a plastic cannister. The level of activity of each cannister is read at a distance of 1 meter and at contact. Two cannisters are then loaded into the plastic-bag lined, lead transport container (see Fig. 3). The plastic bag is used only to insure that the cannisters do not hang when the transport container's trap-door is opened.

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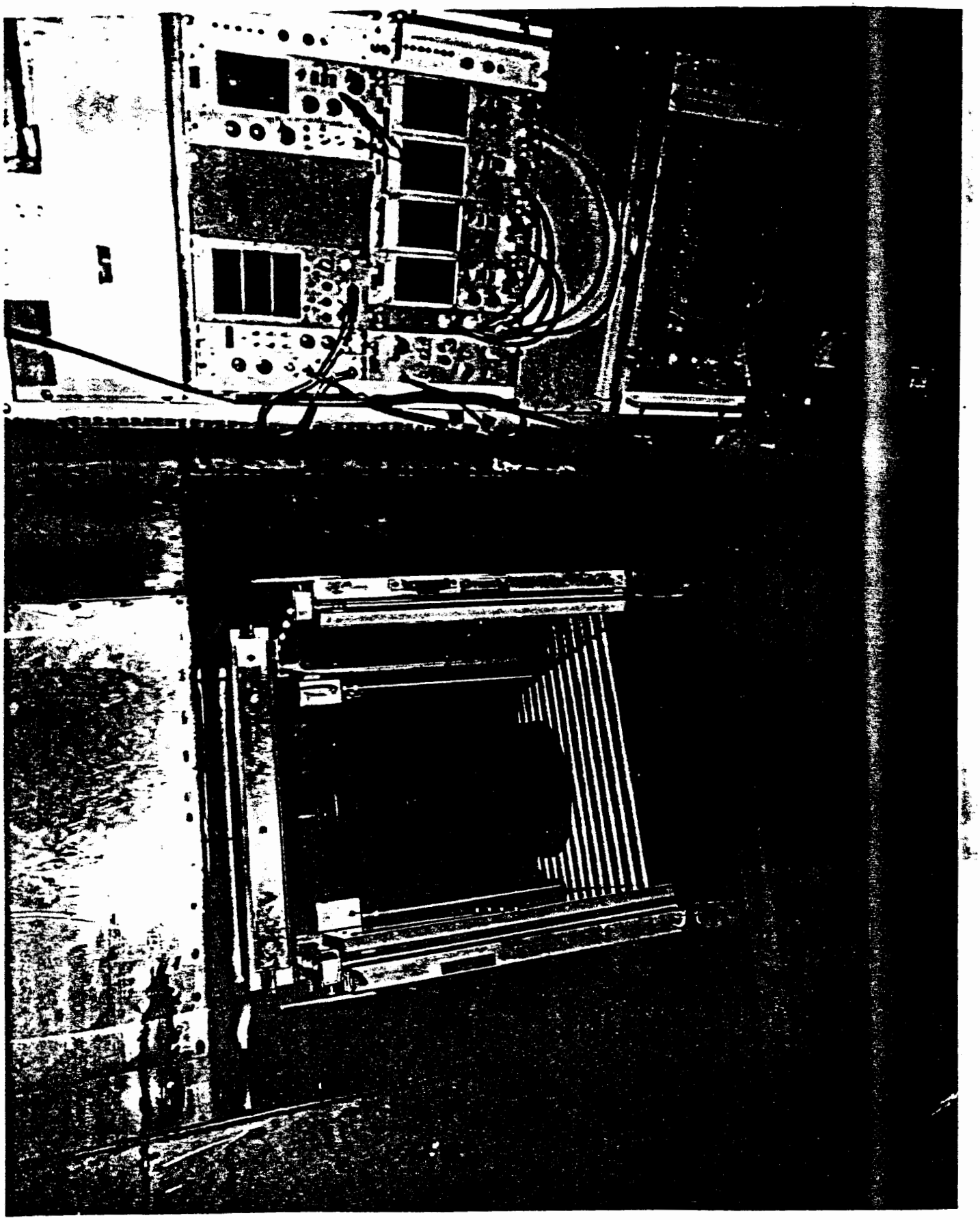

Fig. 2

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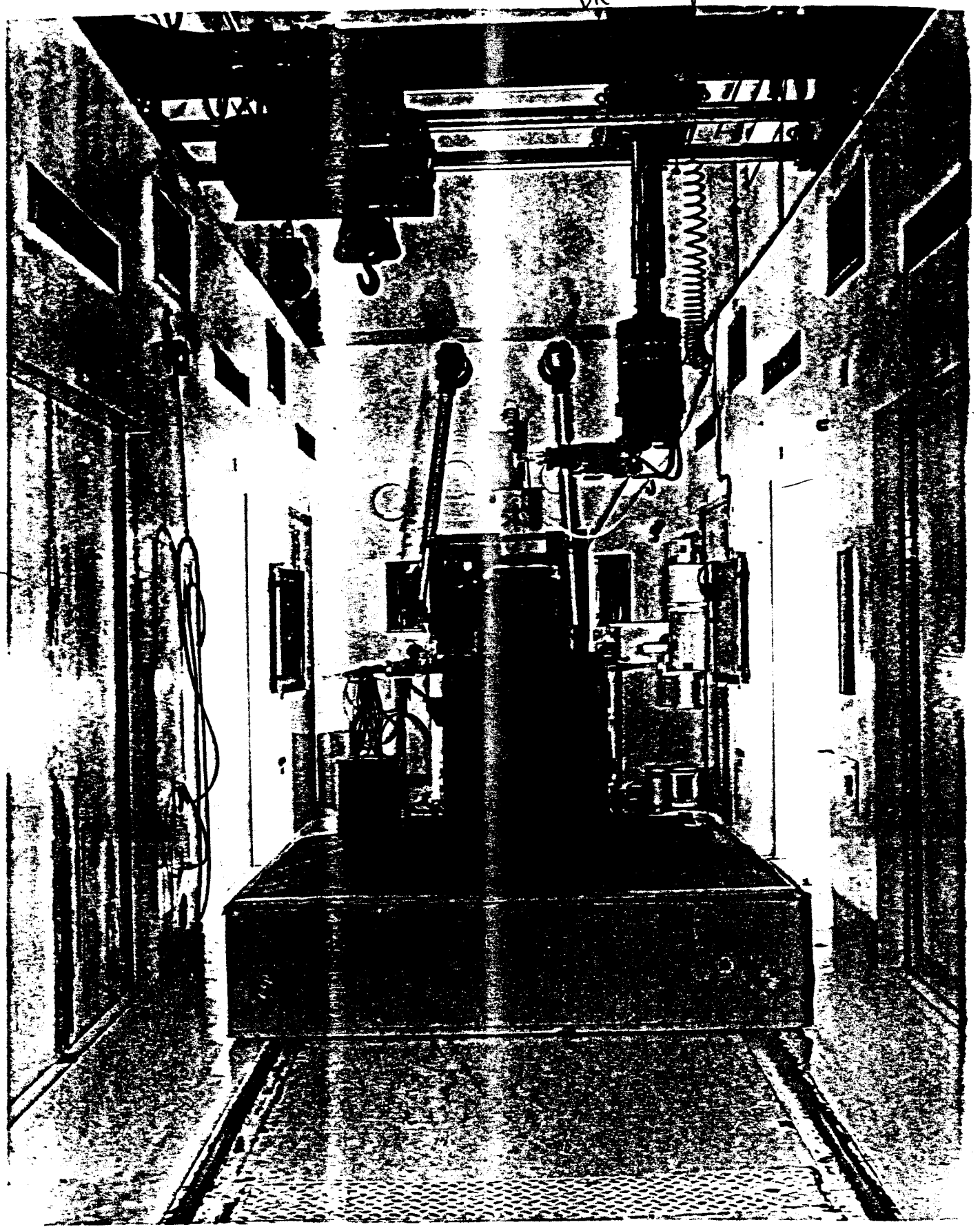

Fig. 3

Routine Tritium Waste

Routine tritium waste, 4.2-5.6 m^3/yr (150-200 ft^3/yr) is packaged in asphalt-lined 115 or 210 ℓ drums.

Other Routine Wastes

Other routine wastes are: 1) contaminated oil (several m^3/yr) which is sorbed onto vermiculite and packaged in 115 or 210 ℓ drums, 2) contaminated chemicals which are neutralized and/or sorbed onto some neutral material and packaged in metal containers filled with sorbent material, 3) contaminated animal tissue, roughly 2.8 m^3 (100 ft^3)/yr, from the laboratories in the HRL Building, and 4) contaminated classified material which amounts to 4.2-5.6 m^3/yr (150-200 ft^3/yr).

Non-Routine Wastes

Non-routine wastes such as large pieces of laboratory equipment and machinery and wastes generated during facility renovation and decommissioning projects may or may not be packaged depending upon the level of contamination or whether the contamination is contained. The decision to package is made by Group H-1 and Group H-7. Materials which pose packaging problems are handled on an individual basis, e.g. filter plenums from the CMR Building which were not packaged but had all openings sealed with metal flanges.

TRANSPORTATION

Transportation of radioactive waste is carried out under guidelines set up in standard operating procedures. Dempster Dumpsters [3.1 or 7.7 m^3 (4 or 10 yd^3) capacity], dump trucks,

flat-bed trucks, and pickup trucks are used as transport vehicles.

Dempster Dumpsters are used to transport approximately 50 % of the routine laboratory waste. Dumpsters are emptied when full. Dumpster deliveries are accepted twoic a week at Area G. Regular Dempster Dumpsters transport non-retrievable transuranic waste from the CMR Building. TA-3, and DP-West, TA-21 and also low-level beta-gamma waste from the CMR Building. "Skip-Type" Dempster Dumpster can carry 9 210 (55 gal) drums per trip. This type of dumpster may be used to carry: 1) sludge drums of non-retrievable or retrievable transuranic waste from the Liquid Waste Treatemtn Plant at TA-52, 2) drums of depleted uranium chips and turnings from the shops department area, 3) retrievable transuranic waste from the CMR Building and DP-West, 4) tritium waste, 5) contaminated oil and, 6) contaminated chemicals.

High-level beta-gamma waste from the CMR Building is transported in a lead transport container chained to a specially designed flat-bed truck (see Fig. 4).

Routine escort of transport vehicles is provided for depleted uranium chips and turnings because of the possibility of fire and for classified contaminated material. Radio-equipped H-7 vehicles which have communication on the H-Division, Zia Company, fire department and police department networks provide the escort. Supply and Property (SP-2 Group) personnel also escort classified contaminated material since they must prepare the proper documentation for its disposal.

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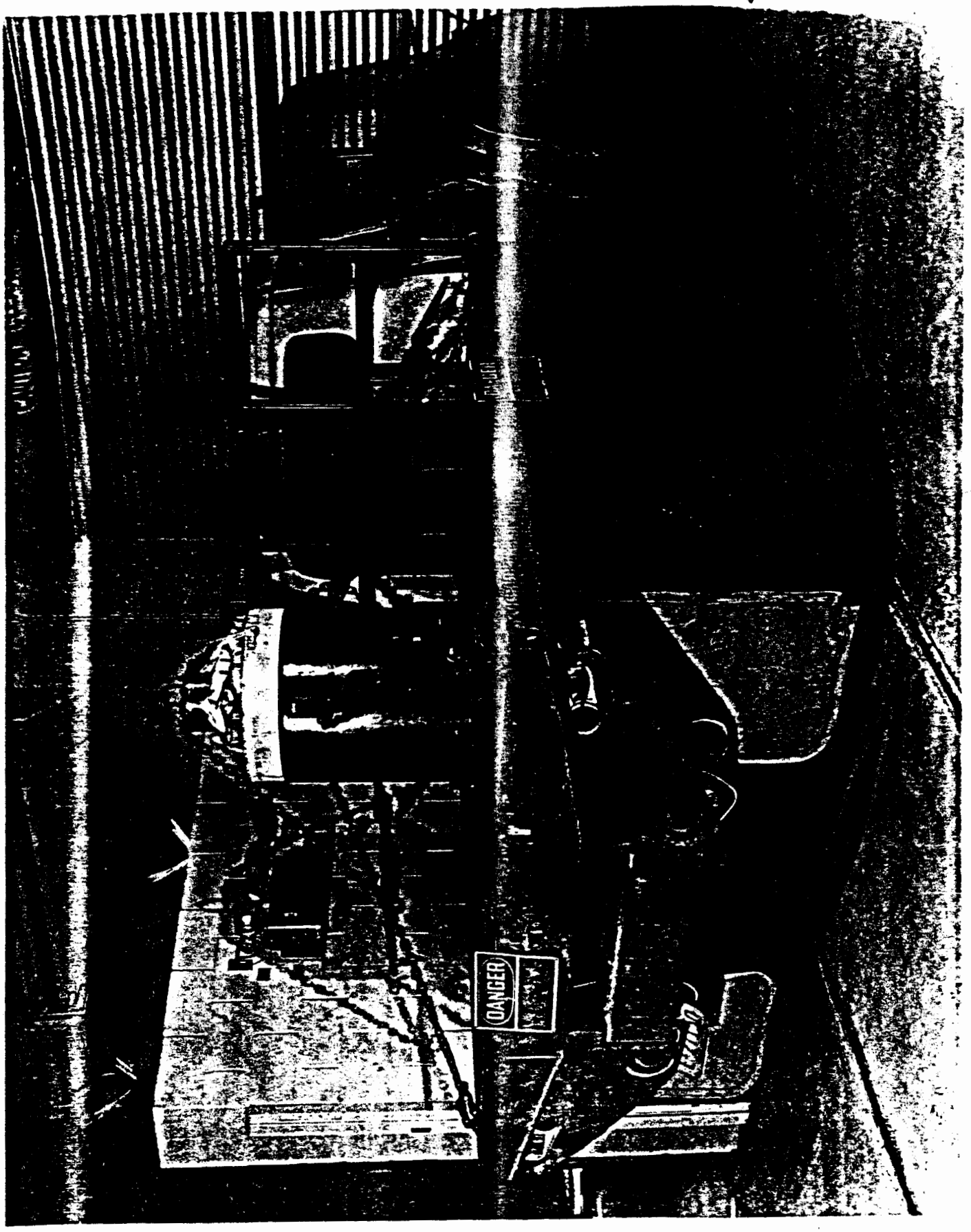

Fig. 4

DISPOSAL

Pits, shafts and trenches are used for burial and storage of wastes. Pits are approximately 8 m (24 ft) deep and vary in length from 122-183 m (400-600 ft) and in width from 8-30 m (25-100 ft). Shafts vary in diameter from 0.6-2 m (2-6 ft) and in depth from 8-18 m (24-60 ft). Trenches are shallow, approximately 4 m (12 ft) wide and as long as 81 m (265 ft).

Pits

There are designated pits for non-retrievable TRU waste, uranium and lower level* beta-gamma (which contains no TRU) waste and retrievable TRU waste. The pits used for the first two waste categories differ in construction, waste covering operations, and monitoring activities from the pit used for the last waste category.

The retrievable TRU waste is stacked in a 8m (25 ft) deep pit 122 m (400 ft) long and 8 m (25 ft) wide. The bottom of the pit is graded and asphalt paved and curbed to promote drainage away from the wastes. Any moisture moving on the asphalt survace drains into sumps at one end of the pit where it is sampled for contamination and if necessary, is removed to the liquid waste treatment plant.

Waste materials are stacked within the curbing to a height of about 1 m (3 ft) below the ground surface for a pit length of about 17 m (55 ft). The waste stack is then covered with 12 mil nylon-reinforced plastic sheeting. Plywood undeylays the nylon-reinforced plastic on top of the waste stack. A

---

* less than 5 R/hr. at contact

1 m (3 ft) layer of crushed tuff is the final covering for the waste stack. The 1 m of crushed tuff between waste stacks provides a firebreak.

Pits for non-retrievable TRU waste and uranium and lower-level beta-gamma waste have no special grading or paving. Dempstre Dumpsters and other transport are unloaded by driving the truck* into the pits. Combustible waste materials are covered with approximately 15 cm (6 in) of crushed tuff the day they are placed in a pit. Waste is layered in the pits with the last layer at least 1 m (3 ft) below the ground surface. Two m (6 ft) of crushed tuff is mounded over this last layer. Neutron moisture probe access holes in the pits allow monitoring of moisture movement in the pit fill and in the tuff.

"Sensitive material", e.g. tape from C-Division is disposed of in the uranium and lower level beta-gamma pit. Any material in this category is considered unsuitable for disposal in the county sanitary landfill.

Shafts

Shafts are used for reduction of personnel exposure to external radiation, for better isolation, for better containment, and for more secure disposal of some waste materials. Shafts are filled to within 1.5 m (5 ft) of the ground surface. Then .6 m (2 ft) of crushed tuff is placed inthem followed by a 1 m (3 ft) thick cement cap.

After waste is placed in a shaft a ground-level measurement with a beta-gamma survey meter is made. Crushed tuff is shoveled into the shaft until a reading of 100 m R/hr, at

* The truck is monitored by H-7 personnel after it has dumped its waste.

ground level is reached. If the ground-level reading cannot be reduced to 100 m R/hr., the shaft is posted with a high level radiation warning sign. A ground-level reading 500 m R/hr. is not tolerated. There is a limit of 500 g/shaft of fissile material.

Unlined shafts .6 m (2 ft) and 1 m (3 ft) in diameter and 8 m (24 ft) deep receive contaminated animal tissue, contaminated classified material, contaminated chemicals, and beta-gamma waste. Animal tissue is placed in the shafts to isolate it from scavengers. Shaft disposal is preferred for contaminated classified material because if it were placed in a pit immediate covering with 1 m (3 ft) of crushed tuff or physical surveillance until covering took place would be required. Contaminated chemicals are placed in shafts for better isolation from other waste materials. Shaft disposal for higher level (greater than 5 R/hr. at contact) beta-gamma waste is for personnel safety. The lead transport container truck backs directly over a shaft. The trapdoor is opened remotely allowing the waste cannisters to fall through the truck bed into the shaft (see Fig. 5).

Extremely high-level fission product waste (which could also contain plutonium) is placed by means of the lead transport container truck in .3 m (1 ft) cement-lined shafts .3m (1 ft) in diameter and 8 m (25 ft) deep. The .3 m (1 ft) cement lining is provided primarily for added containment of fission product activities. Cement-lined shafts of the same type have also been used for disposal of extremely large quantities of tritium contaminated waste which was sealed in the shafts with asphalt.

Shafts 1.8 m (6 ft) in diameter and 18 m (60 ft) deep

are used for disposal of contaminated oil and tritium waste. The shaft for tritium waste is asphalt-coated. Waste drums are lowered, not dropped, into these shafts.

Trenches

Trenches are used for retrievable storage of ^{238}Pu waste. This waste prior to 1973 was sent to Savannah River Plant as scrap for storage. A separate retrievable storage facility was considered necessary for this waste because it has higher levels of penetrating radiation and significant nuclear heating and radiolytic gas formation.

Twenty casks in 2 rows are placed in the trenches so that the casks are 1 m (3 ft) below the ground surface and are separated from each other by approximately .3 m (1 ft) of crushed tuff. Each cell of twenty casks is separated from the next cell by 1.5 m (5 ft) of crushed tuff.

The casks, .6 m (2 ft) (inside) diameter and 2 m (6 ft) high, are reinforced concrete with 7.6 cm (3 in) thick side walls and 15.2 cm (6 in) thick bottoms. Each cask holds two 115 ℓ (30 gal) steel drums with a maximum of 40g ^{238}Pu/drum.

When a cell has been filled, corrugated galvanized metal sheeting is placed over the cask lids to facilitate recovery by preventing crushed tuff from filling the spaces around the lids. Then a 1 m (3 ft) thick layer of crushed tuff is used to cover the cell.

Monitoring of the ^{238}Pu retrievable storage trenches is by cell. At each end of a cell access tubes are inserted beneath the metal sheeting for air sampling. At one end of

a cell access tubes are inserted beneath the metal sheeting for air sampling. At one end of a cell a neutron moisture probe access tube is placed. Casks adjacent to this access tube have temperature sensors placed on the outside wall near the base of the cask and inside a waste drum within the cask.

In Cell ____ of Trench A four waste drums and the four casks in which they are implaced have had copper tubes connected to them (that extend above the surface) in order to determine the amounts and types of radiolytic gases formed and their diffusion rage out of the drums, and into the casks. It may be possible to determine the radiolytic gas diffusion rate out of the casks and into the airspace surrounding the cask lids.

RECORDS

All waste taken to Area G is recorded on a LASL Radioactive Solid Waste Disposal Record Form. This form requires the signatures of the waste generator, H-1 area representatiave, group leader (as necessary) and H07 waste management representative. It records waste volume, waste radioactive content in either grams or curies, waste matrix, waste generator, and waste disposal location and date. This information is computer stored.

Prior to the disposal of capital equipment, a group fills out a form (252-R), Condemnation and Disposal of Classified and/or Contaminated Government Property. The form records the item description, its serial and government property number, the group to whom it is charged, and the

monitoring results of the Health Physics Surveyor. The Health Physics area representative indicates on the form how the item should be disposed. The form is then sent to the Health Physics group office for certification. After certification the form is mailed to the AEC Fiscal Management and Property Office where it is counter-signed. Then the form is sent to the H-7 Waste Management Group. Upon receipt of the form, H-7 personnel call at the site where the item is located, verify the property number(s) on the form, pick up the material and take it to the disposal area. The AEC Fiscal Management and Property Office has the right to witness actual disposal and H-7 Waste Management always calls the AEC office prior to pending disposals. After the disposal has been completed and the form signed by H-7 Waste Management, it is forwarded to SP-2 Group Office where the individual copies of this form are returned to the people entitled to them. After completion of the Property disposal operation, the H-7 area representative will make an entry in an LA Notebook of this disposal operation which includes the item's description, serial number, and property number, it's disposal location, and the serial number of the form (252-R), and signs and dates the disposal. Frequently, H-7 Waste Management is asked to verify the disposal of a government property numbered item.

Every pit and shaft has an identification sign and pits also have numbered reference posts along a side so that location of waste materials can be logged by pit number, layer number and reference post number.

The pit and trenches for retrievable storage also have identification signs. Waste packages placed in these facilities are serially numbered. In the case of the trenches each drum placed in a cask is numbered and the cask has a permanent plastic identification tag attached to its lid. The permanent plastic identification tag is attached to the waste package stored in the pit. Waste is located in the trench by trench designation and cask location number; waste is located in the pit by layer and reference post number.

All structures within Area G are recorded on engineering survey maps. Coveren pits, shafts, and trenches, even when their outlines become obscured by re-vegetation, can be located by their identification signs and engineering survey maps.

ACCESS TO AREA G

Area G is a restricted area. Access is limited to those who are accompanied by an H-7 waste management representative. The access gate to the disposal area is kept locked except when that representative is present in the area. Security patrols Mesita del Buey and checks the access gate padlock twice during each of the three eight-hour shifts. H-7 Waste Management would be contacted if Security found the gate unlocked. Since issuance of access gate padlock keys has been severely restricted, there have been few incidences when the gate was left unlocked

STANDARD OPERATING PROCEDURES

The following SOP's related to health physics and personnel safety can be obtained from H-7 Waste Management:

1. TA-54, Area G, Health Physics Procedures
2. Use of Dempster Dumpster Containers for Hauling Solid Radioactive Waste to the Disposal Pits
3. Use of Skip-Type Dempster Dumpster Containers for Hauling Drums Filled with Radioactive Material to Area G, TA-54
4. Radiological Safety During Covering Operations at the Disposal Pits
5. Use of Disposal Shafts for Solid Radioactive Waste Disposal
6. Radiological Safety During Emplacement of 30-Gallon ^{238}Pu Waste Drums Into Storage Casks at Area G, TA-54
7. Firefighting at the Solid Radioactive Waste Disposal Area
8. Truck Drivers in Case of Fire While Transporting Radioactive Waste to the Burial Ground
9. Standard Operating Procedure Building 257 Waste Treatment Plant
10. Standard Operating Procedure TA-50 Waste Treatment Plant
11. Standard Operating Procedure for Disposal of Retrievable and Nonretrievable Control Pads in Area T, TA-21-157

APPENDIX A

Area G - Shaft #1

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
4/21/66	Irr. sodium loop	1.0										
5/6/66	Books											2.0
7/22/66	Fuel element end boxes	2.0										
7/26/66	Fission rod	1.0	1.0									
8/2/66	^{90}Sr waste	1.0										
8/2/66	Cell filters		1.0	2.0								
8/4/66	^{241}Am			0.1								
8/10/66	Irr. metal	1.0	3.0									
8/15/66	Cell trash			2.0								
8/15/66	Cell trash		2.0	2.0								
8/23/66	Documents											1.0
8/24/66	^{90}Sr waste	2.0	1.0									
8/24/66	Cell trash		1.0	1.0								
8/21/66	Irr. metal	2.0										
8/25/66	Irr. Pu waste		2.5	2.0								
8/26/66	T^2 waste $\bar{c}$ ^{22}Na						1.0					
8/30/66	^{60}Co waste	2.0										
9/6/66	D-38								0.5			
9/14/66	^{237}Np foil			0.1	0.1							
9/14/66	Irr. Pu			0.1								
9/14/66	End boxes	1.0										
9/19/66	Irr. steel	0.1										
9/16/66	Irr. Pu		1.5	2.0								
9/22/66	^{60}Co	0.1	4.0									
9/22/66	^{137}Ce	0.1	0.5									
9/26/66	Pu sources	0.1										
9/27/66	Irr. Pu		150.	2.0								
9/27/66	^{22}Na	1.0										
10/5/66	T^2 waste						0.4					
10/7/66	Irr. Pu		1.0	2.0								
10/25/66	Irr. metal	1.0	1.0									
10/27/66	Irr. metal	1.0	1.0									
10/31/66	Na holding	2.0										
11/1/66	Contam. Pu disk			1.0								
11/2/66	D-38 + Thorium								3.0			
11/2/66	Irr. film	1.0										
11/7/66	Cell filter		1.0	3.0								
11/8/66	Irr. Al	0.2	1.0									
11/9/66	T^2 waste						3.0	150				
11/16/66	End boxes	1.0										
11/18/66	T^2 waste						1.0					
12/5/66	Irr. metal	3.0										
12/5/66	T^2 contam. glass						0.1					
1/9/67	T^2 contam. oil						0.1					
1/9/67	D-38								1.0			
1/13/67	End boxes	1.0										
1/18/67	^{60}Co source	0.1	2.0									
1/20/67	^{235}U metal								4.0			

Shaft = 2' diam. x 25' deep - unlined
Total shaft volume (waste) 60.1
Total Ci reported 324.5

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Area G - Shaft #2

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
4/21/66	Irr. Na loop	1.0										
6/14/66	NRDS tie rods	1.0										
6/15/66	Irr. Pu cell waste		14.0	2.0								
9/27/66	Irr. Pu cell waste		150.0	2.0								
12/8/66	Irr. metal		1.0	2.0								
12/13/66	Irr. steel	0.1										
12/20/66	^{233}U + ^{235}U								0.1	289.75	15.25	
1/17/67	PTC waste		61.0						2.0			
1/18/67	^{60}Co	0.2	4.0									
1/18/67	Vacuum filter		2.5	1.0								
1/19/67	Irr. metal		1.0						1.0			
1/20/67	Exh. filter								1.5			
1/25/67	Animal tissue		2.0									
1/25/67	^{57}Co & ^{182}Ta waste	2.0										
2/8/67	Fuel element end boxes	1.0										
2/8/67	D-38 chips								1.0			
2/17/67	Class. metal			3.5								
3/7/67	D-38 chips								1.0			
3/7/67	^{210}Po sources	1.0	0.1									
3/10/67	Animal tissue			1.0								
3/10/67	^{60}Co source	1.0	4.5									
3/14/67	End boxes	1.0										
3/17/67	Animal tissue			0.1								
3/31/67	Animal tissue			1.0								
4/5/67	Animal tissue			3.0								
4/5/67	D-38 chips								1.0			
4/10/67	D-38 chips								1.0			
4/11/67	Pu contam. desiccator			2.0								
4/14/67	^{60}Co sources	0.1	0.5									
4/17/67	^{235}U + FP waste		1.0						2.0	1.0		
4/24/67	H-1 record books											1.0
5/10/67	Metal slugs ^{238}U								0.1			
5/15/67	^{57}Co waste	0.1	1.0									
6/9/67	Pu, Np, D-38 foils			0.1								
6/12/67	^{238}U chips								1.0			
6/13/67	Class. material			1.0								
	Totals	8.5	240.6	20.7	0	0	0	0	11.7	290.75	15.25	1.0

Shaft = 2' diam. x 25' deep - unlined
Total waste volume 41.9
Total Ci reported 240.6

Area G - Shaft #3

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
4/21/66	Sodium loop	1.0										
1/31/67	Pu contam. Na		200.0	2.0								
1/31/67	Irr. metal								2.0			
1/31/67	Pu contam. Na		8.0	2.0								
2/2/67	Unloaded fuel elements								1.0			
3/30/67	Pu contam. squibbs			1.0		196.0						
4/12/67	Irr. thermocouple		0.8						0.1			
4/12/67	Class. material			6.0								
5/11/67	Irr. metal		2.0						2.0			
7/20/67	B-10 lined neutron tube											1.0
7/21/67	D-38								1.0			
8/4/67	Neutron generator								6.0			
8/15/67	Irr. Ta	0.1	0.5									
8/23/67	Cell waste ^{235}U + F.P.		5.0						4.0			
8/25/67	Cell waste ^{235}U + F.P.								1.5			
8/28/67	D-38								1.5			
8/29/67	Irr. metal								1.5			
10/16/67	U contam. Ni slugs								0.1			
10/26/67	Old sources	0.1										
11/1/67	D-38								1.5			
11/9/67	Irr. metal		0.1						0.5			

Area G - Shaft #4

4/5/67	Control rods	4.0	6.0									
5/31/67	Class. material			2.0								
6/1/67	Class. material			3.0								
6/7/67	Cell trash		1.0	1.0								
6/14/67	Animal tissue			1.0								
6/16/67	^{238}Pu waste			1.0								
6/21/67	Cell waste		1.0	1.0								
6/26/67	^{238}U samples								2.0			
6/26/67	^{238}U samples								1.0			
7/19/67	Misc. sources	2.0	1.0									
7/26/67	Misc. sources	1.0	1.0									
7/31/67	Animal tissue			1.0								
8/4/67	Neutron generator								20.0			
8/4/67	Neutron generator								6.0			
8/11/67	Pu contam. ^{235}U								0.5	465		
9/12/67	End boxes	1.0	1.0									
9/29/67	Cell trash			1.0								
10/5/67	Cell filters			0.5								
1/2/68	D-38								2.0			

Area G - Shaft #5

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
6/7/67	Sodium loop			1.0								
8/7/67	Cell trash			2.0		0.5						
8/10/67	End boxes	2.0										
8/29/67	Irr. metal								3.0			
10/2/67	^{235}U								1.0	31.7		
10/25/67	^{238}U Contam. class. scrap								3.0			
10/30/67	Sample elements	1.0	10.0									
10/31/67	Sample elements	1.0	10.0									
11/1/67	Sample elements	1.0	5.0									
11/27/67	D-38								1.0			
11/29/67	^{235}U contam. BF^3 chambers								2.0			
11/29/67	^{239}Pu foils			2.0								
12/7/67	D-38								1.5			
12/7/67	Alpha source			0.1								
12/11/67	T^2 waste						0.1					
1/18/68	T^2 contam. equip.						2.0					
1/22/68	D-38								2.0			
1/23/68	^{57}Co lab waste	1.0										
1/26/68	T^2 glassware						2.0					

Shaft = 2' diam x 25' deep - unlined

Area G - Shaft #6

6/7/67	Sodium loop			1.0								
9/12/67	D-38								1.0			
10/25/67	^{235}U samples								4.0	460.0		
1/18/68	^{235}U residues								4.0	12.0		
2/5/68	T^2 contam. vacuum pump						2.5					
2/6/68	Be contam. vacuum pump oil						2.0					
2/7/68	Cell waste			1.5								
2/8/68	T^2 "trap"						2.0	300.0				
3/4/68	D-38								0.5			
3/7/68	Animal tissue			2.0								
	Totals	0	0	4.5	0	0	6.5	300.	9.5	462.0	0	0

Shaft = 2' diam x 25' deep - unlined

Area G - Shaft #7

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
6/7/67	Irr. metal ^{239}Pu			1.0								
2/9/68	Graphite stringer	1.0										
2/12/68	Be contam. oil											1.0
2/12/68	^{32}P waste	0.5										
2/15/68	End boxes	2.0										
2/15/68	^{235}U contam. P_2O_5								1.0			
2/16/68	T^2 waste						0.1					
2/26/68	Irr. metal	0.1										
3/7/68	Animal tissue			3.0								
3/25/68	Irr. metal & Na waste	3.0										
3/29/68	D-38								2.0			
4/2/68	Animal tissue			3.0								
4/3/68	Irr. metal & Pu waste			4.0								
4/18/68	^{235}U + FP waste								1.0			
4/22/68	Irr. metal	2.0										
4/23/68	End boxes	1.0										
5/6/68	OWREX waste	2.0	10.0									
5/7/68	D-38								2.0			
5/8/68	PTC waste		.01						2.0			
5/8/68	PTC waste		9.0						2.0	0.8		
5/8/68	Contam. acid (neut.)		0.5						2.0	0.2		
5/8/68	Contam. acid (neut.)		5.4						2.0	14.0		
5/8/68	Alpha sources			1.0	.07	.03						
5/13/68	Th + U waste								2.0			
5/14/68	T^2 contam. oil						3.0					
5/15/68	U + Be contam. oil								1.0			
5/23/68	T^2 contam. pump						2.0	5,200				
6/24/68	Alpha sources			1.0								
6/24/68	T^2 waste						1.0					
7/10/68	D-38								2.0			
7/15/68	Class. material								1.0			
7/15/68	Fuel pins								1.0	1.5		
7/23/68	Irr. foils	1.0										
7/31/68	D-38								2.0			
7/31/68	T^2 waste						2.0					
9/6/68	D-38								1.0			
9/5/68	D-38								1.0			
9/19/68	T^2 waste						2.0					

Shaft = 2' diam x 25' deep - unlined

Area G - Shaft #8

4/22/68	^{235}U residue								12.0	396		
5/14/68	Irr. Al	1.0										
5/14/68	Be contam. waste	4.0										
5/20/68	Irr. metal	3.0										
5/24/68	Phoebus 1-B Hrdwr.	1.0										
7/1/68	End boxes	1.0	1.0									
8/9/68	^{235}U waste								2.0			
8/13/68	End boxes	1.0	1.0									
8/14/68	^{232}U contam. equip.								2.0			
8/26/68	^{235}U contam. graphite								2.0			

Area G - Shaft #8 (continued)

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
9/11/68	^{239}Pu cell waste with F.P.								1.0			
9/12/68	End boxes	1.0	1.0									
9/9/68	T^2 lab waste						2.0					
9/22/68	Hot cell waste						2.0					
10/1/68	Animal tissue			2.0								
10/8/68	Animal tissue			30.0								
10/8/68	Animal tissue			10.0								
10/10/68	Alum. containers			1.0								
11/25/68	Thorium waste											1.0 150 g
12/2/68	Hot cell waste			6.0								
12/3/68	^{235}U cell waste								1.0			
12/5/68	^{235}U cell waste								1.0			
12/9/68	^{239}Pu cell waste			2.0								
12/11/68	^{239}Pu cell waste			2.0								
12/17/68	^{239}Pu cell waste			6.0								
1/7/69	D-38								0.2			
1/14/69	Metal canisters			0.4								
1/15/69	Be contam. solvents								2.0			

Area G - Shaft #9

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
10/17/68	EBR II waste								9.0			
10/31/68	^{60}Co	1.0										
12/19/68	End boxes	1.0										
12/23/68	T^2 waste						2.0					
12/31/68	Irr. graphite & Al	0.5	5.0									
1/3/69	^{239}Pu cell waste			6.0								
1/6/69	^{239}Pu cell waste			2.0								
1/8/69	^{239}Pu cell waste			4.0								
1/29/69	^{239}Pu cell waste			3.0								
1/29/69	End boxes	1.0										
1/28/69	Old sources	3.0	0.5									
2/6/69	^{239}cell waste			2.0								
2/11/69	Thermocouple	0.1										
2/12/69	^{239}Pu cell waste			3.0								
2/24/69	^{239}Pu cell waste			2.0								
2/26/69	Fuel elements (class.)								22.0			
3/18/69	Fuel elements								1.0			
4/3/69	Animal tissue			3.0								
4/9/69	Unloaded graphite								2.0			

Area G - Shaft #10

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
2/26/69	Fuel elements								12.0			
3/7/69	U waste								2.0			
3/7/69	Animal tissue			8.0								
3/27/69	^{235}U waste								4.0	127.0		
4/9/69	Pee Wee graphite rods								2.0			
4/10/69	^{239}Pu cell waste			2.0								
4/11/69	^{239}Pu cell waste		<1.0	3.0								
4/15/69	^{239}Pu cell waste			2.0								
4/16/69	U contam. chemical								5.0	1.0		

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Area G - Shaft #10 (continued)

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
5/8/69	D-38								2.0			
5/8/69	Po-Be neutron source	0.5										
5/12/69	U waste								1.0			
5/14/69	^{57}Co lab waste	0.5										
5/20/69	Pu contam. silver			0.5								
5/23/69	Helium container						3.0					
7/8/69	U Acid soln.								0.5			
7/16/69	U^{238} chips								1.0			
7/25/69	Be contam. metal											2.0
8/12/69	T^2 contam. uranium								1.0			
8/12/69	T^2 contam. glassware						1.0					
8/25/69	T^2 contam. lab waste						1.0					

Area G - Shaft #11

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
4/17/69	^{239}Pu cell waste			2.0								
4/18/69	Pee Wee unloaded graphite								2.0			
4/18/69	Pee Wee unloaded graphite								2.0			
4/18/69	Pee Wee S.S. support rods	2.0										
4/21/69	Animal tissue			4.0								
4/21/69	Sample vials			3.0		2.0						
4/22/69	Pu cell waste			2.0								
4/22/69	Pee Wee FP waste	2.0										
4/22/69	Pee Wee FP waste	2.0										
5/1/69	Irr. ^{235}U sample								0.1	230.0		
5/1/69	Irr. ^{235}U cell waste								2.0			
5/2/69	Irr. ^{235}U cell waste								2.0			
5/9/69	Irr. graphite rods								1.0			
5/9/69	Irr. S.S. rod			0.5								
5/19/69	End boxes	1.0										
5/23/69	Animal tissue			3.0								
6/2/69	Thermocouple								0.5			
6/18/69	Pee Wee end rods								3.0			
6/20/69	Pee Wee FP trash								2.0			
6/24/69	Thermocouples								0.5			
6/24/69	Cell filters			2.0								
6/25/69	^{235}U residues								5.0	221.0		
7/1/69	End boxes	1.0	1.0									
7/2/69	Rover waste		1.0						2.0			
7/15/69	^{235}U waste								2.0			
8/6/69	Pee Wee hardware								1.0			
8/12/69	T^2 glassware						1.0					
8/15/69	Sample holders	1.0	1.0									
8/28/69	Graphite rods								4.0			
9/3/69	End boxes	1.0										
9/8/69	Irr. graphite								4.0			
9/11/69	U hydride & tritide								1.0			

Area G - Shaft #11 (continued)

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
9/11/69	Pu contam. Na			1.0								
9/15/69	D-38								0.5			
9/16/69	T^2 waste						2.0					
11/11/69	^{57}Co & ^{60}Co waste	1.0										

Area G - Shaft #12

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
5/16/69	^{235}U residues								18.0	288.0		
6/16/69	^{239}Pu cell waste		30.0	1.0								
7/2/69	Rover waste		1.0						6.0			
8/20/69	^{235}U residues								10.0	357.0		
8/24/69	Irr. sample holders	2.0										
9/9/69	Cell waste								2.0			
9/10/69	Cell waste								4.0			
9/16/69	Al sample holders	1.0	5.0									
9/22/69	Animal tissue			2.0								
9/24/69	T^2 waste						1.0	5.0				
10/2/69	End boxes	1.0										
10/8/69	T^2 containers						3.0	9.5				
10/8/69	T^2 cylinder						1.0	4.5				
10/29/69	Irr. S.S. tube	1.0										
11/4/69	Old alpha sources			0.5								
11/13/69	End boxes	1.0										
11/17/69	T^2 waste						2.0					
12/1/69	Irr. S.S. tube	1.0										
1/15/70	End boxes	1.0	1.0									
2/4/70	Old targets	1.0										
2/17/70	ThO_2											2.0
2/20/70	Pu lab waste			4.0		<0.1						
2/26/70	Lab waste			5.0		<0.1						
2/25/70	Lab glassware			2.0								
3/4/70	^{240}Pu			2.0		<0.1						
3/9/70	D-38								2.0			

Area G - Shaft #13

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
7/25/68	Animal tissue			2.0								
3/18/69	Hot cell trash								3.0			
3/7/69	Animal tissue			2.0								
3/7/69	Animal tissue			2.0								
8/29/69	Pu, T^2 contam. ^{235}U								5.0	392.0		
9/10/69	Pu contam. metal			2.0								
10/1/69	Irr. fuel support elements								5.0			
10/10/69	^{235}U residue								3.0	31.0		
10/16/69	EBR hardware								2.0			
10/28/69	Furnace			2.0								
11/25/69	EBR hardware								2.0			
12/1/69	EBR hardware								2.0			
12/8/69	Hot cell waste			6.0								
12/9/69	PTC waste								2.0			

Area G - Shaft #13 (continued)

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
1/20/70	Hot cell waste			2.0									
1/20/70	Irr. S.S.	1.0	0.5										
1/22/70	Irr. concrete & iron	1.0	0.3										
1/22/70	Metallographic samples		2.0						1.0	218.0			
1/26/70	^{238}Pu waste			2.0		<0.1							
1/27/70	^{235}U cell waste								0.5	0.1			
1/29/70	Hot cell waste		2.0						0.5				
1/30/70	Hot cell waste		2.8	1.0									
2/2/70	Hot cell waste			1.0		7.0							
2/2/70	Irr. ^{235}U fuel								1.0	28.0			
2/4/70	End boxes	1.0	0.3										
2/4/70	Hot cell waste		5.7	4.0		3.0							
2/13/70	Hot cell waste		<0.1	1.0									
2/20/70	S.S. metal with Be			12.0									
3/3/70	Hot cell trash		12.0	0.5									
3/3/70	Radium source											2.0	100.0
3/5/70	End boxes	1.0	0.1										
3/9/70	Metallographic samples		3.5						2.0	4.0			
3/18/70	D-38 with T^2							<0.1	3.0				
3/18/70	Hot cell waste		5.0						3.0	396.0			
3/18/70	Hot cell waste		8.0						3.0				
3/19/70	Hot cell waste		1.0	2.0									
3/19/70	Hot cell waste		3.0	2.0									
4/22/70	T^2 lab waste						2.0						
5/7/70	^{60}Co source	1.0	2.2										
5/21/70	Old records											2.0	
5/22/70	Reactor parts								6.0				
5/25/70	Fuel elements								12.0				

Area G - Shaft #14

5/8/68	Neutralized acids		0.5	2.0		0.2							
5/8/68	Neutralized acids		5.4	2.0		14.7							
5/14/68	^{235}U Soln. with vermiculite								3.0	<0.1			
10/8/68	^{235}U Soln. in vermiculite								2.0				
10/8/68	^{235}U Soln. in vermiculite								2.0				
10/9/68	^{235}U Soln. in vermiculite								2.0				
10/9/68	^{235}U Soln. in vermiculite								2.0				
11/13/68	^{235}U Soln. in vermiculite								2.0	0.2			
12/2/68	^{235}U Soln. in vermiculite								1.0				
8/6/69	^{235}U precipitate with vermiculite								4.0	0.5			
9/10/69	^{235}U neut. HCl with vermiculite								4.0	0.5			

Shaft #14 = 1' diam x 25' deep lined with concrete

Area G - Shaft #15

Date	Waste Identification	Fission Products Action		Transuranic			Tritium		Uranium			Other	
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3	Ci
11/25/69	T^2 in phosphoric acid						4.0	17,500					
6/16/70	Hot cell waste		4.0							0.8			

Shaft plugged with asphalt and concrete
on same date as above T^2 delivery
Shaft = 1' diam x 25' deep lined with concrete

Area G - Shaft #16

11/25/69	T^2						4.0	17,500					

Shaft plugged with asphalt and concrete, same date
Shaft = 1' diam x 25' deep lined with concrete

Area G - Shaft #17

3/30/70	T^2 pump			1.0		0.1	3.0	20,244					
7/9/70	Neutralized acids												
7/10/70	^{235}U neutralized acid									0.2	<0.1		
8/13/70	Pt scrap			1.0									
9/28/70	^{235}U in sodium		0.1							0.8			
9/29/70	^{235}U in sodium		0.1							0.4	0.1		
10/27/72	Old sources	3.3	0.6			0.2							
12/7/72	Irr. ^{233}metal									1.0		418	
3/24/71				0.2		2.9					10.6		

Shaft = 1' diam x 25' deep lined with concrete

Area G - Shaft #18

7/13/70	Neutralized Na		22.0							0.4			
10/26/70	Neutralized Na		0.1							2.0			
11/25/70	Neutralized Na		30.0							3.0			
3/10/71	Pt scrap			0.1									
6/10/71	Neutralized Na		16.0	0.2									
11/16/71	Neutralized Na		35.0	0.5									
10/17/72	^{137}Cs and ^{140}Ba	1.0	<0.1										
10/17/72	^{137}Cs	2.0	<0.1										
10/17/72	^{60}Co	2.0	<0.1										
2/9/73	Mineral oil		0.6	0.6									
3/2/73	Mineral oil		<0.1	0.9									

Shaft = 1' diam x 25' deep lined with concrete

Area G - Shaft #19

10/21/71	^{235}U residue									1.0	10.9		
5/3/73	^{239}Pu Soln. in vermiculite		0.3	9.0									
1/16/74	^{239}Pu Soln. in vermiculite			1.0									

Area G - Shaft #20

Date	Waste Identification	Fission Products Action		Transuranic			Tritium		Uranium			Other	
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3	Ci

Not in use as of 4/18/74

Shaft = 1' diam x 25' deep lined with concrete

Area G - Shaft #21

Not in use as of 4/18/74

Shaft = 1' diam x 25' deep lined with concrete

Area G - Shaft #22

Not in use as of 4/18/74

Shaft = 1' diam x 25' deep lined with concrete

Area G - Shaft #23

Not in use as of 4/18/74

Shaft = 1' diam x 25' deep lined with concrete

Area G - Shaft #24

9/3/69	^{235}U (52%)								0.5	311			
9/3/69	Pu swipes			0.5									
10/31/69	Irr. control rods	1.0											
5/22/70	Animal tissue			8.0									
5/22/70	Old records											1.0	
6/1/70	Animal tissue			2.0									
6/1/70	Animal tissue			2.0									
6/1/70	Old records											0.1	
6/1/70	U residues								4.0				
6/1/70	D-38								5.0				
6/1/70	D-38								0.1				
6/18/70	Irr. S.S. pipe	2.0											
6/23/70	Irr. thermocouple		2.0						1.0				
6/23/70	^{235}U residue								4.0	186.0			
10/1/70	Unloaded fuel elements								8.0				
10/14/70	End boxes	1.0	0.4										
10/16/70	Pu contam.metal		<0.1	3.0									
10/29/70	Fission products	0.1											
12/8/70	Irr. copper tube	0.1											

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #25

Date	Waste Identification	Fission Products Action		Transuranic			Tritium		Uranium			Other	
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3	Ci
9/29/69	D-38 and ^{235}U(3%)								4.0	100.0			
12/8/69	^{238}Pu contam. pt.			0.5									
1/6/70	^{233}U foil								0.5		<0.1		
3/23/70	Irr. S.S. tube	1.0	5.0										
3/25/70	End boxes	1.0	0.2										
4/1/70	Fuel elements		1.0						1.0	2.0			
4/1/70	Fuel elements		2.5						1.0	3.0			
4/6/70	T^2 lab waste						1.0						
4/6/70	D-38								1.0				
4/7/70	Hot cell trash		35.0	2.0									
4/6/70	^{235}U residue								6.0	216.0			
6/10/70	^{235}U residue								0.1	1.0			
6/10/70	Thorium waste											0.1	
6/23/70	^{235}U residue								8.0	149.0			
10/5/70	Irr. S.S.	4.0											
11/25/70	End boxes	1.0	0.4										
11/25/70	Irr. steel	2.0											
2/1/71	U contam. metal								2.0				
2/16/71	U contam. metal								9.0				

Area G - Shaft #26

12/10/69	Fuel element chips		1.0						0.5	10.0			
4/15/70	^{235}U and D-38								2.0	100.0			
4/15/70	Fuel elements								10.0				
4/29/70	Irr. S.S. tube	2.0											
4/29/70	Na, ^{137}Cs contam. pipe	1.0	<0.1										
5/1/70	Old sources	0.1	<0.1										
5/4/70	Hot cell trash		1.0	4.0		2.0							
5/5/70	Hot cell trash		<0.1	0.3		3.0							
5/5/70	D-38 contam. metal								21.0				
5/6/70	Hot cell trash		0.5						0.2				
5/12/70	^{235}U sources								0.1	<0.1			
5/14/70	D-38 contam. metal								0.4				
5/20/70	Old sources	8.0	40.0										
6/2/70	^{90}Sr waste	0.1											
6/23/70	^{235}U residue								8.0	137.0			

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #27

5/6/70	Irr. material	4.0	<0.1										
5/14/70	D-38 contam. metal								5.0				
5/22/70	Reactor fuel		5.0	0.2		3.4							
5/22/70	^{239}Pu lab waste		0.2	0.1		11.0							
5/22/70	Hot cell waste		32.0	0.2									
5/25/70	Hot cell waste		22.0	0.4		57.9							
5/27/70	Hot cell waste		0.7	0.4		1.0							
5/28/70	Irr. aluminum	0.1											
6/1/70	Manipulator bootie		0.1	1.0									
6/4/70	Hot cell waste		35.0	0.2		21.0							
6/30/70	Thorium waste											0.1	
8/20/70	Thorium waste											0.1	

Area G - Shaft #27 (continued)

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
8/25/70	End boxes	1.0	0.1										

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #28

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
6/23/70	Hot cell waste		65.0						0.2				
6/29/70	Hot cell waste		79.0						0.2				
7/1/70	Irr. sample holders	1.0	14.0										
7/13/70	GETR hardware		115.0						0.2				
7/17/70	^{235}U residues								12.0	266.0			
7/21/70	LA Notebook (classified)											16.0	

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #29

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
7/9/70	Thermocouple waste		19.0						2.0				
7/15/70	Thermocouple waste		2.5						0.2	2.4			
7/22/70	^{239}Pu residue			3.0									
7/29/70	^{235}U residue								12.0	281.0			
7/29/70	Cell filter (charcoal)		1.5						0.2				
7/29/70	Hot cell waste		2.0						0.2				
8/14/70	Animal tissue			6.0									
10/9/70	Enriched UC waste								0.1				
1/20/71	Pu contam. lithium			0.1									

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #30

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
7/28/70	Hot cell waste		40.0	0.2									
8/14/70	Animal tissue			4.0									
8/24/70	Irr. S.S. pipe	0.1	<0.1										
9/8/70	Hot cell trash		2.0	0.2									
9/8/70	Hot cell trash		4.5	0.2									
9/15/70	Hot cell trash		23.9	0.8		5.0							
9/16/70	Hot cell trash		0.3	0.1		0.5							
10/13/70	Irr. Al	2.0	0.4										
2/16/71	^{235}U contam. metal											2.0	
2/26/70	End boxes	1.0	0.4										

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #31

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
9/24/70	^{235}U residue								6.0	141.0			
10/1/70	^{235}U and ^{238}U residue								9.0	8.0			
10/20/70	D-38								1.2				
11/13/70	^{235}U residue								3.0	8.0			
1/28/71	D-38							4.3	22.0				
2/16/71	Lab waste								6.0				

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #32

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
5/27/70	LAPRE II lines and valves								6.0	0.1			
8/11/70	Irr. S.S. tubing	4.0											
5/10/71	D-38								0.2				
5/10/71	^{232}Th												0.2
5/11/71	Lab waste								6.0				
5/14/71	Thorium												1.0
5/14/71	Be waste												1.5
5/17/71	D-38 and ^{235}U residue								3.0	11.0			
5/21/71	End boxes	1.0	0.5										
5/24/71	BeO_2												3.0
5/27/71	Animal tissue				3.0								
6/1/71	^{170}Tm												<0.1
6/10/71	Hot cell waste		0.1		0.2		1.0						
6/15/71	Cryogenic pump		0.1		0.1								
6/17/71	Hot cell waste		<0.1		0.1								
10/7/71	^{239}Pu contam. D-38				3.0								
10/18/71	ThO_2 lab waste												<0.1

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #33

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
10/26/70	Hot cell waste		0.9		0.2								
10/26/70	Hot cell waste		2.8		0.2								
10/23/70	Hot cell waste		5.0		0.2								
10/26/70	Metallograph samples		30.6		0.2		25.0						
10/28/70	Hot cell waste		2.1		0.2								
10/30/70	Hot cell waste		1.3		0.2								
11/2/70	Hot cell waste		4.0		0.2								
11/17/70	^{238}Pu Lab waste		<0.1		4.0		0.3(^{238}Pu)						
12/10/70	Hot cell waste		15.0		2.0		12.5						
12/10/70	Hot cell waste		5.0		2.0								
1/14/71	^{239}Pu residue				0.6		<0.1						
1/19/71	Irr. S.S. with ^{239}Pu				0.6		<0.1						
1/19/71	Hot cell waste		8.0		0.4		2.0						
1/26/71	Hot cell waste		6.8		0.2		4.0			5.0			
1/28/71	Hot cell waste		0.3		0.1		2.6			8.4			
1/28/71	Pu contam. metal				3.0								
1/15/71	Hot cell waste		0.8		0.2		1.0						

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #34

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
2/3/70	U contam. oil								161.0				
2/3/70	Oil from (SM-30)			73.0									
6/22/70	Radium source											7.0	
6/22/70	Contam. oil			14.0									
8/12/70	Contam. oil			125.0									
5/11/71	Contam. oil (SM-30)			102.0									
5/24/71	Contam. oil (SM-30)			1.0									
9/24/71	U contam. oil (SM-66)								213.0				
2/24/72	U contam. oil (SM-30)			51.0									
3/21/72	U contam. oil (SM-39)								154.0				
4/19/72	U contam. oil (SM-39)								22.0				

Shaft = 6' diam x 60' deep

Area G - Shaft #35

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3	Other Ci
9/2/71	UHTREX filter								4.0				
10/21/71	Fission products	5.3	<0.1										
1/13/72	Pu contam. metal			29.0									

Shaft = 3' diam x 25' deep, unlined

Area G - Shaft #36

Date	Waste Identification	Uranium Ft^3
6/9/70	LAPRE II tank	63.0

Shaft = 3' diam x 25' deep, unlined

Area G - Shaft #37

Date	Waste Identification	Uranium Ft^3
6/9/70	LAPRE II tank	63.0

Shaft = 3' diam x 25' deep, unlined

Area G - Shaft #38

Date	Waste Identification	Fission Products Action Ft^3	Fission Products Action Ci	Uranium Ft^3
6/9/70	LAPRE II tank			63.0
2/1/74	Power Reactor parts	<1.0		3.0

Shaft = 3' diam x 25' deep, unlined

Area G - Shaft #39

Date	Waste Identification	Fission Products Action		Transuranic			Tritium		Uranium			Other	
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3	Ci
8/11/70	LAMPRE parts			15.0									
11/30/70	Be & steel metal			15.0				<0.1					
12/28/70	T^2 waste						3.0	572.0					
2/1/71	T^2 waste						1.5	91.0					
2/1/71	T^2 Waste						1.5	6344.0					
2/1/71	T^2 Waste						2.0						
6/1/71	Sodium loops	4.0											
6/7/71	Be & Hg	3.0	<0.1										
6/16/71	T^2 lab waste						1.0	1.0					
9/24/71	T^2 lab waste						2.0						
11/8/71	Irr. S.S. pipe	3.0											
4/4/72	T^2 contam. blower						2.0						
11/2/72	T^2 contam. glassware						12.0	250.0					
11/15/72	T^2 contam. cu tubing						2.0	<0.1					
11/27/72	T^2 contam. pumps						88.0	110.0					
11/27/72	T^2 contam. pumps, etc.						144.0	40.0					
12/13/72	T^2 contam. D-38						8.0	39.0					
12/13/72	T^2 contam. deuterium						16.0	1560.0					
12/21/72	T^2 contam. lab equip.						8.0	<1.0					
2/27/73	T^2 contam. metal						168.0						
3/2/73	T^2 contam. glassware						8.0	10.0					
4/3/73	T^2 waste						2.0	100.0					
4/30/73	T^2 contam. pumps						16.0						
5/7/73	T^2 lab waste						1.0						
5/10/73	T^2 contam. oil						8.0	0.1					
5/14/73	UT_3, UH_3 & UD_3						1.0						
5/21/73	T^2 lab waste						1.0						
7/26/73	T^2 lab waste						1.0	5.0					
8/13/73	T^2 contam. metal						1.0	<0.1					
10/26/73	T^2 contam. pump & oil						1.0	<0.1					

Shaft = 6' diam x 60' deep, unlined

Area G - Shaft #40

3/5/71	Animal tissue			3.0									
3/5/71	D-38 residue									3.0			
3/10/71	D-38 metal									2.0			
3/24/71	Fuel element end boxes	1.0	0.4										
3/24/71	Fission chamber	0.1	20.0										
4/22/71	Be contam. lab trash			3.0									
4/22/71	Contam. metal			2.0									
4/26/71	^{210}Po source	1.5	<0.1										
5/6/71	^{60}Co source	<0.1	<0.1										

Shaft = 2' diam x 25' deep, unlined

Area G - Shaft #41

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
3/12/71	^{235}U residue(93%)								27.0	240		
4/1/71	Irr. S. S. wire	<0.1	<0.1									
6/15/71	Animal tissue			4.0								
6/17/71	^{57}Co lab waste	0.1	<0.1									
6/22/71	T^2 contam. lab waste						2.0	10.0				
6/23/71	End boxes	1.0	0.4									
6/28/71	Irr. S. S.	0.2	20.0									
7/1/71	Animal tissue			8.0								
7/1/71	D-38								4.0			
7/12/71	Animal tissue			1.0								
7/22/71	^{235}U (10%) residues								2.0	33.8		
7/30/71	Animal tissue			10.0								
10/7/71	Anion resin								2.0	<0.1		
11/1/71	HF contam. Hg											<0.1
11/3/71	^{235}U contam. graphite								8.0			
8/31/72	Animal tissue			2.0								
	Totals	1.4	20.6	25.0			2.0	10.0	43.0	273.9		0.1

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #42

1/16/71	Hot cell waste		8.0	0.2		1.0						
3/16/71	Hot cell waste		38.0	0.2								
3/16/71	Manipulator Booties		0.3	0.2								
7/12/71	Animal tissue			2.0								
9/24/71	Irr. metal	<0.1	<0.1									
10/7/71	Animal tissue			14.0								
10/8/71	End boxes	1.0	<0.1									
11/3/71	^{235}U contam. graphite								5.0			
11/4/71	Animal tissue			14.0								
12/15/71	U contam. metal								14.0			
3/17/72	D-38 contam. graphite								2.0	50.0(D-38)		
3/27/72	Sample holder	0.1										
8/31/72	Animal tissue			2.0								
10/25/72	End boxes	1.0	0.4									
	Totals	2.2	46.9	32.6		1.0			21.0	50.0		

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #43

7/1/71	Animal tissue			1.0								
7/1/71	Thorium											3.0
7/26/71	^{238}U scrap								2.0	2.9kg(^{238}U)		
8/2/71	^{235}U residue(93%)								1.0	116.0		
11/4/71	Animal tissue			2.0								
11/15/71	Activated metal	<0.1										
12/15/71	U contam. metal								16.0			

Area G - Shaft #43 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
1/19/72	^{60}Co lab trash	1.0	<0.1									
1/24/72	Old sources	<0.1	0.5									
1/25/72	Hot cell trash		0.6	0.5	2.0							
1/26/72	^{238}U metal								0.1			
1/26/72	^{239}Pu contam. with T^2			0.1				7.0				
1/26/72	End boxes	1.0	0.4									
2/9/72	Hot cell trash		0.6	1.5		15.0						
2/11/72	Old foils						1.0					
2/25/72	D-38								6.0			
3/3/72	D-38								0.1			
3/7/72	Hot cell trash		2.6	0.5		2.0						
3/7/72	^{85}Kn	2.0	<0.1									
3/15/72	T^2 contam glassware						0.1					
3/15/72	^{235}U powder								0.1	81.7		
3/17/72	D-38 contam. graphite								6.0	50.0(D-38)		
6/26/72	^{238}Pu source			0.2								
6/26/72	Contam. Pt.			0.2								
8/3/72	Animal tissue			2.0								
	Totals	4.2	4.9	8.0	2.0	17.0	1.1	7.0	31.3	3147.7		3.0

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #44

8/25/71	Pu contam. metal			8.0								
9/1/71	D-38 with ^{235}U								2.0	75.0		
9/20/71	Hot cell waste		12.0	1.0								
9/20/71	Metallography samples		14.7	1.0		11.0						
9/22/71	^{239}Pu Contam. vermiculite		<1.0	6.0								
12/30/71	Hot cell waste		9.3	0.5		81.0						
1/6/72	Hot cell waste		3.5	0.5		11.4						
1/6/72	Animal tissue			16.0								
1/13/72	D-38								3.0			
1/13/72	^{235}U metal								1.0	28.0		
3/17/72	D-38 with graphite								4.0	50.09(D-38)		
3/20/72	D-38 with graphite								12.0			
3/21/72	Irr. D-38		0.5						0.1			
4/4/72	Animal tissue			4.0								
8/3/72	Animal tissue			2.0								
	Totals		41.0	39.0		103.4			22.1	153.09		

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #45

8/7/71	Lab waste			2.0								
9/8/71	D-38 with Be											1.0
9/8/71	T^2 Lab trash						2.0					
9/8/71	^{235}U residue								2.0	58.0		
9/8/71	^{238}U residue								2.0			

Area G - Shaft #45 (continued)

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
9/16/71	Irr. metal	<0.1										
9/16/71	End boxes	1.0	<0.1									
10/21/71	Hot cell trash		28.0						2.0			
11/9/71	Irr. S. S. with Neut. Na	0.2	20.0									
3/21/72	Hot cell trash		11.2	0.5		64.8						
3/23/72	Hot cell trash		1.3	0.5		2.0						
3/23/72	End boxes	1.0	0.1									
4/3/72	^{239}Pu contam. steel			24.0				<0.1				
4/3/72	^{239}Pu contam. steel			18.0				<0.1				
3/28/72	^{252}Cf residue			2.0								
6/20/72	D-38								0.1			
8/17/72	U Lab waste								3.0			
	Totals	2.3	60.7	47.0		66.8	2.0	0.2	9.1	58.0		1.0

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #46

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
4/4/72	Contam. detectors	0.2	<0.1									
4/4/72	Animal tissue			16.0								
4/4/72	Old foils		0.2	0.5		0.26						
4/21/72	Irr. copper	0.1										
5/2/72	^{239}Pu contam. steel			15.0			1.6					
5/8/72	^{238}Pu lab waste			0.1		0.5						
5/9/72	^{239}Pu and ^{240}Pu foils			0.1		<0.1						
5/9/72	^{241}Am foil			0.2								
5/16/72	End boxes	1.0	0.5									
6/5/72	Unloaded fuel rods								5.0			
8/29/72	Thalium and NI crystals											0.1
	Totals	1.3	0.8	31.9		0.86	1.6		5.0			0.1

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #47

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
4/6/72	Irr. Steel	3.0	<0.1									
4/6/72	^{252}Cf residue			4.0		0.003(^{252}Cf)						
4/18/72	Hot cell waste		0.1	0.3		3.0						
6/15/72	Animal tissue			8.0								
7/11/72	Pu contam. metal			9.0				1.4				
7/13/72	Contam. steel								9.0			
	Totals	3.0	0.2	21.3		3.003		1.4	9.0			

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft # 48

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
7/11/72	End boxes	1.0	0.4									
7/11/72	Contam. silver			0.1								
7/18/72	Hot cell trash		0.1	0.5		2.0						
7/18/72	Hot cell trash		1.1	0.5		2.0						
7/27/72	Irr. Al	0.1	0.8									
8/8/72	Hot cell trash		0.2	1.0								
8/8/72	Pu contam. steel		0.8	0.1								
8/14/72	Irr. S. S.		0.2	1.0								
8/14/72	Irr. metal		10.0	1.0								
8/17/72	Hot cell trash		0.2	3.0								
8/25/72	D-38								3.0	166.5(D-38)		
8/31/72	Animal tissue			2.0								
9/20/72	^{60}Co lab waste	0.1	0.1									
10/5/72	Hot cell waste		1.1	1.0		0.1						
	Totals	1.2	15.0	10.2		4.1			3.0	166.5		

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #49

6/15/72	Animal tissue			3.0								
8/25/72	D-38								6.0	166.5(D-38)		
8/31/72	Animal tissue			4.0								
9/5/72	Irr. fuel		0.1	1.0		10.0						
9/5/72	Hot cell trash		1.1	2.0		0.7						
9/11/72	^{239}Pu contam. steel			4.0				<0.1				
9/15/72	^{90}Sr. lab waste	0.1	<0.1									
0/28/72	Irr. metal	1.0	1.0									
	Totals	1.1	2.3	14.0		10.7		0.1	6.0	166.5		

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #58

7/21/72	Control rods	2.0	230.0	1.0								
9/14/72	Hot cell waste		0.3			<0.1						
10/5/72	Hot cell waste			1.0								
10/31/72	Hot cell waste		0.3	1.0		0.1						
11/6/72	Hot cell waste		0.2	1.0								
11/6/72	Hot cell waste		2.0	1.0		0.1						
1/12/73	BeOxide											4.0
2/7/73	D-38								10.0	6900.0(D-38)		
2/7/73	D-38 contam. graphite								20.0			
2/8/73	Metal shapes								12.0			
2/12/73	D-38 metal								18.0			
3/29/73	^{235}U residue								6.0	111.0		
5/31/73	^{235}U residue								6.0	36.0		

Area G - Shaft #58 (continued)

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
6/20/73	Contam. graphite								1.0			
7/20/73	Pu contam. meta.			3.0								
9/18/73	D-38 metal with Be								2.0			
	Totals	2.0	232,8	8.0		0.3			75.0	7074.0		4.0

Shaft = 3' diam x 25' deep, unlined

Area G - Shaft #59

Date	Waste Identification	Transuranic Ft^3	Tritium Ft^3	Tritium Ci	Uranium Ft^3
2/14/73	U contam. metal				12.0
8/7/73	Steel parts and tools	24.0			
1/11/74	T^2 Contam. Lab equipment		8.0		
1/24/74	Vacuum pump		8.0	0.1	
3/15/74	T^2contam. lab equipment		32.0	1300.0	
12/7/73	T^2 contam. lab waste		5.0	50.0	
12/14/73	T^2 contam. oil		2.0		
11/26/73	T^2O		16.0		
	Totals	24.0	71.0	1350.0	12.0

Shaft = 6' diam. x 60' deep, unlined
As of 4/22/74, shaft still "in use"

Area G - Shaft #60

Date	Waste Identification	Transuranic Ft^3	Uranium Ft^3
12/11/72	Contam. oil		104.0
2/27/73	Contam. oil	272.0	
7/12/73	Contam. oil	96.0	
9/13/73	Contam. oil	0.1	
1/21/74	Contam. oil		2.0
1/28/74	Contam. oil		24.0
	Totals	368.1	130.0

Shaft = 6' diam. x 60' deep, unlined
and still "in use"

Area G - Shaft #61

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Uranium Ft^3
6/25/73	Animal tissue			8.0	<0.1	
6/29/73	Irr. Cu pipe	2.0	5.0			
7/20/73	Pu contam. metal			3.0		
7/25/73	Be waste (U contam)					8.0
9/14/73	Animal tissue			11.0		
10/15/73	Animal tissue			12.0		
11/2/73	Pu contam. metal			3.0		

Area G - Shaft #61 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other	
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3	Ci
11/13/73	Animal tissue			16.0									
11/13/73	Fission Foils			0.5									
11/21/73	Thorium Oxide											3.0	4.3kg
12/7/73	Animal tissue			20.0									
1/22/74	Animal tissue			16.0									
1/24/74	Pu contam. metal			9.0				<0.1					
1/28/74	U contam. metal								12.0				
2/8/74	Animal tissue			6.0									
	Totals	2.0	5.0	104.5		0.1		0.1	20.0			3.0	4.3kg

Shaft = 3' diam. x 25' deep, unlined

Area G - Shaft #62

4/8/74	Animal tissue		10.0

Shaft = 3' diam. x 25' deep, unlined

Area G - Shaft #63

Not in use as of 4/22/74

Shaft = 3' diam. x 25' deep, unlined

Area G - Shaft #64

Not in use as of 4/22/74

Shaft = 3' diam. x 25' deep, unlined

Area G - Shaft #65

Not in use as of 4/22/74

Shaft = 3' diam. x 25' deep, unlined

Area G - Shaft #66

Not in use as of 4/22/74

Shaft = 3' diam. x 25' deep, unlined

Area G - Shaft #72

11/6/72	Hot cell waste		3.0						2.0	5.0			
11/15/72	Hot cell waste	1.0	2.0										
11/15/72	Hot cell waste	1.0	2.0										
11/29/72	Hot cell waste	1.0	2.0										
12/1/72	Hot cell waste		0.1	1.0		0.2							
12/8/72	Hot cell waste		0.1						0.2	0.1			
12/15/72	Old sources	0.1	<0.1										
12/19/72	Old sources	0.2	<0.1										
12/21/72	Old sources			8.0	<0.1								

Area G - Shaft #72 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
12/21/72	Hot cell trash		11.0	1.0		0.1						
12/21/72	Hot cell trash		26.0	2.0		0.1						
12/21/72	Old sources			8.0		<0.1						
1/2/73	Animal tissue			14.0								
1/2/73	^{238}U contam. Hg and As								2.0			
1/4/73	^{235}U residue								2.0	15.0		
1/5/73	Hot cell trash		6.0	2.0		0.1						
1/9/73	Hot cell trash		2.0	2.0		1.5						
1/9/73	Hot cell trash		1.0	2.0		1.5						
1/10/73	Hot cell trash		2.0	2.0		0.1						
1/12/73	End boxes	1.0	0.4									
1/19/73	^{235}U residue								1.0	10.0		
1/23/73	Fuel elements								6.0			
2/9/73	Hot cell trash		<0.1	2.0		0.1						
3/1/73	Old sources			1.0		<0.1			0.4			
	Totals	4.3	57.9	45.0		4.0			13.2	30.5		

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #73

1/19/73	Hot cell trash		8.7	2.0		8.0				18.0		
1/23/73	Fuel elements								4.0	0.1		
1/26/73	Hot cell trash		1.5	2.0		1.0						
2/1/73	PTC waste		8.0						2.0	6.7		
2/1/73	PTC waste		43.0						2.0	40.0		
2/7/73	Irr. metal	0.1	<0.1									
2/7/73	End boxes	0.1	0.1									
2/13/73	Hot cell waste		1.0	2.0		0.1						
2/14/73	Hot cell waste		<0.2	4.0		0.2						
2/15/73	Hot cell waste		10.0	2.0		10.0						
2/20/73	Hot cell waste		0.5	2.0		0.1						
2/21/73	Hot cell waste		3.0	2.0		0.1						
3/1/73	Handling tools	1.0	<0.1									
3/2/73	Hot cell trash		0.2	2.0		0.2						
3/2/73	Hot cell trash		3.5	2.0		0.1						
3/2/73	Irr. metal	2.0	50.0									
3/6/73	Hot cell trash		6.0						3.0	0.1		
3/7/73	Hot cell trash		1.[illegible]	2.0		0.1						
3/8/73	Hot cell trash		1.5	2.0		1.2						
	Totals	3.2	138.8	22.0		21.0			11.0	60.9		

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #74

3/8/73	UF_6 gas cylinder								2.0			
3/13/73	Hot cell trash		0.6						2.0	0.1		
3/15/73	Hot cell trash		3.5	2.0		0.1						
3/16/73	Hot cell trash		1.5						1.0	0.1		
3/16/73	Hot cell trash		3.0	2.0		0.1						
3/19/73	Hot cell trash		1.2	2.0		20.0						
3/23/73	Hot cell trash		1.0	2.0		0.1						

Area G - Shaft #74 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
3/29/73	Animal tissue			10.0								
4/3/73	Hot cell trash		5.5	2.0		0.1						
4/5/73	Pu contam. chemicals			1.0								
4/5/73	Hot cell trash		5.7	2.0		0.1						
4/5/73	Hot cell trash		5.0	2.0		3.5						
4/5/73	Hot cell trash		8.6	2.0		0.1						
4/10/73	Irr. graphite	2.0	12.0									
4/16/73	Hot cell filter		6.5	2.0		0.5						
4/16/73	Hot cell trash		5.7	3.0		0.1			0.3			
4/17/73	Hot cell trash		0.6	2.0		0.1			0.3			
4/19/73	Fuel elements		0.2						0.1			
4/19/73	Sample element holder	2.0	1.0									
4/20/73	Sample holder	2.0	1.0									
4/20/73	Sample holder	2.0	31.0									
4/20/73	Hot cell trash		6.0	2.0		0.1						
4/20/73	Hot cell trash		2.6	2.0		0.1						
4/23/73	Irr. S. S. hardware	1.0	8.0									
4/23/73	Hot cell trash		12.0	2.0		0.1						
4/26/73	Hot cell trash		2.5						2.0	9.0		
4/24/73	Contam. metal								1.5	16.0		
4/30/73	Hot cell trash		5.5	2.0		0.1				50.0		
4/30/73	Hot cell trash		1.5						2.0	18.0		
5/1/73	U contam. ^{242}Pu			0.3						73.0		
5/3/73	Pu contam. S. S.		2.5	1.0								
5/8/73	Hot cell trash		12.0	2.0		0.1						
5/11/73	Hot cell trash		8.0	2.0		0.1						
5/30/73	^{238}U residue								0.1			
5/30/73	Hot cell trash		20.0	2.0		5.0						
5/30/73	Hot cell trash		0.9	2.0		0.1						
	Totals	9.0	185.4	51.30		30.4			11.7	166.9		

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #75

5/31/73	^{235}U residue								3.0	18.0		
5/31/73	Animal tissue			10.0								
6/20/73	Hot cell trash		3.5	2.0		1.8				5.8		
6/20/73	Hot cell trash		3.5	2.0		0.1						
6/21/73	Hot cell trash		8.0	2.0		0.7				2.9		
6/29/73	Hot cell trash		12.0	2.0		7.0						
6/29/73	Pu contam. S. S.		14.0	2.0								
7/9/73	Hot cell filter		10.0	2.0		4.0						
7/12/73	^{24}Na source	0.5	0.4									
7/13/73	Hot cell trash		1.0	2.0		0.1						
7/23/73	Animal tissue			12.0								
7/27/73	Contam. swipes		0.4	1.0								
8/1/73	^{244}Curium waste			0.4		<0.1						
8/7/73	End boxes	1.0	0.4									
8/16/73	Manipulator booties		1.0	1.0		0.1						
8/16/73	Hot cell trash		3.5	1.0		2.0						
8/22/73	Sample holder	1.0	<0.1									

Area G - Shaft # 75 (continued)

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
8/22/73	Hot cell trash		1.0	2.0		0.1						
8/27/73	Hot cell trash		6.0	2.0		0.1						
8/30/73	End boxes	1.0	0.3									
9/4/73	Hot cell trash		1.0	2.0		0.1						
9/4/73	Hot cell trash		3.5	2.0		0.1						
9/14/73	^{182}Ta	0.1	60.0									
9/21/73	Hot cell trash		1.7	2.0		1.1						
9/21/73	Hot cell trash		1.5	2.0		0.1						
10/3/73	Hot cell trash		11.0	2.0		12.0						
10/12/73	Hot cell trash		2.0	1.0		0.2						
	Totals	3.6	145.8	54.4		29.7			3.0	26.7		

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #76

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
10/26/73	^{235}U residue		0.1						0.5	20.0		
10/29/73	Hot cell trash		3.0	2.0		3.0						
10/25/73	Hot cell trash		1.0	2.0		0.1						
10/31/73	Hot cell trash		4.0	2.0		0.2						
11/2/73	Irr. S. S.	2.0	3.0									
11/2/73	Irr. S. S.	2.0	3.0									
11/2/73	Irr. S. S.	2.0	3.0									
11/9/73	Hot cell trash		1.0	2.0		0.1						
11/15/73	Hot cell trash		2.0	2.0		0.2						
11/30/73	Hot cell trash		3.0	2.0		0.2						
12/3/73	D-38								1.5			
12/17/73	Hot cell trash		13.0	2.0		15.0						
12/18/73	ThO_2											1.0
12/18/73	D-38								1.0			
12/20/73	Hot cell trash		4.0	2.0		0.2						
1/17/74	Hot cell trash		5.8	2.0		0.2						
1/21/74	U, AmO_2, CfO_2			1.0								
1/25/74	Irr. Pu and U fuel		65.0	2.0		2.8			7.2			
1/25/74	U contam. metal								1.0			
1/31/74	Hot cell trash		3.8	1.0		0.2						
2/1/74	Hot cell trash		4.4	2.0		0.1						
2/1/74	Hot cell trash		3.7	2.0		0.1						
2/4/74	Old foils	0.1										
2/7/74	^{237}Na			0.1		0.1						
2/11/74	Hot cell trash		2.0	2.0		0.1						
2/11/74	Hot cell trash		4.0	2.0		0.2						
3/4/74	Hot cell trash		0.4	2.0		0.1						
3/11/74	Animal tissue			14.0								
3/13/74	Hot cell trash		2.0	2.0		0.1						
3/22/74	Hot cell trash		0.1	1.0		0.1						
4/3/74	Irr. Hardware	3.0	6.4									
4/3/74	Irr. Hardware	2.0	6.0									
4/3/74	Irr. Hardware	3.0	1.1									
4/3/74	Irr. Hardware	2.0	0.2									
4/4/74	Irr. Hardware	3.0	0.6									
	Totals	19.1	145.6	49.1		22.9			11.2	20.0		1.0

Shaft = 2' diam. x 25' deep, unlined

Area G - Shaft #77

Date	Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
1/16/74	Irr. S. S.	2.0	15.0									
1/10/74	End boxes	1.0	0.2									
1/15/74	Hot cell trash		2.0	2.0		0.2						
1/16/74	Irr. steel	2.0	15.0									
1/31/74	Hot cell trash		3.8	1.0		0.2						
2/13/74	Hot cell trash		33.0	2.0		0.3						
3/11/74	^{235}U residue								0.5	16.0		
3/22/74	Hot cell trash		20.0	2.0		0.1						
3/27/74	Hot cell trash		1.0	2.0		0.1						
4/4/74	Irr. metal	2.0	28.0									
	Totals	7.0	118.0	9.0		0.9			0.1	16.0		

Shaft = 2' diam. x 25' deep - unlined.

Area C - Shaft #1

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
11/10/59	^{140}Ba, ^{140}La + F.P.	1.0	10.0									
11/10/59	^{140}Ba, ^{140}La + F.P.	1.0	125.0									
11/10/59	^{140}Ba, ^{140}La + F.P.	1.0	55.0									
	Totals	3.0	190.0									

Shaft = 2' diam. x 15' deep - unlined
Shaft filled 11/10/59

Area C - Shaft #2

11/30/59	Irr. ^{235}U + F.P.								1.0			
12/23/59	Urimyl Phosphate								4.0			
1/5/60	Iff. graphite	1.0										
1/7/60	Ba-La waste	1.0	760.0									
2/23/60	Ba-La waste	1.0	4.0									
2/23/60	Ba-La waste	1.0	75.0									
	Totals	4.0	839.0						5.0			

Shaft = 2' diam. x 15' deep - unlined
Shaft filled, 2/23/60

Area C - Shaft #3

1/7/60	Ba-La waste	1.0	600.0									
1/7/60	Ba-La waste	1.0	0.5									
1/7/60	Ba-La waste	1.0	8.0									
3/23/60	^{60}CO capsule	1.0	10.0									
	Totals	3.0	618.5									

Shaft = 2' diam. x 15' deep - unlined
Shaft filled, 3/23/60

Area C - Shaft #4

2/11/60	^{140}La waste	1.0	400.0									
3/23/60	Ba-La waste	1.0	891.0									
3/28/60	Irr. graphite	1.0										
4/28/60	Am-Cm waste					1.0						
	Totals	3.0	1291.0			1.0						

Shaft = 2' diam. x 15' deep - unlined
Shaft filled, 4/28/60

Area C - Shaft #5

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
4/6/60	Irr. Ta (200g) and Pu			1.0		1.0						
4/13/60	T^2 in container						1.0	270.0				
5/10/60	^{140}La waste	1.0										
11/1/60	25 Plasma Thermocouples			1.0					4.0			
	Totals	1.0		1.0		1.0	1.0	270.0	4.0			

Shaft = 2' diam. x 15' deep - unlined
Shaft filled, 11/1/60

Area C - Shaft #6

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Uranium Ft^3	Uranium $^{235}U/g$	Other Ft^3
5/2/60	^{60}Co waste	1.0	60.0			
5/3/60	^{233}U waste			1.0		
5/3/60	^{60}Co with lead pig	1.0	2.5			
7/18/60	Irr. U and graphite			1.0		
10/3/60	Irr. U rods			1.0	18.0	
10/18/60	Plasma Thermocouple			1.0		
11/30/60	Irr. Ta wire	1.0	1.0			
12/22/60	ThO_2 and Cesium		1.0			1.0
	Totals	3.0	64.5	4.0	18.0	1.0

Shaft = 2' diam. x 15' deep - unlined
Shaft filled, 12/22/70

Area C - Shaft #7

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci
5/10/60	^{140}La waste	1.0	740.0
2/21/61	Ba-La waste	27.0	8.5
	Totals	28.0	748.5

Shaft = 2' diam. x 15' deep - unlined
Shaft filled, 2/21/61

Area C - Shaft #8

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Uranium Ft^3	Other Ft^3
5/10/60	^{140}La waste	1.0			
5/10/60	^{140}La waste	1.0	25.0		
6/13/60	Irr. U			1.0	
7/5/60	Irr. glassware	1.0	1.0		
7/7/60	^{233}U residues		10.0	1.0	
7/8/60	Thermocouple residues			1.0	
8/3/60	Po-Be source	1.0	1.0		
11/4/60	Notebook				1.0
11/10/60	Notebook				1.0

Area C - Shaft #8 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
2/21/61	Ba-La waste	27.0	184.0									
3/24/61	End boxes		1.0									
3/24/61	D-38								4.0			
	Totals	31.0	222.0						7.0			2.0

Shaft = 2' diam x 15' deep - unlined
Shaft filled, 3/24/61

Area C - Shaft #10

7/25/60	^{89}Sr, ^{90}Sr, ^{140}Ba, ^{140}La	4.0	400.0

Shaft = 2' diam x 15' deep - unlined
Shaft filled, 7/25/60

Area C - Shaft #11

7/29/60	RaLa waste	2.0										
9/11/60	UO_2, Th and Cesium								2.0			
9/11/60	^{233}U residues								2.0			
9/11/60	T^2						4.0					
11/10/60	^{89}Sr, ^{90}Sr, ^{140}Ba, ^{140}La	12.0	350.0									
	Totals	14.0	350.0				4.0		2.0			

Shaft = 2' diam x 15' deep - unlined
Shaft filled, 11/10/60

Area C - Shaft #12

10/3.60	^{140}La waste	12.0	200.0

Shaft = 2' diam x 15' deep - unlined
Shaft filled, 10/3/60

Area C - Shaft #13

10/18.60	Fuel element rods								4.0			
10/21/60	^{233}U residues								2.0			
11/28/60	Ba-La waste	27.0	737.0									
	Totals	27.0	737.0						6.0			

Shaft = 2' diam x 15' deep - unlined
Shaft filled, 11/28/60

Area C - Shaft #14

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
10/5/60	Radioactive Material			16.0								
4/18/61	Ba-La waste	10.0	221.0									

Shaft = 2' diam x 15' deep - unlined
Shaft filled, 4/18/61

Area C - Shaft #15

11/17/60	Fuel element end boxes	1.0	
4/18/61	Ba-La waste	10.0	221.0
	Totals	11.0	221.0

Shaft = 2' diam x 15' deep - unlined
Shaft filled, 4/18/61

Area C - Shaft #16

11/28/60	Ra-La waste	27.0	737.0									
12/29/60	Fission Prod.	4.0	1.6									
3/1/61	T^2						2.0					
4/19/61	Irr. metal	2.0										
4/19/61	Omega Reactor waste	2.0										
6/5/61	D-38 in Solu.								0.1			
	Totals	35.0	738.6				2.0		0.1			

Shaft = 2' diam x 15' deep - unlined

Area C - Shaft #17

1/13/61	^{226}Ra	2.0	<1.0									
1/23/61	Fission Prod.	2.0	5.0									
1/20/61	Fission Prod.	2.0	15.0									
3/2/61	End boxes	1.0	<0.1									
3/13/61	Thermocouples		<1.0						1.0			
3/21/61	T^2						4.0					
4/5/61	Thermocouples		<1.0						1.0			
4/17/61	Thermocouples		<1.0						1.0			
4/19/61	Irr. Metal (U)								2.0		2.4	
4/19/61	RT 133 metal								2.0			
4/25/61	Irr. Cu and Al	2.0	<0.1									
	Totals	9.0	24.2				4.0		7.0		2.4	

Shaft = 2' diam x 15' deep - unlined

Area C - Shaft #18

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
1/27/61	^{60}Co lab waste	0.5	0.5									
1/30/61	Fission products	2.7	0.1									
1/30/61	D-38 + F.P.	2.7	0.1									
1/30/61	^{235}U in H_2SO_4 solution								2.7	1.7		
1/30/61	^{60}Co waste	2.7	0.1									
1/30/61	Irr. Thermo-couple		0.1						2.7			
2/8/61	Irr. ^{235}U + F.P.		14.0						2.7			
2/8/61	Irr. Ta, S.S. and F.P.	2.7	8.0									
2/8/61	Irr. Ta, S. S. and F.P.	2.7	7.0									
2/8/61	F.P. Lab waste	2.7	0.1									
2/21/61	Irr. Ta	2.7	0.1									
2/21/61	Water Boiler Solution								2.7	.05		
2/21/61	^{90}Sr + ^{137}Cs	2.7	1.0									
	Totals	22.1	31.1						10.8	1.75		

Shaft = 2' diam x 15' deep - unlined

Area C - Shaft #19

3/23/61	Radioactive metal								6.0			

Shaft = 2' diam x 15' deep - unlined

Area C - Shaft #20

3/28/61	^{60}Co sources	2.0	7.8									
3/28/61	^{134}Cs sources	1.0	0.6									
	Totals	3.0	8.4									

Shaft = 2' diam x 15' deep - unlined

Area C - Shaft #21

4/18/61	Ra=La waste	10.0	221.0									

Shaft = 2' diam x 15' deep - unlined

Area C - Shaft #22

6/5/61	Alpha contam. soil			27.0								

Shaft - 2' diam x 15' deep - unlined

Area C - Shaft #23

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
5/2/61	^{235}U residue								20.0	10-20g		
5/3/51	Po-Be sources	10.0	0.0									
5/9/61	Ra-La sources	2.0	0.0									
5/22/61	"active" gaps	4.0	<1.0									
5/22/61	T^2						2.0					
6/5/61	Alpha contam. acid		<1.0	1.0								
6/5/61	^{233}U-^{235}U in acid solution								1.0			
	Totals	16.0	2.0	1.0			2.0		21.0	10-20g		

Shaft = 2' diam x 15' deep, unlined.

Area C - Shaft #24

5/10/61	Thermocouple residue		4.0						2.0			
5/10/61	^{235}U in Solu'n		<1.0						2.0	0.6		
5/12/61	Reactor seals	2.0	<1.0									
5/22/61	^{235}U in Solu'n								2.0	2-3 g		
5/22/61	Reactor seals and residue	2.0	<1.0									
5/22/61	Thermocouple residue		<1.0						2.0			
5/26/61	15% enrich ^{235}U								2.0	100.0		
	Totals	2.0	8.0						10.0	102.6-103.6g		

Shaft = 2' diam x 15' deep, unlined.

Area C - Shaft #25

5/22/61	S. S. rods	20.0	<1.0									
2/8/62	^{60}Co + F.P. in solu'n	1.0	0.5									
	Totals	21.0	1.5									

Shaft = 2' diam x 15' deep, unlined.

Area C - Shaft #26

6/6/61	Radioactive Material			10.0								
9/11/61	End boxes	1.0	<1.0									
9/15/61	End boxes	1.0	<1.0									
10/2/61	T^2 waste						20.0	0.4				
10/11/61	D-38 metal								7.0			
10/13/61	$^{137}Cesium$	0.1	0.1									
2/12/62	^{60}Co and Irr. Ni	1.0	0.5									
2/20/62	Pu contam. metal			1.0								
2/26/62	End boxes	1.0										
	Totals	4.1	2.6	11.0			20.0	0.4	7.0			

Shaft = 2' diam x 15' deep, unlined.

Area C - Shaft #27

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
6/6/61	Irr. Ta	20.0	1000.0									
6/12/61	D-38								10.0			
6/26/61	Metal scrap			8.0								

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #28

6/10/61	Ba-La waste	20.0	2100.0									

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #29

8/26/61	^{239}Pu waste + Fiss. Prod.		10.0	4.0								
6/26/61	^{239}Pu waste + Fiss. Prod.			4.0								
6/26/61	F.P. residues	2.0	1.0									
7/17/61	Ra-La waste	2.0	678.0									
	Totals	4.0	689.0	8.0								

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #30

7/7/61	^{239}Pu + Fiss. Prod.		5.0	4.0								

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #31

7/17/61	Ra-La waste	2.0	297.0									
7/17/61	^{239}Pu + Fiss. Prod.		1.0	4.0								
7/19/61	Irr. metal	1.0	1.5									
7/19/61	^{235}U and D-38 Waste		<1.0						2.0			
7/19/61	^{235}U waste		<1.0						2.0			
7/24/61	Pu-Be waste		<1.0	2.0								
	Totals	3.0	302.5	6.0					4.0			

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #32

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
7/26/61	^{235}U + Th solu'n		0.2						0.1	1.0		
7/26/61	D-38 + ^{233}U solution		0.1						0.2			
7/28/61	D-38 metal								0.1			
8/7/61	^{235}U + Fiss. Products		0.4						0.1			
9/26/61	D-38 + Be								4.8			
9/26/61	F.P. Waste	2.4	1.0									
9/26/61	F.P. waste	0.1	50.0									
9/26/61	U contam. shoes								0.1			
9/26/61	^{235}U in ether								0.6	.022		
9/26/61	^{235}U in ether								0.1	.022		
10/18/61	D-38								4.8			
10/27/61	D-38								1.0			
3/2/62	D-38								0.1	2000.0		
3/2/62	F.P. residue	1.0										
3/13/61	F.P. + ^{235}U								0.1			
3/14/61	T^2 waste						1.0					
3/20/61	D-38								1.0			
	Totals	3.5	51.7				1.0		13.0	2001.44		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #33

8/14/61	Irr. ^{235}U + Fiss. Prod.		0.6						0.1	3.0		
8/14/61	Irr. ^{235}U + Fiss. Prod.		0.6						0.1	3.0		
8/14/61	Irr. ^{235}U + Fiss. Prod.		0.5						0.1	3.0		
8/24/61	Contam. H_2SO_4			0.1								
9/26/61	^{235}U residue								0.1	3.0		
10/27/61	End Boxes	1.0	<1.0									
10/27/61	^{235}U + Fiss. Prod.		0.5						1.0	38.0		
11/24/61	U scrap								0.1			
11/30/61	End boxes	1.0	1.0									
12/1/61	End boxes	1.0	<1.0									
12/1/61	^{59}Fe, ^{131}I, ^{60}Co	4.8	0.6									
12/13/61	Irr. ^{239}Pu + F.P.		0.2	1.0								
12/20/61	Irr. ^{239}Pu + F. P.		0.6	0.1								
12/21/61	^{235}U + D-38								0.1			
12/22/61	D-38 metal								0.1			
1/11/62	^{235}U + D-38								0.1			
1/12/62	Foils and targets			4.0		<0.1						
2/5/62	Ra-La waste	0.1	40.0									
	Totals	7.9	46.6	5.2		0.1			1.8	50.0		

Shaft = 2' diam x 15' deep - unlined

Area C - Shaft #34

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
10/11/61	^{235}U + F.P.		0.7						0.1	75.0		
11/15/61	Misc. radio-isotopes	7.2	<0.1									
1/3/62	Irr. Pu + F.P.		1.0	0.1		1.0						
1/3/62	Irr. Pu + F.P.		0.8	0.1		1.0						
1/3/62	Irr. Pu + F.P.		0.8	0.1		1.0						
1/5/62	^{235}U + F.P.								7.0			
	Totals	7.2	3.4	0.3		3.0			7.1	75.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #35

12/26/61	^{235}U + F.P.		4.0						6.0	250.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #36

12/28/61	^{235}U + F.P.		3.5						5.0	200.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #37

12/29/61	^{235}U + F.P.		2.1						3.0	200.0		
12/29/61	^{235}U + F.P.		1.4						2.0			

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #38

1/3/62	^{235}U + F.P.		3.5						5.0			

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #39

1/4/62	Ra-La Waste	0.1	35.0									
1/4/62	Ra-La waste	0.1	0.5									
1/4/62	Ra-La waste	0.1	0.5									
1/4/62	RA-La waste	0.1	1.5									
	Totals	0.4	37.5									

Shaft = 2' diam x 15' deep - unlined

Area C - Shaft #40

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
1/4/62	^{235}U + F.P.		1.0						0.1			
1/5/62	^{235}U + F.P.		1.2						1.0			
	Totals		2.2						1.1			

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #41

1/5/62	^{235}U + F.P.								27.0			
2/5/62	Ra-La waste	0.1	190.0									
2/6/62	Ra-La waste	0.1	68.0									
	Totals	0.1	258.0						27.0			

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #42

1/15/62	^{235}U + F.P.		0.3						1.0	240.0		
1/17/62	^{235}U + F.P.		0.3						1.0	160.0		
	Totals		0.6						2.0	400.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #43

1/18/62	Pu waste			4.0								
2/1/62	^{235}U residue								1.0			
3/20/62	Irr. ^{235}U								0.1	14.0		
3/20/62	Ba-La waste	0.1	0.5									
3/20/62	Filter, U, Pu + F.P.		0.1	3.0		1.0						
	Totals	0.1	0.6	7.0		1.0			1.1	14.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #44

2/7/62	Irr. Pu + F.P.		<0.1	3.0		1.0						

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #45

3/22/62	Irr. Pu + F.P.		<0.1	1.0								
3/28/62	^{235}U + D-38		<0.1						1.0	200.0		
4/4/62	^{235}U + F.P.		2.0						0.1			
4/9/62	Irr. Pu + F.P.		<0.1	0.1								
4/10/62	Radioactive wastes			1.0								

Area C - Shaft #45 (continued)

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic ^{239}Pu/g	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium ^{235}U/g	Uranium ^{233}U/g	Other Ft^3
4/12/62	Ra-La waste	0.5	3.0									
4/12/62	^{235}U + F.P.		0.5						0.5			
4/17/62	Irr. Pu + F.P.		<0.1	0.5								
4/18/62	Irr. Pu + F.P.		3.0	0.5								
4/18/62	Irr. Pu + F.P.		4.0	0.5								
4/19/62	^{235}U residue								0.1	64.2		
4/12/62	Irr. S. S.	0.1	5.0									
4/25/62	^{235}U residue								0.1	34.8		
4/25/62	^{237}Np contam. chemicals			0.1								
	Totals	0.6	17.9	3.7					1.8	299.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #46

2/6/62	Ra-La waste	0.1	600.0
2/7/62	Ra-La waste	0.1	45.0
	Totals	0.2	645.0

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #47

4/20/62	^{235}U + F.P.		3.0
5/8/62	F.P. waste	0.5	140.0
	Totals	0.5	143.0

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #48

5/8/62	F.P. waste	0.1	10.0									
5/10/62	Animal tissue			0.1								
5/11/61	Irr. S. S.	0.1	<10.0									
5/15/62	Plasma Thermo-couple		10.0						1.0			
5/16/62	^{235}U residue								0.1	≅100.0		
5/17/62	F.P. waste	0.1										
5/17/62	^{137}Cs	0.1										
5/28/62	End boxes	1.0										
5/28/62	D-38 metal								0.1			
5/29/62	Radioactive waste			1.0								
5/29/62	R.P. waste	1.0	565.0									
5/29/62	D-38 metal								0.1			
6/5/62	Ra-La waste	1.0	160.0									
	Totals	3.4	755.0	1.1					1.3	100.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #49

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
7/17/62	Plasma Thermo-Couple		10.0						0.1			
7/17/62	Plasma Thermo-Couple		5.0						2.0			
	Totals		15.0						2.1			

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #50

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
6/6/62	Irr. Pu + F.P.		85.0									
6/8/62	^{60}Co waste	1.0	3.0									
6/8/62	Plasma thermo-couple		0.5						1.0			
6/13/62	F.P. waste	1.0	80.0									
6/13/62	Plasma thermo-couple		4.0						0.5			
6/21/62	S. S. tube	0.1										
6/21/62	S. S. tube	0.1										
6/21/62	F.P. waste	0.1										
6/28/62	Radioactive waste								0.1			
6/28/62	^{235}U residue								0.1	62.5		
7/11/62	^{60}Co waste	1.0	1.0									
7/12/62	T_2O waste						1.0	1.0				
7/13/62	T^2 contam. metal						1.0					
7/26/62	Plasma Thermo-couple		0.5						0.1			
	Totals	3.3	174.0				2.0	1.0	1.8	62.5		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #51

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
7/[illegible]/62	^{235}U + graphite								0.1	80.0		
7/3/62	^{235}U in solu'n		0.1						0.1	200.0		
7/[illegible]/62	^{235}U and graphite		<0.1						0.1	40.0		
7/13/62	Irr. Al	1.0	100.0									
7/13/62	^{235}U + F.P.		0.1						1.0			
7/17/62	^{226}Ra sources	1.0										
7/19/62	Radioactive waste			0.1								
7/19/62	Radioactive waste								0.1			
7/26/62	^{131}I + T^2 waste						0.1					
8/1/62	D-38 metal								1.0			
8/7/62	Radioactive waste								1.0			
	Totals	2.0	100.3	0.1			0.1		3.4	320.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #52

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
8/7/62	Actinium residue	1.0	1.0									
8/10/62	F.P. in acid solu'n	1.0										
8/13/62	Radioactive waste								1.0			
8/21/62	T^2 waste						1.0					
8/27/62	Plasma thermo-couple		0.5						1.0			
8/27/62	Contam. sand and water	1.0										
8/28/62	Contam. sand and water	1.0										
8/29/62	End boxes	1.0	0.2									
8/29/62	Radioactive waste								4.0			
8/29/62	^{235}U + F.P. in solu'n								1.0			
9/7/62	S. S. pipe + F.P.	1.0	5.0									
9/11/62	Irr. soil samples	1.0										
9/19/62	Contam. sand and water	1.0										
	Totals	8.0	6.7				1.0		7.0			

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #53

8/24/62	^{60}Co waste	0.1										
8/24/62	^{60}Co waste + F.P.	0.1										
8/30/62	Irr. S.S. and Cu	1.0										
9/10/62	Plasma thermo-couple								0.5			
9/12/62	Exh. cell filter			0.5								
9/19/62	Radioactive waste			1.0								
9/19/62	Irr. Pu + F.P.			1.0								
9/21/62	^{235}U residue								0.1	35.0		
9/21/62	Cell filters + ^{60}Co	1.0	1.0									
9/24/62	^{235}U residue		1.0						1.0	30.0		
9/24/62	^{235}U residue								1.0	200.0		
9/25/62	^{60}Co waste	1.0	1.0									
9/25/62	Contam. sand and water	2.0										
	Totals	5.2	3.0	2.5					2.6	265.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #54

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
9/25/62	Contam. sand and water	2.0										
9/26/62	^{235}U in solu'n		0.5						1.0	20.0		
9/27/62	^{235}U in solu'n		0.5						1.0	70.0		
9/28/62	^{235}U in solu'n		0.5						0.5	10.0		
9/29/62	^{235}U in solu'n		1.0						1.0	100.0		
9/29/62	^{235}U lab waste + F.P.		1.0						2.0			
10/1/62	^{235}U in solu'n		0.5						1.0	16.0		
9/28/62	^{235}U in solu'n		0.5						1.0	90.0		
10/3/62	^{235}U + F.P.		1.0						0.5	47.0		
10/3/62	D-38								2.0			
	Totals	2.0	5.5						10.0	353.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #55

4/28/67	Radioactive waste								0.5			
5/4/62	D-38								0.5			
5/10/62	^{235}U waste + F.P.		1.0						2.0	1.0		
5/12/62	Irr. S. S.	2.0										
5/17/62	Irr. Pu, Ta + F.P.		0.3	2.0		5.0						
5/19/62	D-38								1.0			
5/23/62	Animal Tissue			1.0								
5/26/62	Irr. Pu + F.P.		100.0	2.0		20.0						
	Totals	2.0	101.3	3.0		20.0			4.0	1.0		

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #56

2/28/58	^{89}Sr-^{90}Sr residue	1.0										

12' Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #57

7/3/58	Cerium waste	1.0										
7/3/58	Old sources	1.0										
	Total	2.0										

12' Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #58

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
9/22/58	Barium waste	1.0										

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #59

11/20/58	^{90}Sr resiude	1.0	
12/3/58	$^{90}Sr-^{140}La$ residue	1.0	
	Total	2.0	

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #60

12/10/58	Reactor soup			1.0
2/4/59	Ra-La waste	1.0		
4/10/59	LAPRE II charcoal trap	1.0		
5/22/59	Ra-La waste	1.0	56.0	
	Totals	2.0	56.0	1.0

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #61

5/26/59	Ra-La waste	1.0	250.0

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #62

7/8/59	Ra-La waste	1.0	350.0

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #63

7/10/59	Old sources	1.0

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #64

7/10/59	Old sources	1.0

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #65

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
9/10/59	^{140}Ba-^{140}La, $^{89-90}Sr$	1.0	450.0									

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #66

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
9/16/59	Irr. Ta	1.0										
9/17/59	^{235}U residue								1.0			
10/13/59	Irr. S. S. + Ta	1.0										
10/15/59	Ra-La waste	1.0	436.0									
	Totals	3.0	436.0						1.0			

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #67

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
10/20/59	^{233}U residue								1.0			
10/29/59	Irr. Ta + F.P.	1.0										

Shaft = 2' diam x 12' deep - unlined.

Area C - Shaft #68

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
10/8/62	Irr. Pu + F.P.		1.0	0.1		1.0						
10/11/62	F.P. waste	0.1			0.5	<1.0						
10/12/62	Irr. Pu + F.P.		10.0									
10/19/62	Irr. Pu + F.P.		0.5	0.5		2.4						
10/23/62	Pu + F.P.		8.0	0.5		<1.0						
10/23/62	^{235}U residue + F.P.		0.5						0.5	256.05		
10/24/62	^{235}U residue + F.P.		<1.0						0.1	82.0		
10/25/62	T^2 contam. metal						0.3					
11/1/62	^{239}Pu waste + F.P.		8.0	0.1								
11/2/62	F.P. waste + Pu		7.0	0.1		0.1						
	Totals	0.1	36.0	1.8		5.5	0.3		0.6	338.05		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #69

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
10/23/62	^{235}U residue								0.5	404.13		
11/1/62	^{235}U + F.P.		<1.0						0.5	37.0		
	Totals		1.0						1.0	441.13		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #70

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
11/6/62	Irr. Pu + F.P.			0.1								
11/9/62	Fuel element waste		0.5						0.5	100.0		
11/13/62	F.P. waste	0.1	1.0									
11/14/62	Irr. S. S.	0.1	0.1									
11/19/62	End boxes	0.1	0.1									
11/20/62	F.P. waste	0.1										
11/30/62	^{235}U + F.P.		50.0						0.1	14.0		
11/30/62	Irr. Pu + F.P.		0.2	0.1								
12/4/62	F.P. waste	0.1	0.5									
12/4/62	F.P. waste	0.1	0.5									
12/10/62	Irr. S. S.	0.1	0.1									
12/11/62	Irr. S. S.	0.1	6.0									
12/12/62	Irr. Pu + F.P.		1.0	0.1								
12/12/62	Plasma thermo-couple		0.1						0.1			
12/12/62	Irr. Al metal	1.0	11.0									
12/12/62	Control rod	5.0	11.0									
12/13/62	Irr. scrap		1.0	0.3								
12/13/62	^{235}U + F.P.		0.5						0.2	40.57		
	Totals	6.8	83.6	0.6					0.9	154.57		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #71

11/8/62	Kiwi fuel element waste		<1.0						1.0	58.6		
11/8/62	Kiwi fuel element waste		<1.0						1.0	87.9		
12/14/62	Kiwi fuel element waste		1.0						1.0	68.08		
12/17/62	Kiwi fuel element waste		2.0						2.0	127.0		
12/18/62	Kiwi fuel element waste		1.0						0.8	44.0		
12/19/62	Irr. S. S. + F.P.	0.1	0.5									
12/19/62	Irr. S. S.	0.1	1.0									
12/19/62	^{235}U residue + F.P.		1.0						1.0	33.0		
12/20/62	Irr. S. S. tube	0.1	12.0									
12/28/62	T^2 waste						2.0					
1/10/63	Irr. S. S. + F.P.	0.1	0.5									
1/16/63	Irr, Pu + F.P.		30.0	0.1								
1/18/63	D-38 and Al metal								1.0			
1/22/63	Radioactive waste						1.0					
1/22/63	^{235}U residue								3.0			
1/22/63	Gamma act. lab waste	0.2	<1.0									
1/29/63	^{235}U + F.P.		0.1						2.0	37.4		
1/30/63	Sand and water + F.P.	0.6	0.1									
2/1/63	^{235}U + F.P.		0.3						0.5	52.03		
2/13/63	Sodium samples	0.5										
2/13/63	^{137}Cesium	0.1										

Area C - Shaft #71 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
2/13/63	Sand and water and F.P.	0.5										
3/11/63	Irr. Thermo-couples	0.5	7.0									
4/9/63	Irr. S. S.	0.1	30.0									
	Totals	2.9	89.5	0.1			3.0		13.3		508.01	

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #72

11/8/62	Kiwi fuel element solu'n		<1.0						1.0		31.0	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		104.0	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		87.9	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		146.5	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		146.5	
2/15/63	^{60}Co and ^{137}Cs waste	0.1										
2/15/63	Ion chambers	5.0										
2/15/63	Thermopiles	0.1										
2/15/63	Anitmony	0.1	0.05									
2/18/63	Contam H_2O and sand + F.P.	0.5										
2/19/63	Contam H_2O and sand + F.P.	0.5										
2/19/63	Contam H_2O and sand + F.P.	1.0										
2/26/63	Radioactive waste			2.0								
2/28/63	Radioactive waste	2.0										
3/1/63	Radioactive waste						2.0					
	Totals	9.3	5.05	2.0			2.0		[illegible]		515.9	

Shaft = 2' diam x [illegible]

Area C - Shaft #73

11/8/62	Kiwi fuel element solu'n		<1.0						1.0		146.5	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		77.5	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		11.9	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		130.0	
3/5/63	Contam sand and water + F.P.	0.5										
3/5/63	Contam. lab waste	1.0										

Area C - Shaft #73 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
3/6/63	Irr. boron and steel	1.0	0.5									
3/6/63	Thermocouple wire	1.0	0.1									
3/6/63	Radioactive waste			1.0								
3/18/63	T^2 contam. glassware						2.0					
3/18/63	T^2 contam. vac. pump oil						2.0					
3/18/63	T^2 contam. lab waste						2.0					
3/18/63	T^2 contam. D-38						2.0					
3/20/63	Graphite + F.P.	0.2	0.01									
3/21/63	Pu-Be source			3.0		13.0						
4/1/63	Contam. sand and H_2O + F.P.	0.5	0.3									
4/3/63	End boxes	1.0	0.5									
4/8/63	^{60}Co and ^{137}Ce sources	1.5	4.5									
4/8/63	Irr. S.S. tube	0.1	0.6									
	Totals	6.8	10.51	4.0		13.0	8.0		4.0		365.9	

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #74

11/8/62	Kiwi fuel element solu'n		<1.0						1.0		77.5	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		146.5	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		55.0	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		29.3	
11/8/62	Kiwi fuel element solu'n		<1.0						1.0		8.1	
4/8/63	Radioactive waste								3.0			
4/15/63	End boxes	1.0	0.5									
4/19/63	Contam. H_2O and sand +F.P.	0.4	0.05									
4/25/63	Thermocouples								0.5		1450.0	
5/17/63	Contam. sand and H_2O + F.P.	0.5										
5/27/63	Contam. sand and H_2O + F.P.	0.5										
	Totals	2.4	5.55						8.5		1766.3	

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #75

Date	Waste Identification	Fission Products Induced Action		Transuranics			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
10/26/62	Kiwi fuel element solu'n		<1.0						1.0	30.0		
11/6/62	Kiwi fuel element solu'n		<1.0						1.0	23.0		
11/7/62	Kiwi fuel element solu'n		<1.0						1.0	13.5		
11/7/62	Kiwi fuel element solu'n		<1.0						1.0	176.0		
4/10/63	Irr. ^{235}U + F.P.		25.0						4.0			
4/22/63	Irr. ^{235}U + F.P.		0.1						0.2	5.0		
4/18/63	Radioactive waste			10.0								
5/6/63	Plasma thermocouple waste								0.1			
5/6/63	^{235}U + F.P.								0.1			
5/8/63	^{238}U residue								1.0	3Kg(^{238}U)		
5/9/63	D-38								1.0	28Kg(D-38)		
7/9/63	D-38								2.0			
	Totals		29.1	10.0					12.4	31.25Kg		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #76

10/26/62	Kiwi Fuel Element solu'n		<1.0						1.0	30.0		
11/6/62	Kiwi Fuel Element solu'n		<1.0						1.0	23.0		
11/7/62	Kiwi Fuel Element solu'n		<1.0						1.0	12.0		
11/7/62	Kiwi Fuel Element solu'n		<1.0						1.0	53.0		
5/2/63	Radioactive waste			6.0								
5/6/63	^{60}Co waste	1.0	15.0									
5/14/63	^{57}Co lab waste	1.0										
5/16/63	^{60}Co waste	2.0	11.0									
5/23/63	Contam lead pig	0.1	2.0						0.1			
6/3/63	Irr. Al tube											
6/11/63	Con. sand and H_2O	0.5	<0.1									
6/12/63	^{140}Ba-^{140}La scrap	1.0	8.6									
6/13/63	^{140}Ba-^{140}La scrap	0.2	1.6									
	Totals	5.8	42.3	6.0					4.1	118.0		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #77

10/26/62	Kiwi fuel element solu'n		<1.0						1.0	30.0		
11/6/62	Kiwi fuel element solu'n		<1.0						1.0	23.0		

Area C - Shaft #77 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranics			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
11/7/62	Kiwi fuel element solu'n		<1.0						1.0	12.0		
11/7/62	Kiwi fuel element solu'n		<1.0						1.0	10.0		
6/12/63	^{140}Ba-^{140}La scrap	0.1	0.5									
6/13/63	^{140}Ba-^{140}La scrap	0.1	468.0									
6/13/63	^{140}Ba-^{140}La scrap	0.1	400.0									
6/13/63	Irr. Al metal	0.1										
6/17/63	Thermocouple tube	0.1	2.0									
6/17/63	Irr. Pu solu'n + F.P.			2.0								
6/18/63	Irr. Ta metal	0.1	3.0									
6/24/63	^{235}U residue								2.0	283.0		
6/25/63	Radioactive waste			2.0								
7/1/63	^{238}U and Th residue								0.1	456.0 (Th) 460.0 (U)		
7/1/63	Contam. Acid solu'n			0.6								
7/17/63	Thermocouple waste	0.2	5.0									
	Totals	0.8	880.5	4.6					4.1	1221.0		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #78

10/26/62	Kiwi fuel element solu'n		<1.0						1.0	30.0		
1/6/62	Kiwi fuel element solu'n		<1.0						1.0	23.0		
11/7/62	Kiwi fuel element solu'n		<1.0						1.0	180.0		
11/7/62	Kiwi fuel element solu'n		<1.0						1.0	14.5		
7/5/63	Acid solu'n			0.1								
7/9/63	Thermocouple waste	2.0	<1.0									
7/17/63	Thermocouple waste	0.2	5.0									
	Totals	2.2	10.0	0.1					4.0	247.5		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #79

6/5/63	^{60}Co + ^{137}Cs sources	2.0	5.0									
7/18/63	D-38								12.0			

Area C - Shaft #79 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
7/30/63	^{235}U + F.P.								0.4	4.0		
	Totals	2.0	5.0						12.4	4.0		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #80

Date	Waste Identification	Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
7/18/63	Radioactive waste								14.0			
7/25/63	^{235}U solu'n								0.4	72.0		
7/29/63	Fuel element end boxes	1.0	0.5									
7/30/63	Radioactive waste								2.0			
8/8/63	^{91}Tritium	0.1										
8/13/63	Irr. sample	0.1	5.0									
8/15/63	^{235}U solution								8.0			
8/20/63	Plasma thermo-couple tube	0.1	1.0									
8/23/63	Contam. sand and water	2.0										
8/26/63	Irr. Al pipe	0.5	0.5									
8/27/63	^{235}U in acid solution								4.0			
9/12/63	Irr. ^{239}Pu + F.P.		3.0	1.0								
10/7/63	^{235}U + F.P. in solu'n								1.0	<1.0		
	Totals	3.8	10.0	1.0					29.4	73.0		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #81

Date	Waste Identification	Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
8/20/63	PTC Waste	2.0	30.0									
8/21/63	U contam. chem.								5.0			
8/27/63	U contam. chem.								0.1			
9/12/63	Irr. S.S. + F.P.	0.1	1.0									
10/7/63	^{235}U in Acid solution		<1.0						2.0	56.0		
19/8/63	End boxes	2.0	1.0									
10/11/63	^{238}U in solu'n.								2.0	2.0(^{238}U)		
10/11/63	T^2 waste						1.0	20.0				
10/15/63	F.P. waste	4.5	<1.0									
10/23/63	^{137}Cs waste	0.1										
10/24/63	Radioactive waste								0.1			
	Totals	8.6	34.0				1.0	20.0	9.2	58.0		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #82

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
8/27/63	^{235}U in acid solution								14.0			
8/30/63	PTC waste	2.0	2.0									
9/12/63	Copper tubing	0.1	2.0									
	Totals	2.1	4.0						14.0			

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #83

Date	Waste Identification	Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
9/4/63	^{235}U contam. chemicals								16.0			
9/4/63	Pu contam $NaCO_3$			0.5		400.0						
9/6/63	D-38 and Pu contam. sol.		1.0	2.0		0.01						
9/10/63	Zn and Ag residue with Pu			0.5								
9/11/63	Irr. Pu + F.P.			3.0								
9/12/63	D-38 metal								0.1			
9/16/63	Irr. metal	0.2										
11/13/63	Old sources			0.5								
11/13/63	^{59}Fe, ^{51}Ce, ^{131}I. + Pu			1.0								
11/13/63	D-38								2.0			
11/20/63	Contam. sand + H_2O + F.P.	0.1	0.1									
12/2/63	^{238}U metal								0.1			
12/19/63	^{238}U metal powd								0.1			
12/20/63	^{235}U solution								0.1		206.2	
	Totals	0.3	1.0	7.5		400.01			18.4		206.2	

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #84

Date	Waste Identification	Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
9/10/63	PTC Waste	0.1										
10/24/63	Radioactive waste								1.0			
12/17/63	PTC waste	0.1										
12/20/63	PTC waste	0.1										
12/20/63	PTC waste											
12/20/63	Hot cell waste	0.1	80.0									
1/3/64	^{235}U waste								2.0			
1/8/64	^{235}U waste								8.0		54.5	
1/10/64	^{235}U waste								10.0			
	Totals	0.4	80.0						21.0		54.5	

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #85

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
10/30/63	U contam. waste								6.0			
12/27/63	Reactor Matrix lid	2.0	10.0									
1/6/64	^{192}Iridium waste	1.0										
1/14/64	End boxes	1.0	5.0									
1/17/64	PTC waste		70.0						2.0	2.0		
1/17/64	PTC S.S.tube	0.1	2.0									
1/27/64	Ta, Ce, and ^{60}Co waste	0.1	3.5									
1/29/64	Contam. graphite								0.1			
2/3/64	D-38 powder								1.0	10.0	(D-38)	
2/10/64	T^2 waste						1.0	750.0				
2/17/64	^{114}Iridium waste	1.0										
2/19/64	Animal tissue			0.5								
2/17/64	^{235}U solu'n		<0.1						3.0	0.5		
	Totals	5.2	90.6	0.5			1.0	750.0	17.1	12.5		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #86

1/27/64	Plasma thermo-couple waste		10.0						2.0	1.4		
1/27/64	Plasma thermo-couple waste		50.0						3.0	0.2		
2/11/64	Irr. Pu + F.P.		6.0	1.0		47.0						
2/28/64	LAMPRE waste			2.0								
3/3/64	Old Pu source	0.1										
3/5/64	D-38 and Thorium								1.0			
3/12/64	Irr. Al	2.0	25.0									
3/13/64	U contam. sol-vents								8.0			
3/18/64	Irr. Pu + F.P.			1.0								
3/18/64	Irr. Pu + F.P.		0.8	1.0		1.8						
3/19/64	Irr. Pu + F.P.		0.8	0.5		3.9						
3/24/64	^{60}Co source	0.5	1.0									
3/27/64	T^2 contam. waste						0.2					
3/31/64	Irr. Pu + F.P.			1.0								
3/31/64	Irr. Pu + F.P.			2.0								
4/7/64	D-38								0.2			
4/10/64	^{57}Co waste	3.0										
5/14/64	T^2 contam oil						1.0					
5/14/64	^{60}Co contam cable	1.0										
5/14/64	Irr. Al capsule	1.0										
	Totals	7.6	93.6	8.5		52.7	1.2		14.2	1.6		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #87

4/6/64	LAMPRE rod assem	0.1										
4/8/64	LAMPRE Pu waste + F.P.		10.0	4.0								
5/4/64	Animal tissue			2.0								
5/8/64	T^2 contam. oil						5.0					

Area C - Shaft #87 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
5/12/64	Irr. Pu, ^{93}Zr and ^{22}Na			1.0								
5/15/64	Control rods	3.0	240.0									
6/10/75	Irr. Pu + F.P.		2.0	1.0		8.0						
6/16/64	Irr. Pu + F.P.		4.0	1.0		0.1						
7/9/64	PTC waste		1.0	50.0								
	Totals	3.1	257.0	59.0		8.1	5.0					

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #88

5/21/64	Animal tissue		1.0	3.0								
5/21/64	Radioactive waste						1.0					
5/28/64	Radioactive waste						1.0					
6/4/64	Fuel element end boxes	2.0										
5/5/64	Fuel element end boxes	2.0										
6/16/64	D-38								1.0			
6/22/64	^{137}Cs + F.P.	1.0										
7/8/64	^{60}Co waste	1.0										
7/8/64	^{57}Co lab waste	3.0										
7/9/64	Irr. S. S	0.1	1.0									
7/15/64	Control rods	0.1	20.0									
7/28/64	Irr. metal	8.0	1.5									
7/29/64	Radioactive waste						1.0					
8/3/64	"Unloaded" fuel elem. + F.P.		4.0						8.0			
8/4/64	"Unloaded" fuel elem. + F.P.		5.0						10.0			
8/6/64	"Unloaded" fuel elem + F.P.		2.0						2.0			
8/10/64	"Unloaded" fuel elem. + F.P.		0.2						2.0			
8/13/64	Radioactive material						0.1					
8/17/64	PTC waste + F.P.	2.0	80.0									
8/17/64	Irr. S. S.	0.2	10.0									
8/18/64	Irr. S. S.	0.1	1.0									
9/9/64	^{235}U residue		40.0						1.0		0.3	
9/17/64	Irr. ^{239}Pu + F.P.			10.0								
9/22/64	Irr. graphite	2.0	6.0									
9/23/64	T^2 containers						3.0	100.0				
9/24/64	^{235}U + F.P.		1.0						0.5		2.0	
9/28/64	^{235}U + F.P.		1.0						0.5		2.0	
10/5/64	UHTREX waste								1.0			
10/7/64	Radioactive waste								11.0			
10/9/64	T^2 targets and RaD source						1.0	500.0				
10/14/64	Pu contam. tubing + F.P.	1.0	3.0									
10/16/64	Animal tissue			1.0								
10/16/64	Radioactive waste			1.0								
10/21/64	End boxes	2.0										

Area C - Shaft #88 (continued)

Date	Waste Identification	Fission Products Induced Action		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
11/5/64	Cell filters		1.0						0.5			
11/6/64	Cell filters		1.0						1.0			
11/9/64	^{238}U metal		0.5						3.0			
11/9/64	Irr Al	0.5	0.3									
11/13/64	D-38 powder								3.0	10Kg		
11/19/64	Cell filter (F.P)		0.5						0.3			
11/19/64	Radioactive waste			6.0								
11/20/64	^{57}Co waste	1.0										
11/24/64	Filter (F.P.)		0.5						3.4			
12/8/64	Hot cell waste (Pu + F.P.)		11.5	0.1								
	Totals	26.0	192.0	21.1			7.1	600.0	48.2	10Kg		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #89

4/23/64	^{235}U contam pipe								17.5	1800.0		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #90

8/19/64	Pu contam. sodium coils			5.0								
9/2/64	U contam. metal								10.0			
11/24/64	Animal tissue			5.0								
12/10/64	Hot cell trash		10.6	0.6								
12/10/64	Hot cell trash		10.0	0.6								
12/10/64	Hot cell trash		10.9	1.6								
12/10/64	Hot cell trash		7.0	1.6								
12/10/64	Animal tissue			1.0								
12/10/64	Contam. chemicals			1.0								
12/11/64	^{57}Co lab waste	0.5										
12/17/64	End boxes	4.0										
12/17/64	Radioactive waste			12.0								
12/23/64	T^2 contam. U						1.0					
12/24/64	Irr. graphite	1.0	<1.0									
1/4/65	^{90}Sr source	1.0										
	Totals	6.5	39.5	28.4			1.0					

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #91

8/19/64	Pu contam. sodium coils			5.0								
1/15/65	Irr. graphite		1.0						32.0			
1/16/65	Radioactive waste			<1.0								
1/21/65	Hot cell filters		1.0						1.0			
1/19/65	Radioactive waste			<1.0								

Area C - Shaft #91 (continued)

Date	Identification	Fission Products Induced Activity		Transuranics			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
1/25/65	Fission chamber	1.0	2.0									
1/27/65	T^2 contam. container						1.0					
1/27/65	^{235}U residues								3.0	490.0		
1/28/65	Radioactive material			2.0								
2/3/65	End boxes	1.0	1.0									
2/16/65	Animal tissue			2.0								
2/30/65	Hot cell waste		<1.0									
	Totals	2.0	6.0	12.0			1.0		36.0	490.0		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #92

8/19/64	Pu contam. sodium coil			5.0								
1/28/65	D-38 chips								1.0			
2/1/65	Fission chamber	0.1	15.0									
2/3/65	U and F.P. contam. tank		35.0						2.0			
2/8/65	T^2 contam. containers						29.0					
2/9/65	Irr. metal + F.P.	3.0	<1.0									
2/15/65	Irr. graphite and filters		<1.0						1.0			
2/16/65	Animal tissue			4.0								
2/15/65	D-38 metal								0.5			
2/17/65	Radioactive waste			2.0								
3/1/65	^{210}Pu source	1.0	4.0									
3/1/65	Irr. steel pipe	1.0										
3/1/65	Irr. lab waste	1.0										
3/3/65	D-38 metal								0.5			
2/26/65	Radioactive waste						1.0					
3/8/65	Irr. Pu + F.P.		<1.0	5.0								
3/4/65	Radioactive waste								1.0			
3/12/65	^{235}U residue								1.0		10.0	
3/12/65	^{210}Pu sources	3.0	4.0									
3/12/65	Lab waste (F.P.)	1.0										
3/17/65	D-38 metal								0.5			
3/18/65	Irr. metal + F.P	7.0	<1.0									
3/18/b5	Radioactive waste								2.0			
3/22/65	D-38 metal								2.0			
3/26/65	T^2 contam. glass ware						4.0					
4/5/65	NRX metal	2.0	<1.0									
4/5/65	Elem. samples		<1.0						2.0			
4/6/65	Unloaded fuel elements								2.0			
4/6/65	T^2 contam. can						1.0					
4/8/65	D-38 samples								2.0			
4/9/65	D-38 chips								0.5			

Area C - Shaft # 92 (continued)

Date	Waste Identification	Fission Products Induced Activity		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
4/15/65	D-38 metal								0.5			
4/16/65	Animal tissue			1.0								
4/16/64	Hot cell waste		<1.0	1.0								
4/20/65	Hot cell waste		<1.0	2.0								
5/3/65	Sample mounts		<0.1						2.0	0.5		
4/29/65	Radioactive waste			4.0								
5/6/65	Irr. Pu + F.P.		<1.0	2.0		0.1						
5/6/65	Irr. graphite								3.0			
5/4/65	Radioactive waste								2.0			
5/7/65	Irr. S. S.	1.0										
5/13/65	Irr. U								3.0	55.0 (600.0 D-38)		
5/13/65	D-38								1.0			
5/13/65	Pu contam. sodium			2.0								
	Totals	20.0	67.1	28.0		0.1	35.0		29.5	665.5		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #93

8/19/64	Pu contam. sodium coils			5.0								
4/8/65	^{235}U samples								6.0	250.0		
4/30/65	D-38								25.0			
5/6/65	D-38								4.0			
5/11/65	Animal tissue			7.0								
5/18/65	Pu contam. IBM cards			2.0								
5/19/65	Irr. steel and tantalum	1.0	1.1									
7/15/65	Radioactive waste		0.1						0.1	1.0		
6/24/66	T^2 contam. lab equip.						1.0	2Kg				
6/24/66	D-38 chips								1.0			
7/5/66	Normal U								2.0	1468.0 (^{238}U)		
7/20/66	D-38 metal								3.0			
8/2/66	Animal tissue			2.0								
8/23/66	D-38								2.0			
9/8/66	Animal tissue			2.0								
9/27/66	D-38								1.0			
11/3/66	Animal tissue			2.0								
11/10/66	D-38								4.0			
11/14/66	Animal tissue			7.0								
11/17/66	D-38								3.0			
11/18/66	D-38								1.0			
11/18/66	Animal tissue			1.0								
11/23/66	Animal tissue			3.0								
11/30/66	D-38								8.0			
12/7/66	D-38								6.0			
12/8/66	Animal tissue			2.0								
11/23/66	Animal tissue			1.0								
1/4/67	Animal tissue			1.0								

Area C - Shaft #93 (continued)

Date	Waste Identification	Fission Products Induction Activity		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
1/19/67	D-38								0.1			
9/1/67	Animal tissue			2.0								
2/29/67	Animal tissue			9.0								
	Totals	1.0	1.2	46.0			1.0	2Kg	66.2	1719.0		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #94

8/19/64	Pu contam. Na coils			5.0								
5/19/65	Pu contam. Na coils			5.0		1.5						
5/25/65	Irr. S. S.	2.0										
6/4/65	T^2 contam. glassware						1.0	600.0				
6/8/65	D-38								2.0			
6/16/65	D-38								1.0			
6/16/65	End boxes	1.0										
6/17/65	D-38								1.0			
6/30/65	^{137}Cs residue	1.0										
6/30/65	Animal tissue			2.0								
7/1/65	D-38								2.0			
7/1/65	PTC waste (^{235}U + F.P.)		1.5						4.0	2.16		
7/6/65	Animal tissue			4.0								
7/6/65	D-38								3.0			
7/9/65	^{238}U and T^2 waste								1.0			
7/9/65	Contam. chem's.			1.0								
7/12/65	^{137}Cs source	1.0										
7/12/65	^{60}Co source	1.0										
7/14/65	^{137}Cs source + control rod	2.0										
7/14/65	End boxes	1.0										
7/14/65	^{238}U metal								1.0			
7/20/65	^{90}Sr and Pu-Be sources			2.0								
7/20/65	Contam. Lab waste			1.0								
7/29/65	^{238}U metal								1.0			
7/30/65	^{242}Am sol'n			1.0								
8/3/65	Pu lab waste			1.0								
8/10/65	^{235}U residues								2.0	145.0		
8/20/65	Pu lab waste			1.0								
8/20/65	Animal tissue			2.0								
8/26/65	D-38								1.0			
8/30/65	Animal tissue			1.0								
8/31/65	D-38								1.0			
9/14/65	Irr. S. S.	0.1										
9/20/65	Animal tissue			1.0								
	Totals	9.1	1.5	26.0		1.5	1.0	600.0	20.0	147.16		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #95

Date	Waste Identification	Fission Products Induced Activity		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
5/12/65	Sodium coils (Pu + F.P.)			5.0		1.5						
5/25/65	Irr. S. S.	2.0										
5/27/65	Irr. S. S. + Irr. Ta	1.0	250.0									
6/22/65	Pu contam. equip + F.P.			3.0								
7/15/65	^{235}U contam. chemicals								1.0	0.5		
7/15/65	D-38								1.0			
7/16/65	^{235}U contam. chemicals								1.0	2.0		
7/26/65	Hot cell filters								2.0			
8/2/65	Hot cell waste								4.0			
8/13/65	Irr. graphite								1.0	200G (D-38)		
8/17/65	Fission chamber + end boxes	2.0	3.0									
8/25/65	Unloaded fuel elem. + F.P.		<1.0						8.0			
9/10/65	F. P. waste	2.0	<1.0									
9/13/65	F. P. waste	2.0	<1.0									
9/15/65	OWREX waste	2.0	<1.0									
9/16/65	OWREX waste	1.0										
9/21/65	Animal tissue			4.0								
10/5/65	Irr. S. S.	2.0	<1.0									
10/6/65	Hot cell waste		<1.0	2.0		<0.5						
10/6/65	Irr. sodium	2.0	<1.0									
	Totals	16.0	260.0	10.0		2.0			18.0	202.5		

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #96

5/19/65	Sodium coil			3.0		1.5						
6/23/65	Irr. S. S.	0.1										
9/21/65	^{235}U residue								4.0	3.0		
9/21/65	^{238}U chips								1.0			
9/23/65	D-38								1.0			
10/7/65	D-38								2.0			
10/12/65	Pu contam. waste + F.P.		1.0	1.0								
10/15/65	PTC waste + F.P.		10.0						6.0	0.7		
10/21/65	D-38								2.0			
10/22/65	^{239}Pu contam. waste			2.0		110.0						
10/25/65	Fission cham.		25.0						0.1	1.0		
10/29/65	Hot cell waste		<1.0	2.0								
11/3/65	^{60}Co, Al and graphite	2.0										
11/5/65	End boxes	1.0										
11/9/65	Hot cell waste		6.0	1.0								
11/11/65	Animal tissue			3.0								
11/11/65	^{238}U chips								1.0			
11/15/65	Hot cell waste		<1.0	1.0								
11/15/65	Hot cell waste		<1.0	1.0								
11/18/65	^{238}U metal								0.5	(20g ^{238}U)		
11/22/65	Hot cell waste		<1.0	1.0								
11/22/65	D-38								1.0			

Area C - Shaft #96 (continued)

Date	Waste Identification	Fission Products Induced Activity		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
11/23/65	D-38								1.0			
11/23/65	^{133}Xenon	6.0										
11/23/65	^{133}Xenon	0.1										
11/29/65	T^2 targets						2.0					
12/2/65	Hot cell waste		6.6	2.0								
12/10/65	LAMPRE waste		30.0	4.0		50.0						
12/14/65	D-38								1.0			
12/14/65	^{238}U metal								2.0			
1/11/66	Hot cell waste		<1.0						3.0			
1/14/66	PTC waste								1.0			
5/2/66	Animal tissue			2.0								
5/17/66	D-38								2.0			
5/19/66	D-38 and Thorium								1.0			
5/19/66	D-38 metal								2.0			
5/23/66	Animal tissue			1.0								
5/23/66	^{210}Pu source	0.1										
5/24/66	T^2 lab waste						0.1					
6/2/66	Irr. Thermo-couples	0.1										
6/9/66	D-38								2.0			
6/17/66	Animal tissue			2.0								
6/28/66	PTC waste								2.0		0.2	
7/12/66	Hot cell filter		<1.0	2.0								
	Totals	9.4	84.6	28.0		161.5	2.1		34.6		4.9	

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #97

3/2/66	Hot cell waste		0.4	2.0								
3/3/66	Hot cell waste		7.4	3.0								
3/3/66	Animal tissue			2.0								
3/3/66	Pu contam. waste			9.0								
3/11/66	Irr. Tantalum	0.1										
3/16/66	Irr. S. S	2.0	1.0									
3/16/66	End boxes	1.0	1.0									
3/21/66	Irr. ^{235}U + F.P.		<0.1						3.0			
3/23/66	D-38 chips								2.0			
3/31/66	^{166}Holmium	1.0	<0.1									
	Totals	4.1	10.0	16.0					5.0			

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #98

8/18/64	UC + ZnC sol'n		2.5						1.0		0.5	
9/8/64	UO_2 in solu'n		1.2						1.0		0.5	
9/23/64	^{235}U residue								4.0		215.0	
11/17/64	Pu contam. Na			5.0								
	Totals		3.7	5.0					6.0		216.0	

Shaft = 2' diam x 20' deep - unlined.

Area C - Shaft #99

Date	Waste Identification	Fission Products Induced Activity		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
11/18/64	Pu contam. NAK			3.0								
1/25/65	UHTREX waste								1.0	1.3		
3/9/64	Hot cell waste		<1.0	3.0								
3/10/64	Hot cell waste		<1.0	4.0								
3/15/64	Hot cell waste		<1.0	1.0								
3/30/64	Hot cell waste		<1.0	2.0								
3/31/64	Hot cell waste		<1.0	2.0								
4/15/64	Hot cell waste		<1.0	4.0								
4/16/64	Hot cell waste		<1.0	2.0								
4/19/64	Hot cell waste		<1.0	2.0								
4/19/64	Hot cell waste		<1.0	2.0								
4/19/64	Hot cell waste		<1.0	2.0								
	Totals		10.0	27.0					1.0	1.3		

Shaft = 12" diam x 25' deep - concrete lined.

Area C - Shaft #100

7/26/65	PTC waste		50.0						4.0	1.5		
3/6/66	Irr. Pu + F.P.		5.0	2.0		<1.0						
6/28/66	Neut. Acid solu'n								1.0	0.1		
6/28/66	T^2 lab waste						1.0	<0.1				
9/21/66	^{90}Sr and Irr Pu		1.5	0.1		<0.1						
19/24/66	^{90}Sr lab waste	2.0	<1.0									
	Totals	2.0	57.5	2.1		1.1	1.0	0.1	5.0	1.6		

Shaft = 12" diam x 25' deep - concrete lined.

Area C - Shaft #101

8/24/65	^{233}U residue		3.0						15.0	302.0		

Shaft = 12" diam x 25' deep - concrete lined.

Area C - Shaft #102

11/5/65	Hot cell waste		1.3	1.0								
2/18/66	Hot cell waste		<0.1	3.0								
4/14/65	PTC waste		<1.0						2.0	1.9		
4/18/65	T^2 lab waste						0.1	1000.0				
	Totals		2.4	4.0			0.1	1000.0	2.0	1.9		

Shaft = 12" diam x 25' deep - concrete lined.

Area C - Shaft #103

Date	Waste Identification	Fission Products Induced Activity		Transuranic			Tritium		Uranium			Other
		Ft^3	Ci	Ft^3	Ci	$^{239}Pu/g$	Ft^3	Ci	Ft^3	$^{235}U/g$	$^{233}U/g$	Ft^3
1/17/67	Neut. Acid		0.1	1.0		0.1						
10/17/67	T^2 (HTO)						1.5	75.0				
10/17/67	^{90}Sr source	2.5	10.0									
10/17/67	T^2 (HTO)						1.5	100.0				
	Totals	2.5	10.1	1.0		0.1	3.0	175.0				

Shaft = 12" diam x 25' deep - concrete lined.

Area C - Shaft #104

Note: all material [950 Ci of tritium (est)] transferred to shaft #59, Area G, 5/17/74.

Area C - Shaft #105

12/12/68	Charcoal trap (T^2)	1.0	12,000.0
4/16/69	T^2 (HTO)	0.5	35.0
	Total	1.5	12,035.0

Shaft = 12" diam x 25' deep - concrete lined.

Area C - Shaft #106

8/24/65	^{233}U residue	3.0	18.0	281.0

Shaft = 12" diam x 25' deep - concrete lined.

Area C - Shaft #107

2/11/66	T^2 contam. metal	0.5	40,000.0

Shaft = 12" diam x 25' deep - concrete lined.

Area C - Shaft #27

Date	Waste Identification	Fission Products Induced Action Ft^3	Fission Products Induced Action Ci	Transuranic Ft^3	Transuranic Ci	Transuranic $^{239}Pu/g$	Tritium Ft^3	Tritium Ci	Uranium Ft^3	Uranium $^{235}U/g$	Uranium $^{233}U/g$	Other Ft^3
6/6/61	Irr. Ta	20.0	1000.0									
6/12/61	D-38								10.0			
6/26/61	Metal scrap			8.0								

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #28

6/10/61	Ba-La waste	20.0	2100.0									

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #29

8/26/61	^{239}Pu waste + Fiss. Prod.		10.0	4.0								
6/26/61	^{239}Pu waste + Fiss. Prod.			4.0								
6/26/61	F.P. residues	2.0	1.0									
7/17/61	Ra-La waste	2.0	678.0									
	Totals	4.0	689.0	8.0								

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #30

7/7/61	^{239}Pu + Fiss. Prod.		5.0	4.0								

Shaft = 2' diam x 15' deep - unlined.

Area C - Shaft #31

7/17/61	Ra-La waste	2.0	297.0									
7/17/61	^{239}Pu + Fiss. Prod.		1.0	4.0								
7/19/61	Irr. metal	1.0	1.5									
7/19/61	^{235}U and D-38 Waste		<1.0						2.0			
7/19/61	^{235}U waste		<1.0						2.0			
7/24/61	Pu-Be waste		<1.0	2.0								
	Totals	3.0	302.5	6.0					4.0			

Shaft = 2' diam x 15' deep - unlined.

APPENDIX C

USGS GUIDELINES FOR PIT CONSTRUCTION

(Will consist of Xeroxes of original correspondence.)

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Ground Water Branch
P.O. Box 4217
Albuquerque, New Mexico
June 30, 1965

Mr. Salvatore E. Russo
Chief, Engineering 3
Los Alamos Scientific Laboratory
Los Alamos, New Mexico

Dear Sir:

The following guidelines are proposed for the construction of pits for the disposal of solid radioactive wastes on Mesita del Buey, Los Alamos County, New Mexico. These guidelines were formed during a meeting held at Los Alamos on June 23, 1965 with the following people in attendance.

Salvatore Russo, Eng. 3; Ben Williams, Eng. 3; Dean Meyers, H-1; William Kennedy, H-6; and C. W. Christenson, H-7 of the Los Alamos Scientific Laboratory; and Dr. C. V. Theis, F. C. Koopman and William D. Purtymun of the U.S. Geological Survey.

Construction

1) Pits constructed with a minimum distance of 50 feet from canyon rim.
2) Pits constructed no deeper than adjacent canyon floor.
3) Pits constructed with long dimension parallel (as near as possible) to surface topographic contours.
4) Large open joints filled with seal material (tuff removed from pit during construction).
5) Drainage should be maintained on open pits so that runoff from precipitation on the mesa does not enter the pit while it is being filled.
6) Size and shape of pit are not important.
7) Bottom of the pit does not need to be level.

Burial of wastes

1) Burial of wastes in layers (ie. layer of waste and a layer of tuff) should be continued.
2) Wastes are to be buried in the confines of the natural tuff. If the soil zone is exceptionally thick this would be an unusual condition and would show instability in that immediate area. The wastes should be buried below the soil zone within the tuff.

Surface seal of pits

1) Pits can be filled with wastes to within 2 feet of the land surface.
2) Seal material (tuff) overlying the wastes should range in thickness from 6 to 8 feet.
3) The surface of the seal material over the pit should be slightly rounded.
4) Adequate drainage provided torremove runoff from precipitation on the mesa.
5) Drainage ways are to be located so that they do not cross the surface of a sealed pit.
6) Consideration should be given to the planting of native vegetation on the surface of sealed pits.

As an additional thought - A suggestion by Dr. Theis not discussed at the meeting.

It may be necessary to have periodic inspections of the sealed and finished pits to determine any unusual settling or gullying. It is thought that the times of inspection for instability and indications of adjustment of the surface to a natural condition will be shortly after the season of highest rainfall. It may be necessary to have biannual inspections.

The above information is intended for a guide only. It is hoped that it is specific enough for the continued safe-storage of waste program but general enough to permit future changes that may have to be made.

Sincerely yours,

F. C. Koopman
Acting District Chief

GUIDELINES FOR CONSTRUCTION AND USE

OF SOLID WASTE DISPOSAL FACILITIES

I. Administration

It shall be the responsibility of the individual in charge of the Solid Waste Management Operations to insure compliance of the following recommendations and procedures in the guidelines for construction and use of solid waste disposal facilities.

II. Site Selection Criteria (General)

A. The geohydrology of the site will require evaluation in order to design the site in a manner to minimize the impact on surface and ground water (U.S.G.S. Water Supply Paper 1753, LA-4660-MS, LA-5286-MS).

B. Locations containing archaeological sites will require investigations. Evaluation of Federal land containing archeological sites is required by four Congressional Acts and a Presidential Order. A report has been prepared describing all archaeological sites on LASL property. This includes maps and archaeological evaluation of sites.

C. The ecology of the area will be considered in site selection. Consideration shall be given to leaving strips of natural vegetation between pits as windbreaks to reduce wind erosion of the disturbed surfaces and to make rehabilitation more realistic. Plant and animal communities that are classified as rare or endangered will be preserved and protected as specified in "The Endangered Species Act of 1973" (50 CFR-Part 17).

III. Pit Locations and Layout

A. Topographic contour maps shall be prepared or available at contour intervals of five feet or less, which describe the topography prior to ground breaking or clearing of area.

B. The layout of the pits shall be with the long dimension more or less parallel to the topographic contours to obtain maximum utilization.

C. The location of the "spill point" (the lowest elevation of the rock surface along the edge of the pit) shall be a minimum of 50 feet from the canyon rim (break in topographic slope). This is illustrated in Fig. 1. The canyon "rim" will be identified on the area topographic map. Disposal shafts shall be located no closer than 50 feet from the adjacent canyon rim.

LOS ALAMOS SCIENTIFIC LABORATORY
UNIVERSITY OF CALIFORNIA
LOS ALAMOS, NEW MEXICO 87544

OFFICE MEMORANDUM

TO : Distribution

DATE: April 24, 1974

FROM : LaMar J. Johnson, H-8 Group Leader

SUBJECT : SOLID RADIOACTIVE WASTE DISPOSAL GUIDELINES

SYMBOL : H8-WM-461

MAIL STOP: 490

Attached is a copy of solid radioactive waste disposal guidelines presently in use by the LASL for the construction and use of solid radioactive waste disposal facilities at the Laboratory. The guidelines were arrived at through consideration of previous recommendations, as well as current thinking on requirements for safe and effective disposal of radioactive waste.

It is recognized that in some instances previous practice did not conform with these guidelines. Programs have been initiated to conform with these guidelines in matters relating to the appearance or condition of the burial site. Questions related to the location or burial mode of previously disposed waste are presently incorporated within a research program of the Waste Management Section which will evaluate the short and long term adequacy of the burial sites.

These guidelines are considered to be in final form. Should you feel that any significant considerations have not been included, please contact us.

LJJ:TKK:mar
Attachment as stated.

Distribution:
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I. Drainage shall be constructed and maintained so that surface runoff does not enter the pits or shafts.

J. Topsoil shall be stockpiled for use in rehabilitation of the pit seal. Topsoil shall be stockpiled in such a manner as to minimize erosion.

K. Tuff removed during construction of the pits shall be separately stockpiled in the same manner as the topsoil. It shall not be stockpiled on top of rehabilitated or undisturbed areas.

L. Roads shall be planned so that vehicles or equipment do not transverse rehabilitated areas. Dust control shall be employed to minimize resuspension.

M. Prior to excavation of a pit or shaft, notification shall be provided to a LASL geologist responsible for waste site monitoring. At the discretion of the geologist, material samples may be collected during construction. Following excavation of a pit or shaft, it shall be surveyed and recorded on a map of the waste disposal area. In addition, for pits, an engineering drawing showing lengthwise profiles, i.e. the walls and centerline, and crosswise profiles at significant breaks in bottom slope and at every 100 foot length, will be prepared. At the time of the survey the location of the first and last reference posts (for waste disposal record purposes) shall be established and recorded on the engineering drawing of the pit profiles.

N. Before a pit is placed in use, a qualified geologist from LASL shall inspect and approve its use. The geologist shall prepare a description of the pit, including such things as location and orientation of fractures, position of flow boundaries in the tuff, plant root locations, etc.

V. Burial of Wastes

A. The wastes buried in pits shall be placed in layers and covered with an approximate 0.5 ft layer of compacted crushed tuff.

B. Combustible and wind dispersable wastes shall be covered by the end of the day of delivery.

C. Pits and shafts shall be filled with wastes to a minimum depth of 3 feet below the "spill point" (lowest point on pit rim, Fig. 1).

D. Access roads to pit sites shall be carefully laid out to avoid traversing archeological sites and maintain adequate drainage.

E. Vegetation and topsoil in areas between pit edges and mesa rims, and on one side of each pit shall be left in the natural state as nearly as possible. (See Fig. 2.)

F. If archaeological sites are in a potential disposal site location, construction must be proceeded by the following:

1. Evaluation of the site for antiquity value by a qualified archaeologist.

2. Archaeological salvage of the site under supervision of a qualified archaeologist.

3. A report of the findings and deposition of the artifacts in a suitable repository.

IV. Construction

A. Pits and shafts shall be constructed no deeper than adjacent canyon floors that contain or may contain saturated zones.

B. Horizontal dimensions and shape of pits and shafts are not restricted.

C. The floors of the pits do not need to be horizontal.

D. The slope on pit walls shall be approximately 1 to 4.

E. Minimum distance between pits shall be 15 ft at land surface.

F. Crushed tuff 0.5 to 1 ft deep shall be compacted on floor of the pit before emplacement of wastes.

G. Open joints and fractures in pit walls, access ramps, and floors that are open two inches or more shall be filled with sealing material. (Example: mixture of bentonite (dry) and crushed tuff or cement (dry) and crushed tuff).

H. Appropriate measures shall be taken to insure containment of material within disposal shafts, for example, an asphalt coating on the walls of tritium disposal shafts. Prior to its use, a shaft shall be inspected to insure absence of significant open joints or fractures. If any are present they shall be sealed to the best degree possible with appropriate material, similar to that recommended for the purpose in pits.

D. Documentation shall be made of origin of shipment, type, identity and amount of radionuclides in wastes placed in the pit and shafts. Records shall include location within the pit of each shipment of waste received.

VI. Final Cover of the Wastes

A. The final cover of a pit shall be crushed tuff overlain by topsoil.

B. The final cover of a pit shall be a minimum of 2 ft above the original land-surface at the edge of the pit and will extend beyond the edges of the pit at least 3 ft.

C. The final cover of a shaft shall be non-contaminated cement, a minimum of 3 ft thick, slightly rounded, and extending about 0.5 ft above land surface.

D. The surface of the final pit or shaft cover shall be slightly rounded to allow surface drainage without excessive erosion.

E. Provisions shall be made to control runoff in the disposal area to minimize infiltration and erosion of the final cover of pits or shafts.

F. Bench marks shall be placed at the corners of each pit and in the final pour of seal cement in the shafts. The bench marks (at least 12 inches in diameter) shall be set into the bed rock and extend through the final cover at the corners of each pit. The bench mark will be a single pour of cement with a standard brass cap which will contain Engineering data (cap number, LASL Coordinates, and elevation and Disposal Data (Radioactive Waste Pit numbers and location; e.g. Radioactive Waste Pit 24 SW Corner, or Radioactive Waste Shaft number). These bench marks are to be tied into the disposal and engineering records so that if materials are to be retrieved, they can be found with a minimum of effort and disturbance to the final cover.

VII. Rehabilitation and Revegetation

A. As noted in Section V E, native vegetation will be left in areas between pits.

B. Turf-forming grasses and bunch grasses will be planted in the final cover to prevent wind and sheet wash erosion.

VIII. Monitoring Systems

A. Established "green belts" adjacent to pits and shafts as well as grasses of the final cover will be monitored to determine if uptake of radionuclides occur.

B. Background data to determine radionuclide concentration in and adjacent to pits should be collected prior to disposal of wastes.

C. Monitoring holes and access casing should be operational prior to placing of wastes in pits.

D. The area shall be inspected on an annual basis to determine the condition of final cover. Significant changes in the cover due to settling or erosion shall be corrected.

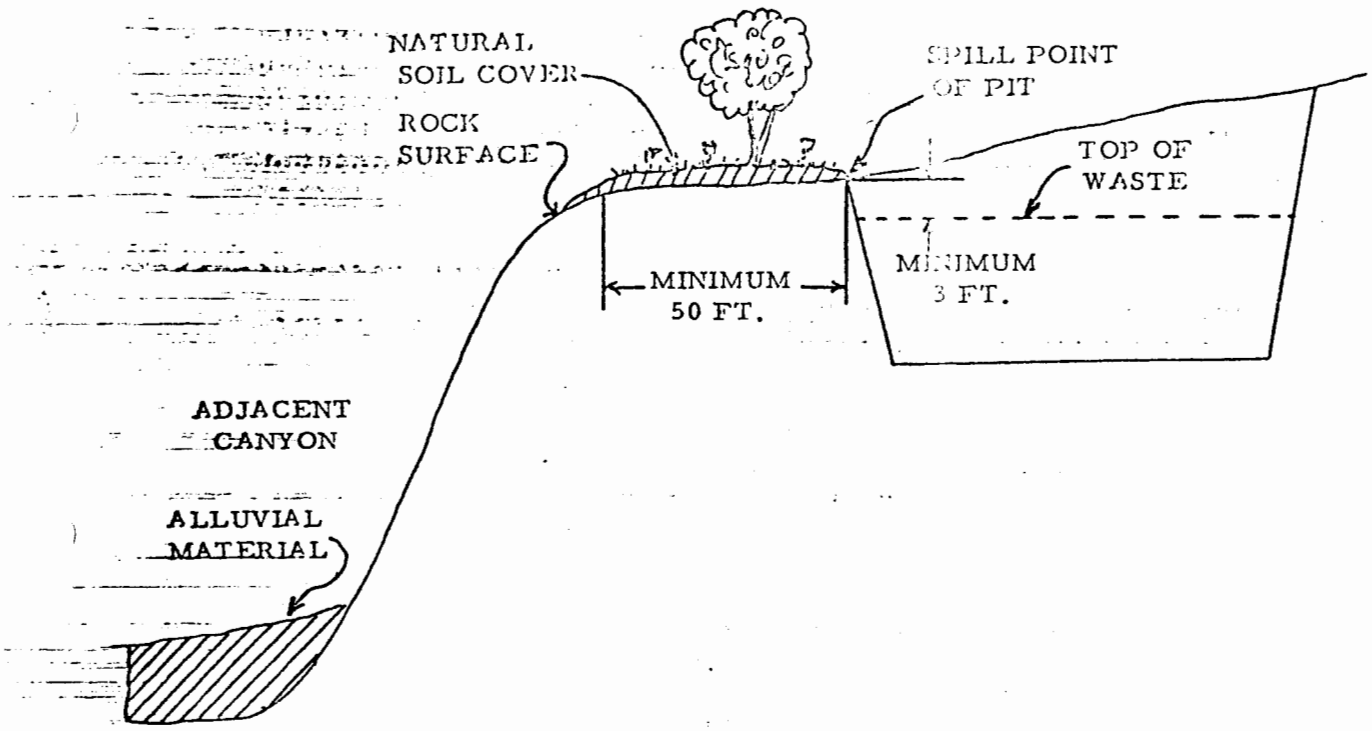
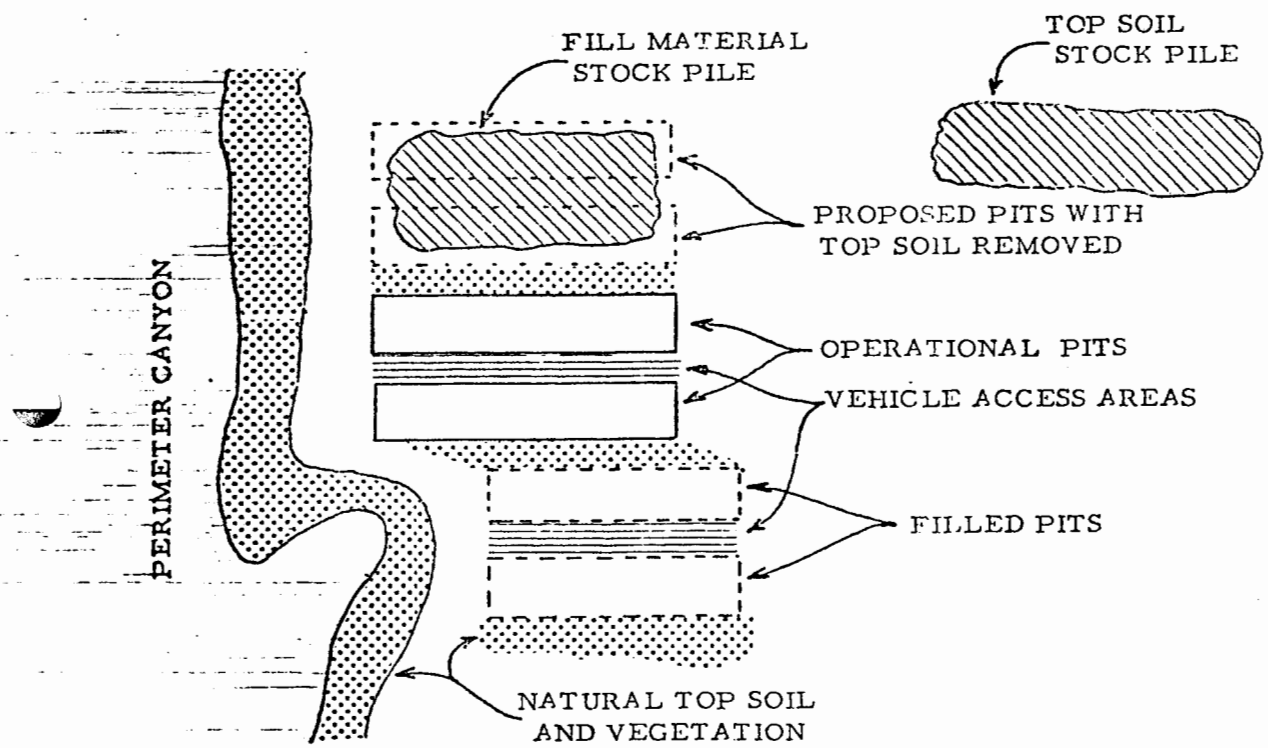


Figure 1. Cross-section showing details of pit location and placement of wastes



gure 2. Suggested layout of disposal pits, stockpile areas and biotic sanctuaries.

APPENDIX D

LASL RADIOACTIVE SOLID WASTE MANAGEMENT POLICY

(Will consist of Xeroxes of original correspondence.)

UNIVERSITY OF CALIFORNIA
LOS ALAMOS, NEW MEXICO 87544

OFFICE MEMORANDUM

TO : Streamline Division and Group Leader Listing

DATE: September 27, 1973

FROM : R. E. Schreiber

SUBJECT : DIRECTOR'S OFFICE MEMORANDUM NO. 48
RADIOACTIVE SOLID WASTE MANAGEMENT POLICY

SYMBOL :
DIR

A. It is the policy of the Los Alamos Scientific Laboratory to manage radioactive solid wastes in a manner to minimize adverse effects to man and his environment and to provide reasonable assurance that this objective is accomplished. The solid waste management programs and operations will be consistent with the directives and policies of the AEC. Specific items in the Laboratory policy include:

1. The quantities of radioactive materials buried shall be reduced to a minimum consistent with economics, technology, and safety.

2. The problems associated with waste having unusual properties, configurations, or quantities of radioactive materials, shall be investigated before storage or disposal of the waste is accomplished. The rationale for the action and the safety of the proposed method of handling shall be documented.

3. All technically and economically practical measures shall be taken to minimize the volumes of radioactive solid wastes placed in burial grounds or retrievable storage.

4. The quantities of transuranic elements placed into retrievable storage or burial grounds shall be reduced to the technically and economically practical minimum.

B. To implement this policy, the following administrative responsibilities are assigned:

1. H Division shall be responsible for operating the waste disposal and retrievable storage facilities and for the routine transportation operations for radioactive solid waste at LASL.

2. H Division shall provide criteria for the packaging and subsequent handling of the waste.

3. The Divisions and Departments of the Laboratory that generate solid waste shall be responsible for minimizing the quantities generated and for packaging.

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4. Nonroutine packaging, handling, or transportation problems should be identified by operational units in sufficient time to permit advance planning. Proposed solutions, including funding considerations, for such unusual problems shall be the responsibility of the waste generating unit of the Laboratory and shall be reviewed and approved by H Division prior to implementation.

5. Standard Operating Procedures (SOP) for all routine operations and for all operations involved in nonroutine problems shall be established by the unit of the Laboratory with operational responsibility in accordance with existing requirements of the Laboratory.

6. H Division shall conduct an annual audit of the Laboratory's overall solid waste management operations to evaluate the Laboratory program against established criteria, standards, and policies.

7. The Laboratory Radioactive Waste Management Commiteee shall be responsible for maintaining cognizance of all Laboratory activities in waste management, serving as an advisory group in operational matters, and providing the Director's Office with recommendations as appropriate.

C. The membership of the Laboratory Radioactive Waste Management Committee is:

J. W. Healy, Chairman
H. S. Jordan, Secretary
W. J. Maraman
R. J. Bard
C. J. Umbarger
D. R. Smith
V. J. Stephens

R. E. Schreiber
Acting Director