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RCRA FACILITY INVESTIGATION TASK

SWMU DESCRIPTIONS AND IDENTIFICATIONS OF DATA NEEDS: TA-21 SURFACE UNITS AGGREGATE AT LOS ALAMOS, NM

By
John W. Nyhan
Environmental Science Group

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2	REPORT	9/1/1990	SWMU DESCRIPTIONS AND IDENTIFICATIONS OF DATA NEEDS: TA-21 SURFACE UNITS AGGREGATE AT LOS ALAMOS, NM	27	725

OUTLINE

TA-21 SURFACE UNITS AGGREGATE

Section 3.1.1 Existing Information

The surface units aggregate at TA-21 currently contains the SWMUs listed in Table I, according to the June 12, 1990 designation scheme. Since most of these SWMUs have several subunits, this aggregate encompasses a total of 45 known SWMU sites and 10 newly discovered potential SWMU sites. These 55 units were divided into five subaggregate groups based on similarities in contaminant migration pathways and type of unit.

The five subaggregates are (A) above ground tanks and container storage areas, (b) surface disposal areas, (c) sewage treatment plant, (d) incinerators, stacks and filter houses, and (e) storm drain surface discharges. The subaggregates are described in more detail in the following subsections.

A. Aboveground Tanks and Container Storage Areas

Thirteen SWMUs are included in this subaggregate (Table II), along with ten newly-discovered potential SWMUs (Table III). SWMU locations are shown in Figures 21-1 through 21-4.

Table I. SWMUs in the TA-21 Surface Units Aggregate.

SWMU Number
21-001
21-002
21-003
21-004
21-007
21-008
21-013
21-019
21-020
21-021
21-025
21-026
21-027
21-028

Table II. Description of aboveground tanks and container storage areas at TA-

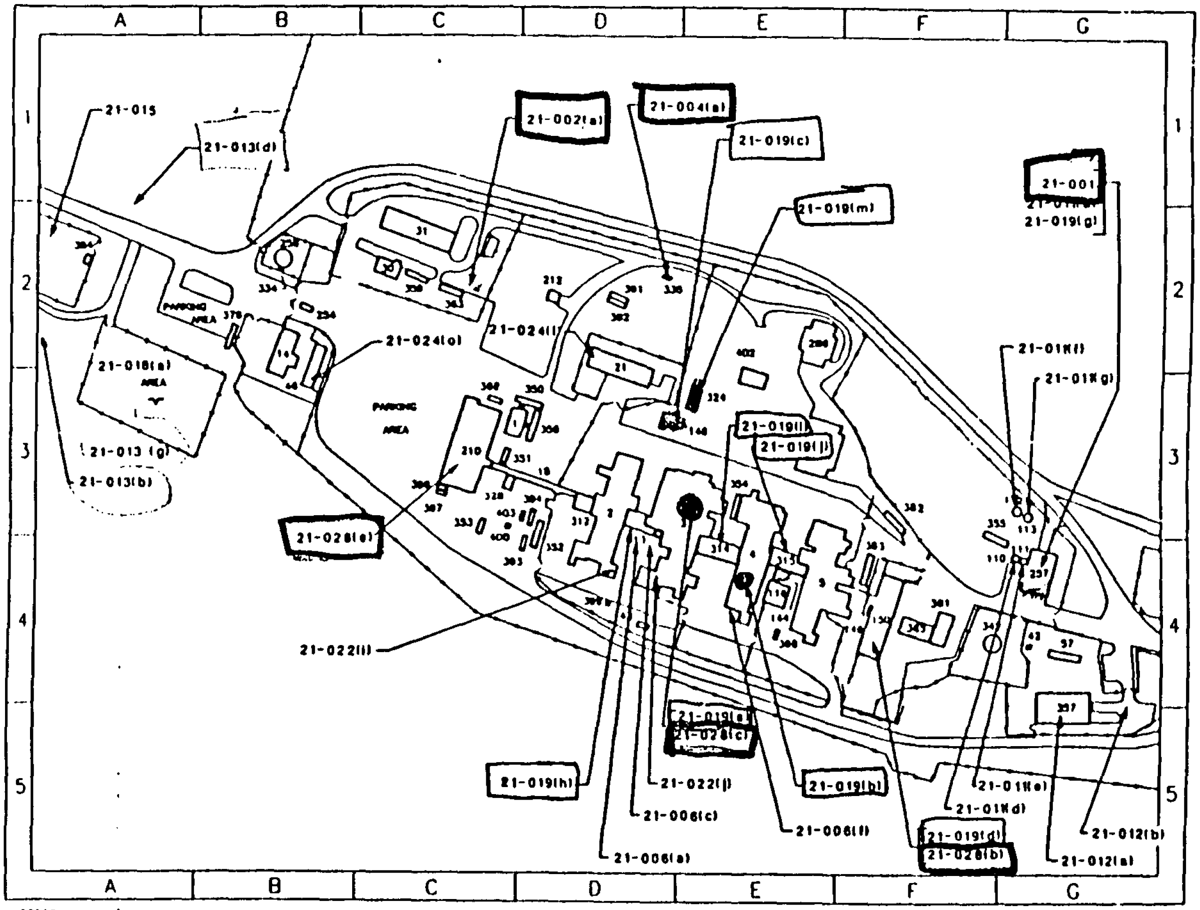
SWMU	Short Description	Period of Use	Comments
21-001	Drum storage area immediately southwest of TA-21-257 used to hold radioactive sludge wastes	1960s-Present	57 empty drums f in November 1988
21-002	Container storage areas located throughout TA-21 used to hold drums and gas cylinders	?-1988	Decommissioned i
21-002(A)	Container storage area in and near TA-21-38	?-1966	Decommissioned i
21-003	PCB storage area at TA-21-61 and a nearby bermed asphalt pad involving boxes of capacitors, transformers, drums and tanks	1978-1989	Area's function transferred to T in August 1989 a no longer used f storage.
21-004(A)	Aboveground tank TA-21-335 (6000 gal.) for receiving liquids from TA-21-21 (emergency releases)	1974-Present	Tank is unused t
21-004(B)	Aboveground tank located in a bermed area north of TA-21-223 and TA-21-213 for receiving liquids from TA-21-223	1979-Present	
21-004(C)	Same as above	1979-Present	

SWMU	Short Description	Period of Use	Comments
21-004(D)	Drainline leading from TA-21-223 into DP Canyon used before 21-004(B) and 21-004(C) were installed	?-1979	
21-028(A)	Satellite container storage area adjacent to acid sump TA-21-121	?-1988	Inactive
21-028(B)	3 satellite container storage areas adjacent to building TA-21-150	1963-Present	Active
21-028(C)	4 satellite container storage areas adjacent to building TA-21-3	1945-Present	Active
21-028(D)	<90 day satellite container storage area adjacent to building TA-21-209.	1965(?)-Present	Active
21-028(E)	3 satellite container storage areas adjacent to building TA-21-210	1965(?)-Present	Active

Table III. Additional Newly-Discovered Container Storage Areas Found at TA-2

Short Description	LANL Negativ of Photog
(1) Gas cylinders, drums, and other containers around TA-21-2	79-9 79-9 79-9 80-6 81-3 81-3
(2) Gas cylinders, drums, and other containers around TA-21-4	81-3 81-3
(3) Drums stored immediately north of TA-21-12	12 8
(4) Drums stored west of TA-21-12	3
(5) Drums stored west of TA-21-14	8 8
(6) Drums stored north of TA-21-30	6
(7) Drums stored south of TA-21-54	6
(8) Drums and gas cylinders stored around TA-21-152	644
(9) Gas cylinders and drums stored north of TA-21-228	83038K-
(10) Drums stored on east end of MDA A	15

TA-21



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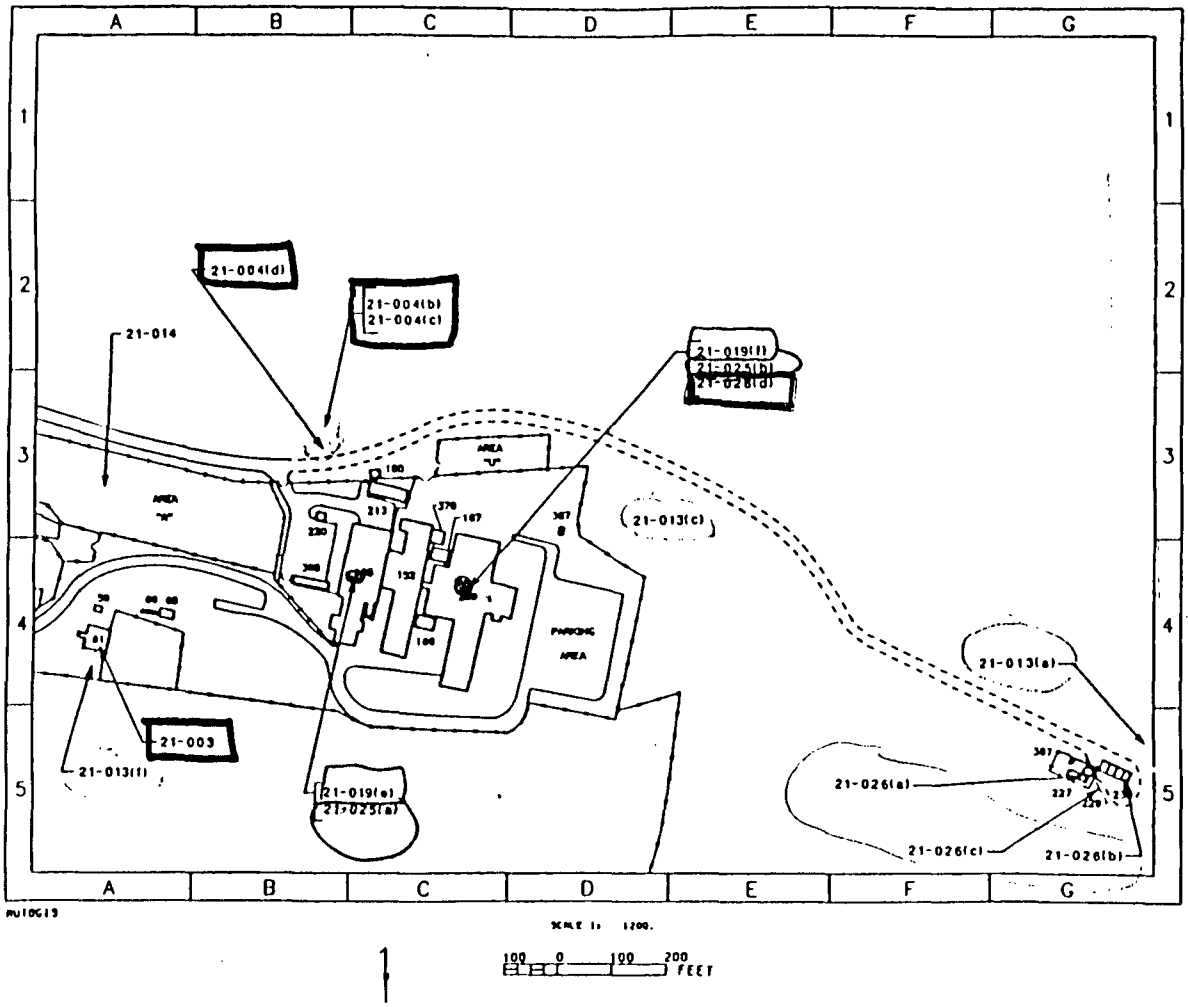

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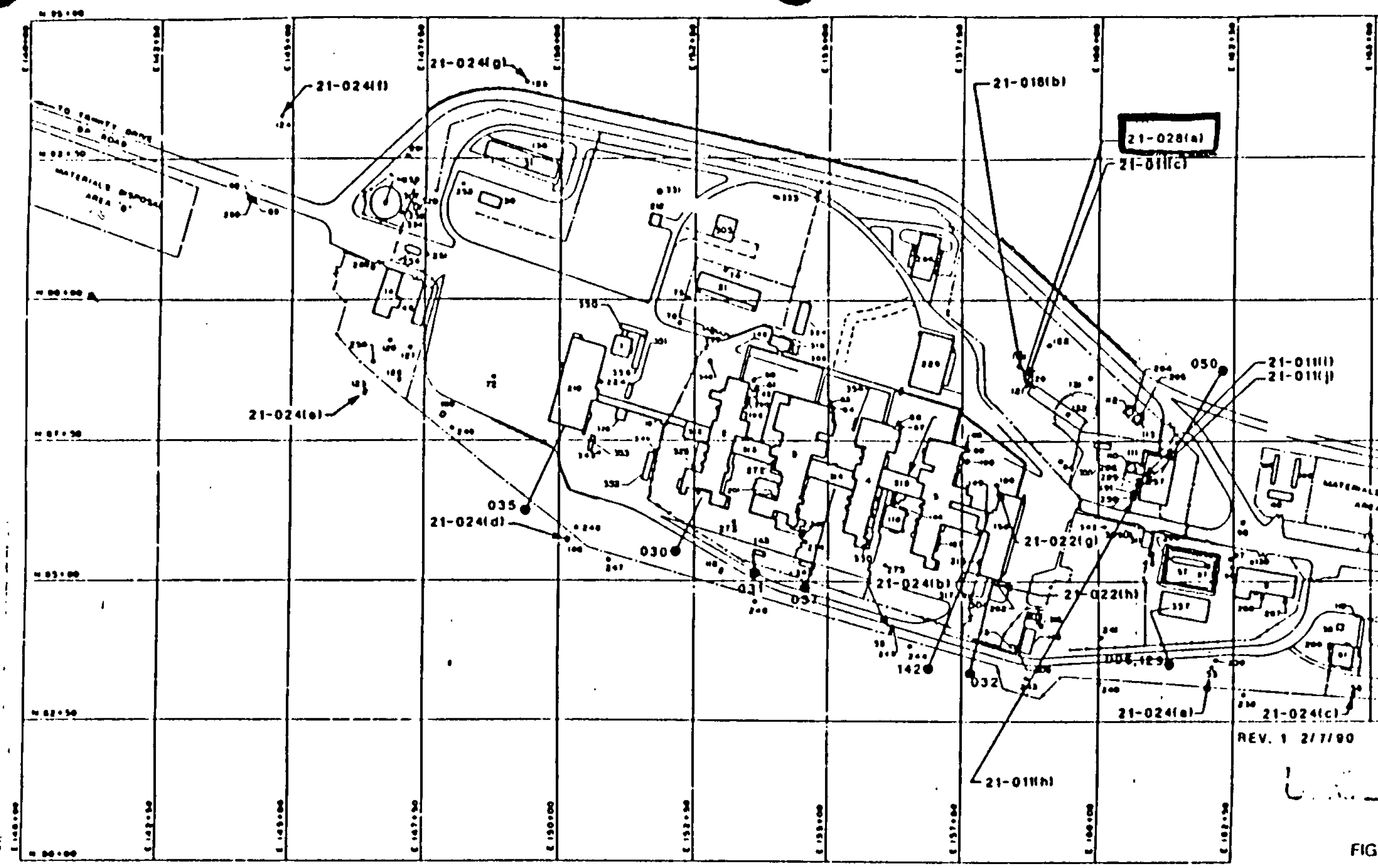

FIG

SOLID WASTE M
(SWMU

EXPLANATION

21 001 SWMU LOCATION

010 LOCATION OF OUTFALL INDICATING ASSOCIATED PIPING AND NPDES SERIAL NUMBERS (SEE APPENDIX A)

1" = 100' GRAPHIC SCALE

NOTES

UNIT 21 002 DRUMS AND CYLINDERS WERE AT DIFFERENT LOCATIONS THROUGHOUT TA 21. THE PLACEMENT OF DRUMS CONSTANTLY CHANGES

UNIT 21-021. SOIL CONTAMINATION FROM STACK EMISSIONS IS THROUGHOUT TA 21 TO THE AIRPORT.

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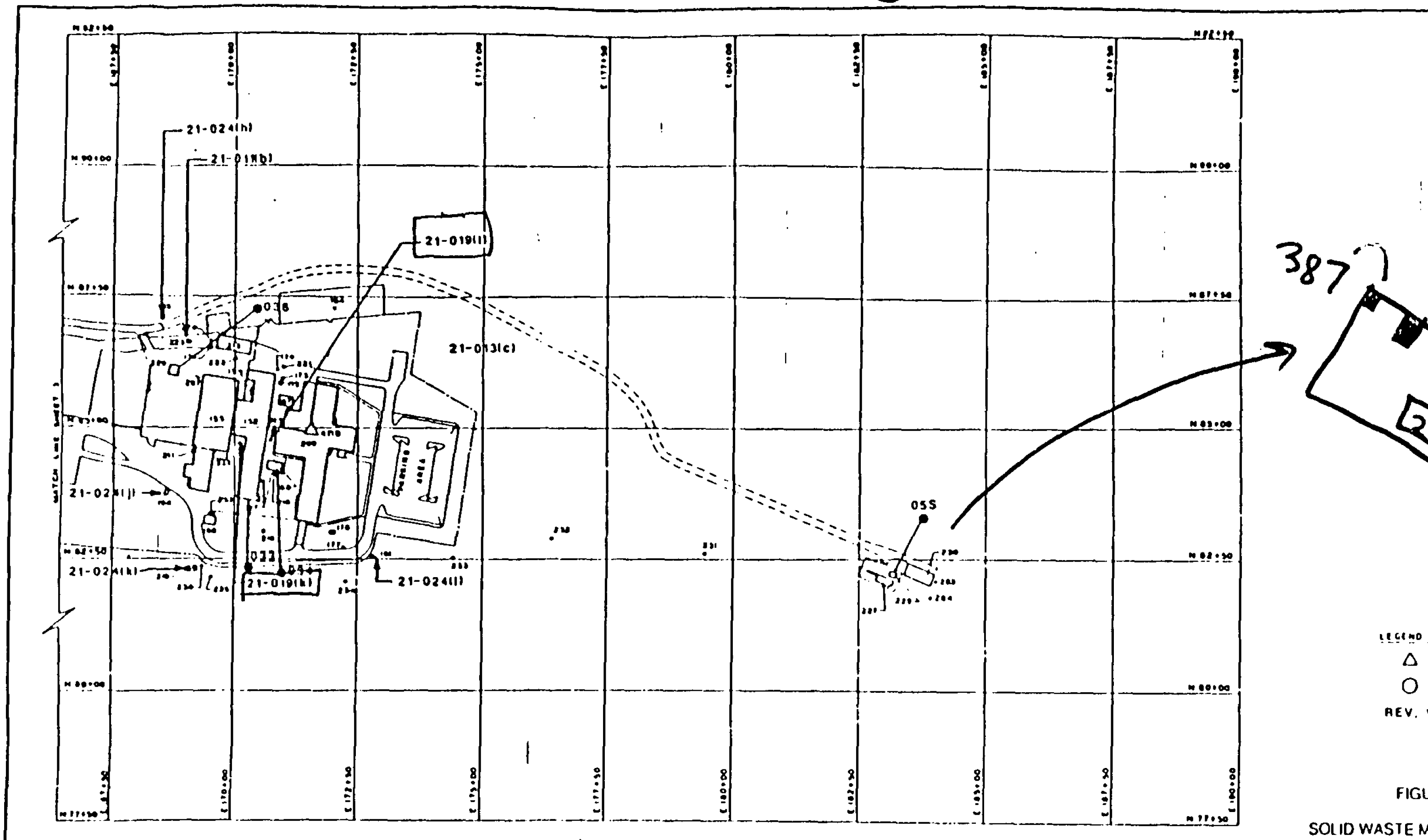

FIGU

SOLID WASTE M
(SWMU

EXPLANATION

21-001 SWMU LOCATION

010 LOCATION OF OUTFALL INDICATING ASSOCIATED PIPING AND NPDES SERIAL NUMBERS (SEE APPENDIX A)

1" = 100' GRAPHIC SCALE

NOTES

UNIT 21-013(e) UNIT LOCATION IS APPROXIMATE

UNIT 21-017 MDA U SEE FIGURE 21-11 FOR MORE DETAILED DRAWING

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TA-21

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1. SWMU #21-001, Radioactive Waste Container Storage Area

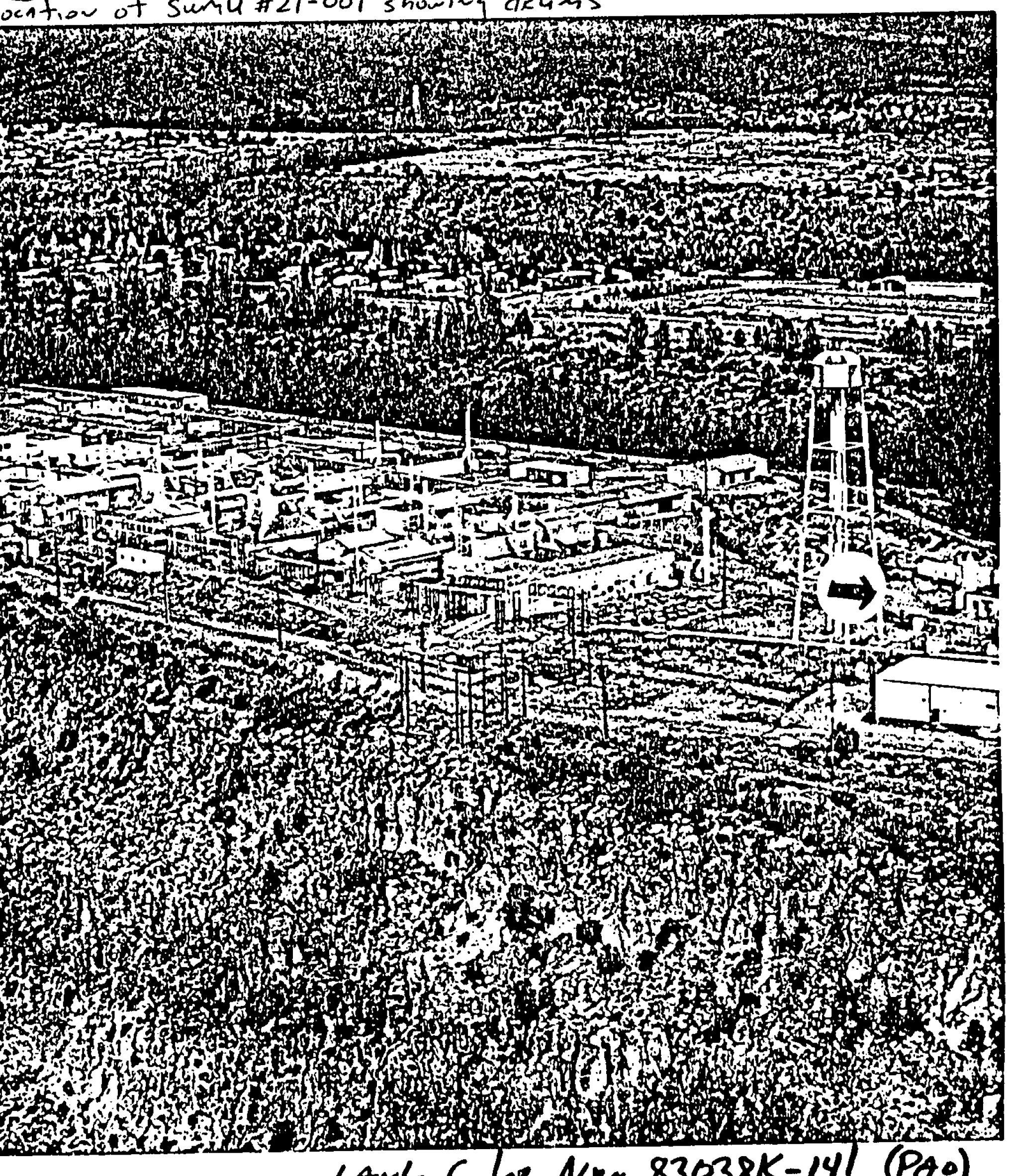
This unit was previously described (IT Corporation, 1990; RFA report, 1988) as a drum storage area used to hold sludge from TA-21-257. The location of this storage area is shown in Figures 21-1, 21-5, and 21-6. This asphalt-covered area was previously incorrectly stated to have been used since the 1950s (IT Corporation, 1990; RFA report, 1988), but aerial photographs of this area taken in 1958 and 1965 do not show signs of this area being used as a SWMU. A more realistic initial period of use would be in 1967, after the small area around Building TA-21-257 was paved. The SWMU occupies a 70 by 100 ft area immediately to the southwest of TA-21-257 (RFA report, 1988).

The operation of the liquid waste treatment facility (building TA-21-257, SWMU #21-011) resulted in the production of a sludge residue contaminated with plutonium and americium. This material was mixed with concrete and placed in steel drums for disposal at MDAs C and G. SWMU #21-011 was used to store these drums.

2. SWMU #21-002 and #21-002(A), Container Storage Areas

SWMU #21-002 refers to the decommissioned container storage areas located across all of TA-21. Abandoned 55-gallon drums lying on their sides on the ground were observed during the VSI (IT Corporation, 1990) and additional drums and gas cylinders were found to be stored throughout TA-21, some of which were leaking.

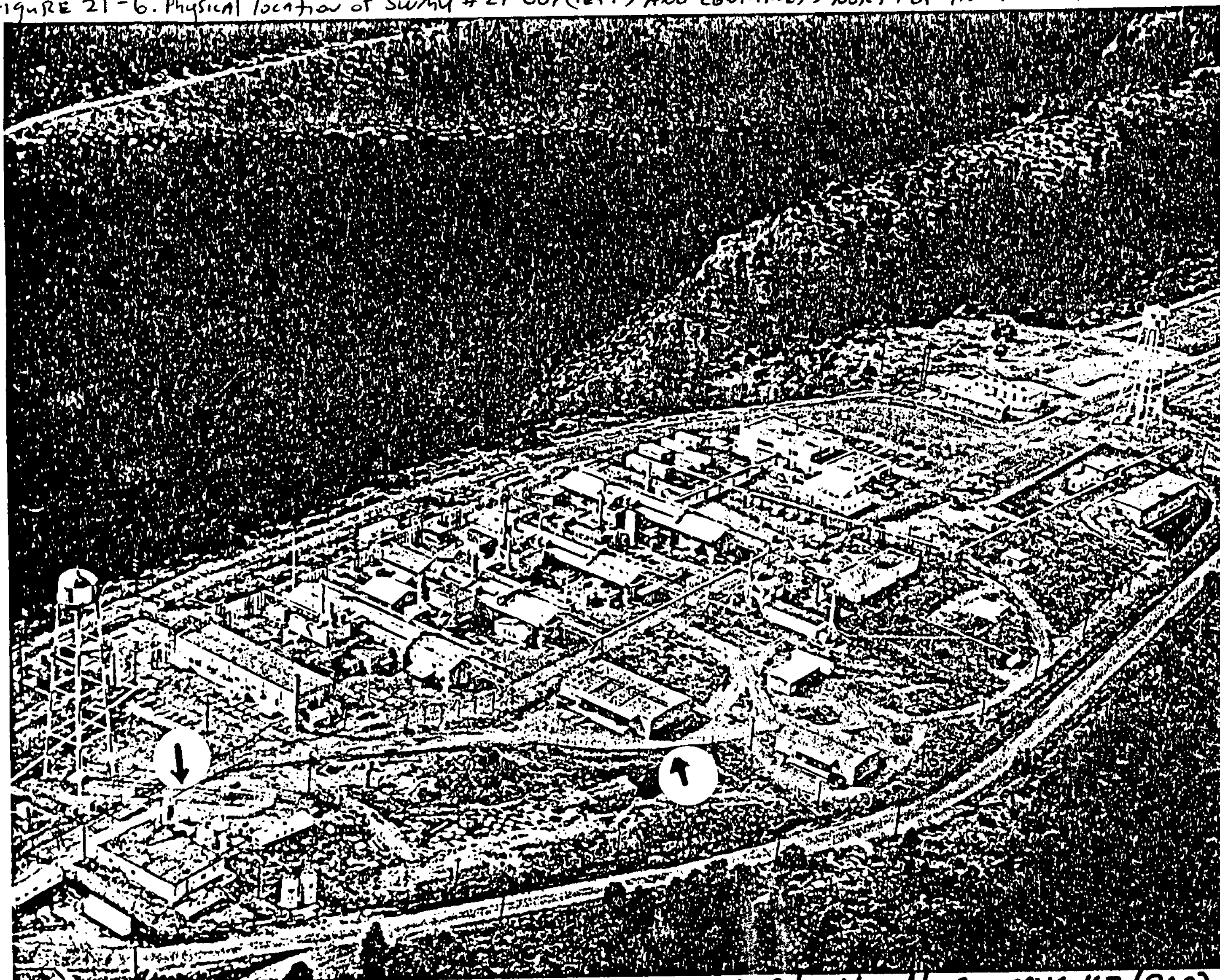
SWMU #21-002(A) actually refers to barrel storage structure TA-21-38 at TA-21 (Fig. 21-1). The best information we have on this structure ocation of SWMU #21-001 showing drums



LANL Color Neg. 83038K-141 (PAO)

12

Figure 21-6. Physical location of SWMU #21-001 (left) and containers north of TA-21-228.



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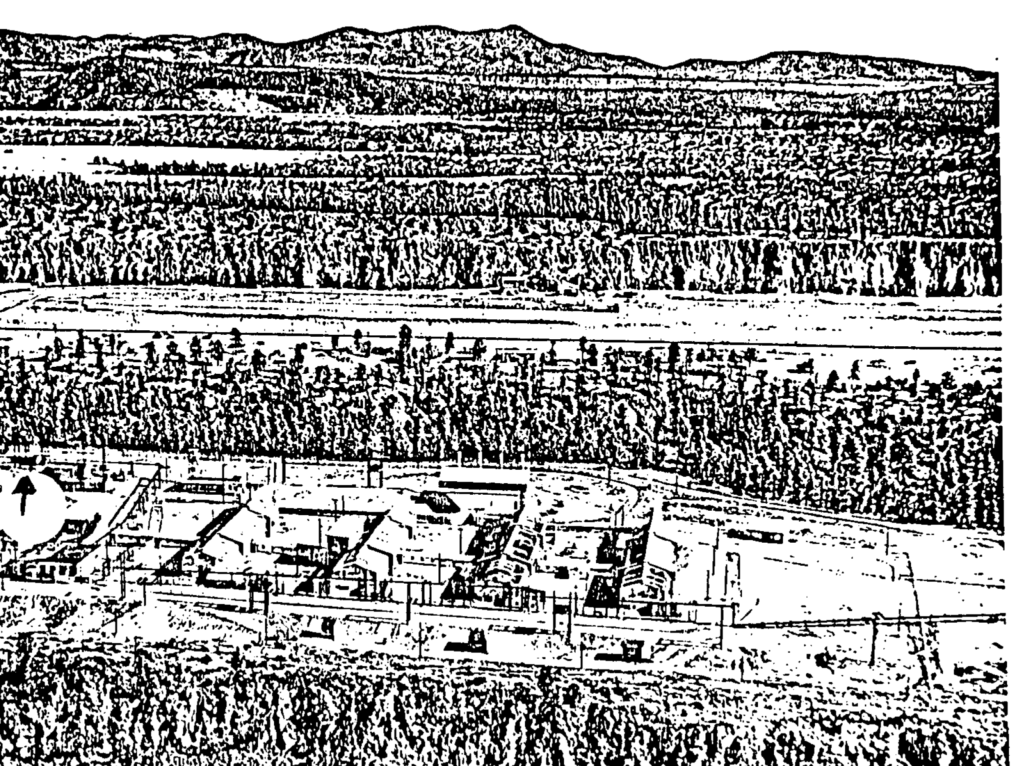
is that it was a 10 foot high, 15 by 36 foot wood frame structure with a concrete foundation (LANL/Pan Am History Book). TA-21-38 was built in August 1945 and was dismantled and removed in 1966 (LANL/Pan Am History Book). This structure did have a roof, but had no wall on the north side of the structure (Fig. 21-7). Upright 55-gallon drums can be observed in a 1950 photo of TA-21-38, located immediately to the southeast of the building (Fig. 21-8).

3. SWMU #21-003, PCB Storage Area

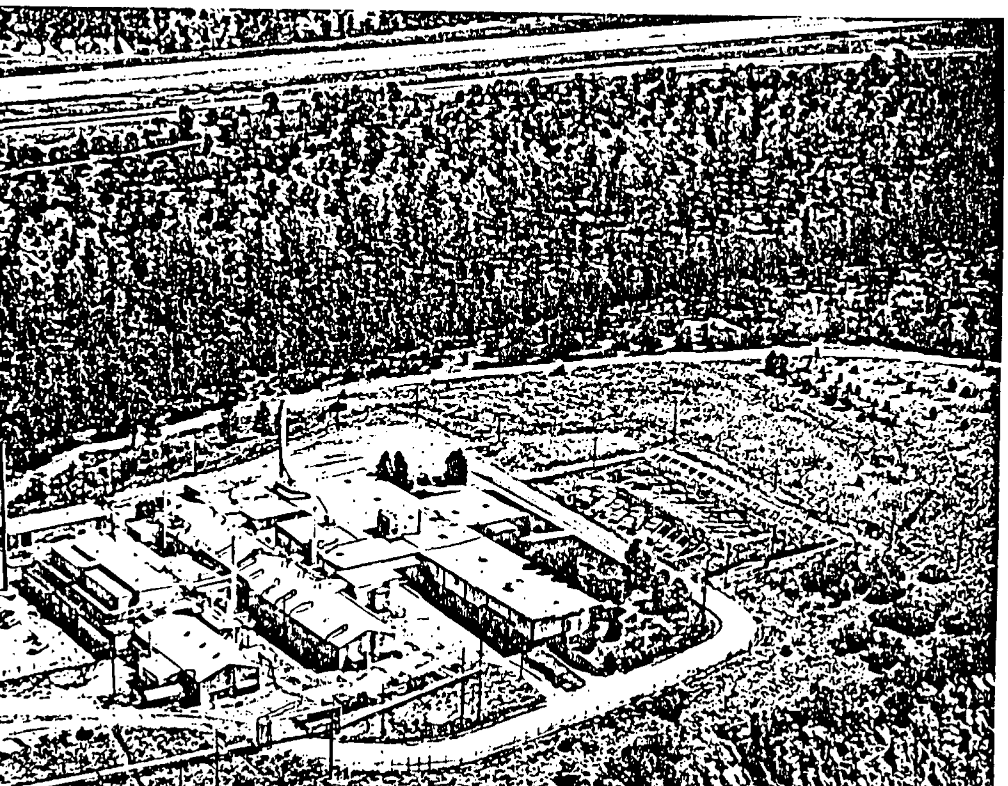
This SWMU currently consists of PCB drum storage at Building TA-21-61 and at a bermed asphalt pad immediately to the east of TA-21-61 (Figs. 21-2, 21-8, 21-9). Up to 20 boxes of capacitors, 5 drain-type transformers and 30 drums of PCB-contaminated oil are reported to be held here (IT Corporation, 1990). Actually, photographs taken on 6/6/85 show over 150 55 gallon drums on the asphalt pad (Figs. 21-10, 21-11). Bulk storage at this area consists of one 4000 gallon tank and one 2000 gallon tank that contain >50 ppb PCBs (IT Corporation, 1990).

Building TA-21-61 was originally constructed by 9/30/50 (LANL/Pan Am History Book). This Laboratory Building was used in its early lifetime for nuclear propulsion program work (LANL, 3/5/58). Since February 1978 "blown capacitors, transformers, and other PCB-contaminated solids... are stored ... at TA-21-61" (Warren, 1979 and 1980). Before this date these materials (for the entire Laboratory) were disposed of at MDA G by Zia craftsmen, who also operated the TA-21-61 PCB storage facility. The oil and solvent wastes and solid wastes were stored at TA-21-61 in plastic-lined drums (Warren, 1979).

TA-21-12 (Arrow to left) on 10/13/49. LANL Neg. No. 12241



2]-013(d))at TA-21 (arrow to left). (LANL Neg. No. 15926, 9/12/50)



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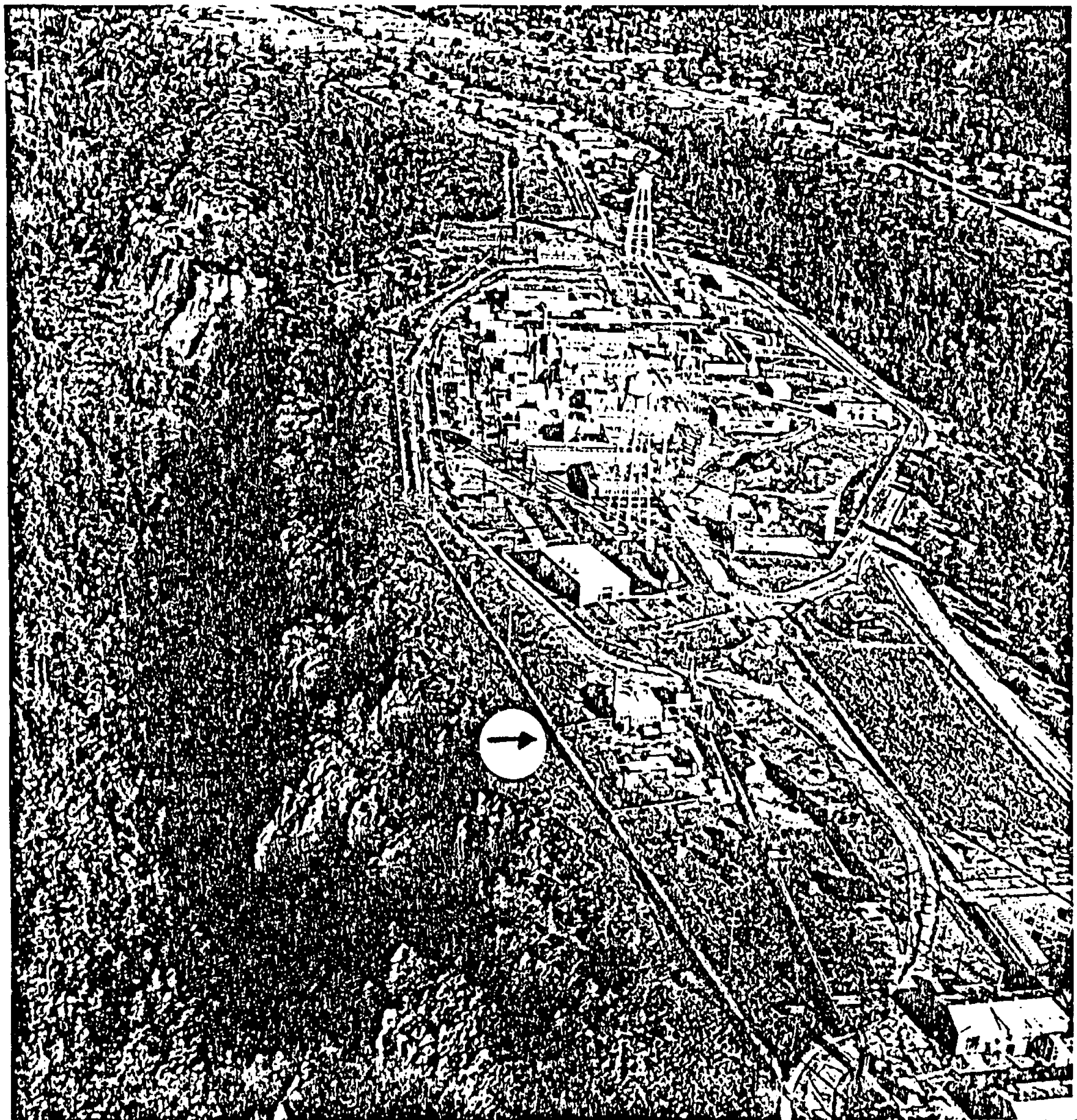
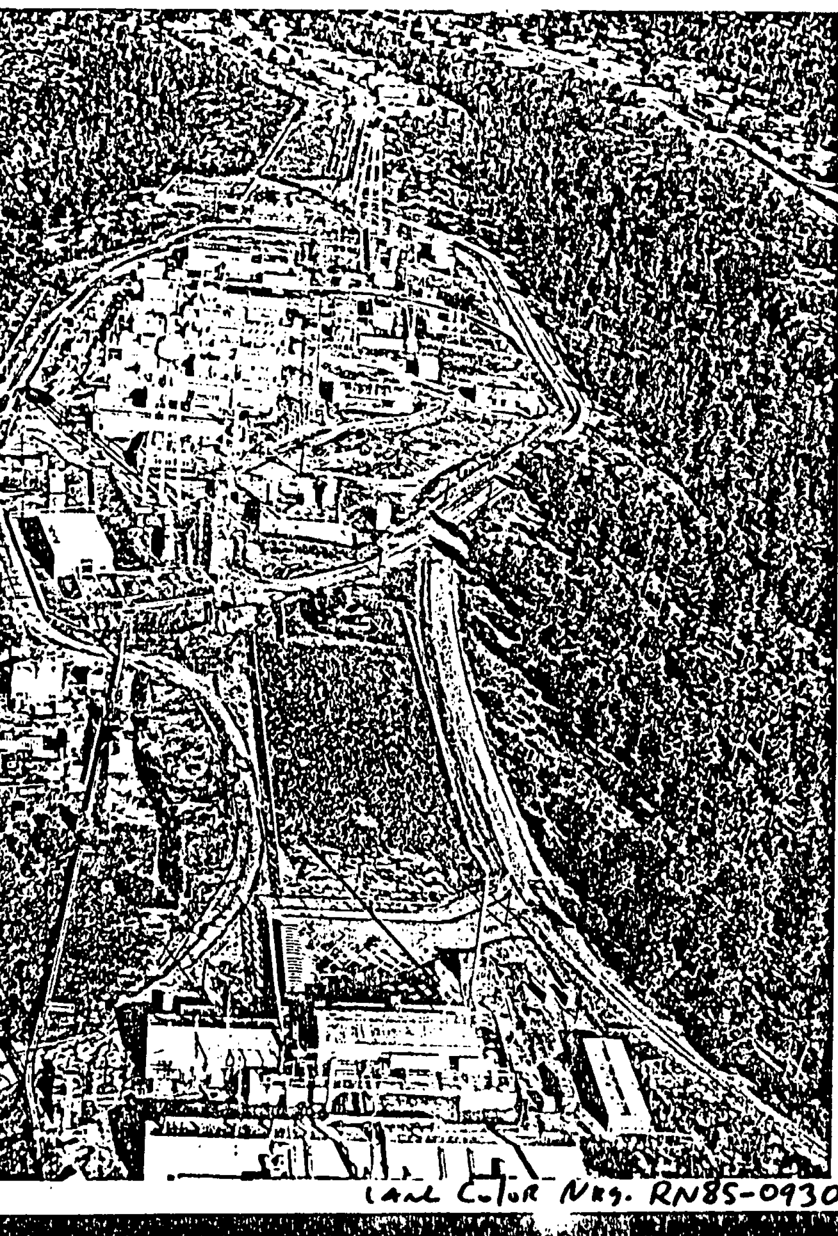


Fig. 21-10. PCB Storage Area at TA-21-61 and nearby asphalt Pad in 1985.

(6/6/85)

LANL Color Neg. No. RN85-093009



LANL Color Neg. RN85-093010 (6/6/85)

The Laboratory finally got an EPA permit to dispose of PCB solid wastes in June 1980 (Balo and Warren, 1981). Also in 1980, Building 61 met the Annex III Federal Register (February 17, 1980) requirements for a PCB storage facility, and was set aside for storage of PCB materials at LASL (Warren, 1980). Until March 1981, PCB capacitors were disposed of at MDA G, but after this date all PCB capacitors, along with oil with greater than 500 ppm PCB, were temporarily stored at TA-21-61 and disposed of off-site at an EPA-permitted incinerator (Balo and Warren, 1981).

A temporary holding pad was constructed east of TA-21-61 in 1981 (probably after October 1), and consisted of a curbed asphalt pad (Balo and Warren, 1961). This pad is approximately 40 ft by 58 ft (Alexander, 1989). Before this date, the PCB-containing drums were stored on a soil-based pad (see Fig. 21-12). After it was determined that the oil contained greater than 500 ppm PCBs, the drums were moved into Building 61 for storage.

As of 1987, dependent on the level of PCBs present in waste oil at the Laboratory, different disposal locations are used (Balo and Warren, 1987). Oil free of PCB's, (<5 ppm) is stored for off-site incineration as a waste fuel. Oil with PCB levels between 5 and 50 ppm is sent off-site for incineration. That with PCB levels between 50 and 500 ppm, is sent off-site for incineration or is absorbed into vermiculite and disposed of at MDA G. Oil with PCB levels greater than 500 ppm is stored at TA-21-61 until shipment to an approved incineration facility. All soil, equipment, and other solid materials contaminated with PCB oil are disposed of at MDA G.

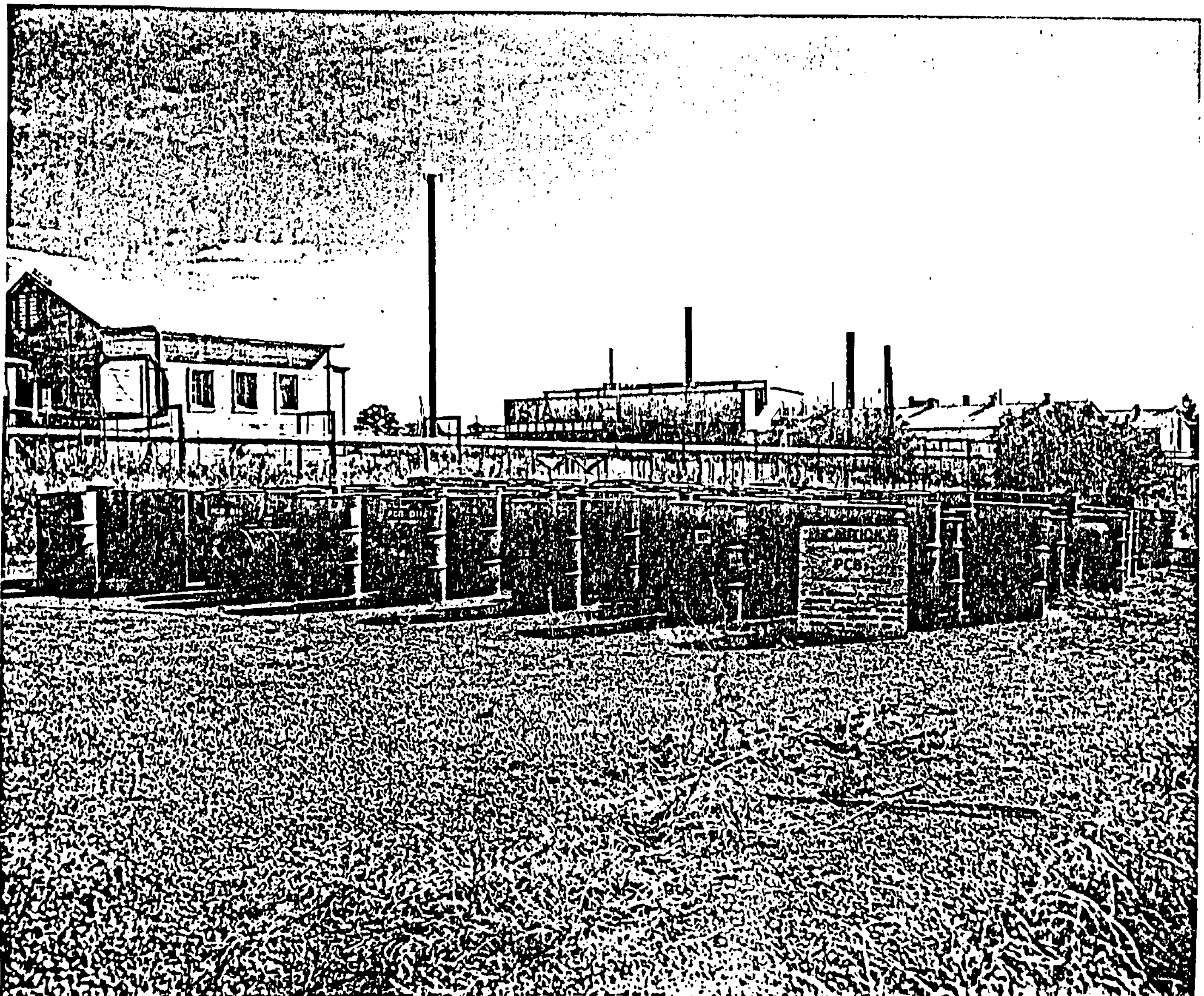


Fig. 21-12. PCB drum storage yard at TA-21 in 1979 before installation of asphalt holding pad. LANL Neg. No. 79-5020

As of August 1989, TA-21-61 was no longer used as a PCB storage area, as this function was taken over by TA-54-39 (Hupke, 1990). This information conflicts with the 1990 IT Corporation report. At this time a PCB survey was performed by Group HSE-8 of both Building 61 and the adjacent pad area. Otherwise, the PCB waste management practices are currently the same as stated in the previous paragraph, with the exception of PCB wastes contaminated with radionuclides, which the Laboratory's HSE-7 Group has an EPA license to incinerate at TA-50.

4. SWMU #21-004(A), #21-004(B), #21-004(C) and #21-004(D), Aboveground Tanks

As shown in Table II, SWMUs 21-004(A), 21-004(B) and 21-004(C) are aboveground tanks, but SWMU 21-004(D) is a drainline.

Aboveground tank TA-21-335, SWMU #21-004(A), is a 6000-gallon tank designed to receive any liquids discharged from the vault TA-21-21 in the event of emergency releases, such as if the fire sprinklers are used (IT Corporation, 1990). This tank is 8 foot in diameter and 16 ft long (Figures 21-13 and 21-14) and was installed in 1974 (IT Corporation, 1990).

There are two stainless steel tanks (SWMUs #21-004(B) and #21-004(C)) located in a bermed area 160 feet north of sump pump TA-21-223 (LANL/Pan Am History Book). These two tanks (Fig. 21-15) are identified as Laboratory structure TA-21-346 and have been described in Lab job number 5972-21 (LANL Laboratory/Pan Am History Book) and in a 4-page engineering drawing (LANL, 1979). These two tanks were moved to their current location in 1979 from TA-53 and connected to the preexisting 6-inch drain line (SWMU #21-004(D)) coming from sump/pump TA-21-223. Each

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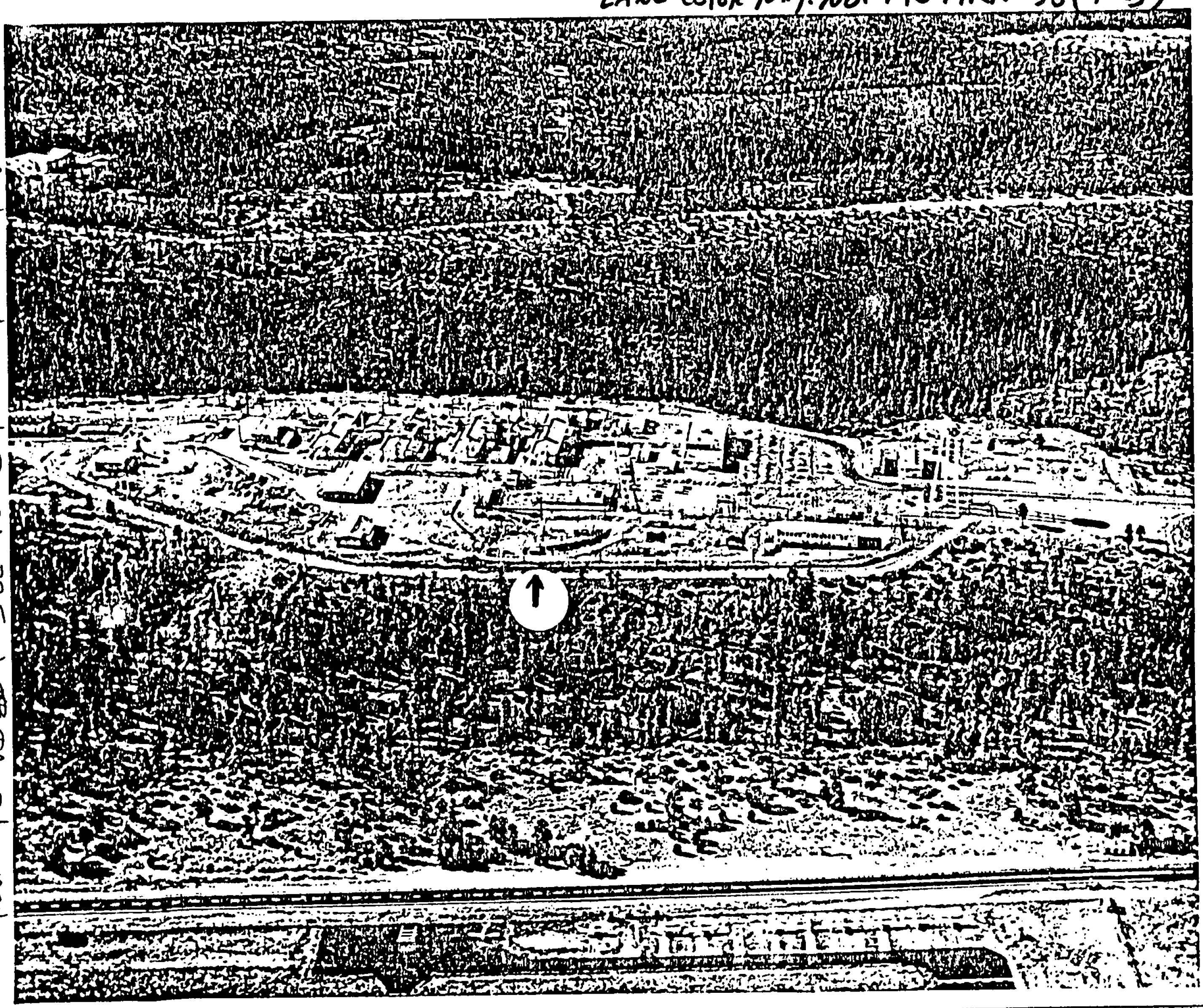
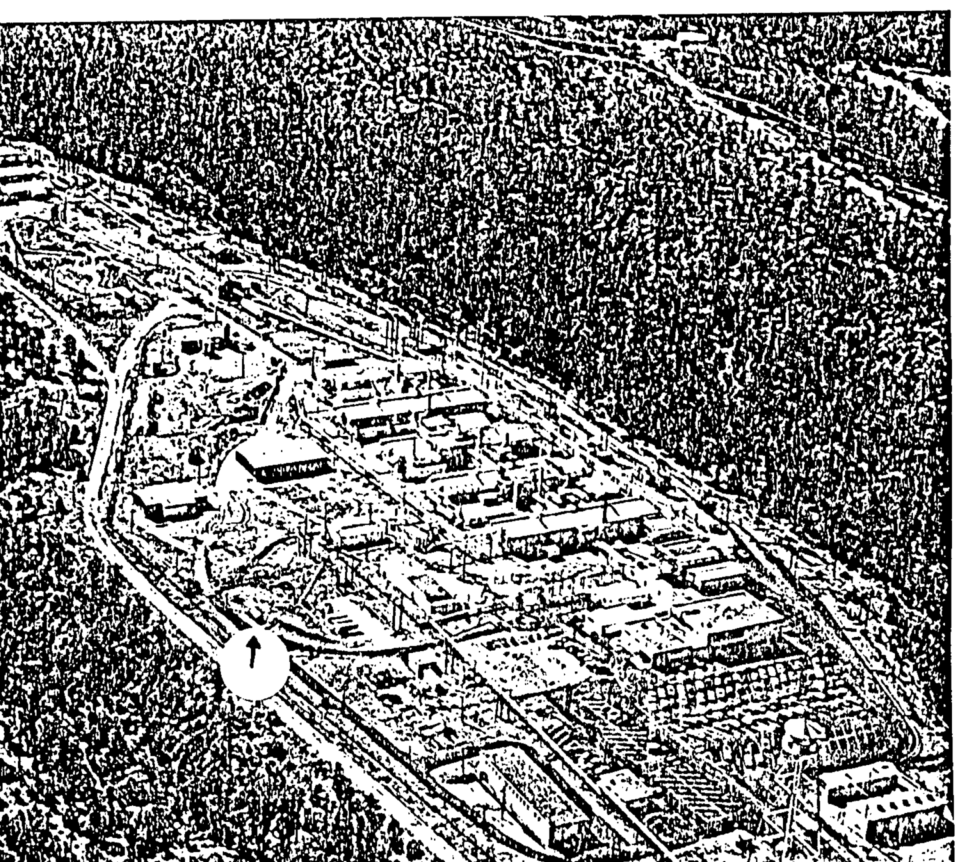
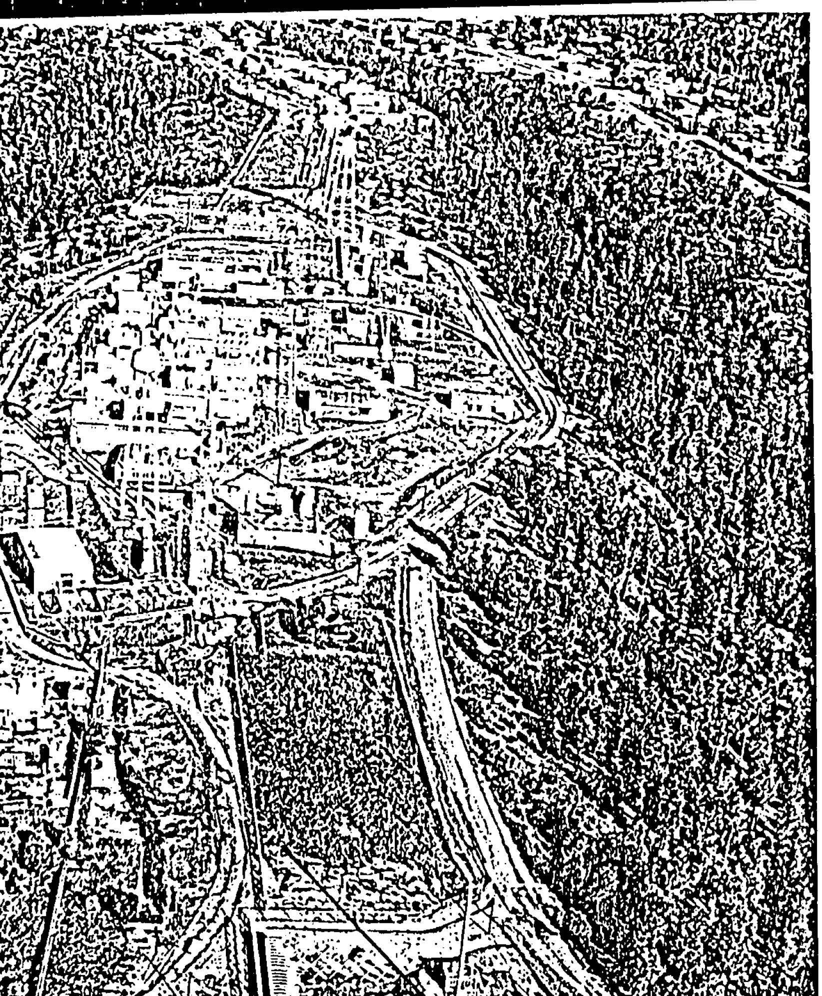


Fig 21-13. Containment vessel TA-21-335 at TA-21... and



LANL Color Neg. 74027 KN-5 (P4B)



LAnL Color Neg. RN85-093010 (6/6/85)

container storage areas in the database mandated by AR 10-3 are divided into two types of sites: <90 day and satellite container storage sites. The <90 day sites require that no containers be stored for more than 90 days from the date accumulation begins before they are delivered to TA-54 or TA-50. Generators at satellite sites may accumulate a total of 55 gallons of hazardous or mixed waste or only 1 quart of acutely hazardous waste.

SWMU #21-028(A) was a satellite site located adjacent to acid sump TA-21-121. It is listed as being inactive in 1988 (IT Corporation, 1990), and is not listed as an active satellite site on the LANL Container Storage database. The acid sump (which is really a distribution box) was built approximately in July 1946 (LANL/Pan Am History Book) to receive liquid wastes from DP West and later from TA-21-35 (LANL, 1976), which might have been the source of the waste in the containers. Besides the IT Corporation report, no photographic or historical information could be found to document this SWMU; it was not present during a drilling operation conducted in 1978 at MDA T (Nyhan, 1990). The IT Corporation report states that alcohol, acetone and freon used to be stored at this location.

SWMU #21-028(B) consists of 3 satellite storage areas generally located around/at TA-21-150 and are said to have been used from an unknown starting point through the present (IT Corporation, 1990). Since the plutonium fuels development building TA-21-150 was built in 1963, the starting point has been changed accordingly on Table II. As of July 1990, the LANL Container Storage Area database contains 5 satellite sites, which are:

(1) Under a hood in Room 603

(2) in Room 605

(3) in Room 607

(4) outside the rear door of Room 500A

(5) in the basement of TA-21-150.

The fourth site on this list is probably incorrect since Room 500A is in building TA-21-5, not TA-21-150. Although most of these 5 locations are probably not SWMUs there is some photographic evidence of container storage areas in May 1981 outside of the east doors of Rooms 601, 604, 605 and 606 (Fig. 21-16).

SWMU #21-028(C) consists of 4 different satellite storage areas in and around building TA-21-3, and have reportedly been used from an unknown starting date through the present (IT Corporation, 1990). Since this building was completed in 1945, the descriptor in Table II was changed to reflect this date. As of July 1990, the LANL Container Storage Area database contains 4 satellite sites, which are

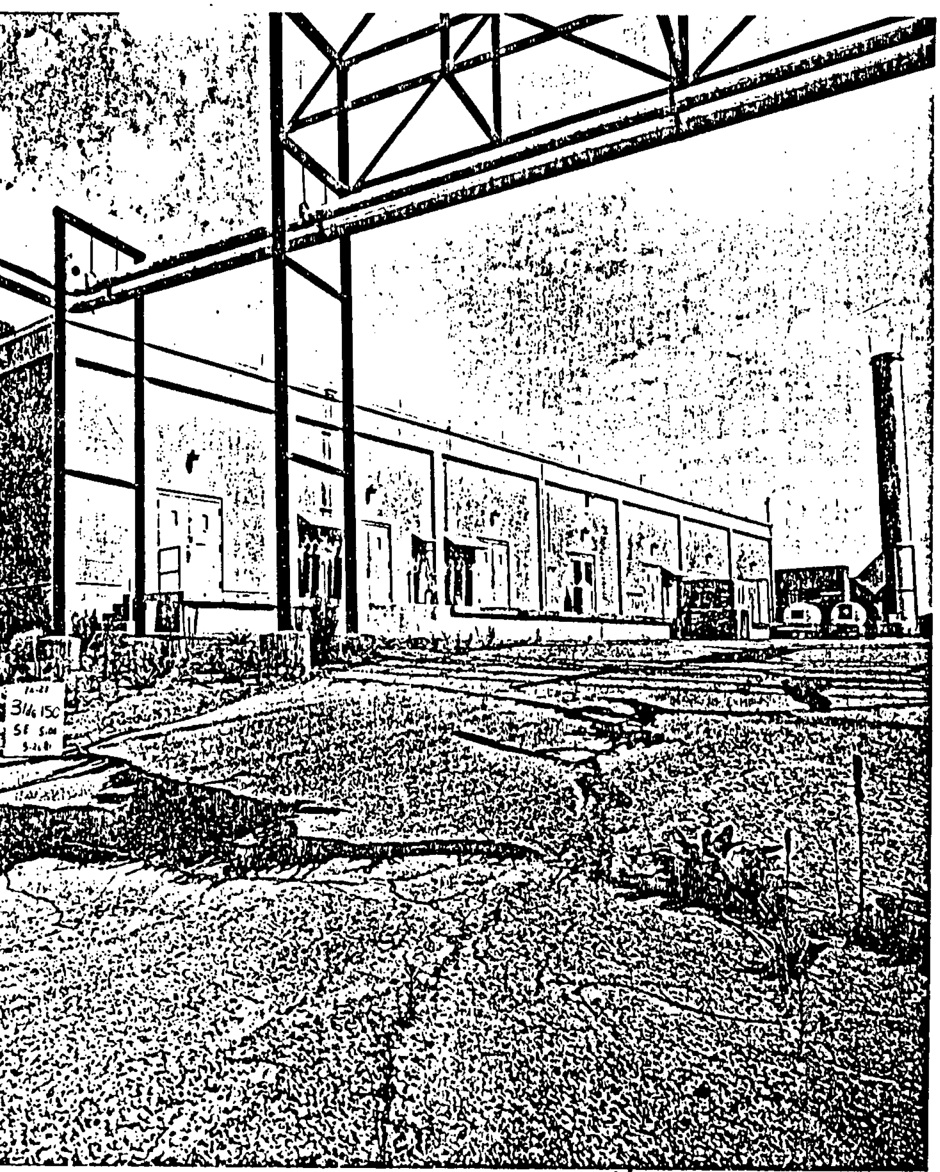
(1) outside the door to room 301 on the dock

(2) outside of the outer door to room 360 (TA-21-3)

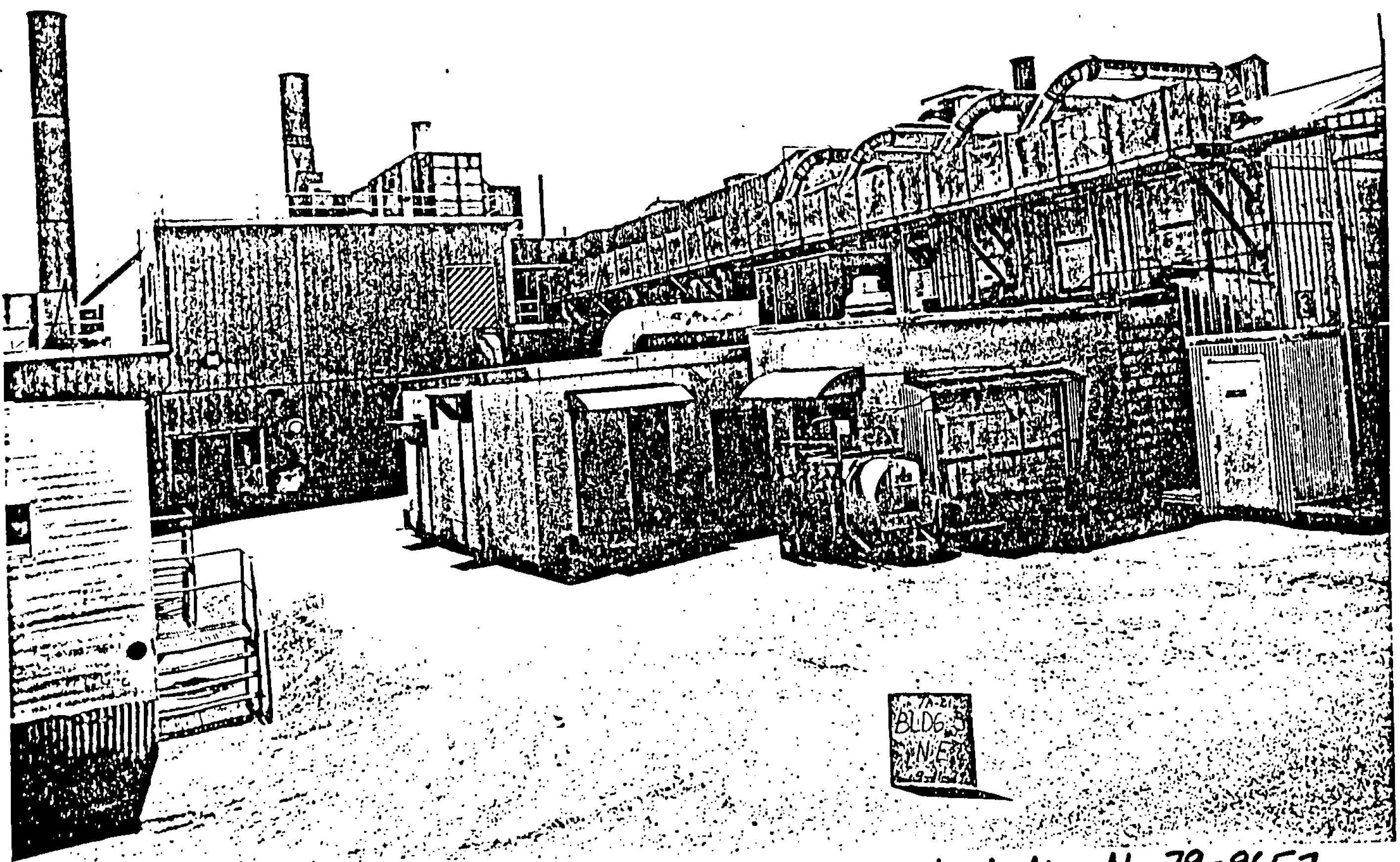
(3) on the northeast side of Fan Room Building 3N (on east side of TA-21-3)

(4) outside of TA-21-3 in Cabinet N.

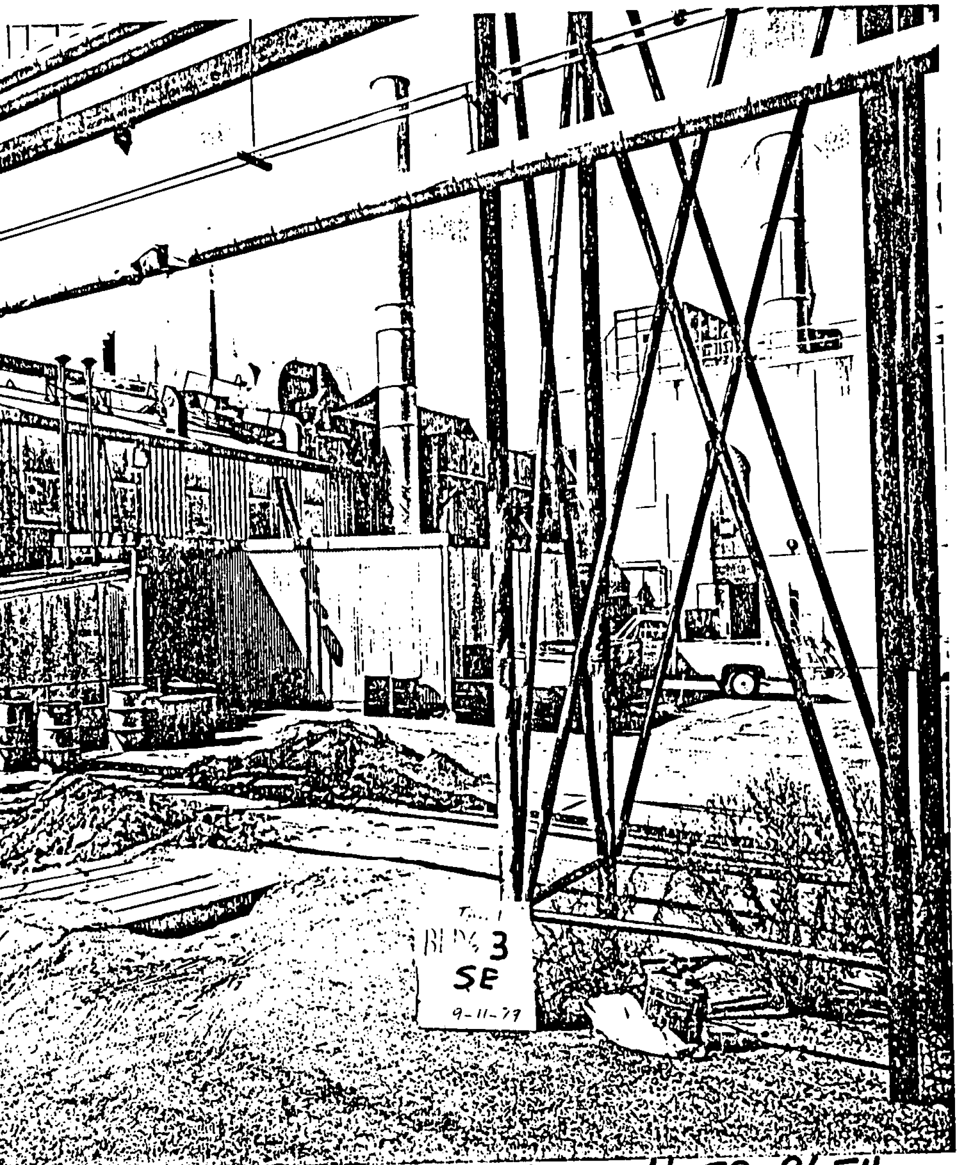
There is photographic evidence in 1979 and 1981 that several other container storage areas were in use around this building (Figures 21-17 through Figure 21-21).



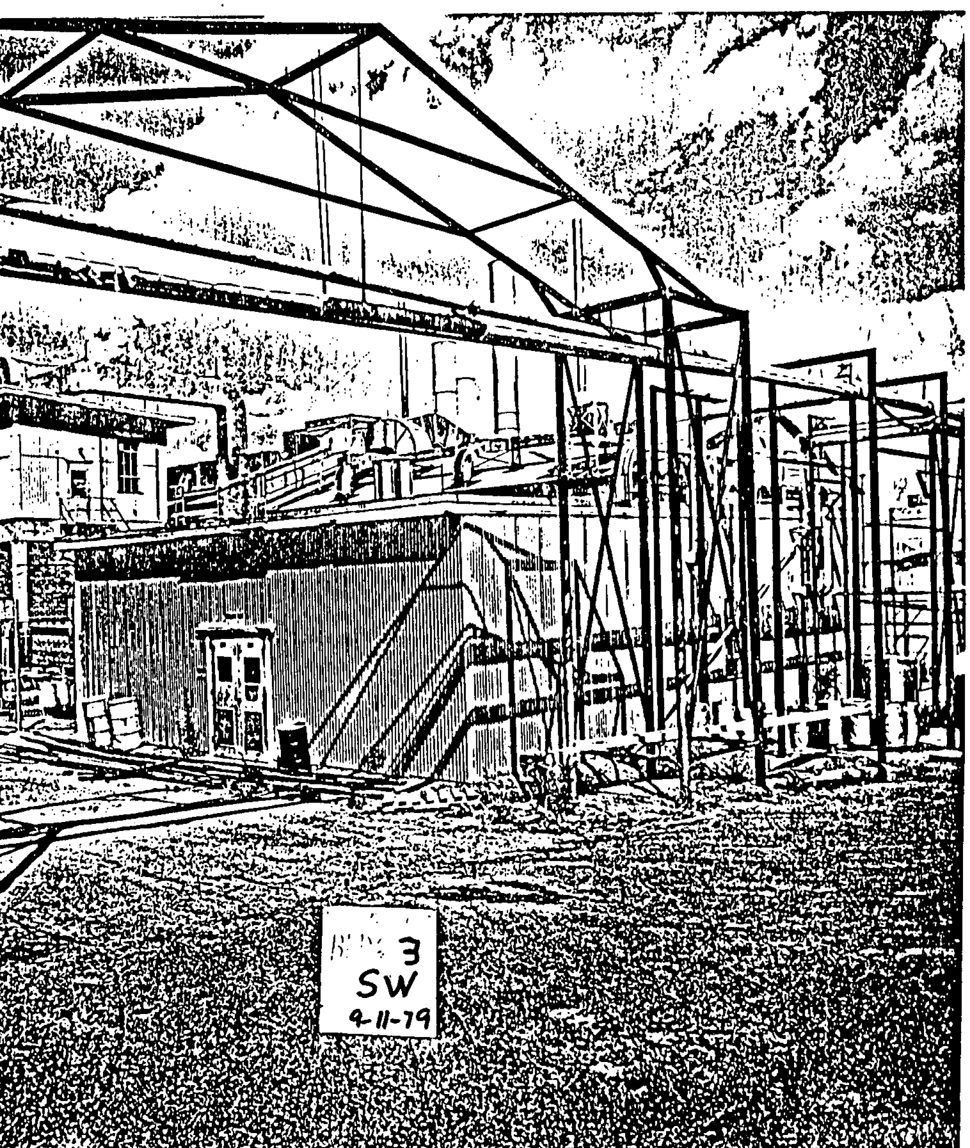
LANL Neg. No. 81-3819



LANL Neg. No. 79-9657

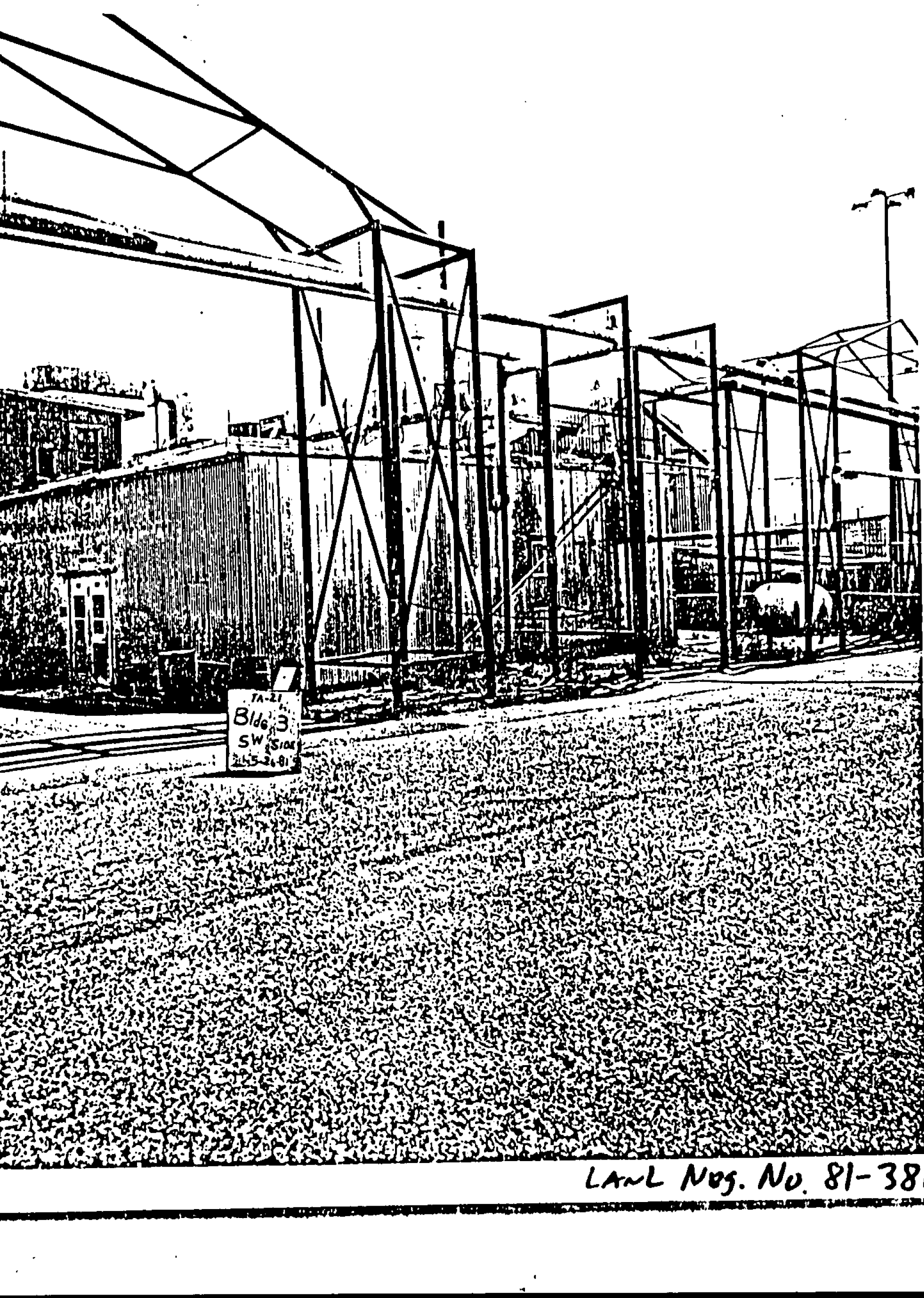


LANL Neg. No. 79-9654



LA-L Neg. No. 9662

LANL Neg. No. 81-3811



LANL Neg. No. 81-3812

SWMU #21-028(D) is not on the LANL container storage database (Grieggs, 1990) because it is listed as dealing only with radioactive wastes (IT Corporation, 1990), yet for some unknown reason it was assigned to the less than 90 day storage site category in the IT Corporation report. The IT Corporation SWMU report (1990) states that the start date for use of this storage area adjacent to Building TA-21-209 is unknown. However, this building was constructed by 1965, as was building TA-21-210 (SWMU #21-028(E)'s location), so Table II was adjusted accordingly.

SWMU #21-028(E) consists of three satellite storage areas located at TA-21-210. The July LANL Container Storage Area database lists these sites as:

(1) inside Room 128,

(2) the south lab in Room 120

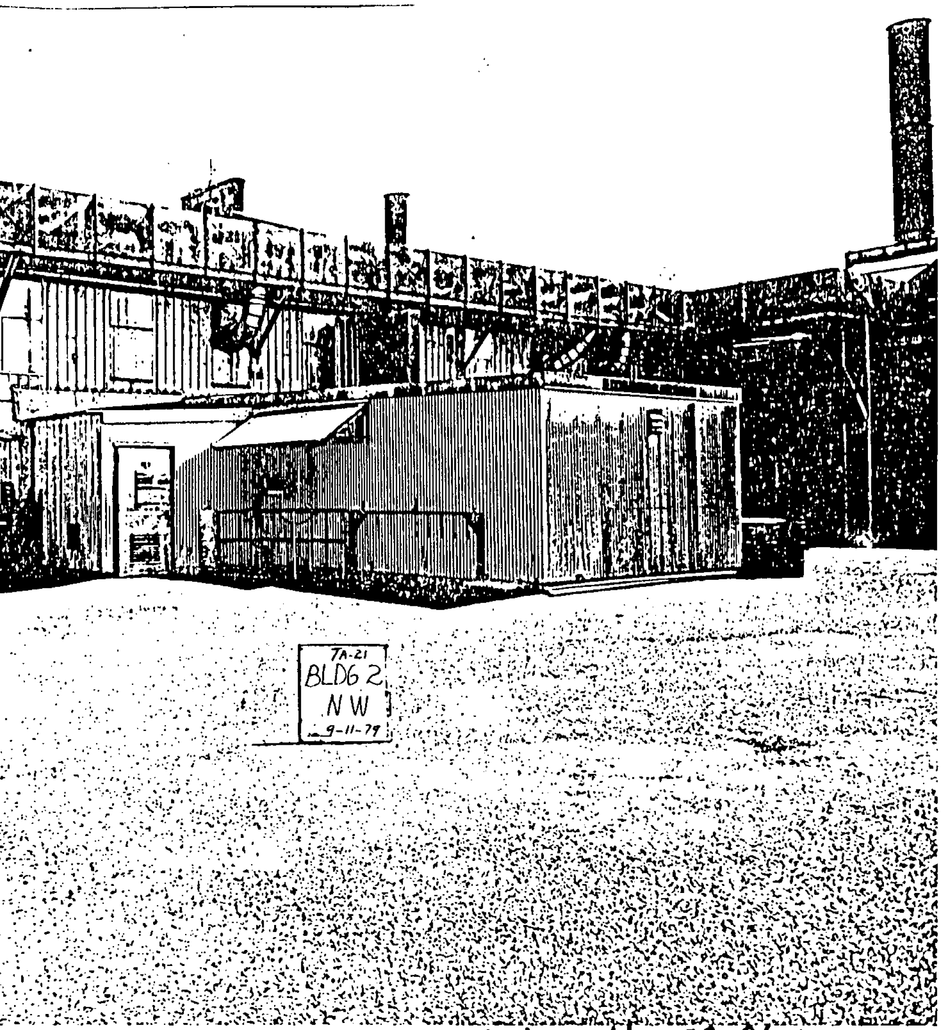
(3) on the north loading dock (outside) of TA-21-210

6. Newly Discovered Sites

Ten newly discovered potential SWMUs were found in the process of finding photographic evidence for the preceding five categories of aboveground tanks and container storage areas (Table III). The sole evidence and information on almost all of these sites is photographic.

Basically seven container storage areas were identified at DP West: around TA-21-2 (Figs. 21-22 to 21-27) and TA-21-4 (Figs. 21-28 and 21-29), north (Fig. 21-7 and 21-30) and west (Fig. 21-31) of TA-21-12, west of TA-21-14 (Figs. 21-32 and 21-33), north of TA-21-30 (Fig. 21-34), and north of TA-21-228 (Fig. 21-6). Three container storage

Container storage
Areas at TA-21-2 in 1979.



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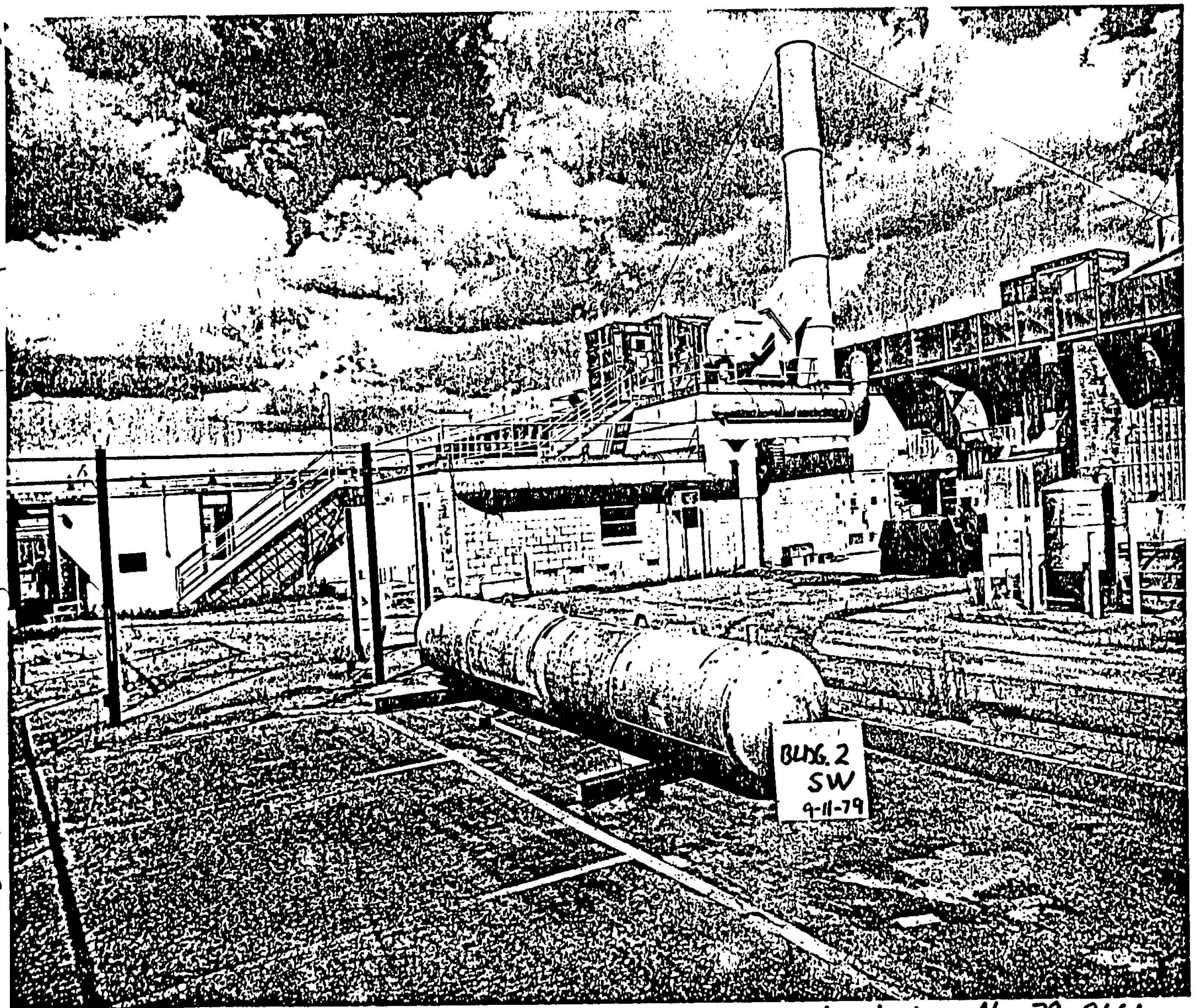

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LANL Neg. No. 79-9659

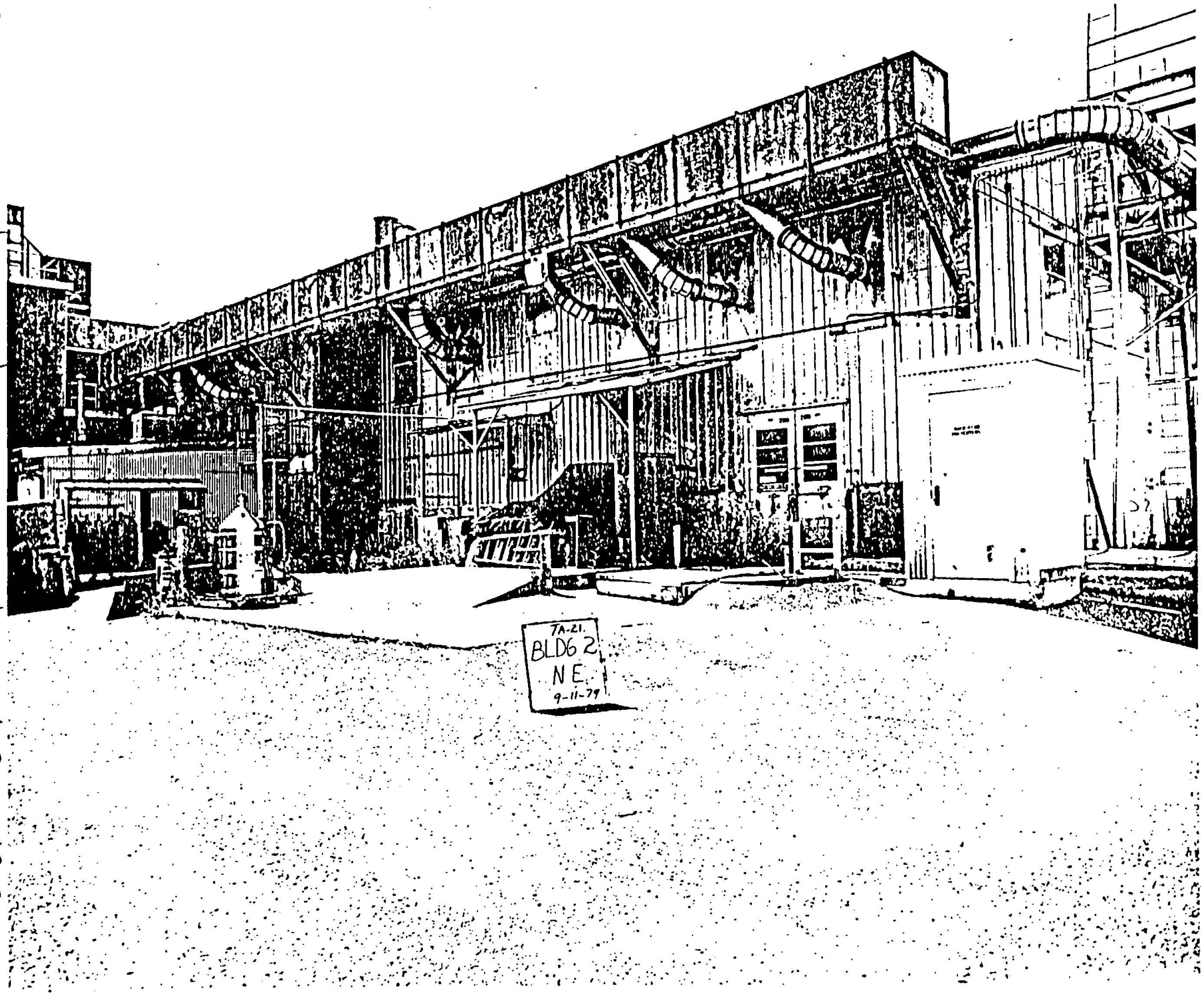


Fig. 21-24. Container storage Areas at TA-21-2 in 1979

LANL Neg. No. 80-6966

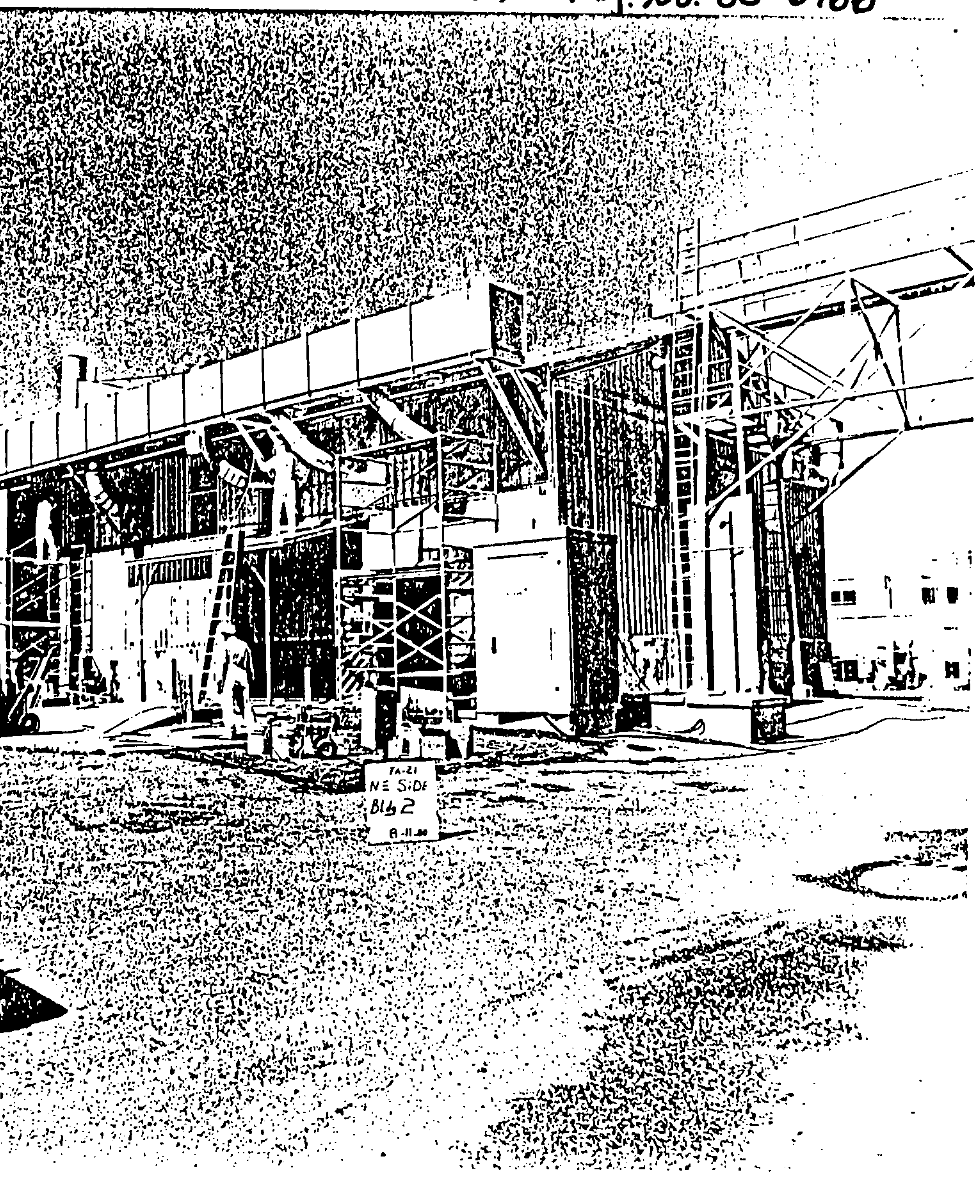
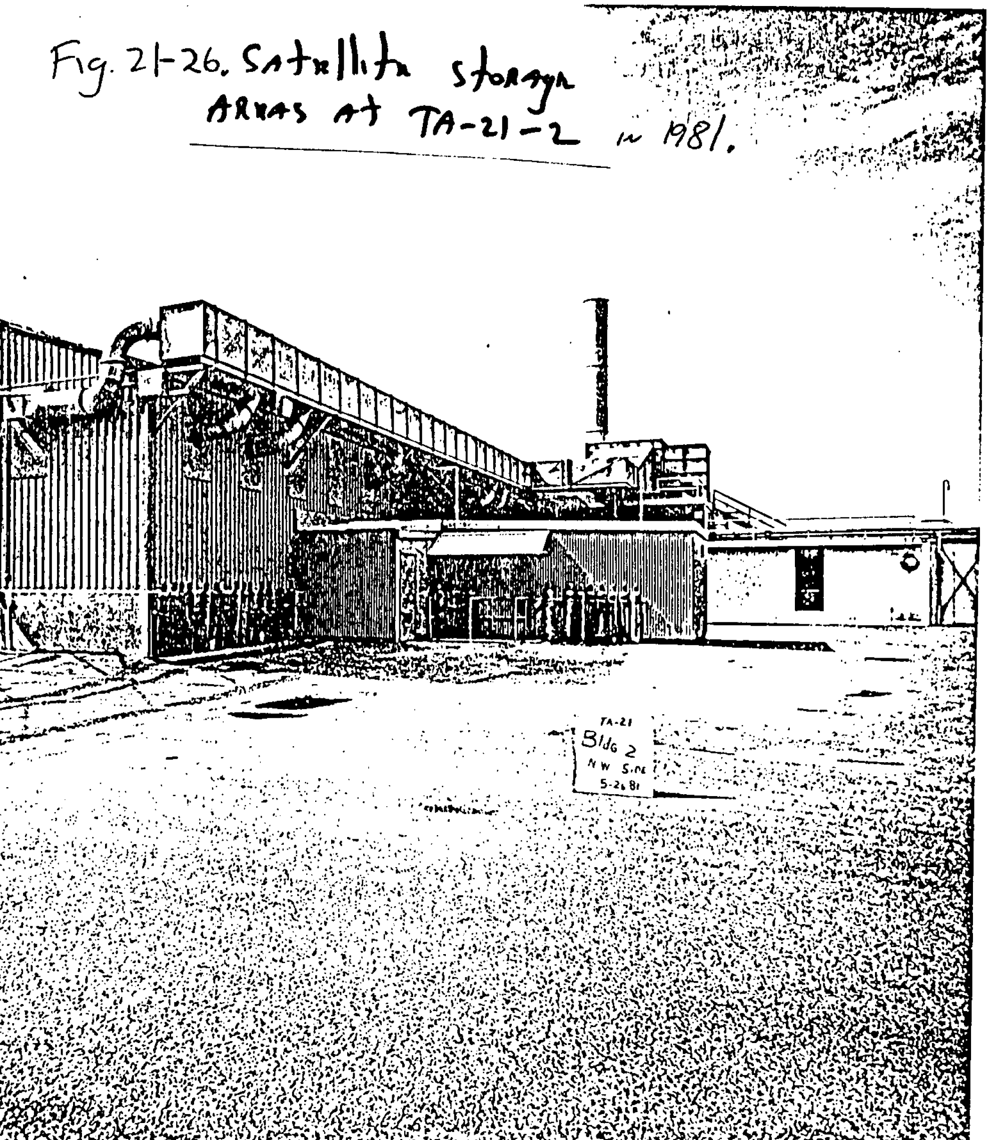


Fig. 21-26. Satellite storage areas at TA-21-2 in 1981.



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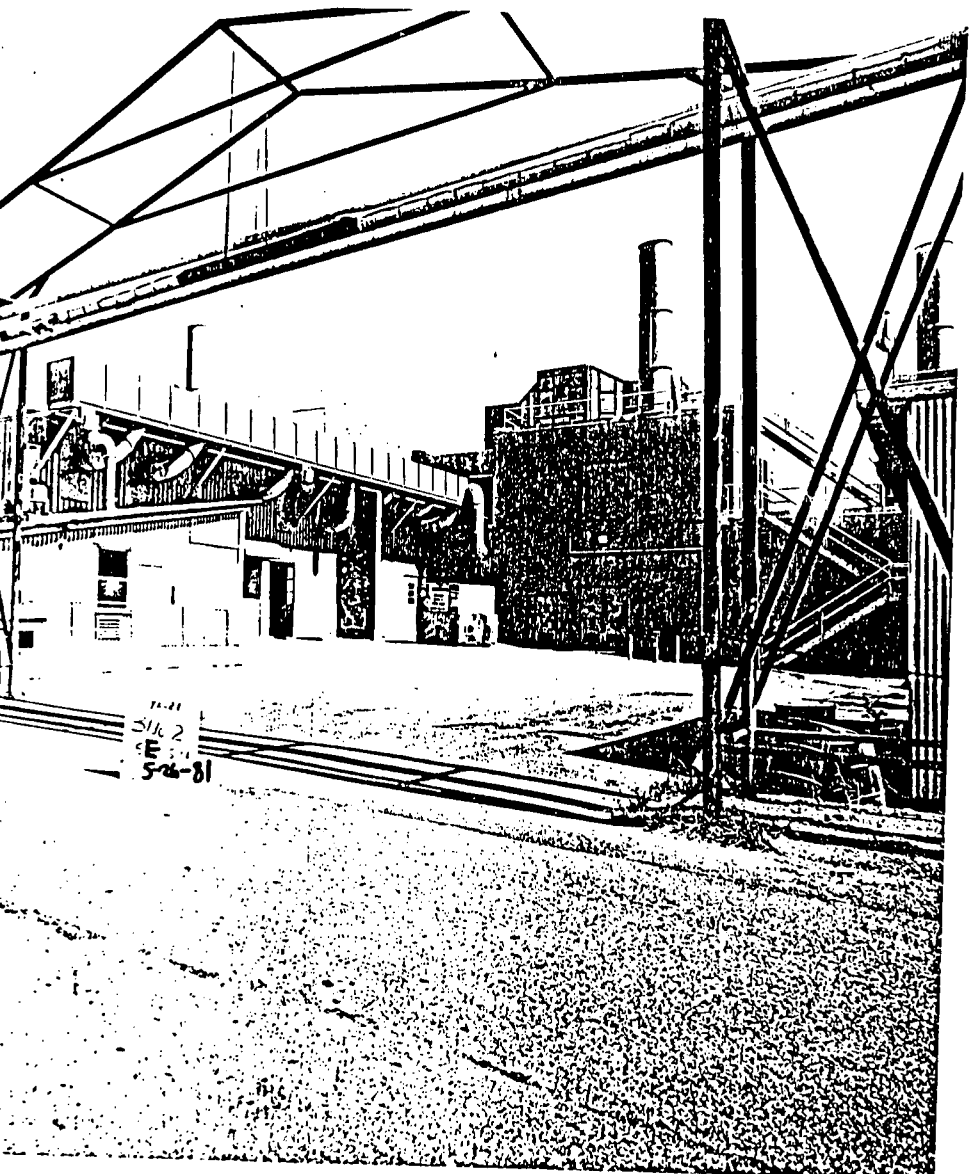

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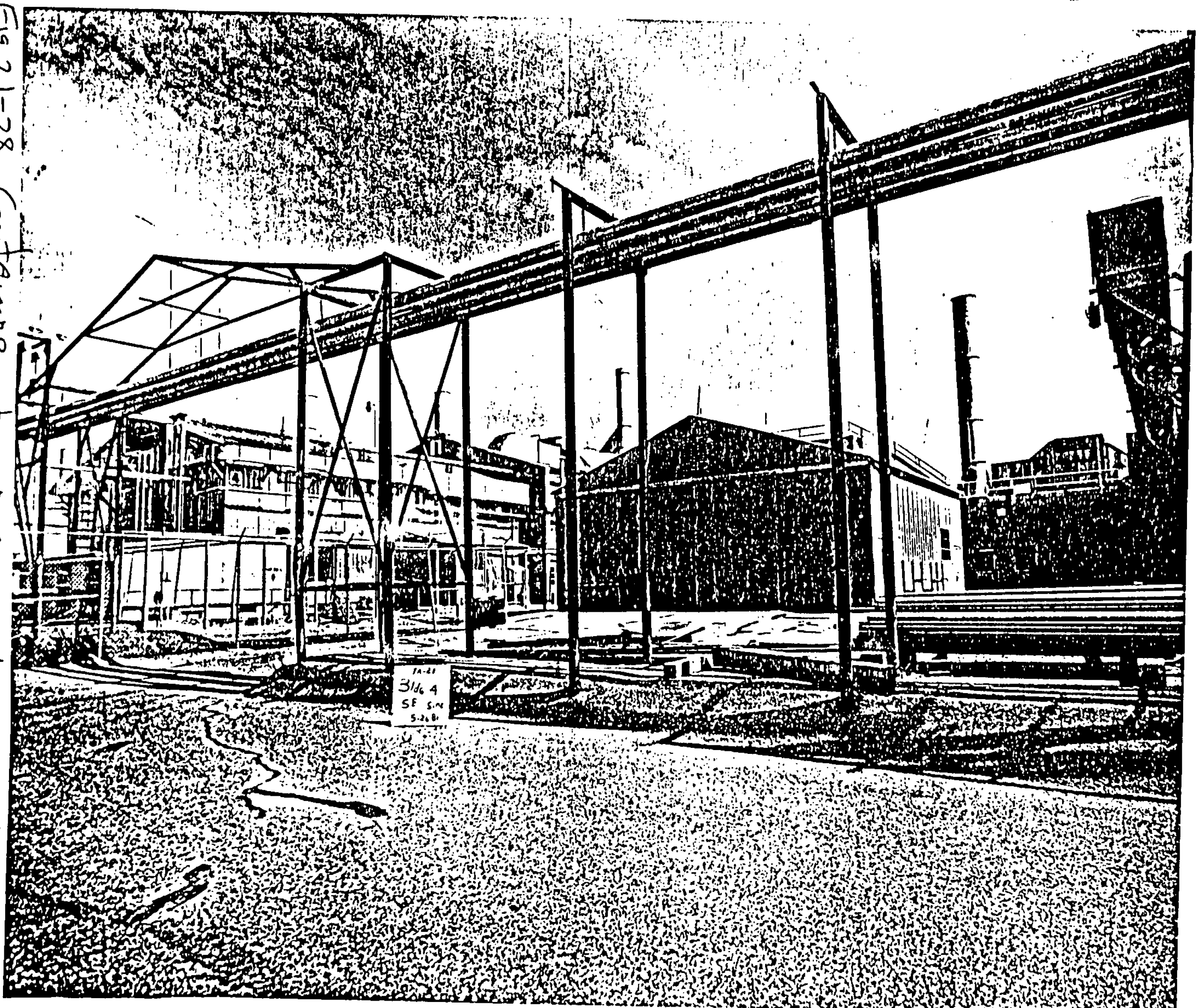
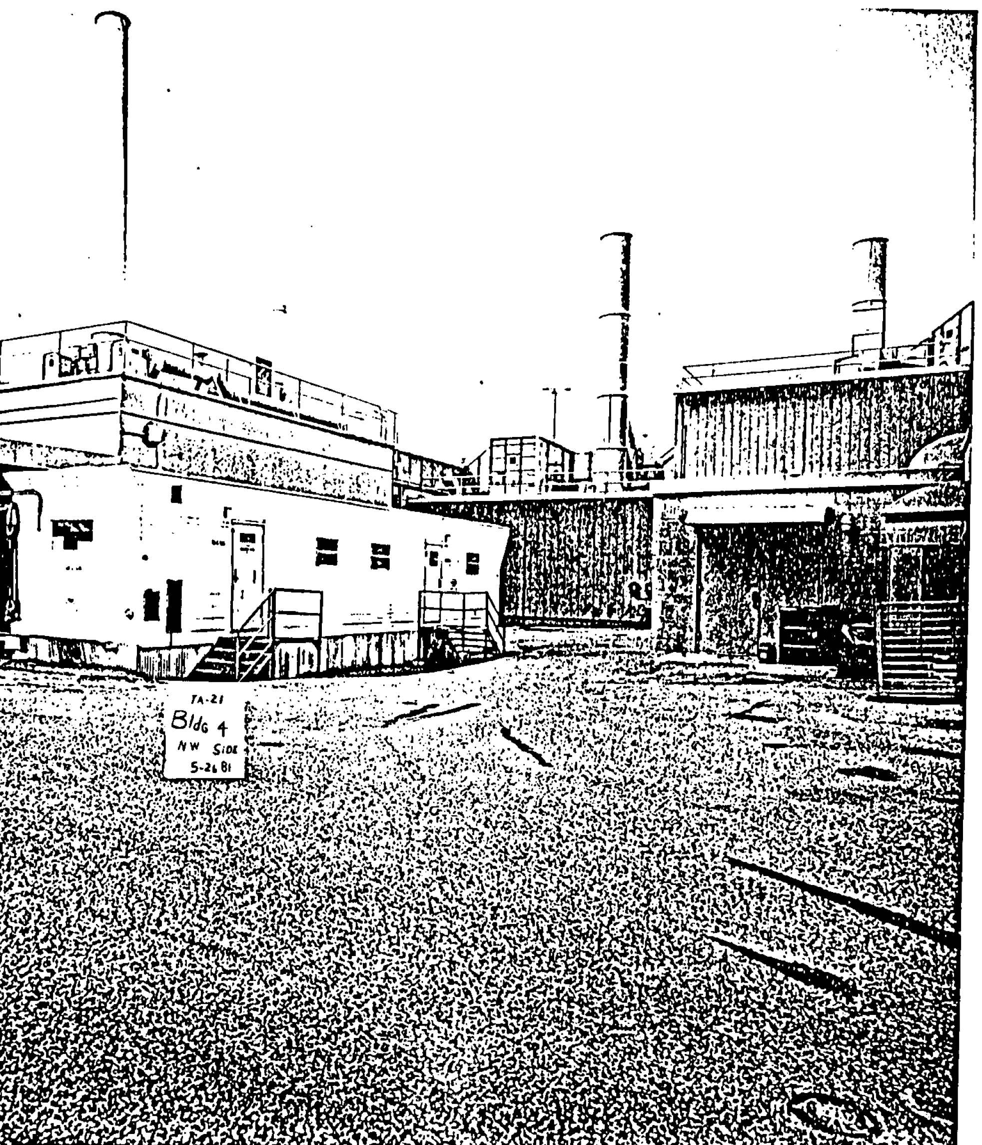


Fig. 21-28. Container storage area [illegible]

LANL Neg. No. 81-3816



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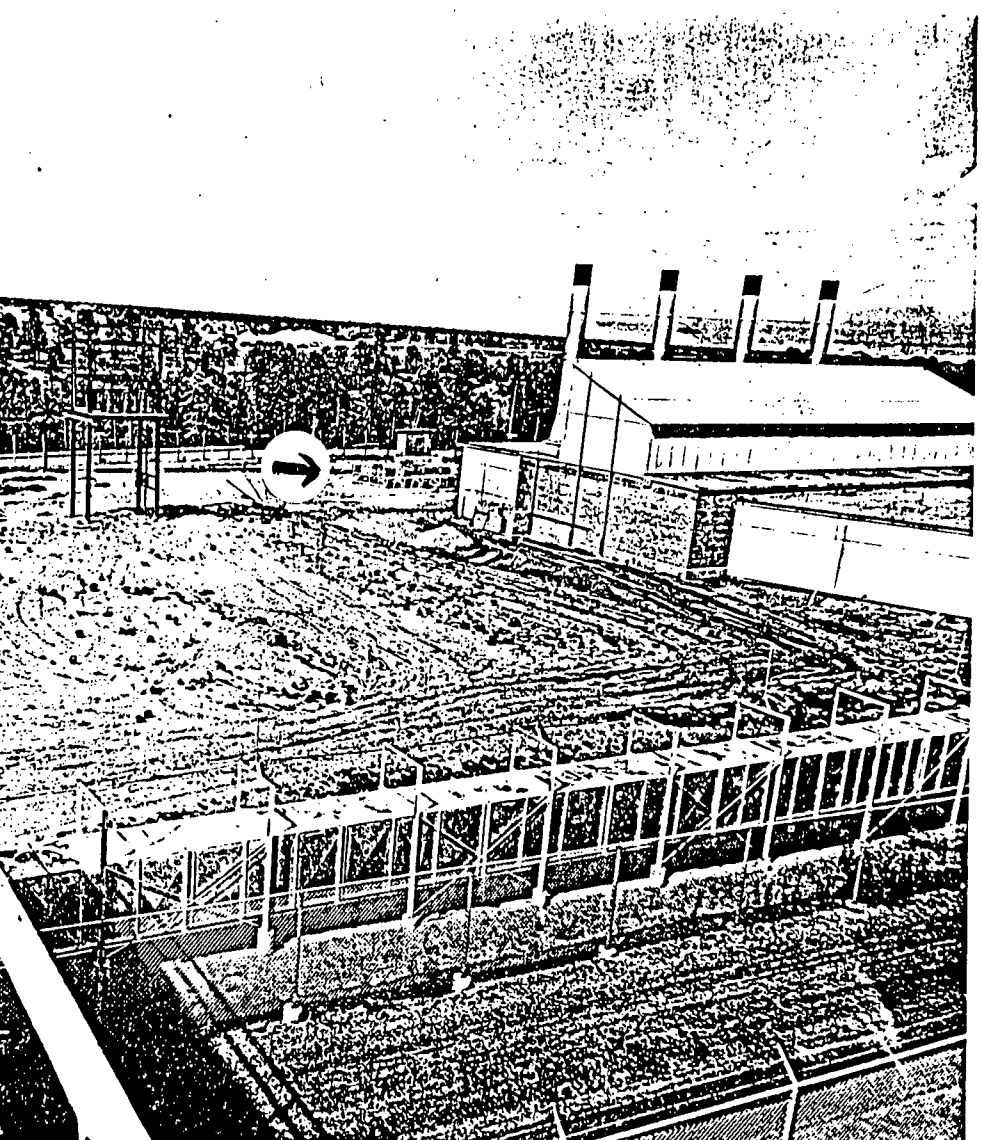


LANL Neg. No 8252

storage area west of TA-21-12.

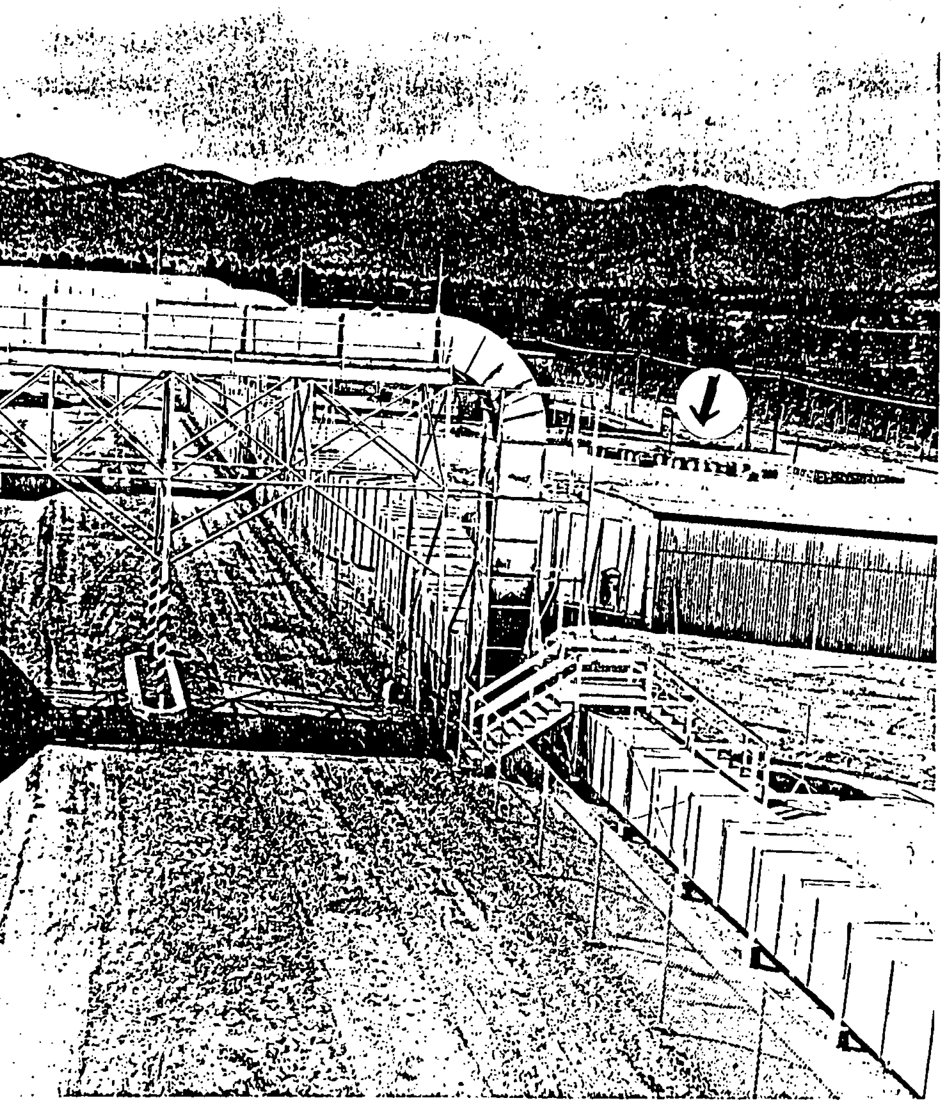
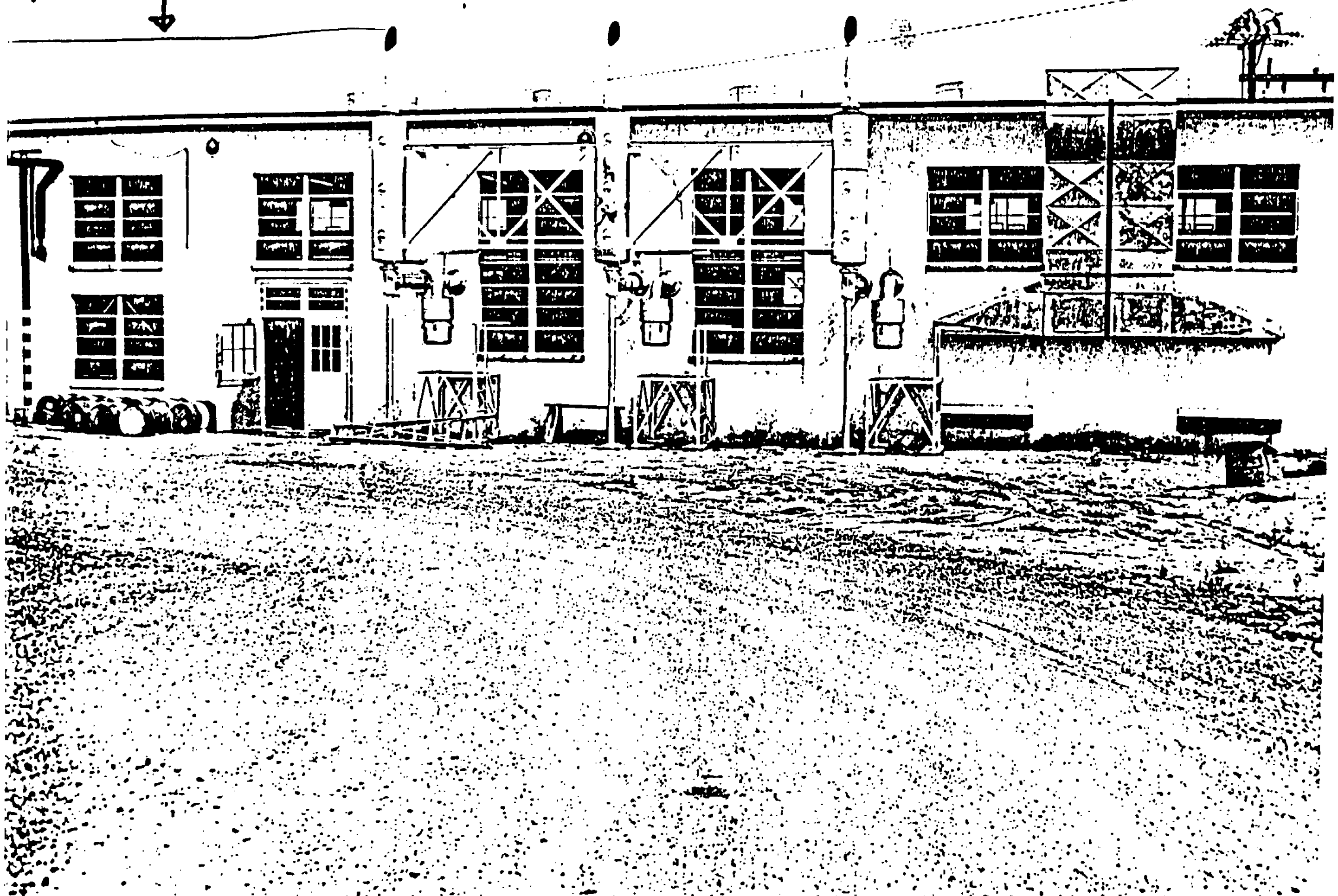


Fig. 21-32.
TA-21-14 Container storage Area with Tank TA-21-60 in foreground and Tank TA-21-58 in background

LANL Neg. No. 8855

Fig. 21-33.

TA-21-14
Container storage
Area ↓



LANL Neg. No. 8854 9/7/48

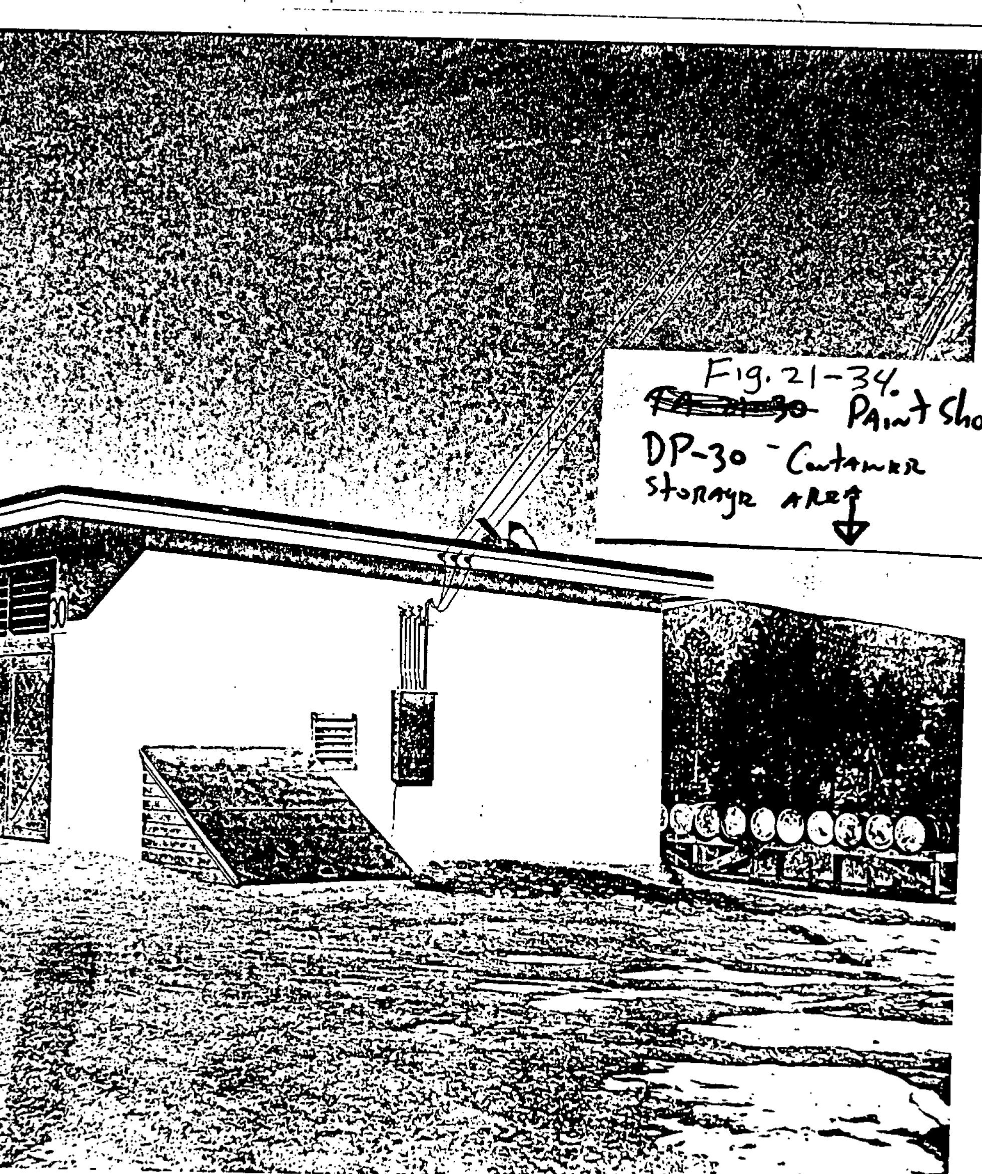


Fig. 21-34. ~~FA-21-30~~ Paint Shop
DP-30 - Container storage area

LANL Neg. No. 6020

areas were found at DP East: south of TA-21-54 (Fig. 21-35), around TA-21-152 (Fig. 21-36) and on the east end of MDA-A (Fig. 21-37).

B. Surface Disposal Areas

These seven inactive disposal areas are listed in Table IV and their locations shown in Fig. 21-1 through Fig. 21-4. Many of these seven SWMUs are actually only potential or suspected disposal areas in this subaggregate, but all of the SWMUs belong to SWMU #21-013, surface disposal units.

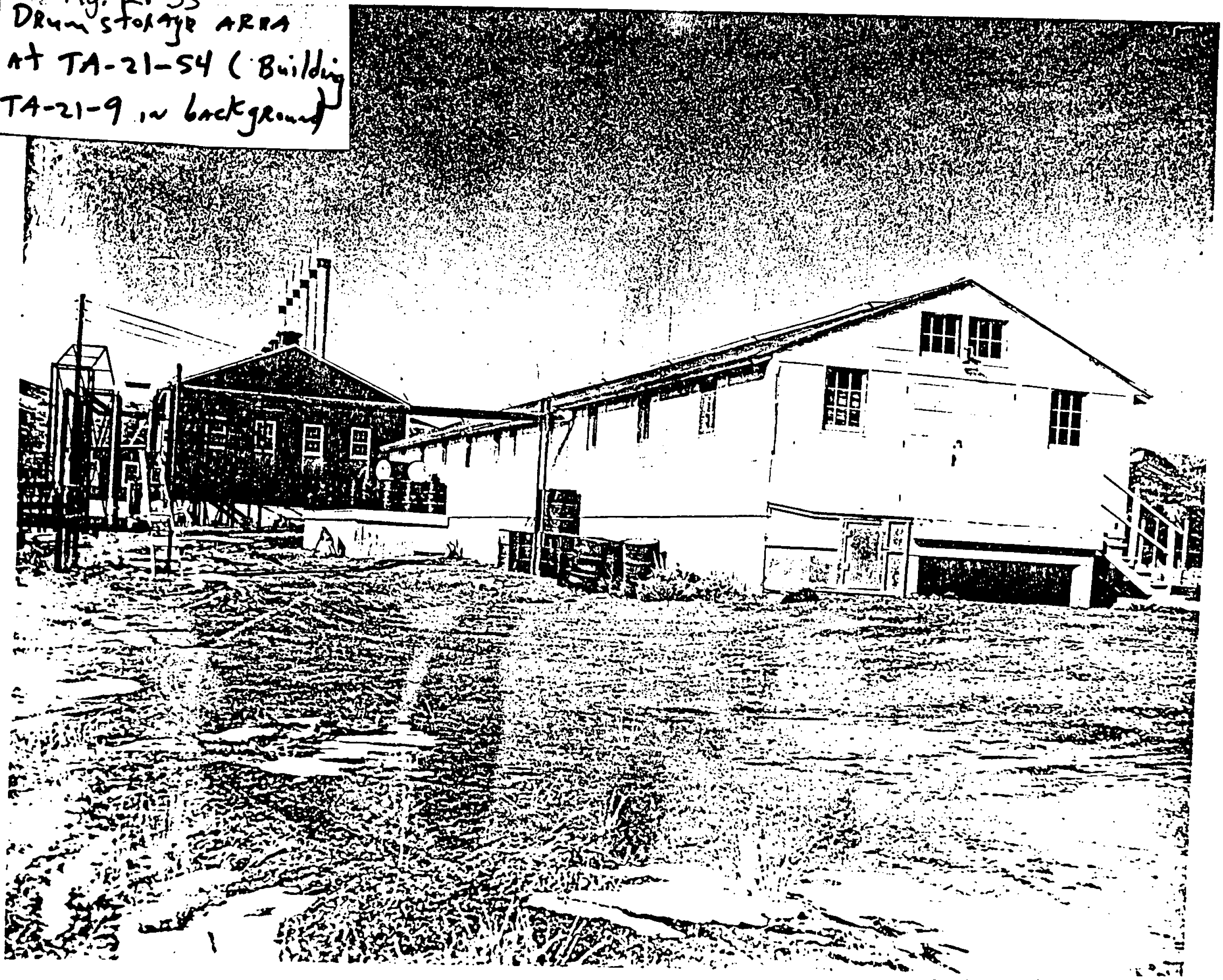
SWMU #21-013(A) is located on the southern edge of DP Canyon, north of the sanitary waste treatment plant. The area probably contains sand from the sludge drying beds TA-21-230 (IT Corporation, 1990), although the sludge is normally taken to the contaminated disposal area at TA-54.

SWMU #21-013(B) is actually located on the northern shoulder of Los Alamos Canyon, southwest of MDA-V (Fig. 21-38). This site essentially consists of building debris which was pushed into Los Alamos Canyon.

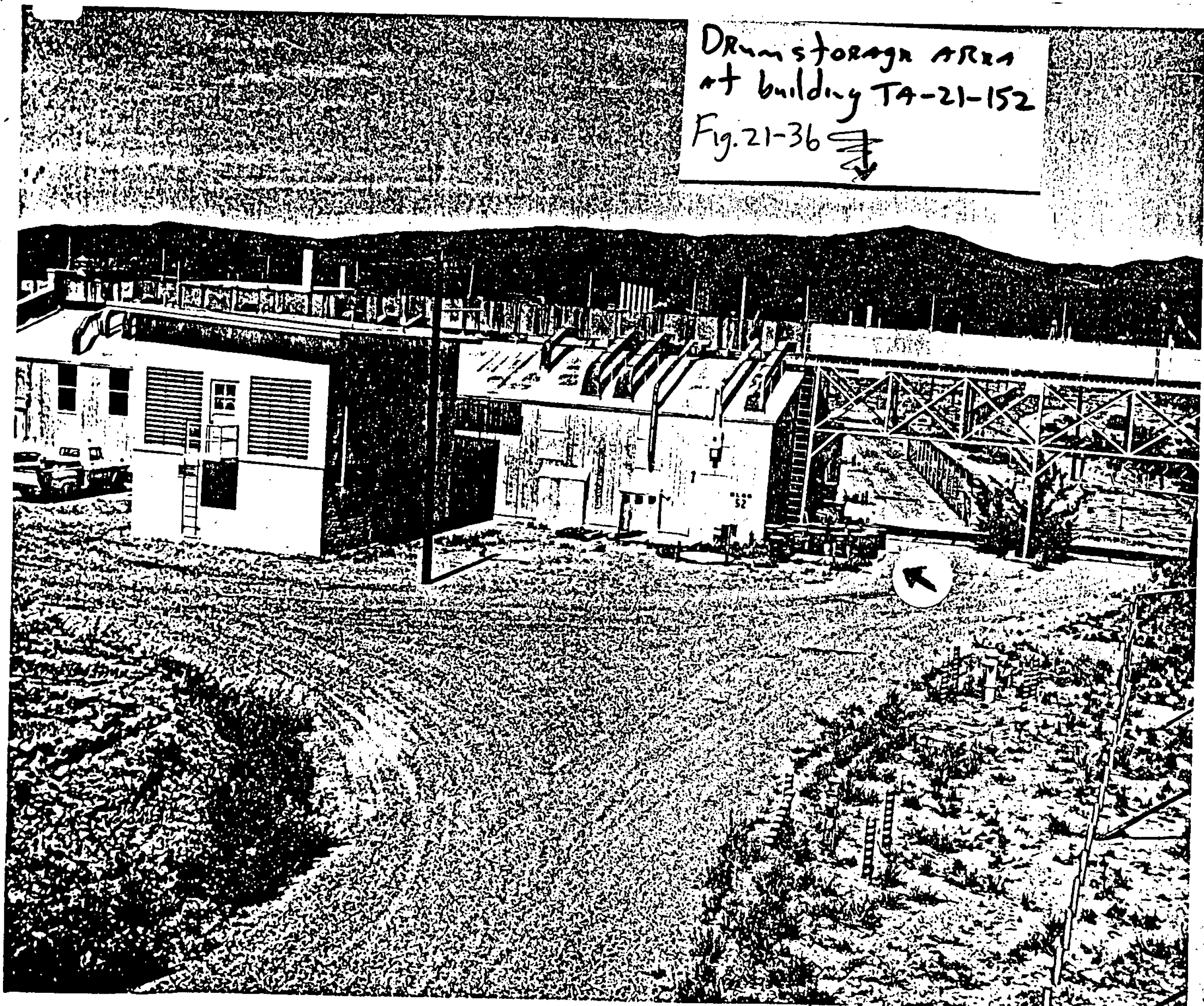
SWMU #21-013(C) is northwest of the High Temperature Chemistry Building TA-21-209. This potential site was discovered during the 1988 ER Program site visit and is located 85 ft from the DP East fence where it makes right angles east of MDA-U and 122 ft from LASL Marker KI 1968, just south of the road to the sanitary treatment plant.

SWMU #21-013(D) is another possible disposal area located north of the old Laundry Building TA-21-20 and north of DP Road. According to the LANL/Pan Am History Book, three storage buildings (TA-21-23 through TA-21-25) were completed in 1946 at this location. This was followed by

Fig. 21-35
Drum storage area at TA-21-54 (Building TA-21-9 in background)



LANL Neg. No 6014



Drum storage area at building TA-21-152
Fig. 21-36

LANL Neg. No. 644131

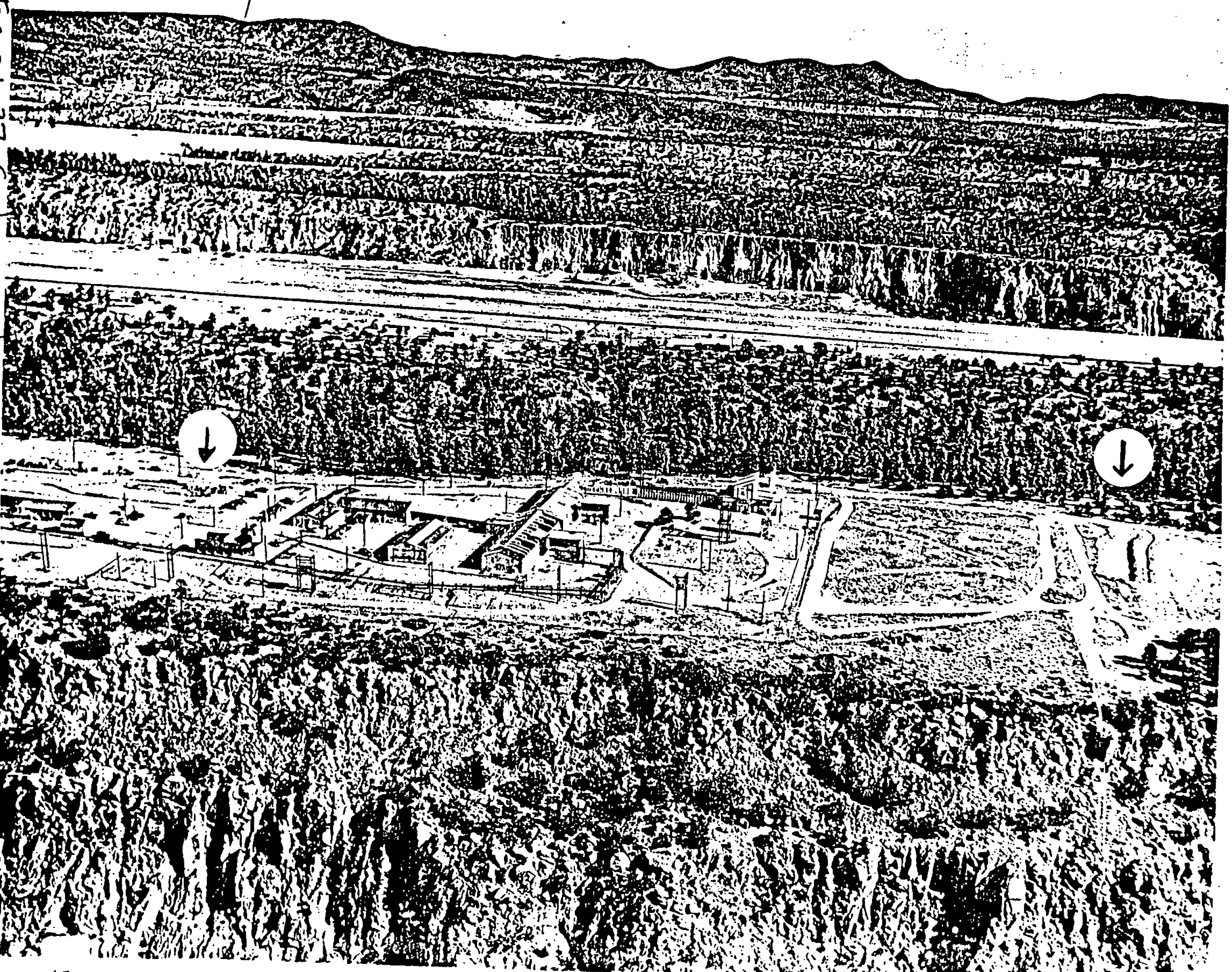


Fig. 21-37. Container Storage Area on east end of MDA-A

LANL Neg. No. 15925 (9/12/50)

Table IV. Description of surface disposal areas at TA-21.

SWMU	Short Description	Period of Use	Comments
21-013(a)	Surface disposal area north of the TA-21 sanitary waste treatment plant TA-21-227 on the southern edge of DP Canyon	?-1989	Currently inact probably sand i the plant's dry beds (TA-21-230
21-013(b)	Surface disposal area immediately west of MDA V in Los Alamos Canyon for building debris	?-1989	Currently inact
21-013(c)	Surface disposal area northeast of TA-21-209 and southeast of MDA U	?-1988	Currently inact
21-013(d)	Surface disposal area north of TA-21-20 and DP Road known as "cold dump"	?-1989	Currently inact
21-013(e)	Surface disposal area immediately northwest of 21-013(d) for construction debris	?-1989	Currently inact
21-013(f)	Surface disposal area close to TA-21-61	?-before 1950	Currently inact
21-013(g)	Surface disposal area located immediately south of MDA V containing two drainlines	?-1989	Currently inact

LANL Neg. RN86053009

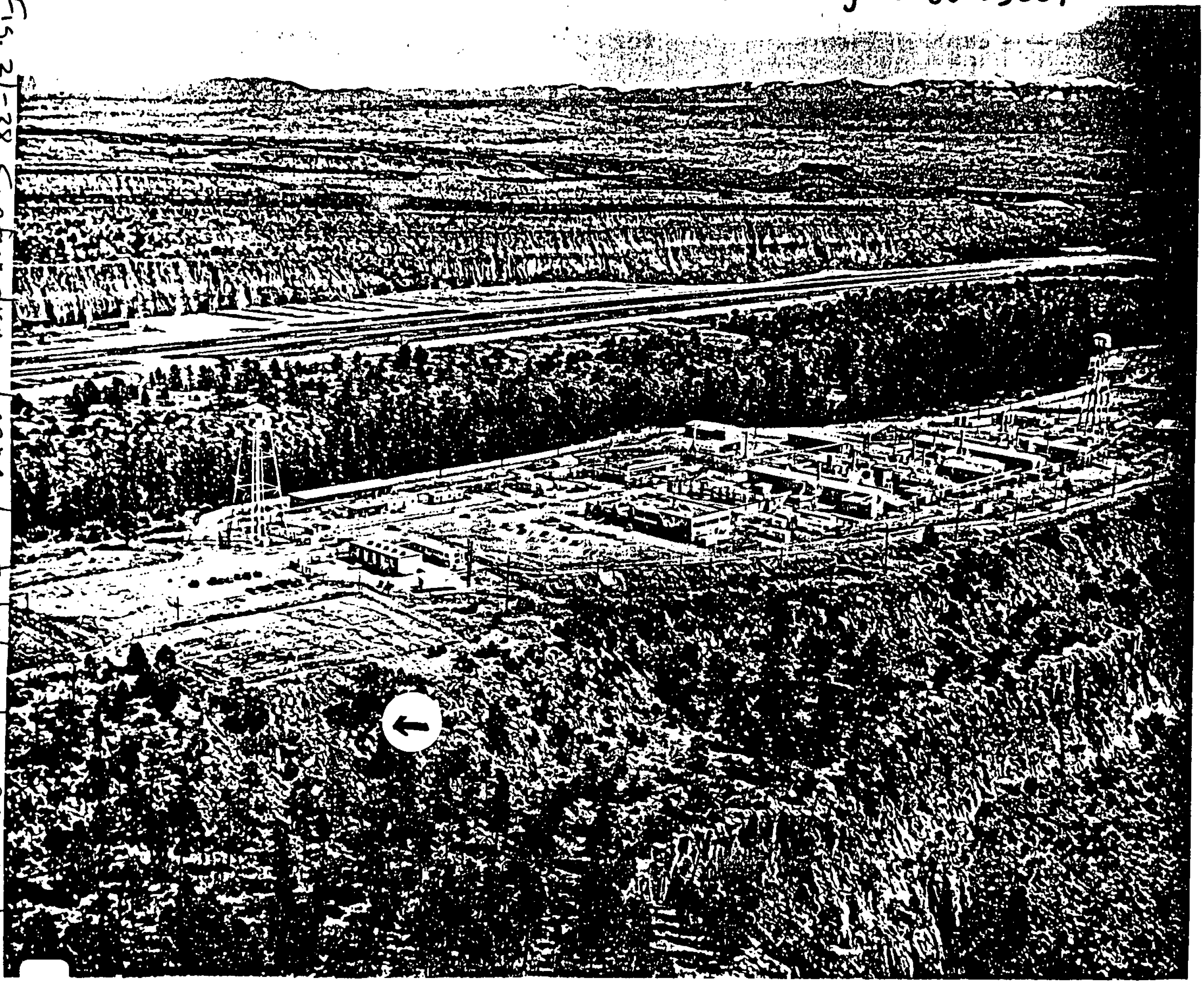


Fig. 21-38. Surface disposal area located close to MDA-V at TA-21 (SWMU # 21-013(b)).

a relocation of the Safety Training Building TA-21-45 in 1947, followed by construction of three more storage buildings (TA-21-26 through TA-21-28) in 1948. These 16 by 16 ft, 8-ft tall storage buildings ("hutments"), shown in Figure 21-8, were removed in 1953 (TA-21-24 and TA-21-25) and 1954 (TA-21-23, TA-21-26, TA-21-27, TA-21-28), which was also the year TA-21-45 was removed. In September 1955, a fenced area (of about the same sized area as TA-21-20) existed in about the same area as TA-21-45 (LANL, 1955), which could have fenced in a pit.

Currently, the only structure left within SWMU #21-013(D)'s location (recently named the "cold dump") is septic tank TA-21-124 (abandoned but not removed in 1966). The area may have been scraped and the "cold dump" removed (IT Corporation, 1990).

SWMU #21-013(E) is another potential disposal area, located northwest of the cold dump (TA-21-13(D)), and may have been used to dispose of construction debris (IT Corporation, 1990). Construction debris, soil piles and drain pipes were observed during the 1988 ER Program visit. Little is known about this site except that it is located 308 ft east of the fence adjacent to the Lobo Lift building and 175 ft north of the fence along DP Road.

SWMU #21-013(F)'s existence is totally based on photographic evidence and is rated as a potential disposal area (IT Corporation, 1990). A 1949 aerial photograph of the area currently occupied by Building TA-21-61 (see documentation for SWMU #21-003) showed a series of mounds on the mesa top. A photo taken in 1950 shows that the mounds had been removed and replaced by TA-21-61. Since construction activities weren't underway on TA-21-61 until July 11, 1950 (LANL/Pan Am History Book), these mounds can't be explained by foundation preparation activities for this building. However, septic tank TA-21-56 and Laboratory Building TA-21-59 are nearby, and were constructed in May 1945 and July 1945, respectively; construction activities on these two structures could have resulted in the "mounds" observed in the 1949 photo.

SWMU #21-013(G) was discovered during an ER Program site visit and is located immediately south of MDA-V (IT Corporation, 1990). Two drain lines had been disposed of at this site, probably left over from when the old acid waste line was replaced. They are not associated with drainage from MDA-V.

An unknown potential landfill also existed in 1950 east of TA-21-209 (see Fig. 21-37).

C. Sewage Treatment Plant

This subaggregate contains 3 SWMUs, all of which are associated with the sewage treatment plant at TA-21 (Table V). According to the 1990 IT Corporation report, SWMU #21-026 contains the sewage treatment plant TA-21-227, the four sludge drying beds TA-21-230, and a chlorine contact chamber TA-21-348, as shown in Figs. 21-2 and 21-4.

Construction began on TA-21-227, TA-21-230, the Control Building TA-21-229, and the two sanitary manholes (TA-21-264 and TA-21-265) on July 13, 1965 and was completed by February 18, 1966 (Laboratory/Pan Am History Book). When the new treatment plant came on line, septic tank/filter field and septic tank/surface discharge systems were abandoned across the entire technical area on the mesa top. Two engineering drawings, ENG-PL-973 (10/7/64) and ENG-PL-44 (1/21/65), show the plans to abandon septic tanks TA-21-124, TA-21-125, TA-21-106, TA-

Table V. Description of sewage treatment plant SWMU at TA-21.

SWMU	Short Description	Period of Use	Comments
21-026(A)	TA-21 sanitary waste treatment plant TA-21-227 located at the eastern end of TA-21	1966-Present	Active
21-026(B)	Drying beds TA-21-230 for sludge coming from 21-026(A)	1966-Present	Active
21-026(C)	Chlorine contact chamber TA-21-348 located immediately north of 21-026(A)	1982-Present	Active

21-55, TA-21-53, TA-21-56, TA-21-163, TA-21-194, and TA-21-219. These drawings show that septic tanks TA-21-62, TA-21-142 and TA-21-181 were previously removed in 1965. Sanitary liquid wastes that went into these tanks was diverted in 1966 to one major sanitary waste line (leading to TA-21-227), which was installed along the southern edge of DP mesa, shown as built in Engineering Drawing ENG-C-34447-55 (7/13/66).

SWMU #21-026(A), the sewage treatment plant, is an extended aeration sanitary waste treatment plant initially designed to service a maximum of 319 employees occupying offices and laboratories at TA-21 as of January 21, 1965 (Engineering Drawing ENG-PL-44). Actually, TA-21 was occupied by 260 employees in 1966 (Emelity et al., 1972). The Zia Company operated and sampled this plant, which consisted of a grit chamber, a comminuter, an aeration tank, a clarifier, and an effluent meter (Emelity et al., 1972; Zia Company, 1986), as shown in Fig. 21-39. The effluent originally left TA-21-227 via an 8-inch-diameter line, which went due east to sanitary manhole TA-21-264, then due north to sanitary manhole TA-21-265, and finally due north to a concrete spill pad located on the southern edge of DP Canyon (Laboratory Engineering Drawing Number ENG-C34455, 7/13/66).

The inlet to TA-21-227 was modified in 1976 (Zia Company Engineering Drawing Z-4703, 10/14/76). A concrete box and flume, as well as a flow meter were installed at the plant's inlet.

Sometime before July 1990, a gauging station was constructed about 28 yards north of the eastern sludge drying bed, and about 12 yards from the concrete spillpad. This station now monitors the effluents discharged to DP Canyon at this outfall (NPDES outfall number 05S).

Fig. 21-39

San Waste Tmt Plant

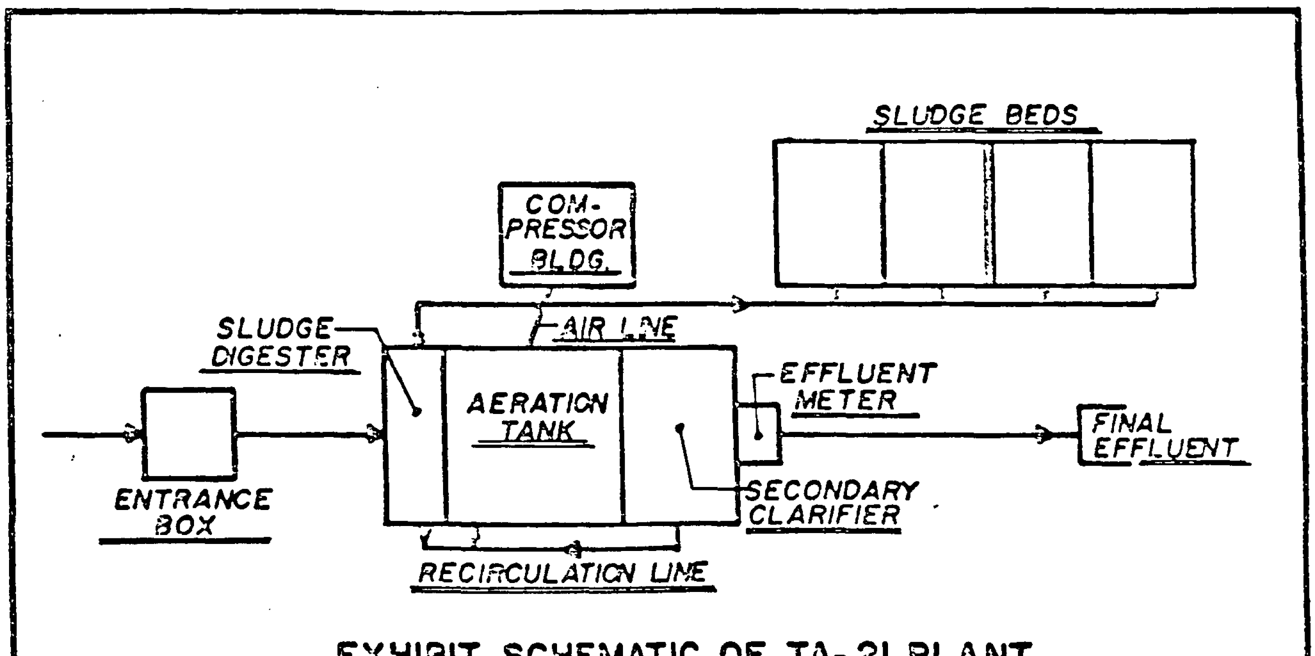


EXHIBIT SCHEMATIC OF TA-21 PLANT

SWMU #21-026(B), the sludge drying beds (TA-21-230), receives TA-21-227 sludge, which is normally collected and taken to the contaminated disposal facility at TA-54. According to Engineering Drawing Numbers ENG-C34455 and LA-HC-TP-1 (March, 1965), each sludge drying bed is 14.5 x 23 feet in size with 4-foot-deep concrete walls. The sand in each bed is located about 2 feet from the top of the bed's walls and is about 1 foot thick on the west side of each bed and grades to about 2 feet thick on the east side of each bed. There is a 4 inch diameter drain line which runs west to east in the middle of the four beds and is located about 9 inches beneath the wall footings. This drain line, which was set unlined in backfill, carries the water which infiltrates the sludge drying beds into sanitary manhole TA-21-265. Thus, sludge liquids coming into the treatment plant within the 8-inch influent pipe drop a total of 15.12 feet by the time they finally get to the bottom of sanitary manhole TA-21-265 (they then proceed through the gauging station and over the spillpad into DP Canyon).

SWMU #21-026(C) is described in the 1990 IT Corporation report as structure number TA-21-348, a 3 foot x 3 foot x 5 foot deep chlorine contact chamber. The records of the Laboratory Engineering Division (Group ENG-7) show that structure TA-21-348 is a 6 x 6 foot, 9 foot deep pit located adjacent to TA-21-227, and that it was installed on January 11, 1982 (Laboratory/Pan Am History Book). This pit was probably the excavation for the 3 foot x 3 foot x 5 foot concrete foundations emplaced for what is currently a concrete detention tank located adjacent to, and on the east side of, the chain link fence on the eastern side of the sanitary waste treatment complex. This detention tank was built because the fecal coliform counts of the plant effluent were higher than allowable by the 1978 NPDES permit (Barnett, 1990). A small plastic box was used as a chlorine tablet feeder and was emplaced inside of the larger concrete detention tank to reduce the fecal coliform bacterial counts in the plant effluent before it entered the two sanitary manholes and was discharged to DP Canyon (Barnett, 1990).

D. Incinerators, stacks and filter houses

This subaggregate contains 21 SWMUs, all of which are associated with potential air-borne emissions within the TA-21 area (Table VI). SWMU locations are shown in Figures 21-1 through 21-4.

(1) SWMU #21-007, Salamanders

In the 1960's and 1970's, several incinerators called salamanders located at DP West were used to burn various types of oils and fats contaminated with radionuclides (IT Corporation, 1990). According to LANL staff these units were long trays used for open burning of waste (IT Corporation, 1990). The current version of the IT Corporation report states incorrectly that this SWMU was associated with acid sump TA-21-132.

Actually, almost all of the preceding information is incorrect. With the help of HSE-7 personnel, we found out that a conventional "Salamander" (company name) oil burner was modified to burn organic transuranic solvents as shown in Figures 21-40 and 21-41, and as drawn in unpublished Figures 21-42 and 21-43. These oil burners are commonly used in orchards to keep the fruit trees from freezing early in the growing season. Here, tricresyl phosphate (TCP) contaminated with ^{239}Pu (approximately 10^3dpm/ml) and diluted with one-half part kerosene was

Table VI. Description of incinerators, stacks and filter houses at TA-21.

SWMU	Short Description	Period of Use	Comments
21-007	Salamander incinerators at TA-21 used to burn oils and fats	1964-1972	All locations but usually wi MDA T.
21-008	Glovebox scraps incinerator in TA-21-2 for element recoveries	1945?-1962	SWMU should in glovebox rag i erator in TA-2
21-019(a)	Exhaust stack at TA-21-3	1945?-Present	Active
21-019(b)	Exhaust stack at TA-21-4	1945?-Present	Active
21-019(c)	Filter house TA-21-146 immediately north of TA-21-3	1960-Present	Active (Replac TA-21-12 in 19
21-019(d)	Exhaust stack at TA-21-150	1962-Present	Active
21-019(e)	Exhaust stack at TA-21-155 (TSTA: formerly Building 55)	1949?-Present	Active
21-019(f)	Exhaust stack at TA-21-209	1965-Present	Active
21-019(g)	Exhaust stack at TA-21-257	1967-Present	Active
21-019(h)	Exhaust stack at TA-21-313	1945-Present	Active
21-019(i)	Exhaust stack at TA-21-314	1945-Present	Active
21-019(j)	Exhaust stack at TA-21-315	1945-Present	Active

SWMU	Short Description	Period of Use	Comments
21-019(k)	Exhaust stack at TA-21-322	1971-Present?	Active, but no nuclides since when DP-153 no service
21-019(l)	Exhaust stack at TA-21-323	1971-Present?	Active, but no nuclides since when DP-153 no service
21-019(m)	Filter house TA-21-324	1974-Present	Active
21-020(a)	Filter house TA-21-12 for DP west rooms and processes; was immediately north of TA-21-4	1945-1972	Used for proce until 1959. U just room air 1972. Decommi in 1973.
TA-020(b)	Filter house TA-21-153 for DP east operations; was immediately south of MDA U	1945-1970	Decommissioned
21-021	Stack emissions throughout TA-21 to the airport (300,000 m^2 area)	1945?-Present	Documentation specific stack
21-025(a)	Tritium train off-gas system at TA-21-155 (TSTA facility)	1984-Present	Active (former Building 55)
21-025(b)	Tritium train off-gas system at TA-21-209	1965?-Present	Active

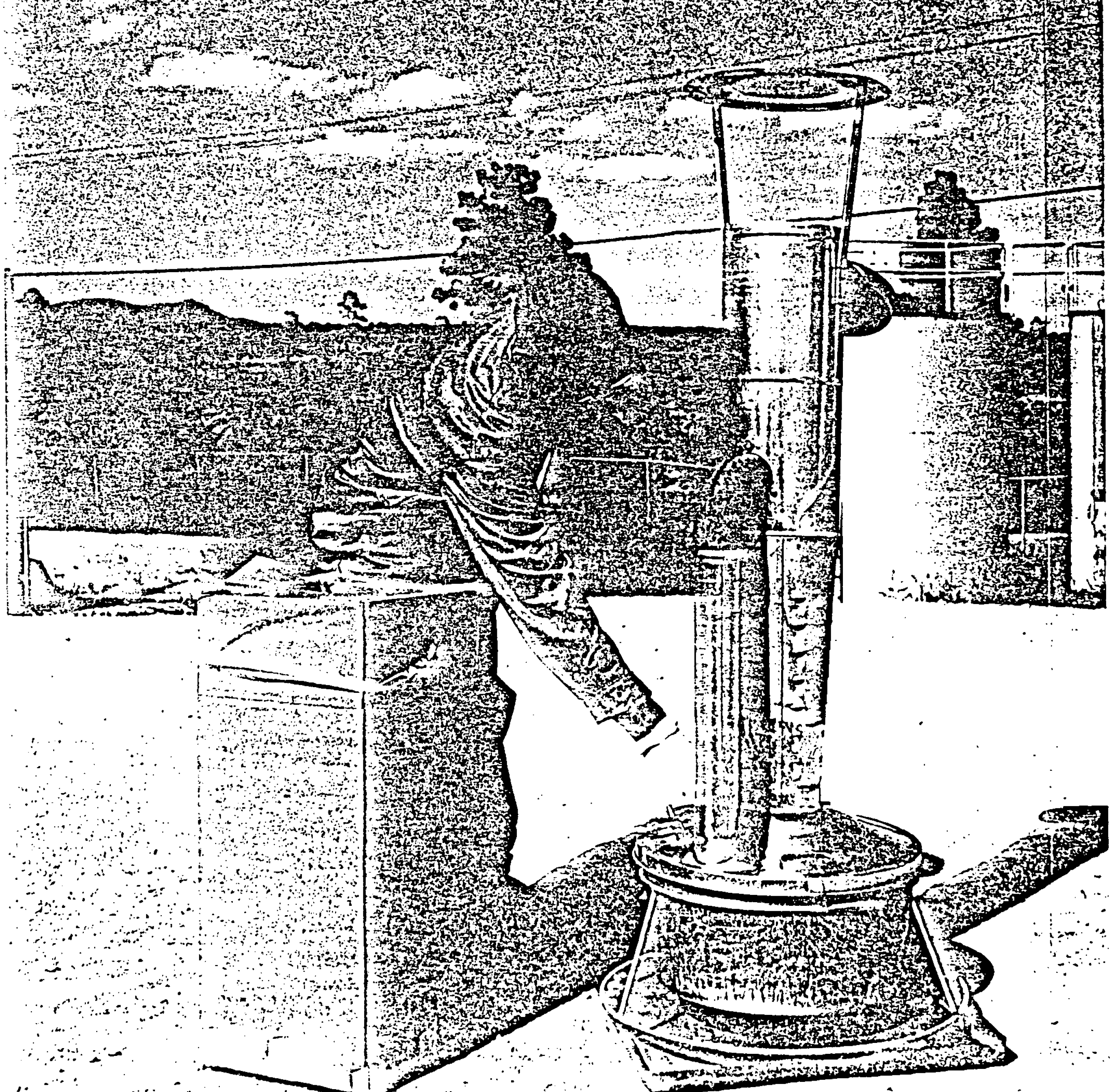


Fig. 21-40

Neg. No. 719986: A conventional "Salamander" oil burner has been used experimentally to burn rubber gloves. Kerosene is used to start and sustain the combustion

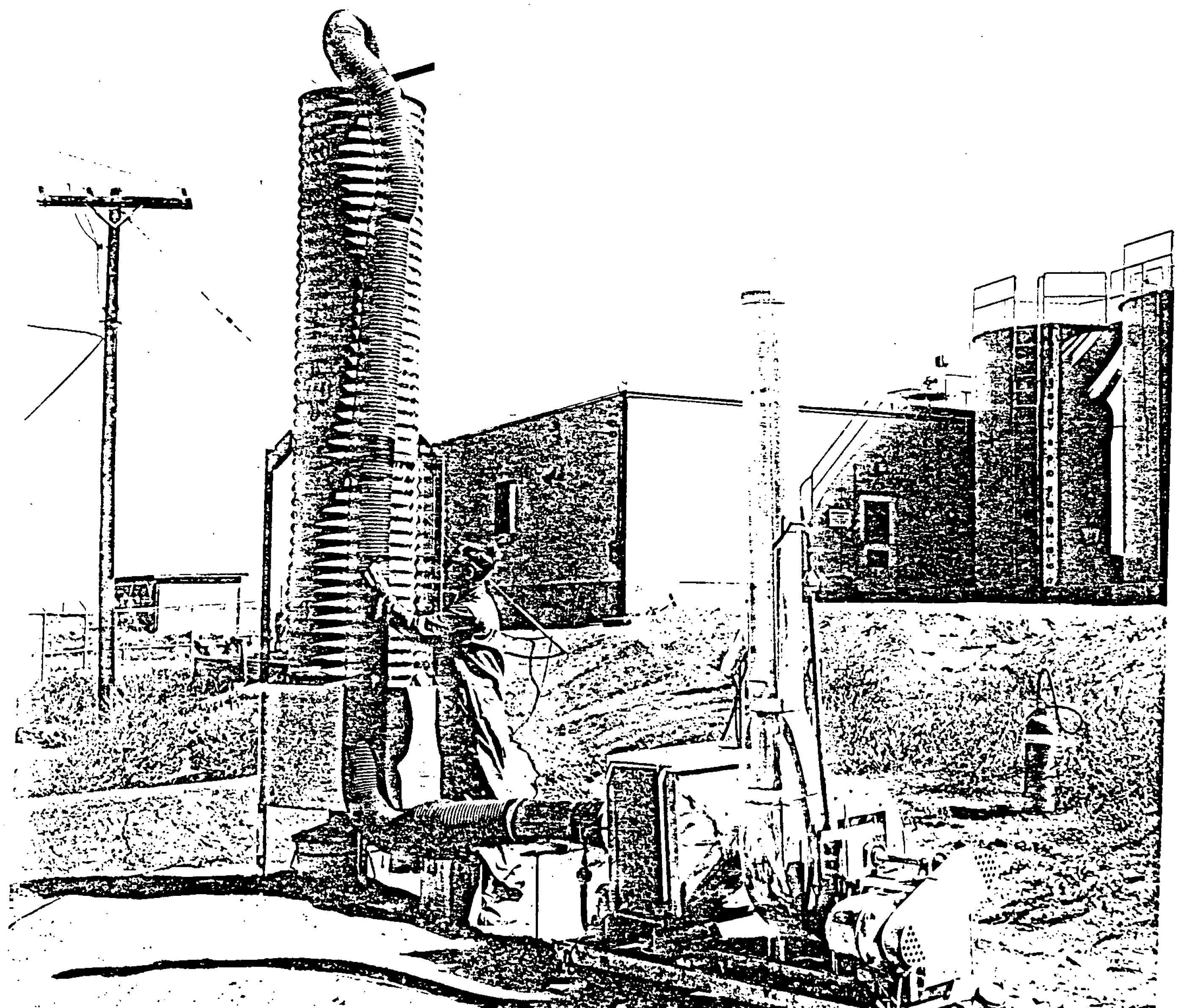


Fig. 21-42

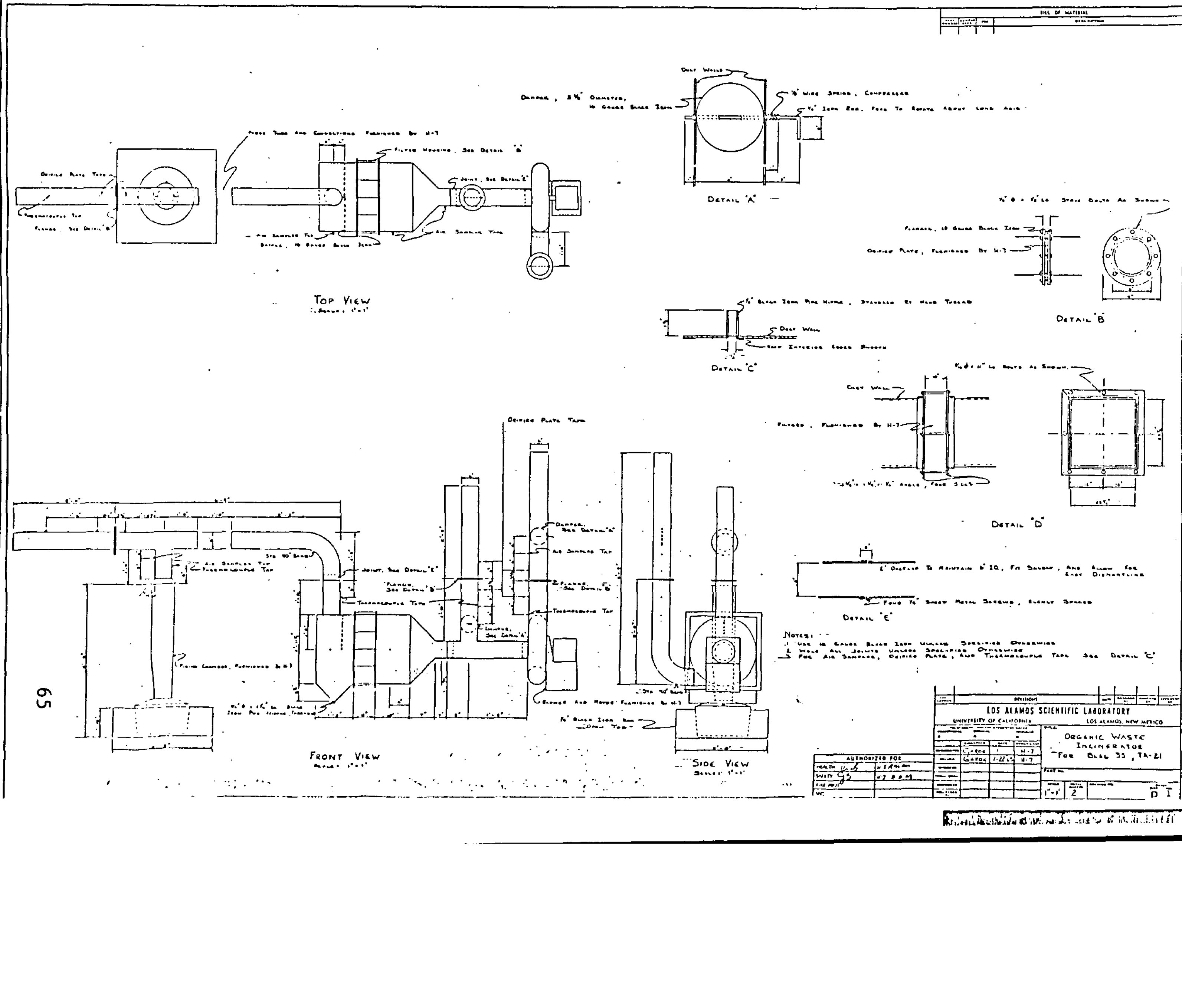
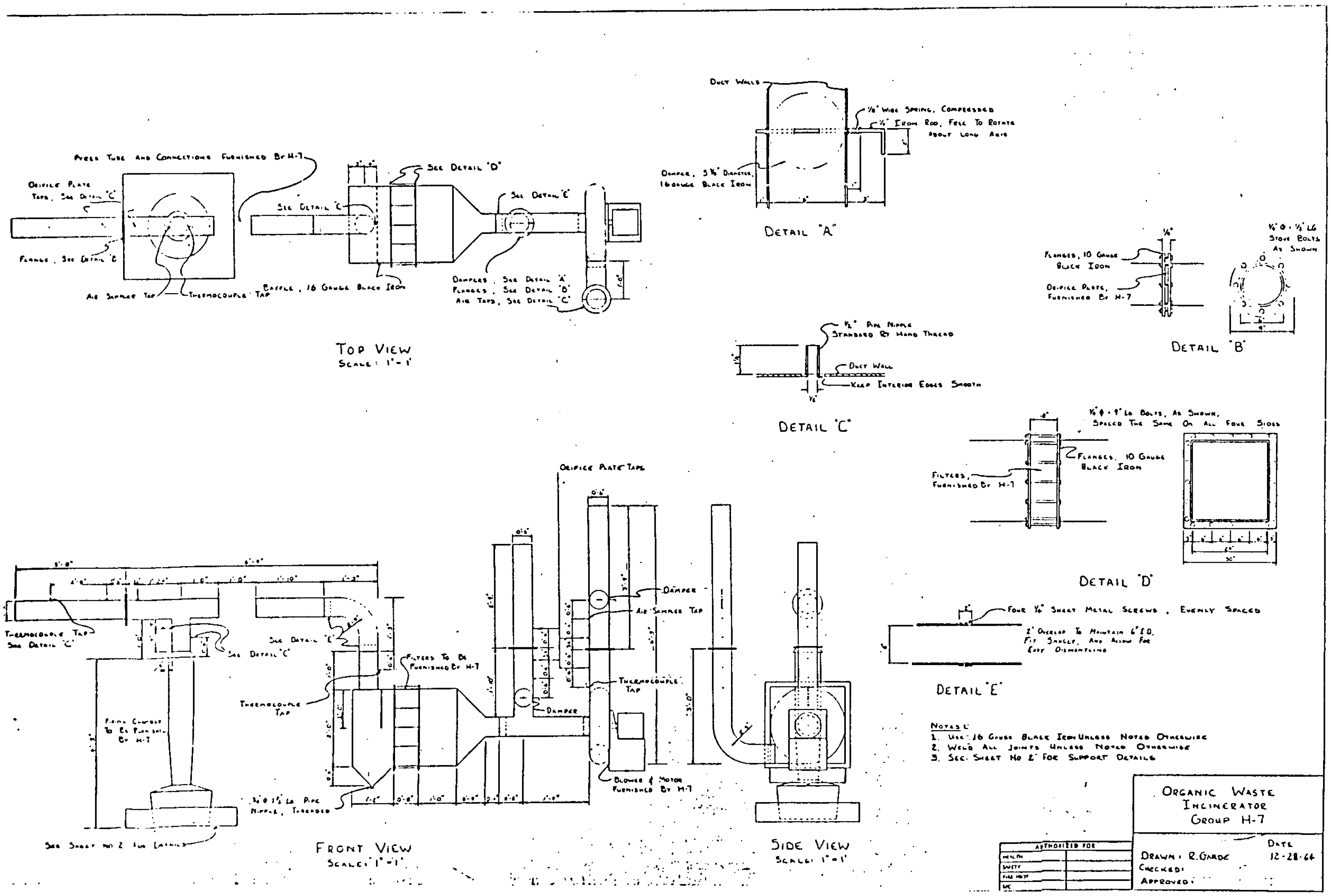

Top View
Front View
Side View
Detail "A"
Detail "B"
Detail "C"
Detail "D"
Detail "E"
Revisions
Los Alamos Scientific Laboratory
University of California
Los Alamos, New Mexico
Organic Waste
Incinerator
For Bldg 35, TA-21
Authorized For

Fig. 21-43.


Top View
Front View
Side View
Detail "A"
Detail "B"
Detail "C"
Detail "D"
Detail "E"
Organic Waste Incinerator Group H-7
Drawn: R. Garde
Date 12-28-64

incinerated in the modified, inexpensive, commercial burner shown in Figs. 21-40 through 21-43.

According to Chris Christenson, Emelity and Garde (unknown date in unpublished paper):

> "Eleven liters of the mixture of kerosene and TCP were poured into the tank of the burner and the mixture ignited. Four air samplers were placed around the burner at a distance of about 3 meters. The rate of burning was about 2.5 liters per hour. The experiment was conducted successfully with no contamination of the surrounding ground area. The surface of the burner became slightly contaminated but there was little, if any, loose contamination. The maximum ^{239}Pu activity in the air was 1.5 $d/m/M^3$. The activity in the burner ash was about 3 x 10^5 d/m/gm, and the activity in the soot in the stack was about 3 x 10^3 d/m/gm. To date about 2500 liters have been incinerated in this way.
>
> The burners are cleaned periodically under carefully controlled conditions and the ash, to which the ^{239}Pu is firmly fixed, is sent to the solid radioactive waste burial pits.
>
> A solution of kerosene contaminated with old fission products 1.0 x 10^5 d/m/ml) was incinerated in a similar manner with usually successful results. In this case the radioactivity travel in the air was 20 $d/m/M^3$ of gross alpha (mostly uranium) and 70 $d/m/M^3$ gross beta. The

radioactivity in the burner ash and soot was about 6 x 10^6 d/m/gm gross beta and 1 x 10^6 d/m/gm gross alpha; and 2 x 10^4 d/m/gm gross beta and 2 x 10^3 d/m/gm gross alpha respectively."

At least for one point in time, November 23, 1964, a miscellaneous Group H-7 data sheet written to "EBF" from "WHA" states that "At beginning of reporting period, 3 salamanders were being used to burn TCP waste at DPW. Residue samples were received about once a week". This hand-written report goes on to give a summary of gross alpha assay results on burner ash and pipe ash samples and verifies that plutonium activity was actually present.

Further insight is provided by Ron Stafford in 1972 concerning a survey outside of TA-21-257, where a salamander was in use (Stafford, 1972). A salamander was being used as the burner at that time to burn contaminated oil, and the exhaust traveled "through a galvanized leaky duct, through a 24" x 24" HEPA filter and on to a "stack" about 10 feet high". Wilbur Workman response to Stafford's October 11, 1972, memo on November 21, 1972 (Workman, 1972) indicating that the oil-burning process had been terminated and that better methods of disposal were being investigated. Lud Emelity (HSE-7) confirmed that three salamanders were commonly used with MDA-T between August 1964 and 1972 (Emelity, 1990). Notice that Figures 21-40 and 21-41 were taken west of TA-21-257 in 1971, within MDA-T (Ralph Ward, HSE-7 is the movie star).

Even a few years past the salamander usage period Chris Christenson states on January 21, 1975 "For a number of years, H-7 has incinerated waste oils and organics in salamander heaters to reduce their volumes and to convert them to a form which would mix with cement" (Christenson, 1975). Chris then requested that ENG-2 design an improved incineration system to be installed at TA-21-257, and enclosed two papers on current incinerator designs. Evidently, Christenson did still want to incinerate the waste organic liquids at this time instead of adding them to absorbents (clays and other gels) in 55 gallon drums, as had happened since 1972 (Emelity, 1990).

(2) SWMU #21-008, Incinerator and a newly-discovered potential SWMU incinerator

According to the 1990 IT Corporation report, "the plutonium facility at DP West operated a small "glovebox" incinerator to recover certain elements". Notice that this report does not list any structures associated with this SWMU. When the term "Plutonium Facility at DP West" is used in this context, the meaning can either encompass all of the structures at DP West or will refer more specifically to the complex of interconnected buildings including TA-21-2, TA-21-3, TA-21-4, TA-21-5 and TA-21-150.

The 1990 IT Corporation report was probably referring to a scrap incinerator located in TA-21-2 (Table VI). Two sets of drawings describe this incinerator in 1952 (Laboratory Drawings ENG-C2692 and ENG-C2694) and in 1962 (Laboratory Drawings ENG-C26857 and ENG-C26858). The incinerator was located in Room 201A under a loading and sorting glovebox. The incinerator was about one foot in diameter (O.D.) and about 38 inches long. It was attached to a bubbler, which was located in a 1 foot-8-inch-deep pit in the concrete floor directly underneath the incinerator and was attached to a condensor system. A 3-inch-diameter exhaust line went from the incinerator to the existing overhead exhaust duct. The 1962 drawings were done because the incinerator and bubbler were to be removed, and the existing bubbler pit was to be filled in with concrete (notes from Laboratory Drawing ENG-C26857). A new loading and sorting chamber was then to be installed in this location of Room 201-A.

Very little is known about this incinerator at this time except that an incinerator was removed during the 1978-1981 decontamination project (Garde et al., 1982), and that it was used solely for plutonium wastes (Romero, 1990).

Another SWMU subunit designation should be given to the rag incinerator located in Room 313 Hood 2 at TA-21-3 (Crismon, 1970). Crismon wrote a memo to the H-3 file describing a fire that occurred on April 16, 1970 in the south wing of this location, where "the rag incinerator had been loaded and combustion of rags for recovery of ^{235}U oxide was being carried out in accordance with procedure CMB-8-4393, page 5, dated 3/1/69". Furthermore, "When the CMB-8 people investigated the alarm they found a fire involving rags waiting to be incinerated in Hood 2". No further information as to the exact location and other details of the incinerator is known at this time. Since Building TA-21-3 was built by September 1, 1945 (Laboratory/Pan Am History Book), this rag incinerator could have been in operation from this startup date but it is unknown if it is currently actively functioning.

(3) SWMU #21-019, Filter Houses/Exhaust Stacks

This SWMU consists of 13 subunits consisting of two filter houses and 11 exhaust stacks located at TA-21. It is probably directly related to SWMU #21-021 in the sense that some and/or all of the facilities in SWMU #21-019 are probably responsible for the contaminated areas observed in the SWMU #21-021, but SWMU #21-021 could have received airborne effluents from sources other than those in SWMU #21-019 (Table VI).

In general, three observations should be made at the onset of the description of the stacks and filter house stacks described in Table VII. First of all, stack location/identification numbers change with time. The best example of this occurred in October 1984, when six of the stack location/identification numbers associated with Buildings TA-21-2 through TA-21-5 were changed to numbers associated with corridor structures TA-21-313 through TA-21-315 (associated with buildings TA-21-2 through TA-21-5). Secondly, one stack can receive exhaust air from more than one exhaust fan (FE), such as Stack 209 FE-1, FE-10, and FE-12.

The third point involves the number of stacks changing with time and their identification as SWMUs. Not counting the stacks whose identification numbers changed, there are 30 different stacks listed in Table VI, and only 14 of these have SWMU numbers (all 30 should be SWMUs). Of the 14 which are numbered (which generally relate to the 1989 list of active stacks), two should probably not even be SWMUs (SWMU #21-019(K) and SWMU #21-019(L)). The number of stacks monitored by Group H-1 at TA-21 in 1978 was 19 and was reduced to 14 in 1982; only 12 stacks are monitored in CY-1989. The important point here is that when the CMB-11 operations work at DP site was transferred to TA-55 during the first half of 1978 (Warren, 1980), the use of the laboratory space, and thus stack emissions, at TA-21 did not cease immediately.

This SWMU is very complex without spending extensive time researching it properly, which has not been done until July-August, 1990 in this study, judging from the small number of SWMUs listed in Table VII. We will now attempt to describe the currently-listed SWMUs.

(a) SWMU #21-019(A): 3 Main, FE-6

This stack has a total height of 50 feet with a diameter of 48 inches (Table VII). It is equipped with HEPA filtration and has a flow rate of approximately 20393 cfm. Since it exhausts MST-12 uranium recovery and processing areas, this stack is monitored for U^{235} and U^{238}. Since Building TA-21-3 was completed by September 1, 1945 (Laboratory/Pan Am History Book), we can only speculate (Table VI) that this stack was active shortly after this date (no documentation is available as to the actual date).

(b) SWMU #21-019(B): 4 Hot Cell, FE-1, and,

(c) SWMU #21-019(B): 4 Main, FE-3

These two SWMUs have been incorrectly given the same number (IT Corporation, 1990), as they represent two different stacks.

The stack identified as 4 Hot Cell, FE-1 has a height of 34 feet, a diameter of 36 inches and a flow rate of only 1708 cfm (Table VII). Since this stack exhausts rooms used for assembly and profilometry of Pu^{239} fuel pins in the Hot Cells, it is monitored for Pu^{239} and is equipped with a HEPA filter.

The stack identified as 4 Main, FE-3 has a height of only 24 feet, a diameter of 48 inches, and a flow rate of 27285 cfm (Table VII). Since this stack exhausts U^{235} processing and recovery areas, it is monitored for U^{235} and is equipped with a HEPA filter.

Since both of the 21-019(B) SWMUs are associated with Building TA-21-4, we can only speculate that they started working after the completion of the building on September 1, 1945 (Laboratory/Pan Am History Book), since an exact startup date is unknown.

meters Annual Review) Program
ngs ENG-C39189 through ENG-C39197
eering Drawings ENG-C21247 through

meter (in)	Stack Height from Ground (ft)	Flow Rate (cfm)	Filter or clean-up system	Sample Rate (cfm)	Radionuclides monitored	Room Operations
----------Same as 313, FE-1------------						
	?	?	?	?	Pu	?
	22	12667	HEPA	2	D-38	Exhausts D-38 chemical analysis and research lab
	50	20393	HEPA	2	U^{235}, U^{238}	Exhausts MST-12 uranium recovery and processing areas
	36	23640	HEPA	2	Pu^{239}, D-38	Exhausts INC-4 D-38 chemical analysis and research labs
	18	563	HEPA	2	U^{235}	Exhausts incinerator used for recovery of enriched uranium
	34	1708	HEPA	2	Pu^{239}	Exhausts rooms used for assembly and profilometry of ^{239}Pu fuel pins in the hot cell.
	36	14472	HEPA	2	Pu^{239}	Exhaust areas that produce ^{239}Pu fuel pins, profilometry
	24	27285	HEPA	2	U^{235}	Exhaust U^{235} processing and recovery areas
e as 315, FE-1------------------------						
	?	?				
	?	?				
	?	?				
	?	?				
	50	23200	HEPA	?		Buildings 2, 3, 4, and 5.

SWMU	Stack Location and ID	Status	Diameter (in)	Stack Height from Ground (ft)	Flow Rate (cfm)	Filter or clean-up system	Sample Rate (cfm)	Radionuclides monitored	Room Opera
21-019 (d)	SM 150, FE-1	Active	48	56	24013	HEPA	2	Pu^{239}	Cold opera radionucli
21-019(e)	155, FE-5 (TSTA)	Active	30	100	?	None	2	H^3	Tritium te recovery
None	155 NE	Decommissioned in 1978	?	?	?				
None	155 NW	Decommissioned in 1978	?	?	?				
None	155 SE	Decommissioned in 1978	?	?	?				
None	155 SW	Decommissioned in 1978	?	?	?				
21-019 (f)	209 FE-10	Active changed to 209, FE-1, -10, -12 on 10/84	48	80	17000	None	2-12	H^3 (gas)	Exhaust tri hoods
21-019 (g)	257, FE-4	Active	12	10	1602	HEPA	2	Pu^{239}	Exhaust hoo
None	313 2E, FE-1 Same as 2E, FE-2	Active	48	24	17214	HEPA	2	$Pu^{238, 239}$	Building cu
21-019 (h)	313, FE-2	Same as 3W, FE-1							
21-019 (i)	314 FE-1, -2	Same as 4W, FE-2							
21-019 (j)	315, FE-1	Active	48	36	8460	HEPA	2	Pu^{239}	Building co
21-019 (k)	322	Active	40	50	21400	Dust	--	None	No radionuc Building DP-
21-019 (l)	323	Active	36	50	13800	Dust	--	None	No radionucl Building DP-
21-019 (m)	324, FE-1, -2	Active	40	44	10673	HEPA	2	$Pu^{239, 235, 238}$	Filter Buil 3 and 4

(d) SWMU #21-019(C): Filter House TA-21-146

This filter house has one stack with a height of 50 feet and a diameter of 36 inches (Table VII). The stack is fed by two exhaust fans, each of which has a capacity of 11,600 cfm and is equipped with HEPA filtration. The filter house is currently active (Table VI), but only in the sense that it has only acted as a conduit for exhaust air in route to TA-21-324 since 1974; TA-21-146 actively filtered exhaust air until 1974, and TA-21-324 performed this function after this date.

Construction of Filter House TA-21-146 was completed on December 8, 1960 (Laboratory/Pan Am History Book) in an effort to replace Filter House TA-21-12 (see write up for SWMU #21-020(A)). TA-21-12 continued to exhaust room air from 1959 until 1972, but was basically abandoned in 1959; TA-21-146 took over in 1960. New ductwork was also installed to supply the process exhaust trunk which came from: (1) the east side of TA-21-2, (2) the east and west sides of TA-21-3, (3) the east side of TA-21-4, and (4) the east side of TA-21-5. Notice that this facility only serviced glovebox air from TA-21-150, which had its own separate treatment systems for servicing the air from the hoods and rooms. The filter house itself was 40 ft 8 inches by 18 foot with a maximum height of the pitched roof of 13 foot 11 1/2 inches. The center of the stack is located 6 foot 6 inches east of the east wall of TA-21-146. The building basically consists of a western room with a recovery dry box and an eastern room with a loading hood, with both rooms separated by the exhaust plenum.

(e) SWMU #21-019(D): SM 150, FE-1

The stack identified as SM-150, FE-1 has a height of 56 feet, a diameter of 48 inches, and a flow rate of approximately 24813 cfm (Table VII). From the data collected in the 1984 and 1987 SPARs, the rooms exhausted by this stack currently have no radionuclides in their daily operations. However, since Building TA-21-150 had been used for plutonium fabrication operations in the past, this stack is currently equipped with HEPA filtration and is monitored for Pu^{239}.

An incident which occurred in Room 605A of TA-21-150 was reported by Dean Meyer, the Group Leader of H-1 (Meyer, 1970):

> "At 8:30 am on October 7, 1970, Carl Bjorklund (CMB-11) was loading an x-ray powder diffraction capillary (0.2 mm dia by 14 mm long) containing $^{238}PuO_2$ into an x-ray diffraction unit camera. The capillary was successfully loaded into the camera but was slightly misaligned. Such operations have been successfully performed many times. As the sealed glass capillary was brought into alignment by Mr. Bjorklund, it broke into two pieces. The above operation took place in an open-faced hood in Room 605A of Building 150 at DP West. The camera was in a pan which was setting on a sheet of plastic on the floor of the hood. Mr. Bjorklund reacted immediately to the capillary breakage by closing the hood down and sealing it off with tape and sheet plastic. Upon removal of his surgical gloves, a spot on the back of his hand measured 5000 counts/min with the alpha

survey instrument. This particle was easily removed by washing. The powder was ground and passed through a 400-mesh screen prior to capillary loading. The maximum powder particle size is 37 μ.

H-1 monitors surveyed the outside of the hood and the room and found no detectable activity. The hood exhausted directly to the roof of the building without filtration. Alpha contamination surveys on the roof area of Building 150 and adjacent areas were conducted. The roof area under the stack was contaminated in a square approximately 10' on a side or about 100 square feet. The level of alpha contamination in this area was up to 500,000 counts/min on a 60 cm^2 alpha detector. Hot spots at other points on the roof of Building 150, on the roof of the office trailer parked northwest of Building 150, on the roof of the office trailer parked northwest of Building 150, and on the ground on the north side of Building 150 measured as high as 750,000 counts/min".

There is not enough information at hand to determine if this incident involved this SWMU's stack, but it does show that unplanned releases can occur in an area where radionuclides were not to be used (Meyer, 1970).

(f) SWMU #21-019(E): 155, FE-5 (TSTA)

The stack identified as 155, FE-5 is a currently active stack with a height of 100 feet and a diameter of 30 inches (Table VII). This stack is associated with Building TA-21-155 at DP-East, as the stack identifier number suggests. Since the room operations involve tritium test assemblies for fuel processing and recovery, this stack is monitored for tritium, but the system does contain the treatment system described in the succeeding section on SWMU #21-025, off-gas systems.

Mitchell made some recommendations in regard to the operations at TA-21-155 and TA-21-006 in October, 1964 to correct conditions which he thought were potential health hazardous (Mitchell, 1964):

> "1. Provide a sufficiently high exhaust stack for the venting of gases (HCl and Cl_2) from the scrubbers to prevent the gases from being returned to ground level by air turbulence around the buildings, as is the case at present. A vent stack at least two times, and preferably 2 1/2 times, the height of any structure located within 20 stack heights of the stack will prevent downwash caused by turbulence generated by buildings.
>
> 2. Use NaOH solution in the gas scrubbers to increase the adsorption efficiency of the scrubbers for Cl_2".

It is not clear at this time if or how these recommendations relate to this SWMU's 100-foot-high stack. If this stack was in operation after construction on Building TA-21-155 was completed, it started functioning after December 1949 (Laboratory/Pan Am History Book).

(g) SWMU #21-019(F): 209, FE-10 or 209, FE-1, FE-10, FE-12

This active stack, identified currently as 209, FE-10, has a height of 80 feet and a diameter of 48 inches. This stack exhausts a tritium effluent treatment system and hoods (Table VII). The best information on Building TA-21-209 at DP-East comes directly out of the 1984 SPAR report and is described in a succeeding section under SWMU #21-025, off-gas systems.

Since construction on Building TA-21-209 was completed on September 13, 1965 (Laboratory/Pan Am History Book), this is our best guess as to the earliest startup date for this stack (Table VI).

(h) SWMU #21-019(G): 257, FE-4

The stack identified as 257, FE-4 has a stack height of 10 feet, a diameter of 12 inches and a flow rate of only 1602 cfm (Table VII). Since this stack on the liquid waste treatment plant TA-21-257 exhausts a hood used for analysis of samples containing plutonium, the stack is monitored for Pu^{239} and is equipped with a HEPA filter.

Since it is known that the construction of Building TA-21-257 was finished in August 1967, we can only guess that this stack was active after this date (Table VI).

(i) SWMU #21-019(H): 313, FE-2 or 3W, FE-1

This stack was identified as 3W, FE-1 until October 1984, when it was renamed 313, FE-2. This stack is 36 feet high, 48 inches in diameter, and has a flow rate of 23,640 cfm (Table VII). According to the 1984 SPAR report, this stack "exhausts INC-4 D-38 chemical analysis and research labs". Thus, the stack is monitored" for Pu^{239} and D-38" and is currently equipped with a HEPA filter (Table VII).

The Laboratory/Pan Am History Book indicates that corridor structure TA-21-313 replaced passageway TA-21-15, which was removed by June 24, 1969. Although the construction of this new improved structure might be significant in evaluating this stack, we have placed the startup date of the stack closer to the completion date of TA-21-3 (the source of the exhaust air): September 1945 (Table VI).

(j) SWMU #21-019(I): 314, FE-1, FE-7 or 4W, FE-2

The stack identified as 4W, FE-2 was renamed 314, FE-1, FE-7 in October 1984. This active stack has a height of 36 feet, a diameter of 48 inches, and a flow rate of 14,472 cfm (Table VII). Since this stack exhausts areas within Building TA-21-4 that produce Pu^{239} fuel pins and are involved in profilometry, the stack is monitored for Pu^{239} and contains a HEPA filter.

The Laboratory/Pan Am History Book indicates that corridor structure TA-21-314 replaced passageway TA-21-16, which was removed by June 24, 1969. Although the construction of this improved structure might be significant in evaluating this stack, we have placed the startup date of the stack closer to the completion date of TA-21-4 (the source of the exhaust air): September 1945 (Table VI).

(k) SWMU #21-019(J): 315, FE-1 or 315 5W, FE-2 or 5W, FE-2

This stack was originally identified as 5W, FE-2 but was renamed (by HSE-1 personnel) either 315, FE-1 or 315 5W, FE-2 in October 1984. This stack is 36 feet high, has a diameter of 48 inches, and a flow rate of only 8460 cfm (Table VII). Building TA-21-5 currently has no radionuclides being used in it's facilities and is being used for MST-11 storage. However, since this building was used for plutonium processing activities in the past, the stack is monitored for Pu^{239} and is equipped with a HEPA filter.

The Laboratory/Pan Am History Book indicates that corridor structure TA-21-315 replaced passageway TA-21-17, which was removed by June 24, 1969. Although the construction of this improved structure might be significant in evaluating this stack, we have placed the startup date of the stack closer to the completion of TA-21-5 (the source of the exhaust air): September 1945 (Table VI).

(l) SWMU #21-019(K): TA-21-322 and SWMU #21-109(L): TA-21-323

These two Laboratory structures at TA-21 do not have HSE-1 stack identifiers because they are not monitored for radionuclides. They are considered together because they were both constructed by September 11, 1969 (Laboratory/Pan Am History Book) and both service exhaust air from Building TA-21-152 at DP East. Both of these structures are entitled "exhaust stack and filter housing, and basically replaced Filter House TA-21-153 (see description of SWMU #21-020(B)), which serviced only Building TA-21-152 until March 1970.

TA-21-322 was installed west of TA-21-152 and has a stack height of 50 feet, a diameter of 40 inches and a flow rate of 21400 cfm (Table VII).

TA-21-323 was installed east of TA-21-152 and has a stack height of 50 feet, a diameter of 36 inches and a flow rate of 13,800 cfm (Table VII).

Both TA-21-322 and TA-21-323 were designed only with dust filters, with no need for HEPA filters. The reason for this is that in 1969 the contaminated duct work on the exterior of TA-21-152 was removed, along with the duct work between TA-21-152 and TA-21-153 as well as TA-21-153 itself. Thus, since TA-21-322 and TA-21-323 went into service, no radionuclides have been used in TA-21-152 (Jones, 1990; Anderson, 1990). Thus, SWMU #21-019(K) and SWMU #21-019(L) should probably not be SWMUs.

(m) SWMU #21-019(M): 324, FE-1, FE-2

This SWMU is a filter building (TA-21-324) which originally serviced exhaust air from Buildings TA-21-2, TA-21-3 and TA-21-4 (notice that TA-21-150 was not included, as it had its own air treatment systems). The single stack associated with TA-21-324 has a height of 44 feet, a diameter of 40 inches and a flow rate of 10,673 cfm (Table VII). Since plutonium and uranium processing either occurs or occurred in the past in the labs and hoods serviced by this facility, the filter building is equipped with a bank of HEPA filters and is monitored for Pu^{239} and $U^{235,238}$.

The final construction cost report for TA-21-324 came in on December 9, 1974, so we are using this data as the time when this SWMU's stack began operation, even though (for some unknown reason) the corresponding Lab Job 4594 was not closed out until September 8, 1978 (Laboratory/Pan Am History Book). From 1974 on, this facility has serviced exhaust air which used to be treated at TA-21-146, which essentially only serves as a conduit for exhaust air from 1974 to the present time. TA-21-146 currently (July 1990) services exhaust air from only TA-21-3 and TA-21-4. The filter house itself is 12 foot high and occupies an area of 60 by 20 feet, with the stack being located north of the building.

(4) SWMU #21-020, Decommissioned Filter Houses

The plutonium processing facility at TA-21 was built as rapidly as possible due to the urgency at that time in history. All of the best construction ideas and minimal technology were incorporated into the early filter houses, which were constructed using only materials that were available at that time. Thus, two filter houses were constructed simultaneously to filter exhaust air from DP-West and DP-East: TA-21-12 and TA-21-153, respectively. Final construction was completed on both of these structures by September 1, 1945 (Laboratory/Pan Am History Book). Both filter houses were decommissioned in the 1970's.

(a) SWMU #21-020(A): Decommissioned Filter House TA-21-12 at DP-West

The filter building for DP West, designated TA-21-12, was completed and put into service in May 1945. The floor area for that portion housing the filters and precipitation units was 30.8 meters by 19.5 meters. The intake plenum was a trapeziodal area 23.5 meters wide at its longest base, 7.6 meters wide where it entered the building and 18.9 meters from that point to the rectangular portion of the building. It continued in service for room and process air, servicing buildings TA-21-2, -3, -4, and -5 until July 1, 1959 (notice that TA-21-150 is not included because it was not in operation until 1962, at which time only the hood air was processed through TA-21-146). That year another system was installed for the process air (TA-21-146, SWMU #21-019(c)) and afterward only room air was handled in Building 12. Building 12 continued in service until February 1973, when new room air filtration systems were completed for each of the process buildings (Christensen et al., 1975).

The basic construction of TA-21-12 is described in Laboratory Engineering drawings ENG-C2260 (5/9/45), ENG-C2342 (8/13/45), ENG-C2316 (5/25/45), ENG-C2307 (5/17/45), ENG-C2278 (5/8/45), ENG-C2279 (3/9/45), and ENG-C2280 (5/12/45). These drawings show that TA-21-12 had four stacks with a total height from the ground of 51 feet 9 inches, each with a diameter of 42 inches. Each stack was equipped with an exhaust fan with a flow rate of 52,200 cfm (Fig. 21-44). Air flow from TA-21-2, -3, -4, and -5, first went through a plenum intake (Figs. 21-45 and 21-46) to a bank of five Electromatic self-cleaning air filters made by the

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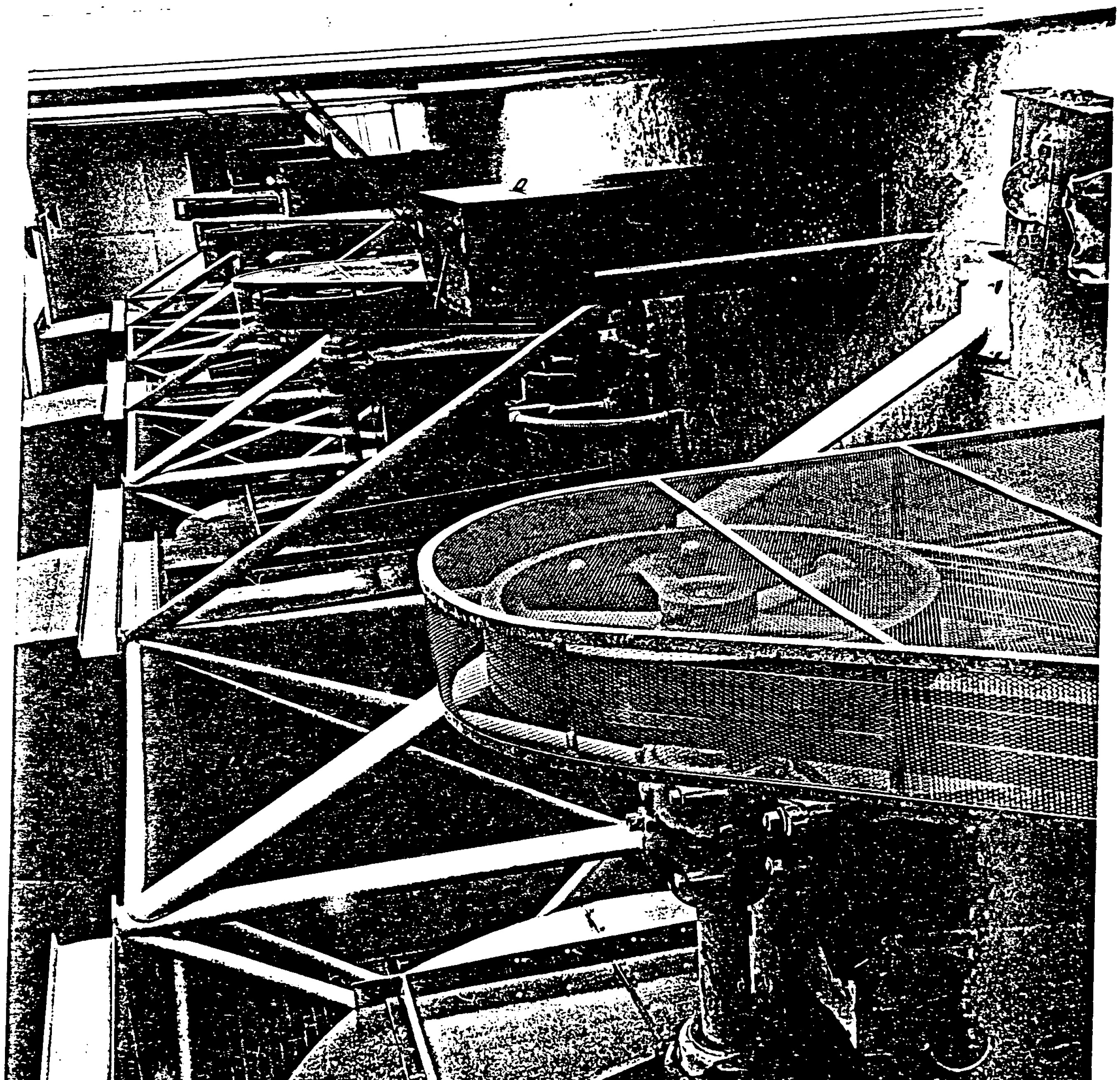
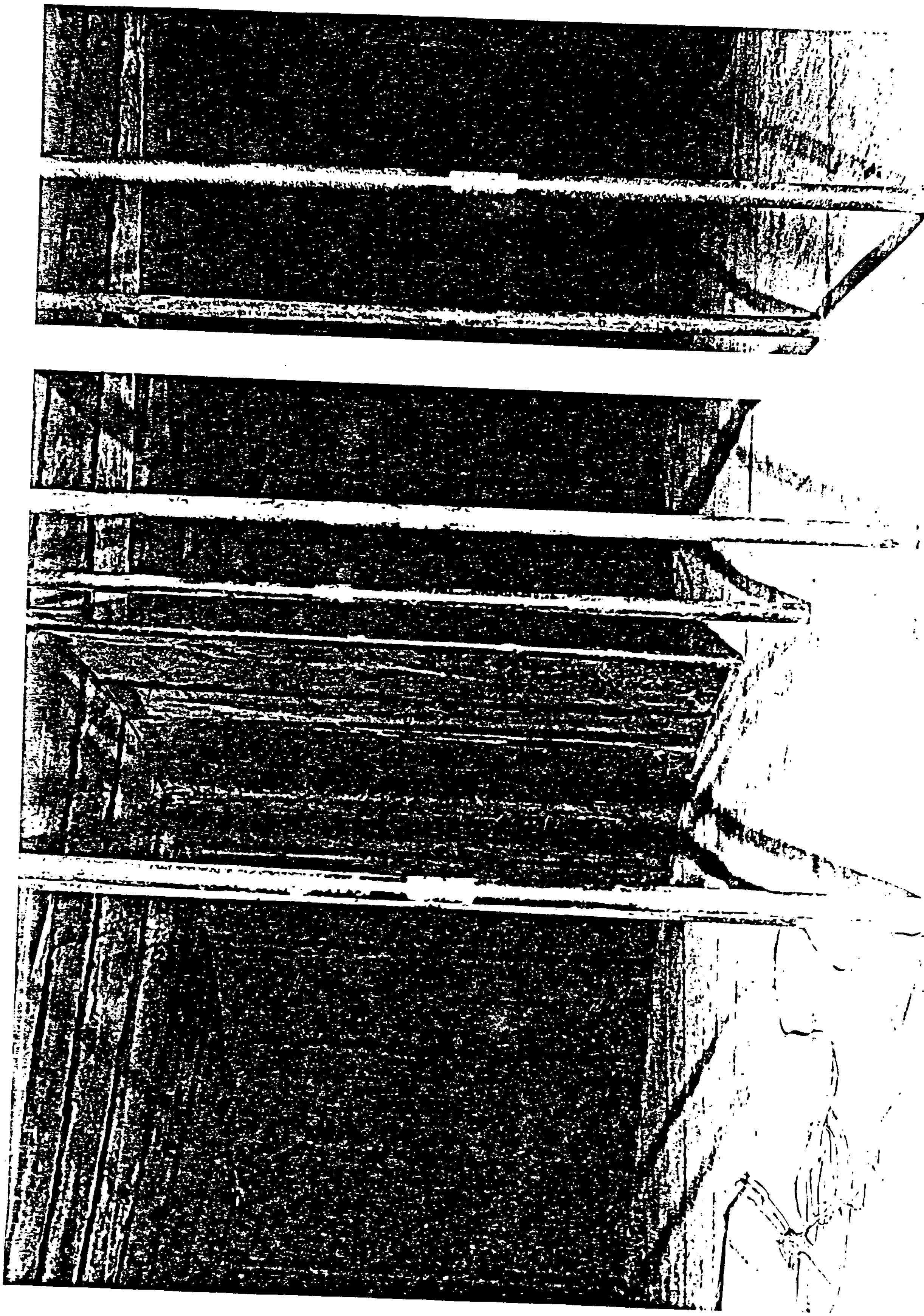




Bldg. 12. Plenum Intake

Fig. 21-45.

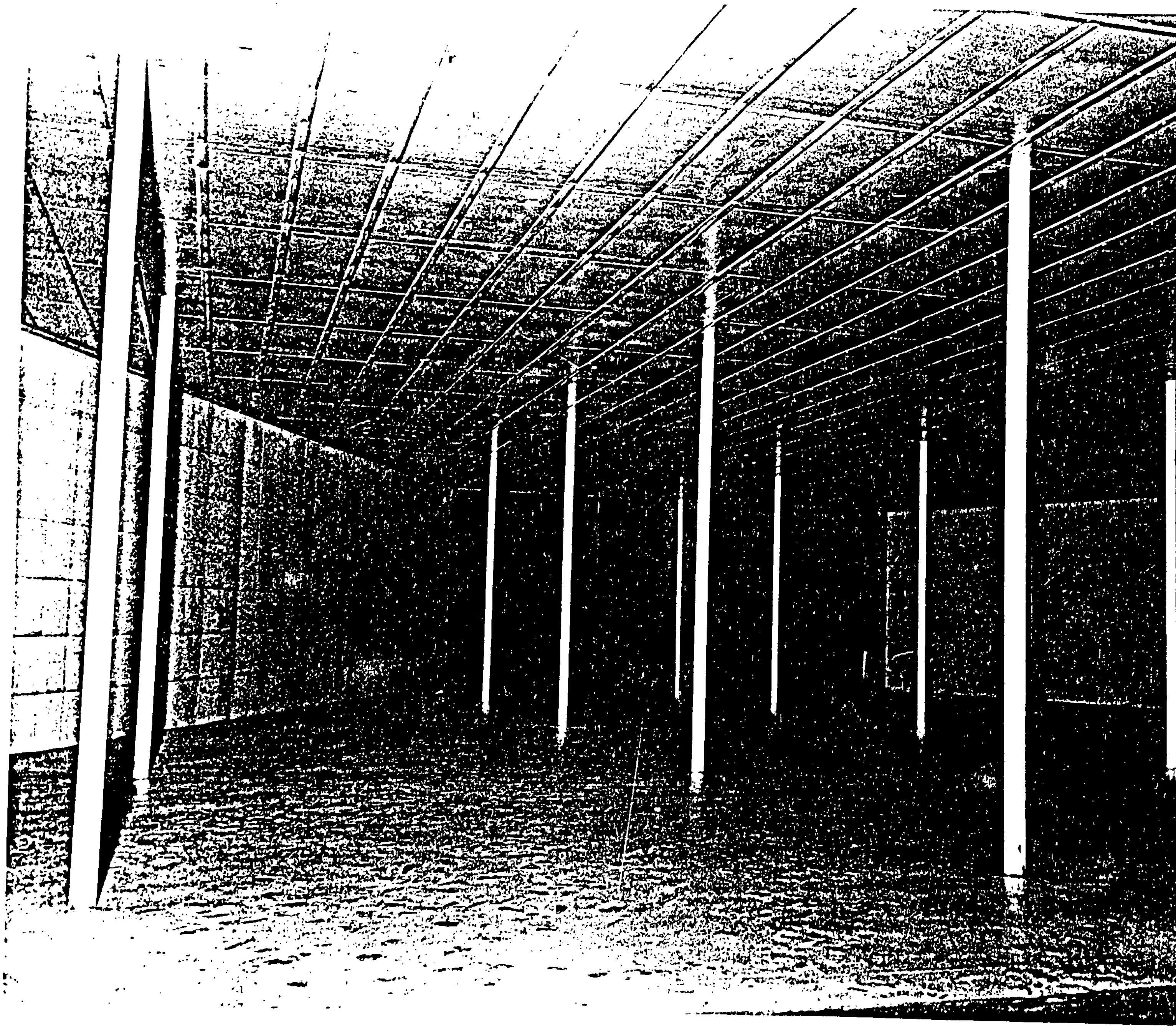
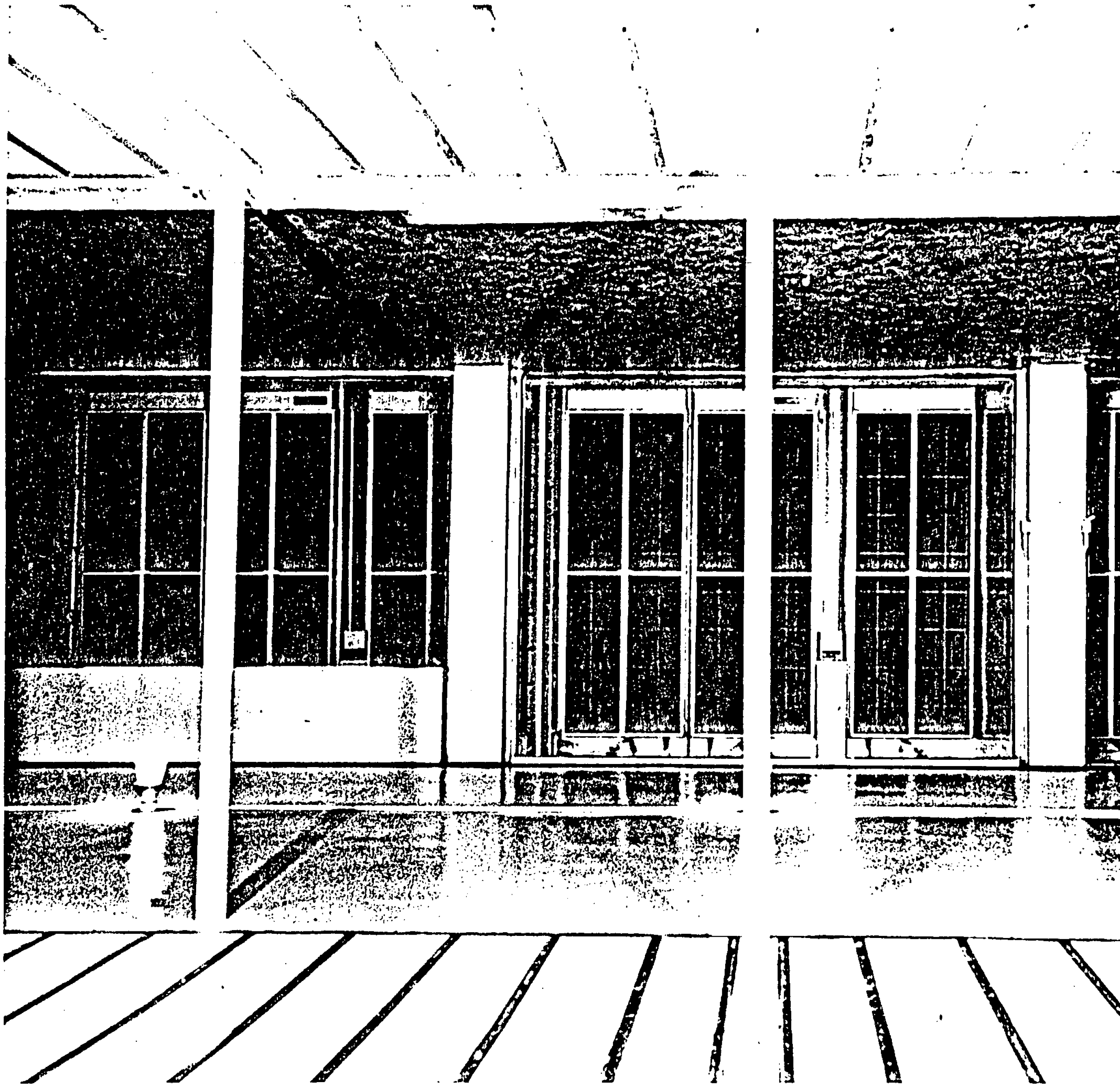


Fig 21-46. Bldg. 18 Plenum Intake

American Air Filter Company (Figs. 21-47 and 21-48). The air then went through a bank of 63 dry filters, arranged 9 filters wide by 7 filters high (Fig. 21-49). These filters were also made by the American Air Filter Company (Type PL-24) and there were 5 banks of these filters, for a total of 315 Type PL-24 filters.

The system described above handled air from rooms and fume hoods, sparging of dissolvers, and venting of solution tanks. At that time exhausting air from the glove boxes was not believed necessary. Several years later the decision was made to vent these work enclosures. The air was exhausted, without being filtered, through the room air exhaust system (Christenson et al., 1975).

In 1960 the interior of the plenum and the largest portion of the air ducts were cleaned in the first stage of decommissioning (Christenson et al., 1975). About 3000 Kg of soil were removed from TA-21-12 during this operation, including several hundred pounds of sand that had been used in sandblasting plutonium-contaminated parts. Over the next few years the building was cleaned several times. Finally, the building was demolished from June 1972 through February 1973 (Christenson et al., 1973). The drain pipe that exited from the northeast corner of the building and entered Absorption Bed 1 of MDA T and contaminated soil were also removed (the pipe was a 6 inch, Jennite coated black iron type, 125 feet in length). In addition to disposal of Building 12 debris at MDA G, 400 cubic meters of concrete, soil, and large metal items from the building were buried at MDA A. Wastes having greater than 10 nCi/g of plutonium had been placed in retrievable storage during the decontamination. Soil was removed to an approximate depth of 30 cm beneath the building and monitoring samples were



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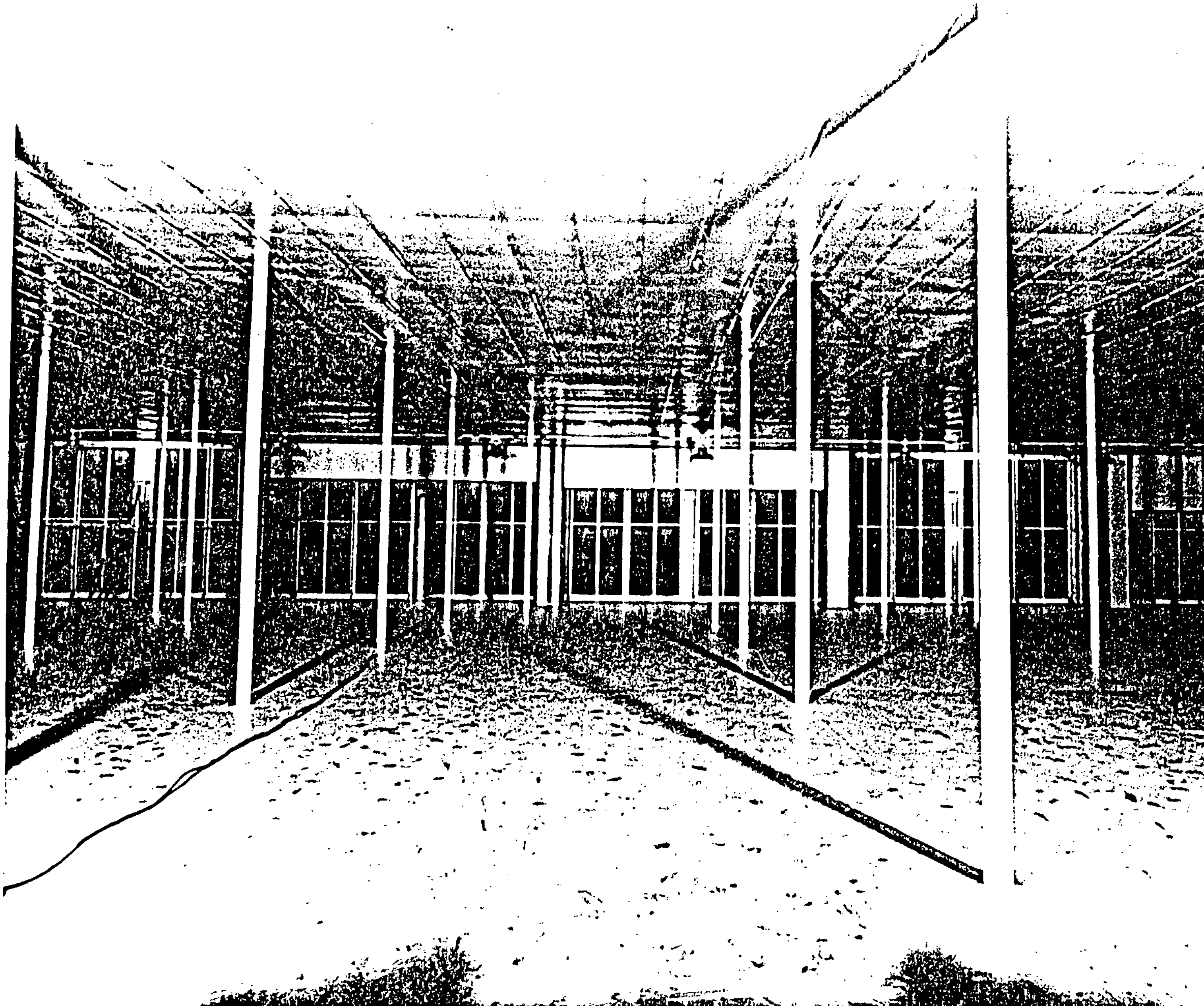

Fig. 21-48. Bldg. 12 Filter Banks

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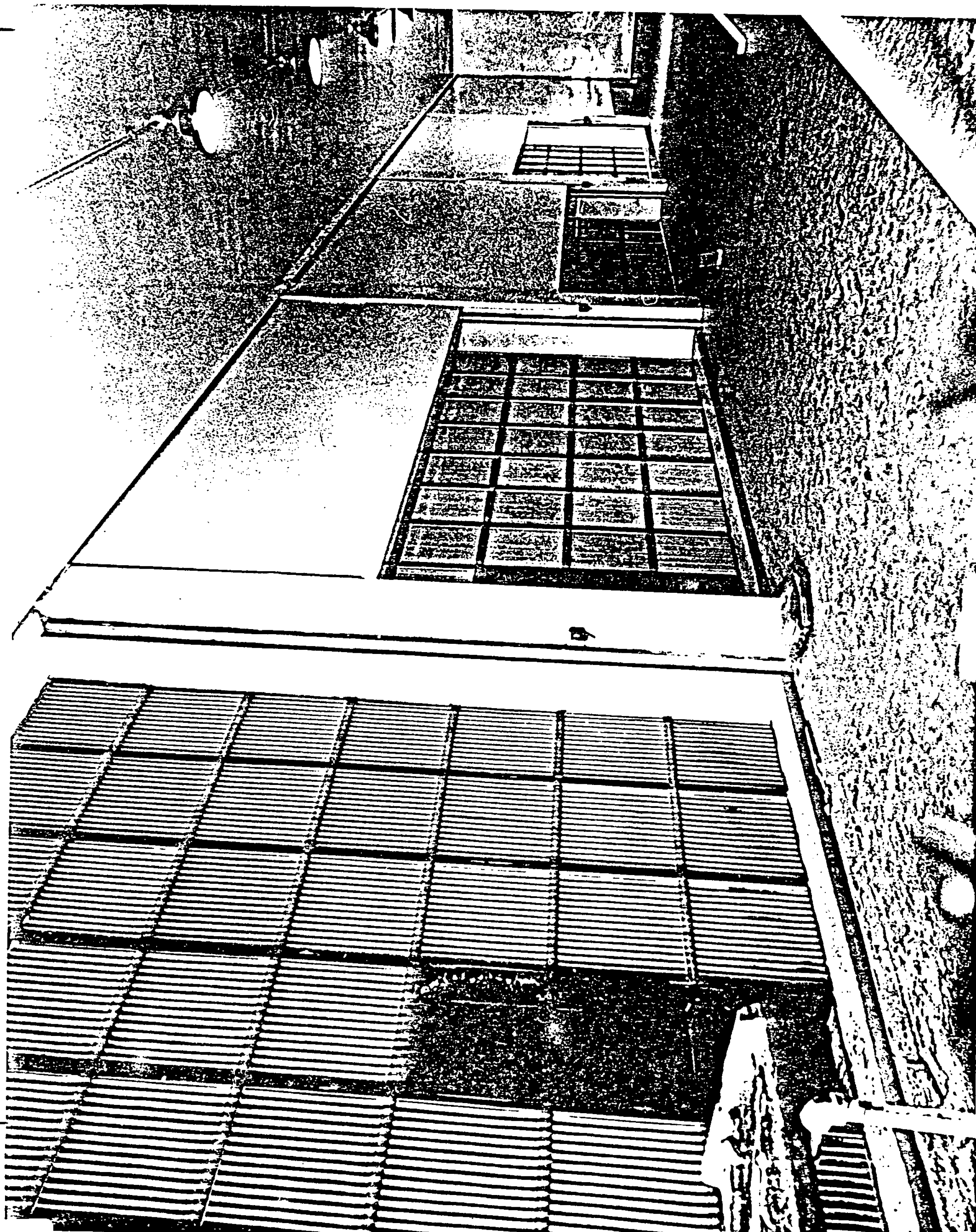
Fig. 9



Bldg. 12. Filter Banks

Fig. 21-49.

collected. After these samples were assayed, the entire area was backfilled with soil, until the original ground contour was restored, and was seeded to native grasses.

(b) SWMU #21-020(B): Decommissioned Filter House
TA-21-153 at DP East

The filter building for DP-East, designated TA-21-153, was finally completed by September 1945 (Laboratory/Pan Am History Book). The first floor area for the portion housing the filters was 46 feet 9 inches by 48 feet 2 inches. The intake plenum was trapezoidal-shaped just as with the basic design of TA-21-12. This facility only serviced exhaust air from Building TA-21-152, which came from the rooms and hoods of this building through duct work running along the roofs. Building TA-21-152 was not used for activities involving plutonium, but some work with polonium-containing initiators occurred in this building some time before 1962 (Anderson, 1990). TA-21-153 continued in service until March 1970 (Harper and Garde, 1981). In 1971 another system was completed to replace TA-21-153 (TA-21-322 and TA-21-323, SWMU #21-019(k) and SWMU #21-019(l).

The basic construction of TA-21-153 is described in Laboratory Engineering drawings ENG-C2260 (5/9/45), ENG-C2275 (5/7/45), ENG-C2277 (5/10/45), ENG-C2342 (8/13/45), and ENG-C2280 (3/9/45). These drawings show that TA-21-153 had only two stacks with a total height from the ground of 51 feet 9 inches, each with a diameter of 42 inches. Each stack was equipped with an exhaust fan with a flow rate which we cannot currently document (it is probably similar to those found at TA-21-12: 52,200 cfm). Air flow from TA-21-152, first went through the plenum and then through a bank of three Electromatic self-cleaning air filters made by the American Air Filter Company. The exhaust air then went through a bank of dry filters arranged 9 filters wide by 7 filters high. These filters were made by the same company (Type PL-24) and there were 3 banks of these filters.

Decommissioning work began on TA-21-153 in April 1978 with all wastes that were generated by this operation being buried at MDA G (Harper and Garde, 1981). Wastes consisted of 2662 cubic meters of building debris and 285 cubic meters of contaminated soil which were disposed of in this manner. The primary radioactive contaminant in the building was 227 actinium in secular equilibrium with its decay daughter products. Precleaning after the 1970 shutdown removed most of the contamination in accessible parts of the building. However, contamination remained in the duct work, plenums, blowers, and stacks which were buried at MDA G.

The former location of TA-21-153 currently exists as an empty lot adjacent to MDA U. It was contoured and revegetated with native grasses in 1978.

(5) SWMU #21-021, Stack Emissions

According to the 1990 IT Corporation report, SWMU #21-021 (Table VI) is described as follows:

"In 1970, above background levels of plutonium and strontium-90 were measured in the vicinity of TA-21. The study concluded that the plutonium was probably deposited from DP Site air stacks. The estimated area of soil contaminated by TA-21 is approximately 300,000 square meters, with plutonium-239 concentrations ranging from 0.005 to 0.6 pCi/g. The sampling locations are located throughout TA-21 extending to the airport. The soil samples were not analyzed for constituents other than radionuclides".

SWMU #21-021 is probably directly related to SWMU #21-019 in the sense that some and/or all of the facilities in SWMU #21-019 are probably responsible for the contaminated areas observed in the SWMU #21-021, but SWMU #21-021 could have received airborne effluents from sources other than those in SWMU #21-019 (Table VI).

This SWMU is based solely on a Los Alamos Scientific Laboratory report published in 1971 (Kennedy and Purtymun, 1971). Soil samples were collected and analyzed for plutonium and strontium in an area in and adjacent to Technical Area 21 as shown in Figure 21-50. Two sets of samples were taken from the same locations in 1970. One set was collected in January-February and the other set in November to determine the isotope levels in the topsoil, possibly from stack emissions. Analyses were made for ^{238}Pu and ^{239}Pu. ^{90}Sr analyses were performed on soils taken in January-February.

Referenced soil samples were collected in previous studies and analyzed from the Los Alamos, Espanola, and Santa Fe areas to establish background of ^{238}Pu, ^{239}Pu, and ^{90}Sr in soil from world-wide fallout as the result of atmospheric nuclear tests. The referenced soils were compared to the results obtained from soils collected near TA-21.

Kennedy and Purtymun referenced a study published in 1958 concerning TA-21 stack emissions (Jordan and Black, 1958). In the

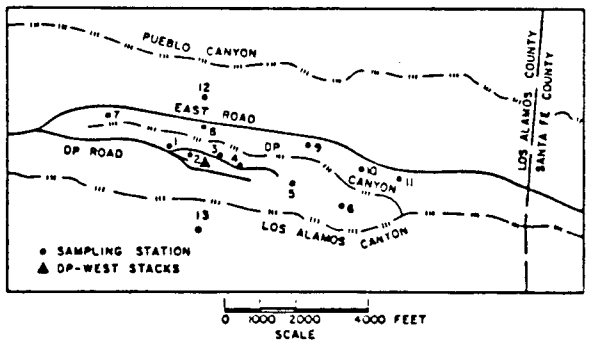


Fig. 21-50. Soil sampling stations near DP-West stacks (Kennedy and Purtymun, 1971).

latter study it was estimated that 13.1 g of plutonium had been released to the atmosphere from the stacks at TA-21 during the previous 9 years. They also estimated that of the 13 g only about 0.5% (or 0.065 g of plutonium) was retained in the soil within a 1-mile radius of the stacks. Thus, Kennedy and Purtymun's data was used to make an estimate of the ^{239}Pu deposition in soils by using average concentrations in $\mu Ci/m^2$ of the two sets of samples collected at each location during 1970 and constructing isoplutonium contours at 0.005, 0.01, and 0.05 $\mu Ci/m^2$.

(6) SWMU #21-025, Offgas System

This SWMU consists of two tritium facilities located at DP-East (Table VI). The stacks for these two facilities were described under SWMU #21-019.

(a) SWMU #21-025(A): TSTA facility, Building TA-21-155

The Tritium Systems Test Assembly (TSTA) at the Los Alamos National Laboratory is the result of the DOE solicitation (Bartlit, 1989). In broadcast terms, the TSTA is characterized by being an integrated operation of all the plasma exhaust gas reprocessing subsystems, and by being a full-scale test facility. The tritium inventory is about 120 grams and the processing rate is 1000 grams of tritium per day--nearly full flow for a fusion device the size of the International Tokamak Experimental Reactor (ITER).

The DOE solicitation and the project took the direction it did at the relatively early date it did for several reasons. The aim was not only to develop the tritium technology that would be needed, but also to demonstrate that the technology could be operated safely over long periods of time. It was realized early on that licensers and the public probably would require more than calculated assurances that tritium could be handled safely in a fusion operating environment. The idea was not to minimize tritium inventories and their handling, but rather to show that full inventories could be handled in situations duplicating, to the maximum extent, those expected in the early tritium-using fusion devices. And to do so while maintaining minimal releases to the environment and doses to workers.

The major characteristic of the TSTA facility relates to its achievement of the process flow loop shown in Fig. 21-51. The torus mockup is simply a vacuum tank into which can be injected the deuterium-tritium fuel mix and the impurities projected to make up the plasma exhaust gases from a reactor. The impurities can be gases such as methane, ammonia, water, helium, and oxides of carbon. The first three of these contain chemically-combined tritium. The Vacuum System is based on compound cryopumps for evacuating the simulated spent fuel mix from the torus mockup. In the Fuel Cleanup System, the injected impurities (except helium) are removed from the hydrogen isotopes and are decomposed to recover the contained tritium and deuterium for reuse. The final processing step is the separation of the hydrogen isotopes and helium by means of fractional distillation carried out at liquid hydrogen temperatures (17-22^{o}K).

The associated processes shown in Fig. 21-51 include a storage system for the separated isotopes. This consists of five uranium beds, which are used primarily when operations are shut down, although they are also useful for scavenging small amounts of isotopes out of purge

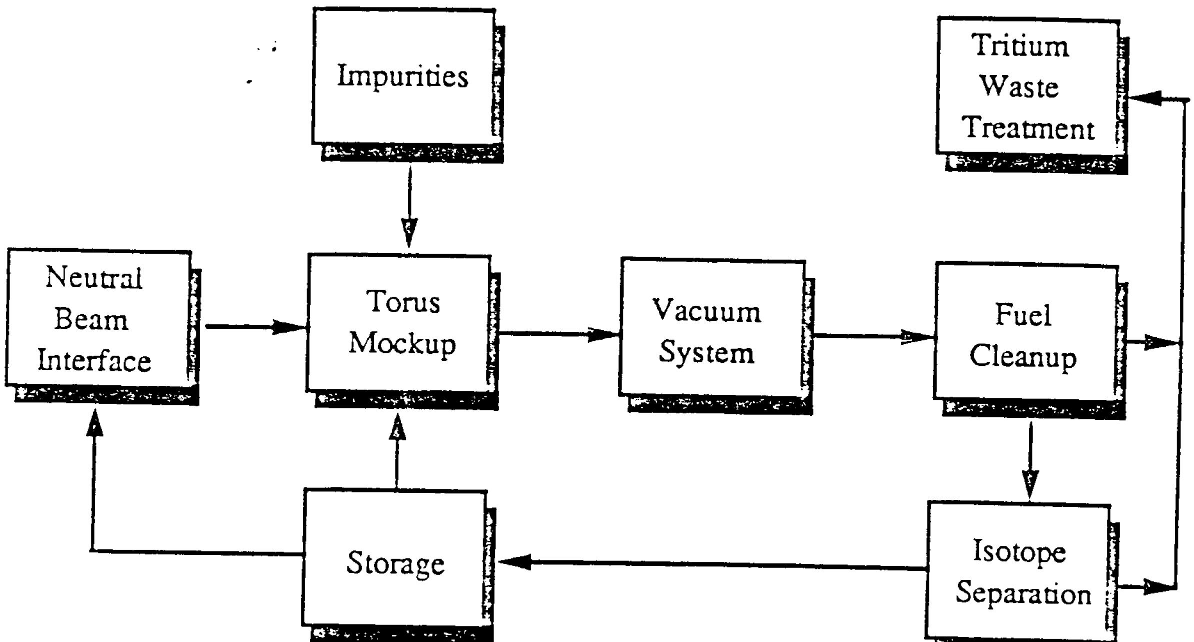


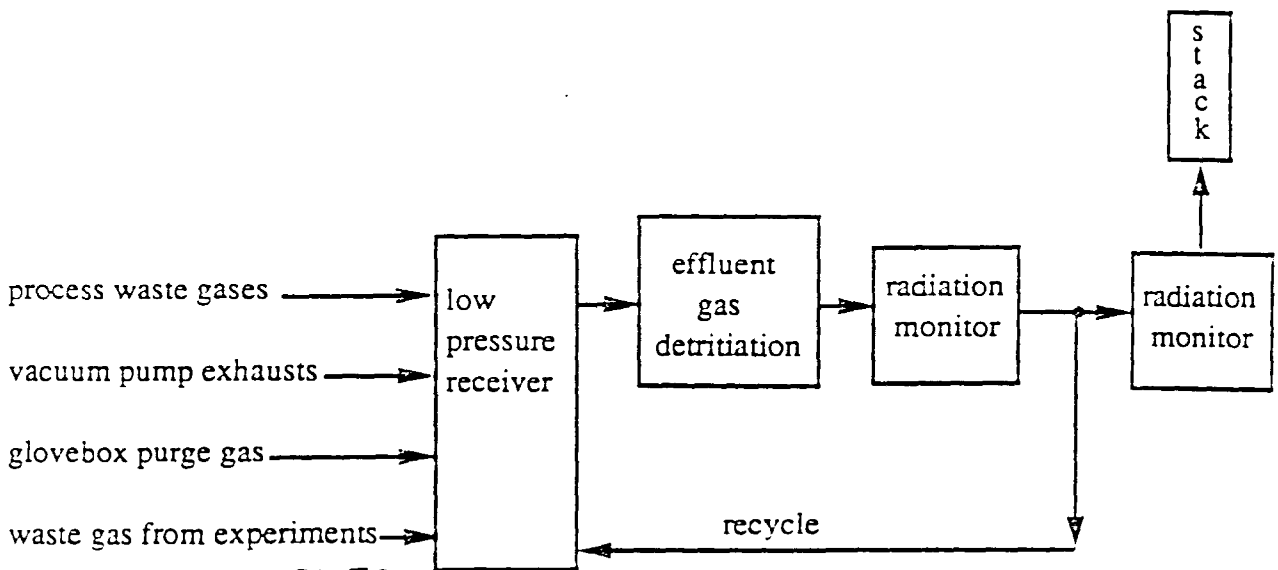
Fig. 21-51. Schematic diagram of TSTA process flow loop.

gases or other waste streams. The Neutral Beam Interface simulates the recovery of tritiated gases from the vacuum pumping of a neutral beam line. The final block shown in Fig. 21-51 is the Tritium Waste Treatment System. More than any other system perhaps, this system is central to the basic nature and purpose of TSTA. It is the effluent gas detritiation system. It is shown schematically in more detail in Fig. 21-52.

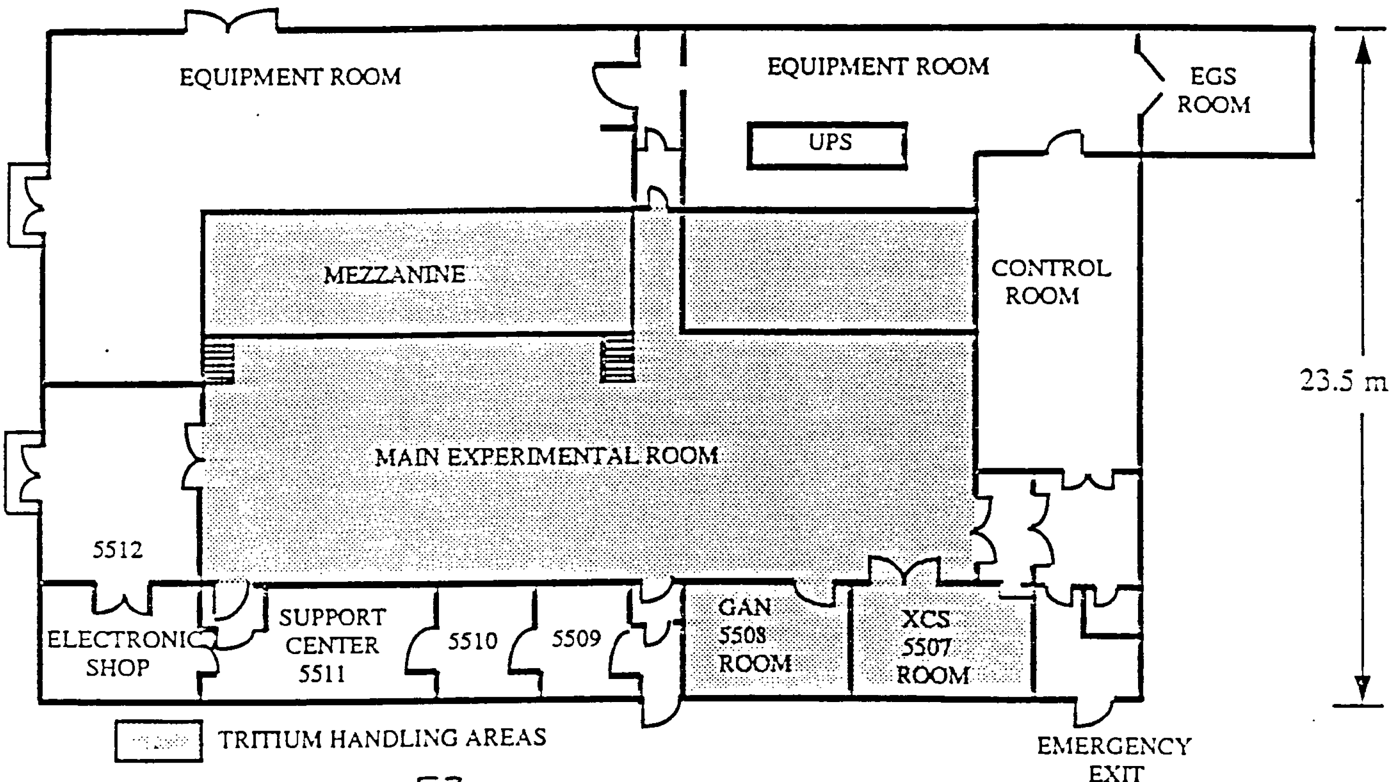
Two points stand out in Fig. 21-52. First, the effluent gas detritiation system is seen to be the final line of defense against emissions of tritium to the environment from all sources at TSTA except a spill into the room itself. Second, for this reason it ties to, and therefore interties, all process systems and most safety systems at TSTA. Thus the effluent gas detritiation system plays a key part in tritium safety as well as in the need to do integrated testing--two major characteristics of TSTA.

The "recycle" stream shown in Fig. 21-52 requires some explanation. If the effluent gas stream is not sufficient detritiated (as shown by radiation monitoring) to be released to the stack, the stream is recycled to the system inlet for further detritiation. Final radiation monitoring, shown before the stack, can halt stack flow if detritiation is insufficient.

The TSTA project was awarded to Los Alamos National Laboratory in January 1977. A prerequisite for a successful proposal was the availability of a suitable building for housing the new facility. Decommissioning of unused equipment and preparation of the building began in early 1977. Major construction was completed in 1982 (Fig. 21-53). Following commissioning with deuterium and hydrogen, first tritium



21-52
Fig. 2. Schematic diagram of effluent gas detritiation system.



21-53
Fig. 3. Floor plan of the Tritium Systems Test Assembly

operations began in 1984 with 10 grams of tritium. Tritium in the systems was steadily increased until reaching its near-optium level of 110-130 grams (1.1-1.3 million curies) in June 1988. As the tritium level was increased incrementally to its full value, subsystems were tested individually and gradually integrated into the full process loop. The first fully integrated operation of the TSTA loop took place in June 1988. TSTA is now capable of full loop operation. In the past, loop operations have been 5-9 days in duration. In early May of 1989, we completed an extended operation of 19 days duration. A doubling of the number of facility operators (from 3 to 6) accomplished in the spring of 1989 will allow longer runs to start to test overall system reliability in long-term, continuous operation.

The main experimental room (Fig. 21-53) has 344 m^2 of floor space. Surrounding the main room is an additional 557 m^2 floor space. This is used for the control room, equipment rooms, a gas analysis laboratory, an experimental contamination studies laboratory, and offices. The height of the main room is 8.0-8.5 m. Besides the integrated fuel processing loop, the major testing resources also include five to six separate gloveboxes for carrying out individual component tests or tritium compatibility tests. The Experimental Contamination Studies Laboratory (labeled "XCS" in Fig. 3) is a separate laboratory for research on the contamination and decontamination of materials and equipment of interest to fusion energy.

Of the many process systems involved at TSTA facility, the safety systems are of most concern in terms of SWMUs. The effluent gas detritiation system, named the Tritium Waste Treatment System (TWT), is based on technology that was well-proved in the U.S. national security programs before the inception of TSTA. The technology utilizes catalytic oxidation of elemental tritium in effluent gases followed by capturing of the resulting oxide on molecular sieve beds. TSTA also includes a larger system, based on the same technology, capable of detritiating the atmosphere in the main experiment room (see Fig. 21-53) in the event of a tritium spill into the room. This larger system, the Emergency Tritium Cleanup (ETC), is designed to detritiate the main room to a level allowing normal entry within 24 hours after a spill of 100 grams of tritium. This system was installed as a test system at TSTA, not as an essential safety system. It certainly would be used in the event of a significant spill, which has not occurred to date.

Integral to overall facility safety and to the use of the room air detritiation system (ETC) is the automatic ventilation control system (VEN). This system has two main functions. The first is to maintain the pressure in the main experimental room slightly lower than that in the adjoining nontritium areas (the control room, offices, and equipment rooms in Fig. 21-53). This pressure differential limits the movement of tritium from the main room in case of a release into the room. Secondly, in the event of a major spill in the main room, VEN automatically isolates the room atmosphere from its normal tie to the stack. This action permits effective detritiation by use of the ETC and in effect makes the building itself the tertiary containment for the tritium (process piping, glovebox, and building).

Besides the TWT and the ETC, the other systems at TSTA whose function is safety are the Tritium Monitoring System (TM) and the Secondary Containment System (SEC). TM is an extensive system of glovebox monitors, room monitors, and stack and duct monitors that warn of off-normal amounts of tritium in unwanted places. All of the tritium monitors at TSTA are of the ion-chamber type. SEC includes the gloveboxes and their controls. All piping that contains or may contain significant amounts of tritium is secondarily contained.

TSTA is designed as a fully computer-controlled facility, as appropriate for a facility for developing technology ultimately to be interfaced with a fusion reactor. In addition to control, the computer system has a major function in recording and trending data and operating parameters. To date, the safety systems at TSTA (TWT, TM and SEC) are fully computer controlled, and have been since the initiation of tritium operations. The process systems (such as FCU and ISS) are operated through the computer by manual instructions from operators and by limited control programs for subsets of operations, generally related to safety and off-normal conditions.

(b) SWMU #21-025(B): TA-21-209 tritium facility

The TA-21-209 tritium facility is older than TA-21-155, having been built in 1965 (Laboratory/Pan Am History Book). The 1984 SPARS report contains the best description of this facility:

> "The main tritium facility at DP-East consists of a large dry box system connected to a gas purification system (GPS) for maintaining an inert atmosphere. The dry box is 11.5 m^3 in volume and the GPS has a 5.7 m^3/min capacity. Thus, every two minutes there is a complete turnover of dry box gas. Both the dry box and the GPS are interfaced with an effluent treatment system (ETS) designed to remove

tritium from all effluents prior to release of these effluents to the environment.

The dry box is designed for handling highly reactive metal tritides, in particular Li(D,T) salt. The dry box is maintained at a slightly positive pressure of 1/2 inch of H_2O by two photohelic gauges, one on the GPS and the other on the nitrogen removal system. The photohelic gauges control the addition of fresh helium and the removal of excess dry box gas to the ETS. An oil bubbler is provided to protect the dry box from large pressure differentials in the event the photohelic system fails. The bubbler consists of a metal U-tube filled with oil to the correct level that will release when the dry box internal pressure exceeds +/- 10 inches of H_2O. This simple device protects the dry box gloves and windows from failure due to excessive pressure".

A very detailed description of the tritium effluent treatment system (ETS) also comes from the 1984 SPAR report:

"The ETS removes tritium by the catalytic reaction of hydrogen isotopes with oxygen, forming water which is then absorbed on a drying tower. The ETS effectively reduces tritium levels in the process stream to one ppm. The capacity of the ETS is 15 ft^3/min, but the ETS is designed to operate intermittently depending on the effluent load.

The gas from the ETS is dumped into the hood exhaust system where a flow of 17,000 ft^3/min reduces the tritium concentration to 1 part in 10^9.

All components, except the low pressure receiver, are redundant. One is in use and an identical component is on-line in the event of a component failure or during periods of scheduled maintenance. Virtually every component of the ETS can be isolated by valves, and evacuated and backfilled with helium. This reduces the probability of exposing personnel to high tritium level gases during maintenance of the ETS. All effluents produced by vacuum systems within the tritium facility and all purge gases used for regeneration of drying towers are processed by the ETS.

All effluents produced by vacuum systems first pass through a series of mist eliminators. These are baffled traps designed to condense oil mist from the vacuum pumps. After passing the gas through the mist eliminators the effluents pass through an activated charcoal trap to reduce the organics to a minimum. The mist eliminators and the two charcoal traps can be valved off and replaced, but this has not been necessary yet.

Precautions to eliminate hydrocarbons must be taken to avoid certain substances which will permanently poison the catalyst within the recombiner. These substances are acids, chlorides, sulfur compounds, oil, vapors of some organic solvents, and base metals.

From the charcoal trap the gas is dumped into a low-pressure receiver (LPR), a large 1.9 m^3 storage and ballast tank. The pressure within the LPR is sensed by mercoid switches. At a pressure of 7 psia the mercoid switch activates the Corken Model D390 reciprocating compressor which pulls gas from the LPR through the ETS until the pressure reaches 2 psia and the compressor is deactivated. This requires approximately 5 minutes operating time. The LPR is equipped with a pressure relief valve so if pressure starts to build in the LPR at a rate faster than the compressor can handle, the pressure relief valve will open at 13.5 psia venting the gas directly into the stack and preventing non-processed gas from entering the room. The T_2 concentration of the gas in the LPR depends on the operations performed that day. Concentrations vary from a fraction of a Ci/m^3 to several thousand Ci/m^3.

From the LPR the process gas enters the recombiner where the gas temperature is increased to 900^oF by a gas-to-gas heat exchanger and an electric preheater. The hydrogen isotopes and hydrocarbons are catalytically converted to water vapor and carbon dioxide by reacting with oxygen, and are then cooled by a gas-to-water heat exchanger to 70^oF. If only hydrogen isotopes are to be converted to water vapor in the catalytic reactor the gas preheater may be operated at temperatures as low as 350^oF. To be sure that all tritiated hydrocarbons are converted to carbon dioxide the gas preheater is maintained at a temperature of 900^oF.

Following the recombiner, the gas is pressurized by the Corken compressor to 30 psig in the on-line high pressure receiver (HPR). This pressure is controlled by down stream Fairchild-Hiller back pressure regulating valves set at 30 psig. The spare HPR is always kept at a vacuum in case more storage volume is needed. These tanks can store gas at a pressure of 120 psig. Pressure relief valves are on both the HPR tanks and the compressor, each of which vent back to the LPR if the down stream back-pressure regulating valves fail.

From the HPR the gas flows through one of two 13X molecular sieve filled towers. The other standby tower has been regenerated by heating to 350°F and purging with helium gas. When one tower is brought on-line the other tower starts regenerating automatically if the controls are in the automatic mode. The tower can be regenerated at a more convenient time by placing the controls in the manual mode. The gas, after passing through the 13X tower, is monitored for water content and tritium concentration. If low water and low tritium concentrations exists the gas is stacked, which is usually the case. High water concentrations >50 ppm result in stack discharges of 1 MPC of tritium (5 $\mu Ci/m^3$). Before this concentration of tritium is reached, the gas is automatically routed through a similar set of towers filled with 4A molecular sieve to further reduce the tritiated water content prior to release to the stack. If this fails, the ETS automatically goes into the recycle mode. In this mode the gas is continuously processed through the ETS in a closed loop until a preset activity level has been reached. The activity levels indicated by both the 13X and 4A ion chambers are fed into the logic control and warning system which determines at what activity level the gas is stacked".

(E) Storm Drain Surface Discharges

There is only one SWMU in this subaggregate, SWMU #21-027, Surface Discharge (Table VIII). A general description of this SWMU is given in the 1990 IT Corporation report as:

"Floor drains from TA-21-3 and drainage from surface areas around buildings TA-21-2, -3, -4, and -5 are believed to have gone to storm drains. Small quantities of radionuclides may have run into Los Alamos Canyon through the culverts. The drainpipe from building TA-21-3 consists of two separate drainpipes: a 3"-diameter line from the floor drain in room 3A inside of a 12"-diameter storm drainline. The effluent from both lines outfalls south of building TA-21-143; a drainline from building TA-21-143 also outfalls at this same location. The liquid from all three drainlines discharges to a small ponded area. This ponded area is drained by a corrugated metal pipe into Los Alamos Canyon. Building TA-21-152 had a cooling tower that discharged to an outfall in Los Alamos Canyon. In 1971, the amount of cooling tower discharge was 16,700 gallons/year.

Table VIII. Description of Storm Drain Surface Discharges at TA-21.

SWMU	Short Description	Period of Use	Comments
21-027	Storm drain surface discharge from floor drains in TA-21-3 and from regional runoff	1945-Present	Several storm di involved outfal along the north Los Alamos Cany the south rim o Canyon.

Another surface discharge came from a 4"-diameter vitrified clay drainline that was connected to the southeast corner of building TA-21-6. Building TA-21-6 contained a machine shop, a cafeteria, two electronics shops, a lucite machine shop, and stock room. The bermed containment area surrounding fuel tank TA-21-47 was drained by 4"-diameter steel drainline into Los Alamos Canyon from 1945 to 1960."

The storm drain system at TA-21 is best described in a set of Laboratory Engineering drawings of the water and drainage system at this site (ENG-R1165 through ENG-R1172, 1/20/56 per Lab Job 1339). Contrary to what the IT Corporation report states, these drawings indicate that Los Alamos Canyon does probably receive most of the storm runoff from the storm drains, but probably about 30% of the site runoff is also diverted into DP Canyon. Drainage from north of all of DP Road was diverted past TA-21-45, and then northeast along the north perimeter road at TA-21, eventually discharging into DP Canyon. Drainage from south of all of DP Road was diverted past TA-21-20 and then due south (at a point adjacent to the northeast corner of TA-21-46) into Los Alamos Canyon. Major storm drains were located south of Buildings TA-21-6, -2, -3, -4, and -5 which drained all of the roof and paved areas south of passageways TA-21-15 through TA-21-18. The roof and paved areas north of these four passageways was diverted around several buildings along three major trunk supply systems which diverted runoff along the north perimeter road: (1) northwest of TA-21-12, and (2) at two locations immediately north of Absorption Bed 3 of MDA-T. The runoff from the TA-21-57/TA-21-9/TA-21-61 area was diverted into Los

Alamos Canyon south of each of these areas. At DP East, storm runoff was diverted into DP Canyon from MDA-A, MDA-U, TA-21-153, and the north sides of Buildings TA-21-151 and -152. The southern sides of these latter buildings drained into Los Alamos Canyon.

An additional Laboratory Engineering drawing finished on 4/15/85 (ZT-5231) gives a description and a location of the storm drain pipes at TA-21. This drawing shows that the storm drains include TA-21 totals of 70, 500, 668, 390 and 80 feet of corrugated metal pipe with diameters of 10, 12, 18, 24 and 30 inches, respectively. Also included are TA-21 totals of 100 and 154 feet of concrete pipe with diameters of 12 and 18 inches, respectively.

Section 3.1.1.1 Source Term

Source term information is presented in this section for each of the SWMUs in the five subaggregates listed in the preceding section: (A) aboveground tanks and container storage areas, (B) surface disposal areas, (C) sewage treatment plant, (D) incinerators, stacks and filter houses, and (E) storm drain surface discharges.

A. Aboveground tanks and container storage areas

(1) SWMU #21-001, Radioactive Waste Container Storage Area:

No known information.

(2) SWMU #21-002 and #21-002(A), Container Storage Areas

No known information.

(3) SWMU #21-003, PCB Storage Area

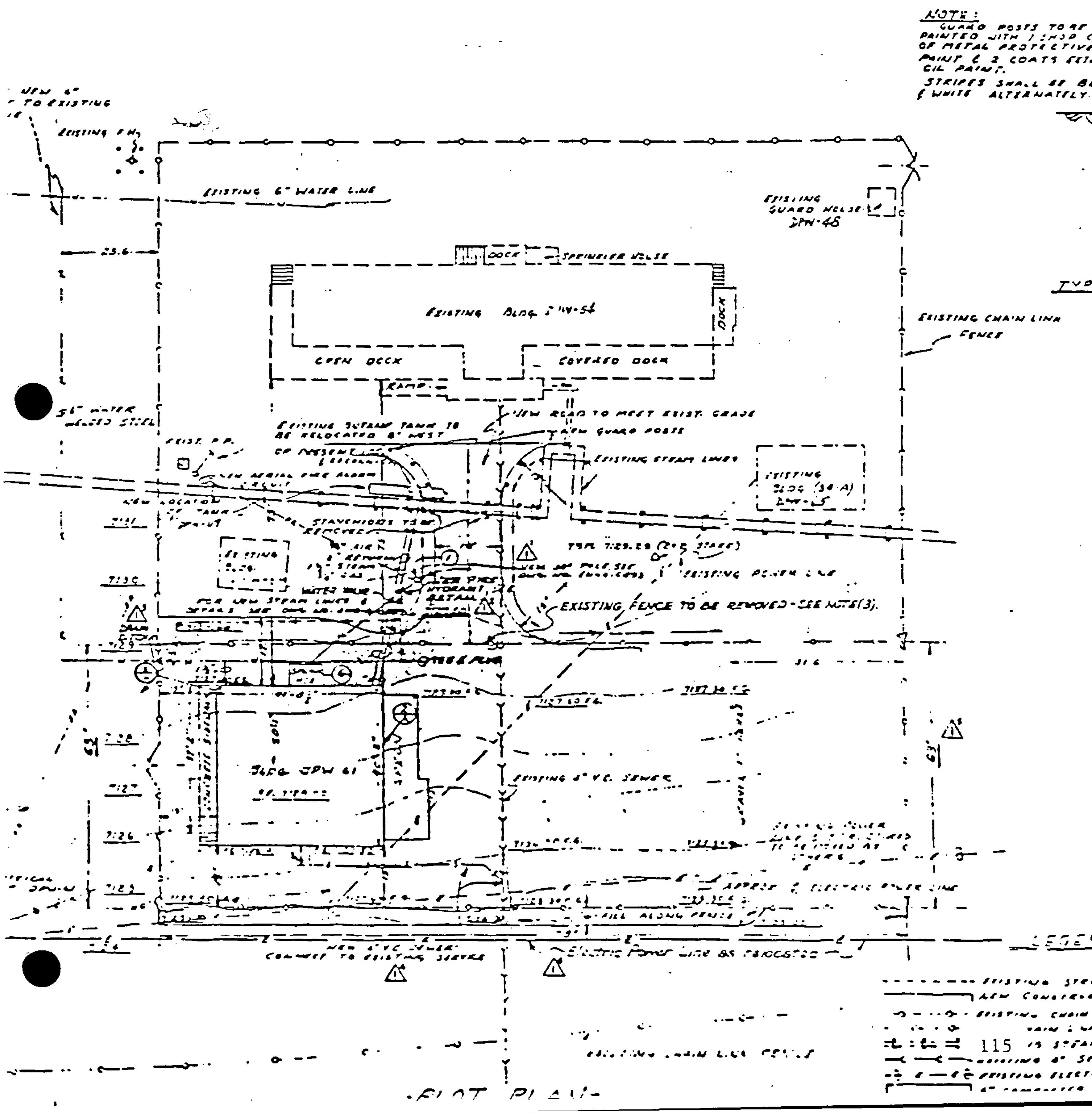
Prior to September 28, 1981, 55-gallon and 30-gallon drums were stored in Building 61, awaiting disposal by incineration. On September 28-29, 1981, ENSCO (El Dorado, Arkansas) hauled three truck loads of this oil to their staging area in Alabama (Balo and Warren, 1981). This oil ranged from 12,000 ppm to 980,000 ppm PCB concentration with the majority being over 500,000 ppm. As of October 1, 1981, the remaining inventory in Building 61 consisted of 6 55-gallon drums of contaminated rags, 2 55-gallon drums of capacitors, and 19 55-gallon and 7 30-gallon drums of usable PCB oil belonging to Zia (Balo and Warren, 1981).

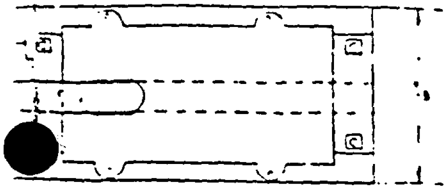
Soil and asphalt were collected July 21, 1988, as grab samples in the fenced area outside Building 61. The building and the enclosed area is a storage facility for electrical equipment (e.g., capacitors) and oil for that equipment. The stored oil contained PCB. Figure 21-54 is a plot plan of Building 61 and the enclosed fenced areas. The sampling scheme with analytical results of total PCB is given in Figure 21-55. Specific analytical results can be obtained from Data Request No. 7132 (LANL, 1988). The results indicate that the contamination is not uniform. The highest concentrations appear to be located on or near the asphalt pad, although exceptions can be observed. The concentrations ranged from less than 10 $\mu g\ g^{-1}$ to approximately 95,000 $^{1}g\ g^{-1}$. Contamination must be cleaned to levels less than 10 $\mu g\ g^{-1}$ (PCB Regulations 40 CFR 761, section 0.125).

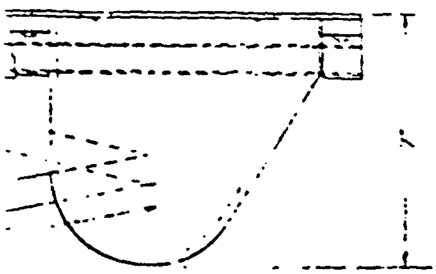
Analytical results indicate that cleanup of the area is necessary. However, this sampling scheme was for a general survey. Cleanup of the

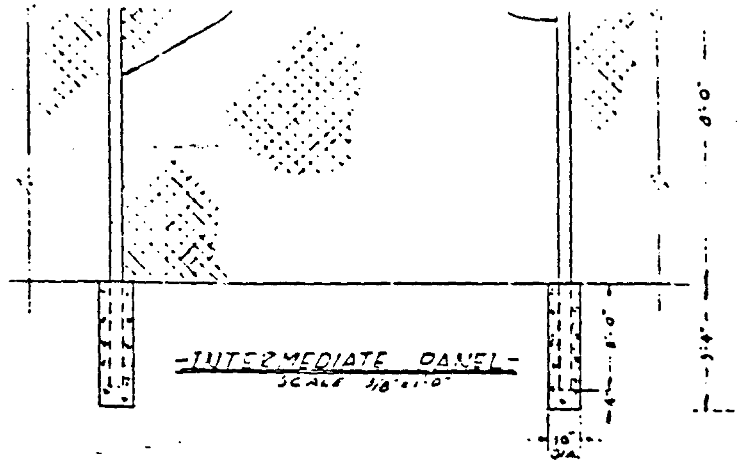
21-54

Figure 1. A plot of Building 61 enclosed in a fenced area at TA-21.









NOTE:

1. ALL WORK INSIDE THE EXISTING FENCED AREA & REMOVAL OF EXISTING FENCE TO BE PERFORMED BY PERSONNEL HAVING "Q" CLEARANCES.
2. EARTH FILLS & BASE COURSE TO BE COMPACTED TO 95% MAX. DENSITY OPTIMUM MOISTURE CONTENT.
3. EXISTING FENCE TO BE REMOVED AFTER NEW FENCE IS CONSTRUCTED & MATERIAL RETURNED TO SALVAGE AS PER SPECIFICATIONS.

NOTE:
GATE LATCH TO BE FURNISHED BY U. OF CALIF. & INSTALLED BY CONTRACTOR. (WELD ALL AROUND, TO 1/4" STEEL PLATE ON GATE)

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... LIST

	TITLE
3..	PLOT PLAN, UTILITIES & DETAILS
383	STEAM LINE & DETAILS
384	FOUNDATION PLAN & DETAILS
385	SCHEDULES & MISC. DETAILS
386	PLAN & ELEVATIONS
387	STEEL FRAMING
388	ARCHITECTURAL DETAILS
389	PARTITION & DOOR DETAILS
390	PLUMBING, HEATING & VENTILATION DETAILS
391	PLUMBING, HEATING & VENTILATING
392	SPRINKLER SYSTEM
393	ELECTRICAL PLAN & DETAILS
394	ELECTRICAL DETAILS

AT (29-1)-963

NO.	DATE	REVISIONS	BY	CK.
1	11-10-50	"AS BUILT" — RELOCATED POWER POLE, FIRE HYDRANT, SEWER LINE, [illegible]	JAS	[illegible]

U. S. ATOMIC ENERGY COMMISSION
SANTA FE OPERATIONS OFFICE
LOS ALAMOS, NEW MEXICO

BLDG. DPW-61
TA-21
PLOT PLAN, UTILITIES & DETAILS

DRAWN: J. Sloine
A-E APPROVED
SCALE: AS NOTED
DATE: 6-30-50
LAB. DWG. NO.: ENG 4-C 882

SUBMITTED: CHIEF DEPT OF ENG. — RECOMMENDED — APPROVED AEC

AUTHORIZED FOR: HEALTH, SAFETY, FIRE PR., COMM., PROC., SEC.

RD DRAWING - AS BUILT CONSTRUCTION
RECOMMENDED: CHIEF - LAB. ENGR. DIV. — APPROVED: CHIEF - CONST. DIV.

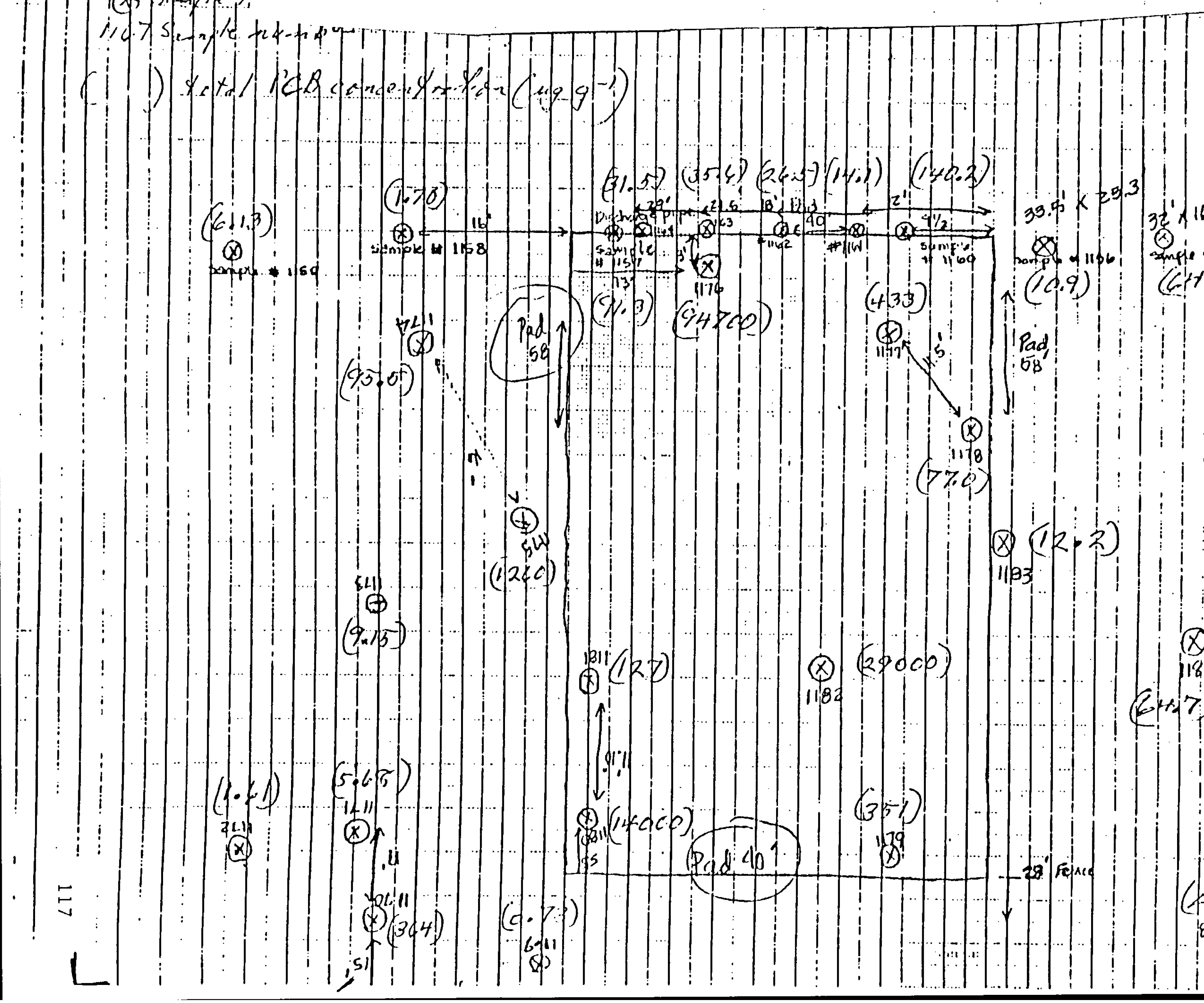
LOS ALAMOS SCIENTIFIC LABORATORY
DEPARTMENT OF ENGINEERING
CONSTRUCTION & MAINTENANCE GROUP

AEC DRAWING NO. SFA-IJ-1 — SHEET 1 OF 13

LAB. JOB NO. 563

21-55

Figure 2. Sample number and location of soil and asphalt with total PCB concentrations (in parenthesis). Samples were collected July 21, 1988.



contamination will require sampling design and procedures defined by EPA guidelines (EPA, 1985, 1986).

During August, September, October 1989 swipe samples were taken inside Building 61 to determine levels of contamination; a water/oil separator was to be installed in the southwest corner of the building (Alexander, 1989). Contamination was then reduced to levels less than 10 $\mu g\ (100\ cm^2)^{-1}$ which is the regulatory guideline concentration for clean areas. EPA guidelines were followed in the design of a sampling grid (EPA, 1986). The grid design and the total PCB concentrations are given in Figure 21-56. Swipe samples were taken within the berm area, on door knobs, and on light switches (Alexander, 1989). The areas of the grid containing concentrations greater than 10 $\mu g\ (100\ cm^2)^{-1}$ were cleaned until swipes of those areas showed levels below the 10 μg (100 $cm^2)^{-1}$. The initial concentration at grid location 5 (outside the door on a concrete pad) was 67.2 $^1g\ (100\ cm^2)^{-1}$. The contamination was imbedded and could not be removed. All other recorded concentrations were reduced to less than 10 $\mu g\ (100\ cm^2)^{-1}$. The contamination was imbedded and could not be removed. All other recorded concentrations were reduced to less than 10 $\mu g\ (100cm^2)^{-1}$ (Alexander, 1989). The berm area is considered acceptable as a clean area. The area outside the berm, but within the building, will be sampled and, if necessary, cleaned to acceptable levels at a later date.

(4) SWMU #21-004, Aboveground Tanks

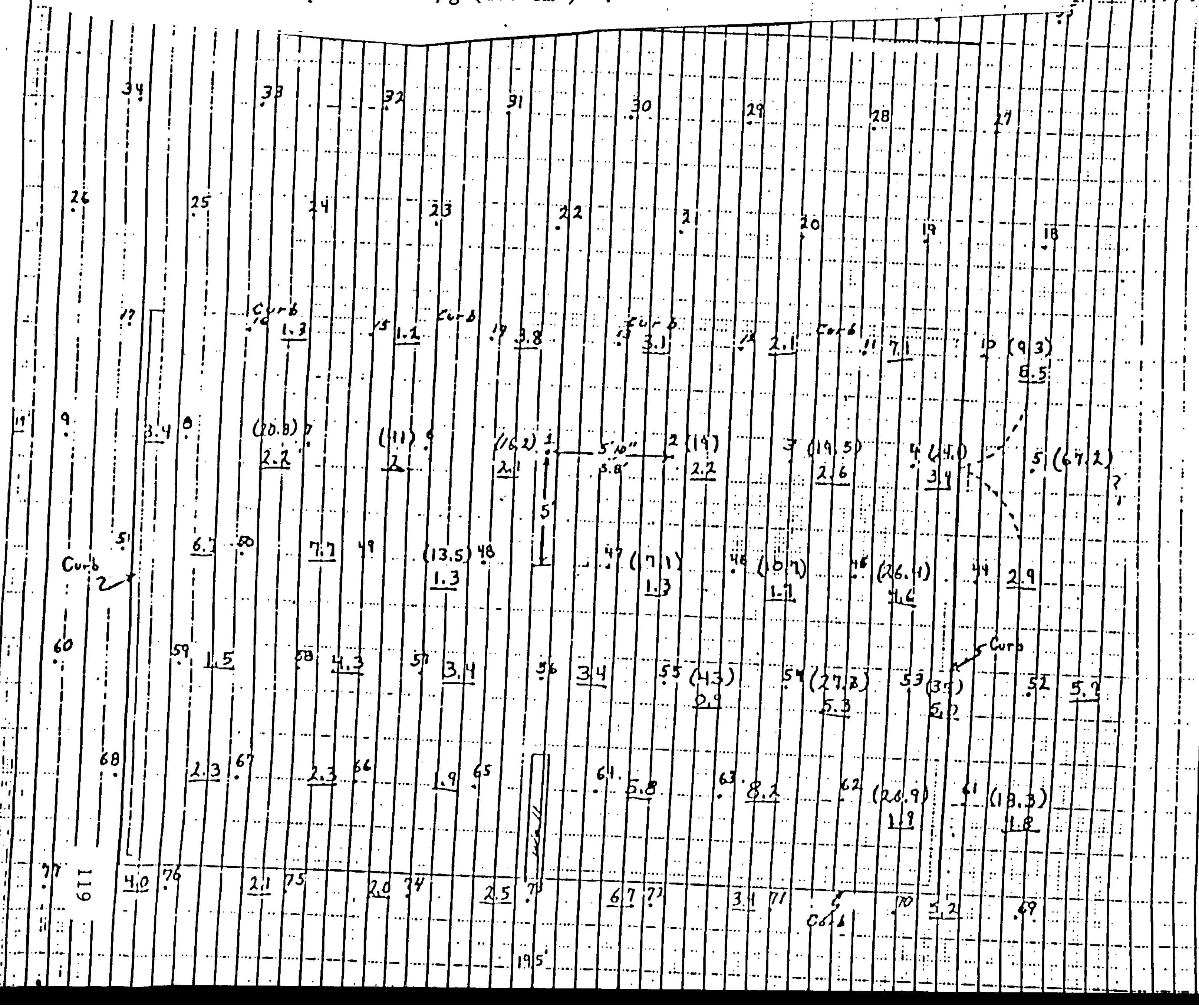
(a) #21-004(A), #21-004(B), #21-004(C):
No known information.

21-56

Figure 3. Sampling grid within Building 61 and PCB concentrations.

Swipe samples were taken in August, September, and October 1989.

Concentrations are expressed as $\mu g\ (100\ cm^2)^{-1}$.



(b) #21-004(D)

Before tanks #21-004(B) and #21-004(C) were installed in 1979, sump/pump TA-21-223 would overflow to DP Canyon because it was not equipped with an overflow alarm system (Garde, 1975).

(5) SWMU #21-028 and ten additional newly discovered container storage areas

There is no known information on most of these units. The LANL Container Storage Area data base information on these SWMUs is presented in Figure 21-57.

Please refer to SWMU writeup on MDA-A for information on the iodide waste drum storage area.

(B) Surface Disposal Areas

No information is available on any of these SWMUs except for SWMU #21-013(d), the "cold dump", which is referred to in a recent DOE HQ summary as request number 800 and 855. This document reports TCE being found at this location in amounts of 0.5 to 0.9 mg/m^3.

(C) Sewage Treatment Plant

(1) SWMU #21-026 (A), Sewage Treatment Plant at TA-21

Flow data summaries for the sewage treatment plant at TA-21 are presented in Table IX for October 1978 through June 1990. Notice the reduced flow rates from 1987 through 1990, compared with previous years.

The results of radionuclide assays on the liquid effluents from the sewage treatment plant are presented in Table X. Data summaries are presented for gross alpha,

Figure 21-57. LANL Container Storage Area Data Base data on SWMU #21-028.

TA-BLDG-ROOM OTHER LOCATION INFO. GROUP CONTACT OR INSPECTOR
021-0003-0301 OUTSIDE DOOR BY DOCK INC-4 BILL WAGEMAN

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE		667-5046	C345	021-0003-0301	INC-4

TYPES OF MATERIALS STORED:

1. HALOGENATED ORGANICS:
2. NON-HALOGENATED ORGANICS:
3. CHLOROFORM, ALKYL HALIDES,
4. ACETONE, TETRAHYDROFURAN,
5. CARBON TETRACHLORIDE, METHYL
6. TOLUENE, BENZENE, ETHANOL
7. CHLORIDE
8. METHANOL, BUTANOL, DIETHYL
9.
10. ETHER, ISOPROPANOL

REMARKS:
ABOVE CAN ALSO BE RAD CONTAMINATED WITH: THORIUM, DEPLETED URANIUM, TECHNETIUM. THESE WASTES WILL BE METAL CONTAMINATED, AND A COMPLETE LISTING OF ALL COMPONENTS WILL BE KEPT FOR EACH DISPOSAL CONTAINER.

TYPE OF PROCESS THAT GENERATES WASTE:
CHEMISTRY RESEARCH LAB

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM OTHER LOCATION INFO. GROUP CONTACT OR INSPECTOR
021-0003-0360 IN CORNER OUTSIDE... INC-4 LORI STEPAN VAN DER SLUYS

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE		665-3720	C346	021-0003-0334	INC-4

TYPES OF MATERIALS STORED:

1. ACETONE*;ETHANOL*; TOLUENE*;
2. BENZENE*; BENZENE d6*; THF*
3. Et20*; HEXANE*; PHOSPHINES;
4. W, Ru, Fe, Mo, Co, B, Cu SALTS
5. ETHYL ACETATE; CYCLOHEPTARIENE
6. VARIOUS ACIDS, ARSINES, AMINES
7. PROPIONITRILE, DEPLETED U & Th
8. VARIOUS SN, LI, & METAL SALTS;
9. PHOSPHITES, Zn & Ag SALTS;
10. TOLUENE-d8; THIOLS, Bi SALTS;

REMARKS:
FILTERING AGENT CELITE.
...OUTER DOOR OF 360
*LIQUID

TYPE OF PROCESS THAT GENERATES WASTE:
THIS IS AN ORGANOMETALLIC RESEARCH LAB, DEDICATED TO THE SYNTHESIS OF NEW, PREVIOUSLY UNKNOWN COMPLEXES. THIS REQUIRES THE USAGE OF A VERY WIDE RANGE OF INORGANIC AND ORGANIC REAGENTS IN SMALL AMOUNTS. THE REAGENTS USED CHANGE CONSTANTLY, AND SO WILL THE COMPOSITION OF THE WASTE GENERATED.

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0003-N/A	BLDG. 3N, NE SIDE	INC-4	AL SATTELBERGER

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE	RES	667-1604	C346	021-3N -0332	INC-4

TYPES OF MATERIALS STORED:

1. DIETHYL ETHER, ALKANES
2. PHOSPHINES, PHOSPHITES
3. TETRAHYDROFURAN, ACETONITRILE
4. ACETONE, TOLUENE, ALCOHOLS
5. CHLOROFORM, DIMETHOXYETHANE
6. CARBON TETRACHLORIDE
7. ORGANIC ISOCYANIDES
8. METHYLENE CHLORIDE
9. D38 & NATURAL THORIUM SALTS
10. BISMUTH SALTS, BARIUM SALTS

REMARKS:
A LARGE VARIETY OF MATERIALS MAY APPEAR IN THE WASTE STREAM AT THIS SITE. DEPLETED U238 SALTS, TRANSITION METAL SALTS, METAL SULFIDES, CYCLOHEPTATRIENE, ORGANIC ESTERS, PROPIONITRILE

TYPE OF PROCESS THAT GENERATES WASTE:
SMALL SCALE SYNTHETIC INORGANIC LAB.

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0003-N/A	OUTSIDE, CABINET N.	INC-4	K. V. SALAZAR

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE	RES	665-1792	C346	21 -3 -301	INC-4

TYPES OF MATERIALS STORED:

1. SOLVENTS
2. MISC. CHEMICALS
3.
4.
5.
6.
7.
8.
9.
10.

REMARKS:
THIS WAS AN UNKNOWN SITE UNTIL THE SURVEY.

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0150-0603	UNDER HOOD	INC-4	BILL WAGEMAN

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE		667-5046	C345	021-0150-602A	INC-4

TYPES OF MATERIALS STORED:

1. HALOGENATED ORGANICS:
2. NON-HALOGENATED ORGANICS:
3. CHLOROFORM, METHYLENE CHLORID
4. ACETONE, TETRAHYDROFURAN,
5. CARBON TETRACHLORIDE, ALKYL
6. TOLUENE, BENZENE, ETHANOL,
7. HALIDES.
8. METHANOL, BUTANOL, DIETHYL
9.
10. ETHER, ISOPROPANOL

REMARKS:
ABOVE CONTAMINATED WITH RAD: THORIUM, DEPLETED URANIUM, TECHNETIUM. WASTE WILL BE METAL CONTAMINATED, AND A COMPLETE LISTING OF ALL COMPONENTS WILL KEPT FOR EACH DISPOSAL CONTAINER.

TYPE OF PROCESS THAT GENERATES WASTE:
CHEMISTRY RESEARCH LAB

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0150-0605		INC-4	CLIFFORD UNKEFER

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE		665-2560	C345	021-0365-0126	INC-4

TYPES OF MATERIALS STORED:

1. LIQ.: ACETONE, DICHLOROMETHANE
2. CHLOROFORM, METHANOL, ETHANOL,
3. ETHER, TETRAHYDROFURAN, HEXANE
4. BENZENE, ISOPROPANOL, TOLUENE,
5. ETHYL ACETATE, XYLENE, PHENOL,
6. ACETIC ANHYDRIDE, ACETALDEHYDE
7. ACETONITRILE, n-BUTYL ALCOHOL,
8. o-TOLUIDINE, PYRIDINE, DIOXANE
9. BENZYL ALCOHOL, FORMALIN,
10. PROPYL ETHER, t-BUTYL ALCOHOL

REMARKS:
DIMETHYLFORMAMIDE, DIMETHYLSULFOXIDE. SOLID WASTE: PIPETS, KIMWIPES, & GLOVES CONTAMINATED WITH CHEMICALS LISTED. THE ETHERS (PROPYL ETHER, ETH ETHER & TETRAHYDROFURAN SEPARATELY STORED IN CHEMICAL SAFETY CABINET DUE VOLATILITY. BUTYLATED HDROXYTOLUENE ADDED TO STORAGE CAN TO STABILIZE DANGEROUS PEROXIDES.

TYPE OF PROCESS THAT GENERATES WASTE:
MERCURY IS BEING TEMPORARILY STORED IN HOOD UNTIL HSE-7 IS ABLE TO DISPOS
GENERAL CHEMISTRY LAB

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0150-0607		INC-4	KATHLEEN GORMAN-BATES

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE		665-4629	C345	021-0150-0116	INC-4

TYPES OF MATERIALS STORED:

1. ACETONE (LIQUID)	2. METHANOL (LIQUID)
3. ETHYL ACETATE (LIQUID)	4. BENZENE (LIQUID)
5. N-BUTYL ALCOHOL (LIQUID & ON	6. HEXANE (LIQUID & ON KIMWIPES,
7. KIMWIPES, GLOVES, PIPETS)	8. GLOVES, PIPETS)
9.	10.

REMARKS:
PRIMARILY USE ACETONE AND METHANOL

TYPE OF PROCESS THAT GENERATES WASTE:
CLEANING GLASSWARE

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0150-500A	OUSIDE REAR DOOR	INC-4	BILL WAGEMAN

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROU
SATELLITE	NONE		667-5046	C234	021-0150-602A	INC-

TYPES OF MATERIALS STORED:

1. HALOGENATED ORGANICS:	2. NON-HALOGENATED ORGANICS
3. CHLOROFORM, ALKYL HALIDES,	4. ACETONE, TETRAHYDROFURAN,
5. METHYLENE CHLORIDE, CARBON	6. TOLUENE, BENZENE, ETHANOL,
7. TETRACHLORIDE	8. METHANOL, BUTANOL, DIETHYL
9.	10. ETHER, ISOPROPANOL

REMARKS:
ABOVE CAN ALSO BE RAD CONTAMINATED WITH: THORIUM, DEPLETED URANIUM, TECHNETIUM. THESE WASTES WILL BE METAL CONTAMINATED , AND A COMPLETE LIS OF ALL COMPONENTS WILL BE KEPT FOR EACH DISPOSAL CONTAINER. UPDATE 5/24/ A SEPARATE CONTAINER WILL BE USED FOR MIXED WASTE.

TYPE OF PROCESS THAT GENERATES WASTE:
CHEMISTRY RESEARCH LAB

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0150-N/A	BASEMENT	INC-4	JOHN HANNERS

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE	RES	665-2555	C345	21 -150 -604	INC-4

TYPES OF MATERIALS STORED:

1. SOLVENTS	2. WASTE CHEMICALS:
3.	4. AMMONIUM CHLORIDE
5.	6. SODIUM PHOSPHATE
7.	8. COPPER SULFATE
9.	10. USED IN CULTURE MEDIUM

REMARKS:
THIS IS APPARENTLY A TEMPORARY LOCATION PENDING APPROVAL BY HSE. ?? SMALL QUANTITIES OF WASTE GENERATED. TONY WILL CHECK INTO WHETHER OR NOT AREA SHOULD BE DESIGNATED AS A SATELLITE STORAGE AREA (12/89)

TYPE OF PROCESS THAT GENERATES WASTE:

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0210-0128		EES-3	JOHN GONZALES

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE		667-6345	C335	021-0210-0105	EES-3

TYPES OF MATERIALS STORED:

1. ALCOHOL, SOLVENTS (?)	2.
3.	4.
5.	6.
7.	8.
9.	10.

REMARKS:
12/14/89: JOHN WILL CHECK CHEMICALS STORED IN THIS AREA AND GET BACK TO US ROOM IS USED INTERMITTENTLTY BY GRA STUDENT. STORAGE AREA MAY BE REMOVED 1/89. CONTACT WILL INFORM US OF ANY CHANGES.

TYPE OF PROCESS THAT GENERATES WASTE:

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0210-120	S.LAB, N. DOCK	EES-3	JOHN GONZALES

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE		667-6345	C335	021-0210-0105	EES-3

TYPES OF MATERIALS STORED:

1. FREON ABSORBED ON WIPES
2. WASTE OIL FROM MACHINES
3.
4.
5.
6.
7.
8.
9.
10.

REMARKS:

TYPE OF PROCESS THAT GENERATES WASTE:
WASTE GENERATED AT MACHINE SHOP

HAZARDOUS WASTE STORAGE, TREATMENT AND, DISPOSAL AREAS.

TA-BLDG-ROOM	OTHER LOCATION INFO.	GROUP	CONTACT OR INSPECTOR
021-0210-N/A	OUTSIDE, NORTH DOCK	EES-5	JOHN GONZALES

FACILITY TYPE	INSPECTIONS	DIREC	PHONE #	MAIL	TA-BLDG-ROOM	GROUP
SATELLITE	NONE	ERA	667-6345	C335	21 -210 -105	EES-5

TYPES OF MATERIALS STORED:

1. ALCOHOL (SMALL AMOUNT)
2. FREON
3. ACETONE
4. ACETONE ON WIPES
5.
6. VACUUM PUMP OIL
7.
8.
9.
10.

REMARKS:
JOHN WORKS PART-TIME (TUESDAYS, WEDNESDAY, AND THURSDAYS)

TYPE OF PROCESS THAT GENERATES WASTE:
ROCK PREPARATION

-8 National Pollutant Discharge Elimination System Discharge Monitoring Reports
: 17 average TGD, 42.5 maximum TGD] for unit 055 ~~(TGD = thousands of gallons/day)~~
(Maximum Flow) during monitoring period

[partial]	April	May	June	July	August	September	October	November	December
							11 (20)[a]	10(47)	10(30)
(10)	10(10)	10(10)	11(11)	10(10)	11(11)	11(11)	12.5(15)	20(25)	15(15)
20)	16(18.5)	17(25)	16(25)	14(15)	17(19)	17(19)	14(14)	13(14)	13(14)
13)	11.9(15.7)	15.2(18.5)	15.2(20.5)	13.2(16.3)	13.0(22.8)	6.6(12.2)	9.8(13.6)	8.3(14.1)	9.2(10.6)
(17.8)	18.5(27.0)	15.7(22.2)	15.5(17.7)	17.9(32.2)	17.4(22.8)	16.0(20.0)	13.3(14.8)	14.2(19.9)	14.6(17.3)
(16.4)	13.1(17.3)	11.7(17.3)	10.4(15.2)	13.1(19.8)	12.9(20.2)	13.7(55.4)	11.1(12.8)	11.5(32.8)	11.8(13.6)
(21.7)	13.4(17.8)	13.7(16.2)	13.4(20.5)	14.7(24.5)	11.5(33.4)	15.5(24.7)	14.9(20.6)	11.2(19.2)	9.0(15.0)
(22.4)	17.3(26.3)	15.7(24.4)	15.4(26.2)	20.8(45.4)	23.3(42.5)	19.4(40.1)	19.9(41.7)	14.2(26.3)	17.2(27.7)
(23.3)	19.5(27.4)	18.9(30.7)	17.3(30.8)	15.8(26.2)	11.2(18.2)	14.9(17.9)	10.2(18.2)	9.9(22.8)	10.0(34.4)
13.5)	8.4(15.7)	4.2(8.2)	7.4(25.5)	8.2(13.3)	5.1(9.4)	5.6(10.6)	4.8(8.7)	5.2(17.3)	5.8(17.9)
7.1)	4.3(13.8)	5.9(20.1)	6.4(17.6)	4.6(14.6)	3.7(9.6)	3.9(9.7)	4.0(8.3)	2.5(6.9)	0.7(2.2)
3)	2.8(6.8)	1.8(4.1)	2.3(8.2)	2.7(8.0)	3.5(7.8)	2.3(9.2)	2.2(6.1)	2.4(5.0)	1.9(7.2)
3)	1.8(6.4)	1.2(4.8)	1.7(9.4)						

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Table X. ← H-8 Chemistry Lab Data on TA-21-227 Effluent

Collection Dates	Sample Number	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (ncpm/L)[a]	Tritium (pCi/L)
1976:					
June 3, 11, 22	7740	9	21	<36	4200
July 13, 22, 30	9734	5	16	<26	4800
August 10, 17, 26	9746	120	9	<36	3700
Sept 10, 21, 29	9761	2.3	11.5	—	6100
Oct 5	10909	<2.4	20	33	4200
1977:					
Dec 16, 1976 – Jan 6, 1977	564	<3	17	<26	3500
Jan 13 – Feb 13	576	<4	21	<26	2700
Feb 10 – Feb 24	694	21	18	<26	3000
Apr 8 – 29	728	15	23	57	4100
May 6 – 27	747	15	92	<28	6100
June 2, 9, 17, 23	5974	6	23	<38	11700
June 28, July 6	5988	<2	20	<38	9600
July 28	6005	<2	26	<38	6500
August 23	8247	2.5	17	<38	—

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...s Alpha /L	Gross Beta pCi/L	Gross Gamma Ncpm/L	Tritium pCi/L
7	16	<38	—
2.8	14	<40	—
5	18	39	—
.1 (1.0)[b]	15.3 (1.7)	245 (19)	11,000 (400)
0 (2)	12.8 (1.5)	199 (19)	13,700 (500)
2.6 (1.6)	14 (1.7)	94 (19)	1600 (300)
.7 (1.5)	17 (2.0)	67 (19)	1800 (300)
.2 (1.1)	12.2 (1.6)	46 (19)	5200 (400)
.9 (1.3)	16.0 (2.0)	40 (19)	5700 (400)
.4 (1.0)	18 (1.5)	23 (19)	1000 (300)
5.9 (1.8)	4.6 (1.4)	28 (19)	1200 (300)
.3 (1.2)	11.7 (1.4)	—	2600 (300)
.9 (1.2)	11.8 (1.5)	53 (19)	0.0 (300)
8 (0.9)	9.2 (1.3)	4.0 (19)	200 (300)
[illegible] (1.4)	9.[illegible] (1.3)	7.0 (19)	—

Collection Dates	Sample Number	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (ncpm/L)	Tritium (pCi/L)
1979:					
Jan 3	139	4.1 (1.4)	9.1 (1.8)	67 (19)	—
Feb 12	178	0.6 (0.6)	6.5 (0.9)	67 (19)	2100 (300)
Apr 10-May 1	281	6.6 (1.7)	8.1 (1.2)	21 (19)	0.0 (300)
June 4-26	311	2.8 (0.9)	8.6 (1.1)	50 (18)	2600 (300)
July 2-24	339	11.0 (3.0)	12.8 (1.6)	22 (18)	5700 (400)
July 31-Aug 30	354	4.0 (1.3)	7.4 (1.1)	128 (19)	2100 (300)
Sept 24	369	4.1 (1.8)	5.5 (1.0)	58 (19)	400 (300)
Sept 27-Oct 18	2175	3.5 (1.0)	6.7 (.90)	59 (19)	300 (400)
Oct 25-Nov 15	2212	6.9 (1.8)	6.8 (1.1)	84 (19)	200 (300)
Nov 26-Dec 10	2227	3.1 (1.2)	4.3 (0.9)	1027 (18)	34800 (800)
1980:					
Dec 17, 1979-Jan 8, 1980	359	12 (2)	5.0 (0.8)	110 (19)	300 (300)
Jan 17-Feb 8	374	7.1 (1.8)	37 (4)	24 (19)	300 (300)
Feb 14-March 5	388	47 (10)	10.9 (1.4)	52 (19)	400 (300)
Mar 14-Apr 8	403	16 (3)	3.8 (0.9)	135 (19)	300 (300)

Collection Dates	Sample Number	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (ncpm/L)	Tritium (pCi/L)
1980:					
Apr 8-May 1	417	6.4 (1.7)	4.4 (0.9)	26 (19)	100 (300)
May 8-29	431	16.0 (4.0)	7.3 (1.1)	11 (19)	400 (300)
Jun 3-26	445	14.0 (3.0)	6.6 (0.9)	43 (18)	700 (300)
July 29-Aug 19	1020	7.4 (1.8)	4.5 (0.9)	4.0 (18)	0.0 (300)
Oct 2-14	6742	9.0 (2.0)	6.6 (0.9)	21 (18)	500 (300)
Oct 27-Nov. 12	6756	4.7 (1.2)	5.9 (0.8)	48 (19)	200 (300)
Nov. 12-Dec 18	6780	8.7 (1.9)	4.9 (0.7)	135 (19)	0.0 (300)
1981:					
Jan 19	403	7.9 (1.9)	5.5 (1.0)	15 (18)	1300 (300)
Feb 3	440	2.3 (1.0)	6.2 (1.0)	55 (19)	1100 (300)
March 6	462	3.1 (1.1)	10.5 (1.4)	49 (19)	500 (300)
Apr. 6	476	5.9 (1.3)	15.3 (1.7)	51 (18)	300 (300)
May 1	490	3.0 (0.9)	8.5 (1.0)	78 (18)	300 (300)
June 1	3266	4.2 (1.3)	9.4 (1.3)	7.0 (18)	0.0 (300)
July 2	3789	4.0 (1.3)	9.0 (1.2)	31 (18)	300 (300)

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...oss Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (NCPM/L)	Tritium (pCi/L)
1.9 (1.0)	45 (5.0)	650 (20)	1100 (400)
0.6 (0.7)	8.9 (1.2)	6 (19)	2600 (400)
0.6 (0.9)	12.9 (1.6)	73 (18)	1100 (400)
2.1 (0.8)	12.6 (1.6)	102 (18)	300 (400)
1.0 (0.7)	13 (1.6)	178 (19)	1300 (400)
3.7 (1.1)	3.2 (0.9)	16 (19)	100 (300)
9.0 (2.0)	9.2 (1.3)	1.0 (18)	400 (300)
—	—	32 (19)	1300 (400)
4.2 (1.3)	13.7 (1.7)	18 (18)	1200 (300)
3.1 (1.3)	34 (4)	73 (19)	5600 (400)
4.3 (1.3)	7.1 (1.1)	44 (18)	700 (300)
17 (4)	12.5 (1.6)	126 (18)	400 (300)
3.8 (1.2)	4.2 (0.9)	62 (18)	900 (300)
5.7 (1.6)	8.8 (1.2)	6 (18)	1800 (300)
22 (5)	15.1 (1.8)	2 (18)	800 (300)
.8 (0.8)	6.0 (1.0)	2 (18)	1000 (200)

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Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (ncpm/L)	Tritium (pCi/L)
3.3 (1.1)	24 (3.0)	26 (18)	4100 (300)
6.0 (1.5)	7.6 (1.1)	12 (18)	200 (200)
-2.8 (1.3)	8.4 (1.0)	-4.0 (18)	1400 (200)
2.6 (1.6)	8.2 (1.0)	7.0 (18)	800 (300)
4.7 (1.5)	7.9 (1.0)	63 (10)	6000 (300)
5.0 (1.4)	7.8 (1.0)	25 (19)	1400 (300)
2.9 (1.0)	13.1 (1.5)	42 (18)	—
2.4 (0.9)	6.6 (0.9)	35 (18)	1100 (300)
1.5 (1.0)	17.3 (1.9)	228 (19)	2200 (300)
0.7 (0.8)	9.2 (1.1)	24 (18)	2500 (400)
2.7 (1.2)	14.1 (1.6)	94 (18)	2100 (300)
—	—	9 (18)	4500 (500)
1.8 (0.8)	13.1 (1.5)	63 (18)	1800 (300)
2.9 (1.3)	17.9 (1.9)	20 (18)	1300 (200)
5.4 (1.5)	11.3 (1.3)	56 (18)	3300 (400)

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Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (ncpm/L)	Tritium (pCi/L)
—	—	277 (19)	—
7.0 (2.0)	20 (2.0)	95 (19)	1200 (300)
11 (3.0)	10 (1.2)	30 (18)	4700 (500)
14 (4.0)	17 (2.0)	39 (18)	400 (200)
10 (3.0)	14 (1.6)	39 (18)	800 (200)
6.0 (3.0)	13 (1.4)	—	600 (200)
5.0 (2.0)	87 (9.0)	—	2700 (400)
6.0 (2.0)	12 (1.3)	—	4500 (500)
8.0 (2.0)	10 (1.2)	—	900 (400)
7.0 (2.0)	13 (1.0)	—	2200 (400)
6.0 (2.0)	15 (2.0)	—	—
5.0 (2.0)	10 (1.0)	—	300 (300)
6.0 (2.0)	13 (1.0)	—	700 (300)
19.0 (5.0)	80 (1.0)	0.0 (50)	900 (300)
11.0 (4.0)	12.0 (1.0)	0.0 (50)	1600 (400)

Collection Dates	Sample Number	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (ncpm/L)	Tritium (pCi/L)
1985:					
Feb. 28	90221	2.0 (1.0)	9.0 (1.0)	70 (50)	1200 (400)
March 28	90321	4.0 (1.0)	10.0 (1.0)	70 (50)	—
April 25	90421	5.0 (2.0)	8.0 (1.0)	50 (50)	500 (400)
		(pCi/L)	(pCi/L)	pCi/L	pCi/L
May 24	90521	5.0 (2.0)	6.6 (0.80)	10 (60)	800 (300)
June 21	90621	4.0 (2.0)	5.7 (0.70)	50 (60)	400 (300)
July 22	90721	4.0 (2.0)	3.8 (0.60)	30 (60)	700 (300)
Aug 16	90821	10.0 (3.0)	5.3 (0.70)	0.0 (60)	400 (300)
Sept. 12	90921	2.0 (1.0)	5.7 (0.70)	120 (60)	1000 (400)
Oct. 10	91021	1.5 (0.9)	3.7 (0.50)	10 (60)	400 (400)
Nov. 8	91121	4.0 (2.0)	4.9 (0.60)	90 (60)	—
Dec. 13	91221	4.0 (2.0)	8.0 (0.90)	70 (60)	6800 (800)
1986:					
Jan 30	91321	2.0 (1.0)	1.8 (0.50)	40 (60)	1800 (400)
Feb. 27	90221	4.0 (2.0)	4.8 (0.70)	110 (60)	400 (400)
Mar. 31	90321	1.0 (1.0)	3.9 (0.60)	10 (60)	1100 (400)
Apr. 24	90421	4.0 (2.0)	4.8 (0.70)	160 (60)	700 (400)
May 22	90521	1.7 (0.8)	4.4 (0.60)	170 (70)	900 (400)

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Gross alpha (pCi/L)	Gross beta (pCi/L)	Gross Gamma (pCi/L)	Tritium (pCi/L)
1.0 (1.0)	6.6 (0.80)	-80 (60)	2800 (500)
2.8 (1.0)	3.5 (0.60)	-110 (60)	800 (400)
4.0 (1.0)	7.0 (0.90)	-100 (100)	6500 (800)
2.2 (0.80)	3.9 (0.60)	0.0 (100)	2600 (500)
3.0 (1.0)	4.2 (0.60)	-100 (100)	1000 (400)
3.0 (1.0)	3.5 (0.60)	0.0 (100)	1400 (400)
7.0 (2.0)	3.9 (0.60)	0.0 (100)	1300 (400)
2.0 (0.90)	10.0 (1.0)	0.0 (100)	1100 (700)
2.1 (0.90)	2.6 (0.50)	0.0 (100)	1000 (700)
6.0 (2.0)	4.9 (0.70)	0.0 (100)	600 (700)
3.0 (2.0)	5.6 (0.70)	-500 (200)	3800 (700)
4.0 (1.0)	7.5 (0.90)	100 (100)	6200 (900)
2.0 (1.0)	5.8 (0.80)	-300 (100)	7700 (700)
7.0 (2.0)	4.2 (0.60)	-200 (100)	3100 (500)
2.0 (1.0)	11 (1.0)	-1100 (200)	—
3.0 (1.0)	9.0 (1.0)	400 (100)	3100 (500)

10/11

Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (pCi/L)	Tritium (pCi/L)
7.0 (2.0)	7.10 (0.90)	-200 (100)	2300 (400)
5.0 (2.0)	10 (1.0)	0.0 (100)	1300 (400)
0.005 (0.002)	0.007 (0.0008)	—	1100 (400)
2.5 (0.9)	5.5 (0.70)	-1100 (200)	1000 (400)
4.0 (2.0)	7.5 (0.90)	-400 (200)	2400 (400)
1.0 (1.0)	9.0 (1.0)	-1100 (200)	—
2.0 (1.0)	11 (1.0)	-100 (200)	4200 (600)
1.0 (1.0)	9.0 (1.0)	200 (200)	3500 (500)
2.0 (1.0)	9.0 (1.0)	1600 (200)	1600 (400)
13.0 (3.0)	9.0 (1.0)	—	—
12 (3.0)	12 (1.0)	—	1000 (300)
14 (3.0)	10 (1.0)	-1100 (200)	200 (300)
8.0 (2.0)	9.0 (1.0)	-400 (200)	2800 (400)
6.0 (2.0)	12 (1.0)	-400 (200)	1200 (400)
1.0 (0.6)	4.2 (0.6)	-300 (200)	1100 (300)

11/11

Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Gross Gamma (pCi/L)	Tritium (pCi/L)
6.0 (2.0)	16 (2.0)	-200 (200)	3300 (500)
10 (3.0)	18 (2.0)	200 (200)	3400 (500)
13 (4.0)	16 (2.0)	-200 (200)	4600 (600)
4.0 (1.0)	12 (1.0)	—	4900 (600)
3.0 (1.0)	14 (2.0)	—	1300 (300)
11 (3.0)	7.4 (0.9)	-200 (200)	3200 (500)
5.0 (1.0)	7.7 (0.9)	600 (200) 600 (200)	19,000 (2000)
—	—	—	—
—	—	—	—
12 (3.0)	15 (2.0)	100 (200)	8,000 (900)
10 (3.0)	14 (2.0)	-300 (200)	5,200 (600)
11 (3.0)	12. (1.0)	-100 (200)	5,000 (600)

...number of counts per minute per liter
...theses reflect standard deviation.
...ncpm/L to pCi/L for gross gamma from May 24, 1985 through 1989

beta, and gamma assays, as well as for tritium assays, on TA-21-227 samples collected from June 1976 through 1989.

(2) SWMU #21-026(B), Sludge Drying Beds

Gross alpha, beta and gamma assays are performed on the sludge collected in the drying beds, as shown in Table XI. These records are summarized for March 1979 through 1985, with no sample data available after this time.

Non-radioactive assays, for heavy metals, are also performed on the sludge samples which are summarized for June 1976 through December 1985 in Table XII. No sample data exists from 1986 to the present for TA-21-230.

(3) SWMU #21-026(C): Chlorine Contact Chamber

No information is available.

D. <u>Incinerators, Stacks and Filter Houses</u>

(1) SWMU #21-007, Salamanders

The HSE-7 records on the amounts of oils burned in the salamanders is presented in Table XIII, as well as any radionuclide assays on the ashes. Approximately 1102.25 gallons of TCP and 156 gallons of TBP oils were burned in the salamanders between 1964 and 1967 and between 1970 through 1972. Although the Group HSE-7 records need to be studied in more detail, the Pu^{239} releases for the years 1970, 1971 and 1972 are estimated to be 0.5, 29.4 and 0.8 dpm/m^3 (Valentine, 1990). This corresponds to a total release for these three years of 30.7 dpm/m^3, or 6.51×10^{-6} Ci of Pu^{239} (Valentine, 1990).

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Table XI. ← H-8 Chemistry Lab Radiation Assay Data on TA-21-227 Sludge Sample

Date	Sample Number	Gross Alpha pCi/g	(std.)	Gross Beta pCi/g	(std)	Gross Gamma ncpm/g	(std)
/21/79	79.00226	61	(12)	21	(2)	1600	(20)
/2/79	79.00326	140	(30)	31	(3)	2050	(30)
/24/79	79.02196	110	(20)	187	(19)	1250	(17)
/14/80	80.00453	18	(4)	14.1	(1.5)	9.31	(.18)
/26/80	80.06769	230	(50)	39	(4)	22.9	(.3)
/28/81	81.00451	110	(20)	30	(3.0)	9.33	(.14)
3/8/82	82.98121	21,000	(4000)	430	(40)	21.8	(0.3)
/15/82	82.98221	110	(20)	33	(3.0)	22.8	(0.3)
/29/82	82.98321	—		—		13.3	(.18)
0/14/82	82.98421	—		—		22.2	(0.3)
3/16/83	83.98121	34	(7.0)	14	(1.4)	19.3	(0.2)
5/26/83	83.98221	74	(15)	27	(3.0)	26.3	(0.3)
9/15/83	83.98321	—		—		27.0	(0.3)
2/22/83	83.98421	—		—		21	(0.3)

Sludg

Date	Sample Number	Alpha pCi/g (std)	Beta pCi/g (std)	Gamma ncpm/g (std)
5/3/84	98121	—	—	22 (0.3)
8/20/84	98221	—	—	65 (0.8)
11/15/84	98321	—	—	11 (0.3)
1/2[illegible]/85	98421	46 (9.0)	15 (1.0)	17 (0.3)
3/8/85	98121	42 (9.0)	15 (2.0)	15 (0.3)
6/10/85	98221	33 (7.0)	4.0 (0.40)	8.2 (0.90)
9/24/85	98321	31 (6.0)	5.0 (0.50)	12 (1.0)
12/19/85	98421	—	—	15 (1.0)
1986	—	—	—	—
1987	—	—	—	—
1988	—	—	—	—
1989	—	—	—	—

1/2

Analytical Chemistry Assays on TA-21-227
Sludge Samples from HSE-8 Data Base (Jun, 7/18/90)

5 Cr	6 Mn	7 Fe %	8 Ni ug/g	9 Cu	10 Zn	11 As	12 Se	13 Mo	14 Ag	15 Cd	16 Sn	17 Ba	18 Hg	19 Pb	Submitter
400	200	.3-3.0	100	1500	2000	<1000	<1000	200	1500	30	300	1000	<100	600	H-7
100	80	.4	150	1000	800	<1000	—	60	300	<60	—	1000	<600	400	H-7
200	100	1	40	800	2000	<200	—	20	400	10	—	1000	<20	300	H-7
100	50	2	30	800	1000	<100	—	50	100	<10	—	200	<10	300	H-7
300	200	2	100	800	3000	<200	—	8	60	<20	—	1500	<60	400	H-7
200	150	2	80	1000	3000	<200	—	8	80	<20	—	1500	<60	400	H-7
250	100	1	20	400	3000	<200	—	10	60	<20	—	800	<60	300	H-7
80	150	1	30	600	1200	<200	—	6	50	<20	—	600	<60	200	H-7
100	60	1	30	800	3000	<200	—	6	20	<20	—	400	<60	300	H-7
80	100	1.5	20	400	2000	<200	—	6	40	<20	—	600	<20	500	H-7
100	200	2	30	1000	1500	<200	—	15	40	<20	—	400	<60	400	H-7
80	200	2	40	1000	1500	<200	—	15	60	<20	—	400	<60	500	H-7
80	50	6	40	1000	3000	<100	—	10	40	<20	—	400	<60	400	H-7
200	200	3	50	2000	2500	<100	—	60	150	<20	—	800	<60	500	H-7
120	150	2	50	800	3000	<100	—	10	60	<20	—	300	<20	400	H-7
300	60	1	100	1200	3000	<100	—	20	40	<20	—	500	<20	300	H-7
300	120	2	80	1000	2500	<100		15	100	<20	—	2500	<20	400	H-7

Sludg

Date	1	B	V	Cr	Mn	Fe	Ni	Cu	Zn	As	Se	Mo	Ag	Cd	Sn	17
1/28/81	17550	30	150	400	160	1.5	100	1000	1500	<100	—	20	80	<20	—	
1/18/81	18907	20	40	300	200	2.0	100	600	3000	<100	—	40	80	20	—	
1/3/81	21177	40	60	100	150	1.8	10	100	1000	<200	—	6	4	<20	—	
18/82	22383	30	30	250	200	1.0	40	1000	3000	<200	—	10	40	<20	—	4
1/15/82	23364	40	50	400	300	2.0	60	1000	2000	<100	—	30	50	<20	—	
1/29/82	23859	30	140	400	400	1.4	80	1600	2500	<200	—	15	40	<20	—	4
10/14/82	24724	80	40	500	300	3.0	60	1000	3000	<200	—	30	30	<20	—	5
3/18/83	8332	—	—	275 (.9)	237 (4.2)	1.0 (.01)	97 (8.4)	935 (1)	1470 (80)	3.4 (0.0)	—	—	9.7 (1.1)	15.3 (1.0)	—	
5/26/83	—	—	—	121 (6.0)	268 (42)	4.6 (.5)	61 (14)	745 (420)	2220 (640)	3.3 (0.74)	—	—	26 (5.6)	14 (.3)	—	8
Sylvia –	Please put these 4 lines in chronological order															
6/84	85.77064		—	172	425	1.75	55.5	924	1708	34.9	—	—	34.9	7.58	—	15
10/84	85.77056	—	—	224	469	1.85	77.5	1010	1840	4.63	—	—	17.3	6.75	—	4
8/84	85.77018	—	—	212	503	2.10	106	1040	1840	9.70	—	—	29.2	13.8	—	1
15/84	85080	—	—	329 (27)	418 (2.9)	1.7 (0.10)	63.4 (2.0)	1570 (43)	2640 (471)	< 0.0001	—	—	—	26.8 (2.5)	—	6E
6/5/85	85.77121	—	—	130 (26)	300 (60)	.79 (1.6)	58 (12)	930 (190)	1400 (280)	5.4 (1.8)	—	—	4.0 (0.8)	12 (2.4)	—	1
11/18/85	85.77072	—	—	245 (49)	339 (68)	1.2 (.24)	43 (8.6)	1000 (912)	400 (364)	7.[illegible] (1.4)	—	—	8.0 (1.6)	18 (4.0)	—	2
2/20/85	85.78421	—	—	100 (73)	50 (57)	0.10 (0.11)	40 (37)	500 (416)	400 (364)	23 (5.0)	—	—	21 (4.0)	10 (2.0)	—	3
1986–1989	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

...amander waste management records from HSE-7.

1	2	3	4	5	6	7	8
SALAMANDER NUMBER	ID of Contaminated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	Gross Alpha (c/m/s) Salamander Ash	Gross Alpha (c/m/s) Stovepipe Ash	Waste Information: Identification of Rad. Isotope	Waste Solution	
1	TCP	1.5					
1	TCP	2.0					
1	TCP	1.5					
1	TCP	1.0					
			2,903,000	4,790			
1	TCP	2.0					
1	TCP	2.0					
1	TCP	2.0					
1	TCP	2.0					
1	TCP	1.0					
1	TCP	2.0					
1	TCP	2.0					
1	TCP	2.5					
			536,700	1,790			
1	TCP	1.5					
1	TCP	1.5					
1	TCP	2.5					
1	TCP	1.5					
2	TCP	1.5					
3	TCP	1.5					
1	TCP	1.0					
2	TCP	1.0					
3	TCP	1.0					
1	TCP	1.5					
2	TCP	1.5					
3	TCP	1.5					
1	TCP	1.0					
2	TCP	1.0					
3	TCP	1.0					

DATE	1 SALAMANDER NUMBER	2 ID of Contaminated Organic Liquid Incin.	3 Gallons of Contaminated Liquid Incin.	4 Gross Alpha (c/m/s) Salamander Ash	5 Stovepipe Ash	6 Waste Information Identification Rad. Isotope & Waste
8/28/64	1	TCP	1.5			
	2		1.5			
	3		1.5			
8/31	1		2.0			
	2		2.0			
	3		2.0			
9/1	1		1.5			
	2		1.5			
	3		1.5			
9/2	1		2.0			
	2		2.0			
	3		2.0			
9/3	1		1.0			
	2		2.0			
	3		1.5			
9/4	1		1.5			
	2		1.5			
	3		1.5			
9/8	1		1.5			
	2		1.5			
	3		1.5			
	1			138,700	1,456	
	2			189,100	88	
	3			111,700	55	
9/9	1		1.5			
	2		1.5			
	3		1.5			
9/10	1		3.0			
	2		3.0			

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DATE	SALAMANDER NUMBER	ID of Contaminated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	GROSS ALPHA (c/m/s) Salamander Ash	Stovepipe Ash	WASTE INF[...] IDENTIFICAT[...] RAD. ISOTOPE &[...]
9/11/64	1	TCP	2.5			
	2		2.5			
	3		1.5			
9/14	1		2.5			
	2		3.0			
	3		3.0			
9/15	1		1.5			
	2		1.5			
	3		1.5			
9/16	1		3.25			
	2		3.25			
	3		3.5			
9/17	1		2.5			
	2		2.5			
	3		2.5			
9/18	1		2.25			
	2		2.25			
	3		2.5			
9/21	1		1.5			
	2		1.5			
	3		1.5			
9/22	1		1.5			
	2		1.5			
	3		1.5			
9/23	1		3.0			
	2		3.0			
	3		3.0			
	1			18,165		
	2			[illegible]		

DATE	SALAMANDER NUMBER	ID of Contaminated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	Gross Alpha (c/m/s) Salamander Ash	Gross Alpha (c/m/s) Standpipe Ash	WASTE INF[…] IDENTIFICAT[…] RAD. ISOTOPE & WAS[…]
9/24/64	1	TCP	2.5			
	2		1.5			
	3		3.0			
9/25	1		1.25			
	2		1.5			
	3		1.5			
9/28	1		2.5			
	2		2.5			
	3		2.5			
9/29	1		3.0			
	2		2.5			
	3		3.0			
	1			1,206	90	
	2			45,940	122	
	3			97,750	36	
9/30	1		2.5			
	2		2.5			
	3		2.5			
10/1	1		2.0			
	2		2.0			
	3		2.0			
10/2	1		2.0			
	2		2.0			
	3		2.0			
10/5	1		2.5			
	2		2.5			
	3		2.5			
10/6	1			2,312	148	
	2			[illegible]	[illegible]	

ALAMANDER NUMBER	ID of Contam-inated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	Gross Alpha (c/m/s) Salamander Ash	Stackpipe Ash	Waste Information: Identification of Rad. Isotope of Waste Solution		
1	TCP	3.0					
2		3.0					
3		3.0					
1		3.0					
2		3.0					
3		3.0					
1		3.0					
2		3.0					
3		3.0					
1		2.5					
2		2.5					
3		2.5					
1		1.0					
2		1.0					
3		1.25					
1		3.0					
2		3.0					
3		3.0					
1		1.5					
2		1.5					
3		1.5					
1		1.5					
2		2.5					
3		2.5					
1		2.0					
2		3.0					
3		3.0					
1		1.5					
2		1.5					

	1	2	3	4	5	6	
DATE	SALAMANDER NUMBER	ID of Contaminated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	Gross Alpha (c/m/s) Salamander Ash	Stackpipe Ash	Waste Information Identification of Rad. Isotope &	Waste S
10/21/64	1	TCP	3.0				
	2		3.0				
	3		3.0				
10/22	1		1.5				
	2		1.5				
	3		1.5				
10/23	1		1.5				
	2		2.5				
	3		2.5				
10/26	1		1.5				
	2		1.5				
	3		1.5				
10/28	1		3.0				
	2		3.0				
	3		3.0				
10/29	1		3.0				
	2		3.0				
	3		3.0				
10/30	1		1.0				
	2		1.5				
	3		1.5				
11/3	1		3.0				
11/5	1		1.5				
11/9	1		2.5				
11/10	1		3.0				
11/11	1		1.5				
11/12	1		3.0				
11/17	1		3.0				

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DATE	SALAMANDER NUMBER	ID of Contaminated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	Gross Alpha (c/m/g) Salamander Ash	Gross Alpha (c/m/g) Stackpipe Ash	Waste Information Identification: Rad. Isotope & Waste
11/25/64	1	TCP	2.0			
12/2	1		1.5			
12/3	2		3.0			
12/4	2		3.0			
12/7	2		3.0			
12/10	2		3.0			
12/11	2		3.0			
12/14	3		2.0	26		
12/15	3		2.5			
12/18	3		2.0	(1) 9,830	506	
12/30				(2) 78,050	12,920	
1/19/65	1		3.0	(3) 21,050	1,580	
	3		3.0			
1/20	1		2.5			
	3		3.25			
1/22	1		3.0			
	3		3.0	~~[illegible]~~ 17.75		
3/15	1	TEP	4.0			U-235 in 7% TBP
	2		4.0			
	3		4.0			
	1		6.0			
	2		7.0			
	3		6.0			
3/17	1		6.0			
	2		6.0			
	3		6.0			
3/18	1		9.0			
	2		9.0			
	3		9.0			

Salamander Number	ID of Contaminated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	Gross Alpha (c/m/s) Salamander Ash	Gross Alpha (c/m/s) Stovepipe Ash	Waste Information: Identification of Rad. Isotope & Waste Solution	
1	TBP	5.0			U-235 in 7% TSP / Cu[illegible] ET	
2		5.0				
3		5.0				
1		5.0				
2		5.0				
3		5.0				
1		5.0				
2		5.0				
3		5.0				
1		5.0				
2		5.0				
3		5.0				
1		5.0				
2		5.0				
3		5.0				
1		3.0				
2		2.0	80.0			
2	TCP	3.0				
3		3.0				
2		4.0				
3		4.5				
1		3.0				
1		6.5				
1		3.0	27.0			
1		3.0				
2		3.0				
1		4.0				
2		4.5				

1 / 0 R 4 4 7 8

Aug 1966

DISPOSAL OF TRICRESYL PHOSPHATE

	Salamander #1					Salamander #2					Salaman[der #3]		
Date	Gal. TCP	Gal. Kerosene	Start	Stop	Air Counts A/M-M³	Gal. TCP	Gal. Kerosene	Start	Stop	Air Counts A/M-M³	Gal. TCP	Gal. Kerosene	[illegible]
11	3	1½	1015	1615		3	1½	1015	1615				
12	4	2	0815	1600		4½	2¼	0815	1600				
15	3	1½	0900	1615		3	1½	0900	1615				
16	4	2	0930	1600		4	2	0930	1600				
17	4	2	0830	1615		3	1½	0830	1615				
18	4½	2¼	0815	1600		5	2½	0815	1600				
19	3	1½	0815	1600		3	1½	0815	1600				
22	4	2	0830	1615		4½	2¼	0830	1615				
24	3	1½	0830	1600		3	1½	0830	1600				
25	3½	1¾	0815	1600		4	2	0815	1600				
26	2½	1¼	1000	1615		2½	1¼	1000	1615				
29	3	1½	1000	1615		3	1½	1000	1615				
31	3	1½	0820	1600		3	1½	0820	1600				
	44.5	22.25				45.5	22.75						

COMMENTS: [illegible] .73 GA[illegible] .7[illegible] GPH

DATE	SALAMANDER NUMBER (1)	ID of Contaminated Organic Liquid Incin. (2)	Gallons of Contaminated Liquid Incin. (3)	Gross Alpha (c/m/s) Salamander Ash (4)	Stovepipe Ash (5)	Waste Information Identification of Rad. Isotope of Waste (6)
8/16/66	1	TCP	4.0			
	2		4.0			
8/17	1		4.0			
	2		3.0			
8/18	1		4.5			
	2		5.0			
8/19	1		3.0			
	2		3.0			
8/22	1		4.0			
	2		4.5			
8/24	1		3.0			
	2		3.0			
8/25	1		3.5			
	2		4.0			
8/26	1		2.5			
	2		2.5			
8/29	1		2.0			
	2		3.0			
8/31	1		3.0			
	2		3.0			
			69.50			
6/6/67	1	TCP	6.5			
6/7	1		8.5			
6/9	1		5.0			
6/12	1		6.0			
6/13	1		6.0			
6/15	1		6.0			
6/16	1		6.0			

1	2	3	4	5	6	7	8
…AMANDER NUMBER	ID of Contaminated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	Gross Alpha (c/m/s) Salamander Ash	Gross Alpha (c/m/s) Standpipe Ash	Waste Information: Identification of Rad. Isotope & Waste Solution		
1	TCP	4.0					
1		3.0					
1		7.0					
		14.0					
		7.9					
		17.2					
		8.5					
		8.6					
		10.0					
		29.1					
		21.9 — 103.40					
		5.0					
		18.5					
		7.0					
		3.0					
		4.0					
		2.9					
		6.6					
		12.9					
		26.9					
		16.9					
		[illegible]					

1	2	3	4	5	6	7	8
SALAMANDER NUMBER	ID of Contaminated Organic Liquid Incin.	Gallons of Contaminated Liquid Incin.	Gross Alpha (c/m/s) Salamander Ash	Gross Alpha (c/m/s) Stovepipe Ash	Waste Information: Identification of Rad. Isotope	Waste Information: of Waste Solution	
		20.5					
		21.4					
		32.5					
		35.4					
		28.0					
		16.5					
		17.4					
		21.7					
		195.40					

(2) SWMU #21-008, Incinerator

The only information available on this unit is reported under the stack data base presented with the source term data for SWMU #21-019.

(3) SWMU #21-019, Filter Houses/Exhaust Stacks

The more current annual radioactive airborne effluent release summaries for TA-21 are presented in Table XIV for 1973 through 1989. Notice that there are many more stacks identified in this table than there are current SWMUs. This data came from the Radiation Protection Groups records (Valentine, 1974; Romero, 1975; Dummer, 1976 through 1984; Guevara, 1985; Valentine, 1986 through 1988; and Graf, 1989 and 1990). Similar data for the period 1946 through 1972 are presented in Table XV. Notice from the data presented in Table XV that annual stack discharges for this SWMU (excluding TA-21-12) amounted to 300 to 400 dpm $Pu^{239} \times 10^{10}$ per year (1.4 to 1.8 Ci) from 1951 to 1953. The emissions in 1973 and 1989, in comparison, amounted to 6.41 and 1.39 μCi Pu^{239}, respectively.

In addition to the radionuclide data, Group HSE-8 and HSE-1 have compiled a listing of the estimated annual toxic air pollutant emissions from each building at TA-21 (Fig. 21-58). These values are based on a one-time Laboratory-wide survey conducted in 1987-1988. The survey was conducted to comply with Air Quality Control Regulation 752 - Registration of Existing Toxic Air Pollution Sources. If the pollutant was not included in the regulation, it was also not estimated for the survey. This means that "typical" air pollutants such as sulfur dioxide and lead were not estimated.

E XIV. TA-21 Radioactive Airborne Effluent Release Summaries, 1973-1989.

(switch columns)

1 Stack Location + ID	2 Total µCi of Pu discharged	3 Total ml of AIR discharged	4 Average µCi Pu/ml	5 Total µCi U^{235} discharged	6	7 Average µCi U^{235}/ml	8 Total µCi MFP discharged	9	10 Average µCi MFP per ml	11 Total µCi of H^3 gas discharged	12	13 Average µCi H^3/ml	To[tal] H^3 disc[harged]
150, FE-1	5.50E-2	1.53E+14	3.61E-16										
257, FE-4	5.30E-2	1.83E+13	2.90E-15										
313(3W), FE-2	4.25E-1	2.68E+14	1.59E-15										
314(3E), FE-1	1.94E-1	1.17E+14	1.66E-15										
314(4W), FE-7	1.40E-1	1.93E+14	7.26E-16										
315(5W), FE-1	4.53E-1	1.16E+14	3.90E-15										
324, FE-1	2.60E-2	8.38E+13	3.11E-16										
4(HC), FE-1	4.30E-2	2.24E+13	1.92E-15				3.10E-2		1.39E-15				
3(MAIN), FE-6		1.20E+14		2.06E+1		1.72E-13							
4(MAIN), FE-3		1.64E+14		8.33		5.07E-14							
155N(TSTA), FE-5		1.22E+14								2.42E+6		1.98E-8	3.4
209, FE-1, 10, 12		3.84E+14								4.18E+8		1.09E-6	

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4 Average µCi of Pu/ml	5 Total µCi/U²³⁵ Discharged	6	7 Average µCi of U²³⁵/ml	8 Total µCi of MFP Discharged	9	10 Average µCi MFP/ml	11 Total µCi of H³ (GMS) Discharged	12	13 Average µCi of H³/ml	14 Total µCi of H³ (HTO) Discharged	15	16 Average µCi of H³/ml
4.30E-16												
3.35E-15												
2.69E-16												
1.20E-15												
2.44E-16												
2.15E-16												
2.36E-15												
2.15E-15				1.54E-01		6.36E-15						
	4.65E+01		3.57E-13									
	1.23E+01		6.92E-14									
							8.36E+06		8.21E-08	3.35E+07		3.29E-07
							4.68E+08		1.27E-06			
5.31E-16												
1.31E-15												
7.23E-16												
1.07E-15												
1.12E-15												
9.27E-16												
5.88E-16												
2.63E-16												
1.13E-14				1.88E-01		6.82E-15						
	7.13E+01		3.14E-13									
	1.36E+02		4.31E-13									
							1.08E+06		8.02E-09	1.45E+07		1.17E-07
							5.80E+08		1.71E-06			
2.17E-15												
2.75E-15												
1.06E-16												
3.41E-15												
4.92E-16												
1.87E-15												
6.79E-16												
6.74E-15												
3.34E-15				3.24E-01		1.08E-14						
	1.14E+02		4.43E-13									
	9.83E+01		3.12E-13									
							1.01E+07		8.36E-08	1.36E+06		
							4.38E+08		1.32E-06			

	Initials	Date
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Row	4 AVERAGE µCi Pu/ml	5 TOTAL µCi U235 DISCHARGED	6	7 AVERAGE µCi U235/ml	8 TOTAL µCi of MFP DISCHARGED	9	10 AVERAGE µCi MFP/ml	11 TOTAL µCi H3 DISCHARGED	12	13 AVERAGE µCi H3/ml	14	15	3/10
1	1.56E-15												
2	4.03E-15												
3	2.05E-15												
4	1.92E-15												
5	1.03E-14				3.41E-01		1.22E-14						
6	3.64E-15												
7	2.82E-14												
8	1.05E-14												
9	2.67E-15												
10		3.09E+02		1.22E-12									
11		7.86E-01		6.85E-14									
12		7.28E+01		2.30E-13									
13								3.59E+06		2.94E-08			
14								3.63E+08		1.14E-06			
15													
16	9.66E-16												
17	1.99E-14												
18	4.71E-15												
19	5.07E-15												
20	1.98E-14												
21	1.20E-14												
22	9.06E-15												
23	2.01E-14												
24	5.14E-15				3.14E-01		1.06E-14						
25		9.50E+02		3.75E-12									
26		9.79E-01		1.30E-13									
27		3.94E+01		9.73E-14									
28								4.40E+05		6.23E-09			
29								8.02E+08		4.09E-06			
30													
31	2.09E-15												
32	2.13E-15												
33	1.16E-14												
34	7.82E-15												
35	7.97E-15												
36	6.52E-15				7.94E-01		2.68E-14						
37	2.35E-15												
38	6.11E-16												
39	8.21E-15												
40	8.08E-15												

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Line	4 AVERAGE μCi of Pu/ml	5 TOTAL μCi of U^{235} DISCHARGED	6	7 AVERAGE μCi U^{235}/ml	8 TOTAL μCi of HFP DISCHARGED	9	10 AVERAGE μCi HFP/ml	11 TOTAL μCi of H^3 DISCHARGED	12	13 AVERAGE μCi H^3/ml	14	15
1		5.46E+02		2.15E-12								
2		1.15		2.69E-13								
3		1.59E+02		3.92E-13								
4								1.80E+08		9.44E-07		
5	1.16E-15											
6	1.66E-15											
7	2.24E-15											
8	7.36E-15											
9	5.24E-14											
10	3.19E-15				4.35E-01		1.45E-14					
11	1.37E-15											
12	1.72E-15											
13	6.38E-15											
14	2.39E-15											
15		1.20E+02		4.67E-13								
16		1.82		4.27E-13								
17		9.21E+02		2.23E-12								
18												
19								1.69E+08		8.61E-07		
20												

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Average conc. Pu^{239} (uCi/ml)	Total uCi $Pu^{238+239}$	Average conc. $Pu^{238+239}$ (uCi/ml)	Total uCi Pu^{238}	Average conc. Pu^{238} (uCi/ml)	Total uCi U^{235}	Average conc. U^{235} (uCi/ml)	Total uCi MFP	Average conc. MFP (uCi/ml)	Total uCi tritium	Average conc. tritium (uCi/ml)	Total uCi Am^{241}	Average conc. Am^{241} (uCi/ml)
1.700E-14												
1.180E-14												
	1.059	5.350E-15										
	0.450	1.540E-15										
	3.053	1.440E-14										
2.280E-15												
							2.802	9.500E-14				
2.611E-15												
	1.008	4.620E-15										
	0.253	1.200E-15										
940E-14												
					658	2.610E-12						
					0.329	7.750E-13						
					363	9.010E-13						
									1.082E+8	1.528E-7		
											0.029	8.810E-15

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Stack Location + ID	Gross volume (m^3)	Total μCi Pu^{239}	Average conc. Pu^{239} (μCi/ml)	Total μCi $Pu^{238+239}$	Average conc. $Pu^{238+239}$ (μCi/ml)	Total μCi Pu^{238}	Average conc. Pu^{238} (μCi/ml)	Total μCi U^{235}	Average conc. U^{235} (μCi/ml)	Total μCi MFP	Average conc MFP (μCi/ml)	Total μCi tritium	A… con… (μ…
80	2 E, FE-2	1.950 E+8	0.118	6.051 E-16										
	2W, FE-1	2.119 E+8	0.056	2.643E-16										
	3 E, FE-2	2.145 E+8			0.088	4.103E-16								
	3W, FE-1	2.873 E+8			0.400	1.392 E-15								
	4W, FE-2	2.145 E+8			0.192	8.951 E-16								
	4 (Hot cell), FE-1	2.951 E+7	0.042	1.423 E-15							4.183	1.417 E-13		
	5 E, FE-2	1.788 E+8	0.100	5.593 E-16										
	5W, FE-2	3.393 E+8	0.141	4.156 E-16										
	5(530), FE-1	5.172 E+7	0.018	3.480 E-16										
	150, FE-1	1.314 E+8			0.501	3.813E-15								
	324, FE-1,2	2.106 E+8			0.485	2.303 E-15								
	257, FE-4	1.980 E+6	0.124	6.263 E-14										
	3S, FE-1	2.535 E+8							487	1.923 E-12				
	3 (INCIN), FE-1	4.264 E+6							0.257	6.027 E-14				
	4S, FE-1	4.043 E+8							146	3.610 E-13				
	209, FE-10	2.067E+8											1.064 E+8	S…
	257 (Pugmill)	3.287 E+7												
79	2 E, FE-2	2.032E+8	0.312	1.535 E-15										
	2W, FE-1	2.212 E+8	0.430	1.944 E-15										
	3E, FE-2	2.080 E+8			0.493	2.370 E-15								
	3W, FE-1	2.855 E+8			1.353	4.739 E-15								
	4W, FE-2	2.152 E+8					0.232	1.078 E-15						
	4 (Hot cell), FE-1	2.952 E+7	0.033	1.118E-15							0.468	1.585E-14		
	5E, FE-2	3.864 E+8	0.333	8.618 E-16										
	5W, FE-2	3.359 E+8	0.439	1.307E-15										
	5(530), FE-1	1.069 E+8	0.880	8.232 E-15										
	150, FE-1	2.232 E+8			1.565	7.012E-15								
	324, FE-1,2	2.041 E+8			0.249	1.191E-15								
	257, FE-4	2.376 E+7	0.138	5.808E-15										
	3 S, FE-1	2.567E+8							408	1.589 E-12				
	3 (INCIN), FE-1	4.603 E+6							0.726	1.577 E-13				
	4 S, FE-1	3.972 E+8							246	6.193 E-13				
	209, FE-10	2.067 E+8											9.491 E+7	4.…
	257 (Pugmill)													

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Stack Location + ID	Gross volume (m^3)	Total μCi Pu^{239}	Average Conc. Pu^{239} ($\mu Ci/ml$)	Total μCi $Pu^{238+239}$	Average Conc $Pu^{238+239}$ ($\mu Ci/ml$)	Total μCi Pu^{238}	Average Conc Pu^{238} ($\mu Ci/ml$)	Total μCi U^{235}	Average conc. U^{235} ($\mu Ci/ml$)	Total μCi MFP	Average conc. MFP ($\mu Ci/ml$)	Total μCi tritium	Av[...] con[...] (μ[...]
2E, FE-2	3.016 E+8	0.738	2.447E-15										
2W, FE-1	3.328 E+8	25.127	7.550E-14										
3E, FE-2	1.586 E+8			0.496	3.127E-15								
3W, FE-1	2.639 E+8			0.841	3.187E-15								
4W, FE-2	2.236 E+8					0.426	2.236E+8						
4 (Hot Cell) FE-1	2.964 E+7	0.056	1.889E-15							1.027	3.465E-14		
5E, FE-2	3.744 E+8	0.318	8.494E-16										
5W, FE-2	2.951 E+8	0.792	2.684E-15										
5(SR), FE5,6	1.370 E+7	0.022	1.606E-15									1.300E+5	4.
5(530), FE-1	4.524E+7	0.091	2.011E-15										
5 (530 hood)	3.260 E+6	0.003	9.202E-16										
150	2.808 E+8			1.574	5.605E-15								
324	1.911 E+8			0.241	1.261E-15								
3S, FE-1	2.951E+8							256	8.669E-13				
3(Incin), FE-1	8.671 E+6							0.979	1.129 E-13				
4S, FE-1	3.120 E+8							48.415	1.552 E-13				
5(SR)	2.740 E+6												
209, FE-10	2.067 E+8											7.147E+7	3.
257(Ag mill)	1.760 E+7												

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Stack Location + ID	Gross volume (m^3)	Total μCi Pu^{239}	Average Conc. Pu^{239} ($\mu Ci/ml$)	Total μCi $Pu^{238+239}$	Average Conc $Pu^{238+239}$ ($\mu Ci/ml$)	Total μCi Pu^{238}	Average Conc Pu^{238} ($\mu Ci/ml$)	Total μCi U^{235}	Average conc. U^{235} ($\mu Ci/ml$)	Total μCi MFP	Average conc. MFP ($\mu Ci/ml$)	Total μCi tritium	Av[...] con[...] (μ[...]
2E, FE-2	3.016 E+8	1.563	5.182E-15										
2W, FE-1	3.328 E+8	0.842	2.530 E-15										
3E, FE-2	1.586 E+8			0.580	3.657E-15								
3W, FE-2	2.639 E+8			0.472	1.789E-15								
4W, FE-2	2.236 E+8					0.265	1.185 E-15						
4 (Hot Cell), FE-1	3.718 E+7	2.164	5.820E-14							3.259	8.765E-14		
5E, FE-2	3.744 E+8	0.606	1.619 E-15										
5W, FE-2	2.951 E+8	1.379	4.673E-15										
5(SR), FE-5,6	1.781 E+7	0.193	1.084 E-14									3.312E+6	1.8
5(530), FE-1	4.524 E+7	0.938	2.073E-14										
5(530 hood)	2.119 E+7	0.286	1.350 E-14										
150	2.808 E+8			0.522	1.859E-15								
324	1.911 E+8			0.182	9.524E-16								
3S, FE-1	2.951 E+8							264	8.946 E-13				
3(Incin), FE-1	8.671 E+6							4.22	4.867 E-13				
4S, FE-1	3.120 E+8							48.288	1.548 E-13				
155 NE	1.084 E+7							0.083	7.657 E-15				
155 NW	8.520 E+6							0.003	3.521 E-16				
155 SE	1.032 E+7							0.002	1.938 E-16				
155 SW	1.840 E+7							0.020	1.087 E-15				
209, FE-10	2.067 E+8											1.300 E+8	6.

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1 Stack Location + ID	2 Gross volume (m^3)	3 Total µCi Pu^{239}	4 Average conc. Pu^{239} (µCi/ml)	5 Total µCi $Pu^{238+239}$	6 Average conc. $Pu^{238+239}$ (µCi/ml)	7 Total µCi Pu^{238}	8 Average conc. Pu^{238} (µCi/ml)	9 Total µCi U^{235}	10 Average conc. U^{235} (µCi/ml)	11 Total µCi MFP	12 Average conc. MFP (µCi/ml)	13 Total µCi tritium	Av[illegible] conc. (µ[illegible]
2E, FE-2	3.074E+8	0.786	2.557E-15										
2W, FE-1	3.392E+8	0.883	2.603E-15										
3E, FE-2	1.617E+8			0.796	4.923E-15								
3W, FE-2	2.690E+8			5.630	2.093E-14								
4W, FE-2	2.279E+8					0.446	1.957E-15						
4 (Hotcell), FE-1	3.790E+7	0.179	4.723E-15										
5E, FE-2	3.816E+8	0.648	1.698E-15							0.550	1.451E-14		
5W, FE-2	3.008E+8	0.513	1.705E-15										
5(SR), FE-56	1.815E+7	0.193	1.063E-14										
5(530), FE-1	4.611E+7	0.218	4.728E-15									2.054E+5	1.
5(530 hood)	2.160E+7	0.130	6.019E-15										
150	2.862E+8			1.362	4.759E-15								
324	1.948E+8			0.372	1.910E-15								
3S, FE-1	2.828E+8							724	2.560E-12				
3(Incin), FE-1	8.838E+6							2.267	2.565E-13				
4S, FE-1	3.180E+8							142	4.465E-13				
155 NE	3.591E+7							0.956	2.662E-14				
155 NW	2.822E+7							0.092	3.260E-15				
155 SE	3.419E+7							0.675	1.974E-14				
155 SW	6.095E+7							0.275	4.512E-15				
209, FE-10	2.107E+8											9.480E+7	4.9

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1 Stack Location + ID	2 Gross volume (m^3)	3 Total µCi Pu^{239}	4 Average conc. Pu^{239} (µCi/ml)	5 Total µCi $Pu^{238+239}$	6 Average conc. $Pu^{238+239}$ (µCi/ml)	7 Total µCi Pu^{238}	8 Average conc. Pu^{238} (µCi/ml)	9 Total µCi U^{235}	10 Average conc. U^{235} (µCi/ml)	11 Total µCi MFP	12 Average conc. MFP (µCi/ml)	13 Total µCi tritium	Av[illegible] conc. (µ[illegible]
2E, FE-2	2.78 E+8	0.25	0.09 E-14										
2W, FE-1	3.87 E+8	0.27	0.07 E-14										
3E, FE-2	1.82 E+8			0.18	0.10 E-14								
3W, FE-2	3.34 E+8			0.50	0.15 E-14								
4W, FE-2	2.66 E+8					2.82	1.06 E-14						
4 (Hotcell), FE-1	0.48 E+8	0.08	0.16 E-14										
5E, FE-2	3.74 E+8	0.37	0.10 E-14							1.44	0.03 E-12		
5W, FE-2	3.53 E+8	0.32	0.09 E-14										
5(SR), FE-56	0.16 E+8	0.50	3.13 E-14										
5(530), FE-1	0.72 E+8	3.75	5.21 E-14									0	0
5 (530 hood)	0.21 E+8	1.07	5.11 E-11										
150	2.83 E+8			0.48	0.17 E-14								
324	2.02 E+8			0.46	0.23 E-14								
3S, FE-1	2.15 E+8							647	301 E-14				
3(Incin), FE-1	0.09 E+8							1.77	19.7 E-14				
4S, FE-1	2.99 E+8							43	14.4 E-14				
155 NE	0.57 E+8							2.05	3.60 E-14				
155 NW	0.44 E+8							15.2	34.6 E-14				
155 SE	0.46 E+8							11.9	25.9 E-14				
155 SW	0.59 E+8							0.29	0.50 E-14				
209, FE-10	2.14 E+8											306 E+6	1.

Year	Stack Location + ID	Gross volume (m^3)	Total μCi Pu^{239}	Average conc. Pu^{239} (μCi/ml)	Total μCi $Pu^{238+239}$	Average conc. $Pu^{238+239}$ (μCi/ml)	Total μCi Pu^{238}	Average conc. Pu^{238} (μCi/ml)	Total μCi U^{235}	Average conc. U^{235} (μCi/ml)	Total μCi MFP	Average conc. MFP (μCi/ml)	Total μCi tritium
1974	2E, FE-2	2.53 E+8	0.4	0.15 E-14									
	2W, FE-1	4.28 E+8	1.0	0.24 E-14									
	3E, FE-2	2.00 E+8			0.5	0.27 E-14							
	3W, FE-2	3.91 E+8			0.3	0.07 E-14							
	4W, FE-2	3.00 E+8					0.6	0.19 E-14					
	4 (Hotcell), FE-1	0.58 E+8	0.2	0.29 E-14							2.9	0.05 E-12	
	5E, FE-2	3.68 E+8	0.3	0.09 E-14									
	5W, FE-2	3.98 E+8	0.4	0.10 E-14									
	5(SR), FE-56	0.14 E+8	0.2	1.40 E-14									0
	5(530), FE-1	0.16 E+8	0.2	0.96 E-14									
	5 (530 hood)	0.03 E+8	<0.01	0.07 E-14									
	150	2.81 E+8			0.9	0.33 E-14							
	324	2.10 E+8			0.7	0.31 E-14							
	3S	2.4 E+8							559	233 E-14			
	3 (Incin)	0.1 E+8							2.1	21.4 E-14			
	4S	2.8 E+8							37.5	13.4 E-14			
	155 NE	0.57 E+8							0.9	1.5 E-14			
	155 NW	0.58 E+8							0.1	0.19 E-14			
	155 SE	0.75 E+8							0.1	0.14 E-14			
	155 SW	0.57 E+8							0.2	0.35 E-14			
973	2E, FE-2	2.54 E+8	1.4	0.54 E-14									
	2W, FE-1	4.29 E+8	2.7	0.63 E-14									
	3E, FE-2	2.01 E+8			1.1	0.54 E-14							
	3W, FE-2	3.91 E+8			0.5	0.14 E-14							
	4W, FE-2	3.00 E+8					1.6	0.54 E-14					
	4 (Hotcell), FE-1	0.58 E+8	0.1	0.23 E-14							1.0	0.017 E-22	
	5E, FE-2	3.68 E+8	0.7	0.18 E-14									
	5W, FE-2	3.98 E+8	1.3	0.32 E-14									
	5(SR), FE-56	0.14 E+8	0.2	1.7 E-14									4.0 E+6
	5(530), FE-1	0.16 E+8	0.01	0.09 E-14									
	5 (530 hood)	0.03 E+8	<0.01	0.04 E-14									
	* 12 #1	0.86 E+8	23.2	27.0 E-14									
	* 12 #2	0.86 E+8	21.5	25.0 E-14									
	* 12 #3	0.86 E+8	13.8	16.0 E-14									
	* 12 #4	2.15 E+8	1312	610 E-14									
	150	2.81 E+8			2.2	0.77 E-14							
	324	2.10 E+8			1.1	0.54 E-14							
	3S	2.4 E+8							840	350 E-14			
	3 (Incin)	0.1 E+8							1.8	18 E-14			
	4S	2.8 E+8							61.6	22 E-14			

* Decommissioned in 1973

TABLE XV. TA-21 Airborne Effluent Release Summaries, 1945

Gross alpha Average c/m/L : CRM-12 Monthly

Location	DEC.
YEAR: 1945	
Exh. Bldg. #2	0.0005
Exh. Bldg. 3	0.0014
Exh. Bldg. 4	0.0014
Exh. Bldg 5	0.0024
Stack #1	0.0003
Stack 3	0.0003
Room 201	0.0016
Room 213	0.0004
Room 308	0.0004
Room 313	0.0024
Room 408	0.0127
Room 413	0.0015
Room 501	0.0019
Room 506	0.0003
Room 513	0.0058
Laundry wash Room	0.0559
Laundry drying Room	0.0093

Gross alpha AVERAGE c/m/L: CRM-12 Monthly Rep

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
YEAR: 1946											
Exh. Bldg. #2	0.0003	0.0003	0.0010	0.0003	0.0003	0.0010	0.0004	0.0003	0.0001	0.0086	0.03
Exh. Bldg. 3	0.0010	0.0029	0.0004	0.0078	0.0037	0.0021	0.0004	0.0005	0.0001	0.0001	0.0007
Exh. Bldg. 4	0.0010	0.0042	0.0007	0.0004	0.0028	0.0295	0.0155	0.0021	0.0025	0.0161	0.0166
Exh. Bldg 5	0.0001	0.0022	0.0014	0.0014	0.0012	0.0009	0.0004	0.0011	0.0003	0.0023	0.0077
Stack #1	0.0003	0.0008	0.0002	0.0009	0.0006	0.0004	0.0004	0.0003	0.0000	0.0001	0.0024
Stack 3	0.0003	0.0006	0.0002	0.0012	0.0007	0.0005	0.0003	0.0002	0.0001	0.0026	0.0040
Room 201	0.0003	0.0007	0.0009	0.0015	0.0029	0.0038	0.0029	0.0012	0.0036	0.0088	0.0092
Room 213	0.0005	0.0016	0.0028	0.0019	0.0017	0.0062	—	0.0022	0.0016	0.0098	0.0181
Room 308	0.0002	0.0089	0.0045	0.0024	0.0092	0.0076	0.0013	0.0060	0.0018	0.0008	0.0009
Room 313	0.0059	0.0110	0.0413	0.0208	0.0288	0.0198	0.0032	0.0099	0.0061	0.0038	0.0089
Room 408	0.0102	0.0409	0.1669	0.0838	0.1194	0.1628	0.0584	0.0189	0.0625	0.0848	0.1278
Room 413	0.0013	0.0100	0.0336	0.0162	0.0133	0.0090	0.0099	0.0195	0.0048	0.0029	0.0040
Room 501	0.0022	0.0677	0.0007	0.0021	0.0080	0.0032	0.0018	0.0040	0.0060	0.0141	0.0283
Room 506	0.0004	0.0012	0.0007	0.0020	0.0013	0.0044	0.0004	0.0045	0.0031	0.0066	0.0050
Room 513	0.0025	0.0056	0.0327	0.0022	0.0067	0.0040	0.0112	0.0446	0.0193	0.0148	0.0948
Laundry wash Room	—	—	—	—	—						
Laundry drying Room	—	—	—	—	—						
Room 322	—	—	—	0.0128	0.0210	0.0369	—	0.0010	0.0011	0.0003	0.0080
DP East:											
Room 5203									0.0519	0.0149	
Room 5204									0.1112	0.1107	
Room 5205									0.0157	0.2205	
Room 5206									0.0257	0.0269	
Room 5207									0.0860	0.0857	
Room 5211									0.0191	0.0476	
Room 5212									0.0188	0.0289	
Room 5213									0.0865	0.0861	
Room 5214									0.0213	0.0427	
Room 5227									0.0109	0.0074	
Room 5230									0.1136	0.0961	
Stack 1									0.0471	0.0663	

EFFICIENCY LINE • 22-213

Gross alpha Average c/m/L Pu : CMR-12 Monthly Reports

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
YEAR: 1947													
Exh. Bldg. #2	0.0003	0.0003	0.0002	0.0020	0.0003	0.0017	0.0006	0.0004	0.0005	0.0006	0.0079	0.	
Exh. Bldg. 3	0.0001	0.0006	0.0009	0.0014	0.0006	0.0002	0.0126	0.0009	0.0027	0.0019	0.	0.	
Exh. Bldg. 4	0.0037	0.0069	0.0020	0.0004	0.0001	0.0000	0.0002	0.0003	0.0204	0.0032	0.	0.	
Exh. Bldg 5	.0087	.0029	0.0143	0.0084	0.0001	0.0168	0.0591	0.1287	0.0461	—	0.	0.	
Stack #1	—	—	—	—	—	—	—	0.0226	0.0300		0.0104	0.0401	
Stack 3	—	—	—	—	—	—					0.0013	0.0100	
Room 201	0.0061	0.0185	0.0061	0.0063	0.0329	0.0160	0.0064	0.0094	0.0076	0.0028	0.0079	0.2484	
Room 213	0.0034	0.0040	0.0025	0.0277	0.0015	0.0475	0.0027	0.0061	—	—	0.	0.	
Room 308	0.0023	0.0133	0.0049	0.0041	0.0012	0.0025	0.0018	0.0050	0.0108	0.0076	0.	0.	
Room 313	0.0080	0.0083	0.0272	0.0106	0.0066	0.0048	0.0119	0.0044	0.0056	0.0071	0.0068	0.0279	
Room 408	0.2103	0.0467	0.0150	0.0123	0.0120	0.0041	0.0049	0.0048	0.0240	0.0578	0.0088	0.0346	
Room 413	0.0051	0.0206	0.0457	0.0278	0.0207	0.0172	0.0154	0.0262	0.0469	0.0962	0.1028	0.1650	
Room 501	0.1279	0.0157	0.0166	0.0134	0.0159	0.0046	0.0055	0.0035	0.0031	0.0080	0.0059	0.0027	
Room 506	0.0172	0.0112	0.0062	0.0022	0.0058	0.0101	0.0069	0.0070	0.0096	0.0180	—	—	
Room 513	0.1082	0.0516	0.2966	0.0486	0.0300	0.0190	0.0218	0.0339	0.0355	0.0292	0.0140	0.0106	
Laundry wash Room	—	—	—	—	—	—	—	—					
Laundry drying Room	—	—	—	—	—	—	—	—					
Room 322	0.0036	0.0153	0.0053	0.0120	0.0053	0.0081	0.0085	0.0074	0.0115	0.0479	0.0271	0.0347	
Stack #2	0.0002	0.0005	0.0004	0.0002	0.0011	0.0039	0.0063	0.0090	0.0008	0.0010	0.0020	0.0013	
Stack #4	0.0005	0.0009	0.0002	0.0006	—	0.0001	0.0026	0.0024	0.0015	0.0025	0.0033	0.0125	
Room 401	—	—	0.0044	0.0074	0.0048	0.0024	0.2170	0.0063	0.0244	0.0038	0.0040	0.0379	
Room 406	—	—	—	—	—	—	—	—	—	0.0212	0.0365	0.0049	
Laundry sorting Room	—	—	—	—	—	0.0310	0.0237	0.0089	0.0117	0.0153	0.0534	0.1021	
Laundry - washer #3	—	—	—	—	—	0.0234	0.0182	0.0006	0.0026	0.0095	0.0198	0.0867	
Manifold*	—	—	—	—	—	—	—	0.2261	—	—			
Manifold-East*									0.1531	0.2703	0.1558	0.1659	
Manifold-West*									0.0135	0.0058	0.0053	0.0248	

* These counts are obtained by sampling air just before it enters precipitron units.

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
DP East:													
Room 5203									0.0054	0.0105	0.1232	0.0131	
5204									0.0481	0.0378	0.1812	0.0649	
5205									0.0248	0.0458	0.1657	0.0071	
5206									0.0535	0.0097	0.0349	0.0084	
5208									0.0186	0.0058	0.0568	0.0103	
5210									0.0048	0.0263	0.0079	0.0080	
5211									0.0083	0.0107	0.0244	0.0147	
5212									0.0104	0.0159	0.0247	0.0186	
5213									0.0185	0.0146	0.3495	0.1254	
5214									0.0064	0.0683	0.1137	0.0111	
5227									0.0056	0.0047	0.0047	0.0185	
5230									0.0108	0.0077	0.0147	0.0072	
Stack 1									0.0751	0.0504	0.0171	0.0115	
Stack 2									0.0872	0.0363	0.0148	0.0146	

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Gross Alpha Average c/m/L : CRM-12 Monthly Reports

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
YEAR: 1948													
Exh. Bldg. #2	—	—	—	—	—	—	—	—	—				
Exh. Bldg. 3	—	—	—	—	—	—	—	—	—				
Exh. Bldg. 4	—	—	—	—	—	—	—	—	—				
Exh. Bldg. 5	—	—	—	—	—	—	—	—	—				
Stack #1	0.0185	0.0445	0.0525	0.0805	0.0601	0.0492	0.0843	0.1132	0.2190	0.2173	0.5618	0.2562	
Stack 3	0.0034	0.0210	0.0110	0.0202	0.0145	0.0135	0.0158	0.0323	0.0368	0.0460	0.1363	0.0523	
Room 201	0.0029	0.0052	0.0038	0.0032	0.0047	0.0033	0.0086	0.0013	0.0070	0.0017	0.0575	0.0170	
Room 213	—	—	—	—	—	—	—	—	—	0.0022	0.0038	0.0078	
Room 308	—	—	—	—	—	—	—	—	—	—	—	—	
Room 313	0.0089	0.0226	0.0197	0.0089	0.0121	0.0090	0.0072	0.0086	0.0078	0.0011	0.0162	0.0225	
Room 408	0.0105	0.0371	0.0094	0.0402	0.0247	0.0186	0.0145	0.0187	0.0015	0.0004	0.0163	0.0167	
Room 413	0.0104	0.0118	0.0851	0.0065	0.0081	0.0095	0.0236	0.0202	0.0705	0.0188	0.0622	0.0901	
Room 501	0.0529	0.0058	0.0022	0.0024	0.0068	0.0037	0.0039	0.0023	0.0033	0.0020	0.0061	0.0116	
Room 506	—	—	—	—	—	—	—	—	—	—	—	—	
Room 513	0.0117	0.0168	0.0075	0.0025	0.0028	0.0017	0.0140	0.0031	0.0036	0.0111	0.0279	0.0041	
Laundry wash Room	0.0367	0.0286	0.0047	0.0301	0.0101	0.0477	0.0080	0.0069	0.0029	0.0014	0.0296	0.0100	
Laundry ~~drying~~ Sorting Room	0.0611	0.1547	0.0470	0.0644	0.0407	0.0358	0.0094	0.0028	0.0024	0.0028	0.0206	0.0152	
Room 322	0.0035	0.0061	0.0027	0.0257	0.0179	0.0177	0.0595	0.0394	—	—	—	—	
Room 401	0.0123	0.0325	0.0097	0.0109	0.0047	0.0031	0.0087	0.0263	0.0082	0.0011	0.0020	0.0012	
Room 406	0.0055	0.0038	0.0057	0.0062	0.0085	0.0015	0.0037	0.0012	0.0029	0.0007	0.0101	0.0079	
Stack #2	0.0003	0.0116	0.0329	0.0776	0.0487	0.0447	0.0317	0.0295	0.0759	0.0759	0.3571	0.1011	
Stack #4	0.0072	0.0155	0.0110	0.0169	0.0148	0.0083	0.0047	0.0014	0.0136	0.0197	0.0387	0.0285	
Manifold-West	0.0180	0.0258	0.0217	0.0272	0.3679	0.0258	0.0352	0.0695	0.1381	0.0459	0.1443	0.1074	
Manifold-East	0.1304	0.0835	0.2335	0.4546	0.4594	0.4619	0.6069	0.6270	0.7149	1.5580	~~0.1443~~	~~0.1074~~	
											3.0241	1.4012	

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
DP East													
Room 5203			0.0097	0.0318	0.0237	0.0146	0.0965	0.0106					
Room 5204			0.0409	0.0293	0.0748	0.0920	0.1758	0.0027					
Room 5205			0.0413	0.1038	0.5843	0.0135	0.0082	0.0402					
Room 5206			0.0200	0.0111	0.0178	0.0315	0.0145	0.0457					
Room 5208			0.0276	0.0036	0.0956	0.3823	0.1474	0.0611					
Room 5210			0.0113	0.0104	0.0612	0.0364	0.0881	0.0077					
Room 5211			0.0061	0.0140	0.0076	0.0083	0.0121	0.0418					
" 5212			0.0467	0.0095	0.0111	0.0103	0.0050	0.0163					
" 5213			0.0310	0.0718	0.2464	0.0873	0.0240	0.0056					
" 5214			0.0088	0.0221	0.1423	0.1498	0.0548	0.0101					
" 5227			0.0234	0.0086	0.0068	0.0049	0.0162	0.0058					
" 5230			0.0241	0.0077	0.0019	0.0031	0.0084	0.0050					
Stack 1			0.0103	0.0265	0.0339	0.0048	0.0112	0.0192					
Stack 2			0.0095	0.0192	0.0360	0.0065	0.0123	0.0122					

EFFICIENCY LINE • 22 213

Gross alpha Average c/m/L: ~~...~~ CRM-12 Monthly Reports

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Year: 1949													
Room 201	.0051	.0040	.003	.006	.015	.011	.001	.042	.002	.008	.005	.099	
Room 213	.0025	.0026	.003	.002	.006	.003	.003	.002	.001	.004	.004	.001	
Room 313	.0184	.0058	.005	.009	.003	.001	.004	.008	.031	.007	.010	.013	
Room 401	.0032	.0100	.002	.000	.000	.000	.015	.187	.057	.040	—	—	
Room 406	.0125	.0061	.004	.015	.008	.047	.002	.005	.002	.003	.003	.002	
Room 408	.0097	.0039	.010	.003	.003	.028	.007	.009	.007	.014	.031	.055	
Room 413	.0412	.0916	.077	.015	.022	.004	.008	.010	.005	.023	.044	.100	
Room 501	.0485	.0113	.013	.001	.000	.002	.001	.002	.002	.001	.005	.003	
Room 513	.0014	.0087	.014	.015	.003	.022	.057	.033	.058	.067	.012	.018	
Room 508	—	—	—	.002	.000	.001	.001	.002	.003	.003	.002	.003	
Daytime Input-Precipitron													
East Manifold	1.1176	1.382	1.247	1.325	2.687	3.641	3.054	5.620	3.894	4.660	9.100	7.712	
West Manifold	0.0364	.0611	.009	.368	.093	.112	.420	.076	.143	.073	.063	.030	
Daytime output													
Stack #1	.2585	.2904	.410	.342	.147	.335	.447	1.006	1.869	2.371	2.418	1.510	
Stack #2	.0963	.1541	.137	.174	.061	.468	.546	.651	1.545	1.641	.501	.706	
Stack #3	.0348	.0881	.072	.074	.028	.117	.129	.337	.229	.322	.607	.453	
Stack #4	.0122	.0349	.101	.055	.027	.104	.100	.780	.163	.274	.268	.381	
Night time Input-Precipitron													
East Manifold	.1519	.1226	.082	.016	.301	.589	.200	.974	.370	.293	.361	.221	
West Manifold	.0038	.0203	.002	.003	.003	.002	.009	.005	.008	.073	.010	.002	
Nighttime output													
Stack #1	.0139	.0296	.035	.017	.016	.022	.047	.051	.178	.122	.071	.024	
Stack #2	.0044	.0128	.010	.007	.007	.033	.023	.033	.119	.065	.029	.010	
Stack #3	.0024	.0049	.004	.003	.003	.005	.003	.008	.017	.017	.018	.006	
Stack #4	.0006	.0025	.012	.002	.003	.005	.002	.002	.009	.110	.023	.008	
Laundry sorting Room	.0765	.0134	.007	.006	.008	.008	.021	.010	.014	.057	.054	.008	
Laundry washing Room	.0235	.0214	.007	.010	.003	.001	.002	.001	.039	.006	.007	.014	
DP-East													
Room 5203				.009	.008	.005	.009	.004	.003	.002	.001	.006	
Room 5204				.020	.041	.007	.003	.006	.003	.003	.005	.003	
Room 5205				.002	.005	.034	.007	.005	.003	.001	.001	.002	
Room 5206				.003	.013	.009	.002	.005	.002	.007	.003	.005	
Room 5208				.033	.006	.017	.011	.011	.008	.013	.002	.007	
Room 5210				.005	.006	.009	.003	.004	.005	.002	.002	.006	
Room 5211				.020	.008	.045	.002	.001	.004	.002	.003	.008	
Room 5212				.005	.008	.012	.006	.017	.021	.006	.005	.006	
Room 5213				.003	.003	.016	.005	.008	.004	.004	.002	.002	
Room 5214				.006	.007	.009	.043	.011	.008	.004	.002	.002	
Room 5227				.008	.004	.011	.009	.002	.005	.003	.001	.004	
Room 5230				.008	.003	.005	.005	.006	.004	.002	.006	.007	
Stack #1				.026	.025	.019	.032	.026	.016	.016	.026	.020	
Stack #2				.023	.019	.015	.042	.033	.028	.018	.029	.017	

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Gross alpha Average c/m/L: ~~Alpha~~ CRM-12 Monthy Reports

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
YEAR: 1950													
Room 201	.003	.009	.015	.024	.009	.006	.009	.002	.002	.001	.001	.001	
Room 208	.002	.000	.000	.001	.000	.000	—	—	—	—	—	—	
Room 213	.003	.002	.000	.001	.001	.000	0.000	0.000	.008	.001	—	—	
Room 313	.010	.005	.008	.006	.004	.002	.001	.002	.002	.002	.010	.003	
Room 406	.006	.001	.004	.001	.001	.003	.000	.001	.003	.001	.006	.009	
Room 408	.015	.004	.013	.005	.002	.000	.004	.003	.002	.001	.003	.003	
Room 413	.035	.056	.015	.025	.001	.008	.000	.002	.003	.001	.003	.002	
Room 501	.008	.005	.001	.003	.002	.002	.001	.001	.003	.004	.003	.005	
Room 508	.002	.002	.004	.002	.001	.000	.001	.000	.003	.004	.001	.001	
Daytime Input-Precipitron	.012	.058	.004	.009	.009	.003	.004	.006	.002	.376	.003	.002	
East Manifold	15.282	13.017	14.967	14.597	26.613	5.693	2.996	2.097	3.110	4.324	3.816	2.723	
Wrst Manifold	.035	.080	.101	.121	.169	.438	.673	.275	.114	.081	.074	.084	
Daytime output													
Stack #1	1.562	1.000	.837	.778	.521	.166	.196	.112	.094	.143	.208	.187	
Stack #2	1.042	1.038	.922	.500	.304	.061	.093	.076	.053	.111	.132	.134	
Stack #3	.520	.424	.378	.255	.059	.019	.027	.028	.015	.025	.041	.034	
Stack #4	.505	.401	.335	.307	.151	.045	.026	.054	.016	.019	.003	.031	
Night time Input-Precipitron													
East Manifold	.670	.952	1.256	1.180	.583	.507	.240	.467	.359	.326	.425	.329	
Wrst Manifold	.004	.008	.009	.008	.026	.242	.022	.022	.114	.021	.016	.012	
Night time output													
Stack #1	.042	.040	.057	.063	.059	.018	.016	.017	.008	.012	.024	.018	
Stack #2	.011	.025	.043	.038	.004	.009	.008	.007	.005	.009	.018	.020	
Stack #3	.012	.012	.024	.017	.001	.004	.004	.005	.003	.002	.018	.003	
Stack #4	.023	.011	.029	.025	.008	.009	.003	.010	.001	.000	.003	.003	
Laundry sorting Room	.006	.004	.003	.004	.003	.007	.003	.004	.004	.004	.003	.003	
Laundry washing Room	.004	.003	.003	.002	.001	.000	.001	.001	.001	.000	.001	.002	
DP-East													
Room 5203	.013	.009	.003	.004	.004	.002	.002	.001	.005	.002	.002	.002	
Room 5204	.014	.007	.004	.005	.003	.008	.005	.001	.034	.007	.001	.001	
Room 5205	.012	.014	.006	.006	.002	.003	.002	.002	.009	.001	.001	.001	
Room 5206	.003	.003	.003	.012	.002	.003	.005	.001	.002	.002	.001	.009	

(Room 513)

1950	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Room 5208	.005	.006	.003	.007	.004	.003	.002	.008	.026	.043	.003	.005	
Room 5210	.002	.005	.005	.003	.001	.003	.005	.001	.002	.009	.002	.001	
Room 5211	.004	.004	.002	.010	.014	.016	.002	.004	.003	.001	.002	.014	
Room 5212	.011	.009	.020	.025	.005	.003	.002	.003	.027	.019	.002	.003	
Room 5213	.010	.006	.010	.009	.006	.002	.003	.002	.001	.292	.002	.002	
Room 5214	.026	.022	.005	.006	.003	.023	.002	.004	.001	.343	.002	.004	
Room 5227	.002	.033	.003	.002	.002	.004	.002	.003	.001	.003	.001	.002	
Room 5230	.005	.008	.002	.003	.002	.004	.003	.001	.002	.003	.005	.001	
Stack #1	.215	.041	.034	.093	.021	.015	.011	.017	.024	.282	.156	3.992	
Stack #2	.182	.032	.031	.053	.016	.017	.007	.010					

Table XV. TA-21 Airborne Effluent Release Summaries, 1945-1972.

		Total α activity d/m/year x 10^{10}	Total d/m/8 hr. x 10^6 July	Reference
1951				
DP-12	Stack 1	50.16		
	Stack 2	40.83		
	Stack 3	20.98		
	Stack 4	30.70		
Main Air Duct	DP-2	118.82		
	DP-3	27.37		
	DP-4	104.22		
	DP-5	59.05		
1952				
DP-12	Stack 1	45.62		
	Stack 2	56.56		
	Stack 3	61.33		
	Stack 4	65.35		
Main Air Duct	DP-2	233.74		
	DP-3	28.87		
	DP-4	119.91		
	DP-5	20.85		
1953				
DP-12	Stack 1	34.19		
	Stack 2	29.34		
	Stack 3	20.49		
	Stack 4	31.07		
Main Air Duct	DP-2	137.66		
	DP-3	5.23		
	DP-4	138.87		
	DP-5	17.40		
for July	Rm. 406		2.13	
	Rm. 413		112.13	
	Rm. 201 (Dissolver)		216.42	
	Rm. 201 (Org. Boxes)		290.10	
	Rm. 213 (Prep)		2166.42	
	Rm. 213 (Final)		159.31	
	Rm. 501		979.91	
	Rm. 513		78.38	

		[illegible]	[illegible]
1954	Stack 1	2.74	[illegible] 10.26.55
	Stack 2	15.21	[illegible] 10.21.55
	Stack 3	12.67	
	Stack 4	15.10	

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DEC. 1963 - MAY 1964

	Pu Total d/m/M³	Fission Products Total d/m/M³	U^{235} Total d/m/M³
1963 - Dec.			
DP-146 STACK - DAY	792		
Stack - Night	136		
RM. 401 STACK EXHAUST	0		
stack Exhaust		22	
DP-12; Stack 1	5		
Stack 2	5		
Stack 3	0		
Stack 4	0		
RM. 313 MAIN STACK			25
INCINERATOR			20
RM 408 & 413			745
MAIN PROCESS STACK			
1964 - Jan.			
DP-146 STACK - DAY	638		
STACK - NIGHT	170		
RM. 401 Stack exh.	0		
Stack exh.		44	
DP-12, Stack 1	10		
Stack 2	10		
Stack 3	10		
Stack 4	10		
RM 313 MAIN STACK			5
" INCINERATOR			40
RM 408 & 413 MAIN			635
PROCESS STACK			
1964 - FEB.			
DP-146 STACK - DAY	171		
STACK - NIGHT	60		
RM. 401 STACK	0		
STACK		18	
DP-12 STACK 1	16		
STACK 2	8		
STACK 3	16		
STACK 4	4		
RM 313 MAIN STACK			8
INCINERATOR			24
RM. 408 & 413 STACK			480

		Pu Total d/m/M³	Fission Products Total d/m/M³	U^{235} Total d/m/M³
1964 - MAR				
DP-146	STACK - DAY	484		
	STACK - NIGHT	85		
RM. 401	STACK	0		
	STACK		22	
DP-12	STACK 1	4		
	STACK 2	4		
	STACK 3	4		
	STACK 4	0		
RM. 313	STACK			24
	INCINERATOR			44
RM. 408 & 413 STACK				160
1964 - APR				
DP-146	STACK - DAY	1034		
	STACK - NIGHT	468		
RM. 401	STACK	0		
	STACK		42	
DP-12	STACK - 1	4		
	STACK - 2	4		
	STACK - 3	4		
	STACK - 4	0		
RM. 313	STACK			42
	INCINERATOR			392
RM. 408 & 413 STACK				180
1964 - MAY				
DP-146	STACK - DAY	980		
	STACK - NIGHT	345		
RM. 401	STACK	0		
	STACK		20	
DP-12	STACK - 1	10		
	STACK - 2	5		
	STACK - 3	5		
	STACK - 4	5		
RM. 313	STACK			20
	INCINERATOR			60
RM. 408 & 413 STACK				395

JUN 1964 - NOV. 1964

		Pu Total d/m/M³	Fission Products Total d/m/M³	U^{235} Total d/m/M³
1964-JUNE				
DP-146	STACK-DAY	88		
	STACK-NIGHT	36		
RM. 401	STACK	0		
	STACK		22	
DP-12	STACK-1	8		
	STACK-2	4		
	STACK-3	4		
	STACK-4	0		
Rm. 313	STACK			16
	INCINERATOR			24
RM. 408 & 413	STACK			152
1964-JULY				
DP-146	STACK-DAY	154		
	STACK-NIGHT	34		
RM. 401	STACK	0		
	STACK		100	
DP-12	STACK-1	10		
	STACK-2	5		
	STACK-3	5		
	STACK-4	0		
Rm. 313	STACK			50
	INCINERATOR			85
RM. 408 & 413	STACK			292
1964-AUG				
DP-146	STACK-DAY	63		
	STACK-NIGHT	17		
RM. 401	STACK	0		
	STACK		42	
DP-12	STACK-1	4		
	STACK-2	4		
	STACK-3	4		
	STACK-4	0		
RM. 313	STACK			32
	INCINERATOR			136
RM. 408 & 413	STACK			184

		Pu Total d/m/M³	Fission Products Total d/m/M³	U^{235} Total d/m/M³
1964-Sept				
DP-146	STACK-DAY	42		
	STACK-NIGHT	51		
RM. 401	STACK	0		
	STACK		21	
DP-12	STACK-1	15		
	-2	20		
	-3	5		
	-4	5		
RM. 313	STACK			68
	INCINERATOR			148
RM. 408 & 413	STACK			280
1964-Oct.				
DP-146	STACK-DAY	154		
	STACK-NIGHT	34		
RM. 401	STACK	0		
	STACK		44	
DP-12	STACK-1	15		
	-2	15		
	-3	5		
	-4	5		
RM. 313	STACK			110
	INCINERATOR			750
RM. 408 & 413	STACK			770
1964-NOV				
DP-146	STACK-DAY	76		
	STACK-NIGHT	14		
RM. 401	STACK	0		
	STACK		38	
DP-12	STACK-1	4		
	-2	4		
	-3	4		
	-4	0		
RM. 313	STACK			4
	INCINERATOR			620
RM. 408 & 413	STACK			296

1965

Prepared By	Initials	Date
Approved By		

Location	Sample	(3) U^{235} TOTAL d/m/M³ (partly cut off)	Pu Total d/m/M³ (10)	Fission Products Total d/m/M³ (11)	U^{235} TOTAL d/m/M³ (12)
1965-MAR					
DP-146	STACK-DAY		437		
	STACK-NIGHT		95		
RM. 401	STACK		0		
	STACK			0	
DP-12	STACK-1		4		
	-2		4		
	-3		0		
	-4		0		
RM. 313	STACK	20			16
	INCINERATOR	350			2832
RM. 408 & 413	STACK	255			52
1965-APR					
DP-146	STACK-DAY		220		
	STACK-NIGHT		34		
RM. 401	STACK		0		
	STACK			0	
DP-12	STACK-1		5		
	-2		5		
	-3		5		
	-4		0		
RM. 313	STACK	24			39
	INCINERATOR	44			1744
RM. 408 & 413	STACK	76			315
1965-MAY					
DP-146	STACK-DAY		80		
	STACK-NIGHT		32		
RM. 401	STACK		0		
	STACK			4	
DP-12	STACK-1		4		
	-2		4		
	-3		4		
	-4		0		
RM. 313	STACK				8
	INCINERATOR				1210
RM. 408 & 413	STACK				420

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JUNE 1965 - NOV. 1965

Prepared By	Initials	Date
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	1 Pu TOTAL d/m/M³	2 FISSION PRODUCTS TOTAL d/m/M³	3 U²³⁵ TOTAL d/m/M³
1965-JUNE			
STACK-DAY	176		
STACK-NIGHT	51		
STACK	0		
STACK		0	
STACK-1	16		
-2	12		
-3	8		
-4	4		
STACK			9
INCINERATOR			760
413 STACK			208
1965-JULY			
STACK-DAY	42		
STACK-NIGHT	16		
STACK	0		
STACK		0	
STACK-1	10		
-2	10		
-3	5		
-4	0		
STACK			48
INCINERATOR			5085
413 STACK			495
1965-AUG			
STACK-DAY	22		
STACK-NIGHT	18		
STACK	0		
STACK		0	
STACK-1	12		
-2	8		
-3	4		
-4	0		
STACK			276
INCINERATOR			5962
413 STACK			108

		10 Pu Total d/m/M³	11 Fission Products Total d/m/M³	
1965-SEPT				
DP-146	STACK-DAY	42		
	STACK-NIGHT	17		
RM. 401	STACK	0		
	STACK		0	
DP-12	STACK-1	16		
	-2	12		
	-3	8		
	-4	4		
RM. 313	STACK			
	INCINERATOR			
RM. 408 & 413	STACK			
1965-OCT				
DP-146	STACK-DAY	168		
	STACK-NIGHT	89		
RM. 401	STACK	0		
	STACK		0	
DP-12	STACK-1	15		
	-2	10		
	-3	5		
	-4	5		
RM. 313	STACK			
	INCINERATOR			
RM. 408 & 413	STACK			
1965-NOV.				
DP-146	STACK-DAY	160		
	STACK-NIGHT	112		
RM. 401	STACK	0		
	STACK		0	
DP-12	STACK-1	8		
	-2	4		
	-3	4		
	-4	4		
RM. 313	STACK			0.
	INCINERATOR			456
RM. 408 & 413	STACK			12

	Initials	Date
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DEC 1965 - MAY 1966

	1 Pu TOTAL d/m/M³	2 FISSION PRODUCTS TOTAL d/m/M³	3 U²³⁵ TOTAL d/m/M³
1965-DEC			
146 STACK-DAY	252		
STACK-NIGHT	288		
401 STACK	0		
STACK		0	
12 STACK-1	5		
-2	5		
-3	5		
-4	5		
313 STACK			200
INCINERATOR			420
408 & 413 STACK			75
1966-JAN			
146 STACK-DAY	189		
STACK-NIGHT	119		
401 STACK	0		
STACK		0	
12 STACK-1	0		
-2	0		
-3	0		
-4	0		
313 STACK			168
INCINERATOR			2247
408 & 413 STACK			196
1966-FEB			
146 STACK-DAY	228		
STACK-NIGHT	56		
401 STACK	0		
STACK		0	
12 STACK-1	4		
-2	4		
-3	4		
-4	4		
313 STACK			133
INCINERATOR			5814
408 & 413 STACK			184

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	10 Pu Total d/m/M³	11 FISSION PRODUCT Total d/m/M³
1966-MAR		
DP-146 STACK-DAY	115	
STACK-NIGHT	76	
RM. 401 STACK	0	
STACK		5
DP-12 STACK-1	12	
-2	8	
-3	4	
-4	4	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		
1966-APR		
DP-146 STACK-DAY	63	
STACK-NIGHT	48	
RM. 401 STACK	0	
STACK		0
DP-12 STACK-1	10	
-2	10	
-3	10	
-4	5	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		
1966-MAY		
DP-146 STACK-DAY	105	
STACK-NIGHT	68	
RM. 401 STACK	0	
STACK		0
DP-12 STACK-1	8	
-2	4	
-3	4	
-4	4	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		

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Prepared By	Initials	Date
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JUNE 1966 - NOV 1966

	1 Pu TOTAL d/m/M³	2 Fission Products TOTAL d/m/M³	3 U 235 TOTAL d/m/M³
1966-JUNE			
146 STACK - DAY	88		
STACK - NIGHT	72		
401 STACK	0		
STACK		0	
12 STACK - 1	12		
-2	12		
-3	8		
-4	4		
313 STACK			110
INCINERATOR			572
408 & 413 STACK			376
1966-JULY			
146 STACK - DAY	40		
STACK - NIGHT	60		
401 STACK	0		
STACK		0	
12 STACK - 1	10		
-2	10		
-3	10		
-4	5		
313 STACK			60
INCINERATOR			1100
408 & 413 STACK			92
1966-AUG			
146 STACK - DAY	115		
STACK - NIGHT	1387		
401 STACK	0		
STACK		0	
12 STACK - 1	12		
-2	12		
-3	8		
-4	4		
313 STACK			138
INCINERATOR			805
408 & 413 STACK			32

	10 Pu Total d/m/M³	11 Fission Products Total d/m/M³
1966-SEPT		
DP-146 STACK-DAY	42	
STACK-NIGHT	32	
RM. 401 STACK	0	
STACK		0
DP-12 STACK-1	35	
-2	30	
-3	20	
-4	10	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		
1966-OCT		
DP-146 STACK-DAY	21	
STACK-NIGHT	17	
RM. 401 STACK	0	
STACK		0
DP-12 STACK-1	12	
-2	12	
-3	8	
-4	4	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		
1966-NOV		
DP-146 STACK-DAY	20	
STACK-NIGHT	16	
RM. 401 STACK	0	
STACK		0
DP-12 STACK-1	4	
-2	4	
-3	4	
-4	4	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		

DEC 1966 - MAY 1967

	Pu TOTAL d/m/M³	FISSION PRODUCTS TOTAL d/m/M³	U^{235} TOTAL d/m/M³	4
1966 - DEC				
146 STACK - DAY	2			
STACK - NIGHT	16			
401 STACK	0			
STACK		0		
12 STACK - 1	15			
-2	8			
-3	10			
-4	5			
313 STACK			280	
INCINERATOR			285	
408 & 413 STACK			450	
1967 - JAN				
146 STACK - DAY	147			
STACK - NIGHT	102			
401 STACK	0			
STACK		4		
12 STACK - 1	12			
-2	16			
-3	16			
-4	8			
313 STACK			52	
INCINERATOR			116	
408 & 413 STACK			324	
1967 - Feb				
146 STACK - DAY	57			
STACK - NIGHT	14			
401 STACK	0			
STACK			4	
12 STACK - 1	28			
-2	28			
-3	16			
-4	16			
313 STACK				32
INCINERATOR				148
408 & 413 STACK				204

	Pu Total d/m/M³	FISSION PRODUCTS Total d/m/M³
1967 - MAR		
DP-146 STACK - DAY	23	
STACK - NIGHT	18	
RM. 401 STACK	0	
STACK		0
DP-12 STACK - 1	30	
-2	24	
-3	24	
-4	12	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		
1967 - APR		
DP-146 STACK - DAY	20	
STACK - NIGHT	16	
RM. 401 STACK		
STACK		
DP-12 STACK - 1	48	
-2	44	
-3	24	
-4	20	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		
1967 - MAY		
DP-146 STACK - DAY	66	
STACK - NIGHT	34	
RM. 401 STACK		
STACK		
DP-12 STACK - 1	124	
-2	136	
-3	164	
-4	116	
RM. 313 STACK		
INCINERATOR		
RM. 408 & 413 STACK		

Prepared By | Approved By | Initials | Date

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Prepared By	Initials	Date
Approved By		

JUNE 1967 - NOV 1967

	1 Pu TOTAL d/m/M³	2 FISSION PRODUCTS TOTAL d/m/M³	3 U 235 TOTAL d/m/M³
967-JUNE			
STACK-DAY	308		
STACK-NIGHT	119		
STACK			
STACK			
STACK-1	200		
-2	230		
-3	170		
-4	100		
STACK			28
INCINERATOR			130
413 STACK			25
967-JULY			
STACK-DAY	540		
STACK-NIGHT	75		
STACK			
STACK			
STACK-1	16		
-2	12		
-3	8		
-4	4		
STACK			8
INCINERATOR			2548
413 STACK			9
67-AUG			
STACK-DAY	207		
STACK-NIGHT	95		
STACK			
STACK			
STACK-1	25		
-2	20		
-3	20		
-4	5		
STACK			25
INCINERATOR			145
413 STACK			115

		10 Pu Total d/m/M³	11 FISSION PRODUCTS Total d/m/M³
1967-SEPT			
DP-146	STACK-DAY	40	
	STACK-NIGHT	30	
RM. 401	STACK		
	STACK		
DP-12	STACK-1	12	
	-2	8	
	-3	8	
	-4	4	
RM. 313	STACK		
	INCINERATOR		
RM. 408 & 413	STACK		
1967-OCT			
DP-146	STACK-DAY	22	
	STACK-NIGHT	0	
RM. 401	STACK		
	STACK		
DP-12	STACK-1	8	
	-2	4	
	-3	4	
	-4	0	
RM. 313	STACK		
	INCINERATOR		
RM. 408 & 413	STACK		
1967-NOV			
DP-146	STACK-DAY	40	
	STACK-NIGHT	16	
RM. 401	STACK		
	STACK		
DP-12	STACK-1	25	
	-2	15	
	-3	20	
	-4	15	
RM. 313	STACK		
	INCINERATOR		5
RM. 408 & 413	STACK		39

Dec. 1967 - May 1968

		Initials	Date
Prepared By			
Approved By			

	Pu TOTAL d/m/M³ (1)	FISSION PRODUCTS TOTAL d/m/M³ (2)	U^{235} TOTAL d/m/M³ (3)
967- DEC			
STACK - DAY	40		
STACK - NIGHT	15		
STACK			
STACK			
STACK - 1	24		
-2	8		
-3	4		
-4	2		
STACK			60
INCINERATOR			1880
413 STACK			12
68 - JAN			
STACK - DAY	22		
STACK - NIGHT	18		
STACK			
STACK			
STACK - 1	4		
-2	0		
-3	0		
-4	0		
STACK			60
INCINERATOR			732
413 STACK			12
8 - Feb			
STACK - DAY	20		
STACK - NIGHT	15		
STACK			
STACK			
STACK - 1	0		
-2	0		
-3	0		
-4	0		
STACK			25
INCINERATOR			125
413 STACK			5

		Pu Total d/m/M³ (10)	FISSION PRODUCTS Total d/m/M³ (11)
1968 - MAR			
DP-146	STACK - DAY	21	
	STACK - NIGHT	16	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	0	
	-2	0	
	-3	0	
	-4	0	
RM. 313	STACK		
	INCINERATOR		
RM. 408	413 STACK		
1968 - APR			
DP-146	STACK - DAY	22	
	STACK - NIGHT	0	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	4	
	-2	4	
	-3	8	
	-4	0	
RM. 313	STACK		
	INCINERATOR		
RM. 408	413 STACK		
1968 - MAY			
DP-146	STACK - DAY	0	
	STACK - NIGHT	0	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	10	
	-2	15	
	-3	5	
	-4	5	
RM. 313	STACK		
	INCINERATOR		
RM. 408	413 STACK		

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JUNE 1968 - NOV 1968

	Initials	Date
Prepared By		
Approved By		

		1 Pu TOTAL $d/m/M^3$	2 Fission Products TOTAL $d/m/M^3$	3 U^{235} TOTAL $d/m/M^3$
1968 – JUNE				
P-146	STACK - DAY	20		
	STACK - NIGHT	16		
.401	STACK			
	STACK			
P-12	STACK - 1	4		
	-2	0		
	-3	4		
	-4	0		
M.313	STACK			
	INCINERATOR			
4.408 & 413	STACK			
1968 – JULY				
P-146	STACK - DAY	22		
	STACK - NIGHT	0		
4.401	STACK			
	STACK			
P-12	STACK - 1	4		
	-2	4		
	-3	4		
	-4	0		
4.313	STACK			
	INCINERATOR			
.408 & 413	STACK			
1968 – AUG				
P-146	STACK - DAY	22		
	STACK - NIGHT	0		
.401	STACK			
	STACK			
-12	STACK - 1	16		
	-2	10		
	-3	10		
	-4	5		
.313	STACK			
	INCINERATOR			
.408 & 413	STACK			

		10 Pu Total $d/m/M^3$	11 Fission Produ[cts] Total $d/m/M$
1968 – SEPT			
DP-146	STACK - DAY	40	
	STACK - NIGHT	16	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	12	
	-2	4	
	-3	8	
	-4	0	
RM. 313	STACK		
	INCINERATOR		
RM. 408 & 413	STACK		
1968 – OCT			
DP-146	STACK - DAY	69	
	STACK - NIGHT	40	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	10	
	-2	5	
	-3	5	
	-4	10	
RM. 313	STACK		
	INCINERATOR		
RM. 408 & 413	STACK		
1968 – NOV			
DP-146	STACK - DAY	152	
	STACK - NIGHT	14	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	4	
	-2	4	
	-3	4	
	-4	0	
RM. 313	STACK		
	INCINERATOR		
RM. 408 & 413	STACK		

Prepared By	Initials	Date
Approved By		

DEC 1968 - MAY 1969

		1 Pu TOTAL d/m/M³	2 Fission Products TOTAL d/m/M³	3 U^{235} TOTAL d/m/M³
1968-DEC				
-146	STACK-DAY	21		
	STACK-NIGHT	14		
.401	STACK			
	STACK			
-12	STACK-1	8		
	-2	4		
	-3	4		
	-4	4		
.313	STACK			
	INCINERATOR			
.408 & 413 STACK				
1969-JAN				
-146	STACK-DAY	44		
	STACK-NIGHT	17		
.401	STACK			
	STACK			
-12	STACK-1	10		
	-2	10		
	-3	5		
	-4	5		
.313	STACK			
	INCINERATOR			
.408 & 413 STACK				
1969-Feb				
-146	STACK-DAY	57		
	STACK-NIGHT	15		
.401	STACK			
	STACK			
-12	STACK-1	8		
	-2	4		
	-3	4		
	-4	4		
.313	STACK			
	INCINERATOR			
408 & 413 STACK				

		10 Pu Total d/m/M³	11 Fission Produc[ts] Total d/m/M³
1969-MAR			
DP-146	STACK-DAY	20	
	STACK-NIGHT	16	
RM. 401	STACK		
	STACK		
DP-12	STACK-1	8	
	-2	4	
	-3	4	
	-4	4	
RM.313	STACK		
	INCINERATOR		
RM. 408 & 413 STACK			
1969-APR			
DP-146	STACK-DAY	66	
	STACK-NIGHT	18	
RM. 401	STACK		
	STACK		
DP-12	STACK-1	4	
	-2	4	
	-3	4	
	-4	0	
RM. 313	STACK		
	INCINERATOR		
RM. 408 & 413 STACK			
1969-MAY			
DP-146	STACK-DAY	231	
	STACK-NIGHT	32	
RM. 401	STACK		
	STACK		
DP-12	STACK-1	10	
	-2	5	
	-3	5	
	-4	0	
RM. 313	STACK		
	INCINERATOR		
RM. 408 & 413 STACK			

JUNE 1969 - NOV 1969

Prepared By	Initials	Date
Approved By		

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	Pu TOTAL d/m/M³	Fission Products TOTAL d/m/M³	U²³⁵ TOTAL d/m/M³
1969 - JUNE			
STACK - DAY	84		
STACK - NIGHT	107		
STACK			
STACK			
STACK - 1	12		
-2	8		
-3	4		
-4	4		
STACK			
INCINERATOR			
& 413 STACK			
69 - JULY	189		
STACK - DAY	85		
STACK - NIGHT			
STACK			
STACK			
STACK - 1	28		
-2	16		
-3	16		
-4	12		
STACK			
INCINERATOR			
& 413 STACK			
- AUG			
STACK - DAY	588		
STACK - NIGHT	126		
STACK			
STACK			
STACK - 1	40		
-2	20		
-3	15		
-4	5		
STACK			
INCINERATOR			
413 STACK			

		Pu Total d/m/M³	Fission Products Total d/m/M³
1969 - SEPT			
DP-146	STACK - DAY	777	
	STACK - NIGHT	64	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	72	
	-2	44	
	-3	32	
	-4	12	
RM. 313	STACK		
	INCINERATOR		
RM. 408	& 413 STACK		
1969 - OCT			
DP-146	STACK - DAY	966	
	STACK - NIGHT	108	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	105	
	-2	80	
	-3	44	
	-4	24	
RM. 313	STACK		
	INCINERATOR		
RM. 408	& 413 STACK		
1969 - NOV			
DP-146	STACK - DAY	1242	
	STACK - NIGHT	154	
RM. 401	STACK		
	STACK		
DP-12	STACK - 1	20	
	-2	16	
	-3	4	
	-4	4	
RM. 313	STACK		
	INCINERATOR		
RM. 408	& 413 STACK		

		Prepared By	Approved By
Initials			
Date			

1969-DEC	Pu Total d/m/M³	Fission Products Total d/m/M³	U^{235} Total d/m/M³		Pu Total d/m/M³	Fission Product Total d/m/M³
146 STACK-DAY	1518			DP-146 STACK-DAY		
STACK-NIGHT	416			STACK-NIGHT		
401 STACK				RM. 401 STACK		
STACK				STACK		
12 STACK-1	30			DP-12 STACK-1		
-2	25			-2		
-3	15			-3		
-4	10			-4		
313 STACK				RM. 313 STACK		
INCINERATOR				INCINERATOR		
408 & 413 STACK				RM. 408 & 413 STACK		
146 STACK-DAY				DP-146 STACK-DAY		
STACK-NIGHT				STACK-NIGHT		
401 STACK				RM. 401 STACK		
STACK				STACK		
12 STACK-1				DP-12 STACK-1		
-2				-2		
-3				-3		
-4				-4		
313 STACK				RM. 313 STACK		
INCINERATOR				INCINERATOR		
408 & 413 STACK				RM. 408 & 413 STACK		
146 STACK-DAY				DP-146 STACK-DAY		
STACK-NIGHT				STACK-NIGHT		
401 STACK				RM. 401 STACK		
STACK				STACK		
12 STACK-1				DP-12 STACK-1		
-2				-2		
-3				-3		
-4				-4		
313 STACK				RM. 313 STACK		
INCINERATOR				INCINERATOR		
408 & 413 STACK				RM. 408 & 413 STACK		

JAN 1970 - APRIL 1970

	Prepared By	Approved By
Initials		
Date		

	Total M^3	Total d/m	AVERAGE d/m/M^3
IN-1970			
STACK-1	2822	5764	2.04
-2	2822	4034	1.42
-3	2822	2392	0.85
-4	2822	2066	0.73
STACK	686	144	0.21
INCINERATOR	686	13576	19.79
STACK	686	15524	22.63
STACK-DAY	565	25635	45.37
STACK-NIGHT	914	5546	6.07
STACK-NE	686	206	0.30
-NW	686	36	0.06
-SE	686	30	0.04
-SW	686	22	0.04
1970			
STACK-1	2258	8640	3.83
-2	2258	4720	2.09
-3	2258	1347	0.60
-4	2258	1574	0.70
STACK	543	306	0.56
INCINERATOR	6543	6210	0.95
STACK	543	1582	2.91
STACK DAY	887	18752	21.14
STACK-NIGHT	646	2353	3.64
STACK-NE	428	514	1.20
-NW	428	16	0.04
-SE	428	18	0.04
-SW	428	12	0.03
STACK	1179	186	0.16

		TOTAL M^3	Total d/m	A…
MAR-1970				
DP-12	STACK-1	2258	10588	4
	-2	2258	7180	
	-3	2258	15400	0
	-4	2258	5932	2
RM.413	STACK	572	202	0
RM.313	INCINERATOR	572	3232	5
	STACK	572	11708	20
DP-146	STACK-DAY			
	STACK-NIGHT			
DP-EAST	STACK-NE	572	280	0
	-NW	572	20	0
	-SE	572	34	0
	-SW	572	48	0
DP-5	STACK	2258	472	0
APRIL-1970				
DP-12	STACK-1	2822	8680	3
	-2	2822	7142	2
	-3	2822	12838	4.
	-4	2822	5112	1.
RM.413	STACK	714	1248	1.
RM.313	INCINERATOR	714	846	1.
	STACK	714	6594	9.
DP-146	STACK-DAY			
	STACK-NIGHT			
DP-EAST	STACK-NE	714	850	1.
	-NW	714	404	0.
	-SE	714	30	0.
	-SW	714	76	0.
DP-5	STACK	2822	180	0.

Prepared By	Initials	Date
Approved By		

MAY 1970 - AUG 1970

		Total M^3	Total d/m	AVERAGE d/m/M^3
MAY 1970				
DP-12	STACK-1	2823	6412	2.27
	-2	2823	3556	1.26
	-3	2823	3260	1.15
	-4	2823	1940	0.69
RM. 413	STACK	543	830	1.53
RM. 313	INCINERATOR	685	502	0.73
	STACK	543	3960	7.29
DP-146	STACK-DAY			
	STACK-NIGHT			
DP-EAST	STACK-NE	685	1678	2.45
	-NW	685	38	0.06
	-SE	685	28	0.04
	-SW	685	66	0.10
DP-5	STACK	2823	189	0.07
JUNE 1970				
DP-12	STACK-1	2258	6336	2.81
	-2	2258	3522	1.56
	-3	2258	3374	1.49
	-4	2258	1222	0.54
RM. 413	STACK	571	282	0.49
RM. 313	INCINERATOR	571	602	1.05
	STACK	571	3658	6.41
DP-146	STACK DAY			
	STACK NIGHT			
DP-EAST	STACK-NE	571	432	0.76
	-NW	571	30	0.05
	-SE	571	20	0.03
	-SW	571	40	0.07
DP-5	STACK	2258	244	0.11

		TOTAL M^3	Total d/m
JULY 1970			
DP-12	STACK-1	2822	8794
	-2	2822	3798
	-3	2822	5360
	-4	2822	4298
RM. 413	STACK	687	316
RM. 313	INCINERATOR	687	1994
	STACK	687	2820
DP-146	STACK-DAY		
	STACK-NIGHT		
DP-EAST	STACK-NE	687	110
	-NW	687	88
	-SE	687	20
	-SW	687	24
DP-5	STACK	2822	104
AUG 1970			
DP-12	STACK-1	2258	22090
	-2	2258	8238
	-3	2258	8294
	-4	2258	4330
RM. 413	STACK	571	238
RM. 313	INCINERATOR	571	3106
	STACK	571	3518
DP-146	STACK-DAY		
	STACK-NIGHT		
DP-EAST	STACK-NE	571	44
	-NW	571	50
	-SE	571	11
	-SW	571	16
DP-5	STACK	2258	144

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	Initials	Date
Prepared By		
Approved By		

SEPT 1970 - DEC 1970

	1 Total M^3	2 Total d/m	3 AVERAGE d/m/M^3
PT 1970			
12 STACK-1	[illegible]	12522	5.55
-2	2258	7668	3.40
-3	[illegible]	2784	1.62
-4	[illegible]	3610	1.60
13 STACK	542	138	0.25
13 INCINERATOR	542	1854	3.42
STACK	542	4988	9.20
6 STACK-DAY			
STACK-NIGHT			
ST STACK-NE	542	58	0.11
-NW	542	196	0.36
-SE	542	40	0.07
-SW	542	38	0.07
5 STACK	2258	130	0.06
CT 1970			
2 STACK-1	2822	13784	4.88
-2	2822	7194	2.55
-3	[illegible]	19887	7.05
-4	[illegible]	19408	6.88
3 STACK	714	840	1.18
3 INCINERATOR	714	2480	3.47
STACK	714	3774	5.29
6 STACK DAY			
STACK-NIGHT			
ST STACK-NE	714	267	0.37
-NW	714	26	0.04
-SE	714	12	0.02
-SW	714	54	0.08
STACK	2822	212	0.07
57 SALAMANDER	486	105	0.21

4	5 Total M^3	6 Total d/m	7 Ave. d/m/M^3
DP-257 SALAMANDER	248	138	0.56
DP-257 SALAMANDER	227	63	0.03

8	9	10 TOTAL M^3	11 Total d/m
NOV. 1970			
DP-12	STACK-1	2258	8065
	-2	2258	5753
	-3	2258	2259
	-4	2258	1823
RM. 413	STACK	514	243
RM. 313	INCINERATOR	514	1959
	STACK	514	3321
DP-146	STACK-DAY		
	STACK-NIGHT		
DP-EAST	STACK-NE	514	148
	-NW	514	34
	-SE	514	11
	-SW	514	15
DP-5	STACK	2258	113
DEC. 1970			
DP-12	STACK-1	2822	12965
	-2	2822	6106
	-3	2822	3823
	-4	2822	2752
RM. 413	STACK	641	845
RM. 313	INCINERATOR	641	2578
	STACK	641	823
DP-146	STACK-DAY		
	STACK-NIGHT		
DP-EAST	STACK-NE	643	1029
	-NW	643	73
	-SE	643	23
	-SW	643	154
DP-5	STACK	2822	113
DP-257 SALAMANDER		354	39.6

1971 - Total µCi Discharged

FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
90.7	115.	59.74	95.29	200.13	55.47	66.85	70.40	50.49	42.67	57.60
4.30	1.4	0.25	0.12	0.36	0.12	0.09	0.48	0.49	0.12	0.07
26.1	25.4	34.76	39.16	39.46	109.35	92.18	10.87	10.62	0.61	0.95
49.2	181.6	6.49	8.07	9.77	50.8	43.55	73.46	132.76	171.14	79.15
0.21	0.23	1.73	3.76	24.05	0.90	1.12	1.09	0.32	0.24	0.84
4.21	5.0	2.27	1.00	2.48	4.64	15.9	14.43	18.03	60.89	12.96
					0.01	0.001	0.004	0.001	0.0006	0.001
7.05	4.44	4.74	0.03	0.42	0.32	0.53	0.74	2.32	1.37	1.16
0.26	0.01	0.04	0.01	0.08	0.03	0.03	0.05	0.015	0.004	0.015
2×10^4	9100.	0.7 Curies	—	0.8 Curies	0.64 Curies	0.27 Curies	7.7×10^5	1.6 Curies	—	—
0.02	0.003	0.001	0.02	0.001	—	0.05	0.04	0.009	0.07	0.02

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CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 3N

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Exceeds NMEID Regs?
ACETONITRILE	000075-05-8	1.68	4530	22650	N
ALLYL CHLORIDE	000107-05-1	0.04	400	2000	N
ALUMINUM OXIDE	001344-28-1	0.00	1330	1330	N
CARBON TETRACHLORIDE	000056-23-5	0.00	1680	1680	N
CHLOROFORM	000067-66-3	0.66	1300	6500	N
ETHYL ETHER	000060-29-7	3.00	160000	800000	N
FLUORIDES, AS F	016984-48-8	0.53	333	1665	N
HEPTANE (N-HEPTANE)	000142-82-5	1.44	46700	233500	N
HEXANE (N-HEXANE)	000110-54-3	13.95	24000	120000	N
HYDROGEN CHLORIDE	007647-01-0	3.60	933	4665	N
HYDROGEN PEROXIDE	007722-84-1	2.80	200	1000	N
HYDROGEN SULFIDE	007783-06-4	0.00	1870	1870	N
ISOPROPYL ALCOHOL	000067-63-0	3.30	131000	655000	N
PHOSPHOROUS PENTACHLORIDE	010026-13-8	0.05	133	665	N
POTASSIUM HYDROXIDE	001310-58-3	1.10	267	1335	N
PYRIDINE	000110-86-1	0.00	2000	2000	N
SULFURIC ACID	007664-93-9	12.00	133	665	N
TETRAHYDROFURAN	000109-99-9	0.63	78700	393500	N
TOLUENE (TOLUOL)	000108-88-3	0.61	50000	250000	N

DATE: July 31, 1990

CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 4

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Exceeds NMEID Regs
ACETONE	000067-64-1	26.00	78700	393500	N

DATE: July 31, 1990

CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 150

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Excee NMEID R
AMMONIA	007664-41-7	15.00	2400	12000	N
HYDROGEN CHLORIDE	007647-01-0	45.00	933	4665	N
METHYL ALCOHOL	000067-56-1	300.00	34700	173500	N
SODIUM HYDROXIDE	001310-73-2	0.00	267	267	N

DATE: July 31, 1990

CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 152

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Excee NMEID R
ACETONE	000067-64-1	69.00	78700	78700	N
HYDROGEN CHLORIDE	007647-01-0	370.00	933	933	N
KEROSENE	008008-20-6	6.70	13300	13300	N
NITROUS OXIDE	010024-97-2	2.00	5990	5990	N

DATE: July 31, 1990

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CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 155N

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Excee NMEID R
WELDING FUMES	000333-33-3	8.52	667	12673	N

DATE: July 31, 1990

CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 209

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Excee NMEID R
ACETONE	000067-64-1	20.00	78700	78700	N
ISOPROPYL ALCOHOL	000067-63-0	6.60	131000	131000	N
POTASSIUM HYDROXIDE	001310-58-3	0.00	267	267	N

DATE: July 31, 1990

CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 210

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Exce NMEID
ACETONE	000067-64-1	33.00	78700	393500	N
HYDROGEN CHLORIDE	007647-01-0	0.33	933	4665	N
MANGANESE AS MN	007439-96-5	0.00	133	133	N
N-BUTYL ACETATE	000123-86-4	0.10	94700	473500	N
NICKEL	007440-02-0	0.00	13.3	13.3	N
NITRIC ACID	007697-37-2	0.39	667	3335	N
OXALIC ACID	000144-62-7	0.00	133	133	N

DATE: July 31, 1990

CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 257

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Exc NMEID
SODIUM HYDROXIDE	001310-73-2	0.00	267	267	N

DATE: July 31, 1990

CHEMICAL EMISSIONS SUMMARY
LOS ALAMOS NATIONAL LABORATORY
TECHNICAL AREA 21
BUILDING 357

Pollutant	CAS #	Uncontrolled Emissions (lb/yr)	Threshold	Adjusted Threshold	Exceeds NMEID Regs
SULFURIC ACID	007664-93-9	0.38	133	133	N

DATE: July 31, 1990

(4) SWMU #21-020, Decommissioned Filter Houses

(a) SWMU #21-020(A): TA-21-12

Stack emission data for TA-21-12 is presented in Tables XIV and XV. This data shows that TA-21-12 made a significant contribution to stack emissions of plutonium at TA-21. For example, for the years 1951, 1952, and 1953, Building 12 accounted for 32%, 38% and 24% of the annual stack emissions for all of DP West of 2.04, 2.85 and 2.14 Ci of Pu^{239}, respectively (Table XV). Although Building 12 continued in service until only February 1973, the 1973 Laboratory records (Valentine, 1974) show that the four stacks emitted a total of 1370.50 μCi Pu^{239} for this year (Table XIV), considerably lower levels than in the 1940s and 1950s. In comparison, all of the other stacks at TA-21 emitted only 6.41 μCi Pu^{239} in 1973.

Upon the decommissioning of this building, soil was removed to an approximate depth of 30 cm below the building. Core samples were taken and analyzed; the readings indicated 1.3 to 70 pCi/g of plutonium 239. The area was backfilled with soil, a composite of which contained 1.3 +/- 0.1 pCi/g plutonium (Christenson et al., 1975). With the exception of DP-402, an open shed, along the northern most line of where the building was, the area remains vacant. The area is covered with dirt and has a small driveway across its breath for access to DP-286.

(b) SWMU #21-020(B): TA-21-153

Stack emission data for TA-21-153 is presented in Tables XIV and XV. Upon decommissioning, soil under and around this facility were removed until the entire area was < 30 pCi Gross alpha/g soil (the detection limit of the Laboratory's ZNS system), according to the final Laboratory report (Harper and Garde, 1981).

(5) SWMU #21-021, Stack Emissions

The following table presents the range and average concentrations of ^{238}Pu, ^{239}Pu, ^{90}Sr, and $^{239}Pu/^{90}Sr$ activity ratio in referenced soils that could be attributed to world-wide fallout in the area (Table XVI).

In Kennedy and Purtymun's study, soil samples were collected from locations 1 through 12 in January-February 1970 (Fig. 21-50). The samples were taken from flat undisturbed areas to avoid concentration or dilution by wash from storm runoff, or contribution by past LASL activities. The samples were collected from a 4 by 4 in. area to a depth of 2 in. The analytical results of soils for ^{238}Pu indicated that samples from locations 3, 4, 5, 8, and 11 contained concentrations of ^{238}Pu in excess of that expected from world-wide fallout. The locations of these sampling stations show that the source of the ^{238}Pu may be from stack emissions at TA-21.

The analytical results of soils for ^{239}Pu indicated that samples from locations 1, 2, 3, 5, 8, 9, 12, and perhaps 7, contained concentrations of ^{239}Pu in excess of that expected from world-wide fallout. The location of the sampling stations in relation to the concentrations indicates that stack emissions are the source of the ^{239}Pu. The concentrations decrease with increased distance from the stacks.

Initially, the ^{90}Sr analyses were performed to distinguish world-wide fallout from local material by activity ratio $^{239}Pu/^{90}Sr$. The ratio method proved invalid for this area because of traces of ^{90}Sr

Table XVI. World-wide Fallout Data (Kennedy and Purtymun, 1971).

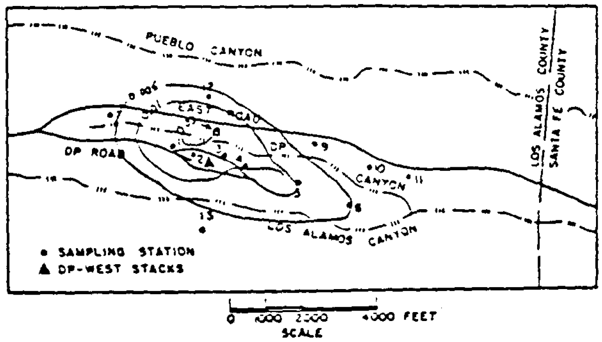
Isotope or Activity Ratio	Number of Samples	Concentrations dpm/g Range	Concentrations dpm/g Average
^{238}Pu	19	0.001-0.008	0.003
^{239}Pu	20	0.001-0.051	0.021
^{90}Sr	18	0.152-1.921	0.711
$^{239}Pu/^{90}Sr$	18	0.003-0.138	0.038

added to the soils by activities in the area many years ago. Short-lived gamma emitting isotopes were used as tracers in atmospheric release experiments done before 1962. These were separated from mixed fission products and contained a trace of ^{90}Sr that was carried over into the experiment. This same ^{90}Sr was also released to the atmosphere along with the gamma tracer. Any ^{90}Sr found locally is under suspicion of originating from other than world-wide fallout. Samples from locations 4 and 5 contain concentrations of ^{90}Sr that cannot be attributed tow world-wide fallout or stack emissions from TA-50.

The $^{239}Pu/^{90}Sr$ activity ratios in samples from locations 6, 7, 9, 10, and 11 are generally equivalent to ratios found by other laboratories in world-wide fallout. The activity ratios in samples from locations 1, 2, 3, 8, and 12 reflect the ^{239}Pu emissions from stacks at TA-21. The ratio from the samples from locations 4 and 5 are anomalous due to excessive ^{90}Sr.

An estimate of the ^{239}Pu deposition in soils was made by using average concentrations in $\mu Ci/m^2$ of the two sets of samples collected at each location during 1970. Isoplutonium contours were constructed at 0.005, 0.01, and 0.05 $\mu Ci/m^2$ (Fig. 21-59). The estimated deposition of ^{239}Pu within the 0.005 $\mu Ci/m^2$ contour was 0.026 Ci or about 0.42 g.

The Kennedy and Purtymun study indicates that plutonium is being deposited from stack emissions at TA-21. In general, the plutonium concentrations decrease with increased distance from the stacks. The deposition of ^{239}Pu in the area was estimated to be 0.42 g. Traces of strontium above world-wide fallout values occurred in soils at some of the locations. The strontium is not from stack emission but is the result of past activities that were suspended in 1970.



21-59

Fig. 2. Isoplutonium ^{239}Pu contours around DP-West stacks, contour values in $\mu Ci/m^2$.

(6) SWMU #21-025, Off Gas System

The stack data available for this SWMU is summarized in Table XIV.

E. Storm Drain Surface Discharges

No data available.

3.1.1.2 Migration Pathways

Section 2.3.2 provides a macroscopic discussion of all pathways for containment migration. Insufficient data are currently available to eliminate any potential transport pathway. Additional data needs are discussed in section 3.1.2.2. Therefore, this section qualitatively discusses potential pathways and their relative importance at the sites occupied by the surface units aggregate.

A. Surface Pathway

The primary potential migration pathway for the subaggregates belonging to (1) the aboveground tanks and container storage areas (Tables II and III), (2) the surface disposal areas (Table IV) and (3) the storm drain surface discharges (Table VIII) is the surface pathway, because contaminants were either discharged or potentially discharged directly to the soil. Evidence for migration within all of these locations (Tables II, III, IV and VIII) only exists for only three SWMU subunits: #21-003, #21-004(D), and #21-013(D), as well as the 10th newly discovered container storage area listed in Table III (which is discussed under the MDA-A SWMU).

The surface pathway would be important in the cases of all of the SWMUs except these three as containers rusted, were breached, or were knocked over, adding their contents directly to the site. The outsides of the containers could also have been accidentally contaminated with wastes, which could have been directly (physically) deposited on the site's topsoil or leached (by natural precipitation) off of the container onto the soil. The topsoil at the surface disposal sites could have received wastes originally in the building debris and materials deposited at their surfaces (Table IV).

The migration scenario for the storm drain surface discharges probably first involved precipitation falling on contaminated roofs, paved areas, and local topsoils. This precipitation probably either physically removed or solubilized some portion of the waste inventory which had been deposited on these surfaces and transported the wastes via runoff along and through the surface drainage systems, which emptied into DP and Los Alamos Canyons.

A small amount of field information is available for the three previously-mentioned SWMUs. Although nothing is known about contamination of the PCB storage area (SWMU #21-003) before the curbed asphalt pad was emplaced in 1981, cracks in the pad after this date could have resulted in wastes penetrating the asphalt pad. The PCB data presented in Figure 21-55 indicates that although the highest PCB concentrations were found on the asphalt pad, several soil samples were collected between the pad and Los Alamos Canyon which had elevated PCB levels. This would imply surface migration in and around this entire area via runoff.

SWMU #21-004(D) received discharges of transuranic wastes from TA-21-223 (Garde, 1975). These discharges would probably have involved small amounts of liquid wastes which probably would have been directly deposited on the south wall of DP Canyon and on the soils in the canyon south of the active stream channel. Local runoff events probably would not result in soil erosion losses from these locations because of the high hydraulic conductivity of the local topsoils, the extensive plant cover, and the elevations of these areas relative to the stream channel.

SWMU #21-013(D) contained a pit, which could have received precipitation, which would have come into direct contact with the wastes if a landfill cover was not emplaced over this pit. Surface runoff could have resulted in local waste migration at this site, as well as migration into the runoff diversion areas leading directly into DP Canyon north of MDA-T.

B. Subsurface pathway

The primary pathways for the sewage treatment plant subaggregate (Table V) is the subsurface pathway because of the liquid effluents discharged directly to (1) the soils in DP Canyon from the treatment plant (SWMU #21-026(A) and (2) the tuff underlying the unlined sludge drying beds (SWMU #21-026(B)). The only information available to access migration at these locations is the source term data presented in Tables IX and X for TA-21-227 and in Tables XI and XII for TA-21-230.

According to the NPDES permit, TA-21-227 should be discharging an average of 17,000 gallons/day to DP Canyon, with a maximum discharge of 42,500 gallons/day (Table IX). Occasionally this plant discharged more than the maximum permissible rate, such in November 1978 (47 TGD) and in

September 1983 (55.4 TGD), according to the 1978-1990 records summarized in Table IX. Similar information is available before 1978 because Pan Am destroyed these Zia records in the late 1980s (Barnett, 1990). The Environmental Surveillance data on the radionuclide assays on the effluent samples show maximum gross alpha, gross beta, and tritium results of 120 (August 1976), 92 (May, 1977), and 34,8000 (November-December, 1979) pCi/L, respectively (Table X). Maximum gross gamma assays for this effluent stream were 1600 pCi/L in May 1988.

The radionuclide assays performed on the sludge samples (Table XI) show a great deal of variability with time. Maximum gross alpha concentrations of 21,000 pCi/g were found on samples collected on March 8, 1982. Maximum gross beta concentrations of 430 pCi/g were found on this same date, but the maximum gross gamma assay results (2050 cpm/g) were found on July 2, 1979 (Table XI).

No data is available on the concrete chlorine contact tank, but water and contaminants from the effluent stream could migrate through the concrete into the underlying backfill and tuff.

C. Airborne pathway

The primary pathway for the subaggregate containing the incinerators, stacks and filter houses (Table VI) is the airborne pathway because of the stack emissions discharged directly to the atmosphere at TA-21.

Optimally, the migration pathway for stack emissions would be performed by determining both the source term information presented in Section 3.1.1.1 and by tracking airborne contaminants spatially and temporally through an extensive network of sampling stations. In actuality, there has only been one continuously operating air sampling station at DP West and it has only been in operation since 1970 (Kennedy et al., 1971). However, if all of the transport processes involved followed first order kinetics, the source data presented in Tables XIV and XV seems to imply that the most important time periods to try to evaluate would be from 1946 to 1973 for SWMU #21-007, 21-008 (as well as the newly-discovered incinerator), 21-019 (as well as the additional 16 stacks identified in Table VI), #21-020, and #21-021. Since the tritium off gas systems (SWMU #21-025) are serviced by the stacks listed in #21-019, the same analysis would be applicable to this SWMU.

In the absence of the detailed monitoring data collected frequently with time mentioned earlier, ground deposition studies, such as the one by Kennedy and Purtymun (1971), can be used to evaluate the airborne pathway. The results of this study (with its minimal number of samples), in conjunction with the surface soil sampling results reported for each of the MDAs at TA-21 (old A411 DOE project results), make the case that extensive airborne contamination occurred within several portions of DP mesa. The soil radionuclide data from stable land positions (minimal water erosion) outside of the MDAs consistently shows the influence of long-term local fallout levels of plutonium and americium. The soil concentrations of these transuranics are (1) consistently above natural worldwide fallout levels detected in soil samples collected far away from the Laboratory, and (2) distributed throughout the entire 30-cm deep soil profiles investigated, where the 0-1, 1-10, and 10-30 cm depths were sampled.

The other pathway involved with this entire subaggregate would be the surface transport pathway previously discussed after ground deposition of airborne wastes had occurred.

D. Biotic pathway

This pathway has not been evaluated because there have been no plant or animal data available for any of the five subaggregates where the specific source terms have been identified. The only data available for TA-21 which involves the biotic pathway involves the MDAs and the liquid effluents from TA-21-257 in DP and Los Alamos Canyons.

3.1.1.3 Potential Public Health and Environmental Impacts

Data collected during site characterization will be used for risk assessment to be performed in the RFI report.

3.1.1.4 Preliminary Identification of Potential Response Actions

In the report from HydroGeoLogic (1989) a series of remedial actions were proposed for plutonium movement from the absorption beds at TA-21. These actions represented a good overview of potential responses that may be considered for the surface units at TA-21, and they will be presented here in an abbreviated form. These preliminary remedial actions were proposed primarily for the plutonium and americium at the site, and other chemicals, organic or inorganic, may not be contained or removed by the proposed remediation.

No action. In this alternative, the site is not treated in any manner to prevent transport of any chemicals. It will serve as a basis for comparison with other alternatives.

Removal. This alternative includes removing the contaminated source material and disposing of it in an EPA approved and/or NRC approved waste disposal site for hazardous, low-level radiation, transuranic radiation or mixed wastes depending on the contaminants present. If radionuclides and other contaminants are found at extensive depths, or over extensive areas, the amount of material requiring removal can be quite extensive. Soil washing techniques can be incorporated with this approach to reduce the volume of material to be moved.

Surface capping and monitoring. Capping of the surface with natural materials to reduce erosion and to control water flow beneath the surface is an alternative currently being studied at MDA-B. Various configurations using surface rock mulch for erosion control and vegetation and hydraulic barriers for subsurface water control have been shown to be effective at limiting water infiltration into waste material and surface removal of soil to prevent waste exposure (Nyhan and Barnes, 1989; Nyhan et al., 1989). This has the benefit of limiting exposure by the air, surface water, and subsurface water pathways. Used in conjunction with monitoring, this alternative represents a readily available technology.

Vapor extraction. This alternative involves either the pumping of dry air into the unsaturated rock beneath TA-21, pumping air from the formation, a combination of these two, or using barometric pressure changes to pump the formation. By passing relatively dry air through the porous media, water is removed by evaporation, and the driving force for subsurface migration is reduced. It may also be possible to heat the air to increase its drying capacity. This method would require some testing for development and optimization. Treatability studies may be appropriate.

Thermal techniques. These include freezing and heating modes to reduce contaminant mobility. Freezing techniques bring the soil temperature below $0^{o}C$ to immobilize water and contaminants. The alternatives using heat are sintering and vitrification. Sintering involves partial melting of the porous media so that the contaminants and solid material become a stable resistant mass. Sintering uses combustion of gases injected through boreholes penetrating the zone to be treated. Vitrification uses electrodes and melts the porous media by resistance heating between the electrodes. Melting is complete and contaminants are solidified into a vitrified mass.

Chemical barriers. Clays or other minerals such as iron and manganese oxides can be used to form a barrier of highly adsorbent material to retard radionuclide migration. Development of techniques to place the material ahead of the plume is needed. Also, coating of the pores by introducing a chemical that precipitates on the pore walls is another chemical means of remediation.

Grout. Grouts can be injected to reduce flow path permeability. These can be combined with chemical barriers to enhance performance.

3.1.1.5 Bench and Pilot Scale Studies

Data related to capping strategies at MDA-B will be analyzed for that task, and pertinent results may be applied to the surface units aggregate when they are available. Many of the other potential remedial alternatives will require treatability studies before being applied to this aggregate at TA-21.

3.1.2 Data Needs

3.1.2.1 Source term

Critical to conducting a pathways analysis is knowledge of the mass of any constituent. The primary focus of the source term characterization is to determine the mass and spatial distribution of contaminants, particularly the transuranics. In addition, other inorganic or organic chemicals may be present and these must be identified and quantified.

One critical data need along these lines is related to the airborne stack emission source term data (Tables XIV and XV). This stack emission data should be compared with the losses in plutonium inventories maintained by the Laboratory fabrication/handling groups.

Disposal of the material underground means that drilling will be required to locate the current extent of contamination. In characterizing the source term, horizontal or slant holes are suggested to provide more coverage both laterally and with depth.

Another data need is to identify the chemical species, particularly for the actinides, because different species of a given element are retarded differently.

To summarize, data required to refine the source term are mass of each constituent, spatial distribution particularly for the radionuclides, and identification of any other contaminants. This data is missing for most of the SWMUs in the surface units aggregate.

3.1.2.2 Migration pathways

These will be divided into surface and subsurface pathways to facilitate discussion. The surface pathway includes both air and surface water, and the subsurface pathway currently considers needs for water flow. It is not known if volatile compounds other than tritium are present at the surface aggregate's sites, so until this has been discerned the magnitude and impact of vapor migration are unknown.

(A) Surface pathway

Data needs for the air pathway include surface contaminant distribution, and distribution by particle size. Meteorological data are collected near TA-21 as part of the environmental surveillance network at LANL. This should provide sufficient information to conduct the air pathways analysis.

For the surface water pathway, contaminants can be transported either in a soluble, sorbed or particulate form. Data required to determine surface runoff response are duration, intensity, frequency and total precipitation, antecedent soil moisture, and soil physical properties. These soil properties include hydraulic conductivity, soil water characteristic curves, bulk density, and particle density. Surface water runoff will flow from the mesa top at TA-21 into Los Alamos and DP Canyons on both sides of the mesa. From these points the water and associated contaminants can be transported through the channel systems in the canyons. It must be determined if the TA-21 task will include the transport analyses for the canyons or if this will be done as part of the ER task on canyons. If the analysis on the canyon is to be done, then data needs will include channel hydraulic roughness, particle size distribution of bed material, channel length and width, and channel infiltration characteristics.

(B) Subsurface pathway

The unsaturated zone beneath TA-21 is 350.5 m (1150 ft) deep. Characterization of the subsurface pathway involves identifying the physical and chemical properties that control transport. The importance of biological processes on radionuclides are primarily plant uptake and animal ingestion. For organic compounds, transformation of chemicals by biologic reactions is possible, but without any further evidence of the organic chemicals present, this transformation will not be discussed any further.

During source characterization activities holes will be drilled into the surface unit aggregate sites to determine the vertical and horizontal extent of contamination. In addition, samples will need to be collected by stratigraphic unit, and the following physical properties will be measured:

- saturated hydraulic conductivity,
- porosity,
- particle size distribution
- actual gravimetric moisture content,
- soil water characteristic curve,
- unit thickness, and
- particle density.

These data will define the parameters required to analyze the flow of water in the unsaturated zone. Also, data will be collected in sufficient detail to determine the effects of stratification on unsaturated flow.

The spatial variability of the parameters both vertically and horizontally means that 20-30 samples from each unit will be required to define the distribution of some of these properties. The soil water characteristic curve in conjunction with the saturated hydraulic conductivity can be used to estimate the variation of hydraulic conductivity with water content. An additional data need would be to conduct characterization of selected samples to verify estimated values of hydraulic conductivity at given water contents against measured values to confirm the soil water characteristic predictions. One concern about samples collected during this phase is the fact that the core may be contaminated with radioactive material and facilities will need to be available to conduct the tests with contaminated core.

In addition to the parameters governing unsaturated flow, the initial and boundary conditions are needed to specify the problem.

Initial conditions will be defined by determining the actual water content from drill hole cores. The lower boundary condition can be defined by the water table or, if required, a lower unit in the saturated zone. The surface boundary is very complex and difficult to measure. Water that infiltrates can be returned by evapotranspiration, remain in storage, or percolate into the tuff as recharge. This recharge component is difficult to measure because of the large lateral spatial variability and temporal variability in parameters and inputs controlling recharge. The water balance approach can be used to estimate recharge, but errors in the calculation of evapotranspiration make the estimate highly uncertain. When conducting the subsurface pathway analysis, the uncertainty in the upper boundary condition will be incorporated into the analysis using stochastic techniques and propagating the uncertainty for risk assessment. In this manner, our inability to obtain an accurate measurement does not preclude an analysis with a subsequent decision.

Many of the contaminants within the surface units aggregate sites are known to react with the solid material that comprises the tuff. Therefore these contaminants do not move with the velocity of water, but they are retarded. In order to evaluate the various alternatives proposed in section 3.1.1.4, characterization of the geochemical conditions are required. Again using the same core material collected during source characterization, the following chemical properties will be determined:

- pH
- cation exchange capacity
- mineral and metal content, and
- trace element geochemistry.

Retardation is generally believed to be adsorption of the solute to reactive surfaces of the porous media. Tests that quantify sorption are conducted either as batch or column modes. The batch mode uses solid materials in a solution spiked with a known amount of solute. Solution samples are collected over time and the amount of solute that is sorbed is determined by the difference between the initial concentration and the measured concentration at a given time. The column approach involves establishing steady flow and continuous feed rate and analyzing the outflow. Either method will require the characterization listed above. A need will be to quantify retardation in the unsaturated zone because many of the tests particularly the batch are conducted in saturated conditions.

In characterizing the source term, one data need was to determine the species of a given element because different species have different reaction characteristics. Another key process is the competition for sorption sites by the various chemicals in solution. Different contaminants as well as species of these contaminants have differential affinities for sorption site. The competition may exclude one of the contaminants thus increasing its potential for migration. Also, complexation of radionuclides with other compounds such as organics or colloidal particles can also facilitate the transport of radionuclides.

A data need would be to define the extent of occurrence of these processes for conditions similar to those in the field.

Knowledge of the geochemical processes becomes more critical as some of the proposed site remediation alternatives are evaluated.

There are a number of physical and chemical properties that are data needs in order to conduct a migration pathways analysis for individual sites within the surface units aggregate. These have been listed in this section and in general most of these can be obtained in conjunction with the source term characterization.

3.1.2.3 Potential Public Health and Environmental Impacts

Data needs for this task will be obtained from tables of values for both radiological and nonradiological chemicals. Standards to estimate exposure via the various pathways will be developed.

3.1.2.4 Preliminary identification of potential response actions

Data collected during the source term characterization and migration pathways activities will be used to support assessments of the potential response actions.

3.1.2.5 Bench and pilot scale studies

There are no bench and pilot scale studies planned at this time. Analysis of the data from the current pilot scale study at MDA-B will support one of the proposed remedial actions for this SWMU. However, if it is determined during characterization that additional potential remedial actions need to be considered then further treatability studies may be needed.

3.1.3 Data Quality Objectives

3.1.3.1 Source term data

Some screening will be needed to determine if organics or other metals are present. Data on radionuclides will be collected at data quality objective (DQO) level III because they will be used in risk assessment. If metals or organics are present, some of these samples will require level III analytical techniques so this data can also be used in risk assessment.

3.1.3.2 Migration pathways data

These data will be used in evaluating alternatives and risk assessments therefore the minimum DQO is level III.

3.1.3.3 Potential public health and environmental impacts data

These data will be used in risk assessment so they must be collected at DQO level III at a minimum.

3.1.3.4 Data required for identification of potential response actions

These data will be used to evaluate alternatives and may be conducted at DQO level II. The potential for using these data in risk assessment means that DQO III should be used at a minimum.

3.1.3.5 Data required for bench and pilot scale studies

Any bench or pilot scale studies that will be conducted to support assessment of potential remedial alternatives will be conducted at DQO level III to support associated risk assessments.

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NYHAN 1990

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

memorandum

TO: Micheline Devaurs, HSE-DO/ER, MS K491

DATE: September 28, 1990

THRU: Wayne Hansen, EES-15 Group Leader

MAIL STOP/TELEPHONE: J495/7-3163

FROM: John Nyhan, EES-15 JWN

SYMBOL: EES15-90-266

SUBJECT: **SWMU DESCRIPTIONS AND IDENTIFICATIONS OF DATA NEEDS FOR RFI TASK: TA-21 SURFACE UNITS AGGREGATE**

Encolsed you will find the TA-21 RFI Surface Units Aggregate draft which I have worked on full time (60 hours/week) since the start of June 1990. I am mentioning this time estimate because this will help you to judge how fast SWMU write-ups can be done when there is no information in the ER SWMU files at the start of the exercise.

The following is a list of action items related to the SWMUs in this Aggregate:

(1) Table III lists ten newly-discovered potential SWMUs (container storage areas), many of which are quite extensive and should probably be added to SWMU #21-028.

(2) SWMU #21-003 (PCB Storage Area) did not contain an asphalt pad before 1981, so that the soil under the current asphalt pad is potentially contaminated with PCB's.

(3) The unkown potential land fill shown in Fig. 21-37 should probably be added to SWMU #21-013.

(4) The current description of SWMU #21-007 (Salamanders) in the IT SWMU report is totally incorrect and should be replaced.

(5) The Rag incinerator located in TA-21-3 should be added to SWMU #28-008.

(6) At least 16 newly-discovered SWMU's should be added to SWMU #21-019 (see Table VI).

(7) Two SWMU's should be removed from SWMU #21-019: subunits K and L (see text).

(8) Since SWMU #21-025 (offgas system) effluents are serviced by the stacks in SWMU #21-019, they should probably not be SWMU's.