1834 TA-21

AREA A

General Information

Area A is located in TA-21, a quarter of a mile east of the intersection of DP Road and the north perimeter road of TA-21. Specifically it is centered on LASL* coordinate E. 165+00 between coordinates N. 85+00 and N. 87+50 (see Fig. A-1). Fig. A

It occupies most of the area between coordinates N. 85+00 and N. 87+50 and between coordinates E.167+50 and E.162+50. Surveyed corners in clockwise direction beginning with the northeast corner are: N.86+58; E.167+18; N.85+14; E.166+88; N.85+42; E.165+35; N.85+78; E.164+88; N.86+00; E.163+80; N.86+13; E.163+11; N.86+33; E.162+91; N.87+34; E.163+07 and N.87+16, E.164+04. It can also be located by township and range: SE 1/4 sec. 14, T. 19 N., R. 6E. Total area is 5058.6 m^2 (1.25 acres).

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

Geology and Hydrology

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

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

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

The attitude of most of the major joints are near vertical to vertical ranging from 70 to 90 degrees measured from the horizontal. Some of the joints were slightly curved, open in places and closed in others. All of the joints were filled with dark brown clay beneath the soil zone while at depth were filled or plated with dark brown or gray clay.

The orientation and distribution of the major joints in the horizontal plane of the north and south walls of the pit are shown on a rose diagram (Fig. A-2). Three point sets occur true north to N 10° W, N 40°E to N 60°E and N 80°E. Though all the joint sets do not intersect at 60 degrees as they would if formed in a homogeneous liquid as it cooled, the predominance of the three joint sets and near vertical attitude of the joints suggest that the joints formed as the ash flow tuff of Unit 3 cooled after emplacement.[10]

A-2

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

and Storage Tank
Pit Descriptions

Early Stage (1944 to 1947)

Background

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

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

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

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

Type of Waste

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

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

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

(Authors Note:

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

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

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

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

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

Mode of Disposal

Four pits are shown in the eastern end of Area A on Engineering Drawing ENG-1266. An arrow pointing to them has the note: "Scaled from W. C. Kruger map 'Special Sewers DP Site Construction Sheet O Outside Services 4' 8-22-45." The pits are depicted as 38m (125 ft) long by 5.5m (18 ft) wide with rounded corners. Probably a more accurate depiction of the pits is on ENG-C 2076 (Fig. A-3). On this drawing there are two pits which are rectangular, covering 400 m^2 (0.99 acres).

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

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

The General's Tanks, TA-21-107 and TA-21-108, are two 189 280 ℓ (50 000 gal) cylindrical steel storage tanks. The

following description of the construction of the tanks is taken from Engineering Drawing ENG-C 2076.

The tanks are 3.7 m (12 ft) in diameter and 19.1 m (62 ft 10 in.) long. They were placed 6.1 m (20 ft) apart in pits 3.7 m (12 ft) deep, 4.6 m (15 ft) wide, and probably 21.0 m (86 ft 10 in.) long on four concrete piers. Each pier was 1.5 m (4 ft 10 in.) high with the bottom 0.6 m (2 ft) below the bottom of the pit. Each tank rested on the piers 0.3 m (1 ft) above the bottom of the pit. Sand was placed in the bottom of the pit up to the top of the piers--a depth of 0.5 m (1 ft 10 in.). Thoroughly packed earth filled the area between the tank and most of the rest of the pit. Directly above the tanks loose earth fill was specified. A concrete slab 20.3 cm (8 in.) thick, 17.1 m (56 ft) wide and 21.0 m (68 ft 10 in) long was poured 0.5 m (1.5 ft) above the tanks. Approximately 1.5 m (5 ft) of earth fill was placed above the concrete slab. This final earth fill formed a mound 0.7-1.8 m (2.25-5.75 ft) above grade. On the north end of each tank a vent extended 4.6 m (15 ft) above the mound. On the south end of each tank the fill pipe is enclosed in a concrete box with outside dimensions 0.9 m (2 ft 10 in.) high, 0.9 m (2 ft 10 in.) wide, and 1.3 m (4 ft 4 in.) long. The box extended 0.3 m (1 ft) above the mound.

Late Stage (1969 to 1975)

Background

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

Type of Waste

This latest and largest pit, located in the center of the area, contains building debris from demolition work at TA-21. This building debris is contaminated by ^{239}Pu, ^{238}Pu, ^{235}U, and depleted uranium along with decay products and other radioactive isotopes which are found with these materials (D. A. Meyer, personal communication, 1974). The first layer of waste was buried by June 30, 1969.[10] January 4, 1971,[171] the volume of debris in the pit was ~~was~~ given as 2166 m^3 (8500 yds^3). The pit was not used from January 1, 1972 through June 30, 1972.[172] After it was enlarged in late 1972 or early 1973, debris from the demolition of TA-21-12 was placed in it.

Mode of Disposal

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

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

A-4

November 9, 1972,[16] the pit was reported to be 12.2 m (40 ft) wide, and 6.7 m (22 ft) deep. ~~(see Figs. A-4, A-5, and A-6).~~ Some time after November 9, 1972,[16] the original pit was enlarged. This enlargement may have provided the approximately 1529 m^3 (6000 yds^3) of additional burial space requested[16] for building materials from TA-21-12. The enlargement would have extended the surface dimensions of the original pit if that pit's dimensions were 45.7 m x 12.2 m x 6.7 m (150 ft x 40 ft x 22 ft) (D. A. Meyer and J. Desilet, personal communication, 1974). In March 1974, the existing pit could have been two-thirds full. It was placed on an engineering drawing for reference, May 1974. The drawing shows the pit to be 52.4 m (172 ft) by 40.8 m (134 ft).

Studies and Monitoring

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

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

> Although surveillance of these tanks has been, to say the least, minimal in the past, there has been no leakage determinable by our present information. The volume 40 000 gallons in one tank and 9 000 gallons in the other as well as chemical concentrations is comparable to the record data.
>
> It is planned to transfer this solution to Bldg. 257 [TA-21-257] for treatment. This will take some time because we will have to rely on dilution to handle the anions which are quite high, e.g., NO_3^- at 130 000 ppm for which the MPC is 45 ppm.[9]