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U.S. Army Toxic and Hazardous Materials Agency

Removal Action

DECISION DOCUMENT

January, 1988

Area A

Alabama Army Ammunition Plant

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US ARMY
MATERIEL
COMMAND

DECISION MEMORANDUM

REMEDIAL ACTION

Site: Area A, Alabama Army Ammunition Plant (AAAP) Talladega, Alabama

Documents Reviewed:

- Alabama Army Ammunition Plant Feasibility Study. Environmental Science and Engineering (ESE), 1986.

- Alabama Army Ammunition Plant Remedial Investigation. Environmental Science and Engineering (ESE), 1986.

- Alabama Army Ammunition Plant Remedial Action Operations. Final Report. Weston Services, Inc., 1987.

Description of Selected Remedy:

For the purpose of cleanup of AAAP, the layout was divided into two areas - Area A and Area B. In order to remove the contaminants from Area A, the following response actions were selected:

- Soil Excavation: Operations were performed to remove all identified contaminated soils. Approximately, 35,000 cubic yards of nitroaromatic-contaminated soils were removed. A large fraction of this soil was also contaminated with lead.

- Onsite Storage: Two temporary storage structures and a walled slab were constructed in Area B of AAAP to store contaminated soil.

- Demolition Burning: Designated buildings in the propellant shipping area were burned to decontaminate residual nitroaromatics. The burned rubble was disposed of at the onsite sanitary landfill.

- Explosives Flashing: Residual explosive materials deposited on the concrete interiors of the Magazine Area storage igloos were burned to decontaminate them. The igloos remained intact. Approximately 5,500 cubic yards of contaminated concrete debris from a rubble pile was covered with straw and diesel fuel and ignited. The decontaminated rubble was disposed of at the onsite sanitary landfill.

- Asbestos Removal: Operations were completed for the Small Arms Ballistics Area. The charred mixture of building debris and friable asbestos insulation was disposed of in an asbestos repository in Area B. The remaining buildings were demolished and disposed of in the base sanitary landfill.

- Underground Tanks: Two tanks for storing fuel oil were located and removed from the site. The liquid contents were taken to an industrial wastewater treatment facility.

- Old Well: Contaminants in the Old Well were properly disposed of and the well was backfilled.

Declaration:

Consistent with the Army's intention to release Area A of the Alabama Army Ammunition Plant (AAAP), decontamination operations were performed in 1987. Based on the results of contamination surveys and a feasibility study, the removal of contaminated materials to a temporary storage structure in Area B of AAAP was deemed to be the most feasible removal action to release Area A at an early date. The storage structure is a temporarily secure solution. Permanent disposal methods in compliance with all applicable or relevant and appropriate regulations will be carried out during the cleanup of Area B.

CONCUR: for Date: 29 Feb 88

STEPHEN L. ETZEL
Colonel, GS
Director
Plant Operations Directorate

APPROVED: J Harold Mashburn Date: 31 Mar 88

J HAROLD MASHBURN
Colonel, CM
Commanding
U.S. Army Toxic and Hazardous Materials Agency

SUMMARY OF REMOVAL ACTION

AREA A

ALABAMA ARMY AMMUNITION PLANT

SITE LOCATION AND DESCRIPTION

AAAP is located in Talladega County in northeastern Alabama, approximately 4 miles north of Childersburg and 40 miles southeast of Birmingham (Fig. 1). The plant was established in 1941 on 13,233 acres of land located near the junction of the Talladega Creek and Coosa River. The terrain is level to rolling with elevations ranging from 384 to 600 feet above sea level (MSL).

The groundwater resources that exist beneath the AAAP consist of the dolomite aquifer of the Coosa Valley and a shallow, low-yielding residual clay aquifer. The solution cavities of the dolomite aquifer are productive potable groundwater resources, whereas the shallow aquifer is considerably less productive than its deeper counterpart. The ground water flow beneath the AAAP is predominantly west-northwest towards the Coosa River. The 140 residences that lie within 1 to 2 miles of the AAAP use private ground water wells, but are not located to the west, northwest or southwest of the plant. Therefore, they are not in the direction of any contaminant movement in the AAAP groundwater. The soil at the site is the primary source of contamination of the ground and surface waters. However, these waters are diluted 1,000 to 10,000 times when they enter the Coosa River.

For the purpose of the Remedial Investigation and Feasibility Study (FS), AAAP was divided into two areas - Area A and Area B. This document addresses source removal actions implemented to decontaminate Area A.

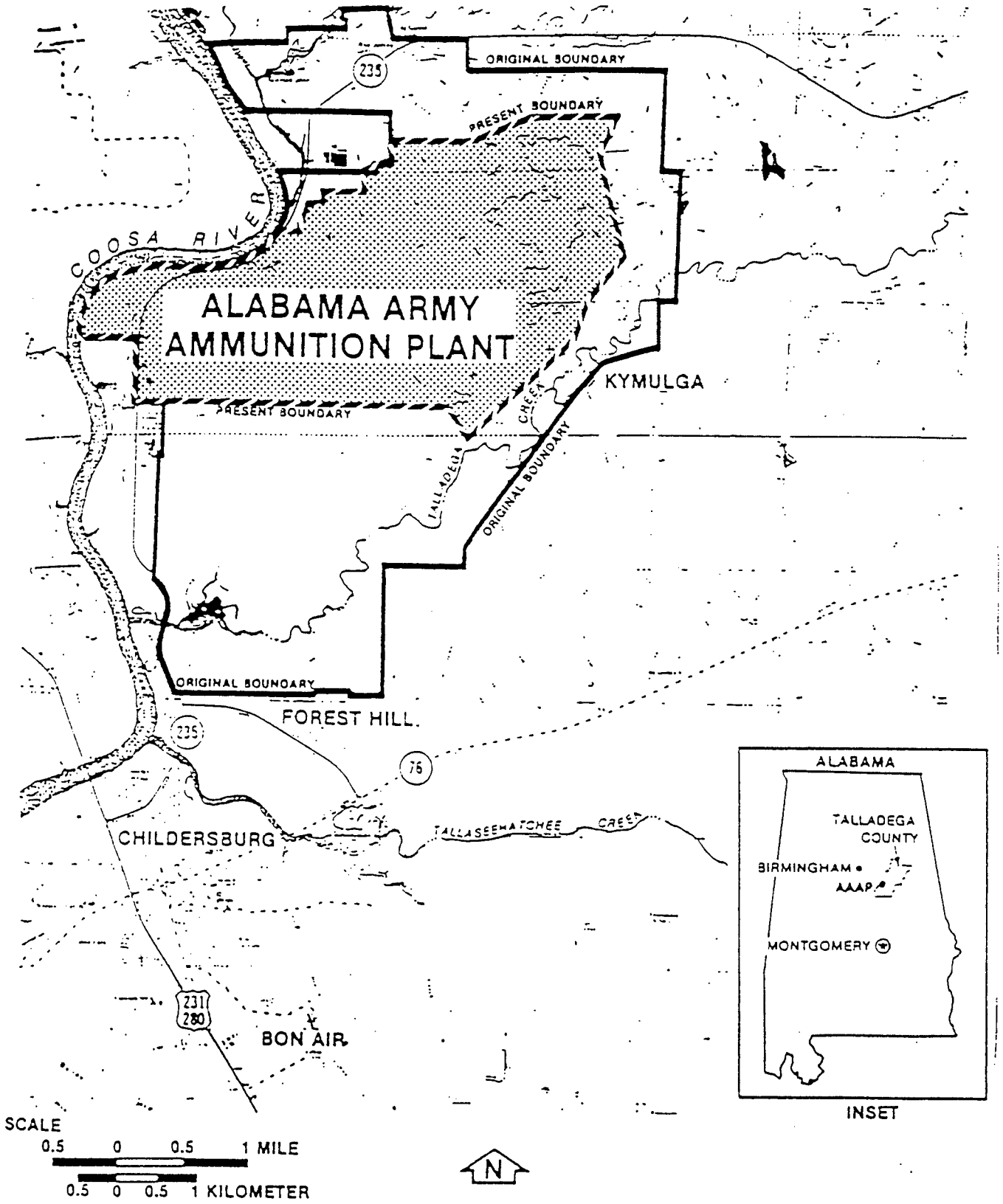

Figure 1. Location of AAAP.
Source: Feasibility Study, ESE, 1986.

SITE HISTORY

The plant was built in 1941 and operated during WW II as a Government-owned/Contractor-operated (GO/CO) facility by E.I. duPont de Nemours & Co. to produce nitrocellulose (NC), single-base smokeless powder, trinitrotoluene (TNT), dinitrotoluene (DNT) and tetryl. Activities at the AAAP included the manufacture of explosives, DNT, H_2SO_4, aniline, N,N-dimethylaniline and diphenylamine. The spent acids were recycled. Wastes from these manufacturing operations were disposed of at AAAP. Operations were terminated and the plant was revoked to standby status in August 1945 following which the prime contractor decontaminated machinery, equipment, buildings and ground areas, completing this work in January 1946. The government released the constructing and operating contractor in a final settlement in September 1946.

From April 1955 to October 1957, Associated Contractors and the Rust Engineering Company, under contract to the U.S. Army (Army), rehabilitated the three NC production lines, three TNT lines and one DNT line to incorporate the latest production techniques. Due to a depletion of funds, the rehabilitation was stopped when 75 percent complete, and the plant was maintained in various stages of standby status until the early 1970s. In 1973, the Army declared AAAP excess to its needs. In the same year, the General Services Administration (GSA) declined to accept 1620 acres of the former manufacturing area because it could not be certified free of contaminants. In 1977, a 1,354 acre parcel containing the Nitrocellulose Manufacturing and Smokeless Power Manufacturing acres (Study Areas 1 and 2, Figure 2) was sold to Kimberly Clark, Inc. To allow the government to remove and decontaminate these manufacturing facilities, an area of 272 acres was leased back to the government until August 1982 when decontamination was completed. This area, designated as the Leaseback Area, had already been cleaned up and released for industrial use and was not included in the Feasibility Study conducted by Environmental Science and Engineering, Inc. Several other parcels of the original property have been sold and AAAP today covers an area of 5,045 acres, excluding the Leaseback Area. The RI and FS addressed the remaining 5,045 acres as two sites, Area A and Area B.

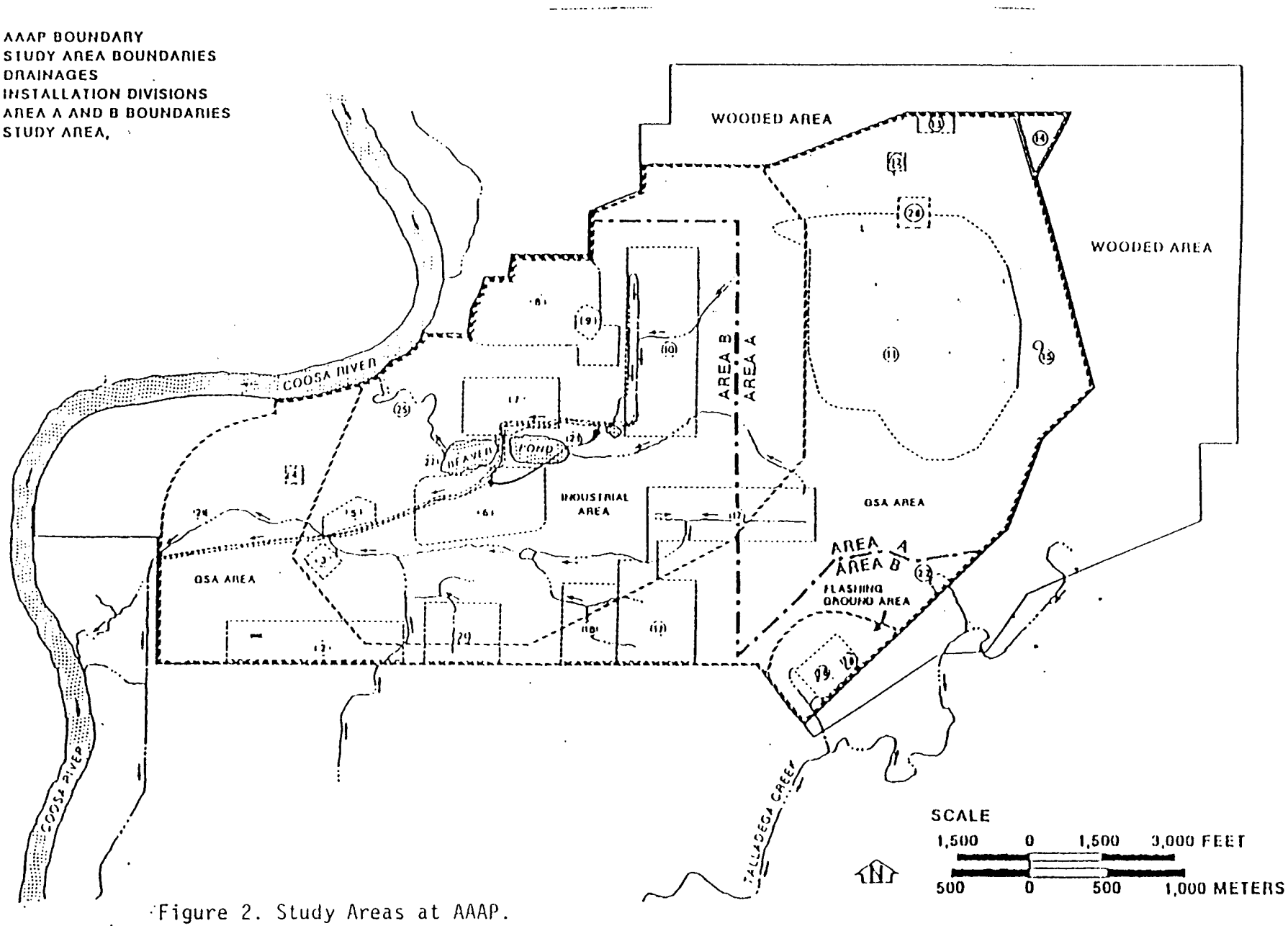

Figure 2. Study Areas at AAAP.
Source: Feasibility Study, ESE, 1986.

SITE STATUS

For the purpose of the Environmental Survey and Remedial Investigation Studies conducted by Environmental Sciences and Engineering, Inc. (1986), Area A was divided into a number of Study Areas (Figure 2). These were:

Magazine Area (Study Area 11)
Old Burning Ground (Study Area 12)
Small Arms Ballistics Ranges (Study Area 13)
Cannon Ranges (Study Area 14)
Old Well (Study Area 15)
Propellant Shipping Area (Study Area 17)
Flaker Services Wash Area (Study Area 28)

A number of contaminants were found in different Study Areas of Area A:

Old Burning Ground

Lead, 2,4,6-trinitrotoluene (2,4,6-TNT), 2,4-dinitrotoluene (2,4-DNT), 2,6-dinitrotoluene (2,6-DNT) and 1,3-dinitrobenzene (1,3-DNB) were found in the soils. The concentration of lead at the soil surface measured as high as 1600 ug/g.

Nitroaromatic residues included:

2,4,6-TNT at levels of up to 0.4 ug/g,
2,4-DNT at levels of up to 1.1 ug/g,
2,6-DNT above 0.4 ug/g, and
1,3-DNB above 0.2 ug/g.

Remedial actions were deemed necessary for both lead and nitroaromatic contamination of soils.

Propellant Shipping Area

Trace amounts of 2,4-DNT and nitrocellulose were found in a few soil samples.

Magazine Area

The concrete interiors of thirteen of the thirty-nine storage igloos were tested for nitroaromatic residues. Nine of these tested positive. A majority of igloos were, therefore, assumed to have trace levels of nitroaromatic residues.

1,3,5-trinitrobenzene (1,3,5-TNB) was detected in soils around two storage igloos at levels as high as 2.5 ug/g. The zone of soil contamination was assumed to be restricted to a small area surrounding the loading dock.

There was no groundwater contamination in the monitoring wells of the magazine area. The exploratory and confirmatory surveys did not identify any asbestos contamination.

Small Arms Ballistics Area

There was no evidence of any nitroaromatic contamination, organics or metal residues in the soils in this study area. A large number of spent small arms bullets were found in the southeast corner of the range area. These would have to be removed to allow release of the area.

Friable asbestos was present as insulation on several pipes. However, since the completion of the Remedial Investigation activities, a regional forest fire destroyed the buildings in this study area, and asbestos contamination was suspected of being mixed with the burned debris and rubble.

Old Well

Composite soil samples collected from areas around the Old Well revealed no detectable contaminants. However, the Old Well was suspected of containing a number of drums whose contents were not known. Remedial actions would therefore be necessary to remove the debris and address any identified contamination.

Table 1. Maximum Contaminant Concentrations Detected in Area A

Study Area/ Environmental Medium	Contaminant	Maximum Concentration* Exploratory Survey	Confirmatory Survey	RI Survey
Magazine Area (Study Area 11)				
Soils	Lead	200 µg/g	—	—
	Mercury	0.3 µg/g	—	—
	1,3,5-TNB	2.540 µg/g	—	—
	2,4-DNT	0.208 µg/g	—	—
Buildings	Asbestos	Obs	—	—
Old Burning Ground (Study Area 12)				
Soils	Lead	1,580 µg/g	—	—
	Extractable Lead	—	—	4,980 µg/L†
	2,4,6-TNT	0.656 µg/g	—	0.386 µg/g
	2,4-DNT	0.876 µg/g	—	1.13 µg/g
	1,3-DNB	BDL	—	0.224 µg/g
	2,6-DNT	BDL	—	0.449 µg/g
	Phthalate residue	trace	—	—
	PAH residue	trace	—	—
Ground Water	2,4-DNT	BDL	—	0.562 µg/L
Small Arms Ballistics Range (Study Area 13)				
Soils	Spent lead bullets	Obs	—	—
Buildings	Asbestos	Obs	—	—
Cannon Range (Study Area 14)				
Buildings	Asbestos	Obs	—	—
Old Well (Study Area 15)				
Standing Well Water	bis(2-ethylhexyl)-phthalate	<10 µg/L	—	—
Ground Water	Chromium	BDL	—	45.5 µg/L
	Thallium	BDL	—	141.0 µg/L
	Zinc	BDL	—	53.0 µg/L
	Nickel	BDL	—	10.2 µg/L
	Antimony	BDL	—	94.8 µg/L

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Table 1. Continued.

Study Area/ Environmental Medium	Contaminant	Maximum Concentration* Exploratory Survey	Confirmatory Survey	RI Survey
Flaker Screen Wash Area (Study Area 28)				
Soils	Nitroaromatics	—	—	BDL
	Tetryl	—	—	BDL
	Lead	—	—	BDL
Propellant Shipping Area (Study Area 17)				
Soils	Lead	30 µg/g	—	—
	NC	139 µg/g	—	—
	2,4-DNT	0.370 µg/g	—	—

Abbreviations:
1,3-DNB = 1,3-dinitrobenzene
2,6-DNT = 2,6-dinitrotoluene
PAH = polynuclear aromatic hydrocarbon
1,3,5-TNB = 1,3,5-trinitrobenzene
µg/g = micrograms per gram
µg/L = micrograms per liter

*Maximum concentration: — = no analyses conducted for the designated survey.
BDL = below detection limit.
Obs = observed but not quantified.
†Extractable lead analysis [extraction procedure (EP) toxicity].

Source: AAAP Feasibility Study, ESE, 1986.

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Groundwater samples collected from monitoring wells did not show significant levels of organic contamination or heavy metals.

Rubble Pile

A rubble pile examined during the Remedial Investigation activities was identified as containing acid-contaminated bricks and uncontaminated concrete footings. The rubble pile was found to continue across the road. The eastern side contained building demolition debris (concrete) contaminated with trace quantities of explosives.

Table 1 summarizes the maximum concentrations detected in Area A. The Cannon Range (Study Area 14) and Flaker Screen Wash Area (Study Area 28) did not contain significant levels of contaminants.

The soil at AAAP has been suspected of being the source of contamination of surface waters, sediments and groundwater. Groundwater flow beneath AAAP property is predominantly to the west-northwest toward the Coosa River. As mentioned earlier, the 140 residences within 1 or 2 miles of AAAP are not in the path of the contaminated groundwater flow.

ALTERNATIVES EVALUATION

USATHAMA has been performing a comprehensive RI/FS at AAAP to assess soil and groundwater contamination at the installation. Although the AAAP had not been designated as a NPL site as of September 1984, USATHAMA had taken the lead for the remedial action at the installation in accordance with Executive Order 12316 and the Memorandum of Understanding between the EPA and the U.S. Department of Defense (DOD), dated 12 August 1983. Its contractors, Weston Services Incorporated (WSI) co-ordinated its activities with the State of Alabama and EPA Region IV.

A number of remedial technologies were evaluated in the 1986 Feasibility Study for effectively eliminating the most widespread contamination in Area A, that is, soil and sediment contamination by explosives and by lead. However, implementation of these technologies was inhibited by safety hazards from reactive explosive residues and asbestos in several Study Areas.

The removal actions for Area A documented here included abatement of these safety hazards followed by excavation and temporary storage of contaminated soils. Alternatives for permanent remediation of contaminated soils will be addressed in decision documentation for Area B.

SELECTED REMEDY

STORAGE STRUCTURES

In order to facilitate release of Area A, the contaminated soils and sediments were removed to two temporary storage structures, TC-4 and TC-4A, and walled slab in Area B.

TC-4 Temporary Containment Structure

An existing concrete slab located in Area B was selected for temporary containment of the nitroaromatic-contaminated soils excavated from Area A. The area surrounding the slab was cleared and graded to allow access to equipment. The slab was swept and all existing anchor bolts were removed via an acetylene torch in preparation for lining. The dimensions of the existing slab were 200' x 70'. A 30-mil high density polyethylene (HDPE) liner was ordered. A heavy liner (30 mil) was chosen to ensure containment of explosive-contaminated soil and any runoff.

The walls surrounding the concrete slab were constructed of 12-inch thick concrete blocks. The walls extended 16-feet high to prevent wind and rain from contacting the stored contaminated soil. Wooden poles and trusses were erected in preparation of the placement of the galvanized sheet steel roof.

The 30-mil HDPE liner was installed over the existing slab and 8 feet up the walls. The liner was installed and the seams were plastic welded.

Prior to transportation and storage of contaminated soils, the floor of the TC-4 building was covered with a layer of fill material. This covering enabled the equipment used for soil placement to maneuver in the building without damaging the liner surface. The entry to the building was ramped with earthen material to allow dump trucks to back up and deposit the material at the entrance of the structure. The pole barn was completely filled to 8 feet height with contaminated soil.

TC-4A Temporary Containment Structure

The second pole barn, TC-4A, was erected in a manner similar to TC-4. A lighter lining material, 20-mil HDPE, was approved by USATHAMA, the State of Alabama and EPA Region IV for usage in TC-4A.

A 20-mil HDPE liner was installed over a new concrete slab and walls. The liner seams were overlapped to ensure complete containment of the staged soil and any water runoff. The floor of the barn was covered with fill material and an earthen ramp was constructed for accessibility.

SITE DECONTAMINATION AND EXCAVATION

Flashing Area (Old Burning Ground)

Material from the explosive contaminated trenches was transported to Area B. A contamination verification sampling program was instituted to confirm satisfactory remediation before closure. Closure operations were conducted after the excavated trenches were verified to have met the State of Alabama and EPA cleanup criteria.

When the quantity of explosively contaminated soil exceeded the pole bran's capacity, a walled slab was utilized. The 250 ft. x 280 ft. slab consisted of a 6 inch thick reinforced concrete base overlying a 6 mil polyethylene barrier and 4 inches of crushed stone. The 3 foot high solid concrete block wall was used. The slab also contains a drain. The contaminated soil placed on the slab will be covered with a 20 mil impervious liner.

Magazine Area

A flashing program was initiated to decontaminate 39 magazine igloos in the magazine area. After the area was verified free of nitroaromatics, closure operations were initiated.

Small Arms Ballistics Sitework

Asbestos contaminated debris was removed in dump trucks retrofitted with double polythene lining to an onsite friable asbestos repository constructed in Area B. The wood timbers were burned on the slab of Building No. 5 of the propellant shipping area. The ash and debris were transported to the asbestos repository since scattered asbestos remained in the ash. Clay material from the outdoor firing range embankent and rubble from the demolition of buildings were removed to the base sanitary landfill.

Old Well

A 20-ton crane equipped with a clam bucket was used to excavate material from the Old Well. Several old tires, empty 5-gallon buckets and two 55-gallon drums were removed from the well.

The empty drums and buckets were crushed with a backhoe and transported by dump truck to Kimberly Clark for disposal. The two 55-gallon drums, which contained roofing tar, were loaded directly onto a dump truck and also transported to Kimberly Clark. The excavated soil was transported to the storage structure, TC-4.

The Old Well was closed by backfilling, regrading the area surrounding the well, and seeding with a 50-50 mixture of Kentucky 31 Tall Fescue and Perennial Rye grass.

Rubblepile

A rubble pile located in Area A was found to be slightly acidic. It was neutralized with hydrated lime and left in place.

The rubble pile which was dumped in a swale, continued across a road and was found to contain pieces of concrete contaminated with explosives. The rubble was taken to the onsite sanitary landfill where it was covered with straw and diesel fuel. The rubble was burned. Certipaks were used to verify that the burn effectively destroyed the contaminants.

Propellant Shipping Buildings

Transite sheets were dismantled and transported to the asbestos repository in Area B. The wood timbers were placed inside the buildings, the buildings were loaded with dunnage, soaked in fuel and burned. Certipaks were used to verify the decontamination of buildings. The burned debris was removed to the onsite sanitary landfill in Area B.

ADDITIONAL MEASURES

In the course of performing the actions described above, two additional sources of contamination were discovered and removed as follows:

New Trench Area

On the direction of USATHAMA, an area southeast of the Flashing Area in the Old Burning Ground, designated as the New Trench Area, was investigated for possible lead contamination. Nitroaromatics and lead were found in concentrations greater than those set by the site cleanup criteria. The contaminated soil was excavated and stored in the temporary storage structures in Area B.

REFERENCES

1. Environmental Science and Engineering, Inc., "Alabama Army Ammunition Plant Feasibility Study" Draft Report (1986).

2. USATHAMA Installation Restoration Programs, Quarterly Summary. 30 June 1987.

3. U.S. Environmental Protection Agency (EPA). Office of Waste Programs Enforcement. "The Endangerment Assessment Handbook". Washington, D.C. prepared by PRC Engineering, Chicago, Il. (1985)

4. Environmental Science and Engineering, Inc. "Alabama Army Ammunition Plant Remedial Investigation" Final Report (1986).