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BLACK & VEATCH Waste Science, Inc.

400 Northridge Road, Suite 350, Atlanta, Georgia 30350, (404) 594-2500, Fax: (404) 587-2930

US EPA – Region IV
Site Inspection Prioritization
Work Assignment No. 12

BVWS Project 52012.566
June 1, 1995

Mr. Narindar Kumar
Chief, Site Assessment Section
U.S. Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

Subject: Final Site Inspection Prioritization
Kerr McGee Chemical Corporation
Theodore, Mobile County, AL
EPA ID No. ALD071937890

Dear Mr. Kumar:

Enclosed please find one copy of the Final Site Inspection Prioritization for the Kerr McGee Chemical Corporation in Theodore, Mobile County, Alabama. If you have any questions, please contact me at 404/643-2320.

Very truly yours,

BLACK & VEATCH Waste Science, Inc.

Felicia Williams-Moon for

Victor Blix
Project Manager

REC'D.
JUN 0 5 1995

fw
Enclosures

cc: Doug Thompson, EPA PO, w/o enclosures
Deborah Davidson, EPA CO, w/o enclosures
Earl Bozeman, EPA WAM, w/o enclosures

BLACK & VEATCH Waste Science, Inc.

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NRAP APPROVED BJ 7/14/95

U.S. Environmental Protection Agency
Kerr McGee Chemical Corporation
Work Assignment 12

BVWS Project 52012.566
February 20, 1995

Mr. Narindar Kumar
Chief, Site Assessment Section
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RFC'D.
JUN 0 5 1995

Subject: Site Inspection Prioritization
Kerr McGee Chemical Corporation
Theodore, Mobile County, Alabama
EPA ID ALD071937890

Dear Mr. Kumar:

BLACK & VEATCH Waste Science, Inc. (Black & Veatch) has been tasked by the U.S. Environmental Protection Agency (EPA) to conduct a Site Inspection Prioritization (SIP) at the Kerr McGee Chemical Corporation (Kerr McGee) in Theodore, Mobile County, Alabama. In accordance with the scope of work, a preliminary Hazard Ranking System (HRS) score was prepared to determine the need for future activities at the site.

Kerr McGee, a chemical processing facility which began operating in 1976, is located on Range Line Road approximately 13 miles south of Mobile, Alabama and 2 miles west of Mobile Bay along State Highway 193 (Refs. 1; 2; 3, p. 3-1). The facility is located in the Theodore Industrial Park (formerly Theodore Ammunition Terminal) along with other industrial facilities, on property formerly owned and operated by the U.S. Navy (Ref. 3, p. 3-1). The U.S. Navy operated the 1,920-acre Theodore Ammunition Terminal from the early 1940's until the mid 1960's. On June 14, 1965, 1,824.96 acres of the terminal was conveyed to the Alabama State Docks Department by quitclaim deed. On April 14, 1965, 50 acres was conveyed by quitclaim deed to the Department of Commerce for the construction of Alabama Highway 163. On May 11, 1965, the remaining 43 acres was transferred to the Public Building Service

(Ref. 3, p. 5-1). Since then, the ASD has resold about 1,624 acres to various owners for industrial or transportation purposes. The Navy reacquired a portion of the original property in 1990 and 1991 to construct Naval Station Mobile, an installation currently scheduled for closure under the Base Reduction and Closure (BRAC) program (Ref. 3, p. 5-1).

The Theodore Ammunition Terminal was utilized as a military depot during World War II and the Korean Conflict for the receiving, storing, and shipping of ammunition (Ref. 3, p. 5-1). Theodore Ammunition Terminal was also used from June 11, 1946 to July 20, 1946 to store chemical warfare munitions (German mustard gas) confiscated during World War II (Ref. 3, p. 6-1). However, this practice was discontinued shortly after toxic vapors were discovered leaking from bomb transport containers (Ref. 3, pp. 6-1, 6-2, 6-3).

Presently, remedial studies are being conducted under the Defense Environmental Restoration Program (DERP) (Ref. 3, p. 1-1). The goals specified for the DERP is "correction of environmental damage such as detection and disposal of unexploded ordinance which creates an imminent and substantial endangerment to the public health or welfare or to the environment" (Ref. 3, p. 1-1).

Operations at Kerr McGee include the beneficiation process of impure titanium dioxide ore (ilmenite) to synthetic rutile using a hydrochloric acid leaching process. An iron oxide slurry is formed as a result of the synthetic rutile process, and is reportedly corrosive and EP Toxic for lead (Ref. 4). The aqueous slurry was disposed into a 19.5-acre unlined surface impoundment (Ref. 5). The surface impoundment was constructed in 1976 and reached capacity in the early 1980s (Ref 5). A french drain leachate system, which collects contaminated groundwater, was installed on the north, east and west sides of the surface impoundment in 1980 and 1981. A 10-acre lined expansion surface impoundment was constructed and placed into service in 1984 to handled process waste (Ref. 6). According to subsequent testing, the liner leaked (Ref. 6). Wastewater produced as a result of operational practices is treated in the facility's wastewater treatment plant and is discharged under an NPDES permit into the Middle Fork of the Deer River (Ref. 7).

The facility implemented a Resource Conservation Recovery Act (RCRA) groundwater monitoring program in January 1977 (Ref. 5). Seventeen monitoring wells were installed in various locations encompassing the surface impoundment from 1977 to 1978. Preliminary results of the assessment indicated the impoundment was adversely affecting the groundwater (Ref. 5). Several rounds of groundwater sampling have been conducted at the site. The samples were analyzed for a limited number of analytical parameters. Results of samples collected from 1977 to 1984 indicated the presence of iron concentrations ranging from nondetected to 3,700 milligrams per liter (mg/L) and lead concentrations ranging from nondetected to 33 mg/L, respectively (Ref. 5). The samples collected were not analyzed in accordance

with the EPA Target Analyte List (TAL) and Target Compound List (TCL) protocol. Available file material did not indicate the collection of additional analytical data beyond 1984.

Kerr McGee operational practices are excluded from regulation under Subtitle C of RCRA by the mining waste exclusion in Section 3001 (b) (3) (A) (ii) of RCRA. This provision excludes wastes from the "extraction, beneficiation, and processing of ores and minerals, including phosphate rock and overburden from the mining of uranium ore" (Refs. 4; 8).

Potable water within a 4-mile radius of the Kerr McGee site is supplied primarily by the Mobile Water Service System, which utilizes surface water from Big Creek Lake (Ref. 9, p. 6). Big Creek Lake is a 3,600-acre man-made lake constructed in 1950 (Ref. 9, p. 6). The lake is located approximately 25 miles west of the city of Mobile, Alabama and is outside the 15-mile surface water pathway. The Mobile Water Service System provides potable water to approximately 81,304 customers or 220,334 people (Refs. 9, p. 6; 10).

The Mobile County Water & Fire Protection Authority (MCWFPA) located in Theodore, Alabama provides potable water to approximately 8,300 customers or 22,493 people (Refs. 9; 10). The MCWFPA source of potable water is groundwater (Ref. 9, p. 2). Groundwater supplies are obtained from six municipal wells. Of the six municipal wells, one well (municipal well number 4) is located within the 4-mile radius, approximately 3.5 miles west of the site (Refs. 1; 9, p. 2). Municipal well number 4 is 480 feet in depth (Ref. 9 p. 2). Water from municipal well number 4 is blended with water from municipal well number 5, which is located outside the 4-mile radius. These two wells provide potable water to approximately 250 customers or 678 people (Refs. 9, p. 2; 10).

Potable water is also supplied by private wells located within the study area. There are approximately 200 private wells located between 3 and 4 miles southeast of the site in the Bellefontaine, Alabama area (Refs. 1; 9, p. 3). These wells provide water supplies for approximately 542 people (Refs. 9, p. 3; 10). The average depth of these private wells is approximately 85 feet (Ref. 9, p. 6).

Surface water runoff from the site flows south into the Middle Fork Deer River (Ref. 1). From the Middle Fork of the Deer River, surface water flows into Mobile Bay and south into the Gulf of Mexico, where the 15-mile surface water pathway expires (Ref. 1). Recreational fishing and boating occur on the Middle Fork of the Deer River and Mobile Bay (Refs. 9, p. 4; 11).

Kerr McGee is located in a sparsely populated area (Ref. 1). As of 1985, he facility employed approximately 150 employees (Ref. 11). There are approximately 8,856 residents within a 4-mile radius of the site, distributed as follows: 0 - 0.25 mile, 0;

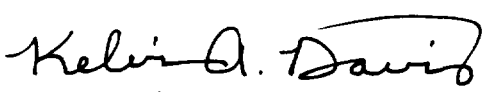
0.25 - 0.50 mile, 50; 0.50 - 1 mile, 150; 1 - 2 miles, 1,423; 2 - 3 miles, 1,048; 3 - 4 miles, 6,185 (Refs. 1; 12). The nearest school is Theodore Junior High School located approximately 3 miles west of the site (Ref. 1). The nearest church is Hollingers Island Church located approximately 1.5 miles northeast of the site (Ref. 1). There are no other public facilities located within close proximity of the site (Ref. 1). Approximately 2,000 acres of wetlands are located with the 4-mile radius (Ref. 1).

Federally-designated endangered or threatened species for this area of the state include: the West Indian Manatee (*Trichechus manatus trichocyst*); the Alabama beach Mouse (*Peromyscus polionotusammobates*); the Florida Panther (*Felis concolor coryi*); the finback Whale (*Balaeonopteraphysalus*); the humpback Whale (*Megaptera novaeangliae*); the right Whale (*Eubalaena glacialis*); the sperm Whale (*Physeter catodon*); the bald Eagle (*Haliaeetus leucoephalus*); the Bachman's Warbler (*Vermivora bachmanii*); the ivory-billed Woodpecker (*Campephilus principalis*); the red-cockaded Woodpecker (*Picoides borealis*); the Arctic peregrine Falcon (*Falco peregrinus tundrius*); the piping Plover (*Charadrius melodus*); the Wood stork (*Mycteria americana*); the gopher Tortoise (*Gopherus polyphemus*); the Alabama red-billed Turtle (*Pseudemys alabamensis*); the Kemp's (Atlantic) ridley Turtle (*Lepidochelys kempii*); the green Turtle (*Chelonia mydas*); the hawksbill Turtle (*Eretmochelys imbricata*); the leatherback Turtle (*Dermochelys coriacea*); the loggerhead Turtle (*Caretta caretta*); the Gulf Sturgeon (*Acipenser axyrhynchus*); and the eastern indigo Snake (*Drymarchon corais couperi*) (Ref. 13). However, the exact locations of these species are unknown.

Based upon the above observations, it is recommended that no further action be planned for the Kerr McGee Chemical Corporation site. Attached are all references used during this investigation. If you have any questions or comments, please contact me at (404) 643-2317 or Victor Blix at (404) 643-2320.

Very truly yours,

BLACK & VEATCH Waste Science, Inc.



Kelvin A. Davis
Project Scientist

KAD
Enclosure

REFERENCES

1. U.S. Geological Survey. 7.5 minute series Topographic Quadrangle Maps of Alabama: Theodore 1953 (Photorevised 1982), Hollingers Island 1953 (Photorevised 1982), Coden 1956 (Photorevised 1985), Bellefontaine 1956 (Photorevised 1974); scale 1:24,000.

2. Steve Maurer, Alabama Department Environmental Management (ADEM), Potential Hazardous Waste Site, Preliminary Assessment, EPA Form 2070-12, for Kerr McGee Chemical Corporation, Theodore, Mobile County, Alabama, September 13, 1985.

3. Archives Search Report, Theodore Ammunition Terminal (U.S. Naval Ammunition Magazine), U.S. Army Corps of Engineers St. Louis District, September 1993.

4. Environmental Protection System (EPS), Potential Hazardous Waste Site, Preliminary Assessment, EPS Form 3012-III for Kerr McGee Chemical Corporation, Theodore, Mobile County, Alabama.

5. Alabama Department Environmental Management (ADEM), Preliminary Assessment Report, for Kerr McGee Chemical Corporation, Theodore, Mobile County, Alabama.

6. B. E. Cox, Industrial and Hazardous Waste Section, Kerr McGee, letter to James H. Scarbrough, Chief, Residuals Management Branch, Region IV, U.S. Environmental Protection Agency, September 26, 1984. Subject: Kerr McGee Chemical Corporation Surface Impoundment Modifications and Repairs.

7. Permit For Discharge, State of Alabama, Water Improvement Commission, Kerr McGee Chemical Corporation, December 13, 1976.

8. James H. Scarbrough, Chief, Residuals Management Branch, Region IV, U.S. Environmental Protection Agency, letter to B. E. Cox, Industrial and Hazardous Waste Section, Kerr McGee Chemical Corporation, November 26, 1984. Subject: Hazardous waste Determination on the Kerr McGee Chemical Corporation Plant in Theodore, Alabama.

9. BLACK & VEATCH Waste Science, Inc. (Black & Veatch), Field Logbook, Offsite Reconnaissance, Kerr McGee Chemical Corporation, Project № 52012.566, January 12, 1994.

10. U.S. Department of Commerce, Proof Copy of table generated for 1990, CPH-1: Summary Population and Housing Characteristics, issued by the Bureau of Census, April 1991.

11. Steve Maurer, ADEM, Windshield Survey, Kerr McGee Chemical Corporation, July 9, 1985.

12. U.S. Environmental Protection Agency, Graphical Exposure Modeling System (GEMS) Data Base. Compiled from U.S. Bureau of the Census data, 1983.

13. U.S Fish and Wildlife Service, Endangered and Threatened Species of the Southeastern United States (Atlanta, Georgia, 1992), excerpt 4 pages.

CONFIDENTIAL

Hazard Ranking System Preliminary Score

For

Kerr McGee Chemical Corporation
Theodore, Mobile County, Alabama

EPA ID ALD071937890

The preliminary HRS score for the Kerr McGee Chemical Corporation site was calculated using the Site Inspection Worksheets. Pathways evaluated include air migration, soil exposure, surface water migration, and groundwater migration. This score reflects a hazardous waste quantity of 10,000 based upon the size of two surface impoundments occupying 19.5 and 10 acres, respectively. Maximum waste characteristics values were used for all pathways, with the waste characterization being based upon sampling data collected from 1977 to 1985.

The groundwater pathway HRS score was based upon an observed release to groundwater in the surficial aquifer. However, there is no documentation to suggest if contamination exists in the intermediate or deep aquifers where several private wells and a municipal well are completed, respectively. Therefore, two scoring scenarios have been developed for each aquifer of concern.

The surface water migration pathway HRS score was based upon potential to release to the Middle Fork of the Deer River, which borders the site to the south and is a known fishery and downstream sensitive environments. The river is utilized for both recreational fishing and boating purposes. The 15-mile surface water pathway begins on the river and continues through Mobile Bay and into the Gulf of Mexico, where the pathway expires.

The soil exposure pathway HRS score was based upon an observed release to surficial soils and target value derived from nearby residential populations. The air migration pathway HRS score was based upon a potential to release and a target value derived from potential populations and sensitive environment targets.

HRS SCORING SUMMARY

Intermediate Aquifer		Deep Aquifer	
S_{gw}	= 0.195	S_{gw}	= 0.179
S_{sw}	= 0.16	S_{sw}	= 0.16
S_{so}	= 6.67	S_{so}	= 6.67
S_a	= 1.615	S_a	= 1.615
OVERALL SCORE = 3.43		**OVERALL SCORE = 3.43**	

Based upon the above score and observations, it is recommended that no further action be planned for the Kerr McGee Chemical Corporation site.

Site Name: Kerr McGee Chemical

Location: Theodore. Mobile County, Alabama

GROUND WATER MIGRATION PATHWAY SCORESHEET (Deep)

FACTOR CATEGORIES AND FACTORS

Likelihood of Release to an Aquifer	Maximum Value	Aquifer Value Assigned	
1. Observed Release	550	220	
2. Potential to Release			
2a. Containment	10	10	
2b. Net Precipitation	10	6	
2c. Depth to Aquifer	5	1	
2d. Travel Time	35	15	
2e. Potential to Release [lines 2a x (2b + 2c + 2d)]	500	220	
Likelihood of Release (higher of lines 1 and 2e)	550		220
Waste Characteristics			
4. Toxicity/Mobility	a	0.2	
5. Hazardous Waste Quantity	a	10,000	
6. Waste Characteristics	100		6
Targets			
7. Nearest Well	50	2	
8. Population			
8a. Level I Concentrations	b	0	
8b. Level II Concentrations	b	0	
8c. Potential Contamination	b	-	
8d. Population (lines 8a + 8b + 8c)	b	4.2	
9. Resources	5	5	
10. Wellhead Protection Area	20	0	
11. Targets (lines 7 + 8d + 9 + 10)	b		11.2
Ground Water Migration Score for an Aquifer			
12. Aquifer Score [(lines 3 x 6 x 11)/82,500][c]	100		0.179
Ground Water Migration Pathway Score			
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100		0.179

a Maximum value applies to waste characteristic* category.
b Maximum value not applicable.
c Do not round to nearest integer.

Site Name: Kerr McGee Chemical

Location: Theodore. Mobile County, Alabama

GROUND WATER MIGRATION PATHWAY SCORESHEET (Intermediate)

FACTOR CATEGORIES AND FACTORS

Likelihood of Release to an Aquifer	Maximum Value	Value Assigned	
1. Observed Release	550	240	
2. Potential to Release			
2a. Containment	10	10	
2b. Net Precipitation	10	6	
2c. Depth to Aquifer	5	1	
2d. Travel Time	35	15	
2e. Potential to Release [lines 2a x (2b + 2c + 2d)]	500	240	
Likelihood of Release (higher of lines 1 and 2e)	550		240
Waste Characteristics			
4. Toxicity/Mobility	a	0.2	
5. Hazardous Waste Quantity	a	10,000	
6. Waste Characteristics	100		6
Targets			
7. Nearest Well	50	2	
8. Population			
8a. Level I Concentrations	b	0	
8b. Level II Concentrations	b	0	
8c. Potential Contamination	b	-	
8d. Population (lines 8a + 8b + 8c)	b	4.2	
9. Resources	5	5	
10. Wellhead Protection Area	20	0	
11. Targets (lines 7 + 8d + 9 + 10)	b		11.2
Ground Water Migration Score for an Aquifer			
12. Aquifer Score [(lines 3 x 6 x 11)/82,500]^c	100		0.195
Ground Water Migration Pathway Score			
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)^c	100		0.195

Site Name: Wright, Carl. Septic Service

Location: Paris. Henry County. Tennessee

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned	
DRINKING WATER THREAT			
Likelihood of Release			
1. Observed Release	550	0	
2. Potential Release by Overland Flow			
2a. Containment	10	10	
2b. Runoff	25	11	
2c. Distance to Surface Water	25	25	
2d. Potential to Release by Overland Flow [lines 2a x (2b + 2c)]	500	360	
3. Potential to Release by Flood			
3a. Containment (Flood)	10	-	
3b. Flood Frequency	50	-	
3c. Potential to Release by Flood (lines 3a x 3b)	500	-	
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	-	
5. Likelihood of Release (higher of lines 1 and 4)	550		360
Waste Characteristics			
6. Toxicity/Persistence	a	0.2	
7. Hazardous Waste Quantity	a	10,000	
8. Waste Characteristics	100		6
Targets			
9. Nearest Intake	50	0	
10. Population			
lOa. Level I Concentrations	b	0	
lOb. Level II Concentrations	b	0	
lOc. Potential Contamination	b	0	
lOd. Population (lines lOa + lOb + lOc)	b	0	
11. Resources	5	5	
12. Targets (lines 9 + lOd + 11)	b		5
Drinking Water Threat Score			
13. Drinking Water Threat Score [(lines 5 x 8 x 12)/82,500, subject to a maximum of 100)	100		0.13

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

Site Name: Wright, Carl. Septic Service

Location: Paris. Henrv County. Tennessee

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
(continued)

Factor Categories and Factors	Maximum Value	Value Assigned	
HUMAN FOOD CHAIN THREAT			
Likelihood of Release			
14. Likelihood of Release (same value as line 5)	550		360
Waste Characteristics			
15. Toxicity/Persistence/Bioaccumulation	a	500,000	
16. Hazardous Waste Quantity	a	10,000	
17. Waste Characteristics	1,000		180
Targets			
18. Food Chain Individual	50	0	
19. Population			
19a. Level I Concentrations	b	0	
19b. Level II Concentrations	b	0	
19c. Potential Human Food Chain Contamination	b	0	
19d. Population (lines 19a + 19b + 19c)	b	0	
20. Targets (lines 18 + 19d)			0
Human Food Chain Threat Score			
21. Human Food Chain Threat Score [(lines 14 x 17 x 20)/82,5000, subject to a maximum of 100)	100		0
ENVIRONMENTAL THREAT			
Likelihood of Release			
22. Likelihood of Release (same value as line 5)	550		360

Site Name: Wright. Carl. Septic Service

Location: Paris. Henry County. Tennessee

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
(continued)

Factor Categories and Factors	Maximum Value	Value Assigned	
ENVIRONMENTAL THREAT, (concluded)			
Waste Characteristics			
23. Ecosystem Toxicity/Persistence/Bioaccumulation	a	5.0×10^8	
24. Hazardous Waste Quantity	a	10,000	
25. Waste Characteristics	1,000		320
26. Sensitive Environments			
26a. Level I Concentrations	b	0	
26b. Level II Concentrations	b	0	
26c. Potential Contamination	b	0.025	
26d. Sensitive Environments (lines 26a + 26b + 26c)	b	0.025	
Targets			
27. Targets (value from line 26d)			0.025
Environmental Threat Score			
28. Environmental Threat Score [(lines 22 x 25 x 27)/82,500, subject to a maximum of 60]	60		0.0349
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED			
29. Watershed Score[c] (lines 13 + 21 + 28, subject to a miximum of 100)	100		0.16
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE			
30. Component Score (S_{of})[c] (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100		0.16

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

Site Name: Wright, Carl Septic Service

Location: Paris, Henry County, Tennessee

SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned	
RESIDENT POPULATION THREAT			
Likelihood of Exposure			
1. Likelihood of Exposure	550		550
Waste Characteristics			
2. Toxicity	a	10,000	
3. Hazardous Waste Quantity	a	10,000	
4. Waste Characteristics	100		100
Targets			
5. Resident Individual	50	0	
6. Resident Population			
6a. Level I Concentrations	b	0	
6b. Level II Concentrations	b	0	
6c. Resident Population (lines 6a + 6b)	b	0	
7. Workers	15	10	
8. Resources	5	0	
9. Terrestrial Sensitive Environments	c	0	
10. Targets (lines 5 + 6c + 7 + 8 + 9)	b		10
Resident Population Threat Score			
11. Resident Population Threat (lines 1 x 4 x 10)/82,500	b		550,000
NEARBY POPULATION THREAT			
Likelihood of Exposure			
12. Attractiveness/Accessibility	100	5	
13. Area of Contamination	100	100	
14. Likelihood of Exposure	500		50
Waste Characteristics			
15. Toxicity	a	10,000	
16. Hazardous Waste Quantity	a	10,000	
17. Waste Characteristics	100		100

Site Name: Wright. Carl. Septic Service

Location: Paris. Henry County. Tennessee

SOIL EXPOSURE PATHWAY SCORESHEET
(contiued)

Factor Categories and Factors	Maximum Value	Value Assigned	
NEARBY POPULATION THREAT, (continued)			
Targets			
18. Nearby Individual	1	0	
19. Population Within 1 Mile	b	0.12	
20. Targets (lines 18 + 19)	b		0.12
Nearby Population Threat Score			
21. Nearby Population Threat (lines 14 x 17 x 20)	b		600
SOIL EXPOSURE PATHWAY SCORE			
22. Soil Exposure Pathway Score[d] (S,), (lines [11 + 21] subject to a maximum of 100)	100		6.67

* Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] No specific maximum value applies to factor. However pathway score based solely on sensitive environments is limited to maximum of 60.
[d] Oo not round to nearest integer.

Site Name: Wright, Carl. Septic Service

Location: Paris. Henrv County, Tennessee

AIR MIGRATION PATHWAY SCORESHEET

FACTOR CATEGORIES AND FACTORS

Likelihood of Release	Maximum Value	Value Assigned	
1. Observed Release	550	0	
2. Potential to Release			
2a. Gas Potential to Release	500	500	
2b. Particulate Potential to Release	500		
2c. Potential to Release (higher of lines 2a and 2b)	500	500	
3. Likelihood of Release (higher of lines 1 and 2c)	a		500
Waste Characteristics			
4. Toxicity/Mobility	a	0.2	
5. Hazardous Waste Quantity	a	10.000	
6. Waste Characteristics	100		6
Targets			
7. Nearest Individual	50	0	
8. Population			
8a. Level I Concentrations	b	0	
8b. Level II Concentrations	b	0	
8c. Potential Contamination	b	20	
8d. Population (lines 8a + 8b + 8c)	b	18.9	
9. Resources	5	5	
10. Sensitive Environments			
10a. Actual Contamination	c	0	
10b. Potential Contamination	c	0.519	
10c. Sensitive Environments (lines lOa + lOb)	c	0	
11. Targets (lines 7 + 8d + 9 + 10c)	b		44.42
Air Migration Pathway Score			
12. Pathway Score (S_a) [(lines 3 x 6 x 11)/82,500][d]	100		1.615

* Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] No specific maximum value applies to factor. However pathway score based solely on sensitive environments is limited to maximum of 60.
[d] Do not round to nearest integer.

APPENDIX C

SITE INSPECTION WORKSHEETS

This appendix consists of worksheets that can be used to generate an SI site score. Completion of these worksheets is not required, but the SI investigator must evaluate an SI score, either by these worksheets, *PREscore*, or other Regional scoring tools.

The worksheets consist of instructions and data tables to be filled in with scores from HRS reference tables. The data tables may also call for Data Type and References.

DATA TYPE: The Data Type columns should be filled in with an H, Q, or + if the data are HRS quality and well documented. The Data Type column should be filled in with an E, X, or • if the data represent estimates, approximations, or are not fully documented. This type identifies data gaps for the expanded SI to investigate.

REFERENCES: The Reference columns should be filled in with coded reference numbers. The numbered reference list should be attached or the numbering should be cross-referenced to the SI Narrative Report.

The SI investigator will need the current Superfund Chemical Data Matrix (SCDM) OSWER Directive 9345.1-13 (revised semi-annually) to complete these worksheets.

SITE INSPECTION WORKSHEETS

CERCLIS IDENTIFICATION NUMBER
ALD 071237890

SITE LOCATION	
SITE NAME: LEGAL, COMMON, OR DESCRIPTIVE NAME OF SITE Kerr McGee Chemical Corporation	
STREET ADDRESS, ROUTE, OR SPECIFIC LOCATION IDENTIFIER Range Line Road P.O. Box 629	
CITY Theodore	STATE , ZIP CODE , TELEPHONE AL 36590 ( )
COORDINATES: LATITUDE and LONGITUDE 30 30 12 / 88 0 - 54	TOWNSHIP, RANGE, AND SECTION Mobile

OWNER/OPERATOR IDENTIFICATION					
OWNER Kerr McGee Chemical			OPERATOR		
OWNER ADDRESS P.O. Box 25861			OPERATOR ADDRESS		
CITY Oklahoma City			CITY		
STATE OK	ZIP CODE 73125	TELEPHONE (405) 270-3701	STATE	ZIP CODE	TELEPHONE ( )

SITE EVALUATION	
AGENCY/ORGANIZATION U.S. EPA Region IV	
INVESTIGATOR K. A. Davis	
CONTACT Brian Farrier	
ADDRESS 345 Courtland Street NE	
CITY Atlanta	STATE , ZIP CODE GA 30365
TELEPHONE (404) [illegible]	

GENERAL INFORMATION

Site Description and Operational History: Provide a brief description of the site and its operational history. State the site name, owner, operator, type of facility and operations, size of property, active or inactive status, and years of waste generation. Summarize waste treatment, storage, or disposal **activities** that have or may have occurred at the site; note whether these activities are documented or alleged. Identify all source types and prior spills, floods, or fires. Summarize highlights of the PA and other investigations. Cite references

GENERAL INFORMATION (continued)

Site Sketch: Provide a sketch of the site. Indicate all pertinent features of the site and nearby environments including sources of wastes, areas of visible and buried wastes buildings, residences, access roads, parking areas, fences, fields, drainage patterns, water bodies, vegetation, wells, sensitive environments, and other features.

Source Descriptions: Describe all sources at the site. Identify source type and relate to waste disposal operations. Provide source dimensions and the best available waste quantity information. Describe the condition of sources and all containment structures. Cite references.

SOURCE TYPES

Landfill: A man-made (by excavation or construction) or natural hole in the ground into which wastes have come to be disposed by backfilling, or by contemporaneous soil deposition with waste disposal.

Surface Impoundment: A natural topographic depression, man-made excavation, or diked area, primarily formed from earthen materials (lined or unlined) and designed to hold an accumulation of liquid wastes, wastes containing free liquids, or sludges not backfilled or otherwise covered; depression may be wet with exposed liquid or dry if deposited liquid has evaporated, volatilized or leached; structures that may be described as lagoon, pond, aeration pit, settling pond, tailings pond, sludge pit; also a surface impoundment that has been covered with soil after the final deposition of waste materials (i.e., buried or backfilled).

Drum: A portable container designed to hold a standard 55-gallon volume of wastes.

Tank and Non-Drum Container: Any device, other than a drum, designed to contain an accumulation of waste that provides structural support and is constructed primarily of fabricated materials (such as wood, concrete, steel, or plastic); any portable or mobile device in which waste is stored or otherwise handled.

Contaminated Soil: An area or volume of soil onto which hazardous substances have been spilled, spread, disposed, or deposited.

Pile: Any non-containerized accumulation above the ground surface of solid, non-flowing wastes; includes open dumps. Some types of waste piles are:

- Chemical Waste Pile: A pile consisting primarily of discarded chemical products, by-products, radioactive wastes, or used or unused feedstocks.
- Scrap Metal or Junk Pile: A pile consisting primarily of scrap metal or discarded durable goods (such as appliances, automobiles, auto parts, batteries, etc.) composed of materials containing hazardous substances.
- Tailings Pile: A pile consisting primarily of any combination of overburden from a mining operation and tailings from a mineral mining, beneficiation, or processing operation.
- Trash Pile: A pile consisting primarily of paper, garbage, or discarded non-durable goods containing hazardous substances.

Land Treatment: Landfarming or other method of waste management in which liquid wastes or sludges are spread over land and tilled, or liquids are injected at shallow depths into soils.

Other: Sources not in categories listed above.

GENERAL INFORMATION (continued)

Source Description: Include description of containment per pathway for ground water (see HRS Table 3-2). surface water (see HRS Table 4-2), and air (see HRS Tables 6-3 and 6-9).

SURFACE IMPOUNDMENTS TOTALING APPROX 30 ACRES

1.5 SURFACE IMPOUNDMENT UNLINED (FIZENER DRAIN EQUIPPED

[illegible]

[illegible]

Hazardous Waste Quantity **(HWQ)** Calculation: SI Tables 1 and 2 (See HRS Tables 2-5. 2-6, and 5-2).

Attach additional **pages, if** necessary

HWQ » 10,000

S, TABLE 1: HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES

(Column 1) TIER	(Column 2} Source Type	Single Source Sites (assigned HWQ scores) (Column 3) HWQ = 10	(Column 4) HWQ = 100
A Hazardous Constituent Quantity	N/A	HWQ = 1 if Hazardous Constituent Quantity data are complete HWQ = 10 if Hazardous Constituent Quantity data are not complete	> 100 to 10,000 lbs
B Hazardous Wastestream Quantity	N/A	≤ 500.000 lbs	>500,000 to 50 million lbs
C Volume	Landfill	≤ 6.75 million ft^3 ≤ 250,000 yd^3	>6.75 million to 675 million ft^3 >250,000 to 25 million yd^3
	Surface impoundment	≤6,750 ft^3 £250 yd^3	>6,750 to 675,000 ft^3 >250 to 25.000 yd^3
	Drums	≤1,000 drums	>1,000 to 100,000 drums
	Tanks and non-drum containers	≤50,000 gallons	>50,000 to 5 million gallons
	Contaminated soil	≤6.75 million ft^3 £250.000 yd^3	>6.75 million to 675 million ft^3 >250,000 to 25 million yd^3
	Pile	£6.750 ft^3 £250 yd^3	>6.750 to 675,000 ft^3 >250 to 25,000 yd^3
	Other	≤6,750 ft^3 ≤250 yd^3	>6.750 to 675,000 ft^3 >250 to 25,000 yd^3
D Arta	Landfill	≤340,000 ft^2 ≤7.8 acres	>340,000 to 34 million ft^2 >7.8 to 780 acres
	Surface impoundment	≤1,300 ft^2 ≤0.029 acres	>1,300 to 130,000 ft^2 • >0.029 to 2.9 acres
	Contaminated soil	:S3.4 million ft^2 ≤78 acres	> 3.4 million to 340 milfion ft^2 > 78 to 7,800 acres
	Pile	≤1,300 ft^2 :≤0.029 acres	>1,300 to 130,000 ft^2 >0.029 to 2.9 acres
	Land treatment	≤27,000 ft^2 ≤0.62 acres	>27.000 to 2.7 million ft^2 >0.62 to 62 acres

TABLE 1 (CONTINUED)

Single Source Sites (assigned HWQ scores)		Multiple Source Sites		
(Column 5) HWQ = 10,000	(Column 6) HWQ = 1,000,000	(Column 7} Divisors for Assigning Source WQ Values	(Column 2} Source Type	(Column 1) TIER
>10,000 to 1 million lbs	> 1 million lbs	lbs + 1	N/A	A Hazardous Constituent Quantity
>£0 million to 5 billion lbs	> 5 billion lbs	lbs + 5,000	N/A	B Hazardous Wastestream Quantity
>675 million to 67.5 billion ft^3 >25 million to 2.5 billion yd^3 >675,000 to 67.5 million ft^3 >25.000 to 2.5 million yd^3 >100,000 to 10 million drums >5 million to 500 million gallons >675 million to 67.5 billion ft^3 >25 million to 2.5 billion yd^3 >675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3 >675.000 to 67.5 million ft^3 >25.000 to 2.5 million yd^3	> 67.5 billion ft^3 > 2.5 billion yd^3 > 57.5 million ft^3 > 2.5 million yd^3 > 10 million drums > 500 million gallons > 67.5 billion ft^3 > 2.5 billion yd^3 > 67.5 million ft^3 > 2.5 million yd^3 > 67.5 million ft^3 > 2.5 million yd^3	ft^3 ÷ 67.500 yd^3 + 2,500 ft^3 * 67.5 yd^3 * 2.5 drums ÷ 10 gallons ÷ 500 ft^3 + 67.500 yd^3 * 2.500 ft^3 + 67.5 yd^3 ÷ 2.5 ft^3 * 67.5 yd^3 * 2.5	Landfill Surface Impoundment Drums Tanks and non-drum containers Contaminated Soil Pile Other	C Volume
>34 million to 3.4 billion ft^2 >780 to 78,000 acres >130,000 to 13 million ft^2 >2.9 to 290 acres > 340 million to 34 billion ft^2 > 7,800 to 780,000 acres > 130,000 to 13 million ft^2 > 2.9 to 290 acres >2.7 million to 270 million ft^2 >62 to 6.200 acres	> 3.4 billion ft^2 >78,000 acres > 13 million ft^2 > 290 acres > 34 billion ft^2 > 780,000 acres > 13 million ft^2 >2SO acres > 270 million ft^2 > 6,200 acres	ft^2 * 3.400 acres * 0.078 ft^2 ÷ 13 acres * 0.00029 ft^2 * 34.000 acres * 0.78 ft^2 ÷ 13 acres * 0.00029 ft^2 ÷ 270 acres ÷ 0.0062	Landfill Surface Impoundment Contaminated Soil Pile Land Treatment	D Arta

HAZARDOUS WASTE QUANTITY (HWQ) CALCULATION

For each migration pathway, evaluate HWQ associated with sources that are available (i.e., incompletely contained) to migrate to that pathway. (Note: If *Actual Contamination Targets* exist for ground water, surface water, or air migration pathways, assign the calculated HWQ score or 100, whichever is greater, as the HWQ score for that pathway.) For each source, evaluate HWQ for one or more of the four tiers (SI Table 1; HRS Table 2-5) for which data exist: constituent quantity, wastestream quantity, source volume, and source area. Select the tier that gives the highest value as the source HWQ. Select the source volume HWQ rather than source area HWQ if data for both tiers are available.

Column 1 of SI Table 1 indicates the quantity tier. Column 2 lists source types for the four tiers. Columns 3. 4, 5, and 6 provide ranges of waste amount for sites with only one source, corresponding to HWQ scores at the tops of the columns. Column 7 provides formulas to obtain source waste quantity values at sites with multiple sources.

1. Identity each source type.
2. Examine all waste quantity data available for each source. Record constituent quantity and waste stream mass or volume. Record dimensions of each source.
3. Convert source measurements to appropriate units for each tier to be evaluated.
4. For each source, use the formulas in the last column of SI Table 1 to determine the waste quantity value for each tier that can be evaluated. Use the waste quantity value obtained from the highest tier as the quantity value for the source.
5. Sum the values assigned to each source to determine the total site waste quantity.
6. Assign HWQ score from SI Table 2 (HRS Table 2-6).

Note these exceptions to evaluate soil exposure pathway HWQ (see HRS Table 5-2):

- The divisor for the area (square feet) of a landfill is 34,000.
- The divisor for the area (square feet) of a pile is 34.
- Wet surface impoundments and tanks and non-drum containers are the only sources for which volume measurements are evaluated for the soil exposure pathway.

SI TABLE 2: HWQ SCORES FOR SITES

Site WQ Total	HWQ Score
0	0
1[a] to 100	1[b]
> 100 to 10.000	100
> 10.000 to 1 million	10.000
> 1 million	1.000.000

[a] If the WQ total is between 0 and 1, round it to 1.
[b] If the hazardous constituent quantity data are not complete, assign the score of 10.

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Site Name: Kerr McGee Chemical

References

Sources:

1. Surface & groundwater
2.
3.
4.
5.
6.
7.
8.
9.

ECO/BIO C-1	SOURCE	HAZARDOUS SUBSTANCE	TOXICITY	GROUND WATER PATHWAY: GW Mobility (HRS Tabla 3-8)	GROUND WATER PATHWAY: Tox/ Mobility Value (HRS Table 39)	SURFACE WATER PATHWAY – OVERLAND/FLOOD MIGRATION: Per (HRS Tables 4-10 and 4-11)	Tox/Per Value (IUIS Tabla 4-12)	Oloac Pol. (HRS Tabla 4-15)	Tox/ Pers/ Bloac Value (IIIIS Tabla 4-16)	Ecotox (IIIIS Tabla 4-19)	Ecotox/ Pers (IIIIS Tabla > 4-20)	Ecotox/ Pers/ Ecu Oloacc Value (HRS Tabla 4 21)	GROUND WATER TO SURFACE WATER: Tox/ Mob/ Pers Value (IUIS Tabla 4-26)	Tox/ Mob/ Pers/ Bloacc Vakia (IIIIS Tabla 4-28)	Ecotox/ Mob/ Pers Value (IIIIS Table 4-29)	Ecotox/ Mob/ Per/ Bloacc Value (IUIS Tnbla 4 30)	A x G
5,000		LEAD	10,000	0.00002	6, 2	1	10,000	50	0.5	1000	1000	5×10^6					0.6
0.5		Iron	—		—	1	—	0.5	5×10^5	iff	10	5					

Gas Mob/Factor

Alabama = 0.00006

Ground Water Observed Release Substances Summary Table

On Si Table 4, list the hazardous substances associated with the site detected in ground water samples tor that aquifer. Include only those substances directly observed or with concentrations significantly greater than background levels. Obtain toxicity values from the Superfund Chemical Data Matrix (SCDM). Assign mobility a value of 1 for all observed release substances regardless of the aquifer being evaluated. For each substance, multiply the toxicity by the mobility to obtain the toxicity/mobility factor value; enter the highest toxicity/mobility value for the aquifer in the space provided.

Ground Water Actual Contamination Targets Summary Table

If there is an observed release at a drinking water well, enter each hazardous substance meeting the requirements for an observed release by well and sample ID on SI Table 5 and record the detected concentration. Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For MCL and MCLG benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the population using the well as a Level I target. If these percentages are less than 100% or all are N/A, evaluate the population using the well as a Level II target for that aquifer.

SI TABLE 4: GROUND WATER OBSERVED RELEASE SUBSTANCES (DY AQUIFER)

Samplo ID	Hazardous Substanco	Bckgrd. Conc.	Toxlcity/ Mobility	References
		Highost Toxicity/Mobility		

SI TABLE 5: GROUND WATER ACTUAL CONTAMINATION TARGETS

Well ID: _____ Level I _____ Level II ____ Population Served _____ References _____

Sample ID	Hazardous Substanco	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancor Risk Conc.	% ol Cancor Risk Conc.	RID	V. ol RID
			Highest Percent		Sum of Percents		Sum of Percents	

Well ID: _____ Lovol I _____ Level II _____ Population Served _____ Rolorences _____

Sample ID	Hazardous Substanco	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% ol Benchmark	Cancer Risk Conc.	% ol Cancer Risk Conc.	RID	% ol RID
			Highost Porconl		Sum ol Porconts		Sum ol Porconls	

GROUND WATER PATHWAY
GROUND WATER USE DESCRIPTION

Describe **Ground** Water Use within 4 Miles of the **Site:**
Describe **generalized stratigraphy, aquifers,** municipal and **private wells**

Groundwater within 4 miles of the site is distributed by 1 municipal well which serves 250 customers or 678 people

There are 200 private wells within 4 miles of the site in the Kellogg area - South of the site

Show Calculations **of** Ground Water Drlnkfng Water Populations for each Aquifer:
Provide apportionment **calculations** for blended **supply** systems.
County average number of persons per household: 2.71 Reference _____

250 customers X 2.71 = 678 (3-4 miles)

Private Wells 1.200 X 2.71 = 542 = (3-4 mile 0

Total 1,220.00

GROUND WATER PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	fiefs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to the aquifer, assign a score of 550. Record observed release substances on SI Table 4.			
2. POTENTIAL TO RELEASE: Depth to aquifer: 450 feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Optionally, evaluate potential to release accordinc to HRS Section 3.	[illegible]		
LR =	220		

Intermediate [illegible] 240

TARGETS			
Are any wells part of a blended system? Yes ____ No ____ If yes, attach a page to show apportionment calculations.			
3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates that any target drinking water well for the aquifer has been exposed to a hazardous substance from the site, evaluate the factor score for the number of people served (SI Table 5). Level I: _____ people x 10 - _____ Level II: _____ people x 1 = _____ Total =	0		
4. POTENTIAL CONTAMINATION TARGETS; Determine the number of people served by drinking water wells for the aquifer or overlying aquifers that are not exposed to a hazardous substance from the site; record the population for each distance category in SI Table 6a or 6b. Sum the population values and multiply by 0.1.	4.2		
5. NEAREST WELL: Assign a score of 50 for any Level I Actual Contamination Targets for the aquifer or overlying aquifer. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Targets exist, assign the Nearest Well score from SI Table 6a or 6b. If no drinking water wells exist within 4 miles, assign 0.	2		
6. WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA for the aquifer, or if a ground water observed release has occurred within a WHPA, assign a score of 20; assign 5 if neither condition applies but a WHPA is within 4 miles: otherwise assign 0.	0		
7. RESOURCES: Assign a score of 5 if one or more ground water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Supply for commercial aquaculture • Supply for a major or designated water recreation area. excluding drinking water use	5		
Sum of Targets T=	11.2		

TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS

SI Table 6a: Oilier Than Karst Aquifers

Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to $\frac{1}{4}$ mile		20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455		
$>\frac{1}{4}$ to $\frac{1}{2}$ mile		18	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122		
$>\frac{1}{2}$ to 1 mile		9	1	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385		
> 1 to 2 miles		5	0.7	3	10	30	94	294	939	2,939	9,385	29,384	93,845	293,842		
> 2 to 3 miles		3	0.5	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212,219		
>3 to 4 miles		2	0.3	1	4	13	42	131	417	1,306	4,171	13,060	41,709	130,596	42	
Nearest Well =		2													Sum =	42

4.2

INTERMEDIATE 240 x 11.2 x 6 / 82,000 — 0.195 DEEP Aquifer = 220 x 11.2 x 6 / [illegible] = 0.179

WASTE CHARACTERISTICS	Score	Data Type	Does not Apply
8. If any Actual Contamination Targets exist for the aquifer or overlying aquifers, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to ground water.	100		
9. Assign the highest ground water toxicity/mobility value from SI Table 3 or 4.	0.2		
10. Multiply the ground water toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below: (from HRS Table 2-7)			

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10.000	6
10,000 to <1E + 05	10
1E+05 to <1E+06	18
1E+06 to <1E+07	32
1E+07 to <1E+oa	56
1E + 08 or greater	100

WC s 6

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the ground water pathway score for each aquifer. Select the highest aquifer score. If the pathway score is greater than 100, assign 100.

GROUND WATER PATHWAY SCORE: $\frac{LR \times T \times WC}{82,500}$ (Maximum of 100)

MUNICIPAL WELL $\frac{220 \times 11.2 \times 6}{82,500} = 0.179$

PRIVATE WELLS $\frac{240 \times 11.2 \times 6}{82,500} = 0.195$

SI TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS (continued)

SI Table 6b: Karst Aquifers

Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category: 1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10.000	10.001 to 30,000	30.001 to 100,000	100,001 to 300,000	300.001 to 1,000,000	1.000.000 to 3,000,000	Pop. Value	Ref.
0 to $\frac{1}{4}$ mile		20	4	17	53	164	522	1.633	5.214	16.325	**52,137**	163.246	521.360	1.632.455		
> $\frac{1}{4}$ to $\frac{1}{2}$ mile		20	2	11	33	102	324	1.013	3.233	10.122	32.325	**101,213**	323.243	**1,012,122**		
> $\frac{1}{2}$ to 1 mile		20	2	g	26	02	**261**	017	2.607	0.163	26.060	**81,623**	260.600	016.227		
> 1 to 2 miles		20	2	g	26	02	261	**817**	2.607	0.163	26.060	01.623	**260,680**	**816,227**		
> 2 to 3 miles		20	2	g	26	02	261	**817**	2.607	0.163	26.060	01.623	260.600	**816,227**		
>3 to 4 miles		20	2	g	26	02	261	017	2.607	**8,163**	26.068	**81,623**	260.600	**816,227**		

Nearest Well = [ ]

Sum B [ ]

TABLE 3-1
GROUND WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors

Likelihood of Release to an Aquifer	Maximum Value	Value Assigned	
1. Observed Release	550	—	
2. Potential to Release			
2a. Containment	10	10	10
2b. Net Precipitation	10	6	6
2c. Depth to Aquifer	5	1	3
2d. Travel Time	35	15	15
2e. Potential to Release [lines 2a x (2b + 2c + 2d)]	500	220	240
3. Likelihood of Releaae (higher of lines 1 and 2e)	550		220
Waste Characteristics			
4. Toxicity/Mobility	a	0.5	
5. Hazardous Waste Quantity	a	10,000	
6. Waste Characteristics	100		6
Targets			
7. Nearest Well	50	2	
8. Population			
8a. Level Z Concentrations	b	—	
8b. Level II Concentrations	b	—	
8c. Potential Contamination	b	—	
8d. Population (lines 8a + 8b + 8c)	b	4.2	
9. Resources	5	5	
10. Wellhead Protection Area	20	—	
11. Targets (lines 7 + 8d + 9 + 10)	b		11.2
Ground Water Migration Score for an Aquifer			
12. Aquifer Score [(lines 3 x 6 x 11)/82,500][c]	100		0.179 - [illegible] 0.195 - INTERMEDIATE AQUIFER
Ground Water Migration Pathway Score			
13. Pathvay Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100		0.179 0.195

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

TABLE 3-2
CONTAINMENT FACTOR VALUES FOR GROUND VATZR MIGRATION PATHWAY

All Sources (except surface impoundments, land treatment, containers, and tanks)	Assigned Value
Evidence of hazardous substance nigration froa source area (i.e., source are* includes source and any associated containment structures).	10
No liner.	10
No evidence of hazardous substance migration from source area, a liner, and:	
(a) None of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system, or (3) functioning leachate collection and removal system immediately above liner.	10
(b) Any one of the three items in (a) present.	9
(e) Any two of the items in (a) present.	7
(d) All three items in (a) present plus a functioning ground vater monitoring system.	5
(e) All items in (d) present, plus no bulk or non-containerized liquids nor materials containing free liquids deposited in source area.	3
No evidence of hazardous substance migration from source area; double liner with functioning leachate collection and removal system above and between liners, functioning ground vatsr monitoring system, and:	
(f) Only one of the following deficiencies present in containment: (1) bulk or noncontainerized liquids or materials containing free liquids deposited in source area, or (2) no or nonfunctioning or nonmaintained run-on control systam and runoff management system, or (3) no or nonmaintained engineered cover.	3

TABLE 3-2 (Continued)

All Sources (Concluded)	Assigned Value
(g) None of the deficiencies in (f) present.	0
Source area inside or under maintained intact structure that provides protection from precipitation so that neither runoff nor leachate is generated, liquids or materials containing free liquids not deposited in source area, and functioning and maintained run-on control present.	0

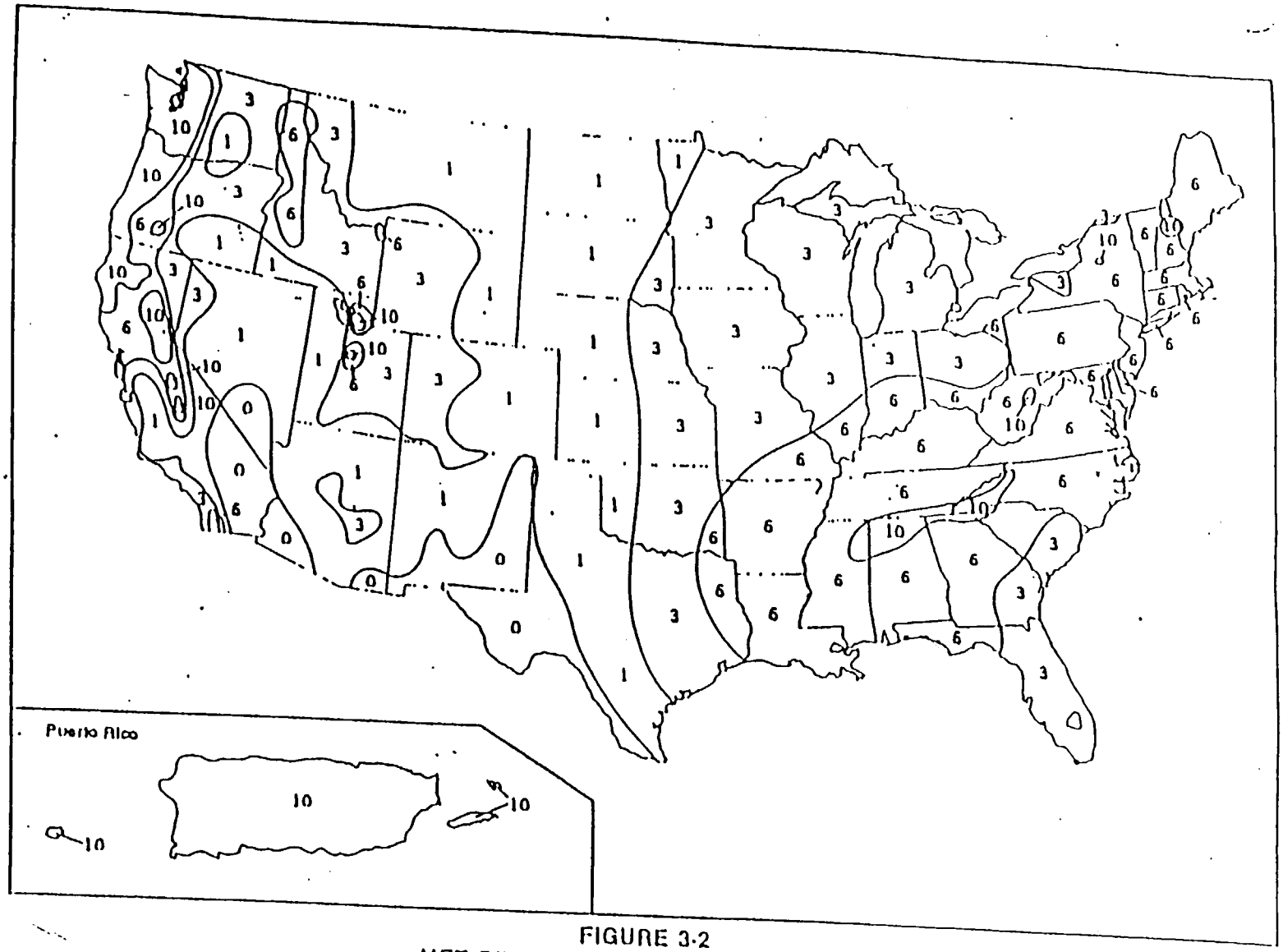


FIGURE 3-2
NET PRECIPITATION FACTOR VALUES

CONFIDENTIAL

CONFIDENTIAL

TABLE 3-5
DEPTH TO AQUIFER FACTOR VALUES

Depth To Aquifer[a] (feet)	Assigned Value
Less than or equal to 25	5
Greater than 25 to 150	3 — INTERMEDIATE PRIVATE WELL
Greater than 150	1 — DEEP WELL

[a]Use depth of all layers between the hazardous substances and aquifer. Assign a [illegible] of 0 feet to any karst aquifer that underlies a portion of the sources at the site.

TABLE 3-6
HYDRAULIC CONDUCTIVITY OF GEOLOGIC MATERIALS

Type of Material	Assigned Hydraulic Conductivity[a] (cm/sec)
Clay; low permeability cill (compacc unfraccured cill); shale; unfraccured metamorphic and igneous rocks	10^{-8}
Silc; loesses; silcy clays; sediments chac are predominancly silcs; moderacely permeable cill (fine-grained, unconsolidaced cill, or compacc cill vich some fraccures); low permeability limescones and dolomices (no karsc); lev permeability sandscone; low permeability fraccured igneous and metamorphic rocks	10^{-6}
Sands; sandy silcs; sediments chac are predominancly sand; highly permeable cill (coarse-grained, unconsolidaced or compacc and highly fraccured); peac; moderacely permeable limescones and dolomices (no karsc); moderacely permeable sandscone; moderacely permeable fraccured igneous and necanorphic rocks	10^{-4}
Gravel; clean sand; highly permeable fraccured igneous and metamorphic rocks; permeable basalt; karsc limescones and dolomices	10^{-2}

[a]Do nocround to nearesc integer.

TABLE 2-7
TRAVEL TIME FACTOR VALUES[a]

Hydraulic Conductivity (cm/sec)	Thickness of Lowest Hydraulic Conductivity Layer(s)[b] (feet)			
	Greater than 3 to 5	Greater than 5 to 100	Greater than 100 to 500	Greater than 500
Greater than or equal to 10^{-3}	35	35	35	25
Less than 10^{-3} to 10^{-5}	35	25	15	15
Less than 10^{-5} to 10^{-7}	15	15	5	5
Less than 10^{-7}	5	5	1	1

[a]If depth to aquifer is 10 feet or less or if, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.
[b]Consider only layers at least 3 feet thick. Do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

SI TABLE 7: SURFACE WATER OBSERVED RELEASE SUBSTANCES

Sample ID	Hazardous Substance	Bckgrd. Conc.	Toxicity/ Persistence	Toxicity/ Parsls./ Bioaccum	Ecoloxicily/ Porsis/ Ecobioaccum	References
		Highest Values				

SI TABLE 0: SURFACE WATER DRINKING WATER ACTUAL CONTAMINATION TARGETS

Intake ID: _____ Sample Type _____ Level I _____ Level II ____ Population Served _____ References _____

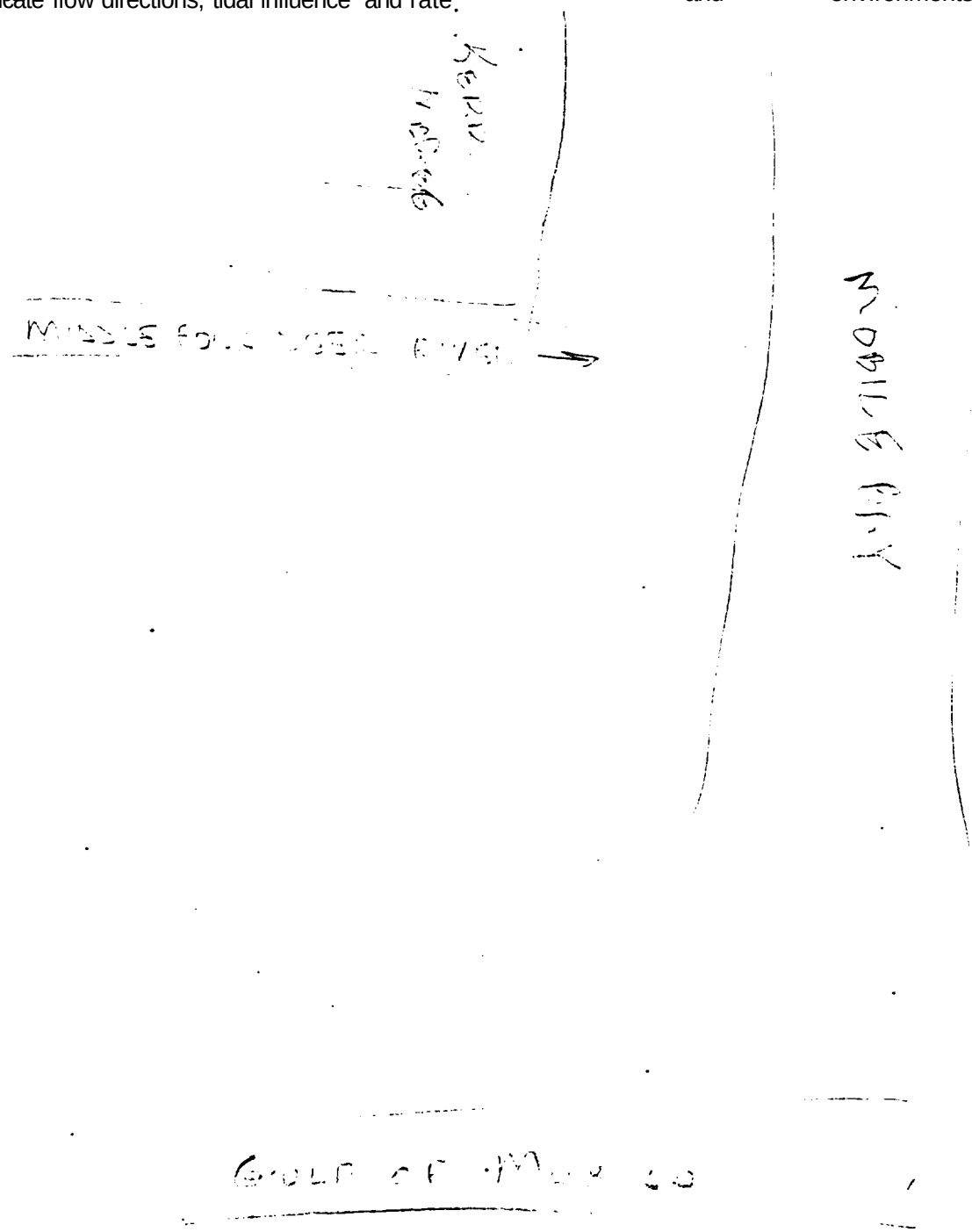
Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

SURFACE WATER PATHWAY

Sketch of the Surface Water Migration Route:
Label all surface water bodies. Include runoff route and drainage direction, probable point of entry, and 15-mile target distance limit. Mark sample locations intakes fisheries, and sensitive environments. Indicate flow directions, tidal influence and rate.



SURFACE WATER PATHWAY

Surface Water Observed Release Substances Summary Table

On SI Table 7. list the hazardous substances detected in surface water samples for the watershed, which can be attributed to the site. Include only those substances in observed releases (direct observation) or with concentration levels significantly above background levels. Obtain toxicity, persistence, bioaccumulation potential, and ecotoxicity values from SCDM. Enter the highest toxicity/persistence, toxicity/persistence/bioaccumulation, and ecotoxicity/persistence/ecobioaccumulation values in the spaces provided.

- TP = Toxicity x Persistence
- TPB = TP x bioaccumulation
- ETPB = EP x bioaccumulation (EP = ecotoxicity x persistence)

Drinking Water Actual Contamination Targets Summary Table

For an observed release at or beyond a drinking water intake, on SI Table 8 enter each hazardous substance by sample ID and the detected concentration. For surface water sediment samples detecting a hazardous substance at or beyond an intake, evaluate the intake as Level II contamination. Obtain benchmark, cancer risk, and reference dose concentrations for each substance from SCDM. For MCL and MCLG benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages of the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. II the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the population served by the intake as a Level I target. If the percentages are less than 100% or all are N/A, evaluate the population served by the intake as a Level II target.

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET

LIKELIHOOD OF RELEASE- OVERLAND/FLOOD MIGRATION	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.			
2. POTENTIAL TO RELEASE: Distance to surface water ____(feet) If sampling data do not support a release to surface water in the watershed, use the table below to assign a score from the table below based on distance to surface water and flood frequency.	360		

Distance to surface water <2500 feet	500
Distance to surface water >2500 feet. and:	
Site in annual or 10-yr floodplain	500
Site in 100-yr floodplain	400
Site in 500-yr floodplain	300
Site outside 500-yr floodplain	100

Optionally, evaluate surface water potential to release according to HRS Section 4.1.2.1.2

LR = 360

LIKELIHOOD OF RELEASE GROUND WATER TO SURFACE WATER MIGRATION	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7. NOTE: Evaluate ground water to surface water migration only for a surface water body that meets all of the following conditions: 1) A portion of the surface water is within 1 mile of site sources having a containment factor greater than 0. 2) No aquifer discontinuity is established between the source and the above portion of the surface water body. 3) The top of the uppermost aquifer is at or above the bottom of the surface water. Elevation of top of uppermost aquifer _____ Elevation of bottom of surface water body _____			
2. POTENTIAL TO RELEASE: Use the ground water potential to release. Optionally, evaluate surface water potential to release according to HRS Section 3.1.2.			

LR = _____

SURFACE WATER PATHWAY

LIKELIHOOD OF RELEASE **AND DRINKING** WATER **THREAT** WORKSHEET

(CONTINUED)

DRINKING **WATER** THREAT TARGETS	Score	Data Type	Refs
Record the water body **type,** flow, and number of people served by each drinking water **intake** within the target distance limit in the watershed. If there is no **drinking** water intake within the target distance limit, assign 0 to factors **3, 4,** and 5. Intake Name / Water **Body Type** / Row / Peoole Served ____ / ____ / ____ / ____ ____ / ____ / ____ / ____ ____ / ____ / ____ / ____ Are any intakes part of a blended system? Yes ____ No ____ If yes, attach a page to show **apportionment calculations.** 3. ACTUAL CONTAMINATION TARGETS: If analytical **evidence** indicates a **drinking** water **intake** has been exposed to a hazardous substance from the site, list the intake name and evaluate the factor score for the drinking **water** population (SI Table 8). Level **I:** people x 10 - ____ Level II: , people **x 1** • **Total =**	0 0		
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water intakes for the watershed that have not been exposed to a hazardous substance from the site. Assign the **population values** from SI Table 9. Sum the values and **multiply by 0.1 .**			
5. NEAREST INTAKE: Assign a score of 50 for any Level **I** Actual Contamination Drinking **Water** Targets for the watershed. Assign a score of 45 if there are Level II targets for the **watershed,** but no Level I targets. If no Actual Contamination Drinking Water Targets exist, assign a score for the intake nearest the PPE from SI Table 9. If no **drinking** water intakes **exist. assign** 0.	0		
6. RESOURCES: Assign a score of 5 if one or more surface water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Major or designated water recreation area, excluding drinking water use	5		
SUM OF TARGETS **T=**	5		

SI TABLE 9 (From HRS Table 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY

Type of Surface Water Body	Pop.	Nearest Intake	Number of people									Pop. Value
			0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	
Minimal Stream (<10 cfs)		20	0	4	17	53	164	522	1.633	5,214	16,325	
Small to moderate stream (10 to 100 cfs)		2	0	0.4	2	5	16	52	163	521	1.633	
Moderate to large stream (> 100 to 1,000 cfs)		0	0	0.04	0.2	0.5	2	5	16	52	163	
Large Stream to river (>1,000 to 10,000 cfs)		0	0	0.004	0.02	0.05	0.2	0.5	2	5	16	
Large River (> 10,000 to 100,000 cfs)		0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	16	
Very Large River (>100,000 cfs)		0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Shallow ocean zone or Great Lake (depth < 20 feet)		0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)		0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Deep ocean zone or Great Lake (depth > 200 feet)		0	0	0	0	0	0.001	0.003	0.008	0.03	0.00	
3-mile mixing zone in quiet flowing river (≥ 10 cfs)		10	0	2	9	26	02	261	017	2,607	0.163	

Nearest Intake = _____ Sum = _____

References _____

SURFACE WATER PATHWAY

Human Food Chain Actual Contamination Targets Summary Table

On SI Table 10, list the hazardous substances detected in sediment, aqueous, sessile benthic organism tissue, or fish tissue samples (taken from fish caught within the boundaries of the observed release) by sample ID and concentration. Evaluate fisheries within the boundaries of observed releases detected by sediment or aqueous samples as Level II, if at least one observed release substance has a bioaccumulation potential factor value of 500 or greater (see SI Table 7). Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For FDAAL benchmarks, determine the highest percentage of benchmark obtained tor any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate this portion of the fishery as subject to Level I concentrations. If the percentages are less than 100% or all are N/A, evaluate the fishery as a Level II target.

Sensitive Environment Actual Contamination Targets Summary Table

On SI Table 11, list each hazardous substance detected in aqueous or sediment samples at or beyond wetlands or a surface water sensitive environment by sample ID. Record the concentration. If contaminated sediments or tissues are detected at or beyond a sensitive environment, evaluate the sensitive environment as Level II. Obtain benchmark concentrations from SCDM. For AWQC/AALAC benchmarks, determine the highest percentage of benchmark of the substances detected in aqueous samples. If benchmark concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage equals or exceeds 100%, evaluate that part of the sensitive environment subject to Level I concentrations. If the percentage is less than 100%, or all are N/A, evaluate the sensitive environment as Level II.

HUMAN FOOD CHAIN THREAT TARGETS	Score	Data Type	Refs
Record the water body type and flow for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a score of 0 at the bottom of this page.			
Fishery Name • Water Bodv Flow cfs Species Production 0 - 1000 lbs/yr Species Production lbs/yr	3		
Fishery Name Water Bodv Flow cfs Species Production lbs/yr Species Production lbs/yr			
Fishery Name Water Bodv Flow cfs Species Production lbs/yr Species_____ Production_____ • _____ lbs/yr			

FOOD CHAIN INDIVIDUAL

7. ACTUAL CONTAMINATION FISHERIES:

If analytical evidence indicates that a fishery has been exposed to a hazardous substance with a bioaccumulation factor greater than or equal to 500 (SI Table 10), assign a score of 50 if there is a Level I fishery. Assign 45 if there is a Level It fishery, but no Level I fishery.

8. POTENTIAL CONTAMINATION FISHERIES:

If there is a release of a substance with a bioaccumulation factor greater than or equal to 500 to a watershed containing fisheries within the target distance limit, but there are no Level I or Level II fisheries, assign a score of 20.

If there is no observed release to the watershed, assign a value for potential contamination fisheries from the table below using the lowest flow at all fisheries within the target distance limit:

Lowest Flow	FCI Value
<10 cfs	20
10 to 100 cfs	2
>100 cfs, coastal tidal waters, oceans, or Great Lakes	0
3-mile mixing zone in quiet flowing river	10

FCI Value =

SUM OF TARGETS T = 0

SI TABLE 10: HUMAN FOOD CHAIN ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Fishery ID: _____ Sample Type _____ Level I ____ Level II ____ References _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Benchmark Concentration (FDAAL)	% of Benchmark	Cancer Risk Concentration.	% of Cancer Risk Concentration	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

SI TABLE 11: SENSITIVE ENVIRONMENT ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Environment ID: _____ Sample Type _____ Level I ____ Level II ____ Environment Value _____

Sample ID	Hazardous Substance	Conc.. (µg/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

Sample ID	Hazardous Substance	Conc.. (µg/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

SURFACE WATER PATHWAY (continued)
ENVIRONMENTAL THREAT WORKSHEET

When measuring length of wetlands that are located on both sides of a surface water body, sum both frontage lengths. For a sensitive environment that is more than one type, assign a value tor each type.

ENVIRONMENTAL THREAT TARGETS	Score	Data Type	Refs
Record the water body type and flow for each surface water sensitive environment within the target distance (see SI Table 12). If there is no sensitive environment within the target distance limit, assign a score of 0 at the bottom of the page.			

Environment Name	Water Body Type	Flow
[illegible]	[illegible]	[illegible] cfs
		cfs
		cfs
		cfs
		cfs

9. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: If sampling data or direct observation indicate any sensitive environment has been exposed to a hazardous substance from the site, record this information on SI Table 11, and assign a factor value for the environment (SI Tables 13 and 14).

Environment Name	Environment Type and Value (SI Tables 13 & 14)	Multiplier (10 for Level I, 1 for Level II)	Product
		x =	
		x =	
		x =	
		x =	
		Sum =	

10. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS:

Flow	Dilution Weight (SI Table 12)	Environment Type and Value (SI Tables 13 & 14)	Pot. Cont.	Product
[illegible] cfs	0.001 x	WETLAND 250 x	0.1 =	0.025
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
			Sum =	

T = [illegible]

SI TABLE 13 (HRS TABLE 4-23): SURFACE WATER AND AIR SENSITIVE ENVIRONMENTS VALUES

SENSITIVE ENVIRONMENT	ASSIGNED VALUE
Critical habitat for Federal designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area	100
Habitat known to be used by Federal designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Coastal Barrier (undeveloped) Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semi-aquatic foragers) for breeding National river reach designated as recreational	75
Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River	50
State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
State designated areas for the protection of maintenance of aquatic life under the Clean Water Act	5
Wetlands — See SI Table 14 (Surface Water Pathway) or SI Table 23 (Air Pathway)	

SI TABLE 14 (HRS TABLE 4-24): SURFACE WATER WETLANDS FRONTAGE VALUES

Total Length of Wetlands	Assigned Value
Less than 0.1 mile	0
0.1 to 1 mile	25
Greater than 1 to 2 miles	50
Greater than 2 to 3 miles	75
Greater than 3 to 4 miles	100
Greater than 4 to 8 miles	150
Greater than 8 to 12 miles	250
Greater than 12 to 16 miles	350
Greater than 16 to 20 miles	450
Greater than 20 miles	500

SI TABLE 12 (HRS Table 4-13): SURFACE WATER DILUTION WEIGHTS

Type of Surface Water Body		Assigned Dilution Weight
Descriptor	Flow Characteristics	
Minimal stream	< 10 cfs	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	> 100 to 1,000 cfs	0.01
Large stream to river	> 1,000 to 10,000 cfs	0.001
Large river	> 10,000 to 100,000 cfs	0.0001
Very large river	> 100,000 cfs	0.00001
Coastal tidal waters	Flow not applicable; depth not applicable	0.001
Shallow ocean zone or Great Lake	Flow not applicable; depth less than 20 feet	0.001
Moderate depth ocean zone or Great Lake	Flow not applicable; depth 20 to 200 feet	0.0001
Deep ocean zone or Great Lake	Flow not applicable; depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

SURFACE WATER PATHWAY (concluded)

WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY

WASTE CHARACTERISTICS	Score
14. If an Actual Contamination Target (drinking water, human food chain, or environmental threat) exists for the watershed, assign the calculated hazardous waste quantity score, or a score of 100, whichever is greater.	
15. Assign the highest value from SI Table 7 (observed release) or SI Table 3 (no observed release) for the hazardous substance waste characterization factors below. Multiply each by the surface water hazardous waste quantity score and determine the waste characteristics score for each threat.	

	Substance Value		HWQ		Product	WC Score (from Table) (Maximum of 100)
Drinking Water Threat Toxicity/Persistence	0.2	x	10,000	=	2,000	6
Food Chain Threat Toxicity/Persistence Bioaccumulation	500,000	x	10,000	=	5×10^{9}	180
Environmental Threat Ecotoxicity/Persistence/ Ecobioaccumulation	5,000,000	x	10,000	=	5×10^{10}	320

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E+05	10
1E+05 to <1E+06	18
1E+06 to <1E+07	32
1E+07 to <1E+08	56
1E+08 to <1E+09	100
1E+09 to <1E+10	180
1E+10 to <1E+11	320
1E+11 to <1E+12	560
1E+12 or greater	1000

SURFACE WATER PATHWAY THREAT SCORES

Threat	Likelihood of Release (LR) Score	Targets (T) Score	Pathway Waste Characteristics (WC) Score (determined above)	Threat Score $\frac{LR \times T \times WC}{82,500}$
Drinking Water	360	5	6	(maximum of 100) 0.13
Human Food Chain	360	0	180	(maximum of 100) 0
Environmental	360	0.025	320	(maximum of 60) 0.03

SURFACE WATER PATHWAY SCORE (Drinking Water Threat + Human Food Chain Threat + Environmental Threat) — (maximum of 100) 0.16

SOIL EXPOSURE PATHWAY

If there is no observed contamination (e.g., ground water plume with no known surface source), do not evaluate the soil exposure pathway. Discuss evidence for no soil exposure pathway.

Soil Exposure Resident Population Targets Summary

For each property (duplicate page 35 as necessary):

If there is an area of observed contamination on the property and within 200 feet of a residence, school, or day care center, enter on Table 15 each hazardous substance by sample ID. Record the detected concentration. Obtain cancer risk, and reference dose concentrations from SCDM. Sum the cancer risk and reference dose percentages for the substances listed. If cancer risk or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the residents and students as Level I. If both percentages are less than 100% or all are N/A, evaluate the targets as Level II.

TABLE 4-1

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned	
DRINKING WATER THREAT			
Likelihood of Release			
1. Observed Release	550	—	
2. Potential co Release by Overland Flow			
2a. Concainaenc	10	10	
2b. Runoff	25	14	
2c. Distance Co Surface Water	25	25	
2d. Pocencial to Release by Overland Flow (lines 2a x [2b + 2c])	500	360	
3. Pocencial co Release by Flood			
3a. Concainaenc (Flood)	10	0	
3b. Flood Frequency	50	7	
3c. Pocencial co Release by Flood (lines 3a x 3b)	500	0	
4. Pocencial co Release (lines 2d + 3c, subject co a maximum of 500)	500	360	
5. Likelihood of Release (higher of lines 1 and 4)	550		360
Vasce Characteristics			
6. Toxicity/Persistence	a	0.2	
7. Hazardous Vasce Quantity	a	10000	
8. Vasce Characteristics	100		6
Targets			
9. Nearest Intake	50	0	
10. Population			
10a. Level I Concentrations	b	—	
10b. Level II Concentrations	b	—	
10c. Potential Contamination	b	—	
10d. Population (lints 10a + 10b + 10c)	b	—	
11. Resources	5	5	

TABLE 4-1 (Continued)

Factor Categories and Factors	Maximum Value	Value Assigned
DRINKING WATER THREAT (Concluded)		
Targets (Concluded)		
12. Targets (lines 9 + 10d + 11)	b	5
Drinking Water Threat Seora		
13. Drinking Water Threat Scora ([lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	100	0.131
	360 x 5 x [illegible] / [illegible]	= 0.131
HUMAN FOOD CHAIN THREAT		
Likelihood of Release		
14. Likelihood of Release (saae value as Una 5)	550	360
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	a	500,000
16. Hazardous Waste Quantity	a	to,000
17. Waste Characteristics	1,000	170
Targets		
18. Food Chain Individual	50	0
19. Population		
19a. Level I Concentrations	b	—
19b. Level II Concentrations	b	—
19c. Potential Human Food Chain Contamination	b	—
19d. Population (lines 19* + 19b + 19e)	b	—
20. Targets (lines 18 + 19d)	b	0
Hunan Food Chain Threat Score		
21. Human Pood Chain Threat Score ([lines 14 x 17 X 20]/82,500, subject Co a maximum of 100)	100	—
	360 x 0 x 180 / 82500	= 0

TABLE 4-1 (Concluded)

Factor Categories and Factors	Maximum Value	Value Assigned
ENVIRONMENTAL THREAT		
Likelihood of Release		
22. Likelihood of Release (same value a* line 5)	550	360
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/ Bioaccumulation	a	5,000,000
24. Hazardous Waste Quantity	a	10,000
25. Waste Characteristics	1.000	320
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	b	—
26b. Level II Concentrations	b	—
26c. Potential Contamination	b	—
26d. Sensitive Environments (lines 26a + 26b + 26c)	b	0.025
27. Targets (value from line 26d)	b	0.025
Environmental Threat Score		
28. Environmental Threat Score ([lines 22 x 25 x 27]/82,500, subject to a maximum of 60)	60	360 0.025 x 320 / 82,500 = 0.0349
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED		
29. Watershed Score[c] (lines 13 * 21 + 28, subject to * maximum of 100)	100	0.16
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE		
30. Component Score (S_{of})[c] (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100	0.16

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

TABLE 4-2
CONTAINMENT FACTOR VALUIS
FOR SURFACE WATER MIGRATION PATHWAY

	Assigned Value
All Sources (except surface impoundments, land treatment, containers, and tasks)	
Evidence of hazardous substance migration from source area (i.e., source area includes source and any associated containment structures).	10
No evidence of hazardous substance migration from source area and:	
(a). Neither of the following present: (1) maintained engineered cover, or (2) functioning and maintained run-on control system and runoff management system.	10
(b) Any one of the two items in (a) present.	9
(c) Any tvo of the following present: (1) maintained engineered cover, or (2} functioning and maintained run-on control system and runoff management system, or (3) liner with functioning leachate collection and removal systaa immediately above liner.	7
(d) All items in (c) present.	5
(e) All items is (c) present, plus no bulk or non-containerized liquids nor materials containing free liquids deposited in source area.	3
Ho evidence of hazardous substance migration froa source area, double liner with functioning leachate collection and reaoval systea above and between liners, and:	
(f) Only one of the following deficiencies present in containment: (1) bulk or noncontainerized liquids or materials containing free liquids deposited in source area, or. (2) no or nonfunctioning or normaintained run-on control systea and runoff management systea, or (3) no or normaintained engineered cover.	3
(g) None of the deficiencies in (f) present.	0

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TABLE 4-3
DRAINAGE AREA VALUES

Drainage Area (acres)	Assigned Value
Less than 50	1
50 to 150	2
Greater than 250 to 1,000	3
Greater than 1,000	4

* drainage area is area that contributes to overland flow across a source based on observing topographic map of the area.

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TABLE 4-4
SOIL GROUP DESIGNATIONS

Surface Soil Description	Soil Group Designation
Coarse-textured soils with high infiltration rates (for example, sands, loamy sands)	A
Medium-textured soils with moderate infiltration rates (for example, sandy loams, loams)	B
Moderately fine-textured soils with low infiltration rates (for example, silty loams, silts, sandy clay loams)	C
Fine-textured soils with very low infiltration rates (for example, clays, sandy clays, silty clay loams, clay loams, silcy clays); or impermeable surfaces (for example, pavement)	D

get info from Soil Survey

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TABLE 4-5
RAINFALL/RUNOFF VALUES

2-Year, 24-Hour Rainfall (Inches)	Soil Group Designation			
	A	B	C	D
Less than 1.0	0	0	2	3
1.0 to less than 1.5	0	1	2	3
1.5 to less than 2.0	0	2	3	4
2.0 to less than 2.5	1	2	3	4
2.5 to less than 3.0	2	3	4	4
3.0 to less than 3.5	2	3	4	5
3.5 or greater	3	4	5	6

Rainfall frequency atlas

TABLE 4.6
RUNOFF FACTOR VALUES

Drainage Area Value	Rainfall/Runoff Value						
	0	1	2	3	4	5	6
1	0	0	0	1	1	1	1
2	0	0	1	1	2	3	4
3	0	0	1	3	7	11	15
4	0	1	2	7	17	25	25

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TABLE 4-7
DISTANCE TO SURFACE WATER FACTOR VALUES

Distance	Assigned Value
Less than 100 feet	25
100 feet to 500 feet	20
Greater than 500 feet to 1.000 feet	16
Greater than 1,000 feet to 2.500 feet	9
Greater than 2,500 feet to 1.5 miles	6
Greater than 1.5 miles to 2 miles	3

TABLE 4-8
CONTAINMENT (FLOOD) FACTOR VALUES

Containment Criteria	Assignee Value
Documentation that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by the flood being evaluated	0
Other	10

C-23F½

CONFIDENTIAL

TABLE 4-9
FLOOD FREQUENCY FACTOR VALUES

Floodplain Category	Assigned Value
Source floods annually	50
Source in 10-year floodplain	50
Source in 100-year floodplain	25
Source in 500-year floodplain	7
None of above	0

SOIL EXPOSURE PATHWAY WORKSHEET
RESIDENT POPULATION THREAT

LIKELIHOOD OF EXPOSURE	Score	Data Tvoe	Refs
1. **OBSERVED CONTAMINATION:** If evidence indicates presence of observed contamination (depth of 2 feet or **less),** assign a score of 550; **otherwise,** assign a 0. Note that a likelihood of exposure score of 0 **results** in a soil **exposure pathway** score of 0.	550		
LE =	550		

TARGETS			
2. RESIDENT POPULATION: Determine the number **of** people occupying residences or attending school or day care on or within 200 feet of areas of observed contamination (HRS section 5.1.3). Level I: ___ people x 10 = ___ Level II: ___ people x 1 = ___ Sun =	0		
3. RESIDENT INDIVIDUAL: Assign a score of 50 if any Level I resident population exists. Assign a score of 45 if there are Level II targets but no Level **I targets.** If no resident population exists *(i.e..* no Level I or Level II **targets). assign** 0 (HRS Section **5.1.3).**			
4. **WORKERS:** Assign a score from the table below for the total **number** of workers at the site and nearby **facilities** with areas of **observed** contamination associated with the site.	10		
5. **TERRESTRIAL** SENSITIVE ENVIRONMENTS: Assign a value for **each** terrestrial sensitive environment (SI Table **16)** In an area of **observed** contamination.			
Sum =	C		
6. **RESOURCES:** Assign a score of 5 if any one or more of the **following** resources is present on an area of observed **contamination** at the site: assign 0 if none **applies.** - Commercial agriculture - Commercial silviculture - **Commercial livestock** production or commercial livestock **grazing**	0		
Total of Targets **T=**	10		

Number **of Workers**	Score
0	0
1 to 100	5
101 to **1.000** (150)	10
>1,000	15

Terrestrial Sensitive Environment Tvoe	Value

SI TABLE 15: SOIL EXPOSURE RESIDENT POPULATION TARGETS

Residence ID: _____ Level I _____ Level II _____ Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

Residence ID: Level I Level II Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

Residence ID: _____ Level I _____ Level II _____ Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

SI TABLE 16 (HRS TABLE 5-5): SOIL EXPOSURE PATHWAY TERRESTRIAL SENSITIVE ENVIRONMENT VALUES

TERRESTRIAL SENSITIVE ENVIRONMENT	*ASSIGNED VALUE*
Terrestrial critical habitat for Federal designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
State lands designated (or wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

SOIL EXPOSURE PATHWAY WORKSHEET
NEARBY POPULATION THREAT

LIKELIHOOD OF EXPOSURE	Score	Data Type	Ref.
7. **Attractiveness/Accessibility** (from SI Table 17 or HRS Table 5-6) Value _____			
Area of Contamination (from SI Table 18 or HRS Table 5-7) Value _____			
Likelihood of Exposure (from SI Table 19 or HRS Table 5-8)			
LE =	[illegible]		

TARGETS	Score	Data Type	Ref.
8. Assign a **score** of 0 if Level I or **Level** II **resident individual** has been **evaluated** or if no individuals live within 1/4 **mile** travel distance of an area of observed **contamination.** Assign a score of 1 if nearby **population** is within 1/4 **mile** travel distance and no **Level I** or Level II resident **population has** been evaluated.	0		
9. **Determine** the population within 1 mile **travel** distance that is not exposed to a hazardous **substance** from the site (*i.e.,* properties that are not determined to be Level 1 or Level II); record the population for each **distance category** in SI Table 20 (HRS Table 5-10). Sum the **population** values and **multiply** by **0.1.**	0.12		
T =	0.12		

SI TABLE 17 (HRS TABLE 5-6): ATTRACTIVENESS/ACCESSIBILITY VALUES

Area of Observed Contamination	Assigned Value
Designated recreational area	100
Regularly used for public recreation (for example, vacant lots in urban area)	75
Accessible and unique recreational area (for example, vacant lots in urban area)	75
Moderately accessible (may have some access improvements–for example, gravel road) with some public recreation use	50
Slightly accessible (for example, extremely rural area with no road improvement) with some public recreation use	25
Accessible with no public recreation use	10
Surrounded by maintained fence or combination of maintained fence and natural barriers	5
Physically inaccessible to public, with no evidence of public recreation use	0

SI TABLE 18 (HRS TABLE 5-7): AREA OF CONTAMINATION FACTOR VALUES

Total area of the areas of observed contamination (square feet)	Assigned Value
≤ to 5,000	5
> 5.000 to 125,000	20
> 125.000 to 250,000	40
> 250.000 to 375.000	60
> 375,000 to 500,000	80
> 500,000	100

SI TABLE 19 (HRS TABLE 5-8): NEARBY POPULATION LIKELIHOOD OF EXPOSURE FACTOR VALUES

AREA OF CONTAMINATION FACTOR VALUE	ATTRACTIVENESS/ACCESSIBILITY FACTOR VALUE						
	100	75	50	25	10	5	0
100	500	500	375	250	125	50	0
00	500	375	250	125	50	25	0
60	375	250	125	50	25	5	0
40	250	125	50	25	5	5	0
20	125	50	25	5	5	5	0
5	50	25	5	5	5	5	0

SI TABLE 20 (HRS TABLE 5-10): DISTANCE-WEIGHTED POPULATION VALUES FOR NEARBY POPULATION THREAT

Travel Distance Category (miles)	Pop.	Number of people within the travel distance category												Pop. Value
		0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,001	10,001 to 30,000	30,001 to 100,000	100.001 to 300,000	300.001 to 1,000,000	
Greater than 0 to $\frac{1}{4}$		0	0.1	0.4	1.0	4	13	41	130	400	1,303	4,001	13,034	
Greater than $\frac{1}{4}$ to $\frac{1}{2}$		0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517	0.2
Greater than $\frac{1}{2}$ to 1		0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,250	1.0

Reference(s)

Sum = 1.2

SOIL EXPOSURE PATHWAY WORKSHEET (concluded)

WASTE CHARACTERISTICS

10. Assign the hazardous waste quantity score calculated for soil exposure	10,000
11. Assign the highest toxicity value from SI Table ~~18~~ 3 or 15	10,000
12. Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	WC = 100

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to < 1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

RESIDENT POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 1;
Targets = Sum of Questions 2, 3, 4, 5, 6)

$$\frac{550 \times 10 \times 100}{LE \times T \times WC} \quad 82,500$$

6.7

NEARBY POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 7;
Targets = Sum of Questions 8, 9)

$$\frac{50 \times 0.12 \times 100}{LE \times T \times WC} \quad 82,500$$

0.0073

SOIL EXPOSURE PATHWAY SCORE:
Resident Population Threat + Nearby Population Threat

6.71
(Maximum of 100)

Air Pathway Observed Substances Summary Table

On SI Table 21, list the hazardous substances detected in air samples of a release from the site. Include only those substances with concentrations significantly greater than background levels. Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For NAAQS/NESHAPS benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate targets in the distance category from which the sample was taken and any closer distance categories as Level I. If the percentages are less than 100% or all are N/A, evaluate targets in that distance category and any closer distance categories that are not Level I as Level II.

TABLE 5-1
SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned	
RZSIDEHT POPULATION THREAT			
Likelihood of Exposure			
1. Likelihood of Exposure	550		
Waste Characteristics			
2. Toxicity	a		
3. Hazardous Waste Quantity	a		
4. Waste Characteristics	100		100
Targets			
5. Resident Individual	50		
6. Resident Population			
6a. Level I Concentrations	b		
6b. Level II Concentrations	b		
6c. Resident Population (lines 6a + 6b)	b		
7. Workers	15	10	
8. Resources	5		
9. Terrestrial Sensitive Environments	e		
10. Targets (lines 5 + 6c + 7 + 8 + 9)	b		10
Resident Population Threat Score			
11. Resident Population Threat (lines 1 x 4 x 10)	.b		550,000
NEARBY POPULATION THREAT			
Likelihood of Exposure			
12. Attractiveness/Accessibility	100	5	
13. Area of Contamination	100	100	
14. Likelihood of Exposure	500		50
Waste Characteristics			
15. Toxicity	a	10,000	
16. Hazardous Waste Quantity	a	10,000	
17. Waste Characteristics	100		100

TABLE 5-1 (Concluded)

Factor Categories and Factors	Maximum Value	Value Assigned
NEARBY POPULATION THREAT (Concluded)		
Targets		
18. Nearby Individual	1	
19. Population Within 1 Mile	b	
20. Targets (lines 18 + 19)	b	
Nearby Population Threat Score		
21. Nearby Population Threat (lines 14 x 17 x 20)	b	
SOIL EXPOSURE PATHWAY SCORE		
22. Soil Exposure Pathway Score[d] (S_s), (lines [11+21] + 82,500. subject to a maximum of 100)	100	6.67

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]No specific maximum value applies to factor. However, pathway score based solely en terrestrial sensitive environments is limited to maximum of 60.
[d]Do not round to nearest integer.

SI TABLE 21: AIR PATHWAY OBSERVED RELEASE SUBSTANCES

Sample ID: _____ Level I _____ Level II _____ Distance from Sources (mi) ___ References _____

Hazardous Substance	Conc. (µg/m³)	Gaseous Particulate	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

Sample ID: _____ Level I _____ Level II _____ Distance from Sources (mi) ___ References _____

Hazardous Substance	Conc. (µg/m³)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

Sample ID: _____ Level I _____ Level II _____ Distance from Sources (mi) ___ References _____

Hazardous Substance	Conc. (µg/m³)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
	Highest Toxicity/ Mobility		Highest Percent		Sum of Percents		Sum of Percents	

AIR PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to air, assign a score of 550. Record observed release substances on SI Table 21.			
2. POTENTIAL TO RELEASE: If sampling data do not support a release to air, assign a score of 500. Optionally, evaluate air migration gaseous and paniculate potential to release (HRS Section 6.1.2).	500		
LR =	500		

TARGETS			
3. ACTUAL CONTAMINATION POPULATION: Determine the number of people within the target distance limit subject to exposure from a release of a hazardous substance to the air. a) Level I: people x 10 = _____ b) Level II: people x 1 = _____ Total =	0		
4. POTENTIAL TARGET POPULATION: Determine the number of people within the target distance limit not subject to exposure from a release of a hazardous substance to the air, and assign the total population score from SI Table 22. Sum the values and multiply the sum bv 0.1.	18.9		
5. NEAREST INDIVIDUAL: Assign a score of 50 if there are any Level I targets. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Population exists, assign the Nearest Individual score from SI Table 22.	20		
6. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: Sum the sensitive environment values (SI Table 13) and wetland acreage values (SI Table 23) for environments subject to exposure from the release of a hazardous substance to the air.	TAB-13 500 TABLE 14 150		
7. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS: Use SI Table 24 to evaluate sensitive environments not subject to exposure from a release.	0.519		
8. RESOURCES: Assign a score of 5 if one or more air resources apply within 1/2 mile of a source; assign a 0 if none applies. • Commercial agriculture • Commercial silviculture • Maior or designated recreation area	r		
T =	44.42		

Sensitive Environment Type	Value
_____	_____
_____	_____
_____	_____

Wetland Acreage	Value
_____	_____
_____	_____
_____	_____

SI TABLE 22 (From HRS TABLE 6-17): VALUES FOR POTENTIAL CONTAMINATION AIR TARGET POPULATIONS

Distance from Silo	Pop.	Nearest Individual (choose highest)	Number of People within the Distance Category												Pop. Value
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1.000	1,001 to 3,000	3.001 to 10.000	10.001 to 30,000	30,001 to 100.000	100.001 to 300.000	300.001 to 1.000.000	1,000,000 to 3.000.000	
On a source	150	20	4	17	53	164	522	1.633	5.214	16.325	52,137	163,246	521.360	1.632,455	164
0 to $\frac{1}{4}$ mile	0	»	1	4	13	41	131	400	1.304	4.001	13.034	40,812	130.340	408,114	
$>\frac{1}{4}$ to $\frac{1}{2}$ mile	50	2	0.2	0.9	(3)	9	28	00	282	002	2.815	0.015	20.153	00.153	3
$>\frac{1}{2}$ to 1 mle	[illegible]	1	0.06	0.3	0.9	(3)	8	26	03	261	034	2.612	8.342	26.119	?
> 1 to 2 miles	1,423	0	0.02	0.09	0.3	0.8	3	8	27	03	266	833	2.659	8.326	5
>2 to 3 miles	1,042	0	0.009	0.04	0.1	0.4	1	(4)	12	30	120	375	1.199	3.755	1
>3 to 4 miles	[illegible]	0	0.005	0.02	0.07	0.2	0.7	2	(7)	20	73	229	730	2,285	7
	Nearest Individual a	20												Sum s	184

References _____

* Score = 20 if the Nearest Individual Is within $\frac{1}{8}$ mile of a source; score = 7 if the Nearest Individual is between $\frac{1}{8}$ and $\frac{1}{4}$ mile of a source.

SI TABLE 23 (HRS TABLE 6-18): AIR PATHWAY VALUES FOR WETLAND AREA

Wetland Area	Assigned Value
< 1 acre	0
1 lo 50 acres	25
> 50 lo 100 acres	75
> 100 to 150 acres	125
> 150 lo 200 acres	175
> 200 lo 300 acres	250
> 300 lo 400 acres	350
> 400 lo 500 acres	450
> 500 acres	500

SI TABLE 24: DISTANCE WEIGHTS AND CALCULATIONS FOR AIR PATHWAY POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS

Distance	Distance Weight	Sensilive Environmeni Type and Value (from SI Tables 13 and 20)	Product
On a Source	0.10	x	
		x	
0 lo 1/4 mile	0.025	x 10 Acre [illegible] AM [illegible]	0.25
		x	
		x	
1/4 lo 1/2 mile	0.0054	x 10 Acre	0.054
		x	
		x	
1/2 lo 1 mile	0.0016	x 1 £3	0.0160
		x	
		x	
1 lo 2 miles	0.0005	x £5, 1.5	0.125
		x	
		x	
2 lo 3 miles	0.00023	x [illegible]	0.0460
		x	
		x	
3 lo 4 miles	0.00014	x 200	0.0[illegible]
		x	
		x	
> 4 miles	0	x	

Total Environments Score = 0.519

WASTE CHARACTERISTICS

9. If any Actual Contamination Targets exist for the air pathway, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if there are no Actual Contamination Targets for the air pathway, assign the calculated HWQ score for sources available to air migration.	10,000
10. Assign the highest air toxicity/mobility value from SI Table 21.	[illegible]
11. Multiply the air pathway toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	WC = 6

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 09 or greater	100

A[R PATHWAY SCORE:

$$\frac{500 \times 44.42 \times 6}{82{,}500}$$

LE X T x WC

1.615 (maximum of 100)

SITE SCORE CALCULATION	S	S^2
GROUND WATER PATHWAY SCORE (SGW)	0.195	0.03[illegible]
SURFACE WATER PATHWAY SCORE (S_{SW})	0.16	0.026
SOIL EXPOSURE (S_S)	[illegible]	[illegible]
AIR PATHWAY SCORE (S_A)	1.615	2.61
SITE SCORE $\sqrt{\frac{S_{GW}^2+S_{SW}^2+S_S^2+S_A^2}{4}}$ =		3.43

COMMENTS

S	S^2
0.16	0.026
	3.43

OVERST7ED

DOCUMENT

AIR MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors

	Likelihood of Release	Maximum Value	Value Assigned	
1.	Observed Release	550	___	
2.	Potential Co Release			
	2a. Gas Potential to Release	500	___	
	2b. Particulate Potential Co Release	500	502	
	2c. Potential to Release (higher of lines 2a and 2b)	500	503	
3.	Likelihood of Release (higher of lines 1 and 2c)	550		500
	Waste Characteristics			
4.	Toxicity/Mobility	t	0.2	
5.	Hazardous Waste Quantity	a	10.00	
6.	Vasce Characteristics	100		6
	Targets			
7.	Nearest Individual	50	___	
8.	Population			
	8a. Level I Concentrations	b	___	
	8b. Level II Concentrations	b	___	
	8c. Potential Contamination	b	20	
	8d. Population (lines 8a + 8b + 8c)	b	19.9	
9.	Resources	5	5	
10.	Sensitive Environments			
	10a. Actual Contaaiaation	c	___	
	10b. Potential Contaaiaation	c	0.519	
	10c. Sensitive Environments (lines 10a + 10b)	e	___	
11.	Targets (lines ? + 83 + 9 + 10c)	b		44.42
	Air Migration Pathway Score			
12.	Pathway Score (S_a) [(lines 3 x 4 x 11)/82,500][d]	100		1.615

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]No specific maximum value applies to factor. However, pathway score based solely en sensitive environments is limited to maximum of 60.
[d]Do not round to nearest integer.

Reference 2

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 • SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
AL	D071937890

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO. OR SPECIFIC LOCATION IDENTIFIER
Kerr-McGee Chemical Corp.	P.O. Box 629 (Range Line Rd. Theodore Industrial Park)

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY COM	08 CONG DIST
Theodore	AL	36590	Mobile	097	01

09 COORDINATES LATITUDE	LONGITUDE
30 30 12.__	08 10 754.__

10 DIRECTIONS TO SITE (Starting from nearest public road)
Take Range Line Road exit off I-10. Kerr McGee is located on the Right side of the road as you travel South.

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
Kerr-McGee Chemical Corp.	P.O. 25861

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Oklahoma City	Ok.	73125	(405) 270-3701

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
			( )

13 TYPE OF OWNERSHIP (Check one)
☒ A PRIVATE ☐ B. FEDERAL _____ (Agency name) ☐ C STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F OTHER: _____ (Specify) ☐ G UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☒ A RCRA3001 DATE RECEIVED 11/17/80 (MONTH DAY YEAR) ☐ B UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED ___/___/___ (MONTH DAY YEAR) ☐ C NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES DATE 11/5/84 (MONTH DAY YEAR)
☐ NO

BY (Check all that apply)
☐ A EPA ☐ B EPA CONTRACTOR ☒ C STATE ☐ D OTHER CONTRACTOR
☐ E LOCAL HEALTH OFFICIAL ☐ F OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☒ A ACTIVE ☐ B INACTIVE ☐ C UNKNOWN

03 YEARS OF OPERATION
1976 (BEGINNING YEAR) | _____ (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT KNOWN OR ALLEGED
Iron oxide slurry containing EP Toxic amounts of lead. Material has been reported as corrosive but testing has not corroborated this.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
This facility has withdrawn from interim status as their waste is produced in the beneficiation of ilmenite. The slurry is placed in a tailings pond on-site which has a french drain to collect leachate. Groundwater corrective action is continuing regardless of RCRA status. These activities are being monitored by ADEM.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A HIGH (Inspection required promptly) ☐ B MEDIUM (Inspection required) ☐ C LOW (Inspect on time available basis) ☒ D NONE (No action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Steve Maurer SCM	ADEM	(205) 271-7728

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Donalea Dinsmore		EPS	(601) 922-8242	9/13/85 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 • DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: AX
02 SITE NUMBER: D071937890

II HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A GROUNDWATER CONTAMINATION — 02 [X] OBSERVED (DATE 1982 - 1983) — G POTENTIAL — G ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
FRENCH DRAIN HAS BEEN INSTALLED TO COLLECT LEACHATE. SHALLOW WELLS SHOW LEAD CONTAMINATION IN THE <0.5 ppm RANGE. One well showed as much as 32 ppm lead in early 1983. Corrective action continues and both geology and hydrology reports have been supplied. The upper aquifer is not used as drinking water

01 [X] B SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: < 50 — 04 NARRATIVE DESCRIPTION
Permits for NPDES discharge have taken into consideration the presence of oyster beds in proximity to the discharge point. Steps have been taken to prevent heavy metal contamination of the surface water and discharge is fully regulated.

01 D C CONTAMINATION OF AIR — 02 C OBSERVED (DATE _____) — G POTENTIAL — 2 ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 C D FIRE/EXPLOSIVE CONDITIONS — 02 C OBSERVED (DATE _____) — G POTENTIAL — G ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 C E DIRECT CONTACT — 02 ⌐ OBSERVED (DATE _____) — ⌐ POTENTIAL — G ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 C F CONTAMINATION OF SOIL — 02 C OBSERVED (DATE _____) — G POTENTIAL — ⌐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres) — 04 NARRATIVE DESCRIPTION

01 [ ] G DRINKING WATER CONTAMINATION — 02 C OBSERVED (DATE _____) — ⌐ POTENTIAL — - ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 [ ] H WORKER EXPOSURE/INJURY — 02 C OBSERVED (DATE _____) — G POTENTIAL — [ ] ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

01 [ ] I POPULATION EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE _____) — G POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT

General Information

The Potential Hazardous Waste Site. Preliminary Assessment form is used to record information necessary to make an initial evaluation of the potential risk posed by a site and to recommend further action.

The Preliminary Assessment form contains three parts:

Part 1 - Site Information and Assessment

Part 2 - Waste Information

Part 3 - Description of Hazardous Conditions and Incidents

Pan 1 - Site Information and Assessment contains all of the data elements also contained on the Site Identification form required to add a site to the automated Site Tracking System (STS). It is therefore possible to add a site to STS at the Preliminary Assessment stage. Instructions are given below.

Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents are used to record specific information about substances, amounts, hazards, and targets, e.g., population potentially affected, that are used in determining the priority for further action. Parts 2 and 3 are also contained in the Potential Hazardous Waste Site, Site Inspection Report form where they may be used to update, add, delete, or correct information supplied on the Preliminary Assessment.

An Appendix with feedstock names and CAS Numbers and the most frequently cited hazardous substances and CAS Numbers is located behind the instructions for the Preliminary Assessment.

General Instructions

1. Complete the Preliminary Assessment form as completely as possible.

2. Starred items {*) are required before assessment information can be added to STS. The system will not accept incomplete assessment information.

3. To add a site to STS at the Preliminary Assessment stage, write "New" across the top of the form and complete items II-01, 02, 03. 04, and 06, Site Name and Location, and item III-13, Type of Ownership.

4. Data items carried in STS, which are identical to those on the Site Identification form and which can be added, deleted, or changed using the Preliminary Assessment form, are indicated with a pound sign (#). To ensure that the proper action is taken, outline the item(s) to be added, deleted, or changed with a bright color and indicate the proper action with "A" (add), "D" (delete), or "C" (change).

5. There are two options available for adding, deleting, or changing information supplied on the Preliminary Assessment form. The first is to use a new Preliminary Assessment form, completing only those items to be added, deleted, or changed. Mark the form clearly, using "A", "D", or "C", to indicate the action to be taken. If only data carried in STS are to be altered, the Site Source Data Report may be used. Using the report, mark clearly the items to be changed and the action to be taken.

Detailed Instructions

Part 1 Site Information and Assessment

I. **Identification**: Identification (State and Site Number) is the site record key, or primary identifier, for the site. Site records in the STS are updated based on Identification. It is essential that State and Site Number are correctly entered on each form.

*I-01 State: Enter the two character alpha FIPS code for the state in which the site is located. It must be identical to State on the Site Identification form.

*I-02 Site Number: Enter the ten character alphanumeric code for sites which have a Dun and Bradstreet or EPA "user" Dun and Bradstreet number or the ten character numeric GSA identification code for federal sites. The Site Number must be identical to the Site Number on the Site Identification form.

II. **Site** Name and **Location**: If Site Name and Location information require no additions or changes, these items are not required on the Preliminary Assessment form. However, completing these items will facilitate use of the completed form and records management procedures.

#II-01 Site Name: Enter the legal, common, or descriptive name of the site.

#II-02 Site Street: Enter the street address and number (if appropriate) where the site is located. If the precise street address is unavailable for this site, enter brief direction identifier, e.g., NW intersection I-295 & US 99; Post Rd, 5 mi W of Rt. 5.

#II-03 Site City: Enter the city, town, village, or other municipality in which the site is located. If the site is not located in a municipality, enter the name of the municipality (or place) which is nearest the site or which most easily locates the site.

#II-04 Site State: Enter the two character alpha FIPS code for the state in which the site is located. The code must be the same as in item I-01.

#II-05 Site Zip Code: Enter the five character numeric zip code for the postal zone in which the site is located.

#II-06 Site County: Enter the name of the county, parish (Louisiana), or borough (Alaska) in which the site is located.

#II-07 County Code: Enter the three character numeric FIPS county code for the county, parish, or borough in which the site is located. (The regional data analyst will furnish this data item.)

#II-08 Site Congressional District: Enter the two character number for the congressional district in which the site is located.

II-09 Coordinates: Enter the Coordinates, Latitude and Longitude, of the site in degrees, minutes, seconds and tenths of seconds. If a tenth of a second is insignificant at this site, enter "0".

II-10 Directions to Site: Starting from the nearest public road, provide narrative directions to the site.

example, do not measure the same amounts of waste as both tons and cubic yards.

*II-03 Waste Characteristics: Check all appropriate entries to indicate the hazards posed by waste at the site. If waste at the site poses no hazard, check Not Applicable.

III. Waste Category: General categories of waste typically found are listed here. Enter the estimated gross amount of the category of waste next to the appropriate substance name and enter the unit of measure used with the estimate.

*III-01 Gross Amount: Gross Amount is the estimate of the amount of the waste category found at the site. Estimates should be furnished in metric tons (MT), tons (TN), cubic meters (CM), cubic yards (CY), drums (DR), acres (AC), acre feet (AF). liters (LT), or gallons (GA). Enter the estimated amount next to the appropriate waste category.

*III-02 Unit of Measure: Enter the appropriate unit of measure: MT (metric tons),TN (tons), CM (cubic meters), CY (cubic yards), DR (number of drums), AC (acres), AF (acre feet), LT (liters), or GA (gallons), next to the estimate of gross amount.

HI-03 Comments: Comments may be used to further explain, or provide additional information, about particular waste categories.

IV. Hazardous Substances: Specific hazardous, or potentially hazardous, chemicals, mixtures, and substances found at the site are listed here. This information may not be available at the Preliminary Assessment stage. Substances for which information is available are to be listed here. For each substance listed those data items marked with an "at" sign (@) must be included.

@IV-01 Category: Enter in front of the substance name the three character waste category from Section III which best describes the substance, e.g., OLW (Oily Waste).

@IV-02 Substance Name: Enter one of the following: the name of the substance registered with the Chemical Abstract Service, the common or accepted abbreviation of the substance, the generic name of the substance, or commercial name of the substance.

@IV-03 CAS Number: Enter the number assigned to the substance when it was registered with the Chemical Abstract Service. Refer to the Appendix for most frequently cited CAS Numbers. CAS Numbers must be furnished for each substance listed. If a CAS Number for this substance has not been assigned, enter "999".

@IV-04 Storage/Disposal Method: Enter the type of storage or disposal facility in which the substance was found: SI (surface impoundment, including pits, ponds, and lagoons), PL (pile), DR (drum), TK (tank). LF (landfill), LM (landfarm), OD (open dump).

IV-05 Concentration: Enter the concentration of the substance found in samples taken at the site.

IV-06 Measure of Concentration: Enter the appropriate unit of measure for the measured concentration of the substance found in the sample, e.g., MG/L. UG/L.

V. Feedstocks

V-01 Feedstock Name: If feedstocks, or substances derived from one or more feedstocks, are present at the site, enter the name of each feedstock found. See the Appendix for the feedstock list.

V-02 CAS Number: Enter the CAS Number for each feedstock named. See the Appendix for feedstock CAS Numbers.

VI. Sources of Information: List the sources used to obtain information for this form. Sources cited may include: sample analysis, reports, inspections, official records, or other documentation. Sources cited provide the basis for information entered on the form and may be used to obtain further information about the site.

Part 3 Description of Hazardous Conditions and Incidents

•I. Identification: Refer to Part 1–I.

II. Hazardous Conditions and Incidents:

II-01 Hazards: Indicate each hazardous, or potentially hazardous, condition known, or claimed, to exist at the site.

II-02 Observed, Potential, or Alleged: Check Observed and enter the date, or approximate date, of occurrence if a release of contaminants to the environment, or some other hazardous incident, is known to have occurred. In cases of a continuing release, e.g., groundwater contamination, enter the date, or approximate date, the condition first became apparent. If conditions exist for a potential release, check potential. Check Alleged for hazardous, or potentially hazardous, conditions claimed to exist at the site.

II-03 Population Potentially Affected: For each hazardous condition at the site, enter the number of people potentially affected. For Soil enter the number of acres potentially affected.

II-04 Narrative Description: Provide a narrative description, or explanation, of each condition. Include any additional information which further explains the condition.

II-05 Description of Any Other Known, Potential, or Alleged Hazards: Provide a narrative description of any othec hazardous, or potentially hazardous, conditions at the site not covered above.

III. Total Population Potentially Affected: Enter the total number of people potentially affected by the existence of hazardous, or potentially hazardous, conditions at the site. Do not sum the numbers shown for each condition.

IV. Comments: Other information relevant to observed, potential, or alleged hazards may be entered here.

V. Sources of Information: List the sources used to obtain information for this form. Sources cited may include: sample analysis, reports, inspections, official records, or other documentation. Sources cited provide the basis for information entered on the form and may be used to obtain further information about the site.

APPENDIX

I. FEEDSTOCKS

CAS Number	Chemical Name
1. 7664-41-7	Ammonia
2. 7440-36-0	Antimony
3. 1309-64-4	Antimony Trioxide
4. 7440-38-2	Arsenic
5. 1327-53-3	Arsenic Trioxide
6. 21109-95-5	Barium Sulfide
7. 7726-95-6	Bromine
8. 106-99-0	Butadiene
9. 7440-43-9	Cadmium
10. 7782404	Chlorine
11. 12737-27-8	Chromite
12. 7440-47-3	Chromium
13. 7440-48-4	Cobalt
14. 1317-38-0	Cupric Oxide
15. 7758-98-7	Cupric Sulfete
16. 1317-39-1	Cuprous Oxide
17. 74-85-1	Ethylene
18. 7647-01-0	Hydrochloric Acid
19. 7664-39-3	Hydrogen Fluoride
20. 1335-25-7	Lead Oxide
21. 7439-97-6	Mercury
22. 74424	Methane
23. 91-20-3	Napthalene
24. 7440424	Nickel
25. 7697-37-2	Nitric Add
26. 7723-14-0	Phoaphorut
27. 7778-50-9	Potassium Dichromate
28. 1310-58-3	Potassium Hydroxide
29. 115-07-1	Propylene
30. 10588-01-9	Sodium Dichromate
31. 1310-73-2	Sodium Hydroxide
32. 7646-78-8	Stannic Chloride
33. 7772-99-8	Stannous Chloride
34. 7664-93-9	Sulfuric Acid
35. 108-88-3	Toluene
36. 1330-20-7	Xylene
37. 7646-85-7	Zinc Chloride
38. 7733-02-0	Zinc Sulfate

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
1. 75-07-0	Aeetaldehyde
2. 64-19-7	Acetic Acid
3. 108-24-7	Acetic Anhydride
4. 75-86-5	Acetone Cyanohydrin
5. 506-96-7	Acetyl Bromide
6. 75-36-5	Acetyl Chloride
7. 1074)24	Acrolein
8. 107-13-1	Acrylonitrile
9. 124-04-9	Adipic Acid
10. 309-00-2	Aldrin
11. 10043-01-3	Aluminum Sulfate
12. 107-18-6	Allyl Alcohol
13. 107-05-1	Allyl Chloride
14. 7664-41-7	Ammonia
15. 631-61-8	Ammonium Acetate
16. 1863-63-4	Ammonium Benzoate
17. 1066-33-7	Ammonium Bicarbonate
18. 7789-09-5	Ammonium Bichromate
19. 1341-49-7	Ammonium Bifluoride
20. 10192-30-0	Ammonium Bitulfite
21. 1111-784)	Ammonium Carbamate
22. 12125-02-9	Ammonium Chloride
23. 7788-98-9	Ammonium Chromate
24. 3012-65-5	Ammonium Citrate, Dibasic
25. 13826-83-0	Ammonium Fluoborate
26. 12125-01-8	Ammonium Fluoride
27. 1336-21-6	Ammonium Hydroxide
28. 6009-70-7	Ammonium Oxalate
29. 16919-19-0	Ammonium Silicofluoride
30. 77734)64)	Ammonium Sulfamate
31. 12135-76-1	Ammonium Sulfide
32. 101964)44)	Ammonium Sulfite
33. 14307434	Ammonium Tartrate
34. 1762-954	Ammonium Thiocyanate
35. 7783-184	Ammonium Thiosulfate
36. 628-63-7	Amyl Acetate
37. 62-53-3	Aniline
38. 7647-18-9	Antimony Pentachloride
39. 7789-61-9	Antimony Tribromide
40. 10025-91-9	Antimony Trichloride
41. 7783-56-4	Antimony Trifluoride
42. 1309-64-4	Antimony Trioxide
43. 1303-32-8	Anenic Disulfide
44. 1303-28-2	Anenic Pentoxide
45. 7784-34-1	Anenic Trichloride
47. 1303-33-9	Anenic Trisulfide
48. 542-62-1	Barium Cyanide
49. 71-43-2	Benzene
50.65454	Benzoic Acid
51. 100-47-0	Benzonitrile
52. 98484	Benzoyl Chloride
53. 100-44-7	Benzyl Chloride
54. 744041-7	Beryllium
55. 7787-47-5	Beryllium Chloride
56. 7787-49-7	Beryllium Fluoride
57. 13597494	Beryllium Nitrate
58. 123-86-4	Butyl Acetate
59. 84-74-2	n-Butyl Phthalate
60. 109-73-9	Butylamine
61. 107-92-6	Butyric Acid
62. 543-90-8	Cadimium Acetate
63. 7789424	Cadmium Bromide
64. 10108-64-2	Cadmium Chloride
65. 777844-1	Calcium Arsenate
66. 52740-16-6	Calcium Arsenite
67. 75-20-7	Calcium Carbide
68. 13765-19-0	Calcium Chromate
69. 592-01-8	Calcium Cyanide
70. 26264-06-2	Calcium Dodecylbenzene Sulfonata
71. 7778-54-3	Calcium Hypochlorite
72. 133-06-2	Captan
73. 63-25-2	Carbaryl
74. 1563-66-2	Carbofuran
75. 75-15-0	Carbon Ditulfide
76. 56-23-5	Carbon Tetrachloride
77. 57-744	Chlordane
78. 7782-50-5	Chlorine
79. 108-90-7	Chlorobenzene
80. 67-66-3	Chloroform
81. 7790-94-5	Chlorosulfonic Acid
82. 292148-2	Chlorpyrifos
83. 1066-30-4	Chromic Acetate
84. 7738444	Chromic Acid
85. 10101-53-8	Chromic Sulfate
86. 10049-05-5	Chromous Chloride
87. 544-18-3	Cobaltous Formate
88. 14017-41-5	Cobaltous Sulfamate
89. 56-72-4	Coumaphos
90. 1319-77-3	Cresol
92. 142-71-2	Cupric Acetate
93. 12002-03-8	Cupric Acetoarsenite
94. 7447-39-4	Cupric Chloride
95. 3251-23-8	Cupric Nitrate
96. 5893-66-3	Cupric Oxalate
97. 7758-98-7	Cupric Sulfate
98. 10380-29-7	Cupric Sulfete Ammoniated
99. 81542-7	Cupric Tertrate
100. 506-77-4	Cyanogen Chloride
101. 110-82-7	Cyclohexane
102. 94-75-7	2,4-D Acid
103. 94-11-1	2,4-D Esters
104. 50-29-3	DDT
106.333414	Diazinon
106. 1918-00-9	Dicamba
107. 1194-65-6	Dichlobenil
108. 117-80-6	Dichlone
109. 25321-22-6	Dichlorobenzene (ell itomert)
110. 266-38-19-7	Dichloropropane (all itomen)
111, 26952-23-8	Dichloropropene (ell isomers)
112.8003-194	Dichloropropene-Dichloropropene Mixture
113. 75-99-0	2-2-Dichloropropionic Acid
114.62-73-7	Dichlorvot
115. 60-57-1	Dieldrin
116. 109-89-7	Diethylemine
117. 124-40-3	Dimethylamine
118.25154444	Dinitrobenzene (ell itomen)
119. 51-28-5	Dinrtrophenol
120. 25321-14-6	Dinitrotoluene (ell itomen)
121. 85-00-7	Diquat
122.298444	Disulfoton
123. 330-54-1	Diuron
124. 27176-87-0	Dodecylbenzenesulfonic Acid
125. 115-29-7	Endosulfan (all itomen)
126. 72-20-8	Endrin and Metabolitei
127. 106-89-8	Epichlorohydrin
128. 563-12-2	Ethion
129. 100-41-4	Ethyl Benzene
130. 107-15-3	Ethylenediamine
131.106434	Ethylene Dibromide
132. 107-06-2	Ethylene Dichloride
133.60404	EDTA
134. 1185-57-5	Ferric Ammonium Citrate
135. 2944-67-4	Ferric Ammonium Oxalatf
[illegible]	Ferric Chloride

ENCLOSURE LIST

1. Final Strategy Determination Form for Kerr McGee Chemical Corporation.

2. Potential Hazardous Waste Site Log for Kerr McGee Chemical Corporation.

3. Preliminary Assessment EPS Form 3012-III Industrial Narrative Sheet for Kerr McGee Chemical Corporation.

4. Tentative Disposition Form for Kerr McGee Chemical Corporation.

5. Project Management Summary for Kerr McGee Chemical Corporation.

6. Identification and Preliminary Assessment for Kerr McGee Chemical Corporation.

7. Preliminary Assessment for Kerr McGee Chemical Corporation.

8. Site Inspection Report for Kerr McGee Chemical Corporation.

9. Letter dated August 16, 1985, from H.O. Everitt to Stephen C. Maurer.

10. Letter dated August 12, 1985, from Stephen C. Maurer to Frank Shearer.

11. Letter dated July 18, 1985, from Stephen C. Maurer to S.W. Foster.

12. Report for Kerr McGee Chemical Corporation Site.

13. Letter dated March 22, 1982, from S.W. Foster to B.E. Cox, Jr.

14. Letter dated November 8, 1983 from S.W. Foster to B.E. Cox, Jr.

15. Memorandum dated October 8, 1984, from Margaret E. Markey, to Bernard E. Cox regarding Inspection of Kerr McGee Chemical Corporation Facilities, September 13, 1984.

16. Letter dated September 26, 1984, from B.E. Cox, Jr. to James H. Scarbrough regarding Kerr McGee Chemical Corporation Mobile Facility.

17. Letter dated October 17, 1984, from Henry R. Seawell, III to Mr. Alex Napier regarding Iron Oxide Pond Modification Project, Kerr McGee Chemical Corporation Mobile Facility

235 pgs
in file
35.25
1 map

18. Memorandum dated November 26, 1984 from John P. Lehman to James H. Scarbrough regarding Hazardous Waste Determination on the Kerr McGee Chemical Corporation Plant in Theodore, Alabama.

19. Letter dated December 14, 1984 from James H. Scarbrough to Don Schiesz.

20. (3) Three Land Programs forms for Kerr McGee Chemical Corporation.

21. Site Report dated July 7, 1982 for Kerr McGee Chemical Corporation.

22. Memorandum dated January 18, 1984, from Charles Fleming to IW Files regarding ALD 071 937 890 Kerr McGee Proposed Landfill.

23. Report of Extraction Procedure Tests of Solid Waste Material dated May, 31, 1982.

24. State of Alabama Water Improvement Commission Permit for discharge issue to Kerr McGee Chemical Corporation, Theodore, Alabama.

25. Hazardous Waste Disposal Facility Final Closure Plan Iron Oxide Pond - Kerr McGee Chemical Corporation, Mobile Facility, Theodore, Alabama.

26. Archives Search Report, Theodore Ammunition Terminal (U.S. Naval Ammunition Magazine) Theodore, Alabama, Mobile County dated September 1993.

US Army Corps
of Engineers
HUNTSVILLE DIVISION

Reference 3

Defense Environmental Restoration Program
for
Formerly Used Defense Sites

Ordnance and Explosive Waste
Chemical Warfare Materials

ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
(U.S. NAVAL AMMUNITION MAGAZINE)

Theodore, Alabama
Mobile County

Site No. I04AL005800
(I04AL317700)

SEPTEMBER 1993

Prepared by
US ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
(U.S. NAVAL AMMUNITION MAGAZINE)

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. I04AL005800

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ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
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THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

APPENDICES

A	**REFERENCES**
B	**ACRONYMS**
C	**REPORTS/STUDIES/LETTERS/MEMORANDUMS**
D	**NOT USED**
E	**NOT USED**
F	**NOT USED**
G	**PRESENT SITE PHOTOGRAPHS**
H	**NEWSPAPERS/JOURNALS**
I	**OEW RISK ASSESSMENT CODE FORM**
J	**REPORT DISTRIBUTION LIST**

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1.0 Introduction

1.1 Authority

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC 9601 et seq. Ordnance and explosive wastes are included in the CERCLA definition of pollutants and contaminants that require a remedial response.

In 1983, the Environmental Restoration Defense Account (ERDA) was established by Public Law 98-212. This Congressionally directed fund was to be used for environmental restoration at Department of Defense (DOD) active installations and formerly used properties. The DOD designated the Army as the sole manager for environmental restoration at closed installations and formerly used properties. The Secretary of the Army assigned this mission to the Corps of Engineers (USACE) in 1984.

The 1986 Superfund Amendments and Reauthorization Act (SARA) amended certain aspects of CERCLA, some of which directly related to OEW contamination. Chapter 160 of the SARA established the Defense Environmental Restoration Program (DERP). One of the goals specified for the DERP is "correction of environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangennent to the public health or welfare or to the environment."

The DERP requires that a CERCLA response action be undertaken whenever such "imminent and substantial endangennent" is found at:

a. A facility or site that is owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense.

b. A facility or site that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination.

c. A vessel owned or operated by the Department of Defense.

The National Contingency Plan (NCP) was established by the Clean Water Act of 1972. The NCP has been revised and broadened several times since then. Its purpose is to provide the organizational structure and procedures for remedial actions to be taken in response to the presence of hazardous substances, pollutants, and contaminants at a site. Section 105 of the 1980 CERCLA states that the NCP shall apply to all response actions taken as a result of CERCLA requirements.

The March 1990 National Oil and Hazardous Substances Pollution Contingency Plan given in 40 CFR part 300 is the latest version of the NCP. Paragraph 300.120 states that "DOD will be the removal response authority with respect to incidents involving DOD military weapons

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2.0 Previous site investigations

The U.S. Army Corps of Engineers, Mobile District has prepared the six Inventory Project Reports, listed below, to establish this site as a Formerly Used Defense Site (FUDS) under the Defense Environmental Restoration Program. The reports were prepared for various portions of the ammunition terminal. This same site is listed as the U.S. Naval Ammunition Magazine, DERP FUDS Project #I04AL3 17700.

1. Project #I04AL005801--The Alabama State Docks Department Property
2. Project #I04AL005802--The Ken McGee Chemical Corporation Property
3. Project #I04AL005803--Turnpoint Basin Corporation
4. Project #I04AL005804--The Alamex Corporation Property
5. Project #I04AL005805--Miscellaneous Private Ownership Property
6. Project #I04AL005806--Miscellaneous Public Property

No other engineering or environmental study reports were found for this site.

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3.0 Site and site area description

3.1 Location

The Theodore Ammunition Terminal is located about 13 miles south of Mobile, Alabama along Mobile Bay. Figure 3-1 shows the general location of the site and Figure 3-2 shows the vicinity around the site.

3.2 Past uses

The U.S. Armed Services used the site beginning in 1942 to receive, store, and ship ammunition.

3.3 Current uses of site

The site is currently used for an industrial park and the U.S. Navy's Naval Station Mobile. The owners as listed in the Inventory Project Reports (INPR) are shown on Map M-3.

3.4 Demographics

3.4.1 Centers of activity

The major center of activity in Theodore is the Mobile County High School, located west of Highway 90. The city of Mobile, about 13 miles north, serves as the county seat and is the major center for activities.

3.4.2 Population density

The population data for the city of Theodore and Mobile County are as follows: (Source: 1990 Census)

City: Theodore	County: Mobile
Area: 12.3 sq. mi	Area: 1233.4 sq. mi
Population: 6,509	Population: 378,643
Density: 529 persons/sq. mi.	Density: 307 persons/sq. mi.

3.4.3 Types of business

Many of the businesses in the Theodore vicinity are located along Highway 90 on the

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3.4.4 Types of industry

Manufacturing and shipping are the two major industries in Theodore. The Theodore Industrial Complex contains three chemical companies, a cement plant, a paint manufacturing plant and other smaller related businesses. Some examples are: Mobile Paint Co., Kerr McGee Chemical, Barnett Millworks, and Holnam Cement. The Theodore Marine Terminal contains 5 companies that deal with the shipping and receiving of forest products. Some examples of businesses in the terminal area are: Gulf Forest Products, Delta Exports, and Etno Inc.

3.4.5 Types of housing

There are a total of 2,247 occupied housing units in Theodore. Of these, 67% are single-family detached dwellings, 22% are mobile homes, 10% are multi-family dwellings and 1% are single-family attached dwellings. The median dollar housing value in Theodore is $48,800 (Source: 1990 Census).

3.4.6 New development in the area

New developments in Theodore include the expansion of The Huls Chemical Co., offshore gas drilling, and the addition of an ice cream factory.

3.4.7 Typical cross-section of the population

The median age of Theodore is 31 with 30% of the total population under age 18, 41% from ages 18-44, 20% from ages 45-64, and 9% over the of 65.

3.4.8 Information sources for demographics

Theodore Industrial Complex (205) 443-4000
Forestry Services (205) 443-8021

4.0 Physical characteristics of the site

4.1 Geology/physiography

The Theodore Ammunition Terminal in Mobile County, Theodore, Alabama is located on the Coastal Plain province (Thornbury, 1965). It is underlain by a thick sequence of unconsolidated to poorly consolidated sedimentary rocks that are post-Miocene in age (See Figure 4-1). These sediments thicken seaward from a featheredge where they crop out against older metamorphic and igneous rocks of the Piedmont and Applachain provinces. In southwestern Alabama, post-Miocene rocks are mostly a thick Pliocene-age sequence (1400 ft-thick) of coarse-grained fluvial, gravelly sands that locally contain interbedded clays, mostly near the base of the sand sequence. The regional dip is to the south-southwest at 15-25 feet per mile. This fluvial sequence is known as the Citronelle Formation. Most of these sediments are comprised of deltaic or estuarine sediments which are in turn capped by a thin layer of fluvial sand and/or residuum (Miller, 1986).

4.2 Soils

The majority of the site is underlain by soils which consist of poorly drained, nearly level soils on broad flats. The surface typically is a dark grayish brown silty clayey sand approximately seven inches thick. The subsurface layer to a depth of 17 inches is a gray silty clayey sand that is mottled brown and yellow. The subsoil is light gray sandy silty clay to 26 inches; light gray silty clay to 47 inches and to 72 inches, a light gray silty clay mottled with yellow, brown and red. These soils were formed in marine and fluvial sediments on uplands and terraces.

Permeability is moderate in the upper subsoil and moderately slow in the lower subsoil. There is moderate available water capacity with the water table being at or near the surface in winter and spring.

The potential for sheet and rill water erosion of the she soils is moderately high. These surficial sites are not susceptible to moderate wind erosion. The risk of corrosion to uncoated steel and to concrete is high.

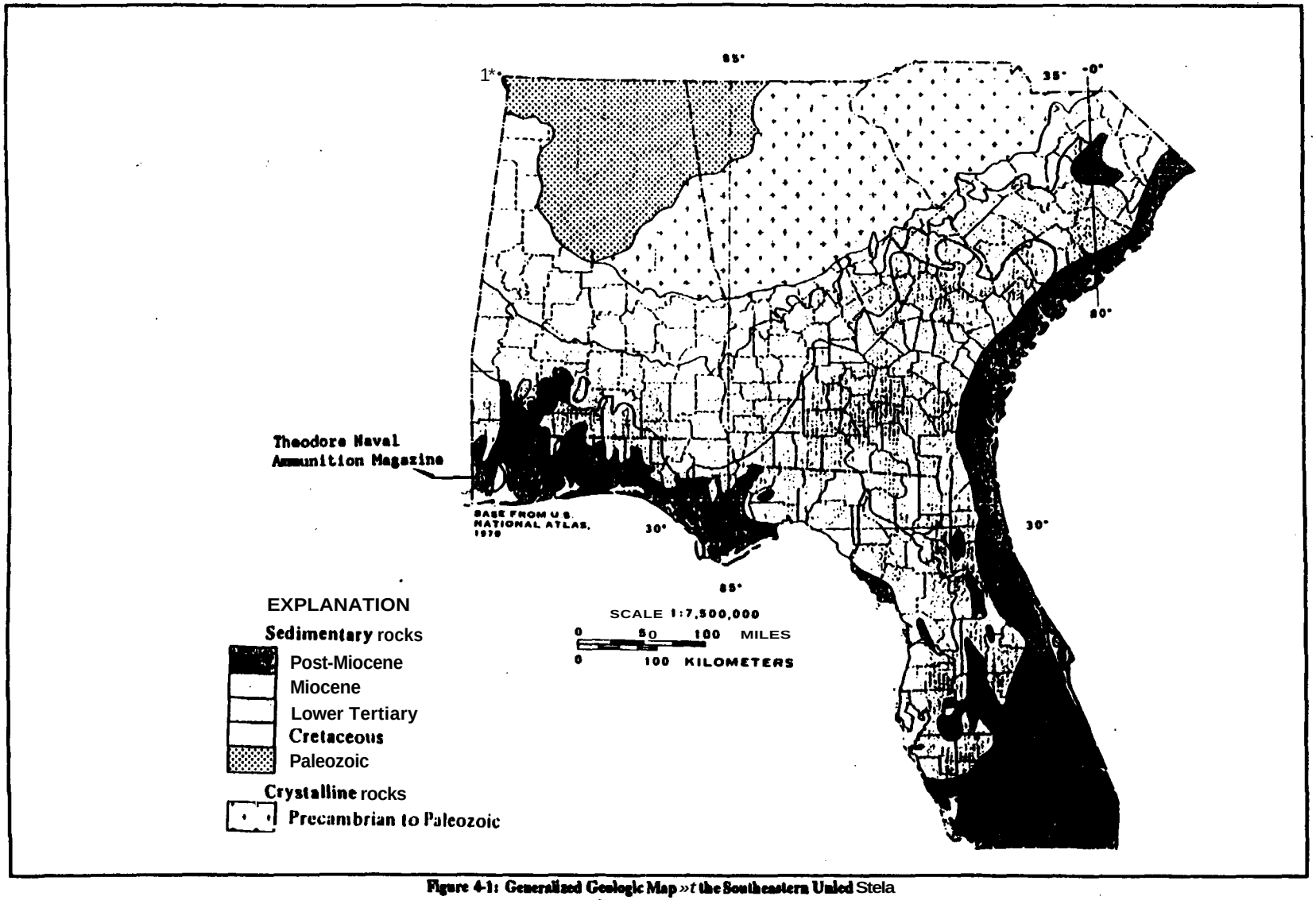


Figure 4-1: Generalized Geologic Map »t the Southeastern Uniled Stela
(from: Miller, MM).

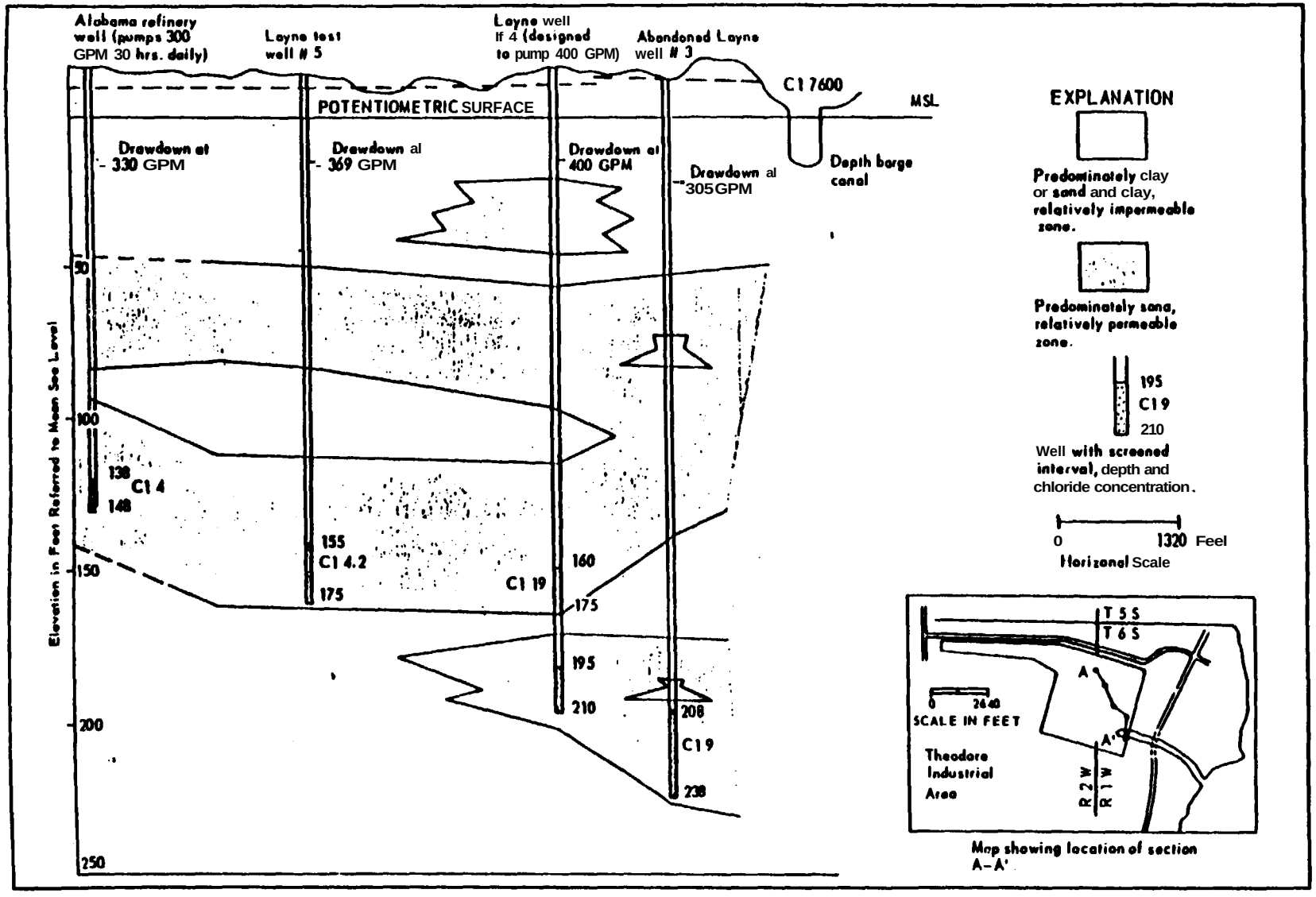


Figure 4-2: Hydrogeologic section based on drillers logs showing MM of relative permeability between wells in lb* Theodore Industrial Complex. (Modified from Riccio, et al., 1973).

4.4 Weather

The climatic data collected at Mobil WSO AP, Alabama for the period of 1900-1992 an average annual precipitation of 65.12 inches. The rainfall is distributed relatively throughout the year. Approximately 32 percent falls in July through September. The in the study area is subtropical, characterized by mild winters and warm humid sum Average annual temperature for the area is about 65 degrees Fahrenheit. According data recorded at the Keesler Air Force Base, the mean winter wind speed is 5.7 knot percent of wind speeds are below 10 knots and the rest of wind speeds range betwee 21 knots. One knots equals 1.15 miles per hour. The base is located about 40 air n west of the study area. The summarized climatic data for the study area are summa the following table:

CLIMATOLOGICAL DATA FOR MOBILE WSO AP, AL

MONTH	TEMPERATURE (°F) MONTHLY MAX	MIN	MEAN	PRECIPITATION (INCHES MONTHLY MAX	MIN	MEAN
JAN	73	31	52	16.07	.98	4.84
FEB	72	34	53	11.89	1.47	5.37
MAR	77	44	60	13.46	.43	6.32
APR	85	51	68	17.69	.48	5.11
MAY	91	60	75	15.08	.45	5.52
JUN	94	66	80	13.07	1.19	5.41
JUL	94	70	82	19.29	1.72	7.70
AUG	96	70	83	15.19	1.46	6.87
SEP	92	64	78	14.04	.29	6.24
OCT	84	48	66	13.20	.00	2.75
NOV	76	40	58	13.65	.20	3.92
DEC	71	34	53	11.38	1.29	5.37
YEAR	79	54	66	86.58	42.35	65.12
YEARS OF RECORD	92	92	92	92	92	92

4.5 Ecology

The information provided for this site was attained from the U. S. Fish and Wildlife The Alabama Natural Heritage Program was not able to provide information at this I to funding limitations.

According to the U. S. Fish and Wildlife Services' records, there are no endangered threatened species located within the vicinity of the Theodore Ammunition Terminal. However, many permanent streams, creeks, palustrine forested and scrub-shrub wed

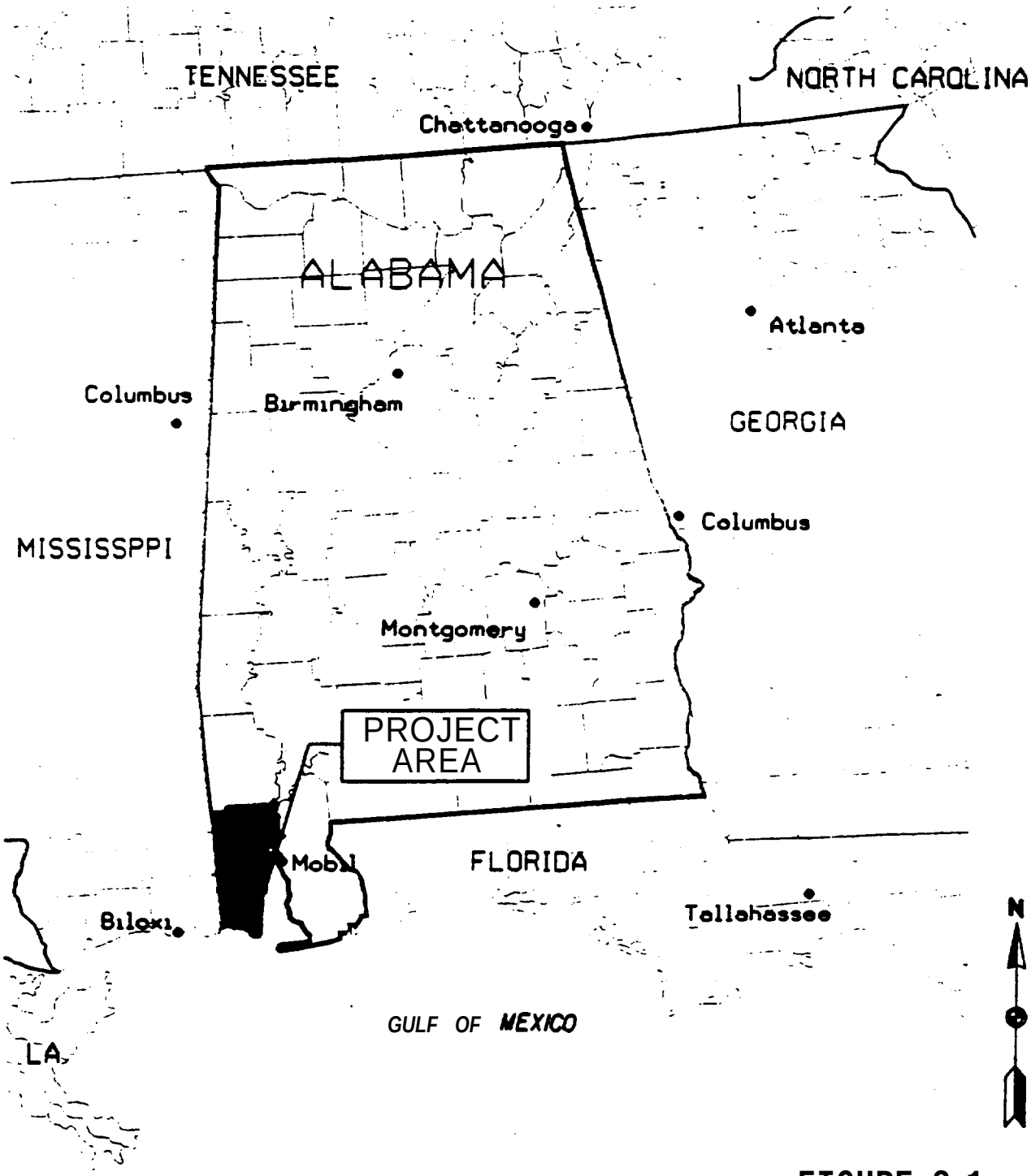
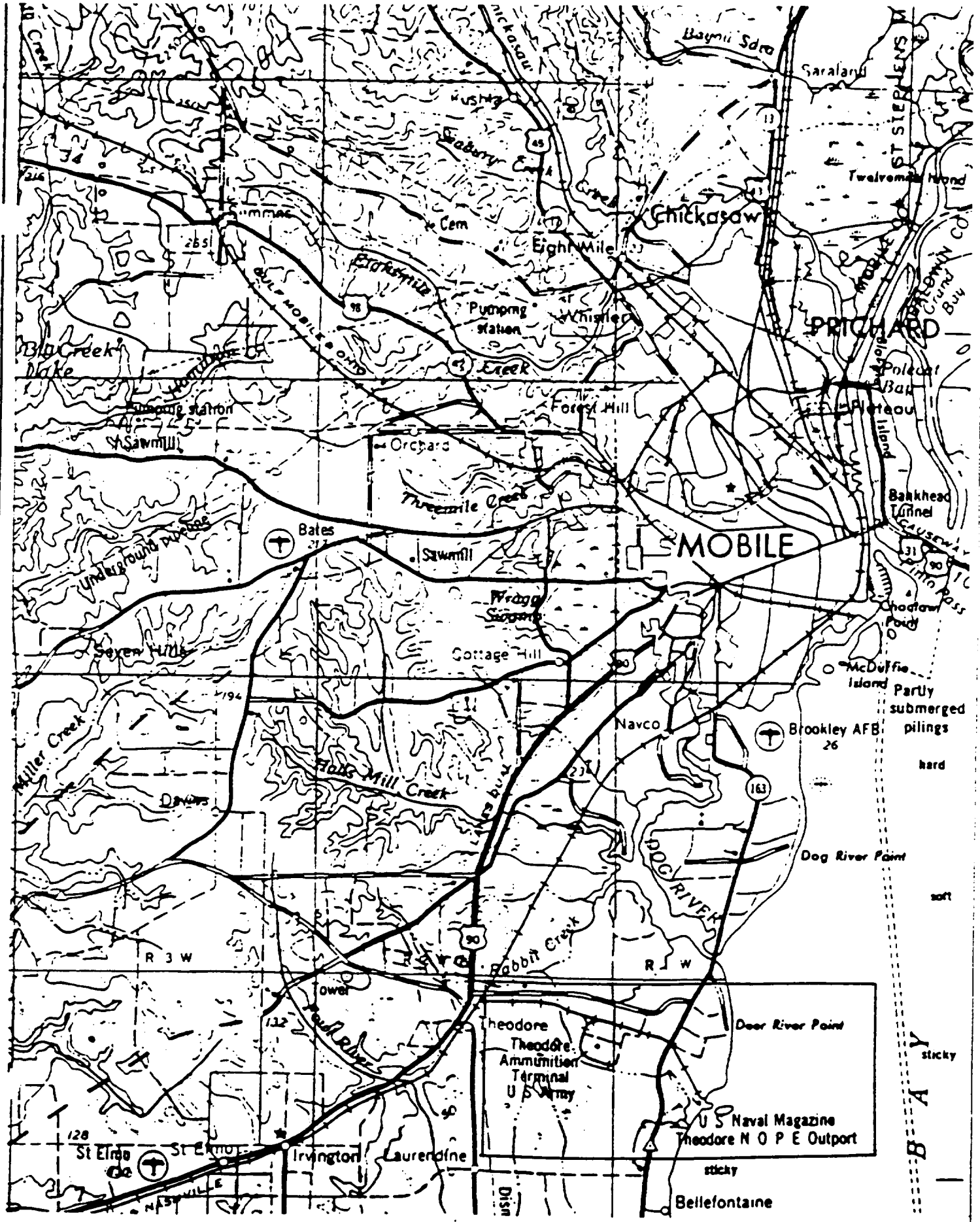


FIGURE 3-1

PROJECT LOCATION
THEODORE
MOBILE COUNTY, ALABAMA

DATE:



SITE VICINITY MAP

FIGURE 3-2

THEODORE AMMUNITION TERMINAL

DERP FUDS #I04AL005800

5.0 Real estate

5.1 DOD ownership

The Theodore Ammunition Terminal comprised a total of 1920 acres and was acquired in fee by condemnation proceedings in the early 1940's. Map M-1 shows the original boundary of the reservation. The site was occupied by the Army in 1942 which constructed security fencing, patrol roads, wood and block buildings, wooden piers, Quonset huts, ammunition bunkers, and service/fueling facilities to accommodate military use. Map M-2 details the structures constructed and their locations. During World War n and the Korean Conflict the Army and the Navy used the facility for the receiving, storing, and shipping of ammunition. Excluding the period from 15 June 1944 to 26 March 1953, when the facility was operated by the Navy, the Theodore Ammunition Terminal was under the control of the Army until it was deactivated on 28 June 1964.

5.2 Present ownership

On 14 June 1965, the General Service Administration (GSA) conveyed 1824.96 acres of the facility to the Alabama State Docks Department (ASD) by quitclaim deed. Since then the ASD has resold about 1624 acres to various owners for industrial or transportation purposes. Map M-3 shows the property ownership presented in the INPR. GSA later conveyed, by quitclaim deed dated 14 April 1965, 50 of the remaining acres to the Department of Commerce, Bureau of Public Roads, for the construction of Alabama Highway 163 (Range Line Road). The balance of the property, about 43 acres, which contained a bauxite storage area, was transferred to the Public Building Services on 11 May 1965. These quitclaim deeds and transfers by GSA did not contain any restrictions, recapture clauses, or restoration provisions.

The Navy recently reacquired a portion of the original 1920 acre tract which contained the wooden pier. This portion was purchased in addition to other nearby lands for construction of the new Naval Station Mobile. This station is presently scheduled for closure under the Base Reduction and Closure (BRAC) program.

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6.0 OEW/CWM site analysis

6.1 Historical summary of OEW/CWM activities

6.1.1 Dates of operation

Theodore Naval Ammunition Magazine was located south of the city of Mobile, Alabama. In 1943, a 750-foot-long dock was built to handle shipments. The magazine was idled in 1955, used by Army reservists as a training site in 1963, and was shut down in 1964. In 1965, the Alabama State Docks purchased 1,800 of the roughly 1,900 acre magazine. In December 1990 and January 1991, the docks were sold and dismantled to make way for Naval Station Mobile. There were no reports of discovered munitions (Harrison, 1990).

6.1.2 CWM shipment to Theodore

In May of 1946, German mustard gas bombs were loaded onto the SS Francis L. Lee in Antwerp, Belgium for shipment to the United States. During the loading operations, several leakers were removed from the cargo (Chemical Warfare Service, SS Francis L. Lee Files, 1946). Despite this, the SS Francis L. Lee sailed for the United States on 20 May 1946 (CWS: Arthur, SS Francis L. Lee Files, 1946). The German mustard gas was loaded in 250 kg. and 500 kg. bomb cases marked with one or more red bands, which were not standard German bomb cases for chemical munitions (CWS: MacArthur, SS Francis L. Lee Files, 1946). These bomb cases were generally reported as 500-pound or 1000-pound bombs in reports by the U.S. military.

6.1.3 General operations

The SS Francis L. Lee crossed the Atlantic Ocean and docked at Theodore Naval Magazine. According to 1946 reports by Lt. Col. Arthur and Lt. Kutschinski of the Chemical Warfare Service, the SS Francis L. Lee docked at the U.S. Naval Magazine on 8 June 1946 and commenced to discharge its cargo on 11 June 1946. The original cargo was 3686 tons, all of which were captured German toxics, except approximately 79 tons of rockets, grenades, etc. Unloading proceeded without event until sometime between 14 and 16 June 1946 when the first casualties among the civilian stevedore crews were sustained. Upon opening of the hatches, routine tests were performed to determine whether or not chemical contamination was present. All preliminary tests were negative and a considerable portion of the upper hold areas were unloaded without obtaining positive indication of chemical contamination (CWS: Arthur and Kutschinski, SS Francis L. Lee Files, 1946). It was not until unloading had reached the lower holds of the SS Francis L. Lee that the first presence of toxic vapor was detected. Leakers were removed from the holds of the ship and placed on the docks of Theodore Naval Ammunition Magazine. During an inspection of the leakers, Lt. Col. White of the Chemical Warfare Service noticed several bombs leaking fine hair-line spray streams of mustard gas (CWS, SS Francis L. Lee File, 1946).

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6.1.5 Emergency dumping

The leaking German mustard gas bombs caused so many injuries and were such a problem that two dumps had to be made away from the Naval Magazine. On 15 or 16 July 1946, thirty 1000-pound bombs and three 500-pound bombs were dumped into the Gulf of Mexico at least 20 miles from the Alabama coast. During the dump, one bomb was ruptured by the lift taking it out of the vessel (CWS, SS Francis L. Lee File, 1946).

Two Mobile Bar Pilots mentioned to Lt. Col. Arthur and Lt. Kutschinski of the CWS mat two objects resembling bombs in crates had drifted by their boat when it was anchored about 8 miles off of the mouth of Mobile Bay. One bomb later showed up on the beach, and the civilian who spotted it notified the Naval Magazine. It was recovered and found to be empty and clear of contamination. The bomb was disposed of on Horn Island, Mississippi. The second reported bomb was searched for by jeep along the beach for 30 miles but nothing was found. On 4 August Lt. Col. Arthur flew in the bombardier's cockpit of a low-flying plane and searched Mobile Bay and the shoreline from the western tip of Horn Island to Pensacola, Florida. No bomb or bomb crate was found (CWS: Arthur and Kutschinski, SS Francis L. Lee File, 1946).

Orders from the Office of Chief, Chemical Warfare Service on 19 July 1946 arrived showing that the War Department had stopped shipping toxic German munitions to the U.S. and that all munitions at depots presenting an undue hazard were to be destroyed locally. On 20 July 1946 workers began to load about 120 leaking mustard bombs at Theodore Naval Magazine onto a barge. The barge was sent to Horn Island, Mississippi, where they were burned (CWS: Waitt, SS Francis L. Lee File, 1946). This disposal operation is more completely described in report DERP #MS0142.

6.1.6 The Francis L. Lee departs Theodore

Orders arrived at Theodore Naval Magazine to reload all munitions that had not yet been shipped by railway back into the SS Francis L. Lee. By 0530, 22 July 1946 all munitions had been reloaded and together with the munitions mat were never unloaded from the ship, the munitions totaled 683 tons. The ship was tested with the M-9 Detector Kit and was found to be free of dangerous concentrations of mustard, except for the holds which had been sealed (CWS: Arthur and Kutschinski, SS francis L. Lee File, 1946).

The ship sailed for the Charleston, South Carolina depot, but was denied docking. Another ship from Antwerp had arrived there about the time the SS Francis L. Lee arrived in Theodore, and the same problem with leakers had occurred. The SS Francis L. Lee then headed for Edgewood Arsenal. The SS Francis L. Lee arrived at Edgewood Arsenal under tow, anchoring at 1700 on 5 August at the mouth of the Bush River (CWS: MacArthur, SS Francis L. Lee File, 1946).

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6.2 Records review

Alabama state Archives
Montgomery, Aiahama

County Files, **Mobile** County
Records

SG6895, Folder 233 - Navy (no help)
SG6896, Folder 255 - Ports and **Docks** (no help)
SG6397, Folder 314 - Theodore, Folder 345 - **Mobiie** County World War **II** (no help)
SG6888: **Folder** 9 **"Army", "Transportation** reservists Train **Here",** The Mobile Press Register, July 28, 1963, E:l.

Adjutant General Administrative Files

1937: 663 - Magazines (no help)

Map Files:

CD-67 Mobile County Maps
CD-776 Theodore Insurance Map, 1 Oct. 1955 (no help)
CD-?? USGS **7.5'** Quadrangles: T.9 Theodore Quadrangle, H.24 Hollinger's Island

Chemical Biological Defense Agency
Historical Office
Edgewood Arsenal, Maryland

A major bound file on the SS Francis L. Lee consisting of dozens of documents: "Receipt of German Toxic Gas Munitions at Mobile, **AL** and Shipment of these Munitions to Pine Bluff Arsenal", date Re: SS Francis L. Lee June 1946 to August 1946, Miscellaneous File Cabinet.

"Significant Post War Missions", author unknown. Cabinet 43, Drawer 1 - Organizational History Files, Technical Escort Unit 1942-1965

Alabama State Docks
Mobile, Alabama

Drawing of proposed shipping canal imposed on Hollinger's Island U.S.G.S. **7.5'** Quadrangle. Date and author unknown.

Register **Staff**
1946 **GI** badly **Burned** From Mustard Gas. *The Mobile Register* **(Mobile,** AL) 14 **June: 1A**

Register Staff
1946 Nine More Burned From Mustard Gas. *The Mobile Register* **(Mobile,** AL) 12 **July: 1A**

Register Staff
1946 Theodore. *The Mobile Register* (Mobile, AL) 12 **July: 1A**

Register Staff
1946 Seaman Wants Bonus To Work At Naval Dump. *The **Mobile** Register* (Mobile, AL) 6 **July: 1A**

Register Staff
1946 **Brakeman** Suffers Gas Burns As Liquid **Spills** From Car. *The Mobile Register* (Mobile, AL) 5 **July: 1A**

Press Staff
1946 Seven More Are Burned Here By German Poison Gas Cargo. *The Mobile Press* (Mobile, AL) 4 **July: 1A**

Register Staff
1946 Gases, Injuring 23 Here, Burned Antwerp Seamen. *The Mobile Register* (Mobile, AL) 21 **June: 1A**

Register Staff
1946 Gas Victims To Recover, Army Officer Announces. *The Mobile Register* (Mobile, AL) 20 **June: 4A**

McDonnell, Harry
1968 Theodore Park To Get $3 Million State Docks Unit. *The Mobile Press* **(Mobile,** AL) 26 **January:** 1A

Mobile District Corps of Engineers
Mobile, Alabama

Patterson, Bill
1993 Ghosts From The Outlaw Ship. *The Harbinger* (Mobile, AL) 17 **August:** 1

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6.5 Air photo interpretation

Air photos from 1952, 1975, 1984, and 1993 were reviewed for the Theodore Ammunition Terminal site. The 1952 air photo was taken while the facility was still active. Numerous rail cars are lined up along the tracks coming into the bunker area. Rail cars are also positioned in front of individual bunkers. A large ship is berthed next to the wooden dock. There is little other development in the area.

At the time of the 1975 photo there appears to be a large construction project in progress in the bunker area. Many of the bunkers have been removed and a considerable amount of excavation is evident Work had also begun on digging the shipping channel through the area.

The photo in 1984 shows the shipping channel and several industrial complexes adjacent to the former terminal property completed.

The 1993 photo shows the area as it is presently developed. The wooden loading pier has been removed and the Naval Station is being constructed in the area immediately adjacent to it. A considerable length of the railroad track has been removed. Most of the ordnance storage has been extensively used for the construction of a large industrial plant and appurtenant holding basins.

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7.0 Evaluation of contamination

7.1 CWM contamination

Historical documents indicate that the ship SS Francis L. Lee brought 3686 tons of munitions to the Theodore Ammunition Terminal in June 1946. Documents concerning the operations are contained in Appendix C. Captured German mustard agent accounted for 3607 tons of the total. Approximately 2500 tons of the chemical munitions had been shipped to CWS arsenals before any leaking problems began. After the leaking bombs were uncovered considerable contamination occurred at the Theodore Ammunition Terminal dock. The CWS continually neutralized the spilled agent in order to make the area as safe as possible. Injuries at the dock totalled 37S by the time the operation was completed. Newspaper articles about the Theodore unloading operations and its problems are included Appendix F-1.

Two batches of severely leaking bombs were disposed of close by. The first batch, 30 1000-pound bombs and 3 500-pound bombs, were dumped in the Gulf of Mexico some 20 miles south of Mobile. An empty casing from this batch washed up onto a nearby shore some days after dumping. The CWS recovered the casing, and after receiving negative contamination tests, disposed of it. One other bomb was reported drifting in this area, but it was never found, even though the beach was searched from Horn Island, MS to Mobile Bay. The second batch of 133 bombs, 106 1000-pound ones and 27 500-pound ones, were destroyed in a special operation on Horn Island, Mississippi. A Corps of Engineers, St. Louis District, archives search report (DERP FUDS #I04MS014200), dated April 1993, details the destruction of the munitions there.

The SS Francis L. Lee was dispatched on 22 July 1946 from Theodore to travel to Edgewood Arsenal with 683 tons of chemical weapons on board. All weapons brought to Theodore can be accounted for through the various shipments and disposals that took place.

In 1990 the wooden dock at Theodore Ammunition Terminal was torn down as part of the construction of the new Naval Station Mobile. A newspaper article showing the dock during its dismantling is included in Appendix F-2. Only a very small portion of the massive wooden dock remains at the tie-in to the railroad embankment. Map M-4 is a 1993 air photo of the terminal.

8.0 Conclusions and recommendations

8.1 Conclusions

8.1.1 CWM materials

The quantity of chemical munitions brought to the Theodore Ammunition Terminal on board the ship SS Francis L. Lee can all be accounted for between the shipments to CWS arsenals and disposals in nearby areas. The wooden dock where all of the munitions were handled after unloading was decontaminated by the CWS after the operations. The dock was dismantled and removed from the site during the construction of the Naval Station Mobile in 1990.

8.1.2 Conventional munitions

Exten ;ve construction and excavation has taken place at the site of the Theodore Ammunition Terminal storage bunkers. The Kerr McGee corporation developed a chemical processing facility at the location. Only 6 of the original 20 bunkers remain and these are being beneficially used by Kerr McGee. There have been no reports of any munitions being found during construction.

8.1.3 Site conclusions

Based upon historical documents, air photo interpretation, interviews with people familiar with the site, and a personal inspection there does not appear to be any chemical warfare materials or other munitions remaining at the terminal.

8.2 Recommendations

The Risk Assessment Procedures for Ordnance and Explosive Waste (OEW) Sites Form, dated 10 February 1993, has been prepared for the Theodore Ammunition Terminal and is included in Appendix I. Based on the best available data a score of RAC 5 has been determined for this site. RAC 5 indicates that no further action is recommended. We concur with mis assessment

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MAPS / DRAWINGS

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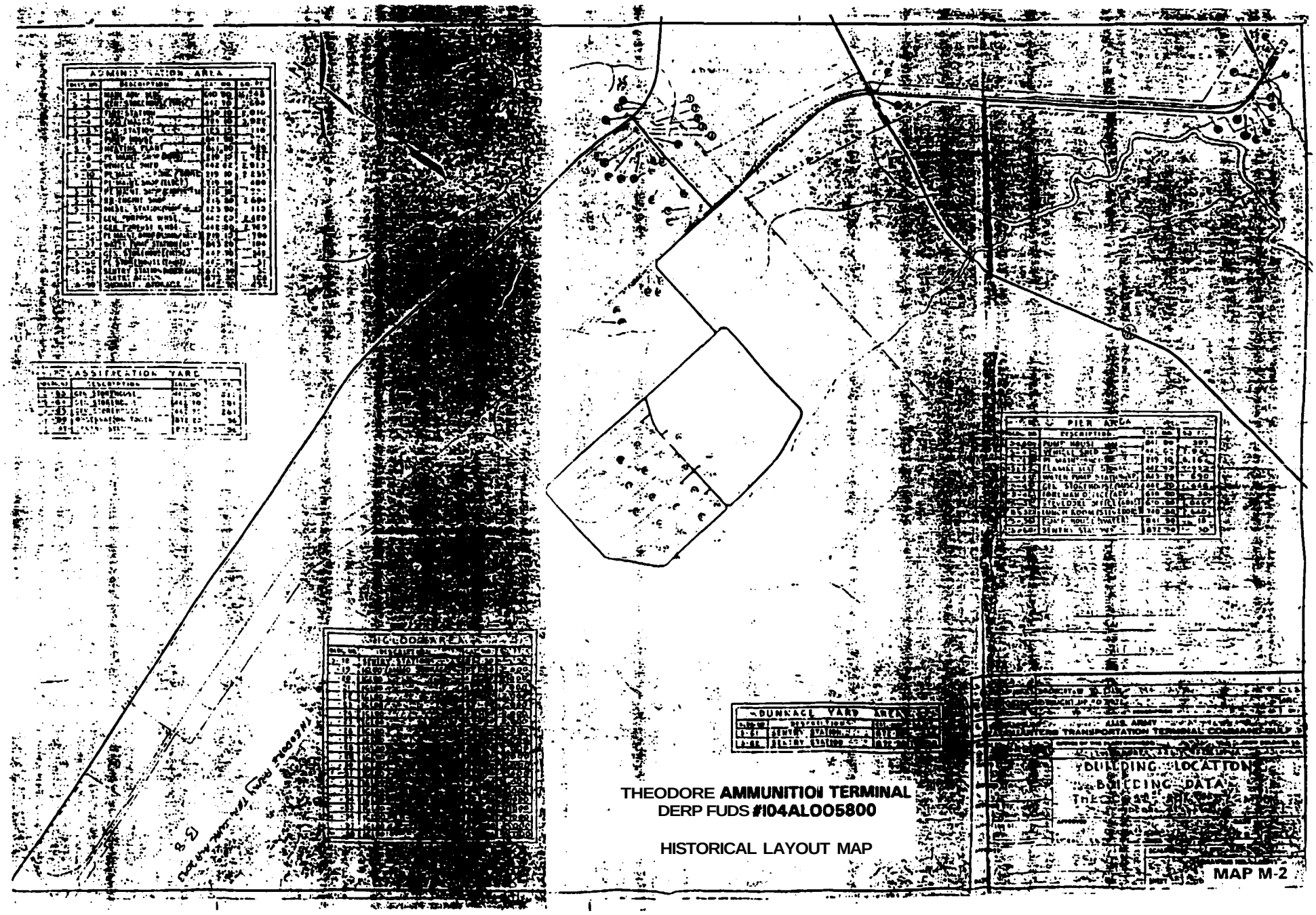


THEODORE **AMMUNITION TERMINAL**
DERP FUDS **#I04AL005800**

HISTORICAL LAYOUT MAP

MAP M-2

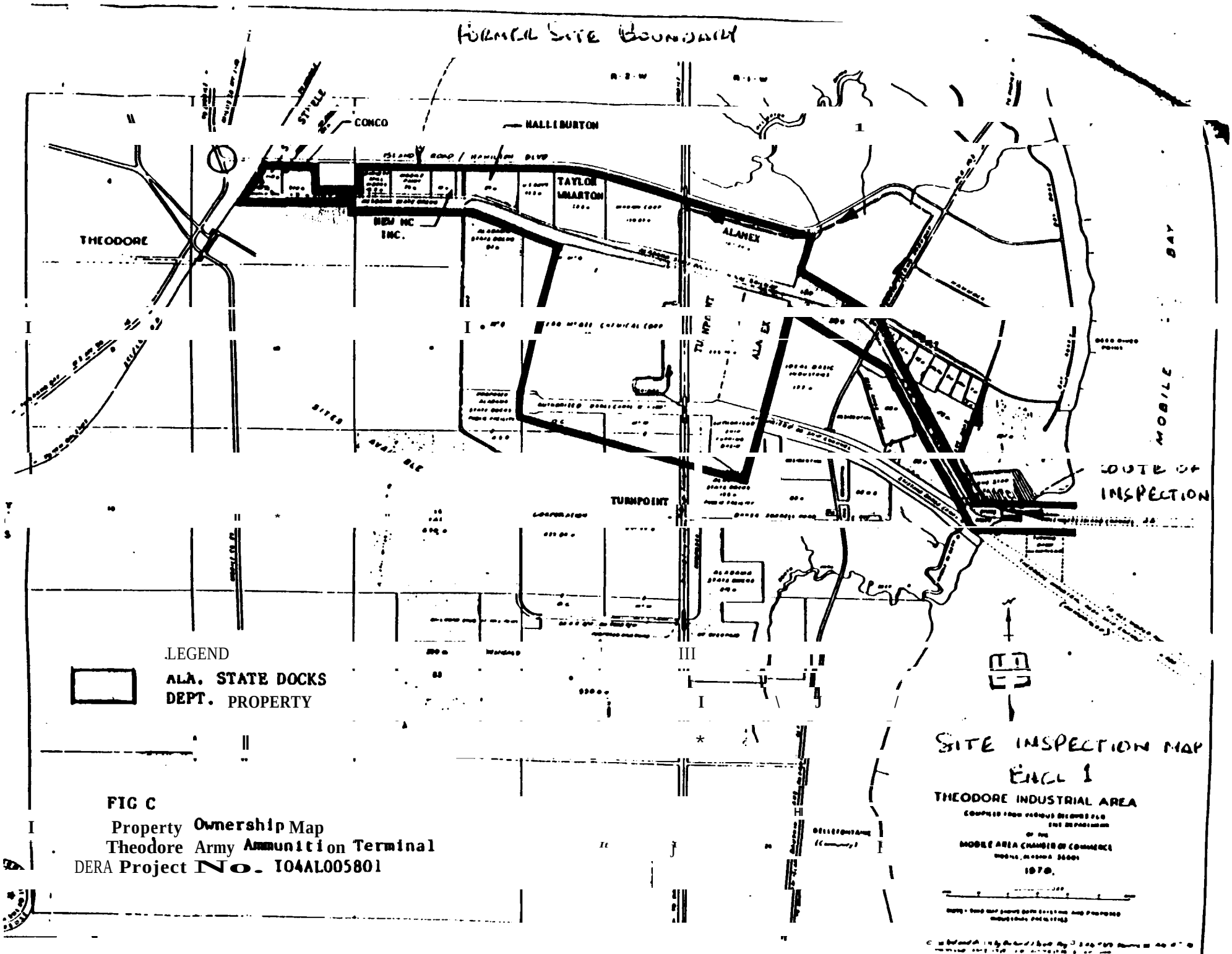
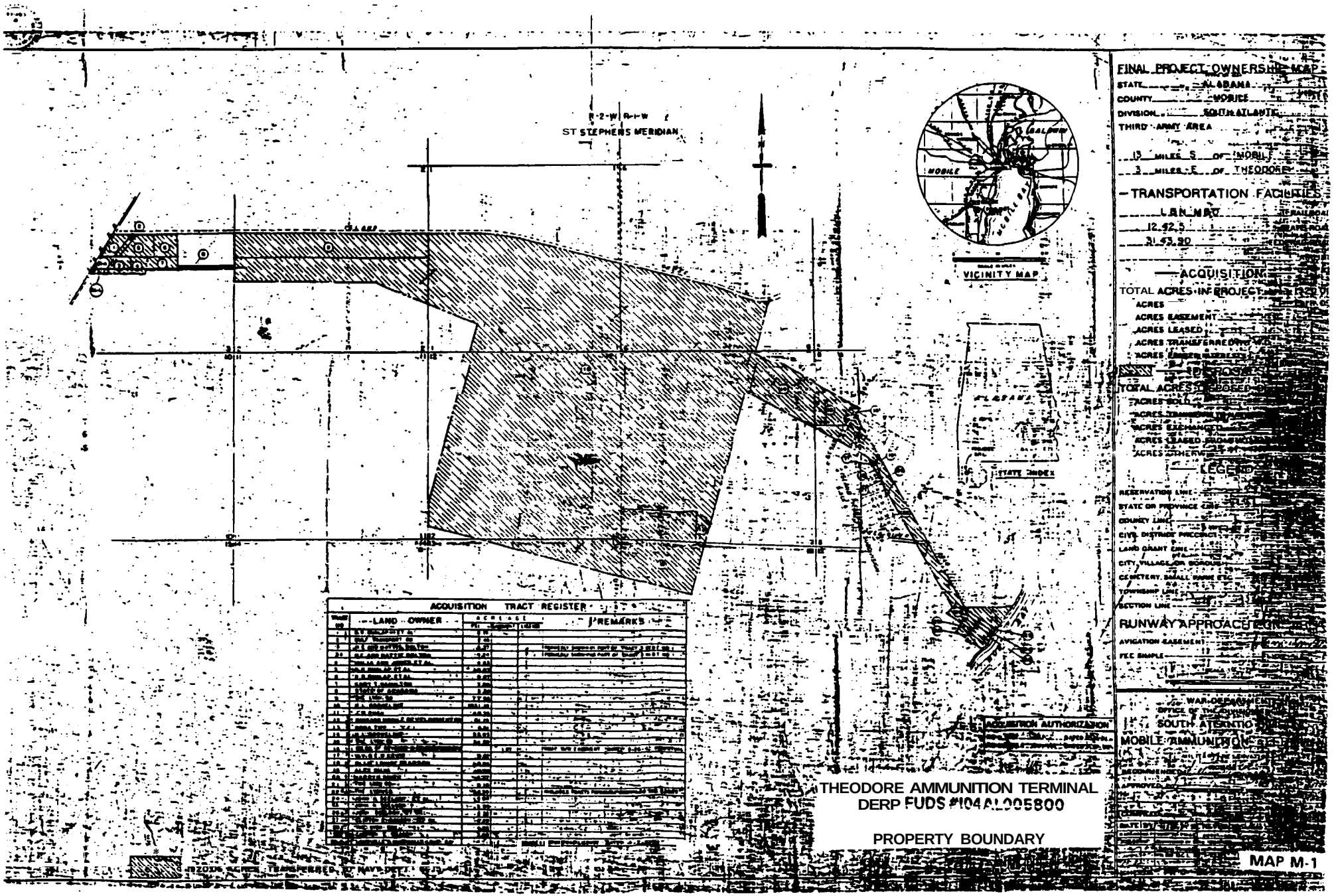
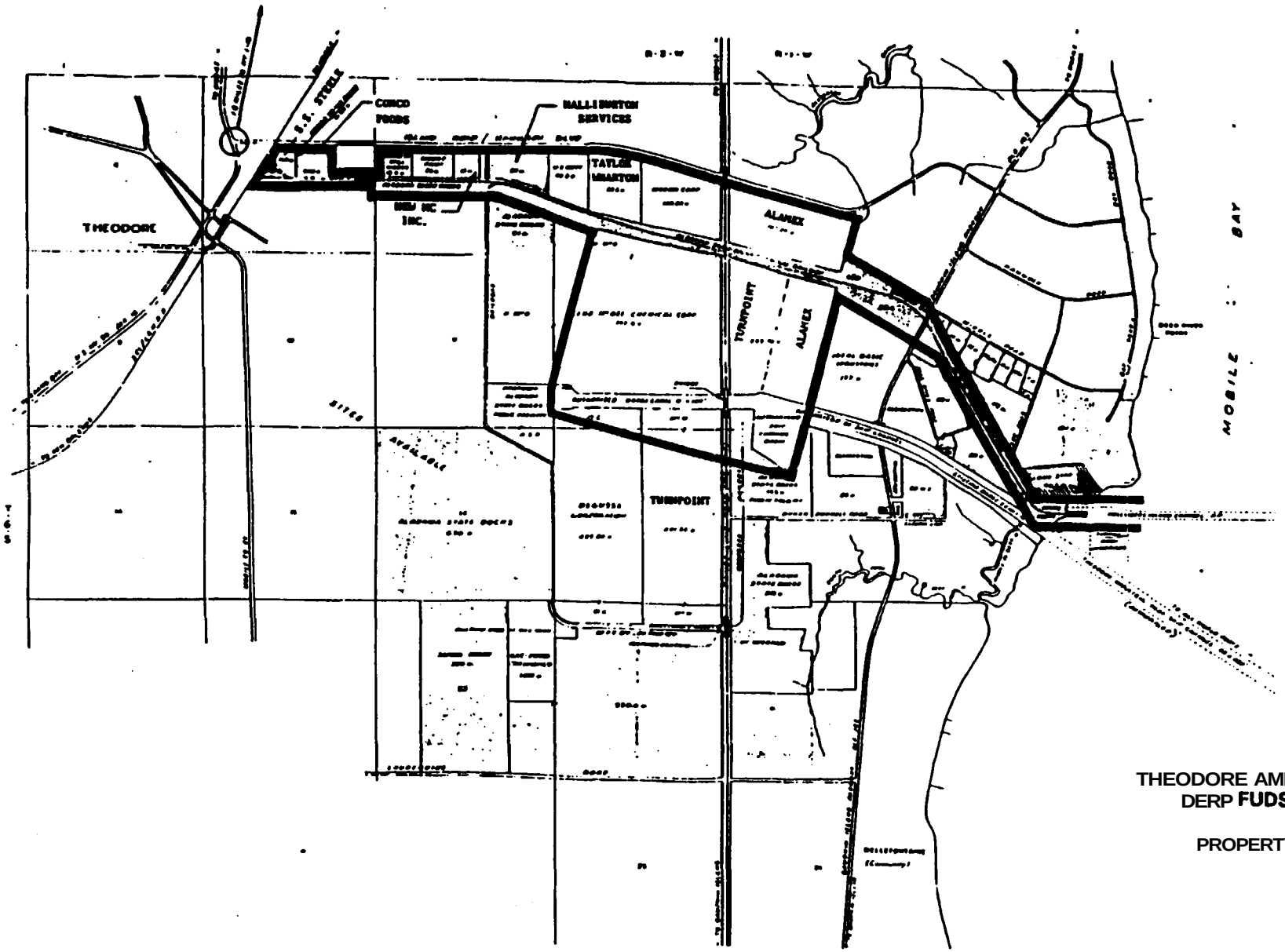


FIG C
Property Ownership Map
Theodore Army Ammunition Terminal
DERA Project No. I04AL005801



FINAL PROJECT OWNERSHIP MAP
STATE ALABAMA
COUNTY MOBILE
DIVISION SOUTH ATLANTIC
THIRD ARMY AREA
13 MILES S OF MOBILE
3 MILES E OF THEODORE
TRANSPORTATION FACILITIES
L&N MBO
12.42.5
31.43.90
ACQUISITION
TOTAL ACRES IN PROJECT
ACRES
ACRES EASEMENT
ACRES LEASED
ACRES TRANSFERRED
DISPOSAL
TOTAL ACRES DISPOSED
ACRES SOLD
ACRES EXCHANGED
ACRES LEASED
ACRES OTHERWISE
LEGEND
RESERVATION LINE
STATE OR PROVINCE LINE
COUNTY LINE
CIVIL DISTRICT PRECINCT
LAND GRANT LINE
CITY VILLAGE OR BOROUGH
CEMETERY, SMALL PARK ETC
TOWNSHIP LINE
SECTION LINE
RUNWAY APPROACH
AVIGATION EASEMENT
FEE SIMPLE
WAR DEPARTMENT
OFFICE OF THE DIVISION
SOUTH ATLANTIC
MOBILE AMMUNITION
RECOMMENDED
APPROVED
MAP M-1
R-2-W R-1-W
ST STEPHENS MERIDIAN
VICINITY MAP
MOBILE
BALDWIN
STATE INDEX
ACQUISITION TRACT REGISTER
LAND OWNER
ACREAGE
REMARKS
ACQUISITION AUTHORIZATION
THEODORE AMMUNITION TERMINAL
DERP FUDS #104AL005800
PROPERTY BOUNDARY



THEODORE AMMUNITION TERMINAL
DERP **FUDS #I04AL005800**

PROPERTY OWNERSHIP

MAP M-3

NORTH
FORMER AMMUNITION
STORAGE BUNKER AREA
TERMINAL RAILRO>
TRACK ALIGNMEN
MOBILE BAY
KERR MCGEE CHEMICAL PLANT
NEW SHIPPING CHANNEL
NAVAL STATION MOBILE
750' LONG WOODEN DOCK
REMOVED FROM THIS AREA
THEODORE AMMUNITION TERMINAL
DERP FUDS #I04AL005800
1993 AIR PHOTO
SITE CONDITIONS
MAP M-4

APPENDIX A

REFERENCES

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE NAVAL AMMUNITION MAGAZINE

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

REFERENCES FOR OEW/CWM ACTIVITIES

Harrison, Royce
1990 Munitions dock being dismantled. *The Mobile Press Register,* December 14, 1990: 13A. Mobile Public Library, Mobile, Alabama.

SS Francis L. Lee File
date compiled unknown. A bound file of dozens of documents pertaining to the SS Francis L. Lee. Miscellaneous File Cabinet, Chemical and Biological Defense Agency Historical Office, **Edgewood** Arsenal, Maryland.

REFERENCES FOR GEOLOGY AND SOILS

Thornbury, Wm. D.
1965 Regional **Geomorphology** of the United States, **John Wiley** & Sons, Inc.

Miller, James A.
1986 **Hydrogeologic** Framework of the **Floridan** Aquifer System in **Florida,** and in Parts of Georgia, Alabama, and South **Carolina,** Regional Aquifer-System Analysis of the U.S. **Geolgical** Survey, Professional Paper **1403-B.**

Riccio, J.F., **Hardin,** J.D., and Lamb, G.M.
1973 Development of a **Hydrologic** Concept for the Greater Mobile Metropolitan-Urban Environment, Geological Survey of Alabama Bulletin 106, Division of Water Resources.

APPENDIX B

ACRONYMS

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE NAVAL AMMUNITION MAGAZINE

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

APPENDIX B

ACRONYMS

ASR	Archive Search Report
BGR	Bombing and Gunnery Range
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEHND	Corps of Engineers, Huntsville Division
COE	Corps of Engineers
CWM	Chemical Warfare Material
CWS	Chemical Warfare Service
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
DPG	Dugway Proving Ground
EOD	Explosives Ordnance Disposal
EPA	Environmental Protection Agency
FUDS	Formerly Used Defense Sites
GSA	General Services Administration
HTW	Hazardous and Toxic Waste
INPR	Inventory Project Report
IRP	Installation Restoration Program
MCX	Mandatory Center of Expertise
NFS	National Forest Service
OEW	Ordnance and Explosive Waste
SARA	Superfund Amendments and Reauthorization Act
SLD	St. Louis District, Corps of Engineers
USACE	U.S. Army Corps of Engineers
USADACS	U.S. Army Defense Ammunition Center and School
USAEDH	U.S. Army Engineer Division, Huntsville, AL
WD	War Department
WNRC	Washington National Records Center

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APPENDIX C

REPORTS/STUDIES/LETTERS/MEMORANDA

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
(U.S. NAVAL AMMUNITION MAGAZINE)

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. I04AL005800

APPENDIX C

REPORTS/STUDIES/LETTERS/MEMORANDA

C-1	Site Specific Safety Plan
C-2	Site Visit Trip Report
C-3	Historical Report-Lt. Col. Arthur-Bomb Shipment Report

APPENDIX C-1
SITE SPECIFIC SAFETY PLAN

SITE SPECIFIC SAFETY AND HEALTH PLAN (SSHP)
for
Theodore Naval Ammunition Depot
Theodore, Alabama

1. PURPOSE. This plan prescribes the safety and health requirements for team activities and operations conducted to determine the presence of ordnance and explosive waste (OEW) from conventional munitions and/or chemical warfare material (CWM) at the specified site.

2. APPLICABILITY. This plan applies to HQUSACE personnel and assigned elements under the control of HQUSACE.

3. REFERENCES. The provisions of this plan implement safety and health standards and requirements contained in 29 CFR 1926, 29 CFR 1960, 30 CFR 56, Executive Order 12196, DODI 6055.1, AR 385-10, AR 385-40, and EM 385-1-1.

4. STATEMENT OF SAFETY AND HEALTH POLICY.

a. No person shall be required or instructed to work in surroundings or under conditions which are unsafe or dangerous to his or her health.

b. Each team member has the responsibility to immediately halt the team's operations and activities upon encountering an unsafe situation or act.

c. Each team member is responsible for reading the SSHP before a site visit, complying with applicable safety requirements, wearing prescribed safety equipment, knowing the symptoms of chemical agents, and preventing avoidable accidents.

5. TRAINING. Prior to site visits each team member shall have received the necessary training, to include refresher training on a scheduled basis, as required by the references listed in paragraph 3.

6. REPORTING REQUIREMENTS. Safety violations will be immediately reported to the designated team safety officer. The team safety officer shall report the findings of fact regarding the safety violation(s) through designated channels, as prescribed by the references listed in paragraph 3.

7. SITE SPECIFICS. Site description, possible hazards, OEW procedures, emergency telephone numbers (medical, police, fire, and other contacts), personnel protective equipment, weather precautions, responsible personnel, site control and communications are provided in enclosure 1AA. Enclosure l is the maps of the sites to be surveyed. Enclosure 2 is the symptom charts and Hospital maps. Prior to entering the site itself, a briefing by the team safety officer shall be provided to all team members.

Patrick O'Donnell
Safety Officer
Alpha South Team

Huntsville Safety Division and the local police.

4. Emergency Telephone Numbers.

a. Medical: Norwood Hospital, 660-5120, 5600 Girby Road, 1

US90(Government) to Norwood to Girby

b. Fire: 911

c. Police: 911

d. Other Contacts. Huntsville Safety Division, (205) 955-
St. Louis District Corps of Engineers, PM-M (Mike Dace), (314
8036.

5. Location of Nearest Telephone to Site.

6. Location and Telephone Number of Nearest Hospital.
As above, Norwood Hospital in Mobile, (660-5120).

7. First Aid. If a medical emergency arises, each team m
qualified in Standard First Aid/CPR should be prepare
administer aid, until medical personnel arrive.

8. Personnel Protective Equipment.

a. Personal Equipment on Site. Check the following equip
eye protection, ear protection, gloves, boots, notebook/pen
personal SSHP copy with associated chemical charts.

b. Team Equipment on Site. Check the following equip
first aid kit, survey tape, flashlight w/batteries, 35 not ca
w/100-300 mm zoom lens, 35 mm film (24 exp., 400 ASA), binocu
general purpose knife, maps of area, FM 9-16 (Explosive Ord
Recognition), and carrying bag.

9. Weather Precautions.

a. Cold Weather: Not applicable for this trip.

b. Heat: Weather may be very hot and humid. Over-exertio
cause a heat related emergency.

c. Severe Weather. The safety officer will monitor
newscasts for any type of severe weather and take the nece
safety precautions.

10. Team Personnel and Responsibilities.

a. Safety Officer: Patrick O'Donnell. The safety office:
overall authority and responsibility to ensure safety proce
are complied with while on site.

APPPENDIX C-2
SITE VISIT TRIP REPORT

CELMS-PM-M 2 September 1993

TRIP REPORT for 17-19 August 1993

SUBJECT: Site visit and data research for Theodore Naval Ammunition Magazine, Theodore, AL

1. 17 August 1993

SLD personnel listed below travelled to Mobile, AL to obtain information and perform an inspection of the subject site.

Mr. Tom Freeman
Mr. Pat O'Donnell, Safety Officer
Ms. Shelia Thomas

Mr. Ellis Pope, Mobile District Planning Division, provided access to various files and reports concerning this site. SLD also obtained copies of reports that Mobile District had prepared for environmental conditions at McCoy AFB (Pinecastle AAF) and Bushnell AAF.

The remainder of the day was spent reviewing files in the "vault" where old military records are kept. Mobile District has tried over the years to return documents to the applicable installations. Many documents have destroyed when they are not wanted by the installations. Ms. Thomas copied a listing of all remaining installations covered in these files.

2. 18 August 1993

Mr. O'Donnell and Ms. Thomas went to the Mobile Public Library to review historical documents and old newspaper files on the subject site. Several articles including pictures concerning the chemical wafare materials were copied.

Mr. Freeman accompanied Mr. Pope in searching through various Corps offices for documents. Several files were available on microfilm in the Real Estate Section concerning disposition of the property. Black and white air photos were provided by Mr. Mike Peterson of the Photographic Section for the years, 1945, 1967,1977, 1986, and 1990. After a considerable review individual photos were selected and will be forwarded to Horizons, SLD contractor for this project. Mr. Peterson also had color air photographs available from 1991, but the cost of reproduction for no additional information than the 1990 photos precluded getting copies of these.

Mr. Pope and Mr. Freeman searched through the records holding area. Documents available in this area were mainly real estate records. One additional map of Camp Sibert was discovered during this search. (After return to the SLD office it was determined that SLD already had the information presented on this map.) In researching this holding area it was determined that Jacksonville District had picked up all available documents pertaining to

APPENDIX C-3
HISTORICAL REPORT
LT. COL. ARTHUR
BOMB SHIPMENT REPORT

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REPORT OF INVESTIGATION CONCERNING RECEIPT OF GERMAN TOXIC GAS MUNITIONS AT [illegible], ALABAMA AND SHIPMENT OF [illegible] MUNITIONS TO PINE BLUFF ARSENAL

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~~CONFIDENTIAL~~

Report of Investigation Concerning Receipt of German Toxic Gas Munitions at Mobile, Alabama and Shipment of these Munitions to Pine Bluff Arsenal

by

Frank H. Arthur, Lt. Col., CWS

Alfred E. Hutchinson, 1st Lt., CWS

~~CONFIDENTIAL~~

[redacted]

REPORT OF INVESTIGATION CONCERNING RECEIPT OF GERMAN TOXIC GAS MUNITIONS AT MOBILE, ALABAMA AND SHIPMENT OF THESE MUNITIONS TO PINE BLUFF ARSENAL

Washington, D.C.

11 August 1945

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EXB A - Orders Pertaining to the Inspection Ices

EXB B - Itinerary of Inspection Team

EXB C - Details of Memphis, Tennessee Investigation (Restricted)

EXB D - Details of Amory, Mississippi Investigation (Restricted)

EXB E - Details of Mobile, Alabama, Investigation (Restricted)

EXB F - List of Telephone Calls to and from Inspection Team

[redacted]

ment vould noraally have been adequate to provide adequate technical assistance to the Transportation Corps officials in charge of tho operation. Normally the detail vould have been able to handle leaking or suspected leaking munitions on the percentage basis heretofore of record, to porfora technical supervision in the enforcement of safety regulations, and to perform required decontamination work. Further, that unforeseen contingencies, beyond the control of the Army officials in charge of tho operation, developed which required additional CWS personnel. That the CWS detail on duty at the U.S. Havel Magazine Cock, Theodore, Alabama on 19 July 1946 was adequate to provide technical assistance at the unloading point.

d. That the high rate of injuries sustained ia the operation at Theodore, Alabama was due largely to carelessness and negligence of the workers themselves rather than to the failure of prescribed operating procedure, existing safety regulations and technical supervision.

e. That the local labor conditions contributed materially to tho overall problem of processing the toxic cargo in that now crews were furnished by tho Long Shoreman's Union for each day's operation and ia that tho labor supplied core generally not high caliber stevedore crews. This situation increased the problems of providing protective equipment inasmuch as unused clothing had to be provided to each san daily, individual instruction was necessitated by this daily turnover of workers and that under these conditions proper individual "safety consciousness" could not bo inculated in the individual worker.

f. That the dumping of a small number of leaking toxic munitions in the Gulf, on or about 15 July 1946, was accomplished by the officials in charge of tho operation at the U.S. naval Magazine, Theodore, Alabama as an emergency measure and that tho dumping was performed in good faith.

g. That adequate inspection of all loaded cars was performed prior to their release for rail movement to C73 Arsenals.

h. That tho CWS Guard and Security escort accompanying each shipment from Theodore, Alabama, under normal circumstances would have proved adequate. That the incidents occurring at Panola, Alabama, Amory, Mississippi aad Memphis, Tennessee ia rocpect to leaking munitions could not reasonably have been foreseen. That the dispatch of CWS Guard and Security escort who were affected with mild contamination from prolonged exposure at Theodore, Alabama, was justified ca tha basis of information available at that time to the military authorities ia charge of the operation at that time.

i. That the 1000 lb. German bomb casings employed to transport German mustard agent are unsuitable containers for shipment or storage

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h. That all future la rge [illegible] shipments be made in trainload lots, accompanied by a CWS Guard and Security Detachment, at least equivalent to a platoon strength. Further that each trainload of persistent munitions be prorided with one or two decontamination apparatuces mounted on flat ears so that they aay be unloaded enroute to perform emergency decontamination. That froquent stops be made enroute during the movement of toxic agents to permit inspection of the entire train. That a small detachment from a Transportation Corps railway unit accompany each toxic shipment to accomplish any necessary switching or movement of leaking cars. That a minimum of one crane truck bo provided pov train to permit handling and shifting of leaking munitions. That adequate protective equipment accompany each trainl cad not only to equip military personnel but also to eqap railway employees. That amply decontamination supplies and equipment be provided to perait coping vith any emergency.

i. That all future chip loading or unloading of toxic munitions bo performed by soldier labor.

j. That while not specifically bearing on the case at hand, the allegations made by Captain Ehlbert concerning tho inadequacy of Guard and Security escort arriving from overseas ports should bo investigated.

k. That data be obtained from tho point of origin concerning the inspection performed at the time the cargo *ma* loaded.

1« That technical tests be made to determine the adequacy of soldering and patching procedures.

m. That ail munitions contained in future shipments bo adequately marked to show the chemical content of each munition. This ic extremely important when non-standard containers are used.

n. That all railway cars containing toxic gas munitions be posted with a "no humping" placard in addition to *t'aa* presently required poison gas placard.

o. That in future rail movements of persistent munitions all stirrups, brake handles, bleeder vaive handles and other car parts with which railway employees come in contact be painted with dctoctcr paint prior to release from military control.

p. That complete medical care histories bo prepared for all personnel treated in crdcr that official evidence may be available in any future claim actions.

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SECTION II

INVESTIGATION AT MEMPHIS, TENNESSEE

7. TTO inspections were made of the activities at Memphis, Tennessee; one on 16 July 1946 (1215 CST to 2230 CST) and the second on 24-25 July 1946 (1000 CST to 2000 CST 24 July 1946 and 0230 CST to 0330 CST 25 July 1946). A detailed, chronological report is contained in Tab C.

8. 16 July 1946 Inspection.

a. Situation: The Memphis General Depot Clerical Officer, Major Spahn, was informed at 1100 hours, 13 July 1946 that a tank car of poison gas was leaking in the Missouri-Pacific Railway Yards. Upon investigation he located a box car containing chemical munitions. A chemical substance, having an odor similar to U.S. mustard, was leaking from the two doorways and from opposite and diagonal corners of the car. He immediately commenced decontamination of the car and adjacent areas. Another contaminated area was subsequently found 30 feet from where the car was standing. At approximately 1730 hours, 13 July 1946, Major Spahn located an additional seven cars of toxic-filled munitions, two of which were leaking badly. By 1845 hours, 13 July 1946, the eight cars of toxic munitions had been switched to an isolated siding in the Memphis General Depot Area. Decontamination along Track No. 7 in the switching yards was continued until dark 15 July 1946. Guard posts were established at once at the extremities of the contaminated zone in the switching yards, and later around the area in the Memphis General Depot Reservation to which the eight carloads of toxic munitions were moved. These guard posts have been in continuous operation since that time. Report of the situation was made to CCWS on 14 July 1946. Decontamination of all areas over which the toxic-filled cars had travelled was initiated as early as possible and subsequent decontamination has been performed as required. [illegible] Guard and Security Detachment and an Edgewood Arsenal Medical Division officer were flown to Memphis, Tennessee, upon CCWS order to assist in handling the toxic chemical munitions at that locality. At the time of this inspection only two Memphis casualties had developed. Three Amory, Mississippi, casualties were also being treated in Memphis hospitals.

b. Discussion: It appears that the Memphis General Depot [illegible] Officer, Major Spahn, took all necessary precautions for the [illegible] safeguarding of civilians and private property from damage resulting from chemical contamination. Decontamination of contaminated areas was commenced immediately upon location of the contaminated car. Additional contaminated areas and cars were worked upon as soon as they were located. Steps were taken to isolate the shipment at the earliest practicable

trench at any one time. Tests made by Lt« Coloaol Arthur's Technical advisor reveals that such practice is safe. Ho toxic vapors were detected at a distance exceeding 300 yards downwind from the disposal pit, even under favorable inversion conditions. All local casualties 7.1th the exception of two military personnel are reported to bo very mild. Captain Whittenberger believes that ao permanent damage will result to the persons concerned.

10. Comments. The situation at Memphis developed without warning. With no trained military personnel at hand, Major Spahn took immediate action to retard the menace resulting from too leaking gas bombs la the Missouri-Pacific Railroad yards. The Railroad officials were satisfied with the action which had been taken. All areas were kept under constant surveillance until negative information concerning chemical contamination was obtained. The decontamination work has progressed very slowly and it is believed that this is due in part to the rather low available chlorine content of the decontamination agent. Destruction of the toxic gas has been performed with due regard to safety and security measures. Unloading and reloading the railroad cars has progressed slowly. The slowness of this operation ia due, in part, to the local working conditions and in part to the small crew available for this job. Within a few day's time from the date of inspection the entire situation should so satisfactorily settled.

11. Recommendations. No specific recommendations are made for improvement of the work being conducted at tho Memphis General Depot. Certain general recommendations for incorporation into future standard operating procedures, based upon lessons learned from this and related activities, are contained ia Section VIII.

SECTION III

INVESTIGATION AT AMORY, MISSISSIPPI

12. An inspection was made at Amory, Mississippi on 17 July 1946 (1100 - 1400 CST). Telephonic conference was held with Captain Walker and Lt. Hatcher on 24 July 1946. A detailed, chronological listing is contained ia Tab D.

13. 17 July 1946 Inspection

a. Situation: One railway car containing leaking toxic gas munitions was discovered in the Amory Switchyards by the Guard and Security Detachment assigned to the train which originally contained ten carloads of toxic chemical bombs. The shipment originated at tho U.S. Naval Magazine at Theodore, Alabama. One car of leakers was discovered at

brought under eontrol vith the least possible delay, and when negative tests indicated their freedom from contamination, these areas were released to the Railway Company for normal operations. The climatic conditions were Tory difficult for efficient operation of working crews and security measures against chemical agents must be enforced. In my opinion, Lt. Hatmer displayed great initiative and foresight in handling the situation at Amory, Mississippi. Ho is to be commended upon the efficient workmanship and dispatch vith which he handled the task at that point.

14. 24 July 1946 telephonic conference vith Captain Walker and Lt. Hatmer.

a. Situation:

Lt. Hatmer stated that all trackage had been decontaminated, tested and released to the Railway Company after negative tests had been obtained. The car which had originally contained the leaking bomb had been safely decontaminated and reloaded with the non-leaking munitions. Only cr.3 1,000-pound leaking bomb had bean found. This had been buried on the Columbus Air Base, Mississippi Military Reservation, in accordance with arrangements made with the Base Commander and Base Engineer. Captain Walker reported that he had troatod a total of 25 casualties to date, of which four were military personnel. Of the 21 civilian patients, all but four were bad: to their normal work. One of the four (Mr. Rorie) had been transferred to a Memphis Hospital far treatment. Mr. Flynn's ulcer had been troatod at Memphis and was healing satisfactorily, and while he was back in Amory, Mississippi, he would be unable to work for a week or tan days. Mr. Borhorn was being sent to St. Louis for observation. Mr. Wright, a railway employee, with mild blister areas on his legs, would bo out for another week or two.

b. Discussion:

The situation seemed to be satisfactorily in hand. Captain Walker, Lt. Hatmer and the CWS Guard and Security Detachment were awaiting orders and funds being forwarded from Edgewood Arsenal prior to their departure from Amory, Mississippi.

15. Comments:

The military personnel dispatched to Amory, Mississippi displayed excellent initiative and keen foresight in handling the situation at that point. In my opinion, all personnel should be commended for their quick and efficient action. It appears that this situation is completely under control.

team's time was devoted to investigation of suitable areas for the disposal of the leaking toxic munitions as well as devising plans for the safe destruction of the toxic agent.

b. Discussion:

Neither records nor journals were maintained during the period that the SS Francis L. Lee was being unloaded. Statements made by the various officials concerned with the unloading operation were entirely from memory. With two exceptions, Captain Allyn, the Transportation Corps officer in charge of the U.S. Army activity at the U.S. Naval Magazine, Theodore, Alabama, stated that he was entirely satisfied with the staff action of the Chemical Warfare Service officer on duty during this operation. These exceptions are discussed in paragraph 28a, Tab C. It is believed that neither of these exceptions contributed to the number of casualties sustained during the unloading of the SS Francis L. Lee.

19. Comments:

A review of the statements contained in Tab S leads to the belief that a normal Chceical Warfare Service Guard and Security Detachment was on duty at the U.S. Naval Magazine Dock during the discharge of toxic cargo from the SS Francis L. Lee. The size of the detachment and the operating procedures followed had been in practice for many months. Prior to this operation these procedures had constituted an adequate and safe means for the handling of toxic gas cargo received in or shipped out of the United States. Furthermore, the safety precautions taken for the movement of toxic gas from the dock to the point of final destination likewise were based on previous experience and operating procedure. Prior to this operation those procedures had always been adequate and effective. Additional security measures were taken as the situation developed. It would seem that adequate provisions had been taken to safeguard the civilian stevedoring crews; however, due to the peculiar labor situations, which are more or less nationwide at this period, rigid enforcement of these regulations could not be made. The large number of leakers which were processed is an abnormal condition not heretofore of record [illegible] the Transportation Corps nor to the Chemical Warfare Service. It would appear that part of the fault was due to the fact that the bomb casings were too light to withstand the tropical climatic conditions prevailing at the discharge point. The inspection team made no attempt in the limited time available to them to ascertain the degree of responsibility of the interested military personnel concerned with the unloading operation at the U. S. Naval Magazine Dock, Theodore, Alabama, at Memphis, Tennessee, and at Amory, Mississippi; or to ascertain the legality of claims from injured personnel or the liability of the U.S. Army in the matter of the contamination of property and the injury of civilians. The inspection team had

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depending on the local situation. Arrangements were made with the Coast Guard to assist in the initial warning concerning the traffic restrictions in the adjacent waters and to assist in the off-shore patrolling necessary to safeguard the shipping channel. Upon completion of the operation, the area was to be thoroughly decontaminated and released upon receiving negative tests on three consecutive days. As an added safety precaution, the burning area was to be fenced and posted for a period of sixty to ninety days with periodic checks made by CWS personnel to indicate the absence of toxic gas contamination. The burning operation appeared to be feasible and capable of being conducted without jeopardizing regular shipping and inhabitance. Complete and detailed plans were to be submitted in writing to the District Engineer, Mobile, Alabama.

SECTION VI

General Summary:

23. The SS Francis L. Leo, carrying toxic cargo of captured German bombs, docked at the U.S. Naval Magazine on 8 June 1946 and commenced to discharge its cargo on 11 June 1946. The ship's manifest indicates an original cargo of 3686 tons, all of which were captured German toxics, except approximately 79 tons of rockets, grenades, etc. It is reported by the participants in the operation at the U.S. Naval Magazine Dock, Theodore, Alabama, that unloading proceeded without event until sometime between 14 and 10 June 1946 when the first casualties among the civilian stevedore crews were sustained. Upon opening of the hatches, routine tests were performed to determine whether or not chemical contamination was present. Captain Ehlbert states that all preliminary tests were negative and that a considerable portion of the upper hold areas were unloaded without obtaining positive indication of chemical contamination. Under this situation, workers were permitted to perform their normal duties without using gas masks and protective clothing. Initially Captain Ehlbert, CWS Chemical Officer of the New Orleans Port of Embarkation, assisted by one officer and seven enlisted men of the CWS Guard and Security Detachment of Edgewood Arsenal were on duty when the unloading operations commenced. Between the time of sustaining the first injuries among the civilian crew and 13 July 1946, two reinforcements from the CWS Guard and Security Detachment, Edgewood Arsenal, were obtained to assist in the operation. On 19 July 1946 the strength of the CWS detail on duty at Theodore, Alabama, was three officers and thirty-four enlisted men. As of 23 July 1946 approximately 241 (plus or minus 10) injuries had been reported by Captain Helm, MC (Medical Division, Edgewood Arsenal) on duty at Mobile, Alabama. According to statements of the officials in charge of the operation each

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car which had been removed from the train at Panola, Alabama, was brought under control and returned to the U.S. Naval Magazine at Theodore, Alabama, without incident. The non-commissioned officer remaining with the car at Amory, Mississippi, developed injuries sufficient to warrant hospitalization and was removed to a local facility for treatment. Subsequently the railway car was isolated on a siding three miles north of the town. A C73 Guard and Security Detachment from Edgewood Araoaal arrived ea 24 July 1946 cad immediately commenced decontamination of all areas over which the leaking cars had passed. The efficient operation quickly brought the Amory situation under control. By 17 July 1946 nineteen civilian injuries, eighteen of which were railway employees, bad been treated at Amory, Mississippi. By 24 July 1946, 21 casualties bad developed in the Memphis area, of which ten were military personnel. Three cars commenced to leak after arrival ia Memphis, Tennessee. The quick action taken by tha military authorities at Memphis, Tennessee resulted in isolating tho leakins cars without unfavorable local incident. On 24 July 1946 a total of 21 injuries had been treated at Memphis, Tennessee. Seven of which were at Memphis, are Army General Depot civilian employees who had received mild contamination from vapor ia areas adjacent to the isolation site.

26. A detail from tha CWS Guard and Security Detachment, Edgewood Arsenal, was sent to Memphis, Tennessee where they were employed to perform the necessary decontamination, to reload the non-leaking munitions for shipment to the CWS Arsenal and to dispose of the leaking bombs.

27. On 25 July 1946 all activity at Memphis was progressing satisfactorily although rather slowly. Tho slowness of the operation me due to local climatic conditions, as well as to the magnitude of the task.

SECTION VII

Conclusions:

28. After review of all evidence obtained during the inspection, Lt. Colonel Arthur and 1st Lt. Kutschinski conclude:

a. That the initial preparations for handling toxic cargo at the U.S. Naval Magazine Dock, Theodore, Alabama, were inadequate ia that change rooms and decontamination facilities were not prepared for tho stevedoring crews and that tho facilities for storage and issuance of individual protective supplies were not ia existence until the operation was under way. These deficiencies were corrected during tho operation and prior to the arrival of tho inspection team.

b. That initially tho storage and care of individual protective equipment was unsatisfactory. This condition was corrected by Captain Allyn when he assumed control of tho Transportation Corps activity on 8 July 1946.

i, That the 1000 lb. German bomb casings employed to transport German mustard agent are unsuitable container* for shipment or storage of toxic gas. This conclusion is based upon the largo number of leakers which developed at Mobile, Alabama and while enrouto to a CWS Arsenal, as well as from the physical inspection of several ruptured containers and from an inspection cf cross-sectional fragments from one of the bombs.

j. That the activity at Memphis, Tennessee, and Amory, Mississippi was handled with efficiency and due regard to the protection of civilians and private property.

29. After a review and study of all evidence obtained during the investigation, the inspection team recommends:

a. That technical tests ba made to ascertain the suitability of both tbo 500 lb. German bombs and 1000 lb. German bombs for storage or shipment of toxic gas.

b. That technical tests be made to ascertain whether or not the bombs were properly voided prior to shipment from Europe.

c. That technical tests be cade to ascertain the exact filling in the various bombs.

d. That a joint CWS - Quartermaster study be made on the ratter of storage and issue of protective clothing.

e. That a technical study bo made concerning CWS surveillance procedures. (This recommendation is made on the basis that the available chlorine content of the chloride of lime used at Memphis, Tennessee, was only 15-20%, and that some cf the protective clothing appeared to have lost its protective quality).

f. That all available evidence be collected and studied concerning the operation cf Mobile, Alabama, Amory, Mississippi and Memphis, Tennessee. The following reports should be obtained: (1) Reports of fill CWS Medical Division officers detailed to duty at the above mentioned localities; (2) Reports cf all CWS officers participating in the operation Lt. Colonel White, Commanding Officer, Guard and Security Detachment; Major Spahn, Chemical Officer, Memphis General Depot; Captain Ehlbert, Chemical Officer, New Orleans Port of Embarkation; Lt. Kaisner, Lt. Michael Lt. Myer and Lt. Sutcrelli, all of the Guard and Security Detachment); (3) A transcript cf all telephonic conferences made by Captain Allyn, Transportation Corps Officer in charge of U.S. Army activity at the U.S. Naval Magazine Dock, Theodore, Alabama, to his superiors at the Headquarters of the New Orleans Port of Embarkation; (4) The report of & board of officers appointee by the Commanding Officer, New Orleans Port of Embarkation to investigate the unloading activity at the U.S. Naval Magazine, Theodore, Alabama. This evidence will give a complete case histcry upon which to base further aotic

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p. That complete medical case histories be prepared for all personnel treated in order that official [illegible]dence may be available in any future claim actions.

FRANK M. ARTHUR
Lt. Colonel, CWS

ALFRED H. KUTSCHIEWSKI
1st. Lieutenant, CWS

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[illegible]

[illegible] REPORT OF INVESTIGATION [illegible] MUNITIONS AT MOBILE, ALABAMA AND SHIPMENT OF [illegible] MUNITIONS TO PINE BLUFF ARSENAL.

MOBILE, ALABAMA INVESTIGATION

1. General. The unloading of the toxic gas munitions was being accomplished at the U.S. Naval Magazine's dock at Theodore, Alabama. The Magazine is situated approximately twenty miles southeast from Mobile, Alabama. The ship carrying the toxic cargo is the SS Francis L. Lee. This ship docked at the U.S. Naval Magazine on 3 June 1946 and commenced to discharge its cargo on 11 June 1946. The ship's manifest indicated an original loading of 3680 tons (Annex I).

2. Chronological listing of inspection.

a. 18 July 1946.

Conference with Lt. Colonel White, CWS, Guard and Security Detachment, Edgewood Arsenal; Captain Henry L. Ehlbert, CWS, Chemical Officer, New Orleans Port of Embarkation; Captain Arthur R. Allyn, TC, OC - U.S. Army Activity at U.S. Naval Magazine Dock.

Inspected dock area.

Interview with Mr. D.A. Jones, Inspector, Bureau of Explosives, American Association of Railroads.

Report to Colonel MacArthur.

Tentative orders received from Colonel Gillot, Chief, Supply and Distribution Division, OCCWS.

Firm orders received from Colonel MacArthur.

Conference with Lt. B.L. Smith, Commanding Officer, U.S. Naval Magazine, Theodore, Alabama.

Interviewed Captain of the SS Francis L. Lee.

Interviewed Captain John D. Helm, Jr., MC (Medical Division, Edgewood Arsenal).

Called Colonel MacArthur concerning rerouting of ATC Special Flight.

Conference with staff officers of District Engineer's Office.

Conference with District Engineer (Colonel Beatner, Jr.).

Conference with Commanding Officer, U.S. Coast Guard Mobile Group (Captain Collins).

Visited U.S. Naval Magazine for conference with Lt. Colonel White, Captain Hilbert, and Captain Allyn.

Interview with Mr. John H. Tappan.

Report to Colonel MacArthur.

Captain Wexler, MC (Medical Division, Edgewood Arsenal) arrived and reported to Lt. Colonel Arthur.

f. 23 July 1946

Lt. Colonel Prentice, Lts. Kutschinski and Subroski made all-day reconnaissance of Horn Island.

Conference with Lt. Smith, Commanding Officer, U.S. Naval Magazine.

Report to Colonel MacArthur.

Telephonic conference with Lt. Colonel White and Captain Allyn.

Lt. Colonel William J. Owen, Jr., CO, ACCWS, [illegible] 1630, 23 July 1946.

Reported plans for departure to [illegible] in Bro[redacted]ld, AO Office.

C[illegible]rence with Lt. Colonels Al[redacted] Prentice to finalize disposal plan

[illegible]. Kutschinski telephonic conference with Captain Helm and Captain Hilbert.

Left Mobile, Alabama for Memphis, Tennessee.

3. General Information Concerning the Toxic Gas Load and Unloading Procedures.

The ship was originally loaded at Antwerp with [illegible] tons of cargo.

d. The following plans and recommendations were submitted to Colonel MacArthur, Assistant Chief, CWS, for Operations.

(1) Plan 1: Load entire tonnage of toxic munitions then at Theodore, Alabama, in two Transportation Corps sealed barges and move via tug over inland water-way to Edgewood Arsenal. Upon arrival at Edgewood Arsenal hold aboard the sealed barrage until cool weather at which time the cargo could be disposed of with greater safety. An alternate phase of this plan was to dispose of leaking bombs is the Mobile area and to ship only non-leaking bombs by barge.

(2) Plan 2: Ship all five hundred non-leaking bombs in especially prepared railway cars (cover floor and a portion of the side walls with heavy tar paper; cement overlaps; use approximately six inches of sand-chloride of lime mixture on the floor" of each car) to Pine Bluff Arsenal. Dump all leaking bombs and one-thousand-pound, non-leaking bombs at sea.

(3) Plan 3: Dump the entire tonnage remaining at the U.S. Naval Magazine, Theodore, Alabama at sea.

(4) Plan 4: Continue unloading and shipping operation without modification.

(3) Adoption of the plan was recommended in the following order:

Priority 1: Plan 2
Priority 2: Plan I
Priority 3: Plan S
Priority 4: Plan 4

5. Orders from Office, Chief, Chemical Warfare Service:

a. Colonel Gillet gave telephonic orders (tentative) as follows:

(1) Move all good 500 pound bombs to Huntsville Arsenal.

(2) Make shipment in two special trains.

(3) Cover the floor and a portion of the side wall of each car with tar paper. Place approximately six inches of dry sand in the bottom of each car prior to loading.

(4) Have an adequate C.73 Guard and Security Detachment (officers and enlisted men) accompany each train.

(5) A 400-gallon decontamination apparatus to be loaded on a flatcar and dispatched with each train. Provision to be made for unloading of the decontamination vehicle enroute, if required at any point for emergency usage.

9. Inspection of the Dock Area.

The dock area contains only one small pier. The pier contains two railroad tracks. Unloading is accomplished by ship's gear. Some leakers which had been detected during the unloading were loaded on an Army barge tied along the pier opposite the SS Francis L. Lee. Some bombs suspected of defect were segregated at the near off side of the pier. The dock area, including the pile of "suspected" bombs, and the barge with the leakers aboard, were well sprayed with slurry. Two decontamination apparatuses, one vehicle mounted and the other skid mounted, were present. A small change shed and shower had been installed near the pier. Protective equipment is stored in and issued from a small two-story temporary Naval building near the pier.

10. Discussion with Captain Helm, MC (Medical Division, Edgewood Arsenal).

Captain Helm stated that as of 1300, 10 July 1946, a total of 122 injuries had developed. At this time only 9 patients required hospitalization. Captain Helm was of the opinion that all losses were [illegible] on the part of the workers.

11. At 1400 CST, 13 July 1946, I called Colonel MacArthur concerning [illegible] of the plane (an ATC special flight originally scheduled from Bolling Field to Memphis, Tennessee; to Columbus Air Base, Miss.; to Mobile, Alabama; thence return to Bolling Field) to comply with Colonel MacArthur's 1300 CST directive to return via Memphis, Tennessee. At this time clearance had not been obtained, and I was informed to "stand by" for further instructions. At 1440 CST, 13 July 1946 Colonel MacArthur directed the release of the special plane and directed the inspection team to remain at Mobile to make arrangements for the disposal of all leaking bombs and of all one-thousand-pound bombs.

12. Arrangements had been made with Lt. Colonel White for Lt. Schrenk to investigate the Fort Morgan area on 13 July 1946 to ascertain if bomb disposal work could be performed in that area. Lt. Colonel Arthur and 1st Lt. Kutschinski visited Mr. John Glennon, a Mobile, Alabama historian and realtor to obtain information concerning the location of additional areas where bomb disposal might be conducted. Mr. Glennon was most informative and helpful. He stated that the Federal Government had released Fort Morgan to the State of Alabama for a state park site. He suggested several isolated areas where bomb disposal might be conducted:

Dauphin Island off the southern coast of Alabama. The island is approximately 12 miles long, one-half mile wide and easily accessible by barge at high tide. It is approximately 25 miles by water from the Naval Magazine. It is largely uninhabited, with only a very small village at the eastern tip. The island is owned by the Vredenberg Lumber Company of Vredenberg, Alabama.

the reloading of all cargo aboard the SS Francis L. Lee and movement to Charleston, South Carolina. Plans were being made to put this directive into operation. Lt. Subroski reported that no land was available in the Fort Morgan area where the leaking toxic bombs could be safely destroyed. He had data concerning Horn Island which appeared very favorable. Lt. Kutschinski and Lt. Subroski left to make a preliminary reconnaissance of the Island which is located approximately 10 miles off shore from Pascagoula, Mississippi, which in turn is approximately 35 miles southwest from Theodore, Alabama. This hasty and preliminary reconnaissance revealed that the island was ideal for the disposal operations. The island is under the jurisdiction of the District Engineer, Mobile, Alabama and is uninhabited except for two civilian caretakers. The water at several points is deep enough to permit access by barge.

15. At 0915 CST, 20 July 1946, Colonel MacArthur informed Lt. Colonel Arthur that the red ring German bomb case was reported to be an incendiary case. It was assumed that this incendiary case had been employed as a container to ship the bulk German mustard agent. He stated that two proposals for disposal of the leaking bombs had been made in the OCCWS and desired that these proposals be considered. The first proposal was that all leaking munitions be placed in metal boxes (to be procured locally) and then the lid welded closed. The second proposal was that all leaking munitions be "cast" in concrete. The munitions treated under either plan could then be easily handled and either shipped to an Arsenal or disposed of at sea. Discussion of these plans with Lt. Colonel White and Captain Ehlbert led to the belief that both were not feasible and that the previous plan for destruction by burning was the most feasible. This conclusion was reported to Colonel MacArthur on 21 July 1946. Colonel MacArthur agreed at that time to the plan for destruction; however, stipulated that no destruction should be initiated pending the arrival of Lt. Colonel William J. Allen, Jr., who had discussed all phases of the problem with representatives of the Assistant Chief, CWS for Research and Development, OCCWS.

16. On 21 July 1946, Colonel MacArthur [redacted] [redacted]:

a. Captain Helm, MC, accompany the SS Francis L. Lee to Charleston. Captain Helm to report by telephone to washington upon arrival at destination. (Another Medical officer was enroute to replace Captain Helm, however, this officer was on other orders and could not accompany the ship. Captain Tatum was being obtained to take over at Mobile but this arrangement would require a few days to effect).

b. Disposal of the toxic munitions be suspended pending the arrival of Lt. Colonel Allen, however, preparation should be continued. Colonel MacArthur stated that all precautions were to be taken to insure that no casualties resulted from the operation regardless of the time involved.

c. Necessary supplies and equipment be requisitioned from Huntsville Arsenal. All preliminary arrangements have been made by OCCWS. Colonel MacArthur also stated that Captain Jack Wexler, MC, would arrive 22 July 1946, as a substitute for Captain Helm at Mobile. As soon as Captain Tatum can be obtained, Captain Wexler will be relieved.

17. In telephonic conference with Lt. Colonel White, it was agreed that Lt. Colonel White, Captain Helm and 10 enlisted men of the CWS Guard and Security Detachment would accompany the SS Francis L. Lee. One (1) decontamination apparatus, necessary protective equipment, protective clothing

2. Fourth Visit to the U.S. Naval Magazine.

Tentative plans for the disposal of the leaking munitions were discussed with Lt. Colonel White, Captain Ehlbert and Captain Allyn. Lt. Colonel White stated that Lt. Hatzner had called from Amory, Mississippi to report that one one thousand pound "leaker" had been discovered in the car at that point. The car has been decontaminated and reloaded with the non-leaking munitions and routed to Pine Bluff Arsenal. Captain Allyn stated that the loading of the SS Francis L. Lee had been finished at 0530 CST, 22 July 1946. The manifest showed a total of 635 tons aboard (a total of 2973 tons had been shipped via rail and 40 tons of leakers were at the dock awaiting destruction). Plans were firmed concerning the CWS activity incidental to the voyage of the SS Francis L. Lee from Mobile, Alabama, to Charleston, South Carolina. Colonel White, Captain Helm and the enlisted men were to accompany the ship. Gas masks and protective clothing for the ship's crew and CWS detachment were to be loaded readily available for usage enroute. One decontamination apparatus was to be loaded on the top deck. 400 pounds of chloride of lime was to be carried for emergency decontamination. These details were reported to Colonel MacArthur.

3. During the visit to the U.S. Naval Magazine Dock on 22 July 1946, Lt. Colonel Arthur and Lt. Kotschevar were introduced to a Mr. John H. Tappan. At the time of the introduction, we were informed that Mr. Tappan was representing the CWS in the situation at Mobile, Alabama. Shortly after his arrival, Mr. Tappan produced several sheets of papers and passed them out to the officers who have been on duty at Mobile. I inquired further into Mr. Tappan's status and he informed me that he was investigating the situation at Mobile in connection with unloading of the SS Francis L. Lee for his firm, "Pillsbury, Sean and Tappan". This firm, he stated, represented the following clients: USA WSA; Fulton P and I Agency (Firm of Marine Underwriters); and the Seas Shipping Company. Captain Ehlbert handed me a sheaf of papers which Mr. Tappan had given him and asked my opinion of the matter. Upon reading the paper, I discovered that it was a legal statement prepared for Captain Ehlbert's signature and contained his narrative of events concerning the incident at Mobile, Alabama as well as certain general comments and opinions on the overall situation, including a statement that several ships loaded with toxic munitions had arrived from foreign ports with an inadequate security detachment and further that he (Captain Ehlbert) had protested such practices. I told Captain Ehlbert that I couldn't comment on his statements inasmuch as he alone knew the facts surrounding the incident. Lt. Colonel White asked me to look at one paragraph contained on the first page of his statement. This was a statement to the effect that in 1940 the Navy had discovered certain data which contradicted certain facts concerning mustard gas and that based upon this data obtained by the Navy, the CWS had commenced tests at San Jose which proved that the Navy was correct in their assertions. I told Lt. Colonel White that this information might not be exactly correct and that further it might be classified data. I then asked Mr. Tappan by what authority he was making the investigation whereupon he produced a

best information available at the time of the dumping operations indicated that the dumping operation was commenced approximately thirty-five (35) miles from the last coast guard light, which would locate the site approximately fifty (50) to sixty (60) miles off shore of the coast of Alabama. During this conference, Lt. Smith disclaimed any responsibility for authorizing the disposal of the leaking munitions in the gulf, however, he does admit recommending the dumping should not be accomplished closer than eighty-five (85) miles to the shore.

26. In a telephone conference with Lt. Colonel White and Captain Allyn on 23 July 1946, it was learned that the SS Francis L. Lee would be delayed for two (2) or three (3) days, due to the fact that clearance for the voyage could not be obtained from the Coast Guard. The annual inspection of the SS Francis L. Lee was several days overdue and the Coast Guard had refused to grant clearance until the inspection had been made. Captain Allyn stated that all arrangements had been made to have the inspection performed. He believed that this inspection was a matter of form and routine to effect in the sea-worthiness of the vessel and had nothing to do with the disposal of toxic munitions. Captain Allyn stated that all the railroad cars had been decontaminated. Preparations were being made for decontamination of the dock and adjacent facilities. All leaking munitions had been loaded on the Transportation Corps barge; the barge had been moved to an isolated area in the general vicinity in the U.S. Naval Magazine Dock, where it was being held pending movement to the Horn Island. Colonel MacArthur was informed of the situation. Tentative plans for further investigation at Memphis, Tennessee and Amory, Mississippi were discussed with Colonel MacArthur at this time.

27. Lt. Colonel William J. Allen, Jr., arrived at Mobile, Alabama at 1030 CST, 23 July 1946. Lt. Colonels Arthur and Prentice oriented Colonel Allen concerning all activity in the Mobile area. All tentative plans and preliminary arrangements were discussed with Colonel Allen and the general scheme of operation was crystalized.

28. Statements made by Lt. Colonel White, Captain Ehlert, and Captain Allyn during the several conferences at the U.S. Naval Magazine Dock, Theodore, Alabama, and not otherwise recorded in this report:

a. Remarks by Captain Allyn:

Captain Allyn stated that he had reported at the U.S. Naval Magazine, Theodore, Alabama, on 8 July 1946, to take charge of the U.S. Army Transportation Corps activities at that locality. He relieved Lt. Russell Chapman, who had been on duty at that station from early 1946 to 7 July 1946. Captain Allyn states that no unloading was done between 8 and 9 July 1946. Upon assumption of commands at the dock, Captain Allyn states that he noticed a particularly disorderly arrangement of the protective equipment. Protective clothing and equipment were strewn around the installation in a very disorderly manner. No procedure had been established for the storage and issue of the items. No racks existed for

that the aeration of protective clothing in bright sunlight caused deterioration of the fabric as well as reduced the impregnite content of the garment. Captain Allyn believes that his CWS adviser should have informed him of this fact. (Captain Ehlbert states that while he agreed to the aeration procedure, he was under the impression that the aeration was to be performed in the shade provided by the improvised change sheds which had been erected to accommodate the stevedoring crews). Captain Allyn stated that he realized he was the commanding officer in connection with the unloading activity at the U.S. Naval Magazine, Theodore, Alabama, and as such was fully responsible for the entire operation. He further stated that it was his understanding that the CWS officers responsibility was solely that of staff adviser to the Transportation Corps officers in charge of the unloading operation. Captain Allyn states that a very limited labor pool is available at Mobile, Alabama. Normal stevedoring activities at the Mobile dock utilize the regular full time stevedoring labor available in the Mobile area. The labor supplied to the Strachan Stevedoring Company by local unions, in Captain Allyn's opinion, was the cull of the water front. Furthermore, the working conditions at the dock were greatly complicated by the fact that a new crew was sent each day. This condition alone caused a tremendous problem in that each worker demanded unused protective clothing before going on the job. Clothing many times in excess of normal requirements was thus required to provide protection to the workers. Arrangements had been made for the local laundering of the clothing. (Captain Ehlbert states that he could not always get one day's service from the laundry establishment). Captain Allyn states that he had been successful in obtaining one day's service. In spite of the fact that local laundering was obtained, considerable quantities of protective clothing over and above normal requirements had to be utilized under these conditions. Captain Allyn agrees with Lt. Colonel White in the statement that the port facilities at the U.S. Naval Magazine Dock are generally inadequate for the discharge of bomb cargo. The facilities at the time of this inspection were greatly improved over those which were reported to exist at the commencement of the operation, in that change sheds and supply showers had been constructed to facilitate personnel decontamination and storage racks and supply facilities had been installed. Captain Allyn also states that supply installations which are in support of the operation, are too far distant from Theodore, Alabama, to provide immediate and adequate service. Captain Allyn has made no final report concerning the unloading activity to the Transportation Corps officials at the New Orleans Port of Embarkation. He states that he has made daily telephonic reports to his superiors and that these telephonic conferences have been recorded in the New Orleans office. He believes that transcript of these reports can be obtained from Major Leere, Superintendent of Water Division, New Orleans Port of Embarkation. Captain Allyn stated that the first bomb injuries appeared between 14 and 15 June 1946. At that time, operations were suspended until additional protective equipment, Guard and Security personnel, and competent military medical assistance could be obtained. The operation was resumed on 17 June 1946. When

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ember of a few days and would afford them an opportunity for a short rest and provide recuperation. Upon being questioned concerning Sergeant Steinberger and Sergeant Woronecklim, Captain Ehlbert states that Sgt. Steinberger had reported from Amory, Mississippi, to inform him of his physical condition prior to his leaving the railway car unguarded. Based upon the information from Sgt. Steinberger, Captain Ehlbert immediately requested CWS Guard and Security reinforcements to handle the leaking car at Amory, Mississippi. Captain Ehlbert states that he received similar information from Sgt. Woronecklim prior to the sergeant's departure for a hospital at Memphis, Tennessee. Again Captain Ehlbert requested CWS Guard and Security reinforcements to handle the situation at Memphis. When questioned concerning the training of the stevedoring crews, Captain Ehlbert stated that intensive training had been given the stevedore bosses and the initial crews. However, subsequent crews were not given formal instruction. Captain Ehlbert stated that he considered this satisfactory in that the stevedoring bosses could explain to their men, the security measures to be enforced. Captain Ehlbert stated that upon opening the hatches of the SS Francis L. Lee that tests had been made to determine whether or not poisonous vapors were present. All tests were negative. During the initial discharging of cargo, periodic checks were made which resulted in negative indication of poison gas. It was not until the operation was well under way and unloading had progressed into the lower hold area that the first presence of toxic vapor was detected. During the discharging when negative tests were obtained, 20 security measures were enforced — wearing of masks and protective clothing. Upon obtaining positive reaction with the M9 detector kits, normal security measures were effected. Captain Ehlbert stated that the Commanding Officer, New Orleans Port of Embarkation had appointed a board of officers to investigate an "incident" which had been reported by southern newspapers as having occurred at the U.S. Naval Magazine Dock, Theodore, Alabama. The investigating board was composed of Lt. Colonel Flynn, Captains O'Neil, Kurtz, and Ehlbert, all of the New Orleans Port of Embarkation. A copy of the [illegible] proceedings, findings, and recommendations was not available at Theodore, Alabama. Captain Ehlbert states that he had turned over all individual protective supplies and equipment to the Transportation Corps officer who was in charge of the operations. He further states that in his opinion the CWS Guard and Security function is to furnish technical advice to the Transportation Corps officials who are responsible for the overall unloading operations as well as to provide competent details to handle leaking munitions and to perform necessary decontamination work. Captain Ehlbert stated that thirty-three (33) leaking gas bombs, thirty (30) 1000-pound bombs and three (5) 500-pound bombs were dumped at sea as an emergency measure. These leaking bombs had been off-loaded from the ship and in Captain Ehlbert's estimation were a menace to the safety of workers employed in the unloading operation. He states that he contacted Lt. Smith, Commanding Officer, U.S. Naval Magazine, and suggested that as an emergency measure, the bombs be disposed of by dumping at sea. He states that Lt. Smith concurred in this proposal. Accordingly, he requested Captain Allyn to provide a tug and barge to accomplish the dumping. Captain Allyn secured for an Army tug belonging to the Transportation Corps at the New Orleans Port of Embarkation (Tug 881) to move to Theodore, Alabama, to tow a barge containing the toxic munitions. The actual dumping was performed on 15 or 16 July 1943. Captain Ehlbert did

Corps officials concerning safety measures and in furnishing technically qualified personnel for necessary decontamination and disposal work. In his opinion these functions have been satisfactorily discharged by the Chemical Warfare Service personnel on duty at the U.S. Naval Magazine dock, Theodore, Alabama. Lt. Colonel White stated that the efficiency of the CWS Guard and Security Detachment at this time was below the standard which had been maintained throughout the war time period. Demobilization of the Army, constant reorganization, continual reassignment of personnel has created serious obstacles in the maintenance of a highly competent and efficiently trained organization. He further states that many of the present non-commissioned officers who hold key positions in the Guard and Security Detachment would not have been rated as first class privates in the war tine organization. Lt. Colonel White states that in his opinion the injuries and casualties resulting from the operation at Theodore, Alabama, are largely duo to carelessness and negligence oa the part or the civilian workers. He is of the opinion that all necessary security measures were taken in accordance with existing regulations which are based upca previous unloading experience and practice.

29. Final check was made with Captain Helm, Medical Corps, on the evening 23 July 1946 to ascertain the total casualties treated to that date. Captain Helm reported that he had not made as actual check of his records, but estimated that the total number of casualties (the term casualty is actually a misnomer for many of the so-called casualties are only minor injury) was two hundred forty-one (241) plus or minus ten (10).

30. Annex 7 contains two (2) clippings from the Mobile, Alabama, paper concerning operation at the U.S. Naval Magazine. Limited time available to the inspection team did not permit interview with the Brookley Field PRO to obtain a complete clipping file. Lt. Colonel Prentice and Lt. Colonel Allen were instructed to obtain the complete file of Mobile, Alabama, clippings.

31. At the time of the inspection, unloading operations had been suspended on order from Washington. Much of the report concerning prior unloading activities at the U.S. Naval Magazine Dock is based on statements of the personnel participating in that activity. In several places, contradicting statements are noted. Neither 153 nor journal was maintained by the officer in charge of the operation. Likewise, the CWS Staff Adviser did not maintain a record of events. It is my opinion, at least during the time of tho inspection, that there was complete harmony between the CWS personnel and Transportation Corps personnel. Inspection of the German bombs leads to the impression that these are unsuitable for tropical or semi-tropical use, storage, and shipment, however, technical engineering tests will have to be made to definitely verify such impression. (Subsequent inspection of bomb gas fragments, both at Memphis and Washington, D.C., substantiates this earlier opinion). Captain Ehlbert, Captain Allyn, and Mr. Jones, all state that the L & N Railway is exceedingly rough

ANNEX I - CONTRD

Only one copy of the Ship's Manifest was obtainable by the Inspection Team. This is included in Section X of the original copy of this report. It may be identified from the following data copied from the Army Ocean Manifest Recapitulation Sheet:

Vessel:	AMT 438 Francis L. Lee
Destination:	Cape-May
Date:	Second half of May, 1946
DWT:	8000
NT:	7133

Superintendent, Water Division signing document:

PAUL J. CARR, 1st Lt.

Annex II

COPY COPY

HEADQUARTERS
NEW ORLEANS PORT OF EMBARKATIONS
New Orleans 12, La.

20 July 1946

SUBJECT: Interim Report Concerning Injuries to Personnel Engaged in Unloading the S.S. Francis L. Lee at Theodore, Alabama.

TO: Lt. Col. Arthur
Chemical Warfare Service
OC-CWS
Washington 25, D.C.

1. Lieutenant James Campbell and the undersigned arrived at this installation on 15 June 1946 in order to be present to assist and advise in the treatment of subject personnel and to advise on precautions in an effort to prevent future injuries.

2. At the time of arrival here investigation disclosed that twenty-four (24) individuals had been or were alleged to have been injured by exposure to mustard gas. Twenty-two (22) of these were patients in the Mobile City Hospital, the other two (2) were at their homes. Through the courtesy of Dr. Acker, physician for the Strachan Shipping Company, we were permitted to examine all patients. They were found to be suffering from mild to severe injuries involving the eyes in four cases, the genitalia in five, and the skin in the remainder. One man claimed to be suffering with abdominal cramps, dyspnea, dysphagia but complete examination revealed no evidence of injury by the gas. The following day eleven (11) other laborers reported for examination and were found to have mild skin irritation and/or mild conjunctivitis.

These patients had been treated as though they were suffering from thermal burns and the treatment was adequate in all instances. It was modified in several cases to agree completely with TMB-285.

Subsequent to this time 173 other individuals have reported to the undersigned for medical care. These have been to a large extent of a very mild nature and may have required one or two days hospitalization. The exact number having been hospitalized will be reported in a final report.

The patients who were injured sufficiently severely to warrant special mention are the following:

Annex III, ltr + zeroxed

These were mainly that all persons engaged in further operations should wear two-layer protective clothing, masks, hoods, and gloves. A considerable amount of difficulty has been encountered in the enforcement of the wearing of the gas mask. The stevedore foremen have been continuously opposed to this measure in that the men would not work while wearing the masks. In spite of this opposition the percentage of the men wearing the masks has increased and during the last several nights of operation it has approached 100%. With this, the number of persons reporting injuries has decreased remarkedly. During the past two nights only a very occasional individual has claimed any injury and these were barely detectable redness of the conjunctiva.

4. Recommendations were made for procedure for unloading future shipments of persistent chemical agents in a letter to Chief, Medical Division on the above subject dated 12 July.

/s/ John D. Helm, Jr.

JOHN D. HELM, JR.
Captain, MC

cc: Chief, Medical Division
CC-CWS
Edgewood Arsenal, Maryland

Lt. Col. Whide, CWS

Capt. A.R. Allyn, TC

Capt. H.L. Hilbert, CWS

TAB F TO REPORT OF INVESTIGATION CONCERNING RECEIPT OF GERMAN TOXIC GAS MUNITIONS AT MOBILE, ALABAMA AND SHIPMENT OF THESE MUNITIONS TO PINE BLUFF ARSENAL

TELEPHONE CALLS TO AND FROM INSPECTION TEAM

16 July	2000 CST	To Colonel MacArthur (At Ms residence (from Memphis)).
17 July	0900 CST	To Colonel MacArthur (from Columbus Air Base).
17 July*	1400 CST	To Colonel MacArthur (Colonel Gillet and Lt. Colonel Allen (from Amory, Mississippi)).
17 July*	1410 CST	To Major Spahn (Mr. Classen) re burster.
18 July*	1030 CST	To Colonel MacArthur re plans (From Naval Magazine).
18 July	1200 CST	From Colonel Gillet - [illegible]
13 July	1500 CST	From Colonel MacArthur — Directive end orders to Memphis and Amory.
13 July*	1400 CST	To Colonel MacArthur ro plans orders and instructions.
13 July	1440 CST	From Colonol MacArthur - Change ia orders and re plans.
19 July	1300 CST	From Colonel MacArthur - Re change of plans.
20 July	0915 CST	From Colonel MacArthur
21 July	1215 CST	Frca Colonel MacArthur
22 July*	1710 CST	To Colonel MacArthur (White cad Arthur).
23 July*	1330 CST	To Colonel MacArthur
24 July	1630 CST	To Captain Walker and Lt. Hammer.
24 July	1700 CST	To Colonel MacArthur

* Placed Collect

Tab G

ANNX 7 - CONTD

Only one set of the MOBILE (19 and 20 Jul 1946 issues) were obtainable by the Inspection Team. These two sets of clippings are included in Section V of the original copy of this report.

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COPY COPY

9710 TECHNICAL SERVICE UNIT-CWS
GUARD AND SECURITY
EDGEWOOD ARSENAL, MARYLAND

12 July 1946

SUBJECT: Report of Unloading Operations at Theodore, Alabama and Charleston, South Carolina

TO: Chief, Chemical Warfare Service, Washington 25, D.C.

THRU: Commanding General, Chemical Warfare Center, Edgewood Arsenal, Md.

PART I

1. In compliance with Pa[illegible]oo, SS #128, Headquarters 9710 TSU-CWS, Chemical Warfare Center, Edgewood Arsenal, Maryland, dated 19 June 1946, the undersigned proceeded from Edgewood Arsenal with 150 suits of Protective Clothing by Army Airplane, arriving Mobile, Alabama at 1930, EST, 20 June 1946. The next morning transportation was furnished for the trip to the US Navy Ammunition Magazine, Theodore, Alabama, where ships were being unloaded. Unloading operations on the SS "Francis L. Lee" had been discontinued awaiting the arrival of additional protective clothing.

2. Friday, 21 June, was occupied with a survey of the situation and conferences with various interested individuals and groups. Captain Henry L. Ehlbert, CWS, Port Chemical Officer, New Orleans Port of Embarkation was in charge of Chemical Activities and had the situation well in hand. Captain John D. Holm, Jr., MC and 1st Lt. James A. Campbell, MC of the Medical Division, OC-CWS, Edgewood Arsenal, Maryland, who had been flown from Edgewood on Tuesday, 18 June, had examined all reported injuries and had established an atmosphere of confidence among both Military and Civilian Personnel.

3. Plans were formulated for the resumption of unloading operations on Monday, 24 June. Protective Measures agreed upon were:

(a) All hatches to be uncovered at once and to remain uncovered throughout the operation, and blowers and wind sails to be installed in the more critical hold, especially No. 3.

(b) All stevedores working in holds to wear impregnated clothing and gas masks and work in fifteen (15) to thirty (30) minute shifts.

(c) Stevedores working on docks and in cars to wear impregnated clothing and carry gas masks for immediate adjustment if gas was detected.

(d) Enlisted Personnel of Guard and Security Division, CWS, to be on duty throughout unloading operations, in the various holds, on dock and in cars, equipped with M9 detector Kits, Chalk, and Paper, to make frequent tests for the presence of gas, locate and isolate leakers, and enforce gas

Annex 1 ✓

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(d) The temperature on Monday, 17 June 1946 was particularly high.

(e) Military personnel, accustomed to the strong odor of our "Levenstein Mustard" were not aware of degree of concentration of the German Agent.

PART II

1. In compliance with Par 22, SO #127, Headquarters 9710 TSU-CWS, Chemical Warfare Center, Edgewood Arsenal, Md., dated 20 June 1946, the Undersigned departed Mobile, Ala. at 1310, 22 June 1946, arriving Charleston Small Boat Wet Storage Basin, Charleston, South Carolina 1315, 23 June 1946. A conference was held during the afternoon with Major Donnovan, TC, Executive Officer and 1st Lt. Ralph S. Pizer, CWS, Officer in charge of Guard and Security detachment, relative to unloading operations on the SS "Edward Richardson" and dumping operations under the supervisions of Captain Charles H. Carnes, CWS, Guard and Security Division.

2. The next three days were spent by the undersigned in observing unloading operations on the "Richardson", loading operations on the barges preparatory to dumping operations and in conference with Military, Naval and Coast Guard Officers covering various problems of unloading and dumping operations.

3. Experience with leaking munitions at Charleston was similar to that at Theodore except the situation was brought under control promptly and the local press did not publicize the incident. See inclosure No. 4, report of Captain Laton H. Rasmussen, MC, to Chief, Medical Division, CC-CWS, Washington, D.C.

4. Approximately one-hundred and twenty (120) H-filled bombs were removed from the "Richardson", and are being held either on the Dock or on a barge in the harbor. Approximately twenty-three (23) CG-filled M 78 and M 79 bombs were removed from the "Richardson" and are being held on the barge.

CONCLUSIONS:

1. Experience in unloading operations at Theodore, Alabama, Charleston, South Carolina, and Houston, Texas are very similar. Ships have arrived and unloading operations have been commenced with adequate preparations having been made. In each case Guard and Security has been requested by the Port to furnish a detail to escort a shipment to a CWS Depot. As the situation developed more personnel were requested, but very inadequate information was supplied as to nature of operation, type of agent, and equipment required. On two occasions the undersigned has requested to be ordered to the Port to ascertain the needs of Guard and Security Details engaged in these operations.

2. The unloading and transportation of returned Chemical munitions to CWS Arsenals during the summer months is a difficult and somewhat hazardous operation.

APPENDIX D

NOT USED

APPENDIX E

NOT USED

APPENDIX F

NEWSPAPERS / JOURNALS

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
(U.S. NAVAL AMMUNITION MAGAZINE)

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

APPENDIX F

NEWSPAPERS/JOURNALS

F-1 Newspaper articles during unloading of SS Francis L. Lee
F-2 Newspaper articles after DOD left site

APPENDIX F-1

NEWSPAPER ARTICLES DURING UNLOADING OF SS FRANCIS L. LEE

THE MOBILE REGISTER
Mobile, Alabama

June 20, 1946

Gas Victims To Recover, Army Officer Announces

Medical Expert Declares Injuries To 21 Are Not Serious; No Permanent Harm Seen.

Capt. John D. Helm, an Army medical officer attached to the medical research laboratory at Edgewater Arsenal, Md., announced here Wednesday night that none of the mustard fas victims at City Hospital was seriously jnjured. *Of* the burns suffered by 21 colored stevedores Monday during unloading "of 500-pound German aerial gas bombs from • Liberty ship at the Theodore Naval-Ammunition Depot he stated: --None of the injuries were of sufficient severity to suggest there would be permanent damage and complete recovery is anticipated in all instances."

6 Discharged

The medical officer also announced that six of the 21 stevedores affected by what Army authorities termed "a mild vapor concentration" have been discharged from City Hospital and will receive out-patient care.

Three of six the victimi with eye injuries suffered burns to those organs which were described by Capt. Helm as of "moderate severity."

Eleven stevedores, in addition to those suffering eye burns, will be held at City Hospital for two to three weeks. He said moat of the burns to arms, hands, legs, face and body were of "minor significance."

"Burns due to these chemicals may be likened to those resulting to severe sunburn with blister formations," he explained. The chief difference between these burns and other type of burns is the fact that the individual experiences no pain at the time he contacts the chemical, and in many cases he is not aware that he is burned."

Capt. Helm said symptoms may not appear for as long as 24 hours after contact.

MM Tons Of Gas

The colored victims were Stevedoes employed by Starchan Shippine Co., in unloading operations aboard the SS Francis L. Lee, which arrived here last week with a cargo of 3860 tons of mustard gas and phosgene aerial bombs shipped from Belgium.

Two white men also were treated for the affects of the vapor. One was an Army chemical warfare technician supervising unloading of the cargo at Theodore and the second was a civilian cargo-checker. Neither suffered serious burns and both were released after treatment. — An Army spokesman said cause of the vapor's release was excessive heat in the ship's hold. He said a temperature of 105 degrees resulted in escape of a quantity of the mustard gas in Hold 2 of the Lee Monday.

Effects of the fat on their skin were not apparent until hours after they left the ammunition depot Monday night. Although reports from Theodore to City Hospital attendants Tuesday night indicated that possibly 20 more victims would be hospitalized, no confirmation of this could be found Wednesday.

Safety Devices Installed

Lt. J. R. Chapman, Jr., officer In charge of Army operations at the ammunition depot, stated Wednesday night that additional safety equipment has been installed aboard the partly-unloaded vessel to prevent any recurrence of (as escape or injuries to workmen in the event of such escape.

"All stevedores are protected by gas masks and impregnated clothing and a security detail of experienced Army personnel win be on duty at all times in the vessel's hold and on the wharf where loading is in actual operation." he announced.

Lt. Chapman said the first few days work on the Lee were eonducted without accidents and difficulties were experienced only when temperature in the hold began rising.

Ventilation equipment also has been installed in the ship's hold to prevent future rises in temperature, he slated.

An explanaUon for reports to City Hospital on additional gas burn victims was given by the officer as the "state-of-mind of other workers following the injuries to the 21 stevedorrs.

He said 11 men who worked with those later admitted to City Hospital reported to the Army dispensary at Theodore with complaints they also were burned.

Physicians who examined them reported to LL Chapman that none of this second group were in any way affected by gas.

THE MOBILE PRESS
Mobile, Alabama

My 4, 1946

Seven More Are Burned Here By German Poison Gas Cargo

Longshoremen Treated At City Hospital For Injuries Received On Job At Navy's Theodore Base.

Mobile's City Hospital last nielli and today was called upon for the second time in three weeks to treat a number of colored longshoremen who suffered mustard gas burns, reportedly while unloading a cargo from the S S Francis Lee at the Navy's Theodore munitions dump

The "officer of the day" at the base told a reporter he knew nothing of the incident

Hospital attendants said four colinert men were treated last night while three additional patients were brought to the hospital this morning.

Burned About Ex*>

[illegible] fering from burns of the eyes.

Less than three weeks ago 23 persons including an Army technician and a civilian checker, were treated at the hospital for burns of the face eyes, hands and bodies received while unloading A bomb cargo at the munitions depot

At that time, Army medical authorities from Washington conducted an investigation of the incident and minimized extent of injuries received by the burn victims

Following the first accident authorities at the base indicated that proper precautionary measures were being taken to protect persons engaged in handling the gas cargoes

Hospital records listed the following colored men as being treated for gas burns last night and today

Took Collard 81, of [illegible] Reception St: James Davis [illegible] N Bayou St: Jimmy [illegible] 30, of 219 Patterson St. [illegible] 39, of 514 Manassas St: [illegible] West 33, of 453 Earle St: J U Lewis, 25, "f 115 Texas St: and Jim Willis of 405 S Hamilton St:

Hospital records identified the injured colored men as employes of the Strachan Shipping Co

Officials of the shipping company

(Continued on Page 4, Col. 3)

'A Part Of Me Has Gone,' Says Writer As Philippines Freed.

By AL VALENCIA
(Of the Associated Press Manila Staff)

MANILA—(AP)—They lowered the American flag today A friend has said goodbye. A part of me is gone....

The Filipino flag stands alone. It is one of the proudest moments of my life

Feeling of Sadness

But I can't help feeling a sadness in seeing that American flag go down I was born under that flag Millions of Filipinos and thousands who fought and died on Bataan and Corregidor to preserve that flag were born under it.

I have mixed and [illegible] feelings What does the future hold? What does the lowering of the American flag mean?

I saw that flag come down once before That was a dark day in January, 1942 I saw the flag of the Japanese invader fluttering in the bright sunshine in almost the same spot where we Filipinos and Americans assembled today.

There followed three of the blackest years within memory of Filipinos now living.

Hat Meant Good

The American flag has meant every good thing I have ever known.

And now this jubilation . . . the gun salute . . . the applause. . . .

And High Commissioner McNutt saying "A nation is born! Long live the republic in the Philippines! May God bless and protect the Filipino people and keep them safe and free!"

If I could speak for the 18,000,000 Filipinos I would say to you good people across the Pacific, "God bless you. We will never forget."

GAS BURNS

(Continued From Page One)

said the men were engaged in unloading a cargo from the SS Francis Lee.

The SS Francis Lee is identified as the vessel upon which the 23 men received mustard gas burns June 17, and 18, while unloading at Theodore.

At that time the cargo was identified as an Army shipment of German aerial bombs containing mustard fas and phosgene.

Seeking details of the blest accident, The Press today contacted the Navy, base at Theodore. A man who identified himself as the officer of the day" told a reporter "as far as I'm concerned. I don't know anything happened."

The officer refused to reveal his name.

When the newsman asked the Navy representative to identify himself, the officer said "that's unimportant."

Slams Down Phone

Asked i second time IB give his name, the officer slammed the telephone down, ending the conversation.

In Navy parlance, the "officer of the day" is an officer designated to assume responsible duties (or specified day at a Navy base.

A majority of the patients admitted in the hospital June 23 have been discharged, and the few remaining are described as recovering.

THE MOBILE REGISTER
Mobile, Alabama

July 6, 1946

Seaman Wants Bonus To Work At Naval Dump

12 Crew Members Treated For Mustard Gas Burns In Latest Incident

A seaman who identified himself as the representative of the Seafarers' International Union (AFL) aboard the SS Frances Lee reported Friday he was placing a demand for a 100 per cent "bonus" for crewmen aboard the vessel after he and 11 other crew members were treated (or mustard gas burns at the Navy dispensary at Theodore.

George Swift of Holliston, Mass., who said he was SIU representative aboard the Lee, stated the ship's crewmen were seeking "double pay" for the nine-week period the gas has been aboard the ship.

He asserted 12 seamen from the Lee reported to the Navy sick bay Friday when their throats and lungs burned persistently. Swift said a Navy doctor told him the burns were caused by mustard gas.

45 Stamen Treated

The 12 crewmen who reportedly suffered burns brings to 45 the total number of persons who have been treated (or mustard gas burns since the Lee began unloading operations ml the Navy's munition depot about four weeks ago.

A watertender in the ship's engine room. Swift Mid he could smell the gas escaping through the vessel's ventilation system while he worked.

He said the German-made mustard gas bombs were "leaky" and that leaking bombs wrre placed on the docks beside thr Lee, making it impossible (or crew members to go to and from the ship without smelling Ihe gas.

An official of the SIU here said he was "making every effort" to get as many of the crewmen from aboard the Lee as quickly as possible," but pointed out that companies arr not required "to pay off crews" until 24 hours after the ship's cargo has been discharged.

Operations Stopped

In an interview, Swift said unloading operations aboard Ihe Lee had been ceased Friday after nine colored longshoremen were treated at City Hospital within two days for mustard gas burns.

Navy officers al Theodore refused to comment.

Strachan Shipping Co. is local agent for the Lee.

Burn victims from the war gas aboard the Lee include Tom Sims, 54, of 161 Linscomb St., who suffered burns when a liquid Ml IMI him while he worked as a brakeman on a Huntsville-bound Louisville & Nashville Railroad Irani which was carrying some of the German bombs.

Following treatment of the first burn victims June 17-18, Ihe Army and Navy mil precaulionary steps would be taken to prevent recurrences.

Swift said the Navy doctor told dim the only certain method for crewmen to protect themselves against thr gas would be to wear Km* masks "24 hours a day."

The union representative reported there also is a quantity of phosgene, another war gas, aboard the Lee. He quoted the Navy physician as saying after efforts such as "lung scars" can result from being exposed to phosgene.

F-1-5

THE MOBILE REGISTER
Mobile, Alabama

July 14, 1946

Here's How Theodore Workers Combat Nazi Gas Menace

F-1-7

3916

THE MOBILE PRESS REGISTER
Mobile, Alabama

July 14, 1946

GI Badly Burned From Mustard Gas

Vapors Leak From Freight In Amory, Miss.

AMORY, Miss.—(AP)—One man was seriously burned here Saturday by mustard gas escaping from a freight ear on the St Louis and San Franciaeo Railroad. Chief or Police R. £ Brassfield. reported Saturday.

He said the burned man was an unidentified soldier who was treated by Dr. John Murphy, returned Army physician of Amory. The soldier was taken to Columous Army Air Field. and later flown to Memphis for treatment.

The freight ear. is on a siding at Big[illegible]e. two miles north of here and a quarter of a mile from the nearest home.

The police chief said the leak was a slow one and there was little danger from [illegible] but instructions have been issued to keep all persons away.

E. L. Puckett, Red Cross disaster chairman at Amory. said that he had notified the Red Cross in Atlanta, and that the Army was sending a decontamination squad here by plane from Edgewood, Md.

Puckett said a specialist was also en route from Birmingham and a detachment of military police was coming to Amory from Memphis.

F-1-8

3916

THE MOBILE REGISTER
Mobile, Alabama

July 16, 1946

Mustard Gas Shipments Impounded At Memphis

MEMPHIS, Tenn.—(UP)—A shipment of captured German mustard gas bombs which left a trail of injury and burns from Mobile to Memphis ha* been impounded at the Memphis general depot, it was learned Monday.

N. N. Hopkins, superintendent of the Missouri Pacific rail terminal here, said eight of the freight cars containing the bombs had been sent to the Army depot for neutralization. At least four of 10 cars developed leaks en route from Mobile.

First trouble with the captured bombs came at the Naval Ammunition Depot docks in Mobile, where 74 longshoremen unloading the bombs from the SS Frances Lee were treated for burns.

Dock hands were paid $40.95 a night for unloading the aerial weapons. Army official* blamed the injuries on workers carelessness in not wearing protective clothing, masks and ointment.

Frisco Railroad officials here disclosed that the first freight car to show leaks was sided between Mobile and j

(Page 10, Col. 6, GAS)

Gas

(Continued From Page One)

Amory, Miss. Saturday another car was found to have leaking at Amory. It was sided at Bigbee, Miss., three miles away. Capt. Ralph Stehr of the military police detachment in Memphis sent 78 MPs to Amory to guard the contaminated area, six gas specialists from Edgewood Arsenal, Maryland, flew to Amory. Dr. John Murphy, Amory veteran doctor, treated seven railroad men and a soldier for burns. The soldier, Sgt. Abraham Steinberg, was hospitalized at the Fourth Ferrying Group Hospital, Memphis, with eye burns. Guy Korle, 48, Amory conductor of the train, was hospitalized here with burns in his eyes, on his legs and back. And Paul Wright, Amory brakeman, was sent to Columbus, Miss., hospital.

Hopkins said two more cars were discovered leaking in the Memphis rail yards when Army specialists checked the cars which were en route to Baldwin, Ark. No injuries were reported here, Hopkins said, and the cars were returned to Frisco Lines which handed them back to the Army for inspection and neutralization.

Mrs. Brigid Davidson was fined $10 in Dundalk, Eire, for the unlawful possession of coal.

THE MOBILE REGISTER
Mobile, Alabama

August 2, 1946

Gas Cargo Sent From Mobile Denied Entry At Charleston

Telegrams Ask Washington To Sink Vessel Carrying Bombs Which Caused Bunu To More Than 80 Here

Charleston wants no part of the ship which tailed from Mobile last week after one-month's stay here during which more than 80 persons were burned In handling the vessel's cargo of mustard gas burns.

From the South Carolina port Thursday, the United ~rem reports the Francis L. Lee ha* been refused entry by the commanding officer of UK Charleston Ordnance Depot.

An Army tug was dispatched from Charleston to the Liberty ship to prevent its entry there and at the same time telegrams were sent to Washington from officials of the city demanding the ship be sunk out on the high seas.

With 900 tons of 500-pound bombs remaining of the original 3500-ton cargo shipped to Mobile from Antwerp, Belgium, the Francis L. Lee Thursday night waa anchored beyond historic Fort Sumter awaiting word from Washington .00 the Army ban of Its entry.

The vessel was sent out of the Naval Ammunition Depot al Theodore last week to climax an almost daily series of mustard gas accidents since June 18 while stevedores unloaded the cargo of German bombs. Two white men and [illegible] 80 colored dock workers were treated for bums of the eyes and skin when the bombs developed leaks which

(Page 4, Col. 1, GAS)

Gas

(Continued From Page One)

flooded holds of the vessel with vapor.

Despite the use by workers of gas masks and treated clothing, burn victims continued to stream into City Hospital here. Physicians explained me accidents were due to failure of stevedores to follow instructions on the handling of the cargo.

Army officers at Theodore said the Lee was ordered transferred to Charleston where troops from the Chemical Warfare Service would complete unloading operations.

Much of the tonnage of bombs unloaded al Theodore was placed aboard barges and sunk in the Gulf when the German missiler were found to be leaking. Such operations were halted when complaints were made the depth of the water waa insufficient to prevent further trouble from escaping gas.

On at least two occasions, trainmen handling freight cars loaded with bomb* en route to Army experimental stations from Theodore were burned.

3916

THE MOBILE REGISTER
Mobile, Alabama

More Than 20 Persons Burned By German War Gas: Chemical Warfare Experts Sent Here By Airplane

FIRE AT PEARL HARBOR

PEARL HARBOR—(AP)—Pacific fleet headquarters reported Tuesday an oil f... had broken out aboard an unidentified ship here, doing slight damage to the side of a repair vessel. Flames were quickly brought under control.

Materials Confiscated In Germany Cause Injuries To Men Unloading Cargo At Theodore Munitions Dump

Twenty colored stevedores who worked Monday unloading German aerial gas bombs from the hold of a Liberty ship at the Naval Ammunition Depot at Theodore, were admitted to City Hospital Tuesday for treatment of mustard gas burns.

Brookley Field's base hospital for similar burns was an Army private one of several chemical warfare technicians aboard the SS Francis L. Lee, who was supervising unloading of the 3860-ton cargo of 500-pound mustard and phosgene gas aerial bombs.

A third victim, Wallace Villarubias, 21, of New Orleans, was released from Marine Hospital Monday night after treatment for leg burns.

18 More May Be Burned

City Hospital attendants reported Tuesday night they were informed by Navy authorities at Theodore to prepare facilities for an additional 18 or more stevedores who worked aboard the vessel Tuesday morning and who may have suffered burns before all work was suspended on the Lee.

Many of the 20 victims are seriously burned, a physician said. Six of the group suffered severe eye burns which doctors asserted may result in loss of eyesight in several cases.

All received extensive burns of the legs, hands, arms and body.

Army Moves Beds To Hospital

Because of a shortage of beds in City Hospital, Army officials at Brookley Field sent beds for the victims admitted Tuesday morning. Later in the day, an additional 20 hospital beds were sent to the hospital and the Army driver of the truck said he was told they were to be used for 1* more mustard gas victim* who, he said, would be sent to City

(Page 2, Col. 2, GAS)

Gas

(Continued From Page 1)

Hospital sometime Tuesday night.

Although a Navy spokesman at Theodore stated cause of the burns was vaporization of mustard gas due to 105-degree temperatures in the ship's hold, most of the victims reported rages and wooden cases binding the single bombs were wet, and they believed the moisture was liquid gas.

When questioned at the hospital all said Hold Number Two of the Francis L. Lee was filled with gas fumes Monday afternoon. None reported any ... until several hours after their work was completed. Each victim said he was unaware of his condition until Tuesday morning when blisters developed.

Unloading operations Tuesday morning were halted following an inspection by Army chemical warfare technicians. One of them, identified at Brookley Field as Pvt. Grifto, received a second-degree leg burn when he attempted to discover cause of the fumes in Hold Two.

Speak In Whispers

Several of the colored victims were reported as suffering from the effects of inhaling the poison gas. At least three of them were able to speak Tuesday night only in hoarse whispers.

Unofficial reports indicate a total of 300 laborers have been engaged in transfering the bomb cargo, shipped here from Antwerp, Belgium. All these stevedores will report to medical authorities for examination immediately, it was said.

Although 19 of the colored victims said they were working in Hold Two, one said he received his burns last Thursday while handling bombs encased in wood in Hold Number One. He insisted that section of the vessel also was filled with fumes, but he was unable to say if anyone other than himself had suffered ill effects in the work gang.

The stevedores were employed by Stracham Shipping Co., agents here for the Francis L. Lee.

Holds Ordered Sealed

Two medical officers attached to the chemical warfare division of the Army arrived in Mobile by plane from Washington at 4 p.m., and immediately went to the scene. They ordered the ship's holds sealed until a ventilating system can be placed in operation. No examination of the cargo—half of which already has been unloaded into freight cars—will be made for the next 48 hours or more, Lt. B. L. Smith, USN, reported following their arrival. Lt. Smith is attached to the Theodore ammunition depot.

The bomb cargo was shipped here by the U.S. Army for experimental purposes at a chemical warfare station, the location of which was listed as "confidential" by Army authorities.

The colored victims of the mustard gas were listed on records of City Hospital as:

Sims Daniels, 28, of 302 S. Cedar St.; Richard Mayo, U. of 710 S. Dearborn St.; Eddie Minor, 23, of 254 N. Lawrence St.; Richard Cade, 35, 601 S. Conception St.; Jeff Ray, 35, 857 S. Lawrence St.; Joe Safford, 41, 708 Our Alley; Jim Pittomey, 44, 558 Elmira St.; Henry Minor, 44, Prichard; Tom Clemons, m. 807 N. Cedar St.; Tom Lawyer, 44, 603 Our Alley; Henry Robinson, 29, 606 Our Alley; Hayfield Moses, 601 Our Alley; Eddie Hill, 35, 187 N. Pine St.; Clayton Cole, 34, 735 S. Warren St.; Willie Pettaway, 3; 305 Washington Ave.; Collie Pettaway, 32, 412 S. Bayou St.; Roosevelt Davis, 508 Delaware St.; Willie Duberry, 53, 710 Elmira St.; Dennis Russell, U. 708 Canal ... William Carter, 40, Mt. Cuba ...

1916
COPIES

APPENDIX F-2

NEWSPAPER ARTICLES AFTER DOD LEFT SITE

THE MOBILE PRESS
Mobile, Alabama

January 26, 1968

By HARRY McDONNELL
Press Staff Reporter

Tbe Alabama Stale Docks will build a C million bulk handling plan: at Theodore Industrial Park. State Docks Director Houston H. Feaster announced today.

Feaster s announcement came alter a $410.000 dredging project on Deer River, awarded by the State Docks had been started to provide a 10.000-foot-long barge channel to industrial sites in tne development.

Start of the dredging project by Bauer Dredging Co. of Port Lavaca. Tex., marked a historical development of the Port of Mobile southward. Port facilities presently extended along the Mobile River front and as far south as the ocean terminal at Brookley Air Force Base on Mobile Bay.

Feaster said no definite date for start of the new bulk handling facility has been selected but construction will be undertaken in the near future. The bulk handling plant will probably be designed to handle about 2.000 tons of materials per hour, be said.

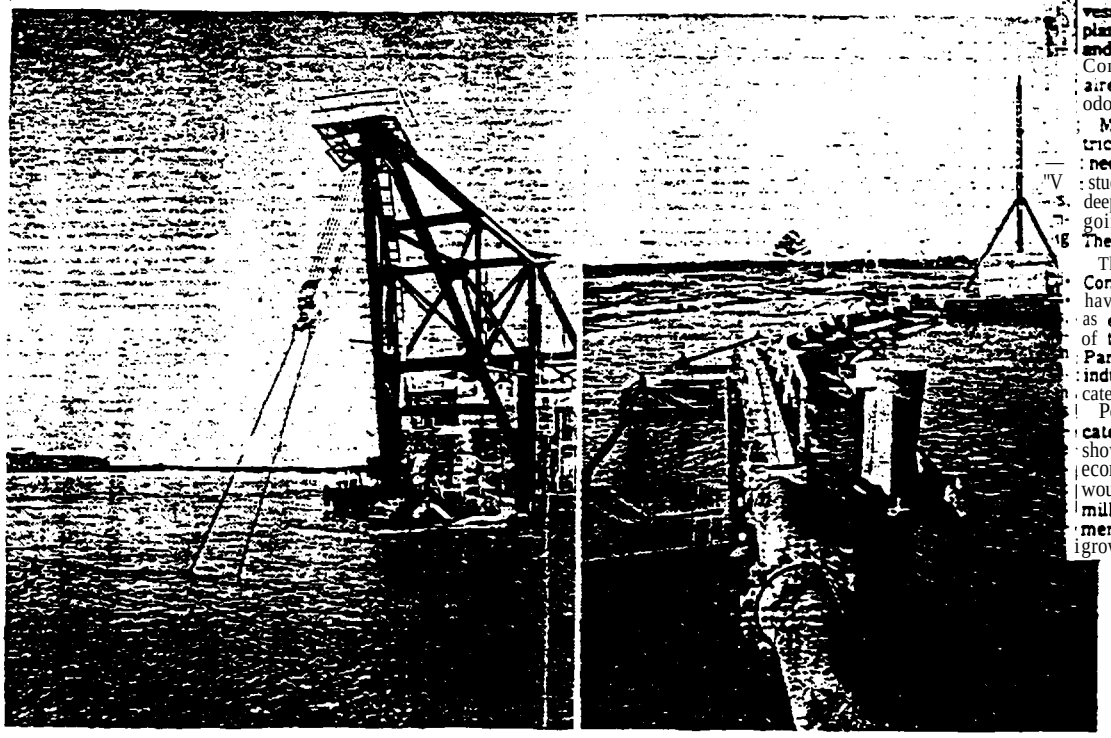
The dredging contract calls for completion of the project in 90 days. Feaster said. It will provide a channel 12 feet deep with an average bottom width of 100 feet.

The channel is scheduled to be completed prior to start of operations at McWane Pipe Company's CO million pig iron plant at the Theodore Industrial Park next August. It will serve the purpose of bringing barges and light draft vessels to the new $20 million plant, now under construction and to Alabama Petroleum Company's $1 million refinery already in operation at the Theodore site.

Meanwhile, the Mobile District, U.S. Army Corps of Engineers is continuing feasibility studies on a proposed 50-foot deep channel to enable ocean going vessels to dock at the Theodore Industrial complex.

The Mobile Area Chamber of Commerce and port interests have urged the 50-foot channel as essential to full development of the new Theodore Industrial Park, where $120 million in new industries are expected to locate during the next decade.

Port authorities have indicated that their own studies show the deep channel to be economically justifiable and would repay the estimated $ million cost speedily in commerce and new industrial growth.



Mobile Press Register Photo by Aaron Turner

PORT DEVELOPMENT SOUTHWARD—A $410.000 dredging project to provide a 12-foot deep barge canai to the new 2.000-acre Theodore Industrial Park was underway today. Above photos show (left) a dredge of Bauer Dredging Co., Port Lavaca. Tex., dredging a 10.000 foot long channel on Deer River from the old Theodore Ammunition Dump dock to sites where S21 million in industrial developments are already under way. Pipe lines (right) from the dredge are dumping the spoil ot iow lands to build up for additional industrial sites. The industrial park is being developed by the Alabama State Docks in cooperation with the Mobile Industrial Board.

THE MOBILE REGISTER
Mobile, Alabama

December 14, 1990

Munitions dock being dismantled

By ROYCE IIAIHtISON
Press Rcflater Reporter

Timber bytimoer.adoekbuiltai Theodore at the outbreak ol World War II to handle Army munitions is disappearing.

Declared surplus bv the Navy. which Is buildinf Naval Station Mobile next door, the dock was sold to Spectrum Maritime Inc., whose owner is salvaging the heavily creosoted timbers and pilings.

Hai Pierce said sales are picking up as word spreads about his endeavor Fivr truckloads were sold to a utilitvcompany that aims to build a small bridge In Rome. Ga. and a Mississippi company bouant 500 railroad lies from him Thursdav. Pierce said

Tested lor stress and flexure, the wood In the 47-year-old dock has been well preserved by creosoting that originally was abnut twice as concentrated aa in modern products. Pierce said.

National Projects Inc.. the prime contractor on the double-deck pier ana other improvemenu lor the Navy homeport. is dismantling the dock and pulling up the pilings.

"We have lor sale more than 100,000 running feet of heavy timbers and about 2,600 medium to heavy pilings," Pierce said "This was a big strong pier and will yield an amazing material list."

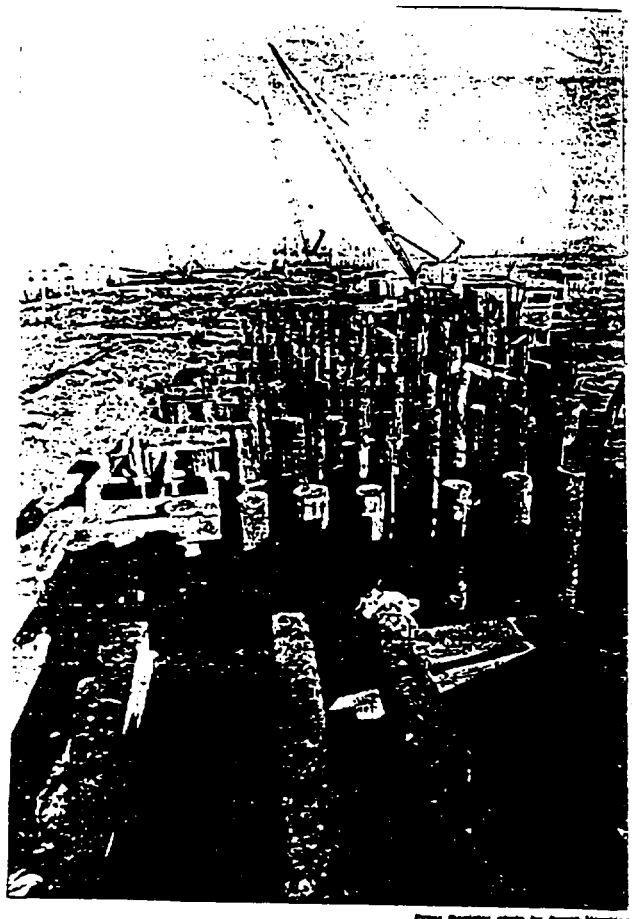
A lot ol wood, virtually a small forest, went into the 750-foot-long dock, which rises 11 feet above mean low water beside berths 32 feet deep.

Built In 1943, the dock served a 1,900-acre Navy ammunition depot that was idled in 1955 andshut down in 1964 In 1965, 1,800 acres were sold to the Alabama Slate Docks lor $975,000. The docks deeded the land to the Mottle Industrial Development Board which financed he pu. chase. The depot became the Theodore Industrial District.

Countless Mm ol munitions and military supplies crossed its decking during the two wars In which the dock waa pressed Mo service: World War II and the Korean War.

After the world war, the Army used the dock d send relief supplies Reactivated m 1951 to support the war I* Korea, the dock handled a ecord volume of shipments After the fiftiies ended, the New Orleans Port ol Embarkation, which operated the depot, reported In 1954 that 0,000 to 50,000 tons ol military supplies moved through the depot in an average month, - quantity that required five to seven ships to carry.

In the late 1950s a 62-acre mountain of bauxite rose on part of the depot property as the overnment stockpiled 2 million tons ol the ore sed in making aluminum. The ore arrived from rinidad on Alcoa Steamship Co. vessels and ansferred to barges at the State Docks. The arges took the cargo to the ammunition ... dock for ... trucks, tiech carried the red ore to the ...



Tightly spaced pilioj. that supported one of the railroad tracks on Army ammunition depot dock at Theodore ban been uncovered (or removal. The creosoted timber la the 47-year-old dock is being salvaged tor male.

DOCK

Continued From Page 13

Nearby, the new concrete Navy pier contrasts with the old timbers, but the Wood will live again somewhere else, Pierce commented

"This material will go into docks and bridges all over south Alabama and will not last long at the salvage price levels being offered," he said "There's people who are going to get a lot 01 wood out of it that they wouldn't get any other way

THE HARBINGER
Mobile, Alabama

August 17, 1993

GHOSTS FROM THE OUTLAW SHIP

by Bill Patterson

Decades after me "KEEP OUT. PROPERTY OF THE U.S. GOVERNMENT" signs were torn down, abandoned military bases can be dangerous.

"Residents...were stunned to learn that tney may live atoo a dump of unused World War I weapons, including canisters of chemicals like mustard gas," wrote USA *Today* on January 7. 1993 after construction workers, digging a sewer line in a Washington D.C. neighborhood, unearthed artillery shells.

"Chemical Keystone Cops" in me previous issue of the *Harbinger* (July 13-26) reported that a Pentagon document released m April. 1993 named tne old Theodore Naval Ammunition Magazine near Mobile for possible clean up of "non-stockpile chemical materiel."

The report described an American vessel, the S.S. Francis L. Lee, which arrived in June. 1946 at Theodore with a load of captured German mustard gas bombs. The weapons were to be used for experiments. Out tney began to leak while being unloaded. Military officials still list one of tne bomos as missing.

Who's Counting

A search by the *Harbinger* of the City of Mobile archives, newspaper files, and data bases snows mat 3.860 tons of poison gas bombs were on board me Francis Lee. Between SO ana 60 tons of the bombs were burned in 1946 on Horn Island off Pascagoula, Mississippi, and another 600 to 900 tons arrived at Edgewood Arsenal m Maryland. What happened to me remaining 2.500 tons?

Some of me German weapons from me Francis Lee were loaded on barges m Theodore and sunk in waters off Alabama's coast.

Press accounts say mat before the Francis Lee reached Maryland, under tow ana "flying a rec flag ana displaying red lights indicating she was not to be boarded," other oomos were dumped in the Atlantic. Where and m what quantity is no; clear.

Getting The Stories Straight

The *Interim* Survey and Analysis Report *for* me *Non-Stockpile Chemical Mate-*

(continued on page 3)

OUTLAW SHIP

(continued from page 1)

nel Programre leased in April was compiled Oy me U.S. Army to trace and document cnemical weapons no one can find. At least two Army agencies investigated the lost bombs: me Chemical Welfare Service and me Corps of Engineers.

The *Harbinger* obtained a briefing tact sheet about the old Theodore depot from Patrick Robbins, Chief of Public Affairs for me Army Corps of Engineers office in Mobile.

The document cays me Army cleared me Theodore site of weapons problems five years ago: The Mobile District (Corps of Engineers] completed the DERP-FUDS Inventory Report (INPR) in 1988 and concluded mat mere was no evidence of ordnance remaining and no further action was recommended."

But the Army is still looking into the old Theodore ammo depot.

The Harbinger spoke on July 16 with Capt. Bill Bruckner, • U.S. Army Public Affairs spokesman. Asked about the Corps' findings, he said, "at the time tne Corps made their assessment in 1988 they were unaware Wat mere were cnemical weapons stored there, or that the incident of me S.S. Francis Lee had occured. Since mat time, me Chemical Warfare Service has informed them of this."

Tommy Lightcap, m me Hazardous and Toxic Waste and Environmental Support Unit at me Corp* in Mobile, said he remembers hearing that some mustard gas "went over me side." He said me gas dissipates so rapidly in me air that none would remain today.

Lightcap added, "of course, mat area near me docks has been dredged so many times that nothing could possibly be there."

Down In The Dumps

Today me site where me German poison gas was unloaded after World War II is part of Naval Station Mobile.

Tne *Harbinger* spoke on July 16 with Lt. George Mullins in me Public Works

(continued on page 16)

OUTLAW SHIP

(continued from page 3)

office at me Base about the Pentagon report. He said tne new. ana soon to be closed, facility has no problem. Describing tne old ammo depot as "an Army situation at the time," Mullins said "everything nere turned upside aown" when tne new homeport was Built. Mullins said tne Base itself is built on dredged materials. ana its "mitigation areas." where environmental laws required me Navy to create wetland acreage, were dug down 20 to 30 feet.

Mullins said ne naa never nearc of Francis Lee. He said the Army s investigation of the Theodore sue is "a ow, low priority." He suggested tne *Harbinger* "talk to tne Corps of Engineers."

In 1964 tne old depot land became the property of tne Alabama State Docks, which soid tne land to tne Navy recently for the homeport

The Harbinger asked Sarah Teague, media spokeswoman for the State Docks, about tne 1946 chemical weapons incidents cited in the Army report. Teague said, "no: a sou nere would have any knowledge" because it happened too long ago. She added she naa never heard of the Francis Lee either. "News to me," she said.

There She Blows?

The old Theodore ammo depot remains listed on me U.S. Army Potential Ordnance/Chemical Contaminated Sne list.

Should people worry about 50-year-old mustard gas bombs? Some scientists think so. because me mustard bombs dumped in Scandinavian waters by tne Allies after World war II are still dangerous.

"Since tne end of World War M. Swedish and Danish fishermen have found lumps of mustard gas jelly as well as rusting ana leaking snens in their nets when trawling east of tne Oanisn island of Bornholm in ;ne Baltic," according to an article m tne *Bulletin of tne Atomic Scientists* in March, 1991 "In 1984, seven fishermen were badly nun after taking a leaking shell on board."

Tne report adds: "The mustard gas tnat nas Been retrieved is still potent. When the bombshells rust away the jelly-like lumps left behind art slowly covered by a new 'shell' of hydrolysis products. inside this new shell me original jelly remains intact."

After the Francis Lee left Theodore in August, 1946, an article in tne *New York Times* said: "The outlaw ship had to somewhere to permit unloading the into barges so tnat the lethal gas be either sunk or burned."

A final report from me Pentag Congress on America's unknown weapons dumps is due in Nove

APPENDIX G

PRESENT SITE PHOTOGRAPHS

Photo 1--Old power plant building near site of terminal dock

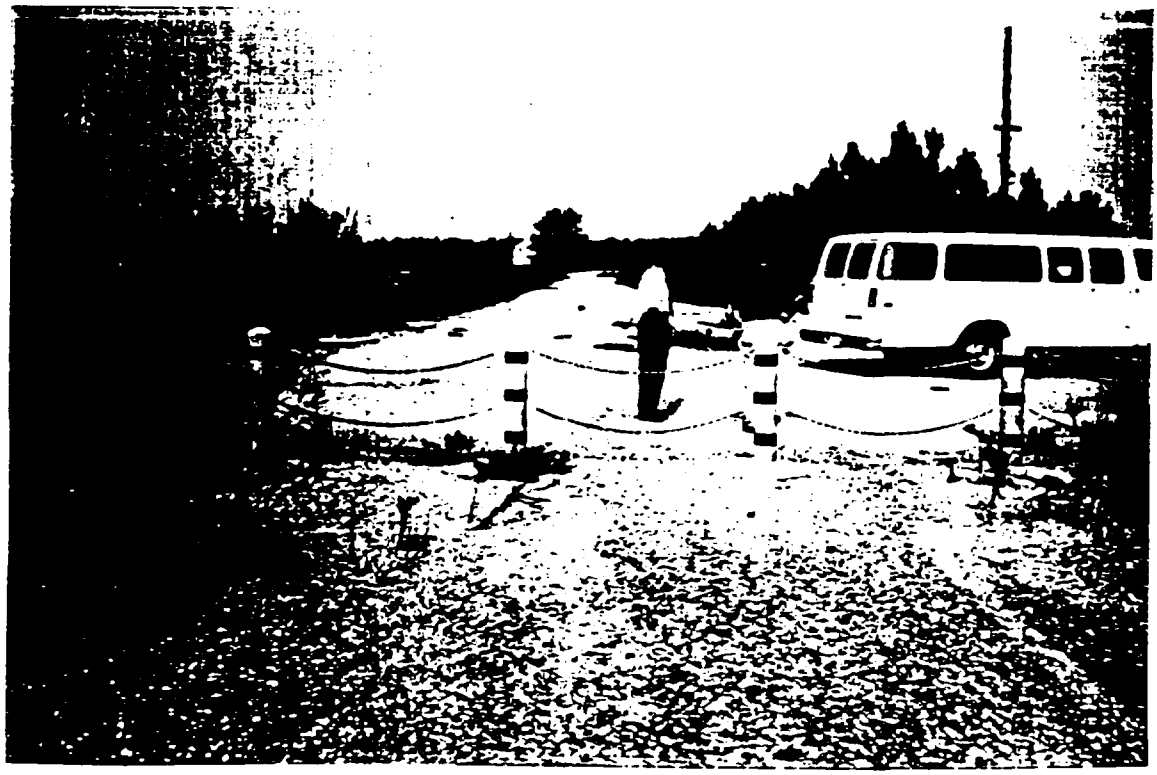


Photo 2--Looking west from site of former dock

3916

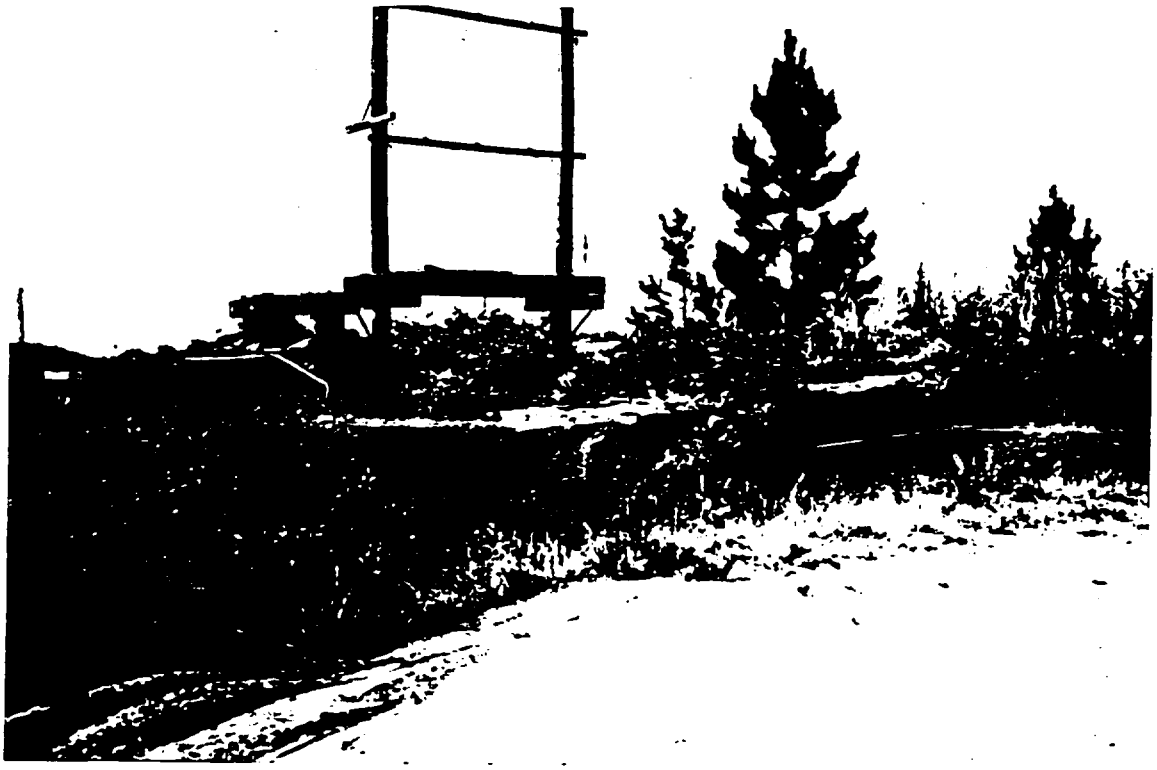


Photo 3--Loading ramp directly behind power plant building

Photo 4--Looking southwest from shore at debris next to former dock area

Photo 5--Concrete bulkhead at landside of former dock

Photo 6--Looking west at North Atlantic Gulf Terminal Group property

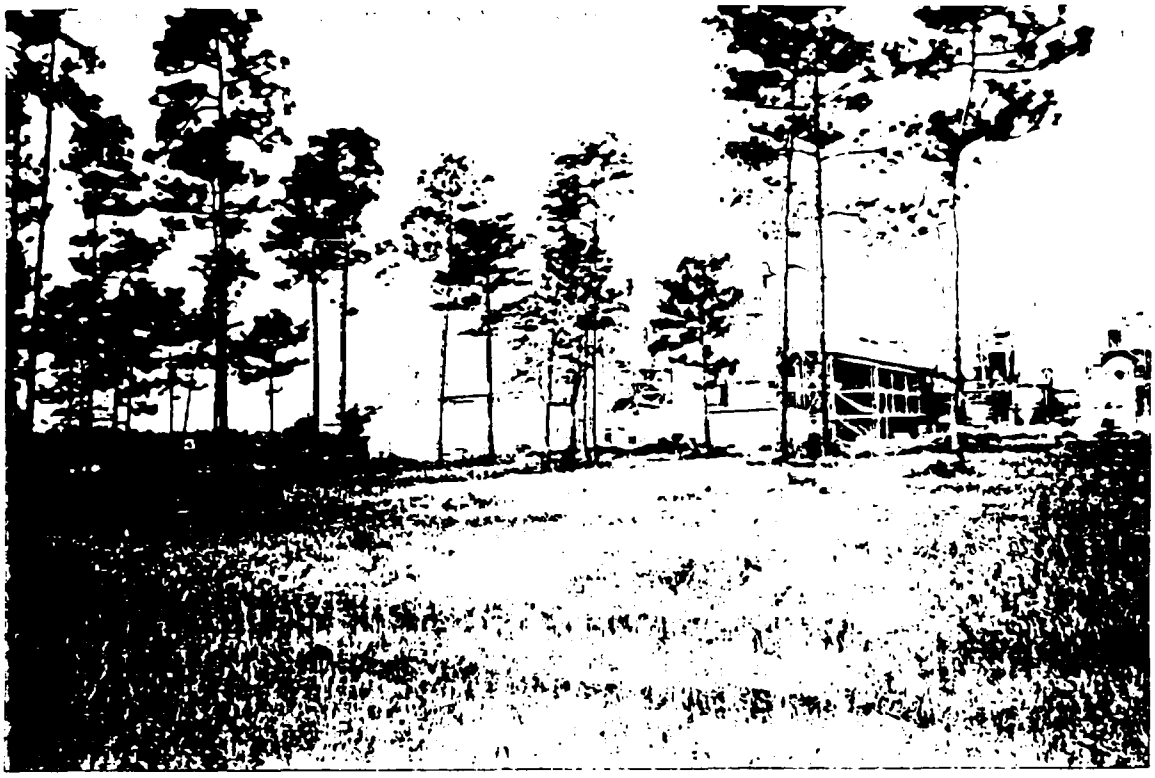


Photo 7--Kerr McGee property
Ammunition storage bunkers in background

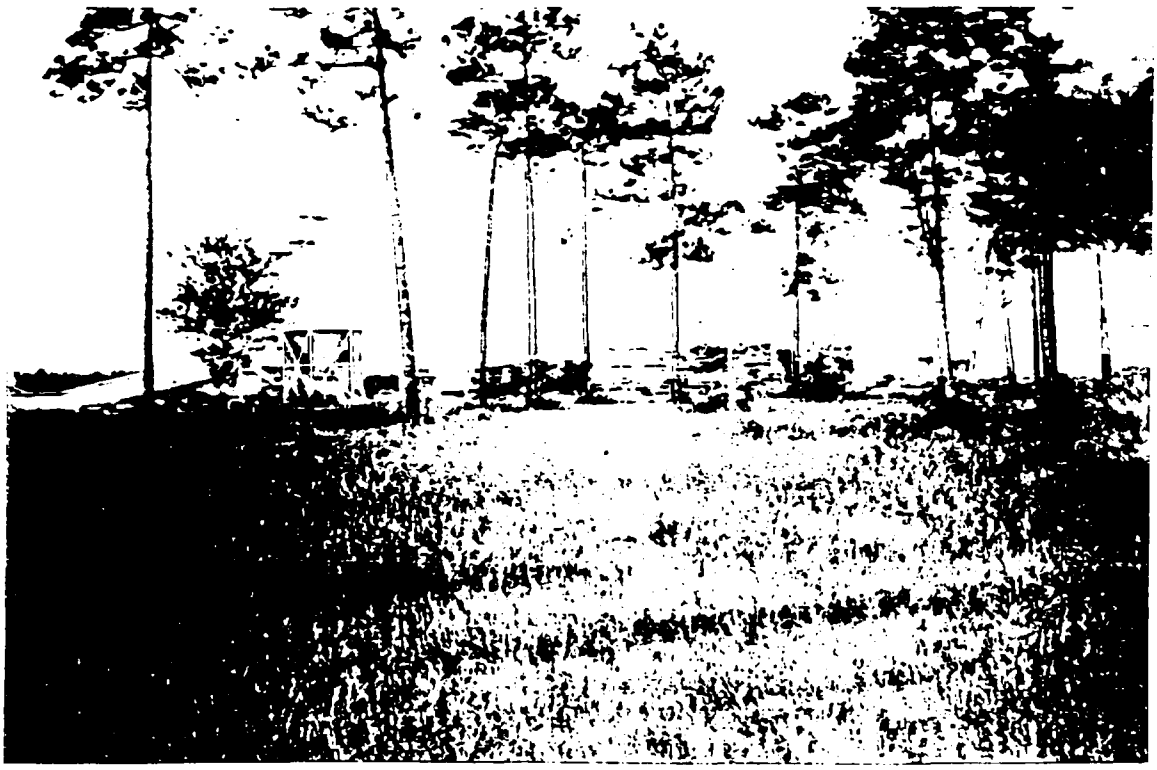


Photo 8-Kerr McGee chemical plant on former ammunition storage bunker area

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The former dock area is part of the new Naval Station Mobile. At the time of our inspection several Navy ships were in Mobile Bay. Base regulations prevented us from taking any pictures of the actual former site of the dock because the ships would have shown up in the background.

APPENDIX H

NOT USED

APPENDIX I

OEW RISK ASSESSMENT CODE FORM

10 Feb 93
Previous editions obsolete

RISK ASSESSMENT PROCEDURES FOR
ORDNANCE AND EXPLOSIVE WASTE (OEW) SITES

Site Name THEODORE AMMUNITION Rater's Name THOS. R. FREEMAN III
Site Location near Mobile, AL Phone No. 314-331-8785
DERP Project # I04 AL 0058 00 Organization CELMS-PM-M
Date Completed 30 SEPT 93 RAC Score 5

OEW RISK ASSESSMENT:

This risk assessment procedure was developed in accordance with MIL-STD 882B and AR 385-10. The RAC score will be used by CEHND to prioritize the remedial action at this site. The OEW risk assessment should be based upon best available information resulting from records searches, reports of Explosive Ordnance Disposal (EOD) detachment actions, and field observations, interviews, and measurements. This information is used to assess the risk involved based upon the potential OEW hazards identified at the site. The risk assessment is composed of two factors, hazard severity and hazard probability. Personnel involved in visits to potential OEW sites should view the CEHND videotape entitled "A Life Threatening Encounter: OEW."

Part I. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel exposure to various types and quantities of unexploded ordnance items.

TYPE OF ORDNANCE
(Circle all values that apply)

A. Conventional Ordnance and Ammunition

	VALUE
Medium/Large Caliber (20 mm and larger)	10
Bombs, Explosive	10
Grenades, Hand and Rifle, Explosive	10
Landmines, Explosive	10
Rockets, Guided Missiles, Explosive	10
Detonators, Blasting Caps, Fuzes, Boosters, Bursters	6
Bombs, Practice (w/spotting charges)	6
Grenades, Practice (w/spotting charges)	4
Landmines, Practice (w/spotting charges)	4
Small Arms (.22 cal - .50 cal)	1
Conventional Ordnance and Ammunition (Select the largest single value)	0

What evidence do you have regarding conventional OEW? None

B. Pyrotechnics (For munitions not described above.)

Munition (Container) Containing White Phosphorus or other Pyrophoric Material (i.e., Spontaneously Flammable)

Munition Containing A Flame or Incendiary Material (i.e., Napalm, Triethlaluminum Metal Incendiaries)

Flares, Signals, Simulators

Pyrotechnics (Select the largest single value)

What evidence do you have regarding pyrotechnics? Nov

C. Bulk High Explosives (Not an integral part of conventional uncontainerized.)

Primary or Initiating Explosives (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, Tetracene, etc.)

Demolition Charges

Secondary Explosives (PETN, Compositions A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc.)

Military Dynamite

Less Sensitive Explosives (Ammonium Nitrate, Explosive D, etc.)

High Explosives (Select the largest single value)

What evidence do you have regarding bulk explosives?

D. Bulk Propellants (Not an integral part of rockets, guided other conventional ordnance; uncontainerized)

Solid or Liquid Propellants

Propellants

What evidence do you have regarding bulk propellants?

E. Radiological/Chemical Agent/Weapons

	VALUE
Toxic Chemical Agents (Choking, Nerve, Blood, Blister)	25
War Gas Identification Sets	20
Radiological	15
Riot Control and Miscellaneous (Vomiting, Tear, incendiary and smoke)	5

Radiological/Chemical Agent (Select the largest single value) 0

What evidence do you have of chemical/radiological OEW? None

Total Hazard Severity Value ___
(Sum of Largest Values for A through E--Maximum of 61).
Apply this value to Table 1 to determine Hazard Severity Category.

TABLE 1

HAZARD SEVERITY*

Description	Category	Value
CATASTROPHIC	I	≥21
CRITICAL	II	≥10 <21
MARGINAL	III	≥5 <10
NEGLIGIBLE	IV	≥1 <5
I**NONE		0

* Apply Hazard Severity Category to Table 3.

**If Hazard Severity Value is 0, you do not need to complete Part II. Proceed to Part III and use a RAC Score of 5 to determine your appropriate action.

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Part II, Hazard Probability. The probability that a hazard has been or will be created due to the presence and other rated factors of unexploded ordnance or explosive materials on a formerly used DOD site.

AREA, EXTENT, ACCESSIBILITY OF OEW HAZARD
(Circle all values that apply)

A. Locations of OEW Hazards

	VALUE
On the surface	5
Within Tanks, Pipes, Vessels or Other confined locations.	4
Inside walls, ceilings, or other parts of Buildings or Structures.	3
Subsurface	2
Location (Select the single largest value)	___

What evidence do you have regarding location of OEW? _____

B. Distance to nearest inhabited locations or structures likely to be at risk from OEW hazard (roads, parks, playgrounds, and buildings).

	VALUE
Less than 1250 feet	5
1250 feet to 0.5 miles	4
0.5 miles to 1.0 mile	3
1.0 mile to 2.0 miles	2
Over 2 miles	1
Distance (Select the single largest value)	___

What are the nearest inhabited structures? _____

C. **Numbers** of **buildings** within a 2 mile **radius** measured from the OEW hazard area, not the installation boundary.

	VALUE
26 and over	5
16 to 25	4
11 to 15	3
6 to 10	2
1 to 5	1
0	0

Number of **Buildings** (Select the **single** largest value) ___

Narrative _____

_____

0. Types of **Buildings** (within a 2 mile radius)

	VALUE
Educational, Child Care, Residential, **Hospitals, Hotels,** Commercial, Shopping **Centers**	5
Industrial, Warehouse, etc.	4
Agricultural, Forestry, etc.	3
Detention, Correctional	2
No **Buildings**	0

Types of Buildings **(Select** the **largest single** value) ___

Describe types of **buildings** in the **area.** _____

_____

E. Accessibility to site refers to access by humans to ordnance and explosive wastes. Use the following guidance:

BARRIER	VALUE
No barrier or security system	5
Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as for a barbed wire fence for grazing.	4
A barrier, (any kind of fence in good repair) but no separate means to control entry. Barrier is intended to deny access to the site.	3
Security guard, but no barrier	2
Isolated site	1
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility; or An artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).	0

Accessibility (Select the single largest value) ___

Describe the site accessibility. _____

_____

F. Site Dynamics - This deals with site conditions that are subject to change in the future, but may be stable at the present. Examples would be excessive soil erosion by beaches or streams, increasing land development that could reduce distances from the site to inhabitated areas or otherwise increase accessability.

	VALUE
Expected	5
None Anticipated	0

Site Dynamics (Select largest value) ___

Describe the site dynamics. _____ ___

_____

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Total Hazard Probability Value
(Sum of Largest Values for A through F--Maximum of 30) ___

Apply this value to Hazard Probability Table 2 to determine Hazard Probability Level.

TABLE 2

HAZARD PROBABILITY

Description	Level	Value
FREQUENT	A	≥27
PROBABLE	B	≥21 <27
OCCASIONAL	C	≥15 <21
REMOTE	D	≥ 8 <1S
IMPROBABLE	E	<8

* Apply Hazard Probability Level to Table 3.

Part III. **Risk Assessment.** The **risk assessment** value for **this** site **is** determined using the following Table 3. Enter with the **results** of the hazard probability and hazard severity **values.**

TABLE 3

Probability Level		FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
Severity **Category:**						
CATASTROPHIC	I	1	1	2	3	4
CRITICAL	II	1	2	3	4	5
MARGINAL	III	2	3	4	4	5
NEGLIGIBLE	IV	3	4	4	5	5

RISK **ASSESSMENT** CODE (RAC)

RAC 1 Imminent Hazard - Expedite **INPR** - Immediately call **CEHND-ED-SY--commercial 205-955-4968** or DSN 645-4968.

RAC 2 High priority on completion of INPR - Recommend further action by **CEHND.**

RAC 3 Complete INPR - Recommend further action by CEHND.

RAC 4 Complete INPR - Recommend further action by **CEHND.**

RAC 5 **Recommend** no **further action.** Submit NOFA and RAC to **CEHND.**

Part IV. **Narrative.** Summarize the documented evidence that **supports** this risk **assessment.** If no documented evidence **was** available, explain all the **assumptions** that you **made.**

See attached ASR

APPENDIX J

REPORT DISTRIBUTION LIST

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE NAVAL AMMUNITION MAGAZINE

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

APPENDIX J

REPORT DISTRIBUTION LIST

Addressee	No. Copies
Commander, U.S. Army Engineer Division Huntsville, ATTN: CEHND-ED-SY P.O. Box 1600 Huntsville, Alabama 35807-4301	4
Commander, U.S. Army Engineer District Mobile, ATTN: CESAM-PD-ES P.O. Box 2288 Mobile, Alabama 36628-0001	1
Commander, U.S. Chemical Material Destruction Agency ATTN: SFIL-CM Aberdeen Proving Ground, Maryland 21010-5401	1
CELMS-ED	1
-ED-G	1
-ED-H	1
-PD	1
-PD-A	1
-PM	1

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
EPS FORM 3012-III

INDUSTRIAL NARRATIVE SHEET

1. Site Identification:

Site number: ALD071937890

Site name: Kerr-McGee Chemical Corporation

Site county: Mobile

2. Industrial Narrative Summary:

Company Name: Kerr-McGee Chemical Corporation

Address: P. 0. Box 629
Theodore, AL 36590

Telephone No.: 205/653-8820

Contact: R. A. Napier

Contact: M. W. Merrill

Discussion: Kerr-McGee has operated at this site since 1976. The process involves upgrading ilmenite ore to synthetic rutile by an acid leaching process. The hydrochloric acid used in this process is reclaimed for reuse. Tailings consist of an iron oxide slurry which is reportedly corrosive and EP Toxic for lead. A French drain has been installed to collect contaminated groundwater which is treated in the NPDES treatment system. All solids are placed in the tailings pond and wastewater discharges are monitored. Kerr-McGee is exempt from RCRA regulation as their process is considered beneficiation of ore. Groundwater continues to be monitored and corrective actions taken in conjunction with ADEM regulation. Prior to Kerr-McGee's occupation of the site, the property was a Government Reservation which was used to store ammunition during World War II. At this time the site is being investigated under the Department of Defense Environmental Restoration Program. No environmental problems have been encountered and a copy of the report will be forwarded to ADEM.

3. Disposition:

No further action required under this program. Present activites are being monitored by ADEM and past activites are under investigation. A

copy of the Department of Defense report will be submitted to ADEM when available.

4. Comments:

NA

56/ncr

INTRODUCTION

The regulated unit came on-line in 1977. It is a settling/disposal pond with an areal extent of about 19.5 acres and a maximum depth of 8 feet. It is considered a RCRA unit due to the disposed material's low pH and the possible presence of lead. The unit is unlined.

In January 1977, a ground-water quality assessment program was established for the monitoring wells (8) adjacent to the pond. At this time analyses for total iron, total dissolved solids, chloride, and pH were begun. Nine additional wells were installed in October, 1978 and incorporated into the monitoring program. Preliminary results of the assessment indicated the impoundment was adversely affecting the ground water. During September 1979, all the monitoring wells were surveyed for elevation control and monthly measurements of ground water levels in the wells initiated. Hydraulic tests were conducted in October 1979, on all shallow wells to determine the hydraulic coefficients of the aquifer.

In July and August 1980, a french drain leachate collection system was installed around the north and east sides of the pond. An upgradient, or background, monitoring well was established in August 1981, as part of the RCRA program. The french drain system was extended to include the south and west sides in October-November 1961. An additional 8 wells were installed in July 1982, to monitor subsurface conditions on the west and south sides.

SITE HYDROGEOLOGY

Soils. The general stratigraphy beneath the site consists of about 15-20 feet of fine sand to silty or clayey sand underlain by some 50 feet of low permeability gray clay. Both of these units are probably alluvial and low terrace deposits of Pleistocene and Holocene age. Beneath the clay layer is another aquifer of fine sands. See Figures 2 and 3 for generalized cross sections and Figure 1 for their location. Also see Appendix A for available drilling logs.

A number of laboratory permeability tests were conducted on soil samples taken from test borings around the pond. The horizontal permeabilities in the sand deposit varied from 4.3×10^{-4} cm/sec to 6.2×10^{-7} cm/sec, with an average of 1.14×10^{-4} cm/sec. These values are typical of a silty sand. The vertical permeabilities for the sand deposit varied from 6.7×10^{-4} to 2.2×10^{-7} cm/sec with an average of 1.15×10^{-5} cm/sec. The vertical permeabilities of the underlying clay strata ranged from 2.5×10^{-8} cm/sec to 3.4×10^{-8} cm/sec. A permeability test was also conducted on the settled out materials in the bottom of the pond. This test showed permeabilities (3.5×10^{-5} cm/sec) slightly higher than the underlying sand. Table 1 lists the actual test results.

Bedrock. No bedrock investigations were conducted at the site. It would appear from regional data that a consolidated bedrock formation would occur at a fairly deep interval from the surface. For the purposes of this study, the gray clay underlying the site will be considered to form an impermeable barrier to the downward migration of constituents of concern. Analytic data fror, wells screened in this layer would tend to support this assumption.

Ground Water Regime. As mentioned previously there are two primary aquifers beneath the site: the one found in the alluvial sands above the 50 foot plus gray clay and the fine sand formation beneath this clay. The upper aquifer is not generally used for water supplies. The lower aquifer, however, is capable of a million gallons per day yield and is exploited by a number of wells in the area.

In the report area the alluvial aquifer generally occurs under unconfined or water table conditions; however there are known localized areas where the sand and gravel deposits are overlain by clay lenses which can produce artesian conditions. These are not thought to be present beneath the pond.

Ground-water flow before the impoundment was constructed was in a southeasterly direction. However releases from the pond have created a localized recharge mound which, prior to the installation of the french drain, could be measured in the surrounding monitoring wells.

The alluvial aquifer is recharged principally from rainfall; though some recharge results fom irrigation, streams, lakes, and upward leakage from deeper aquifers. There are several places on the facility property where the water table is at or near the land surface. This has resulted in intermittent marshes during heavy rainfall events.

The site has several creeks flowing through it and is close to several others. (See Figure 4.)

ASSESSMENT AND CORRECTIVE ACTION

Having recognized from the chemical analyses of water taken from the monitoring wells that the impoundment was affecting the alluvial aquifer, site management commissioned the installation of a french drain. The system was designed to consist of a continuous, gravity feed, 6-inch PVC pipe sloping at a rate of 3×10^{-3} feet/foot from the northwest corner towards the southeast and eventually running along all sides of the impoundment. (See Figures 5 and 6). Water collected by this system is first deposited in a sump at the southeast corner where it is subsequently pumped to another area of the site for treatment. The drain pipe varies from 6 to 9 feet beneath the ground surface and is surrounded by a graded envelope of gravel and sand. The average discharge rate for the combined system has been measured at about 60 gpm. since its installation the system has handled an estimated 72 million gallons of contaminated water.

The company submitted an assessment report dated September 27, 1983 to the State outlining in part what they believe to be the results to date of their system. The relevant excerpts are found in Appendix C. There are a number of claims made in this report which do not appear to be supported by the accompanying data. The major areas will be discussed below on a point by point basis.

1. "The installation of the french drain has reversed the local ground-water flow."

The available data support the fact that the installation of the french drain has lowered by 1 to several feet the water levels in the wells close (within 100 feet or so) to it. E-2, which is greater than 150 feet from the drain does not show any affects from the dewatering. (See Table 2 for selected well distances.) Since the drain is essentially a passive dewatering operation its overall affert should be to lower the water table in its immediate area to a depth not less than that of its own. Being of a passive nature, one would not expect an affect on the water regime below the base of the drain. It is therefore difficult to accept the argument that water flowing in the 11-14 foot thick sand interval above the gray clay but below the bottom of the drain will in fact migrate up to the drain, much less reverse its direction.

2. "The ground-water flow configuration (determined from the analog model) in the alluvial aquifer shows that all ground waters that exit beneath the pond on all sides are captured by the french drain."

This model, shown in cross section in figure 15 of Appendix C, can only be based on 1 of 2 assumptions, neither of which is valid. The first would be that contaminated water escaping the pond itself will not affect the entire 12 foot interval between the bottom of the pond and the clay base, but will rather maintain itself right at the surface of the aquifer (note that the pond is 8 feet deep and that water leaking on the up-gradient side of the pond would have a travel distance of some 1250 feet to get to the down gradient side to allow it to flow into the 6-9 foot deep drain. Since the water in the pond will tend to be heavier than the water in the aquifer due to its high TDS content this is highly unlikely. The other assumption is that all water flowing from beneath the pond is intercepted by the drain as shown in the Appendix figure. This assumption has the water flowing against gravity. A situation that could only happen if there were a vacuum of sorts applied to the drain (i.e. a pump) or there *is* an impermeable wall at the drain extending from the surface to the gray clay. Since this is a passive system and no impermeable wall exists this theory isn't acceptable either.

3. It is stated that by contrasting 4 contour maps of TDS concentrations over 3 years it is apparent that there has been a vast improvement in the ground-water quality of the alluvial aquifer adjacent to the ponds. (See Figures 20-23 in Appendix C for the maps.) It is further stated that the most important conclusion that can be drawn from contrasting these 4 maps is that no further migration of leachate is

Test Bering Number	Sample Interval (feet)	Lithologic Description	Horizontal Permeability (cr/sec)	Horizontal Permeability (ft/day)	Vertical Permeability (cm/sec)	Vertical Permeability (ft/day)
*TH-1-75	0-1	Fine White Sand	- - - -	- - - -	1.3×10^{-4}	3.69×10^{-1}
*TH-2-75	0-2	Fine White Sand	- - - -	- - - -	2.1×10^{-4}	5.95×10^{-1}
*TH-3-75	0-2	Orange & Gray Sandy Clay	- - - -	- - - -	9.2×10^{-5}	2.61×10^{-1}
*TH-4-75	0-2	Orange S Gray Sandy Clay	- - - -	- - - -	5.1×10^{-6}	1.45×10^{-2}
B-1-75	34.5-36	Gray Silty Clay	- - - -	- - - -	3.4×10^{-8} 2.5×10^{-8}	9.6×10^{-5} 7.09×10^{-5}
B-1-79	0-2	Fine Tan Sand	- - - -	- - - -	2.2×10^{-7}	6.23×10^{-4}
B-1-79	7.5-9.5	Fine Tan Sand	2.3×10^{-5}	6.52×10^{-2}	1.3×10^{-6}	3.69×10^{-3}
B-1-79	12-13.5	fine Tan Sand	- - - -	- - - -	6.7×10^{-4}	1.90
B-6-79	10.5-12	Gray Sand	- - - -	- - - -	4.1×10^{-7}	1.16×10^{-3}
B-11-79	4.5-6	Silty Clay Sard	6.2×10^{-7}	1.76×10^{-3}	2.1×10^{-6}	5.95×10^{-3}
B-11-79	9-10.5	Fine Brown Silty Sand	- - - -	- - - -	4.3×10^{-7}	1.22×10^{-3}
B-14-79	3-4.5	Fine Brown Silty Sand	2.1×10^{-6}	5.95×10^{-3}	6.2×10^{-7}	1.76×10^{-3}
B-14-79	12-13.5	Gray Sand	4.3×10^{-4}	1.22	2.7×10^{-5} 1.5×10^{-4}	7.65×10^{-2} 4.25×10^{-1}
8-1-78	0-2	Stratified Iron Oxide Tailings	- - - -	- - - -	3.1×10^{-5}	8.79×10^{-2}

Table 1. Summary of Laboratory Permeability Tests Conducted on Soils and Sediment From the Fond Area

Monitor Well	Saturated Thickness(ft)	Elevation of Water Table (ft) 10-79	Distance from Waste Pond(ft)	Transmissivity (gpd/ft)	Horizontal Permeability ft/day, (cm/sec)
North-1	10.12	17.35	12£	74.80	.99 (3.49 X10^{-4})
North-2	12.66	19.49	130	1.41	.01 (5.2 X 10^{-6})
North-3	13.33	19.33	153	11.20	.11 (3.88 X 10-5)
North-4	13.90	19.65	110	22.44	.22 (7.64 X 10^{-5})
North-SH	10.75	19.4;	125	115.0	1.43 (5.06 X 10^{-4})
North-E	9.00	17.35	no	74.80	1.11 (3.9 X 10^{-4})
East-1	10.98	17.85	85	2.00	.02 (8.61 X10^{-6})
East-2	10.25	16.34	233	3.45	.05 (1.59 x 10^{-5})
East-3	11.86	17.67	53	4.12	.05 (1.64 X 10^{-5})
East-4	10.90	17.4S	103	3.74	.05 (1.62 X 10^{-5})
East-Sh	8.11	17.72	85	123.0	2.11 (7.45 x 10^{-4})
South-SH	9.4	18.72	155	1210	1.72 (6.09 x 10^{-4})
West-SH	12.73	20.13	105	2.09	.02 (7.77 X 10^{-6})
MEAN				43.40	.61 (2.1 X 10^{-4})

Table 2, Summary of Transmissivity and Field Permeability Data; Plus Dis[illegible] of Wells From the Pond,

This statement, especially the part that no further migration is taking place, needs some clarification. First, there is no attempt here to explain why 3 of the wells continue to show increasing, highly elevated TDS readings-- each on a different side of the pond. (See Table 3 below.) And while it is true that the majority of wells are showing some improvement, 13 of the 21 shallow wells still have pH's in the 3 and 4 ranges compared to 6 as a background. Recovery, if occurring, does not appear to be happening very quickly.

TABLE 3. TDS and pH Readings For Selected Wells Over Time.

Well	PH		TDS	
	1/81	1/83	1/81	1/83
WS	4.2	3.9	1010	8770
El	4.7	3.8	5040	12560
	7/82	10/83	7/82	10/83
N5	3 .4	3.4	12120	20000

An additional point also needs to be made here concerning the impact the site's sampling technique may have on their result*. The facility evacuates and samples its wells using a PVC bailer with a bottom ball check valve. They stated during conversations with them that the water is always taken from the top of the column. The amount of water removed varies from evacuation to dryness to less than a casing volume. In the latter case this may not be enough to ensure that formation water is being sampled. Furthermore water found in these wells may be stratified with the pollutant plume tending to be more towards the bottom of the well. This is especially possible since it can be assumed that the french drain is intercepting the top portion of the more highly contaminated waters that are part of the pond's mound.

4. "Because the principal aquifer in the area is the [lower one], the calculation of travel time for fluids in the pond to migrate through the 43-51 foot layer of clay is important. ...Based upon the average velocity it would take a minimum of about 389 years for the fluids in the pond to travel vertically through the 43 feet (minimum thickness) of gray clay..."

The above conclusion is based on a straight application of Darcey's Law using permeability data obtained from boring samples. In general this is acceptable. However, in this case the fluid of concern is highly acidic and many field and laboratory tests have demonstrated that an acid environment is very detrimental to a clay's impermeability characteristics. This was not considered in the report and should be further investigated before the estimate of some 400 years to break through is accepted.

5. "Using the same velocity equation as above, the period of time for seepage fluids from the pond to travel horizontally through the alluvial aquifer to the nearest discharge point (Middle Fork ___ River) can be estimated. Assuming an average horizontal permeability of 6.0 X 10^{-1} ft/day for the alluvial aquifer, an average gradient of .005 and a sand porosity of .25%, the average fluid velocity would be .012 ft/day. This velocity would indicate that a minimum of approximately 457 years would be required for the seepage fluids to travel the 2000 feet distance to the [river]."

While this may or may not be a good estimate of travel time for the pollutant plume, it does not satisfy 265.93(d)(4) as to defining the extent of migration. Most of the present monitoring wells are within 150 feet of the pond and a majority of them are showing below normal pH. This would imply continuing impact from the pond as well as a fluid velocity considerably higher than .012 ft/day and it is unlikely that this impact would abruptly end at these wells-- the plume must extend somewhat further out. Well E-2, which is over 200 feet east and about even with the pond's north/south centerline, is a good example of the type of demonstration that is needed. The concentration values of constituents of interest in this well show that it is largely unaffected by the site activities. However, the original flow direction of the ground water beneath the pond was southeast not east so it very well may be that E-2 is not positioned to intercept an extended migration. More wells are nee'ded to its south to be able to completely demonstrate that no further migration is occurring.

6. "Forward Monitoring Program"

The findings stated in the initial paragraphs of this section have been questioned above so there is no need to belabor the point. There are 4 recommended monitoring changes that were made to the State and have been implemented.

The first two involve changing water level determination frequencies from weekly to quarterly and changing drain discharge measurement frequencies from weekly to monthly. These appear very reasonable.

The third recommendation however, involves the reduction of the number of wells sampled for hazardous constituents from 21 to 9. While the argument that quarterly sampling 21 wells at this stage of the program may be valid, it is not clear that the wells proposed to remain in the program are the ones that should be there. Table 4 shows the last sampling results for all the wells with an asterisk indicating which wells are proposed to remain in the program. Two things are readily apparent from examination of this table. The first is that the site has picked the least contaminated wells on each side for monitoring. The second is that it has chosen to not monitor on a quarterly basis those wells most likely to be down gradient of the general ground water flow, i.e. southeast to south (S-2, SE, E-5, E-1). In addition their designated up gradient well (NW) has been eliminated from the quarterly monitoring program. The State should definitely reconsider allowing the site to implement these proposals.

The fourth recommendation, which proposes that all the monitoring wells be sampled once a year is acceptable.

Table 4. Analytic Results of Monitoring Wells 10/6/83.

Well	Chloride mg/l	PH Std. Units	TDS mg/1
ES*	20	4.9	190
ED	5.6	5.6	57
NS*	420	3.9	670
ND	10	6.0	60
SS*	630	4.2	840
SD	7.5	5.9	45
WS 1/	6800	3.3	10400
WD 1/	6.6	6.0	89
E1	12030	3.3	17000
E2*	12	6.0	80
E3	30	5.6	93
E4	20	6.0	98
E5	210	3.7	330
NE	13	5.8	59
NW	15	6.3	51
SE	290	3.9	520
SW*	12	5.3	44
S1*	90	4.4	130
S2	590	3.6	770
W1*	3790	4.0	59CC
N1	10	5.8	63
N2*	230	4.4	330
N3*	140	5.5	200
N4	2180	4.2	3100
N5	13310	3.4	20000

SAMPLING PROCEDURES

A sampling and analysis plan was available for inspection at the site. A copy of this plan, with amendments, is included as Appendix D of this history. The plan was not followed by the technicians taking the samples.

The sampling and analysis plan as submitted to EPA is not adequate for the following reasons.

1. Well evacuation. The plan calls for 3 well volumes to be removed, if by pump, and 1 to be removed if by bailer or, in the presence of a low permeability formation, evacuation to dryness. The provision to remove only one casing volume is not sufficient. Furthermore in the field the technicians stated it would take far more bailers to evacuate 1 casing volume from the deep wells than they were willing to pull. This casts serious doubts on whether the site is sampling

Table 5. January 23, 1984 Split Sampling Results.

	Cl^-		PH		Iron		Lead		TOC		TUX	
Well	Site	EPA	Site	EPA	Site	EPA	Site	EPA*	Site	EPA	Site*	EPA*
ES	27	25.3	4.2	3.32	1.4	18.3	<.05	53	-	-	-	-
ED	5.2	4.02	5.6	4.69	.56	.98	<.05	10	-	-	-	-
NS	380	350	4.0	3.70	100	132	<.05	4.9	-	-	-	-
ND	6.3	5.28	5.9	5.7	2.2	4.05	<.05	7.9	-	-	-	-
SS	220	234	3.8	3.42	29	78.7	<.05	<1.0	-	-	-	-
SD	5.0	4.27	5.3	5.05	.66	1.07	<.05	8.9	-	-	-	-
E2	9.6	8.04	5.9	5.32	.07	9.05	<.05	<1.0	2.1	10.1	<10	32
NW	7.2	6.53	6.0	5.85	12	29.3	<.05	22	12	9.96	<10	44
SW	11	10.1	4.8	4.60	.10	1.0	<.05	<1.0	-	-	-	-
S1	49	47.2	4.0	3.80	.93	1.76	<.05	6.2	<1.0	5.96	11	57
W1	3300	3230	3.8	3.5	1200	1110	<.05	21	-	-	-	-
N2	350	356	5.5	4.88	47	89.4	<.05	2.0	-	-	-	-
N3	170	177	5.2	4.1	28	61.0	<.05	<1.0	1.2	7.84	11	34

* Reported in ug/l. All other analyte data in mg/l.

Table 6. Dates of Analysis for Each Parameter.

Parameter	EPA	SITE
TOC	2/9	2/6
TOX	2/28	-
pH	1/25	1/23
Chloride	1/27	1/24
Iron	1/30	2/1
Lead	1/30	2/1

fresh formation water or stagnant.

2. Appropriateness of Bailer. So long as the site was sampling only inorganics the use of a PVC bailer could not be challenged. However, they are now, as part of their sampling program, looking for TOC and TOX. This calls into question the use of an instrument that has been shown to be able to contribute through adsorption, absorption, and desorption biases in organic testing.

3. Sampling Handling. The plan calls for site filtering of samples for lead and iron analysis. This has, according to conversations with site personnel and the contractor, never been done. Furthermore there are no container or preservative comments on what needs to be done for TOX and TOC samples. Cleaning procedures are probably adequate for gross metal and salt analysis but a deionized water wash of a braided synthetic cord and a PVC bailer are not sufficient to ensure against possible cross contamination from organics (TOC & TOX).

4. Analytical Methods. Methods are specified in the plan by reference to several Standard Methods published by EPA. Since these references provide several different techniques for analysis, failure to specify which makes it difficult to determine, unless very good records are kept, what exact method was employed.

5. Chain of Custody. The Chain ot" Custody statement, which merely says chain of custody will be on standard company forms, does not give sufficient specificity to allow for a determination of adequacy.

SPLIT SAMPLING AND CHEMISTRY

Results from the January 23, 1984 split sampling are shown in Table 5 and the dates of analysis for the individual parameters in Table 6. The site utilizes a unique sample preparation method for the chloride, iron, and lead analytes. This procedure calls for allowing the samples, which are collected in 1/2 gallon plastic bottles, to sit overnight before decanting the supernatant from the settled out solids. The supernatant, which is intended for metals analysis, is then fixed without filtering with nitric acid.

As can be seen from Table 5, the iron and pH results from the different labs are substantially different, while the chloride and lead results are fairly close. In a series of conversations with the site's laboratory it was determined by them, in response to the results, that samples taken in a subsequent April sampling had radically different (lower) pH's after sitting for 3 weeks than when tested on the day of their withdrawal. If the assumption is made that this pH change begins almost immediately then the lower pH in the EPA samples is due to chemical changes that occurred in the two days prior to their testing. Since the EPA lab was instructed to use the site's handling method, the first opportunity to fix the water for future metals analysis would happen on the fourth day after their withdrawal. This could mean that any iron that would have been tied up on the suspended soil or as hydrolysis complexes at the time of withdrawal would begin to go back into solution as the pH fell-- hence explaining the higher iron levels in the EPA results. This mechanism would also affect the lead levels but

would not apply to the chlorides. However, the total lead levels in the samples appear to be so low that their overall change is not readily apparent.

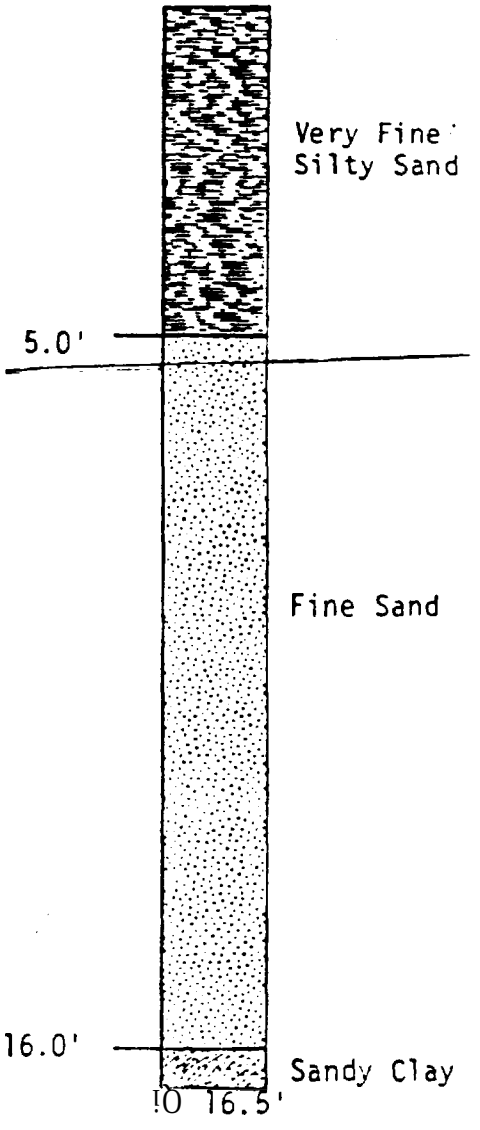
The above explanation for the differences in the metals and pH but not the salt is only an educated guess as the site does not test for a sufficient number of analytes to determine total reactions.

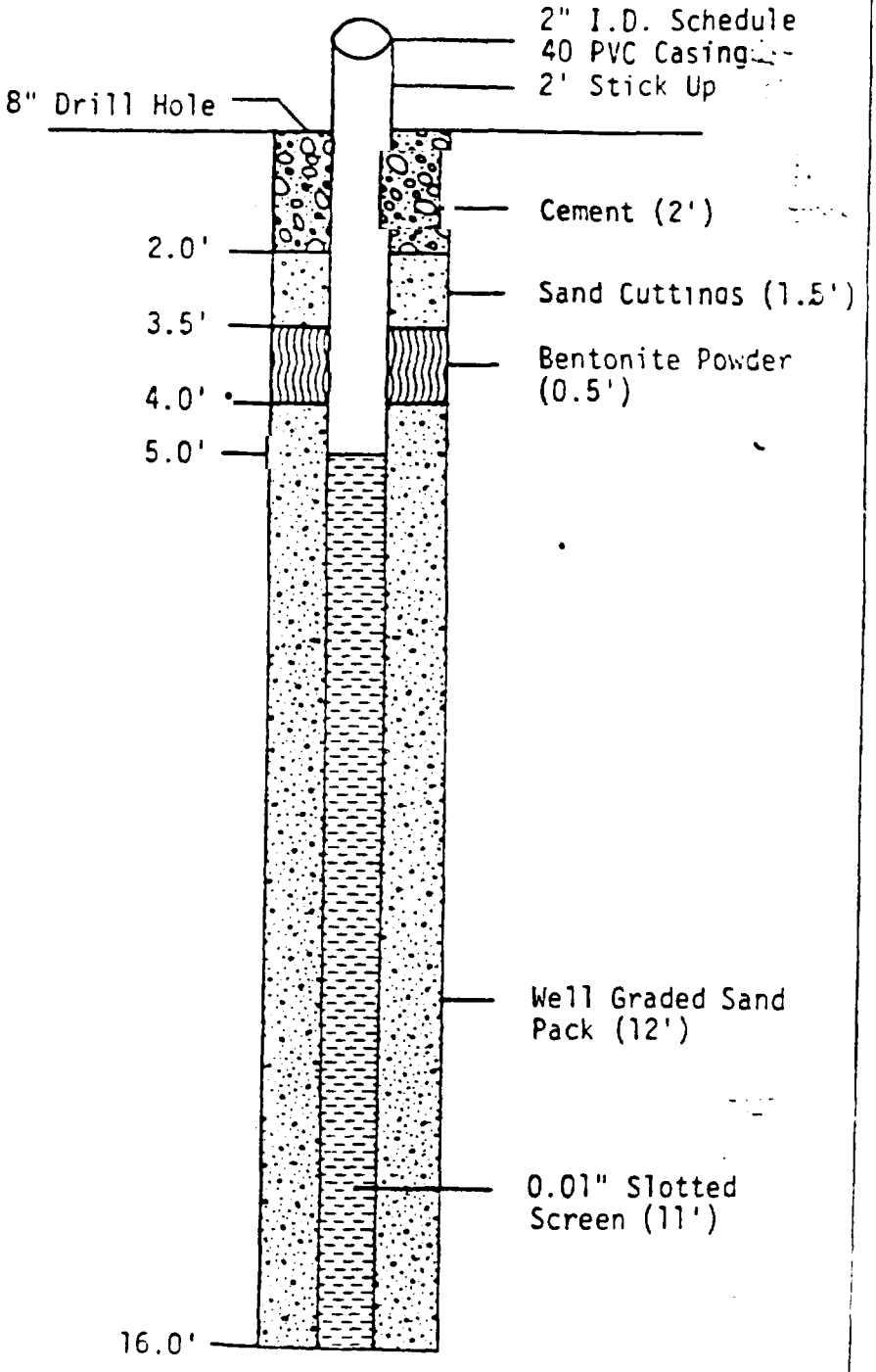
Both the TOC and TOX findings are also substantially different. The reasons for this are not apparent. The site does not handle organics. However, the generally higher levels found in the EPA data are not sufficiently high enough to indicate gross contamination. Whether some organic contaminant is somehow getting into the pond and subsequently out of it can not currently be ascertained because the site has never tested their upgradient well for these parameters.

APPENDIX A

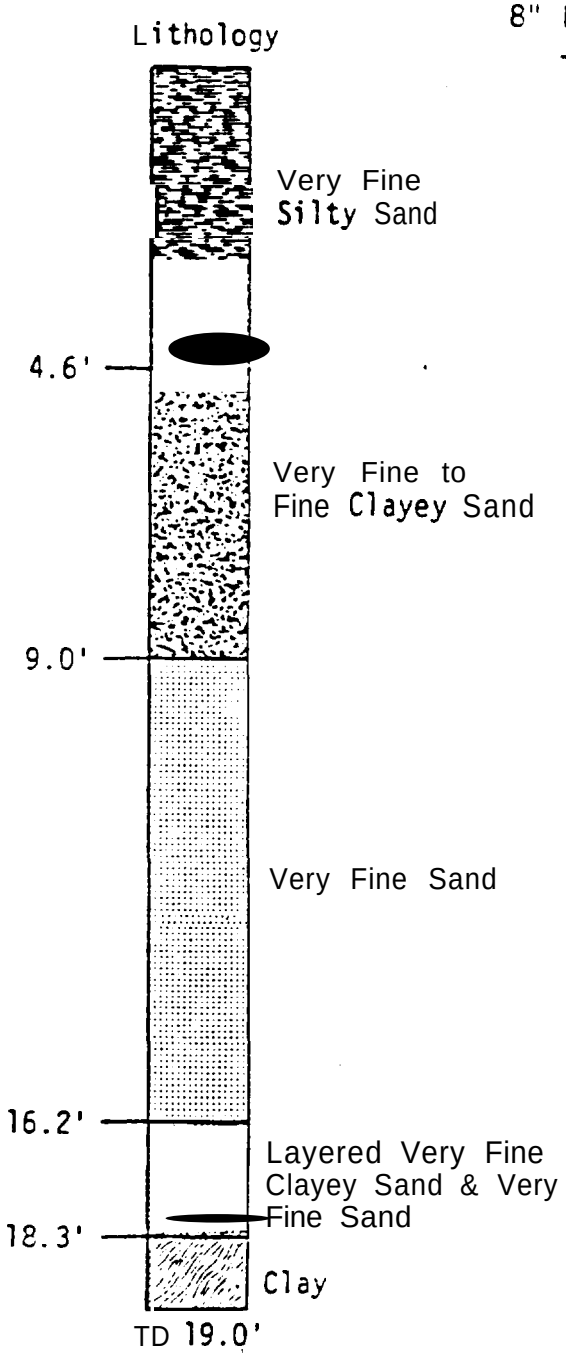
DRILLING LOGS

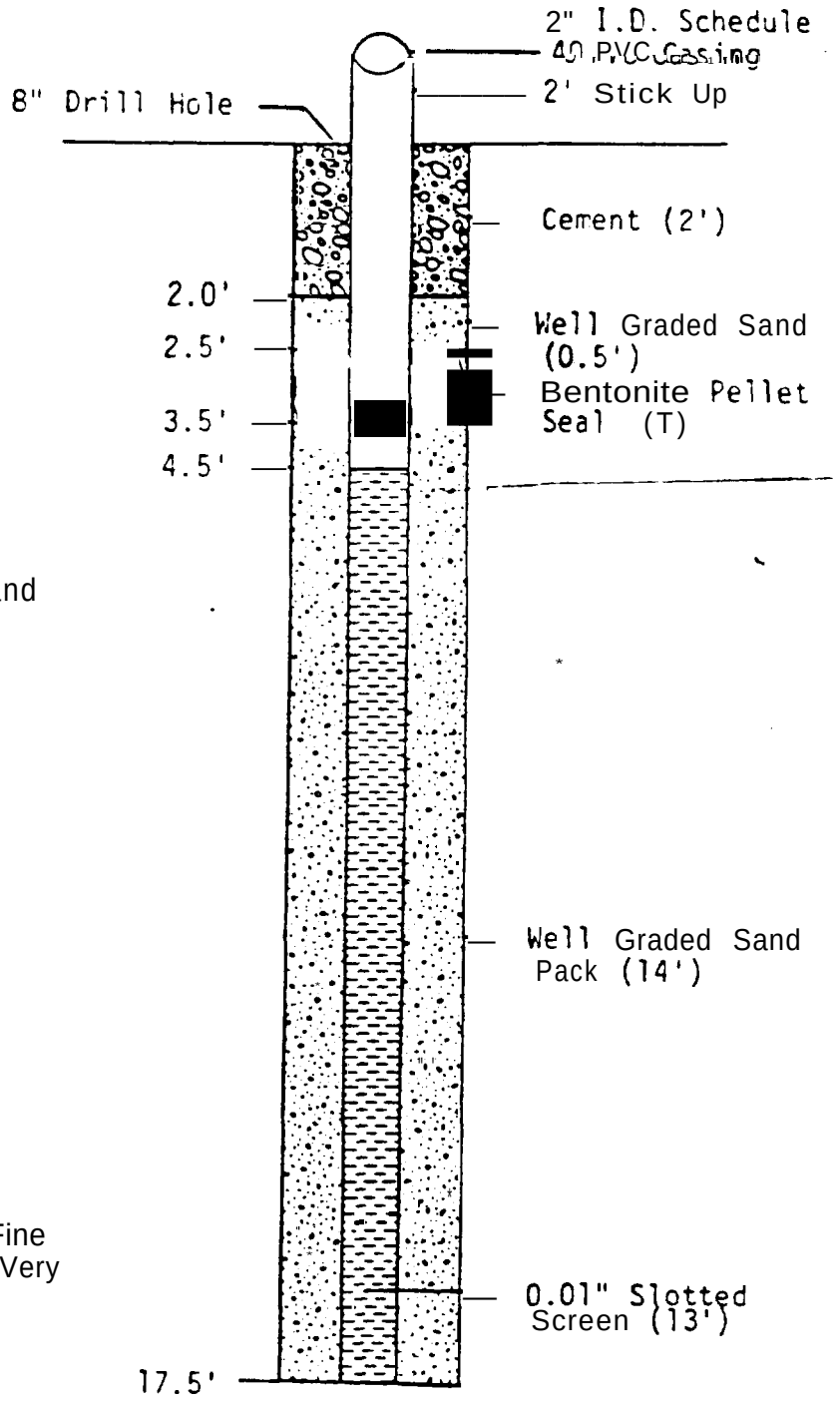
WELL E-5


Lithology
Very Fine
Silty Sand
5.0'
Fine Sand
16.0'
Sandy Clay
TO 16.5'

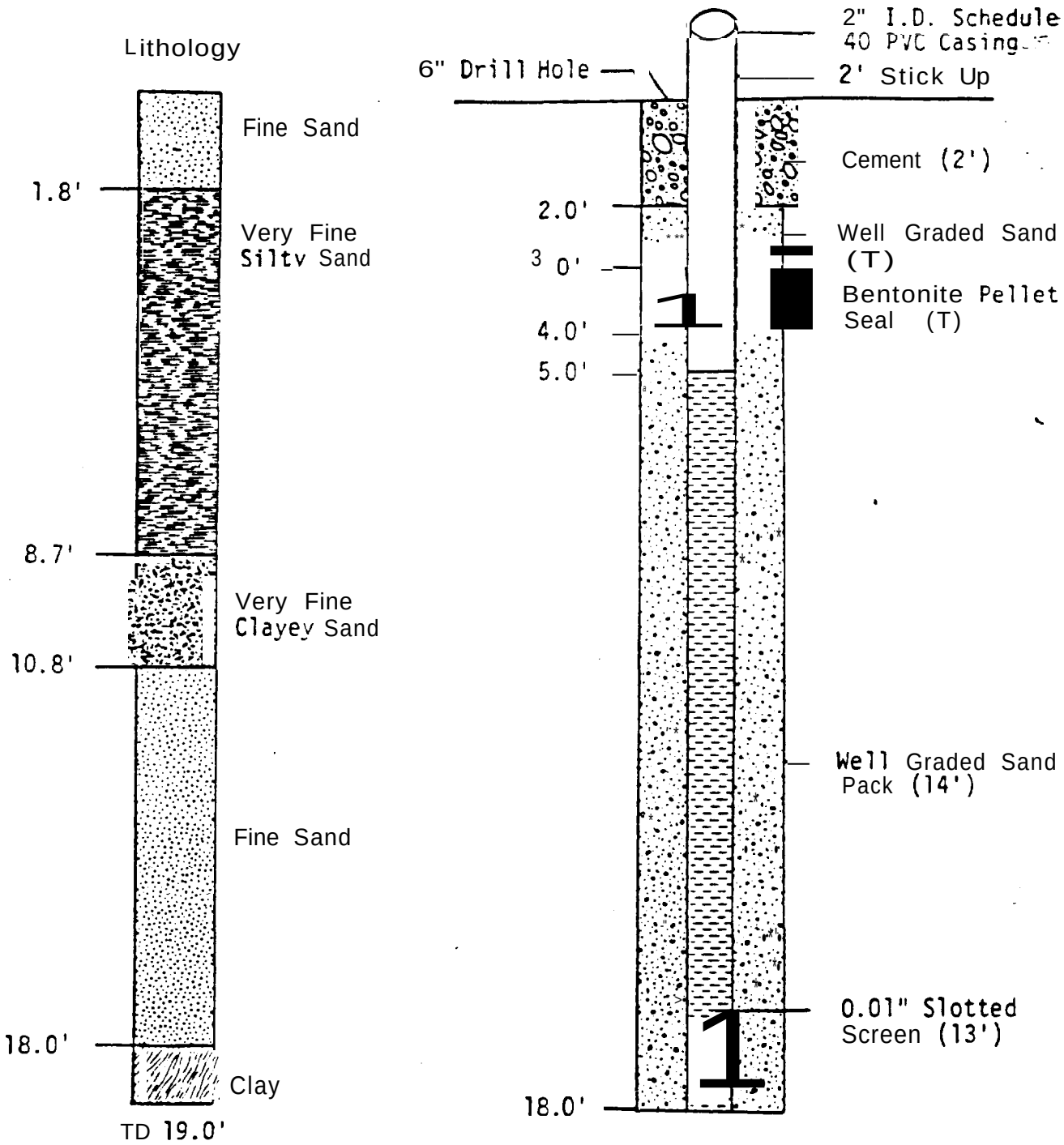

2" I.D. Schedule
40 PVC Casing
2' Stick Up
8" Drill Hole
Cement (2')
2.0'
Sand Cuttings (1.5')
3.5'
Bentonite Powder
(0.5')
4.0'
5.0'
Well Graded Sand
Pack (12')
0.01" Slotted
Screen (11')
16.0'

WELL W2

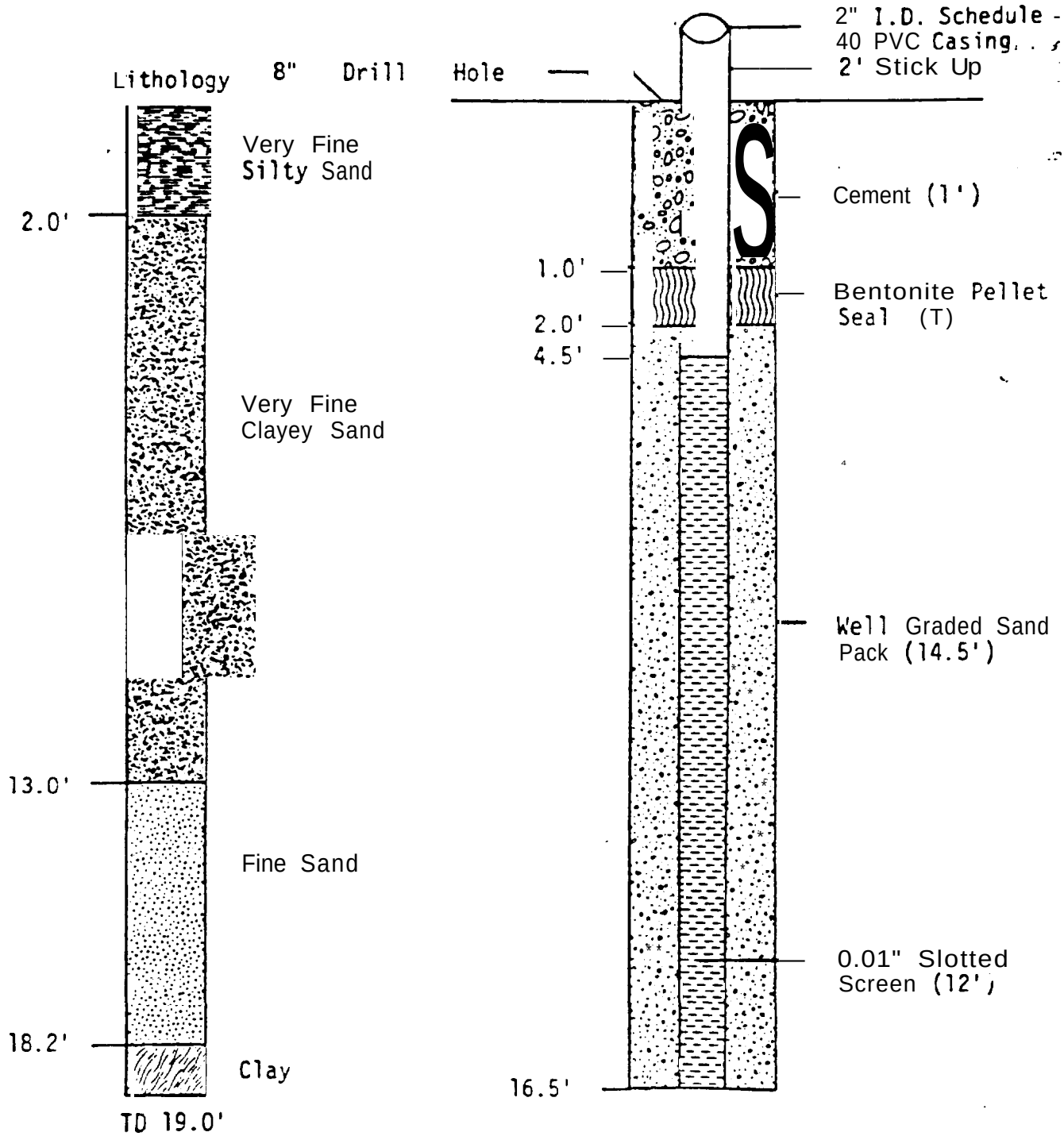

Lithology
Very Fine Silty Sand
4.6'
Very Fine to Fine Clayey Sand
9.0'
Very Fine Sand
16.2'
Layered Very Fine Clayey Sand & Very Fine Sand
18.3'
Clay
TD 19.0'


2" I.D. Schedule 40 PVC Casing
2' Stick Up
8" Drill Hole
Cement (2')
2.0'
2.5'
Well Graded Sand (0.5')
Bentonite Pellet Seal (T)
3.5'
4.5'
Well Graded Sand Pack (14')
0.01" Slotted Screen (13')
17.5'

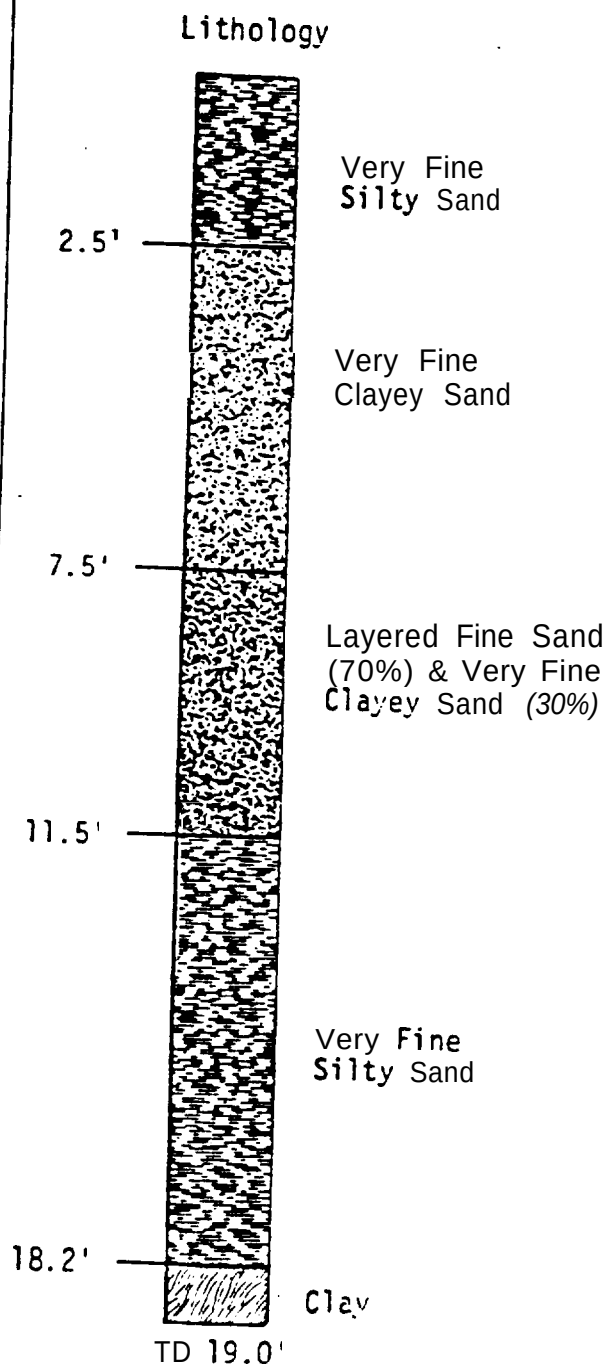
WELL SE

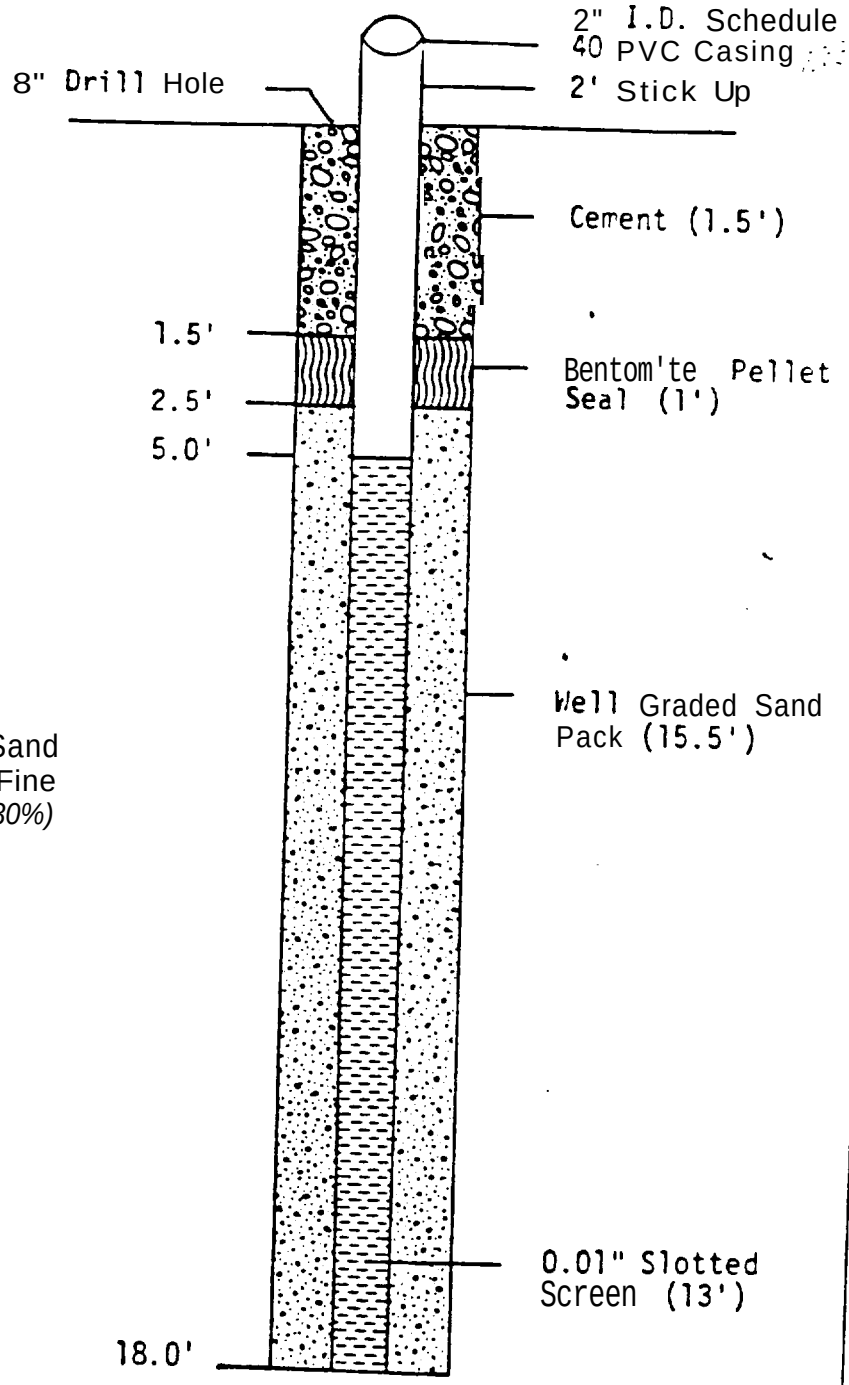

Lithology
Fine Sand
1.8'
Very Fine
Silty Sand
8.7'
Very Fine
Clayey Sand
10.8'
Fine Sand
18.0'
Clay
TD 19.0'
6" Drill Hole
2" I.D. Schedule
40 PVC Casing
2' Stick Up
Cement (2')
2.0'
Well Graded Sand
(T)
3 0'
Bentonite Pellet
Seal (T)
4.0'
5.0'
Well Graded Sand
Pack (14')
0.01" Slotted
Screen (13')
18.0'

WELL N5

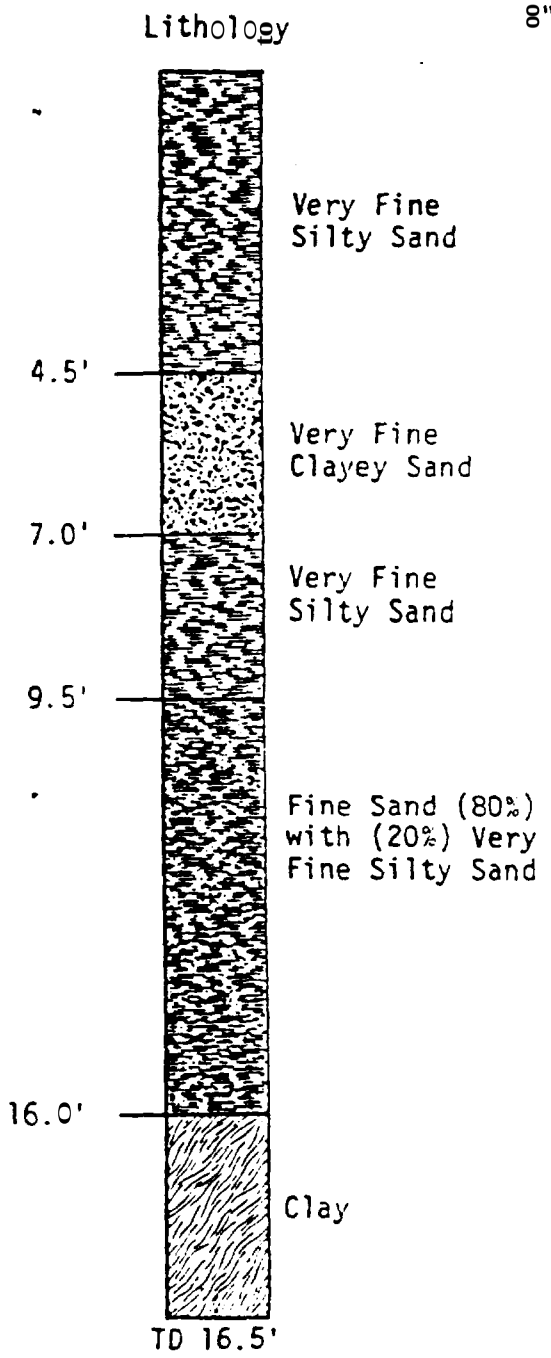

Lithology
8" Drill Hole
Very Fine Silty Sand
2.0'
Very Fine Clayey Sand
13.0'
Fine Sand
18.2'
Clay
TD 19.0'
2" I.D. Schedule - 40 PVC Casing
2' Stick Up
Cement (1')
1.0'
Bentonite Pellet Seal (T)
2.0'
4.5'
Well Graded Sand Pack (14.5')
0.01" Slotted Screen (12')
16.5'

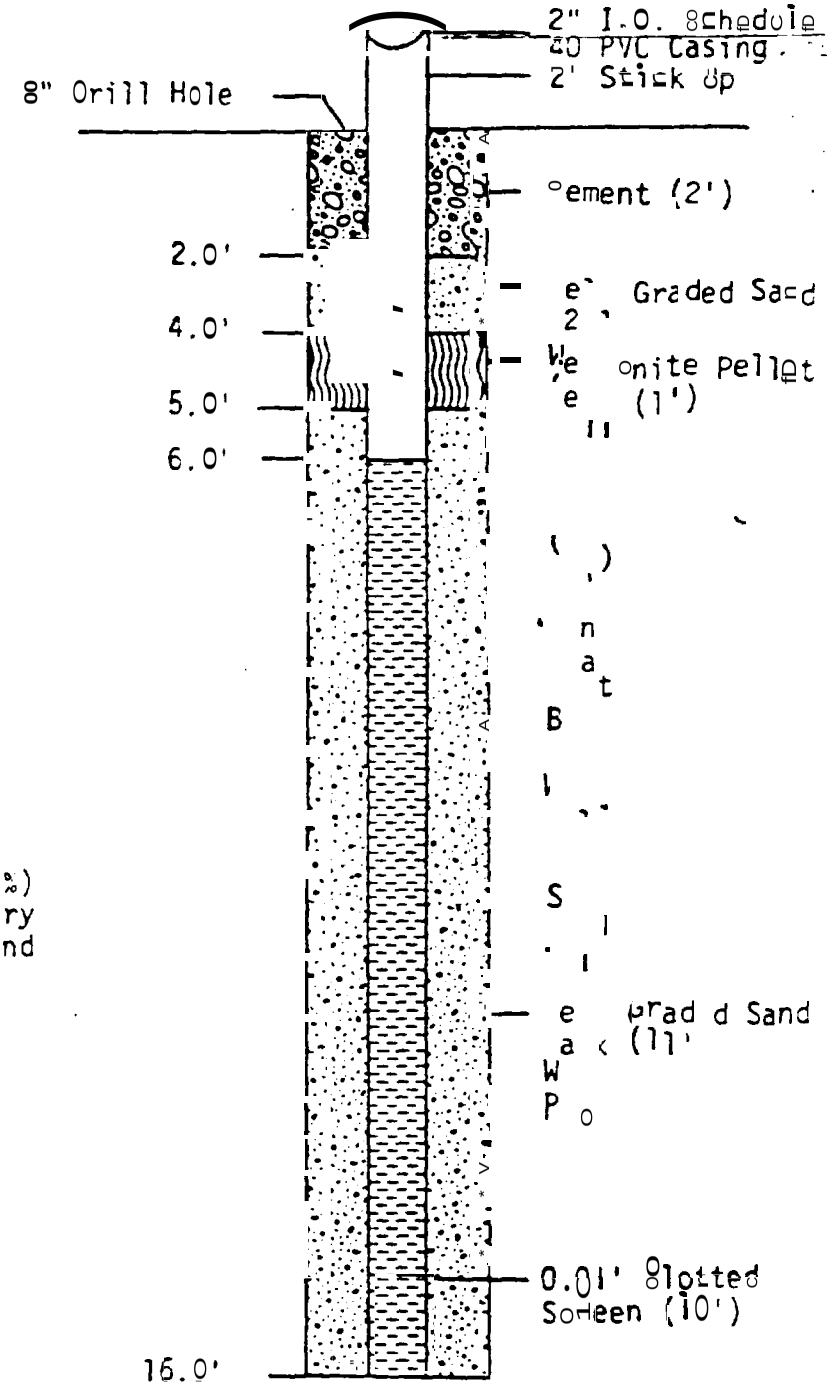
WELL S-2


Lithology
Very Fine Silty Sand
2.5'
Very Fine Clayey Sand
7.5'
Layered Fine Sand (70%) & Very Fine Clayey Sand (30%)
11.5'
Very Fine Silty Sand
18.2'
Clay
TD 19.0'

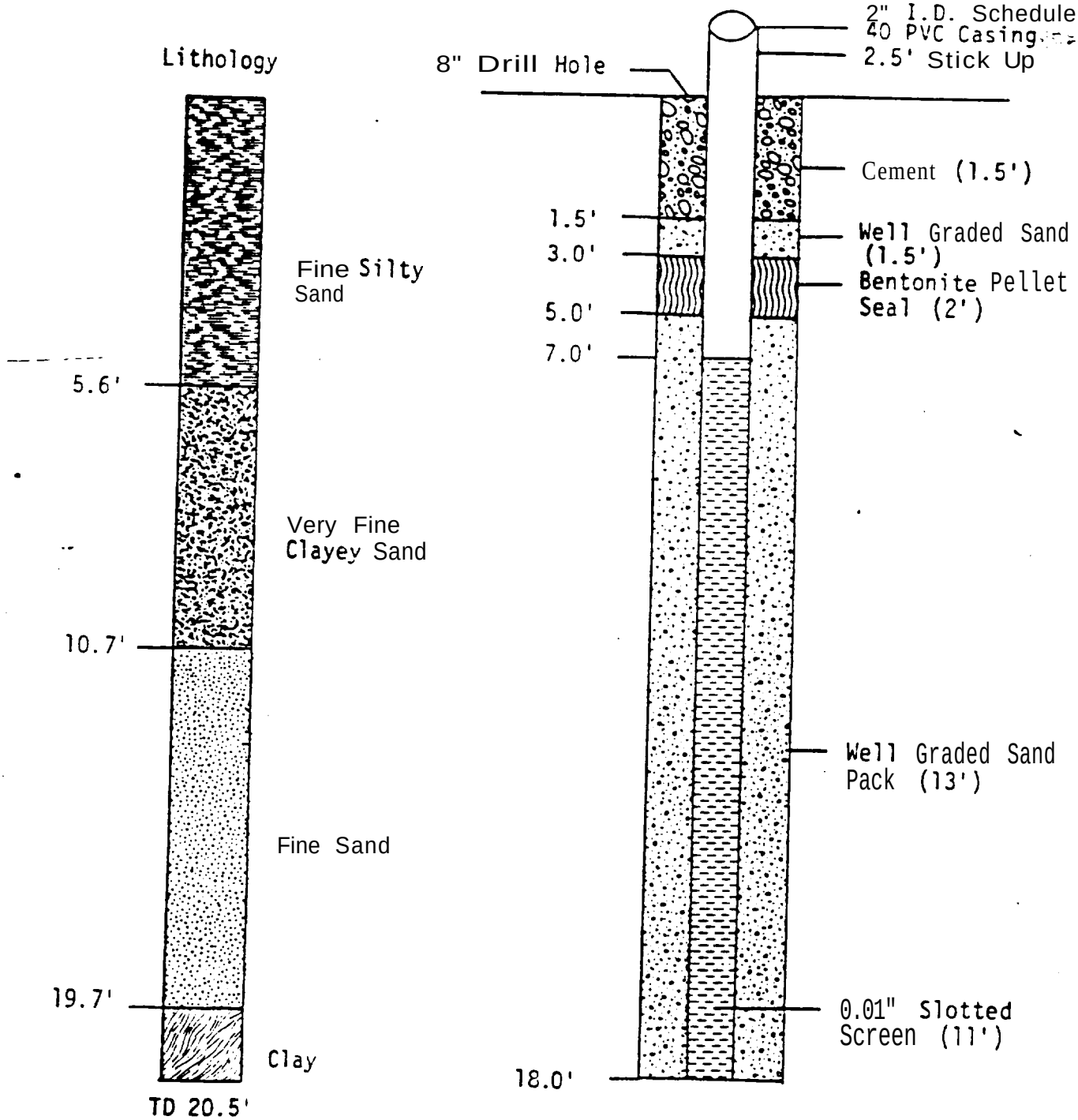

2" I.D. Schedule 40 PVC Casing
8" Drill Hole
2' Stick Up
Cement (1.5')
1.5'
Bentom'te Pellet Seal (1')
2.5'
5.0'
Well Graded Sand Pack (15.5')
0.01" Slotted Screen (13')
18.0'

WELL SW

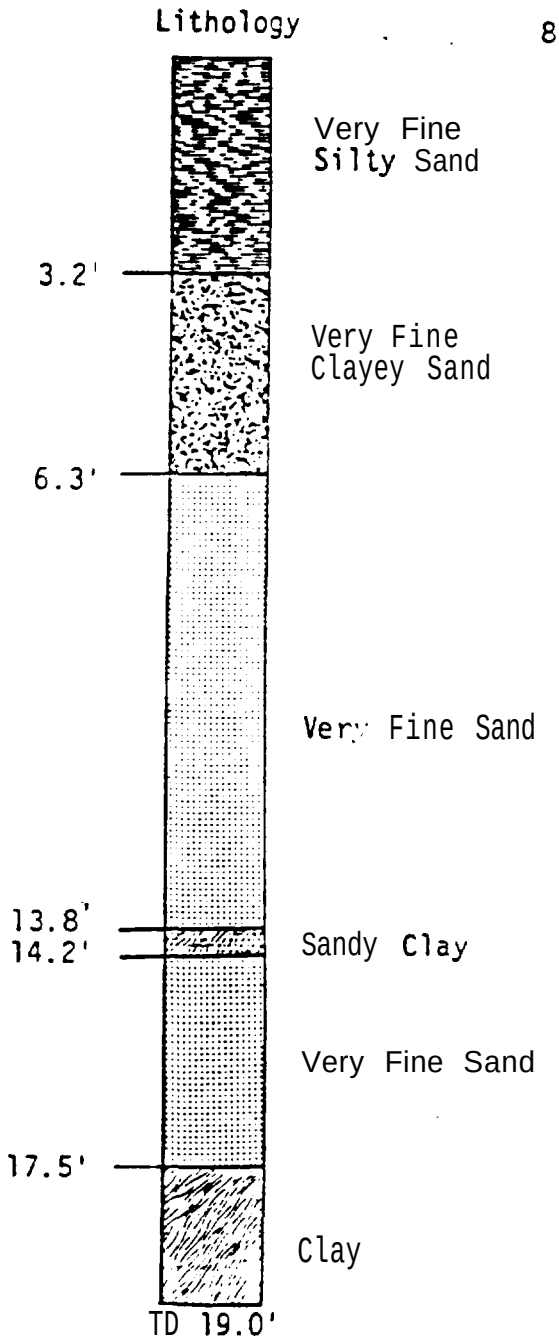

Lithology
Very Fine
Silty Sand
4.5'
Very Fine
Clayey Sand
7.0'
Very Fine
Silty Sand
9.5'
Fine Sand (80%)
with (20%) Very
Fine Silty Sand
16.0'
Clay
TD 16.5'

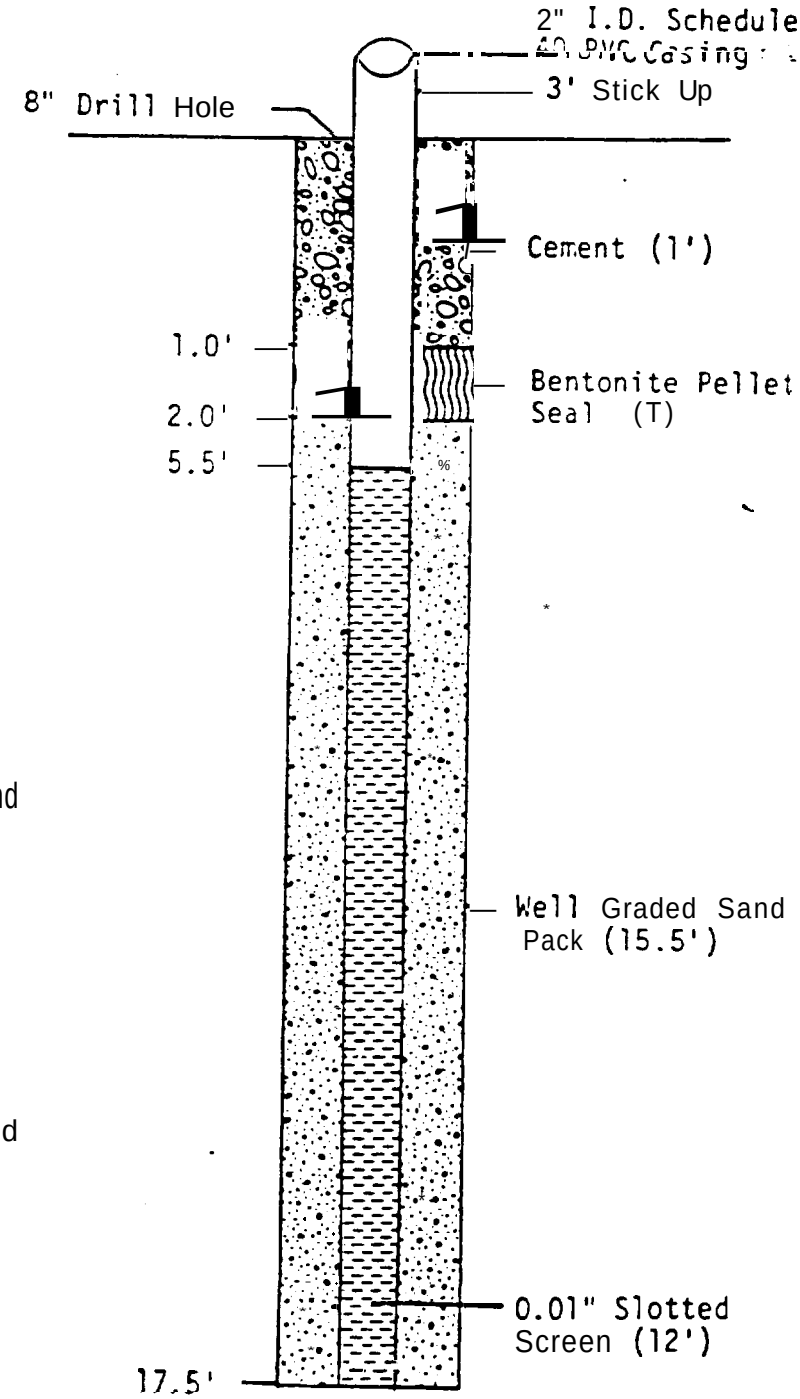

2" I.D. Schedule
40 PVC Casing
2' Stick Up
8" Drill Hole
Cement (2')
2.0'
4.0'
5.0'
6.0'
Graded Sand
Bentonite Pellet
(1')
Graded Sand
(11'
0.01' Slotted
Screen (10')
16.0'

WELL S-1


Lithology
Fine Silty Sand
5.6'
Very Fine Clayey Sand
10.7'
Fine Sand
19.7'
Clay
TD 20.5'
8" Drill Hole
2" I.D. Schedule 40 PVC Casing
2.5' Stick Up
Cement (1.5')
1.5'
3.0'
5.0'
7.0'
Well Graded Sand (1.5')
Bentonite Pellet Seal (2')
Well Graded Sand Pack (13')
0.01" Slotted Screen (11')
18.0'

WELL W1


Lithology
Very Fine
Silty Sand
3.2'
Very Fine
Clayey Sand
6.3'
Very Fine Sand
13.8'
14.2'
Sandy Clay
Very Fine Sand
17.5'
Clay
TD 19.0'


2" I.D. Schedule
40 PVC Casing
3' Stick Up
8" Drill Hole
Cement (1')
1.0'
Bentonite Pellet
Seal (T)
2.0'
5.5'
Well Graded Sand
Pack (15.5')
0.01" Slotted
Screen (12')
17.5'

APPENDIX 3

CHEMICAL ANALYSES

Well
East Shallow

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	[redacted]	[redacted]	TOC mg/l	TOX ug/l
Date							
1/23/84	27	4.2	-	1.4	<.05	-	-
10/6/83	20	4.9	190	1.5	0.12	-	-
7/6/83	43	4.0	140	5.0	<.05	-	-
4/6/83	46	4.2	170	2.2	0.21	-	-
1/5/83	54	4.6	160	4.5	0.09	-	-
10/7/82	22	5.4	130	.29	0.37	-	-
7/29/82	51	4.6	160	.94	0.05	-	-
4/6/82	80	4.5	140	14	-	-	-
1/7/82	130	4.3	240	34	-	-	-
10/6/81	73	5.4	150	8.8	-	-	-
7/2/81	310	3.9	500	110	-	-	-
76/81	740	4.0	1130	290	-	-	-
/9/81	1000	4.0	1880	410	-	-	-
10/7/80	-	-	-	-	-	-	-
/8/80	-	-	-	-	-	-	-
/1/80	9100	2.8	14000	3400	-	-	-
/3/80	7950	3.2	11480	2800	-	-	-
10/9/79	7200	3.1	10200	2500	-	-	-
/11/79	6900	2.8	10000	2700	-	-	-
/6/79	5100	3.0	7230	2100	-	-	-

Well
East Deep

arameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	TOX ug/l
ate							
/23/84	5.2	5.6	–	.56	<.05	–	–
0/6/83	5.6	5.6	57	.09	<.05	–	–
/6/83	16	5.0	59	3.7	<.05	–	–
/6/83	4.3	5.5	49	.88	<.05	–	–
/5/83	9.5	5.7	39	1.4	<.05	–	–
0/7/82	7.0	5.2	38	.42	<.05	–	–
/29/82	5.9	5.6	48	.83	<.01	–	–
/6/82	5.0	5.3	24	1.1	–	–	–
/7/82	7.0	5.2	60	1.4	–	–	–
0/6/81	8.0	5.2	46	.45	–	–	–
/2/81	4.7	5.3	55	.74	–	–	–
/6/81	6.3	5.8	41	.62	–	–	–
/9/81	6.2	6.3	65	1.5	–	–	–
0/7/80	17	4.0	54	.22	–	–	–
/8/80	–	–	–	–	–	–	–
/1/80	48	3.7	130	5.7	–	–	–
/3/80	26	4.6	79	5.4	–	–	–
0/9/79	7.5	6.6	39	.82	–	–	–
/11/79	39	4.6	93	13	–	–	–
/6/79	19	5.6	57	4.6	–	–	–

Well
North Shallow

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	TVOC ug/l
Date							
1/23/84	380	4.0	-	100	<.05	-	-
.0/6/83	420	3.9	670	110	<.05	-	-
'/6/83	150	3.6	220	9.6	<.05	-	-
'/6/83	110	3.9	140	10	<.05	-	-
/5/83	220	4.2	260	32	<.05	-	-
0/7/82	1100	4.2	1500	320	<.05	-	-
'/29/82	550	3.4	700	73	<.01	-	-
/6/82	420	3.5	510	120	-	-	-
/7/82	1240	3.2	1500	320	-	-	-
0/6/81	1280	4.0	1750	460	-	-	-
/2/81	790	4.5	1160	320	-	-	-
/6/81	830	3.6	1270	370	-	-	-
/9/81	1420	3.9	2820	560	-	-	-
0/7/80	1260	2.9	2050	280	-	-	-
/8/80	3480	3.0	5430	1400	-	-	-
/1/80	2900	2.9	4600	1200	-	-	-
/3/80	2590	3.7	3800	1100	-	-	-
0/9/79	2700	3.6	3800	1100	-	-	-
/11/79	2300	3.6	3300	1100	-	-	-
/6/79	1800	4.2	2250	760	-	-	-

Well
North Deep

'arameter	Chloride mg/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
ate							
/23/84	6.3	5.9	-	2.2	<.05	-	-
0/6/83	10	6.0	60	.01	<.05	-	-
/6/83	6.5	5.8	85	4.3	<.05	-	-
/6/83	7.2	5.9	54	4.0	<.05	-	-
/5/83	6.6	6.3	36	.025	<.05	-	-
J/7/82	5.6	5.9	55	1.4	<.05	-	-
/29/82	8.0	6.0	62	2.9	<.01	-	-
/6/82	5.0	5.9	42	2.2	-	-	-
/7/82	12.0	5.8	37	1.6	-	-	-
0/6/81	6.8	5.7	38	0.28	-	-	-
/2/81	7.4	5.4	73	4.5	-	-	-
/6/81	5.8	6.3	56	4.0	-	-	-
/9/81	10	6.6	83	8.5	-	-	-
0/7/80	17	5.8	57	0.70	-	-	-
/8/80	9.4	6.3	77	9.2	-	-	-
/1/80	45	4.9	120	6.2	-	-	-
/3/80	21	6.5	76	5.9	-	-	-
0/9/79	8.8	6.6	46	14	-	-	-
/11/79	15	6.1	58	1.8	-	-	-
/6/79	9.5	6.5	48	15	-	-	-

3

Well
South Shallow

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	TOX ug/l
ate							
'23/84	220	3.8	-	29	<.05	-	-
1/6/83	630	4.2	840	210	<.05	-	-
6/83	740	3.4	900	204	<.05	-	-
6/83	910	3.6	1350	420	<.05	-	-
5/83	1060	3.8	1480	420	<.05	-	-
/7/82	6830	3.4	9980	2700	<.05	-	-
29/82	5960	3.4	8000	2200	<.05	-	-
6/82	5820	3.4	8090	2200	-	-	-
7/82	5150	3.0	7020	1900	-	-	-
/6/81	8010	3.3	10700	3000	-	-	-
2/81	6780	3.2	11800	2700	-	-	-
6/81	4950	3.4	8880	2200	-	-	-
9/81	4160	3.6	8360	1700	-	-	-
/7/80	1960	2.6	3610	520	-	-	-
3/80	1670	3.2	2800	590	-	-	-
1/80	600	4.1	920	140	-	-	-
3/80	280	3.9	360	63	-	-	-
/9/79	160	4.0	260	30	-	-	-
11/79	64	4.9	140	15	-	-	-
5/79							

Wel 1
South Deep

Parameter	Chloride mg/1	PH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/l
Date							
1/23/84	5.0	5.3	-	0.66	<.05	—	-
10/6/83	7.5	5.9	45	0.52	<.05	-	-
7/6/83	5.9	5.4	55	1.2	<.05	-	-
4/6/83	7.0	5.4	48	1.2	<.05	-	-
1/5/83	12	6.3	bo	0.23	<.05	-	-
10/7/82	16	4.9	83	0.07	<.05	-	-
7/29/82	5.3	5.4	42	0.76	<.01	-	-
4/6/82	7.0	5.5	34	0.88	-	-	-
1/7/82	14	5.1	60	1.0	-	-	-
10/6/81	11	4.6	39	0.19	-	-	-
7/2/81	20	5.1	76	4.1	-	-	-
3/6/81	7.8	5.9	57	2.7	-	-	-
1/9/81	18	4.8	75	1.1	-	-	-
10/7/80	13	4.5	190	0.63	-	-	-
7/8/80	10	5.0	65	2.2	-	-	-
4/1/80	9.8	4.8	64	0.60	-	-	-
1/3/80	6.7	5.8	54	1.4	-	-	-
10/9/79	5.1	6.2	45	2.0	-	-	-
7/11/79	4.0	5.9	34	2.7	-	-	-
4/2/79	4.1	5.5	33	2.9	-	-	-

Well
West Shallow

Parameter	Chloride mg/1	PH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TUX ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	-	-	-	-	-	-	-
7/6/83	6800	3.3	10400	2500	<.05	-	-
4/6/83	7010	3.4	10180	2300	<.05	-	-
1/5/83	6120	3.9	8770	2200	<.05	-	-
10/7/82	5660	3.3	8100	2100	<.05	-	-
7/29/82	5940	3.4	7740	2200	<.05	-	-
4/6/82	5120	3.5	7200	2300	-	-	-
1/7/82	4220	3.6	6050	2000	-	-	-
10/6/81	1610	4.2	2520	990	-	-	-
7/2/81	1200	4.1	1710	510	-	-	-
3/6/81	600	3.9	790	210	-	-	-
1/9/81	520	4.2	1010	180	-	-	-
10/7/80	91	3.3	100	4.9	-	-	-
7/8/80	39	4.0	100	.88	-	-	-
4/1/80	18	5.4	82	.55	-	-	-
1/3/80	7.9	6.1	100	1.1	-	-	-
10/9/79	6.9	5.4	34	13	-	-	-
7/11/79	4.9	5.6	42	19	-	-	-
4/2/79	5.5	5.8	58	2.5	-	-	-

Well
West Deep

Parameter	Chloride mg/l	pH Std. Units	IDS mg/l	Iron mg/1	Lead mg/1	TOC mg/1	lux ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	-	-	-	-	-	-	-
7/6/83	6.6	6.0	89	3.4	<.05	-	-
4/6/83	5.8	6.1	67	1.6	<.05	-	-
1/5/83	6.8	6.9	55	1.8	<.05	-	-
10/7/82	12	6.1	100	.29	<.05	-	-
7/29/82	5.1	6.2	68	.86	-	-	-
4/6/82	5.0	6.3	57	1.7	-	-	-
1/7/82	6.2	6.3	80	3.4	-	-	-
10/6/81	5.3	6.0	42	2.8	-	-	-
7/2/81	10	6.3	73	3.9	-	-	-
3/6/81	5.6	6.4	61	1.8	-	-	-
1/9/81	7.4	6.4	73	1.1	-	-	-
10/7/80	7.2	6.1	63	.92	-	-	-
7/8/80	11	6.6	67	1.9	-	-	-
4/1/80	14	6.1	100	1.1	-	-	-
1/3/80	11	6.2	64	.32	-	-	-
10/9/79	9.6	6.4	62	2.4	-	-	-
7/11/79	5.2	6.7	60	1.6	-	-	-
4/2/79	4.8	6.0	40	4.0	-	-	-

Well
E1

Parameter	Chloride mg/1	pH • Std. Units	TDS mg/1	Iron my/1	Lead mg/1	TOC mg/1	[illegible]
Date							
1/23/84	–	–	–	–	–	–	–
10/6/83	12030	3.3	17000	[redacted]	.05	–	–
7/6/83	10300	3.2	15600	3200	<.05	–	–
4/6/83	8743	3.4	14000	3200	<.05	–	–
1/5/83	8587	3.8	12560	2900	<.05	–	–
10/7/32	8930	3.3	12700	2700	<.05	–	–
7/29/82	7720	3.4	10680	2600	<.01	–	–
4/6/82	6310	3.5	8550	2000	-	–	–
1/7/82	6470	3.4	8340	2100	-	–	–
10/6/81	5620	3.5	8240	2000	-	–	–
7/2/81	4600	3.3	7400	1600	-	–	–
3/6/81	2460	4.7	3880	850	–	–	–
1/9/81	2550	4.7	5040	740	–	–	–
10/7/80	2040	2.8	3990	520	–	–	–
7/8/80	1580	3.7	2670	510	–	–	–
4/1/80	1300	4.3	2300	400	–	–	–
1/3/80	790	3.8	1100	5.6	–	–	–
10/9/79	550	3.7	750	130	–	–	-
7/11/79	–	–	–	–	–	–	–
4/2/79	–	–	–	–		–	–

Well
E2

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible] ug/l
Date							
1/23/84	9.6	5.9	—	.07	<.05	2.1	<[illegible]
10/6/83	12	6.0	80	.36	<.05	1.9	[illegible]
7/6/63	8.3	5.9	74	3.4	<.05	1.6	-
4/6/83	11	5.9	81	.21	<.05	0.8	[illegible]
1/5/83	9.0	6.6	70	.52	<.05	0.4	[illegible]
10/7/82	20	6.0	10 J	.30	<.05	-	-
7/29/82	6.9	6.0	89	.20	<.05	-	-
1/6/82	13	6.2	58	1.3	-	-	-
1/7/82	7.0	6.1	100	.94	-	-	-
10/6/81	9.2	6.2	82	9.8	-	-	-
7/2/81	18	6.4	76	1.6	-	-	-
3/6/81	5.4	6.9	67	.72	-	-	-
1/9/81	6.7	6.4	120	16	-	-	-
10/7/80	10	6.4	78	.65	-	-	-
7/8/80	8.1	6.5	92	36	-	-	-
4/1/80	8.3	6.0	76	13	-	-	-
1/3/80	7.1	6.1	84	7.8	-	-	-
10/9/79	17	6.3	77	10	-	-	-
[illegible]	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
E3

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	30	5.6	93	.07	<.05	-	-
7/6/83	40	5.6	110	9.5	<.05		
4/6/83	35	5.0	110	.19	<.05		
1/5/83	20	6.5	100	.22	<.05		
10/7/82	16	6.0	82	1.4	<.05		
7/29/82	59	5.5	140	1.2	<.01		
4/6/82	72	5.6	140	4.0	-		
1/7/62	64	3.4	150	1.5	-		
10/6/81	35	5.2	120	5.8	-		
7/2/81	84	5.4	270	10	-		
3/6/81	77	5.3	130	4.3	-		
1/9/81	100	4.3	220	7.4	-		
10/7/80	270	4.3	540	68	-		
7/8/80	-	-	-	-	-		
4/1/80	320	4.9	540	67	-		
1/3/80	140	3.6	230	13	-		
10/9/79	70	5.7	160	12	-		
7/11/79	-	-	-	-	-		
4/2/79	-	-	-	-	-		

Well
E4

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	20	6.0	94	.11	<.05	-	-
7/6/83	24	5.4	100	5.4	<.05	-	-
4/6/83	30	5.8	100	.28	<.05	-	-
1/5/83	20	6.5	200	.22	<.05	-	-
10/7/82	16	6.0	82	1.4	<.05	-	-
7/29/82	16	6.3	100	.27	<.01	-	-
4/6/82	16	6.0	94	1.1	-	-	-
1/7/82	17	5.5	130	4.6	-	-	-
10/6/81	33	5.7	77	17	-	-	-
7/2/81	28	6.2	94	2.3	-	-	-
4/6/81	31	6.2	59	.92	-	-	-
1/9/81	40	6.1	130	.69	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	620	4.8	850	200	-	-	-
4/1/80	370	4.6	600	110	-	-	-
1/3/80	160	3.5	220	24	-	-	-
10/9/79	80	5.4	150	11	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
E5

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	21[illegible]	3.7	330	37	.23	-	-
7/6/83	3350	2.7	4670	590	[illegible]	-	-
4/6/83	2860	2.9	3610	440	11	-	-
1/5/83	8960	3.0	12170	1000	[illegible]	-	-
10/7/82	950	3.6	1430	300	<.05	-	-
7/29/82	3790	3.3	4720	720	.33	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/60	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
NE

Parameter	Chloride mg/l	pH std. Units	TJS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
1/23/84	–	–	–	–	–	–	–
10/6/83	13	5.8	59	.72	<.05	–	–
7/6/83	13	5.6	62	4.0	<.05	–	–
4/6/83	13	5.6	81	2.8	<.05	–	–
1/5/83	13	6.6	60	.72	<.05	–	–
10/7/82	15	5.7	74	1.8	<.05	–	–
7/29/82	15	5.7	90	.47	<.01	–	–
4/6/82	16	5.7	53	3.0	–	–	–
1/7/82	15	5.6	80	2.9	–	–	–
10/6/8]	14	6.2	68	5.5	–	–	–
7/2/31	16	6.0	90	5.0	–	–	–
3/6/81	14	5.9	88	2.2	–	–	–
1/9/81	17	6.5	130	5.5	–	–	–
10/7/80	17	5.2	7b	.90	–	–	–
7/8/80	17	6.0	100	6.2	–	–	–
1/1/80	20	5.7	62	2.3	–	–	–
1/3/80	18	5.6	66	2.6	–	–	–
10/9/79	17	6.0	55	24	–	–	–
7/11/79	–	–	–	–	–	–	–
1/2/79	–	–	–	–	–	–	–

Well No.

Parameter	Chloride my/l	pH Stc. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	TOX ug/l
ate							
/23/84	7.2	5.0	-	12	<.05	12	<10
0/6/83	15	6.3	51	1.0	<.05	5.2	2
/6/83	14	5.5	178	3.6	<.05	6.0	-
/6/83	15	6.1	86	7.4	<.05	6.5	15
/5/83	8.0	5.8	72	.60	<.05	4.2	2
0/7/82	24	5.6	10	.08	<.05	-	-
/29/82	6.4	5.9	100	3.0	<.01	-	-
/6/82	6.9	6.2	10	.80	-	-	-
/7/82	15	6.2	160	.58	-	-	-
0/6/81	11	6.2	98	2.4	-	-	-
/2/81	-	-	-	-	-	-	-
/6/81	-	-	-	_	-	-	-
/9/81	-	-	-	-	-	-	-
.0/7/80	-	-	-	-	-	-	-
/8/80	-	-	-	-	-	-	-
/1/80	-	-	-	-	-	-	-
/3/80	-	-	-	-	-	-	-
.0/9/79	-	-	-	-	-	-	-
/11/79	-	-	-	-	-	-	-
1/2/79	-	-	-	_	-	-	-

Well
S8

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	TOX ug/l
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	290	3.9	520	44	<.05	-	-
7/6/83	260	4.0	430	78	<.05	-	-
4/6/83	210	4.1	350	74	<.05	-	-
1/5/83	210	5.0	280	57	<.05	-	-
10/7/82	190	5."	280	8.4	<.05	-	-
7/29/82	200	5.7	410	60	<.01	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/8]	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
SA

Parameter	Chloride mg/l	pH Std. Unite	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
/23/84	11	4.8	-	.10	<.05	-	-
0/6/83	12	5.3	44	2.2	<.05	-	-
/6/83	11	4.7	51	.44	<.05	-	-
/6/83	9.0	4.6	38	.22	<.05	-	-
/5/83	15	5.2	25	.35	<.05	-	-
0/7/82	11	4.2	61	.10	<.05	-	-
/29/82	10	4.4	62	.33	<.01	-	-
/6/82	-	-	-	-	-	-	-
/7/82	-	-	-	-	-	-	-
0/6/81	-	-	-	-	-	-	-
/2/81	-	-	-	-	-	-	-
A./81	-	-	-	-	-	-	-
/9/81	-	-	-	-	-	-	-
0/7/80	-	-	-	-	-	-	-
/8/80	-	-	-	-	-	-	-
/1/80	-	-	-	-	-	-	-
/3/80	-	-	-	-	-	-	-
0/9/79	-	-	-	-	-	-	-
/11/79	-	-	-	-	-	-	-
/2/79	-	-	-	-	-	-	-

S1

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
1X23X84	49	4.0	-	.93	<.05	<.0	11
10/6X83	90	4.4	130	1.6	<.05	3.1	32
7X5/83	110	3.8	150	7.0	<.05	1.4	-
4X5/83	170	3.9	200	13	<.05	2.2	<1
1X5/83	360	4.4	460	62	<.05	3.2	2
10/7X82	1530	4.3	2150	510	<.05	-	-
7X29/82	880	3.6	1200	240	<.01	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
S2

Parameter	Chloride mg/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	590	3.8	770	77	<.05	-	-
7/6/83	670	3.4	850	170	<.05	-	-
4/6/83	1030	3.7	1280	260	<.05	-	-
1/5/83	1300	4.1	2000	390	<.05	-	-
10/7/82	2880	3.7	4130	520	<.05	-	-
7/29/82	2470	3.6	3080	730	<.05	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
W1

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
1/23/84	3300	3.8	-	1200	<.05	-	-
10/6/83	3780	4.0	5900	1300	<.05	-	-
7/6/83	1580	3.9	2320	630	<.05	-	-
4/6/83	1250	4.3	1860	420	<.05	-	-
1/5/83	1300	4.8	2100	450	<.05	-	-
10/7/82	3100	4.0	4470	520	<.05	-	-
7/29/82	1700	4.6	2340	580	<.01	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
2/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
M

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible] mg/l
Date							
1/23/84	–	–	–	–	–	–	–
10/6/83	10	5.8	63	1.6	<.05	–	–
7/6/83	7.6	5.7	65	2.5	<.05	–	–
4/6/83	6.7	5.7	42	2.3	<.05	–	–
1/5/83	8.6	6.4	70	1.1	<.05	–	–
10/7/82	8.0	6.0	7[illegible]	4.4	<.05	–	–
7/29/82	8.5	5.8	59	.44	<.01	–	–
4/6/82	8.4	6.1	46	1.5	–	–	–
1/7/82	9.[illegible]	5.5	[illegible]	4.2	–	–	–
10/6/81	8.0	5.6	67	5.4	–	–	–
7/2/81	7.4	6.3	73	6.2	–	–	–
3/6/81	7.8	6.4	110	12	–	–	–
1/9/81	10	6.5	110	12	–	–	–
10/7/80	7.0	5.9	80	3.6	–	–	–
7/8/80	8.0	6.3	230	47	–	–	–
4/1/80	11	6.1	50	44	–	–	–
1/3/80	9.1	6.5	62	21	–	–	–
10/9/79	11	6.4	66	75	–	–	–
7/11/79	–	–	–	–	–	–	–
4/2/79	—	–	–	–	–	–	–

Well
N2

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible] mg/l
Date							
1/23/84	350	5.5	-	47	<.05	-	-
10/6/83	230	4.4	330	22	<.05	-	-
7/6/83	230	5.2	380	60	<.05	-	-
4/6/83	300	5.5	340	46	<.05	-	-
1/5/83	420	5.8	523	110	<.05	-	-
10/7/82	470	4.6	660	80	<.05	-	-
7/29/82	30J	4.4	490	63	<.0i	-	-
4/6/82	340	5.6	490	95	-	-	-
1/7/82	920	5.0	1290	330	-	-	-
10/6/61	540	3.9	860	160	-	-	-
7/2/81	120	4.3	230	29	-	-	-
3/6/81	110	5.7	160	30	-	-	-
1/9/81	100	5.6	250	14	-	-	-
10/7/80	87	3.4	170	2.1	-	-	-
7/8/80	99	3.5	240	23	-	-	-
4/1/80	310	3.2	350	69	-	-	-
1/3/80	300	3.4	340	55	-	-	-
10/9/79	3500	3.4	4900	1500	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
N3

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
1/23/84	170	5.2	-	28	<.05	1.2	[illegible]
10/6/83	140	5.5	200	16	<.05	3.5	[illegible]
7/6/83	310	4.8	460	110	<.05	2.4	-
4/6/83	300	4.5	440	120	<.05	0.9	[illegible]
1/5/83	370	4.4	490	140	[illegible]	0.6	[illegible]
10/7/82	140	5.3	210	17	<.05	-	-
7/29/82	420	5.0	650	190	<.01	-	-
4/6/82	630	4.6	840	280	-	-	-
1/7/82	1670	4.0	2050	580	-	-	-
10/6/81	160	5.4	270	30	-	-	-
7/2/81	300	5.0	570	140	-	-	-
3/6/81	190	4.3	800	240	-	-	-
./9/81	610	4.0	1200	250	-	-	-
-0/7/80	130	3.3	290	8.2	-	-	-
78/80	220	3.8	360	54	-	-	-
/1/80	650	3.4	1000	230	-	-	-
./3/80	320	3.5	430	80	-	-	-
.0/9/79	840	3.8	1100	350	-	-	-
711/79	-	-	-	-	-	-	-
/2/79	-	-	-	-	-	-	-

Well
N4

Parameter	Chloride mg/1	PH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	2180	4.2	3100	760	<.05	-	-
7/6/83	2030	4.7	3920	b00	<.05	-	-
4/6/83	1850	4.5	2810	850	<.05	-	-
1/5/83	2300	4.5	3050	870	<.05	-	-
10/7/62	2530	4.2	3550	920	<.05	-	-
7/29/82	2060	4.2	3100	910	<.05	-	-
4/6/82	2270	4.0	3100	940	-	-	-
1/7/82	3620	3.9	4770	1500	-	-	-
10/6/81	3600	4.2	4200	1600	-	-	-
7/2/81	2060	4.8	3330	940	-	-	-
3/6/81	590	4.3	3420	890	-	-	-
1/9/81	2750	3.9	5520	1000	-	-	-
10/7/80	3220	3.0	6260	1400	-	-	-
7/8/80	3230	3.0	5950	1300	-	-	-
4/1/80	2700	3.4	4400	1000	-	-	-
1/3/80	1950	3.5	2500	660	-	-	-
10/9/79	1400	4.5	2000	490	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
N5

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible]
Date							
1/23/64	-	-	-	-	-	-	-
10/6/83	13310	3.4	20000	5000	<.05	-	-
7/6/83	12560	3.2	19500	4800	< .05	-	-
4/6/83	10690	3.2	15290	4300	<.05	-	-
1/5/83	11700	3.6	15440	3900	<.05	-	-
10/7/82	10100	3.2	5100	3500	<.05	-	-
7/29/82	8620	3.4	12120	3000	<.01	-	-
4/6/82	-	-	-	-	-	-	
1/7/8	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-

KERR-McGEE

September 26, 1984

Reference 6

Mr. B. E. Cox, Jr., Chief
Industrial and Hazardous Waste Section
Land Division

Mr. James H. Scarbrough, Chief
Residuals Management Branch
Region IV
U. S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: Kerr-McGee Chemical Corporation
Mobile Facility
Theodore, Alabama 36582
EPA ID ALD071937890
Surface Impoundment Modifications
and Repairs

Gentlemen:

A beneficiation process for impure titanium dioxide ore (ilmenite) has been operated by the Kerr-McGee Chemical Corporation at their Mobile Facility near Theodore, Alabama since 1977. Iron oxide waste produced in the process has been disposed in a nineteen-acre impoundment. A ten-acre expansion of this impoundment was completed and placed into service on June 12, 1984.

The new impoundment included a lower compacted clay underliner, a middle leak detection/collection system and a synthetic Hypalon upper liner. From samples collected in the leak detection/collection system, it was determined the Hypalon liner is leaking.

In order to protect the clay underliner, the solid iron oxide waste has been routed back to the original impoundment.

However, the reduced capacity of the original impoundment will allow operation of the Mobile Facility for only two months before it is filled with iron oxide waste.

Reference 7

STATE OF
WATER IMPROVEMENT COMMISSION

PERMIT FOR DISCHARGE
Issued To:

Kerr-McGee Chemical Corporation
Theodore, Alabama

Plans, specifications and other information for the design, construction, and operation of waste treatment facilities having been approved by tha staff of tha office af tha Alabama Water Improvement Commission, Montgomery, Alabama, in accordance with Act No. 1260, Acts af Alabama, Regular Session, 1971; and having determined that taa project was constructed in accordance with the approved plans aad specifications, a permit la hereby issued far the discharge of treated wastes from the facility described as follows:

An acid regeneration plant for tha recovery af hydrochloric acid from the digestion process; a fourteen (14) acre tailings pond far the sedimentation of process wastes solids and tha recycle af process wastes liquors; and a two (2) acre final settling pond for receiving emergency overflows af process waataa from tha tai lings pond and non-process wastes including tank farm impoundment runoff, cooling tower blowdown, steam condensate, boiler blowdown, aad water softener backwash.

The purpose af said treatment facilities is ta provide treatment af wastewaters resulting from tha beneficiation af ilmenite ore ta produce synthetic rutile. tha effluent from tha above described facilities is ta be discharged into tha Middle Fork of the Deer River.

This permit for discharge as described above is hereby issued subject to the following conditions:

1. Tba approval af tha Water Improvement Commission;

2. tba rules aad regulations of tha said Water Improvement Commission now or hereafter adopted;

3. The provisions af Act Me. 1260. Acts af Alabama, Regular Session, 1971, supra, aad amendments now or hereafter adopted;

4. The waataa discharged under this permit shall aat contain materials likely ta hat toxic or otherwise injurious to fish, aquatic Ufa. or wildlife; detrimental ta tha health and welf am af the public; or restrictive ta aaa af taa stream far agriculture, livestock watering, navigation ar other beneficial purposes;

5. Tba effluent ahall not violate applicable watar quality standards now or hereafter adopted;

6. The characteristics of the treated waste shall not exceed the following limits:

Discharge Serial 001: Tank Farm Impoundment Runoff, Cooling Tower Blowdown, Steam Condensate, Boiler Blowdown, and Water Softener Backwash

Parameter	Daily Average	Daily Maximum
Flow	0.026 MGD	0.039 MGD*
Temperature	---	90°F
Total Suspended Solids	10.8 lbs/day (30 mg/l)	24.4 lbs/day (75 mg/l)
Total Dissolved Solids	1301 lbs/day (6000 mg/l)	2927 lbs/day (9000 mg/l)
Chlorides	759 lbs/day (3500 mg/l)	1708 lbs/day (5250 mg/l)
Iron (total)	0.30 lbs/day (1.40 mg/l)	0.90 lbs/day (2.80 mg/l)
Chromium (total)	0.05 lbs/day (0.23 at/1)	0.16 lbs/day (0.50 cat/1)
Zinc	0.01 lbs/day (0.07 mg/l)	0.05 lbs/day (0.14 mg/l)
pH	6.0 - 9.0 std. units	---

*Daily maximum flow limitation not applicable during rainfall events

7. The treated wastes shall be monitored in a manner approved by the Commission staff;

8. The contingency plan for containment of contaminated ground water in the area surrounding the tailings pond as approved by the Geological Survey of Alabama shall be available for immediate implementation upon a directive from the staff;

9. The permit shall expire at the time of startup of Kerr-McGee Chemical Corporation's titanium dioxide plant at Theodore, Alabama.

Signed. _____
Ira L. Myers, M.D., Chairman
Water Improvement Commission

_____
James W. Warr
Chief Administrative Officer
Water Improvement Commission

Issued this 13th day of December, 1976.

This permit supersedes all previously issued permits.

WASHINGTON. D.C. 20460

NOV 26 1984

Reference 8

OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Hazardous Waste Determination on the Kerr-McGee Chemical Corporation Plant in Theodore, Alabama

FROM: John P. Lehman, Director
Waste Management and Economics Division (WH-565)

TO: James H. Scarbrough, Director
Residuals Management Branch
Region IV

In response to your request of October 17, 1984, we have reviewed the material describing the processes and waste streams at the Kerr-McGee plant in Theodore, Alabama. We conclude that the acidic iron oxide waste generated by the facility's acid recovery unit is excluded from regulation under Subtitle C of RCRA by the mining waste exclusion in Section 3001(b)(3)(A)(ii) of the Resource Conservation and Recovery Act. This provision excludes wastes from the "extraction, beneficiation, and processing of ores and minerals, including phosphate rock and overburden from the mining of uranium ore."

Kerr-McGee uses hydrochloric acid to digest ilmenite ($FeTiO_3$) into synthetic rutile (TiO_2). This beneficiation process produces a waste stream consisting of hydrochloric acid and ferric oxide. Since this is a beneficiation process, both of these wastes are excluded from Subtitle C regulation by the mining waste exclusion. The fact that the hydrochloric acid is generally regenerated and reused, rather than discarded, (though some hydrochloric acid may become entrained with the discarded iron oxide slurry), does not affect the application of the exclusion; these wastes still fall within the mining waste exclusion because they are generated by beneficiation of an ore.

It is true that the mining waste exclusion does not apply to "solid wastes, such as spent solvents, pesticide wastes, and commercial chemical products, that are not uniquely associated with these mining and allied processing operations ..." 45 FR at 76619. For example, 1, 1, 1-trichlorethane used as a solvent to clean machinery would not be covered under the mining waste exclusion. However, since digestion using

hydrochloric acid is an integral part of the process, i.e., the acid is "uniquely associated" with this beneficiation procedure, this provision does not apply to the Kerr-McGee process.

You have cited my memorandum to Henry Schroeder, Region VIII Project Officer for Utah, dated September 24, 1982, as support for your position. However, we conclude that the situations at Kerr-McGee and Kennecott Copper are not comparable. Kerr-McGee is removing hydrochloric acid from the wastestream of a beneficiation process, producing a second wastestream. In other words, the wastestream from this removal process is derived from the original wastestream. Therefore, the regulatory status of the original wastestream (i.e., whether or not it is excluded from regulation as a mining waste) is relevant in determining the regulatory status of the second wastestream. In the Kennecott situation, however, there were two separate processes at issue, each producing its own distinct wastestream. Therefore, the regulatory status of one wastestream did not affect the regulatory status of the other.

Even if the ferric oxide waste at Kerr-McGee was not a by-product of ore beneficiation and, therefore, within the mining waste exclusion, I am not certain that it would be a corrosive waste, as defined in 40 CFR §261.22. A waste exhibits the characteristic of corrosivity if the waste is either:

(1) "aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5 ..." or

(2) "liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year ...."

In your memorandum, you indicate that the pH range of the slurry is 2.0 to 5.0. Therefore, it is not clear whether this waste would meet the first criterion if it were tested. Of course, the waste would be corrosive if it meets the second test above.

If you need additional information, please contact Dr. Dexter Hinckley (382-7917).

Reference 9

RECORD

I

KERR McGEE Chemical
CORPORATION
SIP
Theodore, Mobile Co., AL
52012.566

KELVIN A. DAVIS
PROJECT SCIENTIST
JANUARY 12, 1995

OFFSITE RECONNAISSANCE

Kelvin A. Davis
1/12/95

(2)

Arrived in Mobile, Alabama at 0830. Travel to Mobile County Water + Fire Protection Authority (MCWFPA) located on U.S. Hwy 90 in Theodore, AL.

0930 Arrived at MCWFPA and met with Ms. Sylvia Hewes. Ms. Hewes pointed our the MCWFPA water distribution area on the radius map. Ms. Hewes said that MCWFPA obtained water supplies from 6 municipal wells. MCWFPA provide potable water supplies for 8,300 customers or 22,493 people. However, only one of the six municipal wells is located within the 4 mile radius. Municipal well number 4 which is 480 feet in depth is located within the 4 mile radius. Municipal wells 4 and 5 are blended. These wells provide potable water for approximately 250 customers or 678 people within the 4 mile radius.

Ms. Hewes said that MCWFPA served a limited number of customers within the 4 mile radius. Ms. Hewes said Mobile Water Service System (MWSS) ~~cover~~ distributed potable water supplies to all the industrial businesses and most of the residents in the 4 mile radius. Ms. Hewes also stated that

Kelvin A. Davis 1/12/95

were a large number of residents in the Belkfontaine and Fowl River communities using private wells for potable water. Ms. Hewes estimated that there were approximately 1,200 residents utilizing private wells. Ms. Hewes said her company (MCWFPA) was actively pursuing those residents in order to provide potable water via their system.

Ms. Hewes stated there were two other water companies south of Theodore but there service areas were outside the 4 mile radius.

1100 Travel to Kerr McGee Chemical Corporation via U.S. Hwy 90 to Hamilton Road (East) to State Hwy 193 (Rangeline Road) south approximately 1½ miles. Kerr McGee facility is west of Rangeline Road along an access which runs north and south parallel to the Kerr McGee property line.

Kerr McGee is an active facility. The facility is completely fenced with a guard shack located at the north east corner the property. Signs displaying "No Trespasing" are posted along the fence.

Melinda A. Davis 1/12/95

(4)

KAD 11/12/95

The Middle ~~Deer~~ Fork DEER River runs Along the southern border of the property.

During this site recon there were several people fishing and boating in the Middle ~~Deer~~ DEER Fork River. Surface water runoff from the facility would like drain into the River. Could not verify, because of restrict access. KAD 11/12/95

1230 Travel to the Bellefontaine, AL approximately 3.5 to 4 miles southeast of the site. Noticed several residents with pumphouses in yards. Indicates private well usage as indicated by

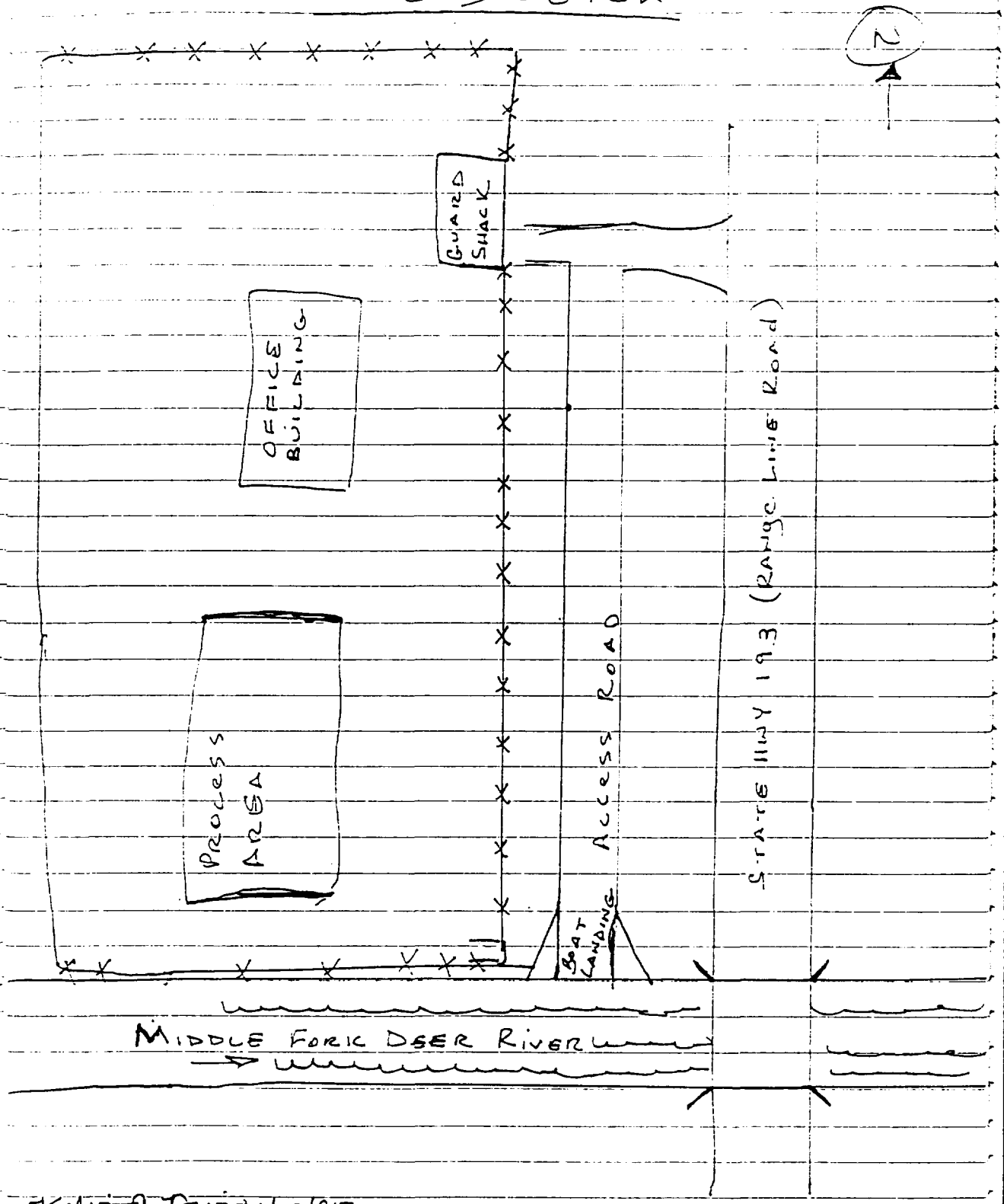
1330 Travel to the Hollinger Island area east of the site. Did not notice any private wells.

1400 Travel to St. Elmo, AL to the water dept. and met with the dept. supervisor, Don. Don said St. Elmo did serve in the 4 mile radius. Don said that private wells in the Bellefontaine area were drilled by R.M. Duct Hardware.

Kelvin A. Davis 11/12/95

SITE SKETCH

(5)



Kelvin A. Davis 1/12/95

1430 I called Mr. R. M. Duck and asked if he knew the average depths of private wells in the Bellefontaine area. Mr. Duck said the wells ranged from 80 to 90 feet in depth or an average of 85 feet. Mr. Duck said the water from these wells was of good quality. (205-565-6711)

1500 Travel to the Mobile Water Service System located in Mobile, AL. Met with Mr. Les Brown, Water Dept. Supervisor. Mr. Brown said they served approximately 81,304 customers or 220,334 people. Mr. Brown said there source potable water was surface water from the Big Creek Lake, a man-made lake constructed in 1950. Big Creek Lake is located approximate 14 25 miles west of Mobile and is 3600 acres in area size. Big Creek Lake is not a part of the 15-mile surface water pathway. Big Creek Lake can be found on the Tanner Williams Topo Quad

Kelvin A. Davis 1/12/95

Mobile County Water + Fire Protection Authority

Water Supply Wells

	Well No.	Location	Depth, Ft.	Capacity*(GPM+)
Blended	1	Freeway Heights	536	629
	2	Meadow Gay Subdivision	500	557
	3**	Clearview Drive	560	700
Blended	4	Highway 90	480	584
	5	Nan Gray Davis Road	540	494
	6	Old Pascagoula Road	250	603
				3.557

* Provided by Layne-Central Company
** Under Construction
\+ Gallons per Minute

The estimated existing consumption per capita (excluding new well and new connections) :

using 5,513 existing connections x 3.5 consumers connection

and an average daily production of 2.1 MGD =

92 gallons per day per capita (GPCD).

2. Water storage: The Authority currently maintains 4 elevated storage tanks as shown in Table II-2 on page II-3. Sizes of the existing tanks range from 100,000 gallons (0.10MG) to 500,000 gallons (.50 MG). All of the tanks are riveted or welded steel on concrete foundations. Existing tanks are in need of painting and some minor repairs, but are generally in good structural condition. Tank numbers 1, 3, and 5 were constructed in 1967-68, while Tank number 5 was constructed in 1984. (Tank numbers 2 and 4 have not been constructed.)

Kelvin A. Davis 1/12/95

Reference 10

1990 CPH-1-2

1990 Census of Population and Housing

Summary Population and Housing Characteristics

Alabama

Issued August 1991

U.S. Department of Commerce
Robert A. Mosbacher, Secretary
Rockwell A. Schnabel, Deputy Secretary

Economics and Statistics Administration
Michael R. Darby, Under Secretary
for Economic Affairs and Administrator

BUREAU OF THE CENSUS
Barbara Everitt Bryant, Director

Table 6. Household, Family, and Group Quarters Characteristics: 1990

[illegible]

State County Place and [In Selected States] County Subdivision	[illegible]	[illegible]	Family households			Nonfamily households				Persons per—		Persons in group quarters		
							Householder living alone							
								65 years and over						
	[illegible]	[illegible]	Total	[illegible]	[illegible]	Total	Total	Total	[illegible]	[illegible]	[illegible]	Total	[illegible]	[illegible]
The State	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.62	3.13	[illegible]	51 383	[illegible]
COUNTY														
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PLACE AND COUNTY SUBDIVISION														
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

NOTE: The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991.

WINDSHIELD SURVEY FORM

Reference 11

1. NAME OF SITE ON ERRIS: Kerr McGee Chemical Corp.

2. EPA I.D. NUMBER OF SITE: ALD 071 937 890

3. STREET ADDRESS OR DIRECTIONS TO SITE: (See attached map):
Theodore Industrial Park
P.O. Box 629

4. CITY: Theodore

5. COUNTY: MOBILE

6. STATE: Alabama ZIP CODE: 36590

7. TELEPHONE NUMBER: (205) 653-8820

8. PERSON CONDUCTING SURVEY: Steve Maurer - ADEM

9. DATE OF SURVEY: 7/9/85 TIME OF SURVEY: 10:20 A.M.

10. DESCRIPTION OF SITE AND SURROUNDING AREA: Active company, covers large area of industrial park, no nearby residences, people fishing along Middle Fork Deer River south of plant.

11. DESCRIPTION OF AREAS PHOTOGRAPHED: 1 photo to entrance off Range Line Rd. — Several photos from bridge over Middle Fork Deer River.

12. OTHER COMMENTS: (S.W. Foster, Manager, employs 101-150 people, Synthetic Rutile, established 1974 — source: 1982-83 Alabama Directory of Mining and Manufacturing)

i

Reference 12

KERR MCGEE CHEMICAL CORP.
LATITUDE 30:30:12 LONGITUDE 88: 7:54 1983 POPULATION

	C - 0.25	0.25-0.50	0.5-1	1-2	2-3	3-4	SECTOR
KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	TOTALS
S 1	0	0	0	0	0	0	0
S 2	0	0	0	0	0	0	0
S 3	0	0	0	0	1048	0	1048
S 4	0	0	0	0	0	0	0
S 5	0	0	0	1423	0	0	1423
S 6	0	0	0	0	0	0	0
S 7	0	0	0	0	0	0	0
S 8	0	0	0	0	0	6185	6185
RING TOTALS	0	0	0	1423	1048	6185	8656

press RETURN to continue
MENU: Geodata Handling Data List procedures
[illegible] (in parentheses) ([illegible])
or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS> exit

Type YES to confirm the EXIT command; type NO to restart GEMS
GEMS> yes
$ logout
HTW logged out at 9-JAN-1995 14:16:29.80
Itemized resource charges, for this session, follow:

NODE: VAXTM1
ACCT: 9040
PROJ: GEMS0001
USER: HTW
UIC: [000710,000012]
BAUD:

START TIME: 9-JAN-1995 14:15:41.35
FINISH TIME: 9-JAN-1995 14:16:29.80
BILLING PERIOD:950101
WEEKDAY: MONDAY
TERMINAL PORT: VTA1411

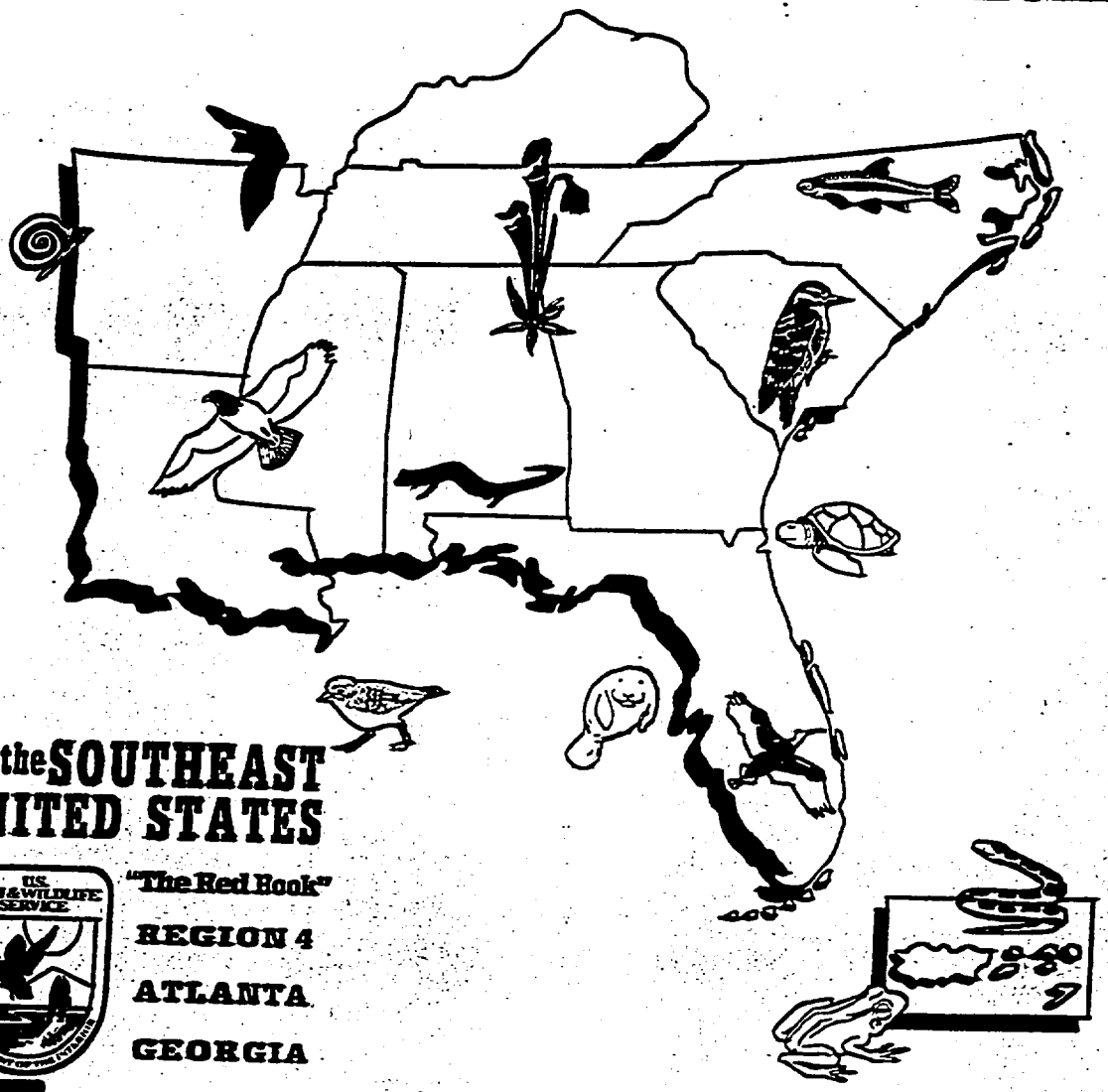
DESCRIPTION OF CHARGE		QUANTITY	EXPENDITURE
ALL CHARGE LEVELS			
300 baud	(Seconds)	48	0.0000
CPU TIME	(Seconds)	3	0.4983
TOTAL FOR THIS SESSION			$ 0.4983

** Note: This total reflects the charges for this process only, subprocesses created during this session are accounted for separately
CLR PAD

NO CARRIER

Reference 13

ENDANGERED & THREATENED SPECIES



of the SOUTHEAST UNITED STATES

U.S. FISH & WILDLIFE SERVICE

"The Red Book"

REGION 4

ATLANTA

GEORGIA

9300991

ENDANGERED AND THREATENED SPECIES

OF THE

SOUTHEASTERN UNITED STATES

(THE RED BOOK)

Prepared by:

U.S. Fish and Wildlife Service
Southeast Region
Atlanta, Georgia

January 1992

Availability Unlimited
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Federally Listed Species By State

ALABAMA

(E=Endangered; T=Threatened; CH=Critical Habitat determined)

Mammals	General Distribution
Bat, gray (Myotis grisescens) - E	Extreme North, East
Bat, Indiana (Myotis sodalis) - E	Extreme North
Manatee, West Indian (Trichechus manatus) - E	Coastal waters
Mouse, Alabama beach (Peromyscus polionotus ammobates) - E,CH	Coastal; Baldwin
Mouse, Perdido Key beach (Peromyscus polionotus trissyllepsis) - E,CH	Perdido Key
Panther, Florida (Felis concolor coryi) - E	Entire state
Whale, finback (Balaenoptera physalus) - E	Coastal waters
Whale, humpback (Megaptera novaeangliae) - E	Coastal waters
Whale, right (Eubalaena glacialis) - E	Coastal waters
Whale, sei (Balaenoptera borealis) - E	Coastal waters
Whale, sperm (Physeter catodon) - E	Coastal waters

Birds	
Eagle, bald (Haliaeetus leucocephalus) - E	Entire State
Falcon, American peregrine (Falco peregrinus anatum) - E	North
Falcon, Arctic peregrine (Falco peregrinus tundrius) - T	Entire State
Plover, piping (Charadrius melodus) - T	Coast
Warbler, Bachman's (Vermivora bachmanii) - E	Entire State
Wood, stork (Mycteria americana) - E	Entire State
Woodpecker, ivory-billed (Campephilus principalis) - E	South, West Central
Woodpecker, red-cockaded (Picoides [=Dendrocopos] borealis) - E	Entire State

Reptiles	
Alligator, American (Alligator mississippiensis) - T (S/A)*	Coastal plain

*Alligators are biologically neither endangered nor threatened. For law enforcement purposes they are classified as "Threatened due to Similarity of Appearance." Alligator hunting is regulated in accordance with State law.

	General Distribution
Snake, eastern indigo (Drymarchon corais couperi) - T	South
Tortoise, gopher (Gopherus polyphemus) - T	Choctaw, Mobile, Washington Counties
Turtle, Alabama red-bellied (Pseudemys alabamensis) - E	Mobile River system; Baldwin and Mobile Counties
Turtle, flattened musk (Sternotherus depressus) - T	Upper Black Warrior River system
Turtle, Kemp's (Atlantic) ridley (Lepidochelys kempii) - E	Coastal waters
Turtle, green (Chelonia mydas) - T	Coastal waters
Turtle, hawksbill (Eretmochelys imbricata) - E	Coastal waters
Turtle, leatherback (Dermochelys coriacea) - E	Coastal waters
Turtle, loggerhead (Caretta caretta) - T	Coastal waters
Amphibians	
Salamander, Red Hills (Phaeognatus hubrichti) - T	Covington, Conecuh, Butler, Crenshaw, Monroe Counties
Arthropods	
Shrimp, Alabama cave (Palaemonias alabamae) - E	Madison County
Fishes	
Cavefish, Alabama (Speoplatyrhimus poulsoni) - E, CH	Lauderdale County
Darter, boulder (Etheostoma (Nothonotus) sp - E	Lower Elk River System, Limestone County
Darter, goldline (Percina aurolineata) - T	Cahaba River System
Darter, slackwater (Etheostoma boschungi) - T, CH	Madison, Lauderdale, Limestone Counties

	General Distribution
Darter, snail (Percina tanasi) - T	Madison and Jackson Counties (Paint Rock R.)
Darter, Watercress (Etheostoma nuchale) - E	Jefferson County
Shiner, blue (Cyprinella caerulea) -T	Upper Coosa River System: Weogufka and Choccolocco Creeks, lower reach of Little River
Sturgeon, Gulf (Acipenser axyrhynchus) - T	Alabama River System, Mobile River System
Mollusks	
Mussel, Alabama lamp pearly (Lampsilis virescens) - E	Paint Rock River, Estill Fork, Hurricane Creek, Larkin Fork
Mussel, fine-rayed pigtoe pearly (Fusconaia cuneolus) - E	Paint Rock River
Mussel, inflated heelsplitter - Potamilius inflatus - T	Tombigbee and Black Warrior Rivers
Mussel Judge Tait's (Pleurobema taitianum) - E	Tombigbee River (bendway in Sumter County), Sipsey River
Mussel, Marshall's (Pleurobema marshalli) - E	Tombigbee River (bendway in Sumter County)
Mussel, orange-footed pimpleback (Plethobasus cooperianus) - E	Tennessee River
Mussel, pale lilliput pearly (Toxolasma [Carunculina] cylindrella) - E	Paint Rock River, Estill Fork, Hurricane Creek
Mussel, peni-tent (Epioblasma [= Dysnomia] penita) - E	Tombigbee River (bendway in Sumter County), and Buttahatchie River
Mussel, pink mucket pearly (Lampsilis obiculata) - E	Tennessee and Paint Rock Rivers
Mussel, rough pigtoe pearly (Pleurobema plenum) - E	Tennessee River

	General Distribution
Mussel, shiny pigtoe pearly (*Fusconaia edgariana*) - E	Paint Rock River
Mussel, stirrup shell (*Quadrula stapes*) - E	Tombigbee River (bendway in Sumter County), and Sipsey River
Snail, Tulotoma (*Tulotoma magnifica*) - E	Coosa River tributaries (Kelly Creek, St. Clair and Shelby Counties; Weogufka and Hatchet Creeks, Coosa County; Ohatchee Creek, Calhoun County; and between Jordan Dam and Wetumpka, Elmore County)

Plants

Amphianthus pusillus (little amphianthus) - T	Randolph, Chambers Counties
Clematis socialis (Alabama leather flower) - E	St. Clair, Cherokee Counties
Dalea foliosa (= Petalostemum *foliosum*) Leafy prairie-clover - E	Franklin, Morgan, Lawrence, and Jefferson Counties
Marshallia mohrii (Mohr's Barbara's buttons) - T	Bibb, Cherokee, Etowah Counties
Phyllitis scolopendrium var. *Americana* (American hart's tongue fern) - T	Jackson, Morgan Counties
Ptilimnium nodosum (harperella) - E	Dekalb County
Sagittaria secundifolia (Krai's water plaintain) - T	Dekalb, Cherokee Counties
Sarracenia *oreophila* (green pitcher plant) - E	Cherokee, Dekalb, Jackson, Marshall, Etowah Counties
Sarracenia rubra ssp. alabamensis Alabama canebrake pitcher-plant - E	Autauga, Chilton, Elmore Counties
Trillium reliquum (relict trillium) - E	Henry, Lee Counties
Xyris tennesseensis (Tennessee yellow-eyed grass) - E	Franklin County

US Army Corps
of Engineers
HUNTSVILLE DIVISION

Defense Environmental Restoration Program
for
Formerly Used Defense Sites

Ordnance and Explosive Waste
Chemical Warfare Materials

ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
(U.S. NAVAL AMMUNITION MAGAZINE)

Theodore, Alabama
Mobile County

Site No. I04AL005800
(I04AL317700)

SEPTEMBER 1993

Prepared by
US ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
(U.S. **NAVAL AMMUNITION MAGAZINE)**

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

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ORDNANCE AND EXPLOSIVE WASTE
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MAPS

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ORDNANCE AND EXPLOSIVE **WASTE**
CHEMICAL WARFARE MATERIALS
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THEODORE AMMUNITION TERMINAL
(U.S. NAVAL AMMUNITION MAGAZINE)

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

APPENDICES

A	**REFERENCES**
B	**ACRONYMS**
C	**REPORTS/STUDIES/LETTERS/MEMORANDUMS**
D	**NOT USED**
E	**NOT USED**
F	**NOT USED**
G	**PRESENT SITE PHOTOGRAPHS**
H	**NEWSPAPERS/JOURNALS**
I	**OEW RISK ASSESSMENT CODE FORM**
J	**REPORT DISTRIBUTION LIST**

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1.0 Introduction

1.1 Authority

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC 9601 et seq. Ordnance and explosive wastes are included in the CERCLA definition of pollutants and contaminants that require a remedial response.

In 1983, the Environmental Restoration Defense Account (ERDA) was established by Public Law 98-212. This Congressionally directed fund was to be used for environmental restoration at Department of Defense (DOD) active installations and formerly used properties. The DOD designated the Army as the sole manager for environmental restoration at closed installations and formerly used properties. The Secretary of the Army assigned this mission to the Corps of Engineers (USACE) in 1984.

The 1986 Superfund Amendments and Reauthorization Act (SARA) amended certain aspects of CERCLA, some of which directly related to OEW contamination. Chapter 160 of the SARA established the Defense Environmental Restoration Program (DERP). One of the goals specified for the DERP is "correction of environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment."

The DERP requires that a CERCLA response action be undertaken whenever such "imminent and substantial endangerment" is found at:

a. A facility or site that is owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense.

b. A facility or site that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination.

c. A vessel owned or operated by the Department of Defense.

The National Contingency Plan (NCP) was established by the Clean Water Act of 1972. The NCP has been revised and broadened several times since then. Its purpose is to provide the organizational structure and procedures for remedial actions to be taken in response to the presence of hazardous substances, pollutants, and contaminants at a site. Section 105 of the 1980 CERCLA states that the NCP shall apply to all response actions taken as a result of CERCLA requirements.

The March 1990 National Oil and Hazardous Substances Pollution Contingency Plan given in 40 CFR part 300 is the latest version of the NCP. Paragraph 300.120 states that "DOD will be the removal response authority with respect to incidents involving DOD military weapons

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and munitions under the jurisdiction, custody, and control of DOD."

On April 5, 1990, U.S. Army Engineer Division, Huntsville (USAEDH) was designated as the USACE Mandatory Center of Expertise (MCX) and Design Center for Ordnance and Explosive Waste (OEW). As the MCX and Design Center for OEW, USAEDH is responsible for the design and successful implementation of all Department of the Army OEW remediations required by CERCLA. USAEDH will also design and implement OEW remediation programs for other branches of the Department of Defense when requested. In cooperation with the Huntsville Division the U.S. Army Corps of Engineers St. Louis District has been assigned the task of preparing Archives Search Reports for those Formerly Used Defense Sites (FUDS) suspected of chemical warfare materials (CWM) contamination.

.1.2 Subject

The Theodore Ammunition Terminal is located near Mobile, Alabama in Mobile County. The Department of Defense acquired the property in 1942 and constructed an ammunition handling facility. The U.S. Army Chemical Warfare Service (CWS) used the site during 1946 to off-load captured German chemical munitions.

This installation has also been known as Mobile Ammunition Terminal, Theodore Backup Ammunition Storage Depot, Theodore Ammunition Loading Terminal, Theodore Ammunition Outloading Facility, U.S. Naval Magazine, Theodore, Alabama, and Theodore Ammunition Storage Annex.

.1.3 Purpose

This Archives Search Report (ASR) compiles information obtained through historical research at various archives and records holding facilities, interviews with individuals associated with the site or its operations, and personal visits to the site. All efforts were directed towards determining possible use or disposal of chemical warfare materials on the site. Particular emphasis was placed on establishing the chemical (agent), the type of munitions or container, quantities and area of disposal. Information obtained during this process was used in developing recommendations for further actions at the site.

.1.4 Scope

The entire area of the magazine was considered in assessing the potential for chemical warfare material contamination.

2.0 Previous site investigations

The U.S. Army Corps of Engineers, Mobile District has prepared the six Inventory Project Reports, listed below, to establish this site as a Formerly Used Defense Site (FUDS) under the Defense Environmental Restoration Program. The reports were prepared for various portions of the ammunition terminal. This same site is listed as the U.S. Naval Ammunition Magazine, DERP FUDS Project #I04AL317700.

1. Project #I04AL005801--The Alabama State Docks Department Property
2. Project #I04AL005802--The Kerr McGee Chemical Corporation Property
3. Project #I04AL005803--Turnpoint Basin Corporation
4. Project #I04AL005804--The Alamex Corporation Property
5. Project #I04AL005805--Miscellaneous Private Ownership Property
6. Project #I04AL005806--Miscellaneous Public Property

No other engineering or environmental study reports were found for this site.

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3.0 Site and site area description

3.1 Location

The Theodore Ammunition Terminal is located about 13 miles south of Mobile, Alabama along Mobile Bay. Figure 3-1 shows the general location of the site and Figure 3-2 shows the vicinity around the site.

3.2 Past uses

The U.S. Armed Services used the site beginning in 1942 to receive, store, and ship ammunition.

3.3 Current uses of site

The site is currently used for an industrial park and the U.S. Navy's Naval Station Mobile. The owners as listed in the Inventory Project Reports (INPR) are shown on Map M-3.

3.4 Demographics

3.4.1 Centers of activity

The major center of activity in Theodore is the Mobile County High School, located west of Highway 90. The city of Mobile, about 13 miles north, serves as the county seat and is the major center for activities.

3.4.2 Population density

The population data for the city of Theodore and Mobile County are as follows: (Source: 1990 Census)

City: Theodore	County: Mobile
Area: 12.3 sq. mi	Area: 1233.4 sq. mi
Population: 6,509	Population: 378,643
Density: 529 persons/sq. mi.	Density: 307 persons/sq. mi.

3.4.3 Types of business

Many of the businesses in the Theodore vicinity are located along Highway 90 on the

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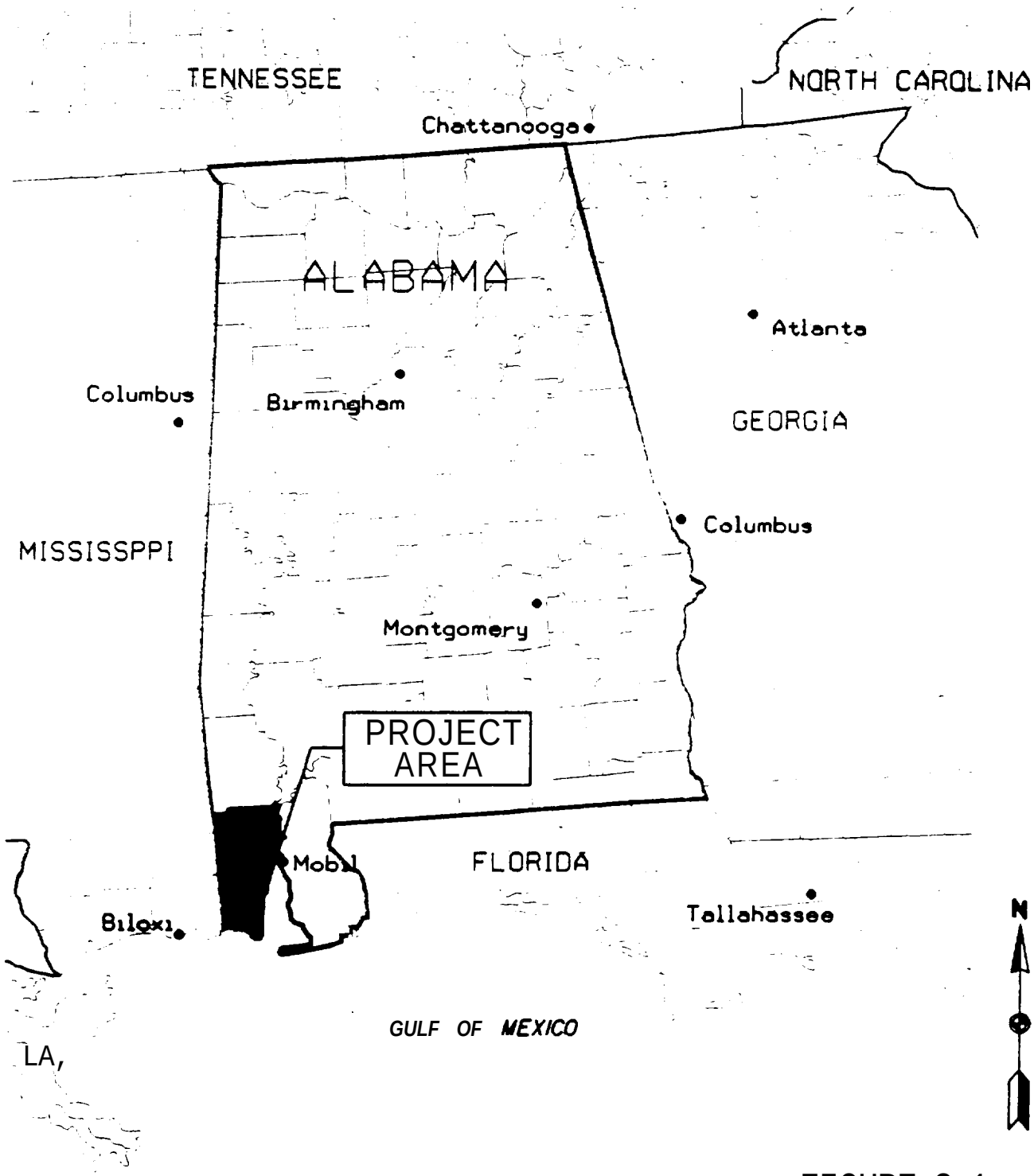
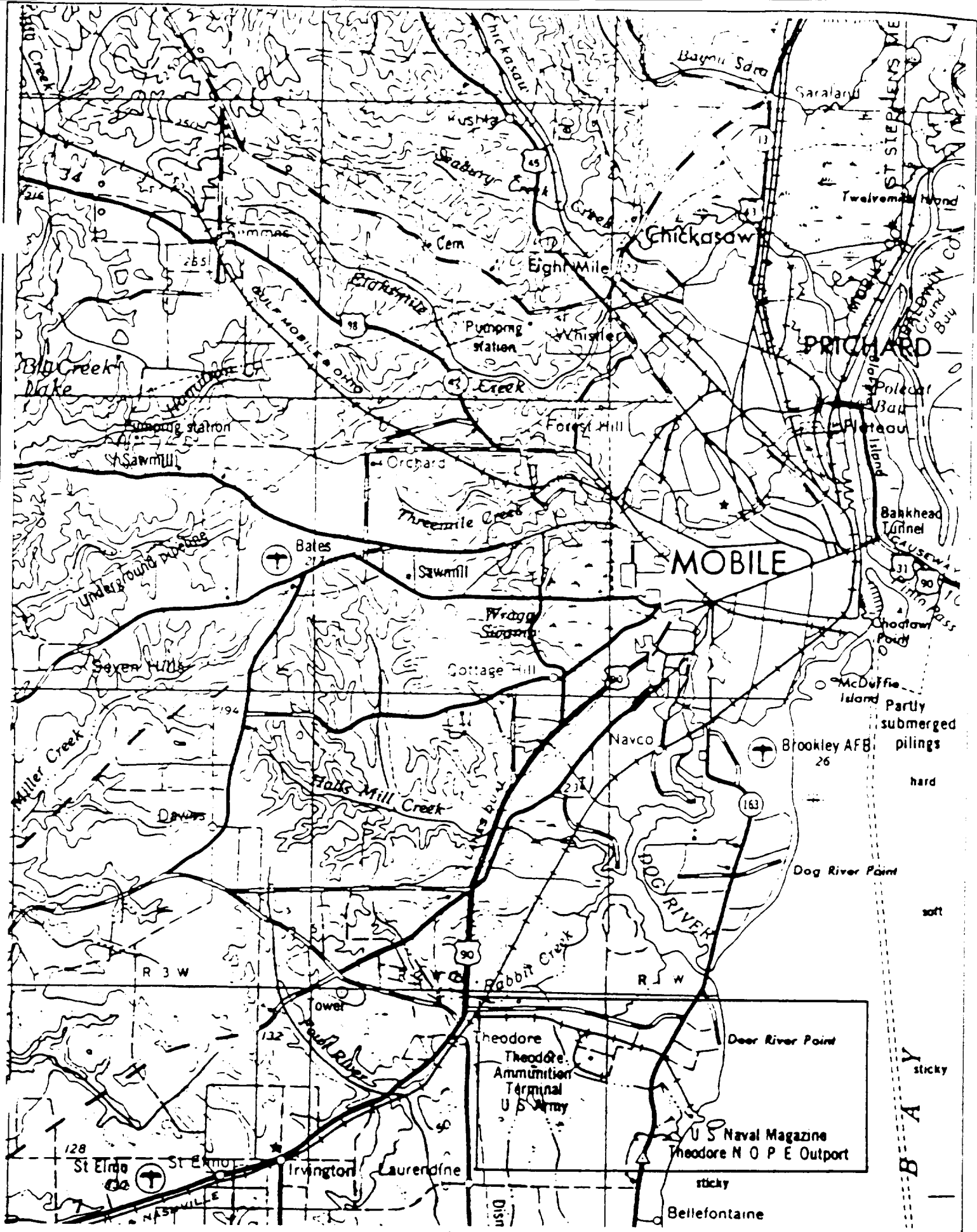


FIGURE 3-1

PROJECT LOCATION
THEODORE
MOBILE COUNTY, ALABAMA

DATE: DATE OF MAP 1973



SITE VICINITY MAP

FIGURE 3-2

THEODORE AMMUNITION TERMINAL

DERP FUDS #I04AL005800

3.4.4 Types of industry

Manufacturing and shipping are the two major industries in Theodore. The Theodore Industrial Complex contains three chemical companies, a cement plant, a paint manufacturing plant and other smaller related businesses. Some examples are: Mobile Paint Co., Kerr McGee Chemical, Barnett Millworks, and Holnam Cement. The Theodore Marine Terminal contains 5 companies that deal with the shipping and receiving of forest products. Some examples of businesses in the terminal area are: Gulf Forest Products, Delta Exports, and Etno Inc.

3.4.5 Types of housing

There are a total of 2,247 occupied housing units in Theodore. Of these, 67% are single-family detached dwellings, 22% are mobile homes, 10% are multi-family dwellings and 1% are single-family attached dwellings. The median dollar housing value in Theodore is $48,800 (Source: 1990 Census).

3.4.6 New development in the area

New developments in Theodore include the expansion of The Huls Chemical Co., offshore gas drilling, and the addition of an ice cream factory.

3.4.7 Typical cross-section of the population

The median age of Theodore is 31 with 30% of the total population under age 18, 41% from ages 18-44, 20% from ages 45-64, and 9% over the of 65.

3.4.8 Information sources for demographics

Theodore Industrial Complex (205) 443-4000
Forestry Services (205) 443-8021

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4.0 Physical characteristics of the site

4.1 Geology/physiography

The Theodore Ammunition Terminal in Mobile County, Theodore, Alabama is located on the Coastal Plain province (Thornbury, 1965). It is underlain by a thick sequence of unconsolidated to poorly consolidated sedimentary rocks that are post-Miocene in age (See Figure 4-1). These sediments thicken seaward from a featheredge where they crop out against older metamorphic and igneous rocks of the Piedmont and Applachain provinces. In southwestern Alabama, post-Miocene rocks are mostly a thick Pliocene-age sequence (1400 ft-thick) of coarse-grained fluvial, gravelly sands that locally contain interbedded clays, mostly near the base of the sand sequence. The regional dip is to the south-southwest at 15-25 feet per mile. This fluvial sequence is known as the Citronelle Formation. Most of these sediments are comprised of deltaic or estuarine sediments which are in turn capped by a thin layer of fluvial sand and/or residuum (Miller, 1986).

4.2 Soils

The majority of the site is underlain by soils which consist of poorly drained, nearly level soils on broad flats. The surface typically is a dark grayish brown silty clayey sand approximately seven inches thick. The subsurface layer to a depth of 17 inches is a gray silty clayey sand that is mottled brown and yellow. The subsoil is light gray sandy silty clay to 26 inches; light gray silty clay to 47 inches and to 72 inches, a light gray silty clay mottled with yellow, brown and red. These soils were formed in marine and fluvial sediments on uplands and terraces.

Permeability is moderate in the upper subsoil and moderately slow in the lower subsoil. There is moderate available water capacity with the water table being at or near the surface in winter and spring.

The potential for sheet and rill water erosion of the site soils is moderately high. These surficial sites are not susceptible to moderate wind erosion. The risk of corrosion to uncoated steel and to concrete is high.

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TABLE 4-1 NEAR-SURFACE SOIL PROFILE						
DEPTH (FT)	SOIL DESCRIPTION	PERCENTAGE PASSING SIEVE NUMBER			LIQUID LIMIT	PLAS-TICITY INDEX
		#4	#40	#200		
0 - 17.0	Dark grayish brown, SILTY CLAYEY SAND, (SM)	95-100	60-95	30-65	--	NP
17.0 - 72.0	Light gray SILTY CLAY with brown, yellow, and red mottling at base (CL-ML)	95-100	86-95	55-80	<25	2-7
SOURCE: SCS SOIL SURVEY OF MOBILE COUNTY, ALABAMA						

4.3 Hydrology

4.3.1 Groundwater

Groundwater in the alluvium, residuum, and Citronelle Formation is unconfined except where confined locally by lenses of clay. Artesian conditions prevail in aquifers at a depth of 65 feet or more. The groundwater is recharged from areas north where the aquifers are exposed at the land surface. Where capped by overlying alluvium or residuum, the recharge occurs through vertical leakage as well. Direction of flow, except where locally influenced, is to the south-southwest.

The permeability of the Citronelle Formation ranges from 7.62 x 10^{-4} to 1.5 x 10^{-3}. The permeability of the alluvium ranges from 1.461 x 10^{-2} to 1.000 x 10^{-5}. (See Figure 4-2). (Riccio, et al. 1973).

4.3.2 Surface water

The Middle Fork Deer River drains the terminal site into the adjacent Mobile Bay. The area is vulnerable to tidal surge flooding.

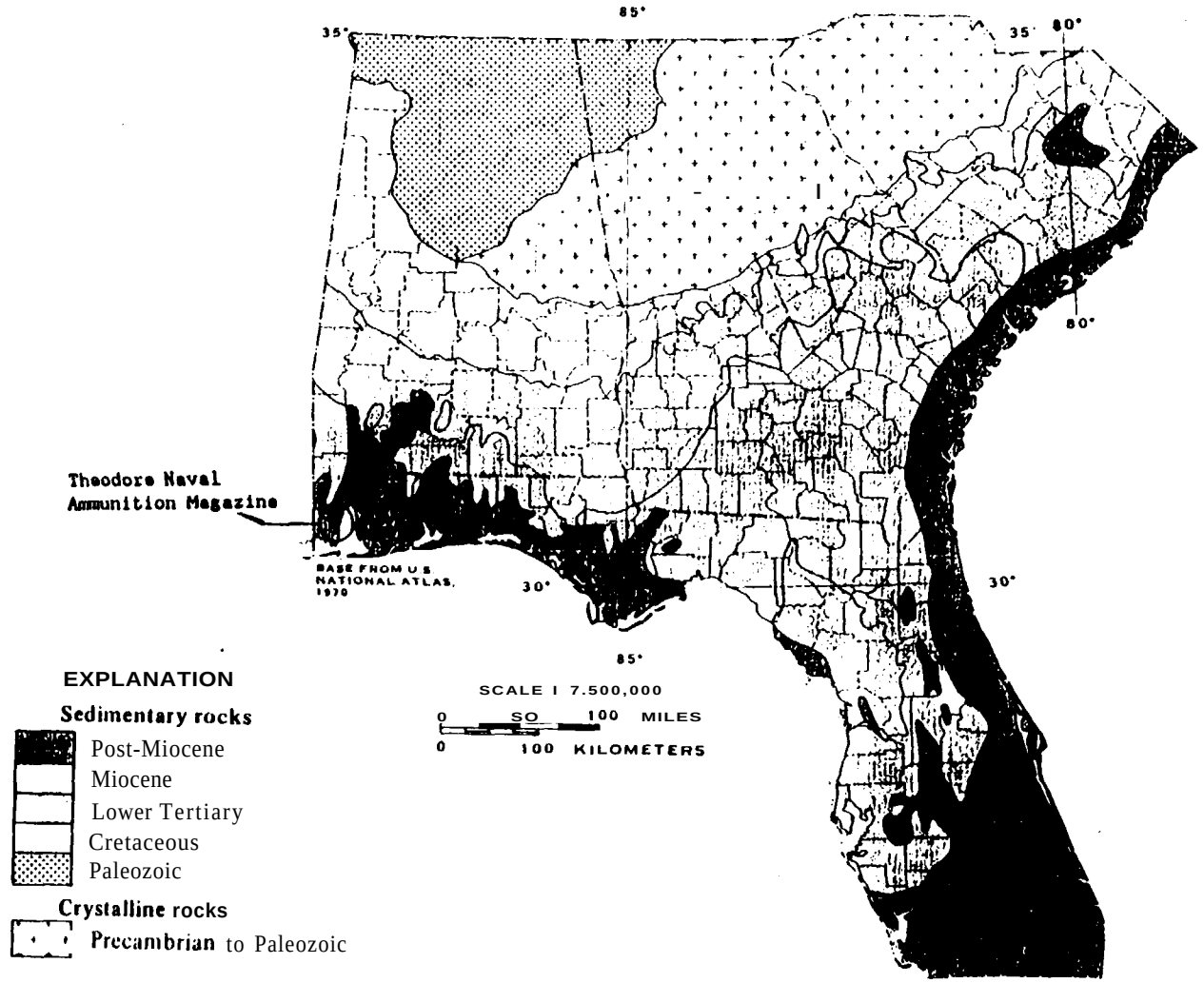

Figure 4-1: Generalized Geologic Map of the Southeastern United States (from: Miller, 1966).

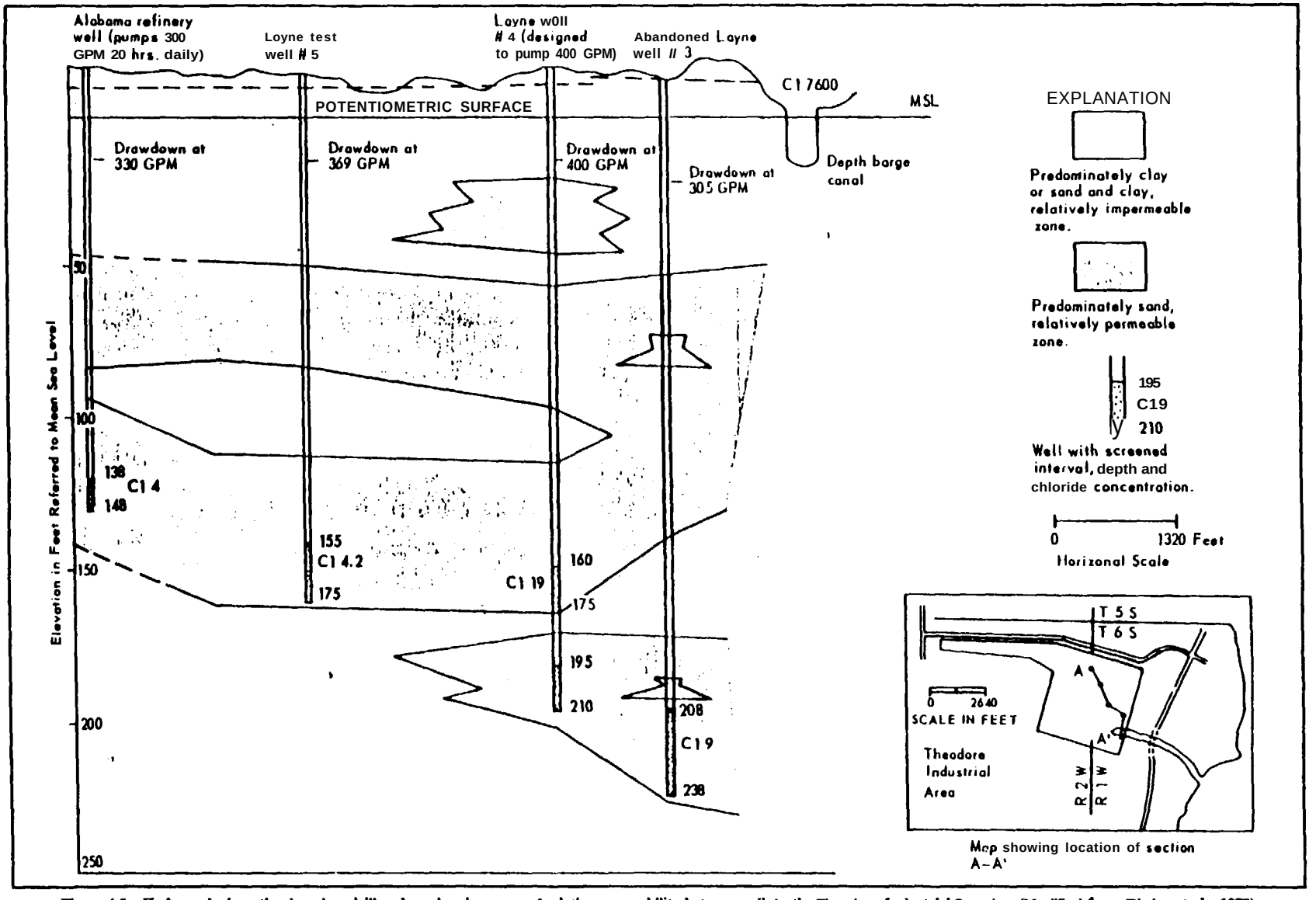

Figure 4-2: Hydrogeologic section based on drillers logs showing zones of relative permeability between wells in the Theodore Industrial Complex. (Modified from Rkdo, et al., 1973).

4.4 Weather

The climatic data collected at Mobil WSO AP, Alabama for the period of 1900-1992 shows an average annual precipitation of 65.12 inches. The rainfall is distributed relatively evenly throughout the year. Approximately 32 percent falls in July through September. The climate in the study area is subtropical, characterized by mild winters and warm humid summers. Average annual temperature for the area is about 65 degrees Fahrenheit. According to the data recorded at the Keesler Air Force Base, the mean winter wind speed is 5.7 knots, 92.3 percent of wind speeds are below 10 knots and the rest of wind speeds range between 10 to 21 knots. One knots equals 1.15 miles per hour. The base is located about 40 air miles west of the study area. The summarized climatic data for the study area are summarized in the following table:

CLIMATOLOGICAL DATA FOR MOBILE WSO AP, AL

MONTH	TEMPERATURE (°F) MONTHLY			PRECIPITATION (INCHES) MONTHLY		
	MAX	MIN	MEAN	MAX	MIN	MEAN
JAN	73	31	52	16.07	.98	4.84
FEB	72	34	53	11.89	1.47	5.37
MAR	77	44	60	13.46	.43	6.32
APR	85	51	68	17.69	.48	5.11
MAY	91	60	75	15.08	.45	5.52
JUN	94	66	80	13.07	1.19	5.41
JUL	94	70	82	19.29	1.72	7.70
AUG	96	70	83	15.19	1.46	6.87
SEP	92	64	78	14.04	.29	6.24
OCT	84	48	66	13.20	.00	2.75
NOV	76	40	58	13.65	.20	3.92
DEC	71	34	53	11.38	1.29	5.37
YEAR	79	54	66	86.58	42.35	65.12
YEARS OF RECORD	92	92	92	92	92	92

4.5 Ecology

The information provided for this site was attained from the U. S. Fish and Wildlife Service. The Alabama Natural Heritage Program was not able to provide information at this time due to funding limitations.

According to the U. S. Fish and Wildlife Services' records, there are no endangered or threatened species located within the vicinity of the Theodore Ammunition Terminal. However, many permanent streams, creeks, palustrine forested and scrub-shrub wetlands are

located on the Coden, Hollingers Island and Theodore sites. These wetlands and streams are closely associated with Mobile Bay and provide habitat for many migratory and wading birds and other fish and wildlife resources.

Currently, no additional information on the occurrence of rare or endangered species or natural communities is known at this time. This does not mean that state or federally-listed species may not be present within the area of interest. An on site inspection by appropriate state or federal personnel may be necessary to verify the presence, or absence or location of listed species, or natural communities if remedial action is recommended as part of the final ASR.

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5.0 Real estate

5.1 DOD ownership

The Theodore Ammunition Terminal comprised a total of 1920 acres and was acquired in fee by condemnation proceedings in the early 1940's. Map M-1 shows the original boundary of the reservation. The site was occupied by the Army in 1942 which constructed security fencing, patrol roads, wood and block buildings, wooden piers, Quonset huts, ammunition bunkers, and service/fueling facilities to accommodate military use. Map M-2 details the structures constructed and their locations. During World War n and the Korean Conflict the Army and the Navy used the facility for the receiving, storing, and shipping of ammunition. Excluding the period from 15 June 1944 to 26 March 1953, when the facility was operated by the Navy, the Theodore Ammunition Terminal was under the control of the Army until it was deactivated on 28 June 1964.

5.2 Present ownership

On 14 June 1965, the General Service Administration (GSA) conveyed 1824.96 acres of the facility to the Alabama State Docks Department (ASD) by quitclaim deed. Since then the ASD has resold about 1624 acres to various owners for industrial or transportation purposes. Map M-3 shows the property ownership presented in the INPR. GSA later conveyed, by quitclaim deed dated 14 April 1965, 50 of the remaining acres to the Department of Commerce, Bureau of Public Roads, for the construction of Alabama Highway 163 (Range Line Road). The balance of the property, about 43 acres, which contained a bauxite storage area, was transferred to the Public Building Services on 11 May 1965. These quitclaim deeds and transfers by GSA did not contain any restrictions, recapture clauses, or restoration provisions.

The Navy recently reacquired a portion of the original 1920 acre tract which contained the wooden pier. This portion was purchased in addition to other nearby lands for construction of the new Naval Station Mobile. This station is presently scheduled for closure under the Base Reduction and Closure (BRAC) program.

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6.0 OEW/CWM site analysis

6.1 Historical summary of OEW/CWM activities

6.1.1 Dates of operation

Theodore Naval Ammunition Magazine was located south of the city of Mobile, Alabama. In 1943, a 750-foot-long dock was built to handle shipments. The magazine was idled in 1955, used by Army reservists as a training site in 1963, and was shut down in 1964. In 1965, the Alabama State Docks purchased 1,800 of the roughly 1,900 acre magazine. In December 1990 and January 1991, the docks were sold and dismantled to make way for Naval Station Mobile. There were no reports of discovered munitions (Harrison, 1990).

6.1.2 CWM shipment to Theodore

In May of 1946, German mustard gas bombs were loaded onto the SS Francis L. Lee in Antwerp, Belgium for shipment to the United States. During the loading operations, several leakers were removed from the cargo (Chemical Warfare Service, SS Francis L. Lee Files, 1946). Despite this, the SS Francis L. Lee sailed for the United States on 20 May 1946 (CWS: Arthur, SS Francis L. Lee Files, 1946). The German mustard gas was loaded in 250 kg. and 500 kg. bomb cases marked with one or more red bands, which were not standard German bomb cases for chemical munitions (CWS: MacArthur, SS Francis L. Lee Files, 1946). These bomb cases were generally reported as 500-pound or 1000-pound bombs in reports by the U.S. military.

6.1.3 General operations

The SS Francis L. Lee crossed the Atlantic Ocean and docked at Theodore Naval Magazine. According to 1946 reports by Lt. Col. Arthur and Lt. Kutschinski of the Chemical Warfare Service, the SS Francis L. Lee docked at the U.S. Naval Magazine on 8 June 1946 and commenced to discharge its cargo on 11 June 1946. The original cargo was 3686 tons, all of which were captured German toxics, except approximately 79 tons of rockets, grenades, etc. Unloading proceeded without event until sometime between 14 and 16 June 1946 when the first casualties among the civilian stevedore crews were sustained. Upon opening of the hatches, routine tests were performed to determine whether or not chemical contamination was present. All preliminary tests were negative and a considerable portion of the upper hold areas were unloaded without obtaining positive indication of chemical contamination (CWS: Arthur and Kutschinski, SS Francis L. Lee Files, 1946). It was not until unloading had reached the lower holds of the SS Francis L. Lee that the first presence of toxic vapor was detected. Leakers were removed from the holds of the ship and placed on the docks of Theodore Naval Ammunition Magazine. During an inspection of the leakers, Lt. Col. White of the Chemical Warfare Service noticed several bombs leaking fine hair-line spray streams of mustard gas (CWS, SS Francis L. Lee File, 1946).

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The reports by Lt. Col. Arthur and Lt. Kutschinski further illustrate the problems encountered. From 11 June 1946 to 15 July 1946, 2973 tons had been unloaded and shipped to CWS Arsenals. However, many "leakers" had been discovered. A report by the 9710 Technical Service Unit of the CWS also noted that leakers were removed from the ship during operations from 24 to 27 June, which caused some injuries (9710 Technical Service Unit CWS, SS Francis L. Lee File, 1946).

At the time of an inspection in July 1946, the general situation seemed to be under control. Each bomb removed from the hold was inspected to ascertain whether or not it was leaking. Although portions of the dock had been contaminated during the unloading operations prior to the inspection, constant decontamination made the dock area safe for work. At the time of the inspection 137 one-thousand pound leaking bombs, 12 five-hundred pound leaking bombs as well as 8 five-hundred pound bombs which were vapor leakers were under surveillance pending decision of the Office of Chief, Chemical Warfare Service as to their disposal (CWS: Arthur and Kutschinski, SS Francis L. Lee File, 1946).

On 18 July 1946 it was estimated that approximately 400 to 500 tons remained aboard the SS Francis L. Lee. An estimated total of 910 tons, including the approximately 400 to 500 tons on board the SS Francis L. Lee, was at the U.S. Naval Magazine for shipment to Pine Bluff Arsenal. Of the estimated 910 tons to be moved, all bombs were thought to be toxic bombs except for 69 tons of fuses, bursters, rockets, etc. A portion of the 910 tons of cargo were contained in 10 or 11 carloads of leakers which were being held in the U.S. Naval Magazine Railway Yards pending development of means for disposal in the general vicinity of Mobile (CWS, Francis L. Lee File, 1946). The leaking bombs and contamination were such a problem that for a while the Chemical Warfare Service was considering having the ship taken out to sea and sunk (CWS: MacArthur, SS Francis L. Lee File, 1946).

6.1.4 Injuries

Many people working on the unloading of the SS Francis L. Lee sustained injuries from the leaking mustard gas bombs. Most of the injuries were sustained by the civilian stevedores, who found it very difficult to resist removing protective equipment and masks because of very hot weather. However, most of the injuries were minor in nature. Captain Helm of the Medical Corps reported 182 injuries as of 28 July 1946, but only 9 required hospitalization. Captain Helm was of the opinion that all cases resulted from carelessness on the part of the workers (CWS, SS Francis L. Lee File, 1946). The number of injuries continued to rise during the unloading operation. Captain Helm estimated 241 injuries plus or minus 10 on 23 July 1946 (CWS, SS Francis L. Lee File, 1946). A later report by Captain Wood of the Medical Corps had recorded 337 individuals examined because of injury by mustard gas(Medical Corps: Wood, SS Francis L. Lee File, 1946). The final estimate of injuries sustained because of the leaking German mustard gas bombs was 435 cases, 375 of which were at Theodore Naval Magazine(CWS: MacArthur, SS Francis L. Lee File, 1946).

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6.1.5 Emergency dumping

The leaking German mustard gas bombs caused so many injuries and were such a problem that two dumps had to be made away from the Naval Magazine. On 15 or 16 July 1946, thirty 1000-pound bombs and three 500-pound bombs were dumped into the Gulf of Mexico at least 20 miles from the Alabama coast. During the dump, one bomb was ruptured by the lift taking it out of the vessel (CWS, SS Francis L. Lee File, 1946).

Two Mobile Bar Pilots mentioned to Lt. Col. Arthur and Lt. Kutschinski of the CWS that two objects resembling bombs in crates had drifted by their boat when it was anchored about 8 miles off of the mouth of Mobile Bay. One bomb later showed up on the beach, and the civilian who spotted it notified the Naval Magazine. It was recovered and found to be empty and clear of contamination. The bomb was disposed of on Horn Island, Mississippi. The second reported bomb was searched for by jeep along the beach for 30 miles but nothing was found. On 4 August Lt. Col. Arthur flew in the bombardier's cockpit of a low-flying plane and searched Mobile Bay and the shoreline from the western tip of Horn Island to Pensacola, Florida. No bomb or bomb crate was found (CWS: Arthur and Kutschinski, SS Francis L. Lee File, 1946).

Orders from the Office of Chief, Chemical Warfare Service on 19 July 1946 arrived showing that the War Department had stopped shipping toxic German munitions to the U.S. and that all munitions at depots presenting an undue hazard were to be destroyed locally. On 20 July 1946 workers began to load about 120 leaking mustard bombs at Theodore Naval Magazine onto a barge. The barge was sent to Horn Island, Mississippi, where they were burned (CWS: Waitt, SS Francis L. Lee File, 1946). This disposal operation is more completely described in report DERP #MS0142.

6.1.6 The Francis L. Lee departs Theodore

Orders arrived at Theodore Naval Magazine to reload all munitions that had not yet been shipped by railway back into the SS Francis L. Lee. By 0530, 22 July 1946 all munitions had been reloaded and together with the munitions that were never unloaded from the ship, the munitions totaled 683 tons. The ship was tested with the M-9 Detector Kit and was found to be free of dangerous concentrations of mustard, except for the holds which had been sealed (CWS: Arthur and Kutschinski, SS francis L. Lee File, 1946).

The ship sailed for the Charleston, South Carolina depot, but was denied docking. Another ship from Antwerp had arrived there about the time the SS Francis L. Lee arrived in Theodore, and the same problem with leakers had occurred. The SS Francis L. Lee then headed for Edgewood Arsenal. The SS Francis L. Lee arrived at Edgewood Arsenal under tow, anchoring at 1700 on 5 August at the mouth of the Bush River (CWS: MacArthur, SS Francis L. Lee File, 1946).

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6.1.7 Theodore decontamination

There were 16 railroad cars that were contaminated due to leakers after loading at Theodore Naval Magazine. By 23 July 1946 all railroad cars at Theodore Naval Magazine had been decontaminated and shipped to Huntsville Arsenal. Preparations were being made to decontaminate the dock and adjacent facilities. As a Transportation Corps barge of leakers was prepared for shipment to Horn Island, complete decontamination of the Theodore Naval Magazine was underway in earnest. The dock area, a pile of "suspected leakers" and the barge with the leakers aboard were well sprayed with decontaminating slurry (CWS, SS Francis L. Lee File, 1946).

All contaminated dunnage removed from the SS Francis L. Lee and contaminated shoring from the railway cars were destroyed by burning. On August 2, Lt. Col. Alien of the CWS inspected the docks and adjacent area with chemical tests and found no harmful levels of contamination (CWS: Alien, SS Francis L. Lee File, 1946). Another inspection using the M-9 Detector Kit on August 3 also found no harmful levels of contamination (CWS: Arthur and Kutschinski, 1946). Lt. Col. Alien declared the decontamination of Theodore Naval magazine satisfactory.

6.1.8 Rail shipments

The reason that the SS Francis L. Lee docked at the Theodore Naval Magazine was to unload its cargo and have it shipped by railroad to Chemical Warfare Service Depots. Due to the number of leaking bombs removed from the SS Francis L. Lee, responsible officials inspected each bomb before it was loaded into a rail car and each rail car before it left Theodore to make sure that it was not contaminated with liquid mustard or mustard gas vapors. Shipments of about 2500 tons of bombs had been made to Pine Bluff without incident until 11 or 12 July 1946 (CWS: Arthur and Kutschinski, SS Francis L. Lee File, 1946).

On that trip, a ten car shipment had one car develop a leaking bomb that was detached at Panola, Alabama. After that, another car was discovered with a leaker at the Amory, Mississippi switchyard, which was moved to the Bigbee, Mississippi siding. A 1000-pound bomb was discovered leaking which was buried at Columbus Air Base, Mississippi Military Reservation. The remaining eight cars headed for Pine Bluff, when in Memphis three of these eight can were discovered to have leakers. All eight cars were moved to an isolated area at Memphis General Depot Reservation (CWS: Arthur and Kutschinski, SS Francis L. Lee File, 1946). The results of this disastrous rail trip were an additional 28 injuries at Amory and 32 at Memphis trying to handle the leaking bombs (Medical Corps: Waitt, SS Francis L. Lee File, 1946). The total of all rail shipments from the holds of the SS Francis L. Lee while at Theodore Naval Magazine was 2973 tons of toxic munitions (CWS, SS Francis L. Lee File, 1946).

6.2 Records review

Alabama State Archives
Montgomery, Alabama

County Files, Mobile County
Records

SG6895, Folder 233 - Navy (no help)
SG6896, Folder 255 - Ports and Docks (no help)
SG6397, Folder 314 - Theodore, Folder 345 - Mobile County World War II (no help)
SG6888: Folder 9 "Army", "Transportation reservists Train Here", The Mobile Press Register, July 28, 1963, E:l.

Adjutant General Administrative Files

1937: 663 - Magazines (no help)

Map Files:

CD-67 Mobile County Maps
CD-776 Theodore Insurance Map, 1 Oct. 1955 (no help)
CD-?? USGS 7.5' Quadrangles: T.9 Theodore Quadrangle, H.24 Hollinger's Island

Chemical Biological Defense Agency
Historical Office
Edgewood Arsenal, Maryland

A major bound file on the SS Francis L. Lee consisting of dozens of documents: "Receipt of German Toxic Gas Munitions at Mobile, AL and Shipment of these Munitions to Pine Bluff Arsenal", date Re: SS Francis L. Lee June 1946 to August 1946, Miscellaneous File Cabinet.

"Significant Post War Missions", author unknown. Cabinet 43, Drawer 1 - Organizational History Files, Technical Escort Unit 1942-1965

Alabama State Docks
Mobile, Alabama

Drawing of proposed shipping canal imposed on Hollinger's Island U.S.G.S. 7.5' Quadrangle. Date and author unknown.

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Naval Facilities Engineering
Alexandria, VA

Fact Sheet on Real Estate of Mobile Ammunition Terminal, from files at Naval Facilities Engineering.

Mobile Public Library
Mobile, Alabama

Press Register Staff
1946 Army Keeps Sharp Eye On Navy Dump Workers. *Mobile Press Register* (Mobile, AL), 14 July: 1B.

Harrison, Royce
1990 Munitions dock being dismantled. *The Mobile Register* (Mobile, AL), 14 December: 13A.

Patterson, Bill
1993 Chemical Keystone Cops. *The Harbinger* (Mobile, AL), 13 - 26 July: 1.

Register Staff
1946 Mustard Gas Bomb Cargo To Be Reloaded On Ship. *The Mobile Register* (Mobile, AL), 20 July: 1A.

United Press
1946 Mustard Gas Shipments Impounded At Memphis. *The Mobile Register* (Mobile, AL), 16 July: 1A.

Associated Press
1946 Soldiers Unload Gas Bomb Cargo. *The Mobile Press* (Mobile, AL), 16 August: 1A

Register Staff
1946 8 More Workers Suffer Gas Burns Unloading Vessel. *The Mobile Register* (Mobile, AL), 15 July: 1A

Register Staff
1946 Gas Cargo Sent From Mobile Denied Entry at Charleston *The Mobile Register* (Mobile, AL) 2 August: 1A

Register Staff
1946 More Than 20 Persons Burned By German War Gas; Chemical Warfare Experts Sent Here By Airplane. *The Mobile Register* (Mobile, AL) 19 June: 1A

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Register Staff
1946 **GI** badly **Burned** From Mustard Gas. *The Mobile Register* (Mobile, **AL)** 14 **June:**1A

Register Staff
1946 Nine More **Burned** From Mustard Gas. *The Mobile Register* **(Mobile,** AL) 12 **July:1A**

Register Staff
1946 Theodore. *The Mobile Register* (Mobile, AL) 12 **July: 1A**

Register Staff
1946 Seaman Wants Bonus To Work At Naval Dump. *The Mobile Register* (Mobile, **AL) 6 July:1A**

Register Staff
1946 Brakeman Suffers Gas Burns As Liquid Spills From Car. *The Mobile Register* (Mobile, **AL)** 5 **July: 1A**

Press Staff
1946 Seven More Are Burned Here By German Poison Gas Cargo. *The Mobile Press* (Mobile, AL) 4 **July: 1A**

Register Staff
1946 Gases, Injuring 23 Here, Burned Antwerp Seamen. *The Mobile Register* (Mobile, AL) 21 **June: 1A**

Register Staff
1946 Gas Victims To Recover, Army Officer Announces. *The Mobile Register* (Mobile, AL) 20 **June:4A**

McDonnell, Harry
1968 Theodore Park To Get $3 Million State Docks Unit. *The Mobile Press* (Mobile, AL) 26 January: **1A**

Mobile District Corps of Engineers
Mobile, Alabama

Patterson, Bill
1993 Ghosts From The Outlaw Ship. *The Harbinger* (Mobile, AL) 17 **August:** 1

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6.3 Summary of interviews

There were no interviews conducted for this site.

6.4 Site inspection

The following Corps of Engineers personnel inspected the former Theodore Ammunition Terminal site on 19 August 1993:

Mr. Thomas Freeman, St. Louis District
Mr. Patrick O'Donnell, St. Louis District
Ms. Shelia Thomas, St. Louis District
Mr. Ellis Pope, Mobile District

The site inspection team proceeded to the U.S. Naval Station Mobile to begin the inspection of the terminal. The Navy provided an escort to get us out to the former dock area, since this is now part of their property. After the appropriate site and safety briefing the entire group went to the dock area. Essentially all of the wooden dock has been removed and disposed of off-site. Only a portion of the wooden bulkhead retaining wall, in addition to a concrete and brick power and pumping building, remains. The railroad siding servicing the dock has been torn up and the rail bed has been regraded and paved over on the Navy property. Pictures taken during the site inspection are included in Appendix G.

Leaving the Navy property we continued to follow the former rail line for a short distance west. Through this area the rails and bed had been completely removed and the underlying ground extensively reworked. Outside the Navy portion of the site a considerable amount of industrial development has occurred on the site. As part of this development a new shipping channel was dredged just south of the old rail line and in front of the old dock. It appeared that some of the dredged materials had been spread on both sides of the new channel. Leaving the railroad right-of-way area we proceeded to the old bunker area. This portion of the former magazine has been used for the construction of a large chemical processing plant. Only 6 of the 20 original ammunition bunkers remain and these are being utilized by the Kerr-McGee Corporation. Kerr-McGee had indicated to Mobile District that they did not see any need for their property to be considered for any remediation work.

Several new highways have been constructed across the subject site. Mr. Pope indicated that he had not heard of any munitions being found during construction on the site. The entire inspection team left the site and returned to the District office.

6.5 Air photo interpretation

Air photos from 1952, 1975, 1984, and 1993 were reviewed for the Theodore Ammunition Terminal site. The 1952 air photo was taken while the facility was still active. Numerous rail cars are lined up along the tracks coming into the bunker area. Rail cars are also positioned in front of individual bunkers. A large ship is berthed next to the wooden dock. There is little other development in the area.

At the time of the 1975 photo there appears to be a large construction project in progress in the bunker area. Many of the bunkers have been removed and a considerable amount of excavation is evident. Work had also begun on digging the shipping channel through the area.

The photo in 1984 shows the shipping channel and several industrial complexes adjacent to the former terminal property completed.

The 1993 photo shows the area as it is presently developed. The wooden loading pier has been removed and the Naval Station is being constructed in the area immediately adjacent to it. A considerable length of the railroad track has been removed. Most of the ordnance storage has been extensively used for the construction of a large industrial plant and appurtenant holding basins.

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7.0 Evaluation of contamination

7.1 CWM contamination

Historical documents indicate that the ship SS Francis L. Lee brought 3686 tons of munitions to the Theodore Ammunition Terminal in June 1946. Documents concerning the operations are contained in Appendix C. Captured German mustard agent accounted for 3607 tons of the total. Approximately 2500 tons of the chemical munitions had been shipped to CWS arsenals before any leaking problems began. After the leaking bombs were uncovered considerable contamination occurred at the Theodore Ammunition Terminal dock. The CWS continually neutralized the spilled agent in order to make the area as safe as possible. Injuries at the dock totalled 375 by the time the operation was completed. Newspaper articles about the Theodore unloading operations and its problems are included Appendix F-1.

Two batches of severely leaking bombs were disposed of close by. The first batch, 30 1000-pound bombs and 3 500-pound bombs, were dumped in the Gulf of Mexico some 20 miles south of Mobile. An empty casing from this batch washed up onto a nearby shore some days after dumping. The CWS recovered the casing, and after receiving negative contamination tests, disposed of it. One other bomb was reported drifting in this area, but it was never found, even though the beach was searched from Horn Island, MS to Mobile Bay. The second batch of 133 bombs, 106 1000-pound ones and 27 500-pound ones, were destroyed in a special operation on Horn Island, Mississippi. A Corps of Engineers, St. Louis District, archives search report (DERP FUDS #I04MS014200), dated April 1993, details the destruction of the munitions there.

The SS Francis L. Lee was dispatched on 22 July 1946 from Theodore to travel to Edgewood Arsenal with 683 tons of chemical weapons on board. All weapons brought to Theodore can be accounted for through the various shipments and disposals that took place.

In 1990 the wooden dock at Theodore Ammunition Terminal was torn down as part of the construction of the new Naval Station Mobile. A newspaper article showing the dock during its dismantling is included in Appendix F-2. Only a very small portion of the massive wooden dock remains at the tie-in to the railroad embankment. Map M-4 is a 1993 air photo of the terminal.

8.0 Conclusions and recommendations

8.1 Conclusions

8.1.1 CWM materials

The quantity of chemical munitions brought to the Theodore Ammunition Terminal on board the ship SS Francis L. Lee can all be accounted for between the shipments to CWS arsenals and disposals in nearby areas. The wooden dock where all of the munitions were handled after unloading was decontaminated by the CWS after the operations. The dock was dismantled and removed from the site during the construction of the Naval Station Mobile in 1990.

8.1.2 Conventional munitions

Extensive construction and excavation has taken place at the site of the Theodore Ammunition Terminal storage bunkers. The Kerr McGee corporation developed a chemical processing facility at the location. Only 6 of the original 20 bunkers remain and these are being beneficially used by Kerr McGee. There have been no reports of any munitions being found during construction.

8.1.3 Site conclusions

Based upon historical documents, air photo interpretation, interviews with people familiar with the site, and a personal inspection there does not appear to be any chemical warfare materials or other munitions remaining at the terminal.

8.2 Recommendations

The Risk Assessment Procedures for Ordnance and Explosive Waste (OEW) Sites Form, dated 10 February 1993, has been prepared for the Theodore Ammunition Terminal and is included in Appendix I. Based on the best available data a score of RAC 5 has been determined for this site. RAC 5 indicates that no further action is recommended. We concur with this assessment.

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MAPS / DRAWINGS

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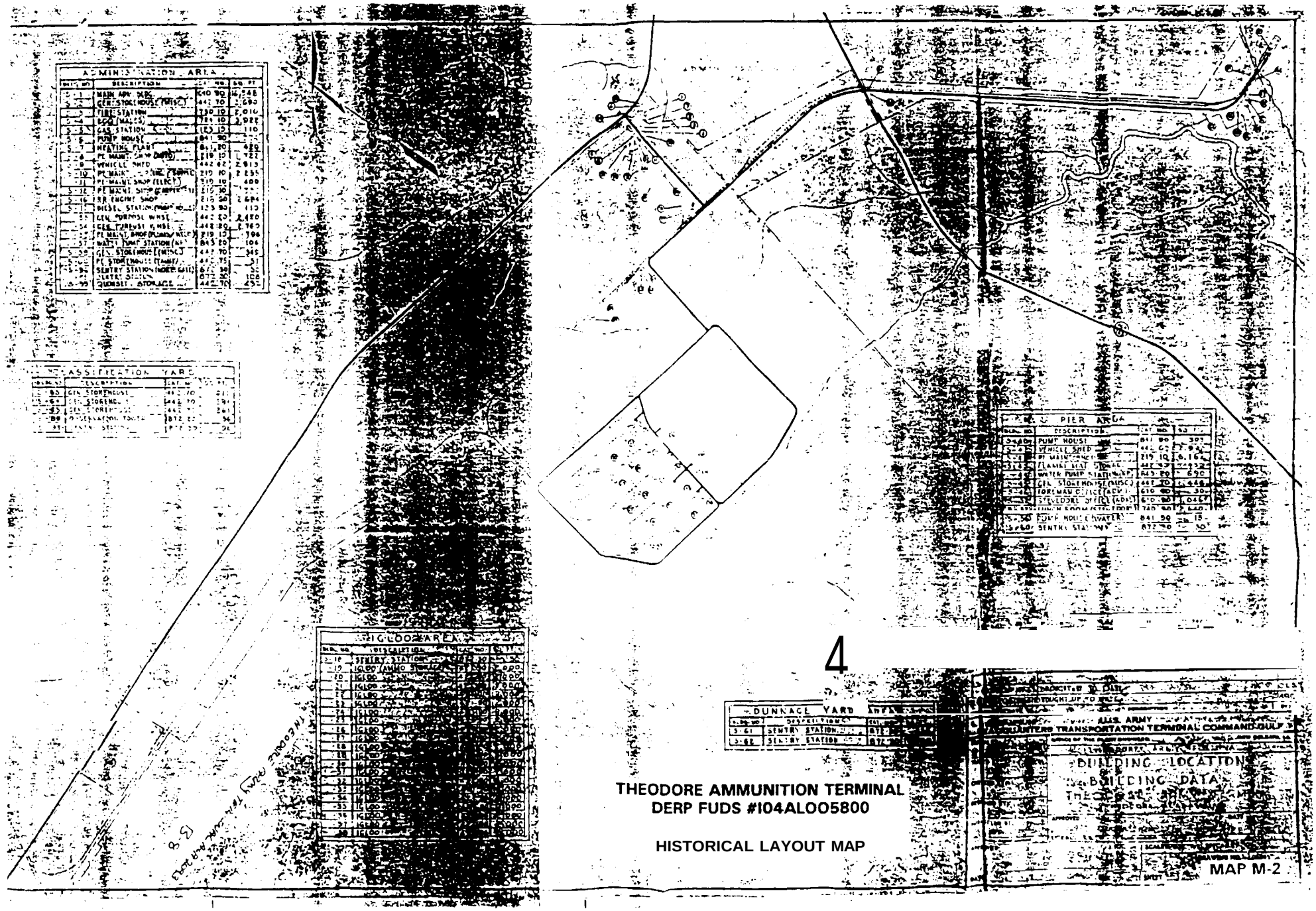
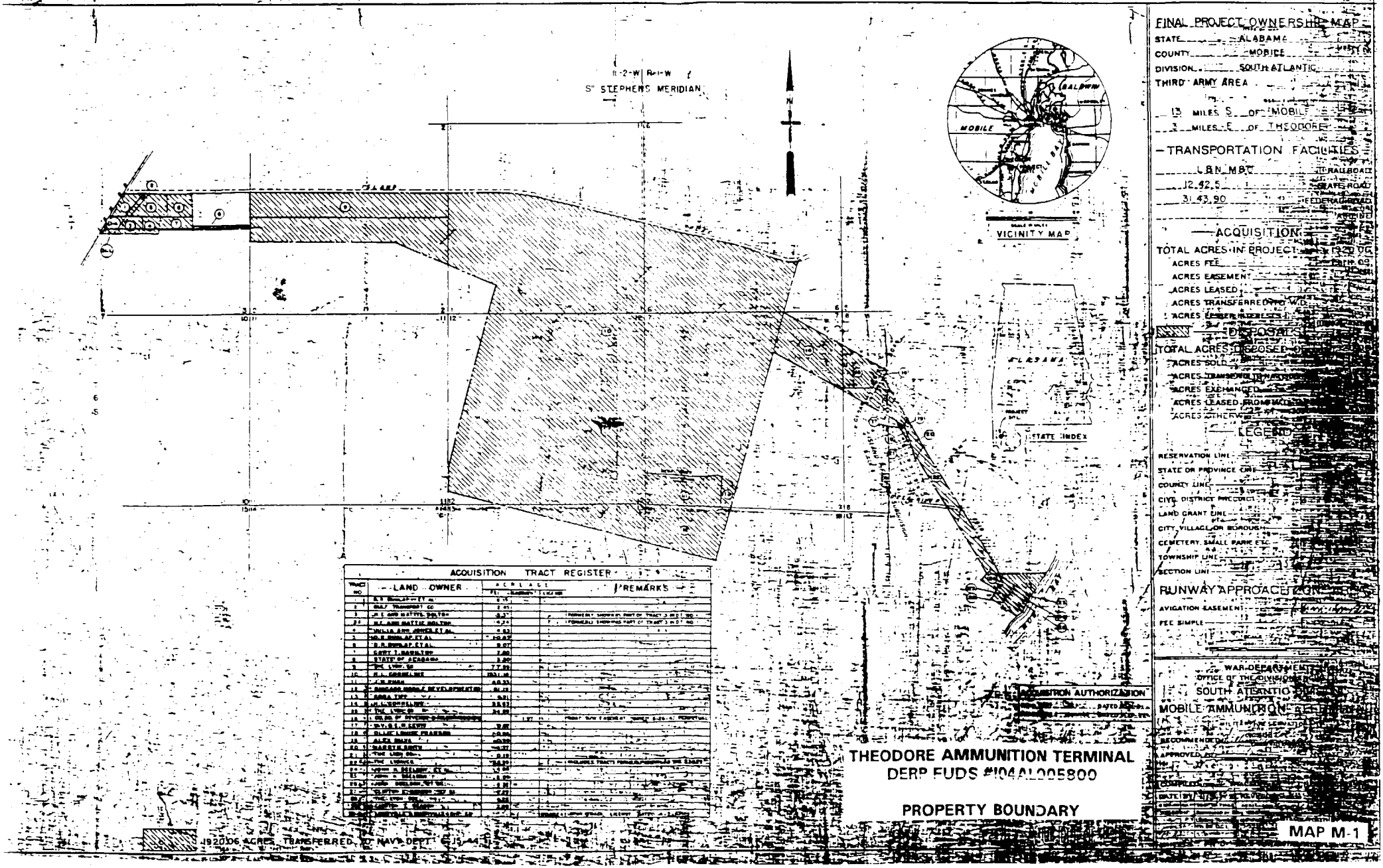


THEODORE AMMUNITION TERMINAL
DERP FUDS #I04AL005800

HISTORICAL LAYOUT MAP

MAP M-2



FINAL PROJECT OWNERSHIP MAP
STATE ALABAMA
COUNTY MOBILE
DIVISION SOUTH ATLANTIC
THIRD ARMY AREA
13 MILES S OF MOBILE
3 MILES E OF THEODORE
TRANSPORTATION FACILITIES
L&N M&O RAILROAD
12.42.5 STATE ROAD
31.43.90 FEDERAL ROAD
ACQUISITION
TOTAL ACRES IN PROJECT
ACRES FEE
ACRES EASEMENT
ACRES LEASED
ACRES TRANSFERRED TO W.D.
ACRES FEWER INTERESTS
DISPOSALS
TOTAL ACRES DISPOSED OF
ACRES SOLD
ACRES TRANSFERRED TO NAVY
ACRES EXCHANGED
ACRES LEASED FROM W.D.
ACRES OTHERWISE
LEGEND
RESERVATION LINE
STATE OR PROVINCE LINE
COUNTY LINE
CIVIL DISTRICT PRECINCT
LAND GRANT LINE
CITY, VILLAGE OR BOROUGH
CEMETERY, SMALL PARK ETC.
TOWNSHIP LINE
SECTION LINE
RUNWAY APPROACH ZONE
AVIGATION EASEMENT
FEE SIMPLE
WAR DEPARTMENT
OFFICE OF THE DIVISION
SOUTH ATLANTIC
MOBILE AMMUNITION
RECOMMENDED
APPROVED
MAP M-1
VICINITY MAP
BALDWIN
MOBILE
MOBILE BAY
ALABAMA
STATE INDEX
S. STEPHENS MERIDIAN
ACQUISITION TRACT REGISTER
TRACT NO
LAND OWNER
ACREAGE
REMARKS
ACQUISITION AUTHORIZATION
THEODORE AMMUNITION TERMINAL
DERP FUDS #104AL005800
PROPERTY BOUNDARY
1920.06 ACRES TRANSFERRED TO NAVY DEPT

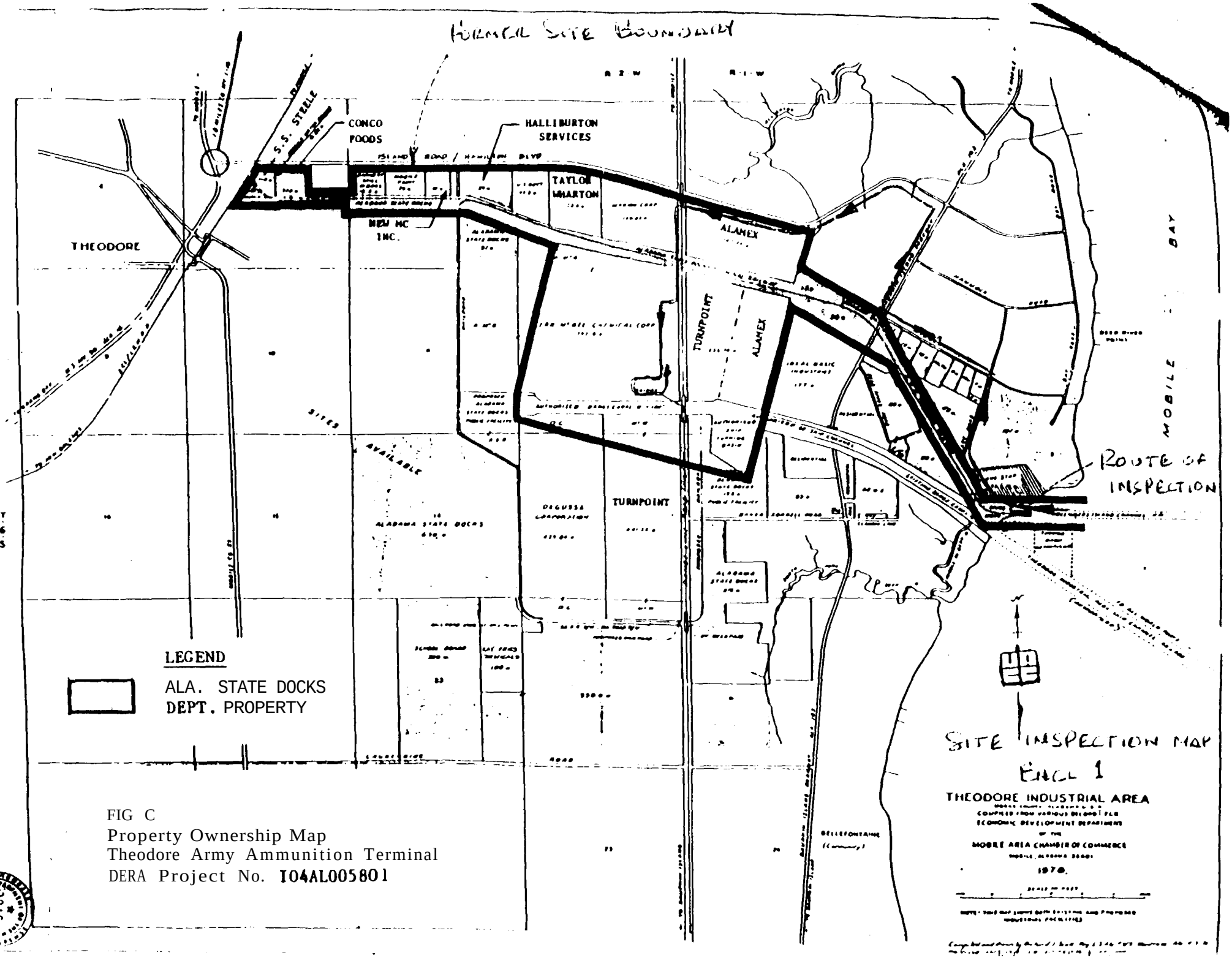
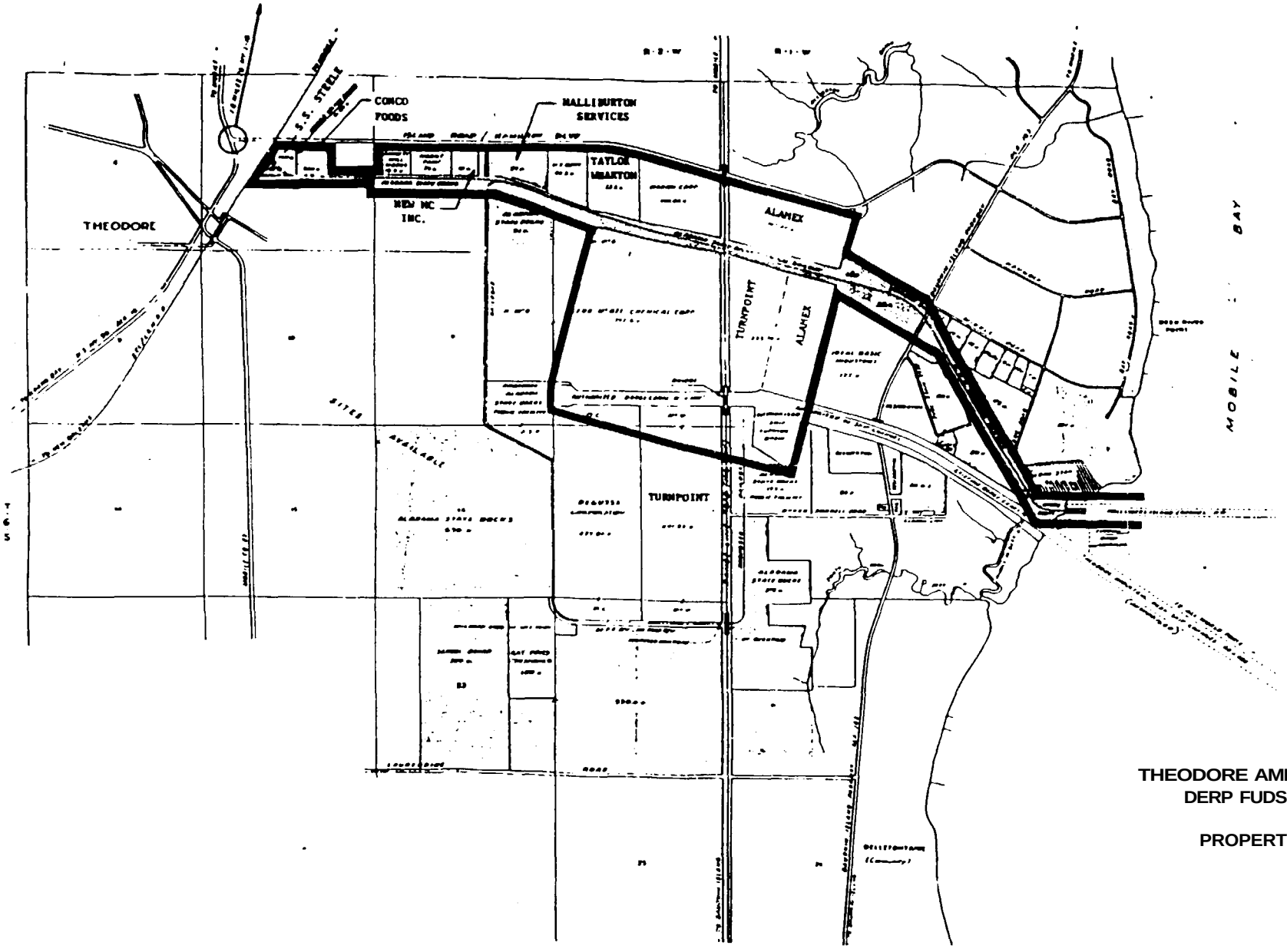


FIG C
Property Ownership Map
Theodore Army Ammunition Terminal
DERA Project No. I04AL005801



THEODORE AMMUNITION TERMINAL
DERP FUDS #I04AL005800

PROPERTY OWNERSHIP

MAP M-3

NORTH
FORMER AMMUNITION STORAGE BUNKER AREA
TERMINAL RAILROAD TRACK ALIGNMENT
MOBILE BAY
KERR MCGEE CHEMICAL PLANT
NEW SHIPPING CHANNEL
NAVAL STATION MOBILE
750' LONG WOODEN DOCK REMOVED FROM THIS AREA
THEODORE AMMUNITION TERMINAL
DERP FUDS #I04AL005800
1993 AIR PHOTO
SITE CONDITIONS
MAP M-2

APPENDIX A

REFERENCES

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE NAVAL **AMMUNITION MAGAZINE**

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. I04AL005800

REFERENCES FOR OEW/CWM ACTIVITIES

Harrison, Royce
1990 Munitions dock being dismantled. *The Mobile Press Register,* December 14, 1990: 13A. Mobile Public Library, Mobile, Alabama.

SS Francis L. Lee File
date compiled unknown. A bound file of dozens of documents pertaining to the SS Francis L. Lee. Miscellaneous File Cabinet, Chemical and Biological Defense Agency Historical Office, Edgewood Arsenal, Maryland.

REFERENCES FOR GEOLOGY AND SOILS

Thornbury, Wm. D.
1965 Regional Geomorphology of the United States, John Wiley & Sons, Inc.

Miller, James A.
1986 Hydrogeologic Framework of the Floridan Aquifer System in Florida, and in Parts of Georgia, Alabama, and South Carolina, Regional Aquifer-System Analysis of the U.S. Geolgical Survey, Professional Paper 1403-B.

Riccio, J.F., Hardin, J.D., and Lamb, G.M.
1973 Development of a Hydrologic Concept for the Greater Mobile Metropolitan-Urban Environment, Geological Survey of Alabama Bulletin 106, Division of Water Resources.

APPENDIX B

ACRONYMS

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE NAVAL AMMUNITION MAGAZINE

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. I04AL005800

APPENDIX B

ACRONYMS

ASR	Archive Search Report
BGR	Bombing and Gunnery Range
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEHND	Corps of Engineers, Huntsville Division
COE	Corps of Engineers
CWM	Chemical Warfare Material
CWS	Chemical Warfare Service
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
DPG	Dugway Proving Ground
EOD	Explosives Ordnance Disposal
EPA	Environmental Protection Agency
FUDS	Formerly Used Defense Sites
GSA	General Services Administration
HTW	Hazardous and Toxic Waste
INPR	Inventory Project Report
IRP	Installation Restoration Program
MCX	Mandatory Center of Expertise
NFS	National Forest Service
OEW	Ordnance and Explosive Waste
SARA	Superfund Amendments and Reauthorization Act
SLD	St. Louis District, Corps of Engineers
USACE	U.S. Army Corps of Engineers
US AD ACS	U.S. Army Defense Ammunition Center and School
USAEDH	U.S. Army Engineer Division, Huntsville, AL
WD	War Department
WNRC	Washington National Records Center

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APPENDIX C

REPORTS/STUDIES/LETTERS/MEMORANDA

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ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
(U.S. NAVAL AMMUNITION MAGAZINE)

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. I04AL005800

APPENDIX C

REPORTS/STUDIES/LETTERS/MEMORANDA

C-1	Site Specific Safety Plan
C-2	Site Visit Trip Report
C-3	Historical Report-Lt. Col. Arthur-Bomb Shipment Report

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APPENDIX C-1
SITE SPECIFIC SAFETY PLAN

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SITE SPECIFIC SAFETY AND HEALTH PLAN (SSHP)
for
Theodore Naval Ammunition Depot
Theodore, Alabama

1. PURPOSE. This plan prescribes the safety and health requirements for team activities and operations conducted to determine the presence of ordnance and explosive waste (OEW) from conventional munitions and/or chemical warfare material (CWM) at the specified site.

2. APPLICABILITY. This plan applies to HQUSACE personnel and assigned elements under the control of HQUSACE.

3. REFERENCES. The provisions of this plan implement safety and health standards and requirements contained in 29 CFR 1926, 29 CFR 1960, 30 CFR 56, Executive Order 12196, DODI 6055.1, AR 385-10, AR 385-40, and EM 385-1-1.

4. STATEMENT OF SAFETY AND HEALTH POLICY.

a. No person shall be required or instructed to work in surroundings or under conditions which are unsafe or dangerous to his or her health.

b. Each team member has the responsibility to immediately halt the team's operations and activities upon encountering an unsafe situation or act.

c. Each team member is responsible for reading the SSHP before a site visit, complying with applicable safety requirements, wearing prescribed safety equipment, knowing the symptoms of chemical agents, and preventing avoidable accidents.

5. TRAINING. Prior to site visits each team member shall have received the necessary training, to include refresher training on a scheduled basis, as required by the references listed in paragraph 3.

6. REPORTING REQUIREMENTS. Safety violations will be immediately reported to the designated team safety officer. The team safety officer shall report the findings of fact regarding the safety violation(s) through designated channels, as prescribed by the references listed in paragraph 3.

7. SITE SPECIFICS. Site description, possible hazards, OEW procedures, emergency telephone numbers (medical, police, fire, and other contacts), personnel protective equipment, weather precautions, responsible personnel, site control and communications are provided in enclosure 1AA. Enclosure 1 is the maps of the sites to be surveyed. Enclosure 2 is the symptom charts and Hospital maps. Prior to entering the site itself, a briefing by the team safety officer shall be provided to all team members.

Patrick O'Donnell
Safety Officer
Alpha South Team

Enclosure 1AA

SITE SPECIFICS
for
Theodore Naval Ammunition Magazine
Theodore, Alabama

1. Site Descriptions:

Theodore Naval Ammunition Magazine is now owned by the Alabama State Docks and private corporations, mostly of an industrial nature.

2. Possible Hazards.

a. OEW/CWM Hazards. A records search to date indicates that there may be contamination from the storage, handling and dumping of Mustard Gas at Theodore Naval Ammunition Magazine. Records indicate that 1000-pound and 500-pound German mustard bombs, including some which leaked, were at Theodore Naval Ammunition Magazine. Normal safety precautions will be observed at all times. Team members should be familiar with the characteristics and symptoms associated with all agents mentioned. All members should refer to the charts at the back of this plan for full information.

b. Toxic Wastes.

c. Natural Hazards. In addition to snakes and other dangerous wildlife, also avoid harmful vegetation such as poison ivy and oak, exercise caution in walking the area to avoid slips, trips, and falls. Site vegetation could pose a trip hazard.

d. Other Hazards. Other hazards associated with any outdoors trek are expected. Hard hats should be worn in old, unstable bunkers or old unused buildings.

3. OEW/CWM Reconnaissance Procedures.

a. Movement. Before walking in a particular direction, scan your approach with your eyes. Do not stray from travelled paths or enter areas with dense vegetation. REMEMBER – STAY ALERT, STAY ALIVE! Teams will walk in pairs with a safety officer monitoring a pair of individuals. It is important to stay in eyesight of team members and to stay in pairs.

b. Sighting. Upon sighting a suspicious object, note its size, shape, any markings, and specific location. DO NOT TOUCH ANYTHING!

c. Actions. Alert all team members. Withdraw to a safe distance. The safety officer will mark the area with survey tape. If the suspicious object is considered to be an immediate threat, designated team members will remain in the area at a safe distance to warn civilians until the unexploded ordnance (UXO) personnel arrive. Notes regarding the suspicious object will be compiled by the project manager on the team for the archival search report.

d. Notification. If the suspicious object is considered to be an immediate threat, the safety officer will contact and advise the

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Huntsville Safety Division and the local police.

4. Emergency Telephone Numbers.

a. Medical: Norwood Hospital, 660-5120, 5600 Girby Road, Mobile

US90(Government) to Norwood to Girby

b. Fire: 911

c. Police: 911

d. Other Contacts. Huntsville Safety Division, (205) 955-4968; St. Louis District Corps of Engineers, PM-M (Mike Dace), (314) 331-8036.

5. Location of Nearest Telephone to Site.

6. Location and Telephone Number of Nearest Hospital.
As above, Norwood Hospital in Mobile, (660-5120).

7. First Aid. If a medical emergency arises, each team member qualified in Standard First Aid/CPR should be prepared to administer aid, until medical personnel arrive.

8. Personnel Protective Equipment.

a. Personal Equipment on Site. Check the following equipment: eye protection, ear protection, gloves, boots, notebook/pen, and personal SSHP copy with associated chemical charts.

b. Team Equipment on Site. Check the following equipment: first aid kit, survey tape, flashlight w/batteries, 35 mm camera, w/100-300 mm zoom lens, 35 mm film (24 exp., 400 ASA), binoculars, general purpose knife, maps of area, FM 9-16 (Explosive Ordnance Recognition), and carrying bag.

9. Weather Precautions.

a. Cold Weather: Not applicable for this trip.

b. Heat: Weather may be very hot and humid. Over-exertion can cause a heat related emergency.

c. Severe Weather. The safety officer will monitor local newscasts for any type of severe weather and take the necessary safety precautions.

10. Team Personnel and Responsibilities.

a. Safety Officer: Patrick O'Donnell. The safety officer has overall authority and responsibility to ensure safety procedures are complied with while on site.

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b. Project Manager: Tom Freeman. Prior to actually entering the site, the project manager will inform the safety officer of the time schedule, routes to be taken and the specific locations on the site to be surveyed. If the safety officer becomes incapacitated, the project manager will assume the duties of the safety officer.

c. Other Team Member: Shelia Thomas. Team member will assist the safety officer as necessary. Under no circumstances will any team member participate in any activity contrary to the advice of the safety officer.

d. On-Site Personnel: Any Alabama State Docks Representatives are not under the jurisdiction of the appointed safety officer. However, personnel will not participate in activities deemed unsafe by the safety officer, regardless of the advice given by any Alabama State Docks Representative.

e. Other Personnel: All other accompanying personnel must attend the safety briefing of this plan.

11. Site Control and Communications.

a. Site Control. While on site, team members will stay together in pairs and remain within eyesight and vocal contact with each other.

b. Site Communications. The nearest telephones are at Mobile Naval Station, adjacent to the site.

c. Hand Signals among members. If audible communications are not possible, the following standard hand signals will be used:

Hand gripping throat-----choking/can't breathe due to smoke or other airborne contaminants.

Grip partner's wrist or both hands around waist-----Leave area Immediately/stop movement.

Hand gripping nose-----Unusual smell detected.

Thumbs up/down-----OK, I am all right, I understand/No, negative.

Wave hand in a circular motion above head-----gather together here, now.

12. Changes to SSHP. As the situation dictates and without risking the safety of team personnel, the safety officer may modify aspects of the plan in coordination with team personnel.

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APPPENDIX C-2
SITE VISIT TRIP REPORT

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CELMS-PM-M 2 September 1993

TRIP REPORT for 17-19 August 1993

SUBJECT: Site visit and data research for Theodore Naval Ammunition Magazine, Theodore, AL

1. 17 August 1993

SLD personnel listed below travelled to Mobile, AL to obtain information and perform an inspection of the subject site.

Mr. Tom Freeman
Mr. Pat O'Donnell, Safety Officer
Ms. Shelia Thomas

Mr. Ellis Pope, Mobile District Planning Division, provided access to various files and reports concerning this site. SLD also obtained copies of reports that Mobile District had prepared for environmental conditions at McCoy AFB (Pinecastle AAF) and Bushnell AAF.

The remainder of the day was spent reviewing files in the "vault" where old military records are kept. Mobile District has tried over the years to return documents to the applicable installations. Many documents have destroyed when they are not wanted by the installations. Ms. Thomas copied a listing of all remaining installations covered in these files.

2. 18 August 1993

Mr. O'Donnell and Ms. Thomas went to the Mobile Public Library to review historical documents and old newspaper files on the subject site. Several articles including pictures concerning the chemical wafare materials were copied.

Mr. Freeman accompanied Mr. Pope in searching through various corps offices for documents. Several files were available on microfilm in the Real Estate Section concerning disposition of the property. Black and white air photos were provided by Mr. Mike Peterson of the Photographic Section for the years, 1945, 1967,1977, 1986, and 1990. After a considerable review individual photos were selected and will be forwarded to Horizons, SLD contractor for this project. Mr. Peterson also had color air photographs available from 1991, but the cost of reproduction for no additional information than the 1990 photos precluded getting copies of these.

Mr. Pope and Mr. Freeman searched through the records holding area. Documents available in this area were mainly real estate records. One additional map of Camp Sibert was discovered during this search. (After return to the SLD office it was determined that SLD already had the information presented on this map.) In researching this holding area it was determined that Jacksonville District had picked up all available documents pertaining to

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their district sites in 1979.

After leaving the Mobile District office Mr. Freeman joined Mr. O'Donnell and Ms. Thomas in reseaching records at the county property office. No additional information was developed in that search.

3. 19 August 1993

SLD personnel and Mr. Pope proceeded to the U.S. Navy Mobile Home Port to conduct an inspection of the the subject site. The Navy provided an escort to get us out to the former dock area. After the appropriate site and safety briefing the entire group went to the dock area, as shown on Encl 1. Essentially all of the wooden dock has been removed and disposed of off-site. Only a portion of the wooden bulkhead retaining wall, in addition to a concrete and brick power and pumping building, remains. The railroad siding servicing the dock has been torn up and the rail bed has been regraded and paved over on the Navy property. Pictures taken during the site inspection will be included in the archives search report.

Leaving the Navy property we continued to follow the former rail line for a short distance west. Through this area the rails and bed had been completely removed and the underlying ground extensively reworked. Outside the Navy portion of the site a considerable amount of industrial development has occurred on the site. As part of this development a new shipping channel was dredged just south of the old rail line and in front of the old dock. It appeared that some of the dredged materials had been spread on both sides of the new channel. Leaving the railroad right-of-way area we proceeded to the old bunker area. This portion of the former magazine has been used for the construction of a large chemical processing plant. Only 6 of the 20 original ammunition bunkers remain and this are being utilized by the Kerr-McGee Corporation.

Several new highways have been constructed across the subject site. Mr. Pope inciated that he had not heard of any munitions being found during construction on the site. The entire inspection team left the site and returned to the District office. After continuing discussions at the office, SLD personnel left for the return trip to St. Louis.

Thomas R. Freeman III

Patrick O'Donnell

Shelia Thomas

APPENDIX C-3
HISTORICAL REPORT
LT. COL. ARTHUR
BOMB SHIPMENT REPORT

~~RESTRICTED~~

REPORT OF INVESTIGATION CONCERNING [illegible] OF GERMAN TOXIC GAS MUNITIONS AT MOBILE, ALABAMA AND SHIPMENT OF THESE MUNITIONS TO PINE BLUFF ARSENAL

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Report of Investigation Concerning

Receipt of German Toxic Gas

Munitions at Mobile, Ala-

bama and Shipment of

these Munitions to

Pine Bluff

Arsenal

by

Frank H. Arthur, Lt. Col., CWS

Alfred E. Hutschinski, 1st Lt., CWS

RESTRICTED

REPORT OF INVESTIGATION CONCERNING RECEIPT OF GERMAN TOXIC GAS MUNITIONS AT MOBILE, ALABAMA AND SHIPMENT OF THESE MUNITIONS TO PINE BLUFF ARSENAL

Washington, D.C.

11 August 1948

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EXH A - Orders Pertaining to the Inspection Team

EXH B - Itinerary of Inspection Team

EXH C - Details of Memphis, Tennessee Investigation (Restricted)

EXH D - Details of Amory, Mississippi Investigation (Restricted)

EXH E - Details of Mobile, Alabama, Investigation (Restricted)

EXH F - List of Telephone Calls to and from Inspection Team

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A B S T R A C T

1. During the period 15 - 25 July 1946, Lt. Col. Frank M. Arthur, 0-032200, CCCWS and First Lieutenant Alfred H. Kutschinski, 0-616073, Technical Command, Edgewood Arsenal, inspected the CWS activities incidental to the handling of captured German toxic gas munitions at Memphis, Tennessee; Amory, Mississippi; and Mobile - Theodore, Alabama.

2. The mission of the inspection team was:

a. To investigate the CWS activities concerning the handling and moving of German toxic munitions at Memphis, Tennessee; Amory, Mississippi; and Mobile, Alabama.

b. To ascertain what safety and security measures had been effected at each location to protect civilians and private property from damage resulting from chemical contamination.

c. To issue, if necessary, directives to accomplish the movement of the German toxic stocks to final destination with complete safety to civilians and private property.

3. A summary concerning the inspection at each locality mentioned in paragraph 1, above, is contained in Sections II, III, and IV, respectively, of the basic report. A general overall summary of the entire inspection is contained in Section VI of the basic report. A more detailed account of the activities at each place is contained in Tabs C, D, and E, respectively.

4. The conclusions of the inspection team are:

a. That the initial preparations for handling toxic cargo at the U.S. Naval Magazine Dock, Theodore, Alabama, were inadequate in that change rooms and decontamination facilities were not prepared for the stevedoring crews and that the facilities for storage and issuance of individual protective supplies were not is existence until the operation was under way. These deficiencies were corrected during the operation and prior to the arrival of the inspection team.

b. That initially the storage and care of individual protective equipment was unsatisfactory. This condition was corrected by Captain Allyn when he assumed control of the Transportation Corps activity ca G July 1946.

c. That on the basis of previous experience the initial CWS detail consisting of the Chemical Officer, New Orleans Port of Embarkation, one officer and seven enlisted men of the CWS Guard and Security Detach-

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ment would normally have been adequate to provide adequate technical assistance to the Transportation Corps officials in charge of the operation. Normally the detail would have been able to handle leaking or suspected leaking munitions on the percentage basis heretofore of record, to perform technical supervision in the enforcement of safety regulations, and to perform required decontamination work. Further, that unforeseen contingencies, beyond the control of the Army officials in charge of the operation, developed which required additional CWS personnel. That the CWS detail on duty at the U.S. Naval Magazine Dock, Theodore, Alabama on 19 July 1946 was adequate to provide technical assistance at the unloading point.

d. That the high rate of injuries sustained in the operation at Theodore, Alabama was due largely to carelessness and negligence of the workers themselves rather than to the failure of prescribed operating procedure, existing safety regulations and technical supervision.

e. That the local labor conditions contributed materially to the overall problem of processing the toxic cargo in that new crews were furnished by the Long Shoreman's Union for each day's operation and in that the labor supplied were generally not high caliber stevedore crews. This situation increased the problems of providing protective equipment inasmuch as unused clothing had to be provided to each man daily, individual instruction was necessitated by this daily turnover of workers and that under these conditions proper individual "safety consciousness" could not to inculated in the individual worker.

f. That the dumping of a small number of leaking toxic munitions in the Gulf, on or about 15 July 1946, was accomplished by the officials in charge of the operation at the U.S. Naval Magazine, Theodore, Alabama as an emergency measure and that the dumping was performed in good faith.

g. That adequate inspection of all loaded cars was performed prior to their release for rail movement to CWS Arsenals.

h. That the CWS Guard and Security escort accompanying each shipment from Theodore, Alabama, under normal circumstances would have proved adequate. That the incidents occurring at Panola, Alabama, Amory, Mississippi and Memphis, Tennessee in respect to leaking munitions could not reasonably have been foreseen. That the dispatch of CWS Guard and Security escort who were affected with mild contamination from prolonged exposure at Theodore, Alabama, was justified on the basis of information available at that time to the military authorities in charge of the operation at that time.

i. That the 1000 lb. German bomb casings employed to transport German mustard agent are unsuitable containers for shipment or storage

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of toxic gas. This conclusion is based upon the large number of leakers which developed at Mobile, Alabama and while enroute to a CWS Arsenal, as well as from the physical inspection of several ruptured containers and from an inspection of cross-sectional fragments from one of the bombs.

j. That the activity at Memphis, Tennessee, and Amory, Mississippi was handled with efficiency and due regard to the protection of civilians and private property.

5. The recommendations of the inspection teams are:

a. That technical tests be made to ascertain the suitability of both the 500 lb. German bombs and 1000 lb. German bombs for storage or shipment of toxic gas.

b. That technical tests be made to ascertain whether or not the bombs were properly voided prior to shipment from Europe.

c. That technical tests be made to ascertain the exact filling in the various bombs.

d. That a joint CWS - Quartermaster study be made on the matter of storage and issue of protective clothing.

e. That a technical study be made concerning CWS surveillance procedures. (This recommendation is made on the basis that the available chlorine content of the chloride of lime used at Memphis, Tennessee, was only 15-20%, and that some of the protective clothing appeared to have lost its protective quality).

f. That all available evidence be collected and studied concerning the operation of Mobile, Alabama, Amory, Mississippi and Memphis, Tennessee. The following reports should be obtained: (1) Reports of all CWS Medical Division officers detailed to duty at the above mentioned localities; (2) Reports of all CWS officers participating in the operation (Lt. Colonel White, Commanding Officer, Guard and Security Detachment; Major Spahn, Chemical Officer, Memphis General Depot; Captain Ehlbert, Chemical Officer, New Orleans Port of Embarkation; Lt. Watzner, Lt. Michael, Lt. Myer and Lt. Subredi, all of the Guard and Security Detachment); (3) A transcript of all telephonic conferences made by Captain Allyn, Transportation Corps Officer in charge of U.S. Army activity at the U.S. Naval Magazine Dock, Theodore, Alabama, to his superiors at the Headquarters of the New Orleans Port of Embarkation; (4) The report of a board of officers appointed by the Commanding Officer, New Orleans Port of Embarkation to investigate the unloading activity at the U.S. Naval Magazine, Theodore, Alabama. This evidence will give a complete case history upon which to base further action.

g. That all standard operating procedures and existing regulations concerning the shipment of toxic gas be reviewed and that the lessons learned from this operation be incorporated [illegible] in current publications.

h. That all future large-scale toxic gas shipments be made in trainload lots, accompanied by a CWS Guard and Security Detachment, at least equivalent to a platoon strength. Further that each trainload of persistent suniticas be provided with ono or two decontamination apparatuces mounted on flat cars so that they may be unloaded enroute to perform emergency decontamination. That frequent stops be made enroute during the movement cf toxic agents to permit inspection of the er.tire train. That a small detachment from a Transportation Corps railway unit accompany each toxic shipment to accomplish any necessary switching or movement cf leaking cars. That a minimum of one crane truck bo provided por train to perait handling and shifting of leaking munitions. That adequate protective equipment accompany each trainload not only to equip ailitary perscnnal tut also to equp railway eraploycea. That amply decontamination supplies and equipment be provided to perait coping with any emergency.

i. That ail future ship loading or unloading of toxic munitions bo performed by soldier labor.

j. That while not specifically bearing on the case at hand, the allegations made by Captain Ehlbert concerning tho inadequacy cf Guard and Security escort arriving from overseas ports should bo investigated.

k. That data be obtained from the point of origin concerning the inspection performed at the time tho cargo was loaded.

1. That technical tests be made to determine the adequacy of soldering and patching procedures.

m. That all munitions contained in future shipments bo adequately marked to show the chemical content 01 each munition. This is extremely important when non-standard containers are used.

n. That all railway cars containing toxic gas munitions be posted with a "no humping" placard in addition to the presently required poison gas placard.

o. That in future rail movements cf persistent munitions all stirrups, brake handles, bleeder valve handles and other car parts with which railway employees come in contact be painted with detector paint prior to release from military control.

p. That complete medical care histories bo prepared for all personnel treated in order that official evidence may bo available in any future claim actions.

SECTION I

GENERAL

1. Pursuant to Letter Orders, OCOMS, dated 16 July 1946; as amended by telegraphic orders dated 191045Z July 1946, 231700Z July 1946, and 231130Z July 1946; and as further amended by various telephonic instructions from Colonel John C. MacArthur, Assistant Chief, CWS, for Operations, Lt. Colonel Frank M. Arthur, O-[illegible], OCOMS and 1st Lt. Rutschinski, O-[illegible], Technical Command, Edgewood Arsenal made investigations at Memphis, Tennessee; Amory, Mississippi; and Mobile, Alabama. (See Tab A for copies of written and telegraphic orders.)

2. The itinerary of Lt. Colonel Arthur and 1st Lt. Rutschinski is listed in Tab B.

3. Verbal orders issued 15 July 1946 by Colonel John C. MacArthur, Assistant Chief, CWS, for Operations, to Lt. Colonel Frank M. Arthur were:

a. To investigate the CWS activities concerning the handling and moving of German toxic munitions at Memphis, Tennessee; Amory, Mississippi; and Mobile, Alabama.

b. To ascertain what safety and security measures had been effected at each location to protect civilians and private property from damage resulting from chemical contamination.

c. To issue, if necessary, directives to accomplish the movement of the German toxic stocks to final destination with complete safety to civilians and private property.

4. 1st Lt. Rutschinski was designated by Technical Division, OCOMS, as technical adviser to Lt. Colonel Arthur.

5. Prior to departure orientation conferences were held with Colonel MacArthur, Assistant Chief, CWS, for Operations; Colonel Gillet, Chief, Supply and Distribution Division; Lt. Colonel Hyes, Executive Officer, Supply and Distribution Division; Lt. Colonel Rothschild, Executive Officer, Research and Development; and Lt. Colonel G.M. White, Chief, Guard and Security Detachment. Major Fletcher, Acting Chemical Officer of the Seventh Army was informed by telephone at 181150 July 1946 of the proposed investigation.

6. Periodic telephonic reports made to OCOMS and instructions received from OCOMS are tabulated in Tab D.

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SECTION II

INVESTIGATION AT MEMPHIS, TENNESSEE

7. Two inspections were made of the activities at Memphis, Tennessee; one on 18 July 1946 (1315 CST to 2230 CST) and the second on 24-25 July 1946 (1000 CST to 2000 CST 24 July 1946 and 0850 CST to 0950 CST 25 July 1946). A detailed, chronological report is contained in Tab o.

8. 16 [illegible] 1946 Inspection.

a. Situation: [illegible] Memphis General Depot Chemical Officer, Major Spahn was informed at [illegible]00 hours, 13 July 1946 that a tank car of poison gas was leaking in the Missouri-Pacific Railway Yards. Upon investigation he located a box car containing chemical munitions. A chemical substance, having an odor similar to U. S. mustard, was leaking from the two doorways and from opposite and diagonal corners of the car. [illegible] immediately commenced decontamination of the car and adjacent areas. Another contaminated area was subsequently found 30 feet [illegible] where the [illegible] was standing. At approximately 1730 hours, 13 July 1946, Major Spahn located an additional seven cars of toxic-filled munitions, two of which were leaking badly. By 1845 hours, 13 July 1946, the eight cars of toxic munitions had been switched to an isolated siding in the Memphis General Depot Area. Decontamination along Track No. 7 in the switching yards was continued until dark 13 July 1946. Guard posts were established at one at the extremities of the contaminated zone in the switching yards, and later around the area in the Memphis General Depot Reservation to which the eight carloads of toxic munitions were moved. These guard posts have been in continuous operation [illegible] that time. Report of the situation was made to [illegible] on 14 July 1946. Decontamination of all areas over which the toxic-filled cars had travelled was initiated as early as possible and subsequent decontamination has been performed as required. [illegible] Guard and Security Detachment and an Edgewood Arsenal Medical Division officer [illegible] to Memphis, Tennessee, [illegible] order to [illegible] in handling the toxic chemical munitions at [illegible] Ability. At the time of this inspection only two Memphis casualties had developed. Three Amery, Mississippi, casualties were also being treated in Memphis hospitals.

b. Discussion: It appears that the Memphis General Depot Chemical Officer, Major Spahn, took all necessary precautions for the [illegible] of civilians and private property from damage resulting from chemical contamination. Decontamination of contaminated areas was commenced immediately upon location of the contaminated car. Additional contaminated areas and cars were worked upon as soon as they were located. Steps were taken to isolate the shipment at the earliest practicable

moment. Considering the lack of trained personnel available to Major Spahn on 13 July 1946, it is my opinion that he took all necessary measures and action which a prudent officer would take in a similar situation. Upon arrival of reinforcements from CWS Guard and Security Detachment, Edgewood Arsenal, immediate action was taken to expand the scope of activity to insure a complete and thorough decontamination. The dim-tic conditions at Memphis, Tennessee, produced difficult working conditions. The average daytime temperature has been in the 90 degree bracket with a 10 to 15 degree differential at night time. The humidity is very high. These climatic conditions, together with the restrictions imposed by security measures including the wearing a? protective clothing and other equipment, materially reduced the efficiency of all workers. The fact that positive tests were obtained in the contaminated areas some five days after the original contamination leads to the belief that the chloride of lime has a much lower available chlorine content than is prescribed for standard decontamination. This can only be ascertained by analysis of the substance.

9. 24-25 July 1946 Inspection.

a. Situation: All railway trackage had been decontaminated. All trackage except Track No. 7 in the Missouri-Pacific Memphis switching yards was in use. By 1900, 24 July 1946, negative tests had been obtained for three consecutive days and Track No. 7 was released at that time. The five cars of non-leaking munitions had been shipped to the CWS Depot. The three cars of "leakers" had been unloaded and 15 leaking bombs had been removed. Five of the 15 "leakers" had already been destroyed by chemical means. Six were in the process of being destroyed and four that developed during the night 24-25 July 1946 remained to be destroyed. The "non-leakers" were being reloaded for shipment to the CWS Depot. One carload was ready for shipment. All contaminated areas on the Memphis General Depot Railroad were under constant surveillance and decontamination was performed as required. A total of 21 local casualties (5 Frisco Line Railroad employees, 3 Missouri-Pacific Railroad employees; 7 Memphis General Depot civilians employees and 2 military personnel) and 3 casualties transferred from Amory, Mississippi, have been treated.

b. The second inspection at Memphis, Tennessee, disclosed that all activities outside the Memphis General Depot Reservation were under control. All the railway trackage had been returned to the railway companies for normal usage by 1900 CST, 24 July 1946. The work on the destruction of the leaking bombs and reloading of the good bombs for shipment to the Chemical Warfare Service Depot was progressing slowly. This in part is due to the difficulty of local climatic conditions. Car loading of 1000 lb. and 500 lb. bombs is very difficult when it must be accomplished almost entirely by manual labor. Loading operations are conducted at night in order to obtain maximum efficiency from the working crew. Destruction of the toxic agent while relatively close to inhabited areas appeared to be satisfactory inasmuch as it is strictly controlled with only small quantities of agent being released into the destruction

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trench at any one time. Zosta made by Lt. Colonel Arthur's Technical Advisor reveals that such practice is safe. No toxic vapors were detected at a distance exceeding SOO yards downwind frca the disposal pit, even under favorable inversion conditions. All local casualties with the exception of two military personnel are reported to be very mild. Captain Whittenberger believes that no permanent damage will result to the persona concerned.

10, Comments. The situation at Memphis developed without warning. With no trained military personnel at haad, Major Spahn took immediate action to retard the menace resulting from the leaking gas bombs ia the Missouri-Pacific Railroad yards. The Railroad officials were satisfied with the action which had been taken. All areas were kept under constant surveillance until negative information concerning chemical contamination was obtained. The decontamination work has progressed very slowly and it is believed that this is due in part to the rather low available chlorine content of the decontamination agent. Destruction of the toxic gas has been performed with duo regard to safety and security measures. Unloading and reloading the railroad cars has progressed slowly. The slowness of this operation is due, ia part, to the local working conditions and in part to the small crew available for this job. Within a few days' a time from the date of inspection the entire situation should be satisfactorily settled.

11. Recommendations. No specific recommendations are made for improvement of the work being conducted at the Memphis General Depot. Certain general recommendations for incorporation iato future standard operating procedures, based upon lessons learned frca this and related activities, are contained ia Section VIII.

SECTION IX-A

INVESTIGATION AT AMORY, MISSISSIPPI

12. An inspection was made at Amory, Mississippi on 17 July 1946 (1100 - 1400 CST). Telephonic conference was held with Captain Walker and Lt. Hatcher on 24 July 1946. A detailed, chronological listing is contained in Tab D.

13. 17 July 1946 Inspection

a. Situation: One railway car containing leaking toxic gas munitions was discovered in the Amory Switchyards by the Guard and Security Detachment assigned to the train which originally contained ten carloads of toxic chemical bombs. The shipment originated at the U.S. Naval Magazine at Theodore, Alabama. One car of leakers was discovered as

Panola, Alabama and was detached from the train at that point. A CWS Guard and Security NCO remained there to keep the car under surveillance. The remaining eight cars of non-leaking munitions, under escort of two CWS Guard and Security NCO's, were forwarded to Pine Bluff Arsenal, their final destination. These are the eight cars which were being held in Memphis, Tennessee. The leaking car stood in the Amory, Mississippi Switching Yards of the Frisco Lines Railway shortly after midnight 12-13 July 1946 until midmorning 13 July 1946. Sergeant Steinberger was removed as security guard upon becoming severely injured by the toxic agents. Lt. Matzner, CWS Guard and Security Detachment, Edgewood Arsenal, arrived at Amory, Mississippi at 0300 hours 14 July 1946. Prior to Lt. Matzner's arrival, the leaking car had been moved to Bigbee siding which is located approximately three miles north of Amory, Mississippi. Upon arrival at Amory, Mississippi, Lt. Matzner made a reconnaissance of the Bigbee area and the Amory, Mississippi Railroad Yards. Upon arrival of decontamination materiel and equipment, Lt. Matzner commenced decontamination of the Amory Yards (approximately 2300 or 2330 CST, 14 July 1946). Upon completion of the decontamination of the Amory Switching Yards, the trackage between Amory and Bigbee siding (approximately 3 miles) was decontaminated. The trackage in the Amory Switching Yards was released Monday, 15 July 1946, after negative tests indicated the area to be free from contamination. At the time of the inspection, Lt. Matzner and his CWS Detachment were making preparations for the unloading of the contaminated car to segregate the leaking munition(s) from the non-leaking munitions and to either decontaminate the car and reroute the good munitions or to load the good munitions in a new car for shipment from Amory, Mississippi. Lt. Matzner also had plans for the disposal of the leaking munition(s). At the time of this inspection, 19 civilians were being treated by Captain Walker, M.C., (Medical Division, Edgewood Arsenal). All patients were being treated at their homes. The injuries were primarily eye burns and trachea bronchitis. However, four of the patients had small blister areas on their legs. Only one case was considered serious and that was Mr. R. J. Flynn, who had developed a corneal ulcer. Arrangements had been made for his evacuation and treatment at Memphis, Tennessee by Dr. Rightland who is a specialist on these disorders.

b. Discussion:

It appears that the leaking car was under proper surveillance until the Guard and Security attendant (Sergeant Steinberger) became a casualty. Upon arrival in the Amory, Mississippi area, Lt. Matzner and his CWS Guard and Security Detachment took immediate steps for the safeguarding of civilians and private property from damaging results from chemical ammunition. Decontamination of contaminated areas was [illegible] as early as possible. Contaminated areas were

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brought under control with the least possible delay, and when negative tests indicated their freedom from contamination, these areas were released to the Railway Company for normal operations. The climatic conditions were very difficult for efficient operation of working crews and security measures against chemical agents must be enforced. In my opinion, Lt. Hatmer displayed great initiative and foresight in handling the situation at Amory, Mississippi. He is to be commended upon the efficient workmanship and dispatch with which he handled the task at that point.

14. 24 July 1946 telephonic conference with Captain Walker and Lt. Hatmer.

a. Situation:

Lt. Hatmer stated that all trackage had been decontaminated, tested and released to the Railway Company after negative tests had been obtained. The car which had originally contained the leaking bomb had been safely decontaminated and reloaded with the non-leaking munitions. Only one 1,000-pound leaking bomb had been found. This had been buried on the Columbus Air Base, Mississippi Military Reservation, in accordance with arrangements made with the Base Commander and Base Engineer. Captain Walker reported that he had treated a total of 25 casualties to date, of which four were military personnel. Of the 21 civilian patients, all but four were back to their normal work. One of the four (Mr. Rorie) had been transferred to a Memphis Hospital for treatment. Mr. Flynn's ulcer had been treated at Memphis and was healing satisfactorily, and while he was back in Amory, Mississippi, he would be unable to work for a week or ten days. Mr. Berhorn was being sent to St. Louis for observation. Mr. Wright, a railway employee, with mild blister areas a his legs, would be out for another week or two.

b. Discussion:

The situation seemed to be satisfactorily in hand. Captain Walker, Lt. Hatmer and the CWS Guard and Security Detachment were awaiting orders and funds being forwarded from Edgewood Arsenal prior to their departure from Amory, Mississippi.

15. Comments:

The military personnel dispatched to Amory, Mississippi displayed excellent initiative and keen foresight in handling the situation at that point. In my opinion, all personnel should be commended for their quick and efficient action. It appears that this situation is completely under control,

16. Recommendations:

No specific recommendations are made concerning the work done at Amory, Mississippi. Certain general recommendations for incorporation to future Standing Operating Procedures based upon lessons from this and related activities are contained in Section VIII.

SECTION IV

INVESTIGATION AT MOBILE, ALABAMA

17. An inspection was made at the U.S. Naval Magazine Dock, Theodore, Alabama on 18, 19, 20 and 22 July 1946. A detailed chronological listing of events is contained is Tab E.

18. Inspection

a. Situation:

Upon arrival at the U.S. Naval Magazine Dock, Theodore, Alabama, it was found that all unloading had been suspended on 18 July 1946 pending investigation by representatives from CSCMS. The SS Francis L. Lee had arrived on 3 June 1946 with 3886 tons of munitions aboard, all of which were toxic except 70 tons. From 11 June 1946 to 15 July 1946, 2573 tons had been unleaded and shipped to CWS Arsenal. At the time of the inspection the general situation seemed to be well in hand. Although portions of the dock had been contaminated during the previous unloading operation, constant decontamination made the dock area safe for work. A considerable quantity of 1000-pound and 500-pound bombs were under surveillance as leakers or suspected leakers. After interview with the military and civilian personnel concerned with the unloading operation, recommendation for future action was made to CSCMS (Colonel MacArthur). The quantity of protective equipment available on 18 July 1946 was adequate for the safeguarding of the crews engaged in the unloading operation. As of 23 July a total of 241 injuries, plus or minus ten, had been sustained in the unloading operation. From the statements made by the military and civilian [illegible] the injuries sustained in the discharge of the toxic cargo from the Francis L. Lee were largely, if not entirely, due to carelessness or even negligence upon the part of the stevedores engaged in the work. It also appears that the general labor situation, including availability of responsible stevedoring crews, contributed to the difficulties encountered in handling the toxic cargo. Statements made by responsible officials, including an inspector of the Bureau of Explosives, American Association of Railroads, claim that all cars leaving the U.S. Naval Magazine Yards were thoroughly and adequately inspected prior to their release to the Railway Company for shipment to Pine Bluff Arsenal and further that each car was free of vapor or liquid contamination at the time it left Theodore, Alabama. A considerable portion of the inspection

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team's time was devoted to investigation of suitable areas for the disposal of the leaking toxic munitions as well as devising plans for the safe destruction of the toxic agent.

b. Discussion:

Neither records nor journals were maintained during the period that the SS Francis L. Leo was being unloaded. Statements made by the various officials concerned with the unloading operation were entirely from memory. With two exceptions, Captain Allyn, the Transportation Corps officer in charge of the U.S. Army activity at the U.S. Naval Magazine, Theodore, Alabama, stated that he was entirely satisfied with the staff action of the Chemical Warfare Service officer on duty during this operation. These exceptions are discussed in paragraph 20a, Tab E. It is believed that neither of these exceptions contributed to the number of casualties sustained during the unloading of the SS Francis L. Leo.

19. Comments:

A review of the statements contained in Tab S leads to the belief that a normal Chemical Warfare Service Guard and Security Detachment was on duty at the U.S. Naval Magazine Dock during the discharge of toxic cargo from the SS Francis L. Leo. The size of the detachment and the operating procedures followed had been in practice for many months. Prior to this operation these procedures had constituted an adequate and safe means for the handling of toxic gas cargo received in or shipped out of the United States. Furthermore, the safety precautions taken for the movement of toxic gas from the dock to the point of final destination likewise were based on previous experience and operating procedure. Prior to this operation these procedures had always been adequate and effective. Additional security measures were taken as the situation developed. It would seem that adequate provisions had been taken to safeguard the civilian stevedoring crews; however, due to the peculiar labor situations, which are more or less nationwide at this period, rigid enforcement of these regulations could not be made. The large number of leakers which were processed is an abnormal condition not heretofore of record [illegible] the Transportation Corps nor to the Chemical Warfare Service. It would appear that part of the fault was due to the fact that the bomb casings were too light to withstand the [illegible] climatic conditions prevailing at the discharge point. The inspection team made no attempt in the limited time available to them to ascertain the degree of responsibility of the interested military personnel concerned with the unloading operation at the U. S. Naval Magazine Dock, Theodore, Alabama, at Memphis, Tennessee, and at Amory, Mississippi; or to ascertain the legality of claims from injured personnel or the liability of the U.S. Army in the matter of the contamination of property and the injury of civilians. The inspection team had

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h&d bean dispatched on an emergency mission to inspect tho safety plans la force at each of the three locations, to determine if those plans were adequate for the handling of tho toxic cargo, and to effect such additional measures as might be required. A complete investigation to explore into tho responsibility of tho various officials concerned with the three operations, to ascertain tho validity of all claims of injury or damage and to determine the U.S. Army's liability, if any, would require a board of officers in continuous session over a 3 or 4 weeks' period. In tho opinion of tho inspection team, adequate quantities of protective equipment were on hand to permit the unloading of tho SS Francis L. Leo and to accomplish the inland movement of the munitions to CWS Arsenals. The team recommended to the officer in charge at the dock that during the unloading directed by OCCWS on 13 July 1946, rigid enforcement of security regulations bo made. The Transportation Corpa officer in charge At tho dock agreed to this policy and Lt. Colonel White was instructed to see that compliance of standard operating procedure was explicitly followed.

20, Recommendations:

Bo specific recommendations are made in this portion of tho report. General recommendations cro contained in Section VIII.

SECTION V

PLANS FOR DISPOSAL

21. Interview with & Mobile historian and realtor revealed the possibility of several desirable localities which could bo used for the destruction of leaking munitions. Preliminary reconnaissance cf Horn Island revealed that this was an ideally situated locality to accommodate the disposal work, A sore complete aerial and ground reconnaissance substantiated this opinion.

22. The site having been determined, specific procedures for the destruction of tho toxic munitions by burning were planned. The toxic munitions were to be moved from the U.S. Naval Magazine Dock at Theodore, Alabama, to Horn Island on barge and tow supplied by the Transportation Corps. A district engineer installation at Pascagoula, Mississippi, had available vehicles, crane, and small boats to assist in the operation. It bad been decided to use a small artificial ravine on the island in order to minimize the amount cf trenching which would bo required to install burning points. The general plan was to burn one bomb and catalog *tho* drift, toxicity, and dispersion in order that adequate data would bo available to govern larger scale operation. The remaining bombs were to bo destroyed in groups of ten or larger quantities

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depending on the local situation. Arrangements were made with the Coast Guard to assist in the initial warning concerning the traffic restrictions in the adjacent waters and to assist in the off-shore patrolling necessary to safeguard the shipping channel. Upon completion of the operation, the area was to be thoroughly decontaminated and released upon receiving negative tests on three consecutive days. As an added safety precaution, the burning area was to be fenced and posted for a period of sixty to ninety days with periodic checks made by CWS personnel to indicate the absence of toxic gas contamination. The burning operation appeared to be feasible and capable of being conducted without jeopardizing regular shipping and inhabitance. Complete and detailed plans were to be submitted in writing to the District Engineer, Mobile, Alabama.

SECTION 77

General Summary:

23. The SS Francis L. Lee, carrying toxic cargo of captured German bombs, docked at the U.S. Naval Magazine on 8 June 1946 and commenced to discharge its cargo on 11 June 1946. The ship's manifest indicates an original cargo of 3688 tons, all of which were captured German toxics, except approximately 79 tons of rockets, grenades, etc. It is reported by the participants in the operation at the U.S. Naval Magazine Dock, Theodore, Alabama, that unloading proceeded without event until sometime between 14 and 16 June 1946 when the first casualties among the civilian stevedore crews were sustained. Upon opening of the hatches, routine tests were performed to determine whether or not chemical contamination was present. Captain Ehlbert states that all preliminary tests were negative and that a considerable portion of the upper hold areas were unloaded without obtaining positive indication of chemical contamination. Under this situation, workers were permitted to perform their normal duties without using gas masks and protective clothing. Initially Captain Ehlbert, CWS Chemical Officer of the New Orleans Port of Embarkation, assisted by one officer and seven enlisted men of the CWS Guard and Security Detachment of Edgewood Arsenal were on duty when the unloading operations commenced. Between the time of sustaining the first injuries among the civilian crew and 13 July 1946, two reinforcements from the CWS Guard and Security Detachment, Edgewood Arsenal, were obtained to assist in the operation. On 19 July 1946 the strength of the CWS detail on duty at Theodore, Alabama, was three officers and thirty-four enlisted men. As of 23 July 1946 approximately 241 (plus or minus 10) injuries had been reported by Captain Holm, MC (Medical Division, Edgewood Arsenal) on duty at Mobile, Alabama. According to statements of the officials in charge of the operation each

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bomb removed from the hold was inspected to ascertain whether or not it was leaking. Only non-leaking bombs were loaded into railway cars for inland movement to CWS Arsenals. Leaking munitions or those suspected of being leakers were separated for surveillance. 30 one-thousand pound leaking bombs and 3 five-hundred pound leaking bombs were dumped in the Gulf on approximately 15 or 13 July 1946 as an emergency measure. At the time of the inspection 137 one-thousand pound leaking bombs, 12 five-hundred pound leaking bombs as well as 8 five-hundred pound bombs which were vapor leakers were under surveillance pending decision of CCCWS as to their disposal. During the operation an additional 20 bombs which were vapor leakers were patched and 16 leaking bombs were soldered and after surveillance and inspection were shipped to CWS Arsenals. Not only was each individual bomb inspected before being loaded into railway cars but each car was inspected prior to release to the railway for inland movement. Each car inspection team consisted of a CWS representative, an Inspector of the Bureau of Explosives, Association of American Railroads, a representative of the Ordnance Department and a representative of the Transportation Corps. Unloading operations had been suspended at 15 151600 July 1946 upon direction from Washington. The munitions which were leakers or suspected leakers and the entire pier was under constant surveillance and periodic decontamination. The dock and adjacent area appeared to be safe for use. All military personnel who were interviewed are of the opinion that the majority, if not all, of the injuries sustained by the civilian stevedores resulted from their own carlessness and even negligence.

24. In accordance with decision made in Washington on 19 July 1946, the SS Francis L. Lee was prepared for movement to Charleston, South Carolina, where the remaining cargo was to be disposed of by dumping at sea. By 220530 all non-leaking munitions at the dock had been reloaded and these together with the munitions which had not yet been unloaded totaled 633 tons.

25. A ton car shipment was dispatched from the U.S. Naval Magazine at Theodore, Alabama on 11 - 12 July 1946 with three CWS Guard and Security Detachment NCO's as escort. Prior to this time, shipments had been made in excess of 2500 tons of toxic munitions without incident. Enroute to Pine Bluff Arsenal one of the ten cars developed a "leaker(s)" and was r[illegible]d from the train at Panola, Alabama. One non-commissioned officer r[illegible]d at Panola in charge of the leaking car. The remaining nine cars w[illegible]spatched for their final destination. At Amory, Mississippi, another c[illegible]menced to leak. This was removed from the train and a CWS Guard and Security Detachment non-commissioned officer remained at Amory, Mississippi to decontaminate and control the car. The eight non-leaking cars continued toward Pine Bluff Arsenal under escort of the remaining CWS Guard and Security NCO. At Memphis, Tennessee, three of the eight cars developed leakers and were subsequently moved to an isolated area on the Memphis General Depot Reservation. Prior to the finding of the leaking cars at Memphis, Tennessee, the non-commissioned officer, acting as security escort, became incapacitated and reported to a local hospital for treatment. The

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car which had been removed fron tha train at Panola, Alabama, was brought under control and returned to the U.S. Naval Magazine at Theodore, Alabama, Tiithout incident. The non-commissioned officer remaining with the ear at Amory, Mississippi, developed injuries sufficient to warrant hospitalization and was removed to a local facility for treatment. Subsequently the railway car was isolated on a siding three miles north of tha town. A CWS Guard and Security Detachment from Edgewood Arsenal arrived on 24 July 1946 and immediately commenced decontamination of all areas over which the leaking cars had passed. The efficient operation quickly brought the Amory situation under control. By 17 July 1946 nineteen civilian injuries, eighteen of which were railway employees, had been treated at Amory, Mississippi. By 24 July 1946, *21* casualties had developed in tha Memphis area, of which ten were military personnel. Three cars commenced to leak after arrival in Memphis, Tennessee. The quick action taken by tha military authorities at Memphis, Tennessee resulted in isolating the leaking cars without unfavorable local incident. Oca 24 July 1946 a total of 21 injuries had been treated at Memphis, Tennessee. Seven of which were at Memphis, are Army General Depot civilian employees who had received aild contamination from vapor ia areas adjacent to the isolation site.

26. A detail from the CWS Guard and Security Detachment, Edgewood Arsenal, was sent to Memphis, Tennessee where they were employed to perform tha necessary decontamination, to reload the non-leaking munitions for shipment to the CWS Arsenal and to dispose of the leaking bombs.

27, On 25 July 1946 all activity at Memphis tea progressing satisfactorily although rather slowly. The slowness of tha operation was due to local climatic conditions, as well aa to the magnitude of tha task.

SECTION VII

Conclusions:

28. After review of all evidence obtained during the inspection, Lt. Colonel Arthur and 1st Lt. Hutchinsid conclude:

a. That the initial preparations for handling toxic cargo at the [illegible]val Magazine Dock, Theodore, Alabama, were inadequate ia that change r[illegible] and decontamination facilities were aot prepared for the stevedoring c[illegible] and that the facilities for storage and isauaaco of individual protective supplies were sot ia existence until tha operation was under way. These deficiencies were corrected during the operation and prior to the arrival of the inspection team.

b. That initially the storage and caro of individual protective equipment was unsatisfactory. This condition was corrected by Captain Allyn when he assumed control of tha Transportation Corpa activity on 8 July 1946.

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c. That on the basis of previous experience the initial CWS detail consisting of the Chemical Officer, New Orleans Port of Embarkation, one officer and seven enlisted men of the CWS Guard and Security Detachment would normally have been adequate to provide adequate technical assistance to the Transportation Corps officials in charge of the operation. Normally the detail would have been able to handle leaking or suspected leaking munitions on the percentage basis heretofore of record, to perform technical supervision in the enforcement of safety regulations, and to perform required decontamination work. Further, that unforeseen contingencies, beyond the control of the Army officials in charge of the operation, developed which required additional CWS personnel. That the CWS detail on duty at the U.S. Naval Magazine Dock, Theodore, Alabama on 13 July 1946 was adequate to provide technical assistance at the unloading point.

d. That the high rate of injuries sustained in the operation at Theodore, Alabama was due largely to carelessness and negligence of the workers themselves rather than to the failure of prescribed operating procedure, existing safety regulations and technical supervision.

e. That the local labor conditions contributed materially to the overall problem of processing the toxic cargo in that new crews were furnished by the Long Shoreman's Union for each day's operation and in that the labor supplied were generally not high caliber stevedore crews. This situation increased the problems of providing protective equipment in as much as unused clothing had to be provided to each man daily, individual instruction was necessitated by this daily turnover of workers and that under these conditions proper individual "safety consciousness" could not be inculcated in the individual worker.

f. That the dumping of a small number of leaking toxic munitions in the Gulf, on or about 15 July 1946, was accomplished by the officials in charge of the operation at the U.S. Naval Magazine, Theodore, Alabama as an emergency measure and that the dumping was performed in good faith.

g. That adequate inspection of all loaded cars was performed prior to their release for rail movement to CWS Arsenals.

h. That the CWS Guard and Security escort accompanying each [illegible]ment from Theodore, Alabama, under normal circumstances would have [illegible] adequate. That the incidents occurring at Panola, Alabama, Amory, [illegible]ssippi and Memphis, Tennessee in respect to leaking munitions could not reasonably have been foreseen. That the dispatch of CWS Guard and Security escort who were affected with jaild contamination from prolonged exposure at Theodore, Alabama, was justified on the basis of information available at that time to the military authorities in charge of the operation at that time.

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i. That the 1000 lb. German bomb casings employed to transport German mustard agent are unsuitable containers for shipment or storage of toxic gas. This conclusion is based upon the largo number of leakers which developed at Mobile, Alabama and while enroute to a CWS Arsenal, as well as from the phycical inspection of several ruptured containers and from an inspection of cross-sectional fragments from one of the bombs.

j. That the activity at Memphis, Tennessee, and Amory, Mississippi was handled with efficiency and due regard to the protection of civilians and private property.

29. After a review and study of all evidence obtained during the investigation, the inspection team recommends:

a. That technical tests be made to ascertain the suitability of both the 500 lb. German bombs and 1000 lb. German bombs for storage or shipment of toxic gas.

b. That technical tests be made to ascertain whether or not the bombs were properly voided prior to shipment from Europe.

c. that technical tests be made to ascertain the exact filling in the various bombs.

d. That a joint CWS - Quartermaster study be made on the matter of storage and issue or protective clothing.

e. That a technical study be made concerning CWS surveillance procedures. (This recommendation is made on the basis that the available chlorine content of the chloride of lime used at Memphis, Tennessee, vss only 15-20%, and that some of the protective clothing appeared to have lost its protective quality).

f. That all available evidence be collected and studied concerning the operation of Mobile, Alabama, Amory, Mississippi and Memphis, Tennessee. The following reports should be obtained: (1) Reports of all CWS Medical Division officers detailed to duty at the above mentioned [illegible]lities; (2) Reports cf all CWS officers participating in the operation [illegible] Colonel White, Commanding Officer, Guard and Security Detachment; [illegible] Spahn, Chemical Officer, Memphis General Depot; Captain Ehlbert, [illegible]ical Officer, New Orleans Port cf Embarkation; Lt. Matzner, Lt. Michael, Lt. Myer and Lt. Subroski, all of tho Guard and Security Detachment); (3) A transcript c? all telephonic conferences made by Captain Allyn, Transportati Corps Officer in charge of U.S. Army activity at tho U.S. Naval Magazine Dock, Theodore, Alabama, to his superiors at the Headquarters of tho New Orleans Port of Embarkation; (4) The report of & board of officers appointee by the Commanding Officer, New Orleans Port of Embarkation to investigate the unloading activity at the U.S. Naval Magazine, Theodore, Alabama. This evidence will give a complete case history upon which to base further action

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g. That all standard operating procedures and existing regulations concerning tha shipment of toxic gas be reviewed and that the lessons learned from this operation be incorporated into the our rent publications.

h. That all future large scale toxio gas shipments be cade in trainload lots, accompanied by a CWS Guard and Security Detachment, at least equivalent to a platoon strength. Further that each trainload of persistent munitions be provided with one or two decontamination apparatuses mounted on flat cars so that they may be unloaded enroute to perfam emergency decontamination. That frequent stops be made enroute during the movement of toxic agents to permit inspection of the entire train. That a small detachment from a Transportation Corps railway unit accompany each toxic shipment to accomplish any necessary switching or movement of leaking cars. That & minimum of one crane truck be provided per train to permit handling and shifting of leaking munitions. That adequate protective equipment accompany each trainload not only to equip military personnel but also to equip railway employees. That ample decontamination supplies and equipment be provided to permit coping with any emergency.

i. That all future ship loading or unloading of toxic munitions be performed by soldier labor.

j. That while not specifically bearing on the case at hand, the allegations made by Captain Ehlbert concerning tha inadequacy of Guard and Security escort arriving from overseas ports should be investigated.

k. That data be obtained from the point of origin concerning the inspection performed at the time the cargo was loaded.

l. That technical tests be Bade to determine the adequacy of soldering and patching procedures.

m. That all munitions contained in future shipments be adequately marked to show the chemical content of each munition. This is extremely important when non-standard containers are used.

n. That all railway cars containing toxio gas munitions be [illegible]ed with a "no humping" placard in addition to the presently required poison gas placard.

o. That in future rail movements of persistent munitions all stirrups, brake handles, bleeder valve handles and other car parts with which railway employees come in contact be painted with detector paint prior to release from military control.

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p. That complete medical case histories be prepared for all personnel treated in order that official evidence may be available in any future claim actions.

FRANK M. ARTHUR
Lt. Colonel, CWS

ALFRED H. KUTSCHINSKI
1st. Lieutenant, CWS

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REPORT OF INVESTIGATION CONCERNING [illegible] MUNITIONS AT MOBILE, ALABAMA AND SHIPMENT OF [illegible] MUNITIONS TO PINE BLUFF ARSENAL.

MOBILE, ALABAMA INVESTIGATION

1. General. The unloading of the toxic gas munitions was being accomplished at the U.S. Naval Magazine dock at Theodore, Alabama. This magazine is situated approximately twenty miles southwest from Mobile, Alabama. The ship carrying the toxic cargo is the SS Francis L. Lee. This ship docked at the U.S. Naval Magazine on 3 June 1946 and commenced to discharge its cargo on 11 June 1946. The ship's manifest indicated an original loading of 3080 tons (Annex B).

2. Chronological Listing of Inspection.

a. 18 July 1946.

Conference with Lt. Colonel White, CWS, Guard and Security Detachment, Edgewood Arsenal; Captain Henry L. Hulbert, CWS, Chemical Officer, New Orleans Port of Embarkation; Captain Arthur R. Allyn, AC, CO - U.S. Army Activity at U.S. Naval Magazine Dock.

Inspected dock area.

Interview with Mr. D. A. Jones, Inspector, Bureau of Explosives, American Association of Railroads.

Report to Colonel MacArthur.

Tentative orders received from Colonel Gillo[illegible], Chief, Supply and Distribution Division, OCCWS.

Firm orders received from Colonel MacArthur.

Conference with Lt. B. L. Smith, Commanding Officer, U.S. Naval Magazine, Theodore, Alabama.

Interviewed Captain of the SS Francis L. Lee.

Interviewed Captain John D. Holm, Jr., MC (Medical Division, Edgewood Arsenal).

Called Colonel MacArthur concerning rerouting of ATC Special Flight.

Additional ordorc received from Colonel MacArthur.

b. 29 July 1946.

Interview with Mr. John Glennon, Mobile Historian and Realter.

Reported to AC. Brookley Field, Alabama (1100 CST, 19 July 1946).

Directive from Colonel MacArthur.

Visited U.S. Naval Magazine for conference with Lt. Colcaoi White, Captain Ehlbert and Captain Allyn.

It. Rutschinski and Lt. Subroski made trip to Horn Island.

Lt. Colonel Joseph C; Prentice, CWS, OCWS, arrived 1630 CST.

Oriented Lt. Colonel Prentice.

Lt. Rutschinski and Lt. Subroski returned and reported concerning facilities at Horn Island.

c. 20 July 1946

Obtained maps from Engineer Officer at Brookley Field.

Suggestions received frcn Colonel MacArthur.

Visited U.S. Naval Magazine for conference with Lt. Colonel White, Captain Ehlbert and Captain Allyn.

d. 21 July 1946

Visited Mobile City Hospital to inspect gas casualties that wo bein_ treated there.

Instructions from Colonel MacArthur.

Telephonic conference with Lt. Colonel White.

Lt. Colonels Arthur and Prentice and 1st Lt. Rutschinski discussed tentative plans for disposal of the toxic gas bomb "Leakers".

e. 22 July 1946

Lt. Colonel Prentice made aerial reconnaissance of Horn Island and adjacent area.

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Conference with staff officers of District Engineer's Office.

Conference with District Engineer (Colonel Beatner, Jr.).

Conference with Commanding Officer, U.S. Coast Guard Mobile Group (Captain Collins).

Visited U.S. Naval Magazine for conference with Lt. Colonel White, Captain Hilbert, and Captain Allyn.

Interview with Mr. John H. Tappan.

Report to Colonel MacArthur.

Captain Wexler, MC (Medical Division, Edgewood Arsenal) arrived Gad reported to Lt. Colonel Arthur.

f. 23 Ally 1946

Lt. Colonel Frentico, Lt. Mutschinski and Suboski made all-day reconnaissance of Horn Island.

Conference with Lt. Smith, Commanding Officer, U.S. Naval Magazine.

Report to Colonel MacArthur.

Telephonic conference with Lt. Colonel White cad Captain Allyn.

Lt. Colonel William J. Allen, Jr., CWS, OCCWS, arrived 1630, 23 July 1946.

Reported plans for departure to CD ia BrookleyField, AG Office.

Conference with Lt* Colonels Allen aad Frestico to finalize disposal plans.

Lt, Mutschinski telephonic conference with Captain Helm and Captain Hilbert.

Left Mobile, Alabama for Memphis, Tennessee.

3. General Information Concerning the Toxic Gas Load and Unloading Procedures.

The ship was originally loaded at Antwerp with 3893 tons of cargo.

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On 19 July 1840 it was estimated that approximately 400 to 500 tons remained aboard. An estimated total of 910 tons (including approximately 400 to 600 tons on board the S3 Francis L. Lee) was at the U.S. Naval Magazine for shipment to Pine Bluff Arsenal. Of the estimated 910 tons to be moved, all was estimated to be toxic bombs except for 63 tons of fuzes, bursters, rockets, etc. A portion of the 910 tons of cargo are contained in 10 or 11 carloads of "leakers" which are being held in the U.S. Naval Magazine Railway Yards pending development of means for disposal in the general vicinity of Mobile. Discharge of the ship's cargo was stopped at 1600 CST, 15 July 1946 on orders from Washington (originated by CSOWS).

4. General Problems, Recommendations and Plans Discussed at Conference 18 July 1946.

a. Captain Allyn and Captain Ehlbert state that one of the principal problems incidental to the unloading operations is one concerning the procurement of stevedore crews. All the stevedore crews were during the unloading operation are colored and are furnished by a local stevedoring company, the Strachan Stevedoring Company of Mobile, Alabama. The crews supplied are of inferior quality and very difficult to control insofar as enforcement of security regulations are concerned. Some leakers have been found in the holds. Some leakers have developed after non-leaking munitions were loaded into the railway cars. Each bomb placed in a railway car is inspected. Only non-leakers are loaded. The railway cars are held in a collection yard pending make-up of complete shipment. Prior to the release from the collection yard another test is made and only those cars which test negative are released for shipment to destination. These inspections are performed by CWS personnel using the H-9 detector kit. Each test is witnessed by a Transportation Corps representative, an inspector of the Bureau of Explosives, American Association of Railroads, and by an Army Ordnance inspector. At the time of the conference approximately 137 thousand-pound "leakers", 12 five-hundred-pound "leakers", and 8 five-hundred-pound "vapor" leakers were on hand. On approximately 15 or 16 July 1946 an emergency dump (see paragraph 27 b below for details) was made at sea of 50 one-thousand-pound bombs and 3 five-hundred-pound bombs. During the operations 20 vapor leakers were patched (litharge and glycerin) and 16 liquid leakers were sealed and deemed safe for shipment. These were shipped to Pine Bluff Arsenal.

b. Captain Ehlbert was of the opinion that the 910 tons could be safely moved to Pine Bluff after certain precautions not heretofore in effect had been taken (covering of the floor and a portion of the side walls of each car with tar paper).

c. Lt. Colonel White suggested that the 910 tons of munitions be loaded on Army barges (supposedly available at NOTS), sealed securely, and then moved via inland waterway to Edgewood Arsenal where they could be held aboard the barges until cold weather. The munitions could then be discharged at Edgewood under relatively safe conditions.

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d. The following plans and recommendations were submitted to Colonel MacArthur, Assistant Chief, CWS, for Operations.

(1) Plan 1: Load entire tonnage of toxic munitions then at Theodore, Alabama, in too Transportation Corps sealed barges and move via tug over inland water-way to Edgewood Arsenal. Upon arrival at Edgewood Arsenal hold aboard the sealed barrage until cool weather at which time the cargo could be disposed of with greater safety. An alternate phase of this plan was to dispose of leaking bombs in the Mobile area and to ship only non-leaking bombs by

(2) Plan 2: Ship all five hundred non-leaking bombs in especially prepared railway cars (cover floor and a portion of the side walls with heavy tar paper; cement overlaps; use approximately six inches of sand-chloride of lime mixture on the floor of each car) to Pine Bluff Arsenal. Dump all leaking bombs and one-thousand-pound, non-leaking bombs at sea.

(3) Plan 3: Dump the entire tonnage remaining at the U.S. Naval Magazine, Theodore, Alabama at sea.

(4) Plan 4: Continue unloading and shipping operation without modification.

(5) Adoption of the plan was recommended in the following order:

Priority 1: Plan 2
Priority 2: Plan I
Priority 3: Plan 5
Priority 4: Plan 4

5. Orders from Office, Chief, Chemical Warfare Service:

a. Colonel Gillet gave telephonic orders (tentative) as follows:

(1) Move all good 500 pound bombs to Huntsville Arsenal.

(2) Make shipment in two special trains.

(3) Cover the floor and a portion of the side wall of each car with tar paper. Place approximately six inches of dry sand in the bottom of each car prior to loading.

(4) Have an adequate CWS Guard and Security Detachment (officers and enlisted men) accompany each train.

(5) A 400-gallon decontamination apparatus to be loaded on a flatcar and dispatched with each train. Provision to be made for unloading of the decontamination vehicle enroute, if required at any point for emergency usage.

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(6) A railway coach to be provided for the CWS Guard and Security Detachment while enroute.

(7) Frequent train stops to be scheduled to permit inspection enroute.

(8) Leaking munitions at Theodore, Alabama to be disposed of locally.

(9) Non-leaking thousand-pound bombs to be held at the U.S. Naval Magazine pending further orders.

b. At approximately 1300 CST, 18 July 1946, Colonel MacArthur confirmed the tentative order cited in paragraph 5 a above.

6. Interview with Mr. D.A. Jones, Inspector, Bureau of Explosives, American Association of Railroads.

Mr. Jones was greatly concerned over decontamination of the cars in order to make them safe for the shipment of foodstuffs, grains, etc. I assured Mr. Jones that we would do any necessary work to make the cars safe for these type shipments. I told him that cars which had contained leakers would be decontaminated sufficiently to permit their safe movements to Louisville Arsenal or Plant Plant Arsenal at which place they would be reworked (contaminated floors and side walls removed and replaced). Any cars moved from Theodore, Alabama could have their exteriors checked to insure that they were free from contamination; and any necessary decontamination would be done before they left that area. Mr. Jones was satisfied with this plan. He concurred in the plan of using dry sand in the bottom of the car between the "spreaders" holding the ammunition (it was planned to place 2 x 6 "spreaders" on the floor of the cars, fill the space between with dry sand even with the tops of the 2 x 6's and then to load the bombs on top of this "safety" bottom).

7. Interview with Lt. R.L. Smith, CO, U.S. Naval Magazine, Theodore, Alabama.

Lt. Smith stated that while he desired to cooperate with the Army, he could not permit storage of toxic filled munitions at the Naval Magazine for an indefinite period. A satisfactory agreement was reached, and our instructions were stated in a letter (Annex II) which I gave him.

8. Interview with the Captain of the SS Francis L. Lee.

The ship's Captain stated that the vessel had been loaded at Antwerp during May 1946. He had not wanted to load toxics but had been assured that there was no danger involved. During the loading operations, several leakers were removed from the cargo. The crew informed the Captain that they were quitting the ship unless the toxic cargo was completely discharged by 22 July 1946.

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9. Inspection of the Dock Area.

The dock area contains only one small pier. The pier contains two railroad tracks. Unloading is accomplished by ship's gear. Some leakers which had been detected during the unloading were loaded on an Army barge tied along the pier opposite the SS Francis L. Lee. Some bombs suspected of defect were segregated at the near off side of the pier. The dock area, including the pile of "suspected" bombs, and the barge with the leakers aboard, were well sprayed with slurry. Two decontamination apparatuses, one vehicle mounted and the other skid mounted, were present. A small change shed and shower had been installed near the pier. Protective equipment is stored in and issued from a small two-story temporary Naval building near the pier.

10. Discussion with Captain Helm, MC (Medical Division, Edgewood Arsenal).

Captain Helm stated that as of 1300, 13 July 1946, a total of 102 injuries had developed. At this time only 0 patients required hospitalization. Captain Helm was of the opinion that all cases resulted from carelessness on the part of the workers.

11. At 1400 CST, 13 July 1946, I called Colonel MacArthur concerning rerouting of the plane (an ATC special flight originally scheduled from Bolling Field to Memphis, Tennessee; to Columbus Air Base, Miss.; to Mobile, Alabama; thence return to Bolling Field) to comply with Colonel MacArthur's 1500 CST directive to return via Memphis, Tennessee. At this time clearance had not been obtained, and I was informed to "stand by" for further instructions. At 1440 CST, 13 July 1946 Colonel MacArthur directed the release of the special plane and directed the inspection team to remain at Mobile to make arrangements for the disposal of all leaking bombs and of all one-thousand-pound bombs.

12. Arrangements had been made with Lt. Colonel White for Lt. Schroeder to investigate the Fort Morgan area on 13 July 1946 to ascertain if bomb disposal work could be performed in that area. Lt. Colonel Arthur and 1st Lt. Hutchinson visited Mr. John Glennon, a Mobile, Alabama historian and realtor to obtain information concerning the location of [redacted] areas where bomb disposal might be conducted. Mr. Glennon [redacted] informative and helpful. He stated that the Federal Government [redacted] Fort Morgan to the State of Alabama for a state park site. [redacted] suggested several isolated areas where bomb disposal might be conducted:

Dauphin Island off the southern coast of Alabama. The island is approximately 12 miles long, one-half mile wide and easily accessible by barge at high tide. It is approximately 25 miles by water from the Naval Magazine. It is largely uninhabited, with only a very small village at the eastern tip. The island is owned by the Vredenburg Lumber Company of Vredenburg, Alabama.

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Petit Bois Island, is a U.S. reservation with a light house on the eastern tip. It is ten miles long and lies just west of Dauphin Island. Mr. Glennon thought that it might be in use as a wild life sanctuary.

Land area northeast of Fort Morgan. Bomb disposal here would necessitate blocking off a slightly used public road.

Use of certain Section No. 16's [illegible] ch are owned by local School Districts under Alabama law.

Horn Island lies generally west of Petit Bois Island and approximately 10 to 12 miles due South from Pascagoula, Mississippi. The Island is approximately 11 miles long and has an average width of approximately one half mile. At the time of the investigation the Island was under the control of the District Engineer, Mobile, Alabama. It was reported uninhabited except for civilian caretakers employed by the District Engineer. The Mississippi channel lays off its north coast, approximately one and one-half to two miles. Except for this one defined channel the water adjacent to the Island on the north side is comparatively shallow. On the south side little or no traffic approaches close to the Island.

13. Orders from [illegible]. At approximately 1000 CST, 19 July 1940 Colonel MacArthur called Lt. Colonel Arthur and informed him that due to requirements of the Transportation Corps and various other governmental agencies, previous plans for movement of the bombs had to be cancelled. He directed that:

a. All non-leaking toxic bombs be loaded on the SS [illegible] is L. Lee for movement to Charleston, South Carolina.

b. A CWS officer, a Medical officer [illegible] adequate CWS Guard and Security Detachment accompany the ship.

c. The car of toxic bombs at Amory, Mississippi be moved to Mobile, Alabama.

d. Leaking bombs be destroyed locally, or those that might be safely plugged could be plugged and loaded with the other cargo.

e. Lt. Colonel Prentice was enroute under orders to accompany rail shipment of the bombs. Upon arrival at Mobile, Lt. Colonel Prentice was to be directed to take charge of disposal operations and Lt. Colonel Arthur and Lt. Kutschinski were to proceed to Memphis, Tennessee, to conduct further investigations there.

14. Second Visit to the U.S. Naval Magazine.

A visit was made to the U.S. Naval Magazine to discuss the changed plans with Lt. Colonel White, Captain Philbert and Captain [illegible]. Tar paper, [illegible], and lumber had been obtained to prepare the cars for [illegible] in accordance with previous instructions. All arrangements had been effected for commencement of discharging operations on the night of 19 July 1940. These officers had just received Colonel MacArthur's directive concerning

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the reloading of all cargo aboard the SS Francois L. Lee and movement to Charleston, South Carolina. Plans were being made to put this directive into operation. Lt. Subrecki reported that no land was available in the Fort Morgan area where the leaking bombs could be safely destroyed. He had data concerning Horn Island which appeared very favorable. Lt. Rutherfield and Lt. Subrecki left to make a preliminary reconnaissance of the Island which is located approximately 10 miles off shore from Pascagoula, Mississippi, which in turn is approximately 35 miles southwest from Theodore, Alabama. This hasty and preliminary reconnaissance revealed that the island was ideal for the disposal operations. The island is under the jurisdiction of the District Engineer, Mobile, Alabama and is uninhabited except for two civilian caretakers. The water at several points is deep enough to permit access by barges.

15. At 0915 CST, 20 July 1946, Colonel MacArthur informed Lt. Colonel Arthur that the red ring German bomb case was reported to be an incendiary case. It was assumed that this incendiary case had been employed as a container to ship the bulk German mustard agent. He stated that two proposals for disposal of the leaking bombs had been made in the COCMS and desired that those proposals be considered. The first proposal was that all leaking munitions be placed in metal boxes (to be procured locally) and then the lid welded closed. The second proposal was that all leaking munitions be "cast" in concrete. The munitions treated under either plan could then be easily handled and either shipped to an Arsenal or disposed of at sea. Discussion of these plans with Lt. Colonel Miller and Captain Ehlert led to the belief that both were not feasible and that the previous plan for destruction by burning was the most feasible. This conclusion was reported to Colonel MacArthur on 21 July 1946. Colonel MacArthur agreed at that time to the plan for destruction; however, stipulated that no destruction should be initiated pending the arrival of Lt. Colonel William J. Allen, Jr., who had discussed all phases of the problem with representatives of the Assistant Chief, CWS for Research and Development, COCMS.

16. On 21 July 1946, Colonel MacArthur directed that:

a. Captain Helm, MC, accompany the SS Francois L. Lee to Charleston. Captain Helm to report by telephone to Washington upon arrival at destination. (Another Medical officer was enroute to replace Captain Helm, however, this officer was on other orders and could not accompany the ship. Captain Tatum was being obtained to take over at Mobile but this arrangement would require a few days to effect).

b. Disposal of the toxic munitions be suspended pending the arrival of Colonel Allen, however, preparation should be continued. Colonel MacArthur stated that all precautions were to be taken to insure that no casualties resulted from the operation regardless of the time involved.

c. Necessary supplies and equipment be requisitioned from Huntsville Arsenal. All preliminary arrangements have been made by COCMS. Colonel MacArthur also stated that Captain Jack Wexler, MC, would arrive 22 July 1946, as a substitute for Captain Helm at Mobile. As soon as Captain Tatum can be obtained, Captain Wexler will be relieved.

17. In telephonic conference with Lt. Colonel Miller, it was agreed that Lt. Colonel Miller, Captain Helm and 10 enlisted men of the CWS Guard and Security Detachment would accompany the SS Francois L. Lee. One (1) decontamination apparatus, necessary protective equipment, protective clothing

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decontamination supplies, etc., would be loaded as required equipment for the voyage.

13. On 21 July 1946 Lt. Colonels Arthur and Prentice, Lt. Kutschinski visited the Mobile City Hospital where Captain Helm was treating several injured stevedores. Four colored patients were visited. Two of these suffered from extensive skin and genital burns and two were eye burns. A detailed Interim Report by Captain Helm is attached as Annex III. Captain Helm was of the opinion that all of the injuries resulted from negligence on the part of the workers. At the time of the visit to the hospital a total of 202 persons had been treated for gas contamination in one form or another. Captain Helm stated that the Stevedoring Company had approached him on 20 July 1946 requesting that security measures involving the use of protective clothing be waived, they desired to take casualties in order to speed up the discharge operations. Captain Helm stated that he informed the Stevedoring Company that no security measures would be waived, but on the contrary, all regulations would be rigidly enforced.

15. Lt. Colonel Prentice made a thorough low aerial reconnaissance of Horn Island on 22 July 1946 and reported that an excellent area had been located where the destruction of the leaking munitions could be performed.

20. Conferences were held with staff officers of the District Engineer's Operation Division (Mr. Johnson, Mr. U.L. Perry and Mr. Hayes) concerning the utilization of Horn Island for the disposal of the leaking toxic gas munitions. After discussion of preliminary plans, the representatives of the District Engineer stated that Horn Island would be made available to the CWS for use in connection with the disposal of the toxic gas munitions remaining at Mobile after departure of the SS Francis L. Lee. They desired a complete and detailed formal statement of the operations before commencement of the operation. Upon completion of the negotiations with the District Engineer's Operation Division personnel, Colonel Beatner, the District Engineer discussed the proposed plans with Lt. Colonels Arthur and Prentice, Lts. Kutschinski and Subreski.

21. A conference was held with the Commanding Officer, Mobile, Alabama Coast Guard Group, Captain Collins. Security measures to be effected offshore from Horn Island during the disposal operations were discussed. Captain Collins stated that his detachment was so small that he seriously doubted whether he could supply the required boats and personnel for security patrol. He called his superiors at New Orleans, Louisiana to request authority to provide the patrols as well as to request reinforcements for his meager facilities. In the event that satisfactory security measures cannot be effected at Horn Island, Captain Collins recommended the utilization of Chandeleur Island, which is operated as a Coast Guard station. This is more isolated from sea routes than is Horn Island. All traffic is ocean going commerce to or from the New Orleans area. This traffic passes the island in the regular channel and never approaches closer than five miles to the station.

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22. Fourth Visit to the U.S. Naval Magazine.

Tentative plans for the disposal of the leaking munitions were discussed with Lt. Colonel White, Captain Ehlbert and Captain Allyn. Lt. Colonel White stated that Lt. Hatzner had called from Amory, Mississippi to report that one one thousand pound "leaker" had been discovered in the car at that point. The car has been decontaminated, reloaded with the non-leaking munitions and routed to Pine Bluff Arsenal. Captain Allyn stated that the loading of the SS Francis L. Lee had been finished at 0630 CST, 22 July 1946. The manifest showed a total of 033 tons aboard (a total of 2973 tons had been shipped via rail and 40 tons of leakers were at the dock awaiting destruction). Plans were firmed concerning the CWS activity incidental to the voyage of the SS Francis L. Lee from Mobile, Alabama, to Charleston, South Carolina. Lt. Colonel White, Captain Holm and ten enlisted men were to accompany the ship. Gas masks and protective clothing for the ship's crew and CWS detachment were to be loaded readily available for usage enroute. One decontamination apparatus was to be loaded on the top deck. 400 pounds of chloride of lime was to be carried for emergency decontamination. These details were reported to Colonel MacArthur.

23. During the visit to the U.S. Naval Magazine Dock on 22 July 1946, Lt. Colonel Arthur and Lt. Kutschinski were introduced to a Mr. John H. Tappan. At the time of the introduction, we were informed that Mr. Tappan was representing the USA in the situation at Mobile, Alabama. Shortly after his arrival, Mr. Tappan produced several sheets of papers and passed them out to the officers who have been on duty at Mobile. I inquired further into Mr. Tappan's status and he informed me that he was investigating the situation at Mobile in connection with unloading of the SS Francis L. Lee for his firm, "Fillous, Ream and Tappan". This firm, he stated, represented the following clients: USA WSA; Fulton P and I Agency (firm of Marine Underwriters); and the Seas Shipping Company. Captain Ehlbert handed me a sheaf of papers which Mr. Tappan had given him and asked my opinion of the remarks. Upon reading the paper, I discovered that it was a legal statement prepared for Captain Ehlbert's signature and contained his narrative of events concerning the incident at Mobile, Alabama as well as certain general comments and opinions on the overall situation, including a statement that several ships loaded with toxic munitions had arrived from foreign ports with an inadequate security detachment and further that he (Captain Ehlbert) had protested such practices. I told Captain Ehlbert that I couldn't comment on his statements inasmuch as he alone knew the facts surrounding the incident. Lt. Colonel White asked me to look at one paragraph contained on the first page of his statement. This was a statement to the effect that in 1940 the Navy had discovered certain data which contradicted certain facts concerning mustard gas and that based upon this data obtained by the Navy, the CWS had commenced tests at San Jose which proved that the Navy was correct in their assertions. I told Lt. Colonel White that this information might not be exactly correct and that further it might be classified data. I then asked Mr. Tappan by what authority he was making the investigation whereupon he produced a

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telegram from his principals directing that he investigate the Mobile incident and render a complete report. Upon further questioning, he acknowledged that he had no War Department nor other Military authorization to conduct the investigation. He further stated, upon detailed questioning, that the statements which he had prepared for the various officers' signatures would be used as a part of an overall study his firm was making concerning the Mobile incident and as a result of the study his firm would advise their clients of their legal status in the matter. I advised all the officers to refrain from signing until competent military authority had authorized the investigation. Accordingly, Lt. Colonel White referred the matter to Colonel MacArthur during the routine telephonic report on plans for the move of the SS Francis L. Lee from Mobile, Alabama to Charleston, South Carolina. Colonel MacArthur directed that no statements be given unless such action was approved by the Chief of the Transportation Corps. All the military personnel retained the statements which had been prepared by Mr. Tappan, and he was informed that no signed statements would be made by any of the military personnel until such action was authorized by the Chief of the Transportation Corps.

24. On 23 July 1946, Lt. Colonel Prentice and Lts. Kutschinski and Schroeli made an all-day reconnaissance of Horn Island. Upon their return, they reported that their findings substantiated the opinions formed during an earlier, hasty reconnaissance and a complete aerial reconnaissance of the area. Suitable, cleared ground is located on about the center of the island with an adequate barge approach from the south, as well as the north. The area picked for the destruction of the toxic munitions contains a small artificial ravine which has been created by wind and sand. A minimum amount of effort will be required for the construction of the disposal trenches. Adequate facilities exist in the built-up section on the western end of the island for housing all personnel required for the disposal operations. A YTL and a crash-boat can be obtained from the Engineer installation at Pascagoula, Mississippi, which is approximately ten (10) to twelve (12) miles north of Horn Island. The Engineer installation can also furnish a crane and any transportation required for the operation.

25. During a telephone conference, Lt. B.L. Smith, Commanding Officer, U.S. Naval Magazine, at Theodore, Alabama, stated in reference to the disposal of thirty-three (33) leaking gas bombs in the gulf, that he did not expressly authorize the disposal of the munitions. He stated that Captain Ehlbert has advised him that thirty-three (33) leaking munitions were a hazard to the unloading operations. According to Lt. Smith, Captain Ehlbert stated that an emergency existed and that he proposed to dump the munitions at sea. According to Lt. Smith, Captain Ehlbert was advised that no dumping should be made closer than eighty (80) to eighty-five (85) miles to the coast line. Lt. Smith further states that upon return from the dumping operations that the tug captain was unable to identify the exact location where the dumping operation occurred, due to the fact that the tug captain normally operated on the inland waterways and did not have ocean charts, and that the voyage beyond the limits covered by the tug's navigation chart was entirely by estimate. According to Lt. Smith, the

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best information available at the time of the dumping operations indicated that the dumping operation was commenced approximately thirty-five (35) miles from the last coast guard light, which would locate the site approximately fifty (50) to sixty (60) miles off shore of the coast of Alabama. During this conference, Lt. Smith disclaimed any responsibility for authorizing the disposal of the leaking munitions in the gulf, however, he does admit recommending the dumping should not be accomplished closer than eighty-five (85) miles to the shore.

26. In a telephone conference with Lt. Colonel White and Captain Allyn on 23 July 1946, it was learned that the SS Francis L. Lee would be delayed for two (2) or three (3) days, due to the fact that clearance for the voyage could not be obtained from the Coast Guard. The annual inspection of the SS Francis L. Lee was several days overdue and the Coast Guard had refused to grant clearance until the inspection had been made. Captain Allyn stated that all arrangements had been made to have the inspection performed. He believed that this inspection was a matter of form and routine to ascertain the sea-worthiness of the vessel and had nothing to do with the shipment of toxic munitions. Captain Allyn stated that all the railroad cars had been decontaminated. Preparations were being made for decontamination of the dock and adjacent facilities. All leaking munitions had been loaded on the Transportation Corps barge; the barge had been moved to an isolated area in the general vicinity in the U.S. Naval Magazine Dock, where it was being held pending movement to the Horn Island. Colonel MacArthur was informed of the situation. Tentative plans for further investigation at Memphis, Tennessee and Amory, Mississippi were discussed with Colonel MacArthur at this time.

27. Lt. Colonel William J. Allen, Jr., arrived at Mobile, Alabama at 1030 CST, 23 July 1946. Lt. Colonels Arthur and Prentice oriented Colonel Allen concerning all activity in the Mobile area. All tentative plans and preliminary arrangements were discussed with Colonel Allen and the general scheme of operation was crystalized.

28. Statements made by Lt. Colonel White, Captain Ehlbert, and Captain Allyn during the several conferences at the U.S. Naval Magazine Dock, Theodore, Alabama, and not otherwise recorded in this report:

a. Remarks by Captain Allyn:

Captain Allyn stated that he had reported at the U.S. Naval Magazine, Theodore, Alabama, on 8 July 1946, to take charge of the U.S. Army Transportation Corps activities at that locality. He relieved Lt. Russell Chapleain, who had been on duty at that station from early 1946 to 7 July 1946. Captain Allyn states that no unloading was done between 3 and 8 July 1946. Upon assumption of commands at the dock, Captain Allyn states that he noticed a particularly disorderly arrangement of the protective equipment. Protective clothing and equipment were strewn around the installation in a very disorderly manner. No procedure had been established for the storage and issue of the items. No racks existed for

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storing gas mask, or for cataloging and storing shoes. He states that he immediately corrected this deficiency. He further states that in his opinion, the stocking of the individual protective items was inadequate. (Captain Ehlbert stated that initially 100 units of protective clothing had been provided; however, the abnormal situation required that additional clothing be provided. Accordingly, another 150 units were obtained. This additional quantity of clothing was inadequate to meet the ever increasing demands of the situation and another request for protective clothing was made). Additional protective supplies had been scheduled for delivery at Theodore, Alabama on 11 July 1946. These additional supplies did not arrive on that date. On 12 July 1946, certain quantities of clothing arrived but upon inspection of the various items, it was found that the garments were unimpregnated. In fact they were not even special clothing but were only ordinary issue items. Captain Allyn immediately notified officials at the New Orleans Port of Embarkation of the situation and suspended further unloading operations pending the arrival of adequate quantities of protective clothing. The additional protective clothing, 500 units, arrived on 15 July 1946. Stevedoring activities are under contract with the Strachan Stevedoring Company of Mobile, Alabama. Mr. Grover Dickson is the Mobile manager of the concern. Mr. Davis is superintendent of the Company. Mr. Jesviane Palma was the stevedoring boss in charge of the crews at the U.S. Naval Magazine Dock, Theodore, Alabama. In addition to the dock boss being constantly on the ground, Mr. Dickson and Mr. Davis frequently investigated the dock. Captain Allyn pointed out that no labor representative from the International Long-Shoremens Union, Local No. 410, had visited the U.S. Naval area and dock, however, these officials had made several derogatory statements concerning the hazardous situation existing at the unloading area. Not only had no officials of the Long-Shoremens Union visited the scene of operations but in addition no Union delegates had inspected the operation, although these same delegates were very critical of the overall operation when Captain Allyn visited their office. Captain Allyn states that he had issued several invitations to the Union officials and delegates inviting them to inspect the operation. Captain Allyn stated that for the most part, relations between CWS and Transportation Corps personnel was satisfactory. He further stated that he was completely satisfied with the technical assistance rendered by Captain Ehlbert except for the deficiencies in the protective clothing supply. Captain Allyn is of the opinion that the CWS representative should have undertaken supply responsibility in connection with the operation at Theodore, Alabama. (Captain Ehlbert stated he had made arrangements with the New Orleans Port of Embarkation Quartermaster to furnish the necessary protective clothing. He further states that the New Orleans Port of Embarkation operates on the consolidated supply system therein stocks are returned to the general depots in the event that no monthly demand is made against the storage available at the port supply depot. Captain Ehlbert stated that the New Orleans Port of Embarkation Quartermaster had inadequate quantities of protective clothing on hand to meet the demands of Theodore Operation. However, Captain Ehlbert states that he made arrangements with the New Orleans Port of Embarkation Quartermaster to requisition the required quantities of protective clothing from Quartermaster depots). Captain Allyn states that he had decided to aerate all protective clothing worn by the stevedores during the time they were off shift. This aeration procedure was agreed to by Captain Ehlbert and was placed in effect. Subsequently Captain Hahn, the Medical expert, advised Captain Allyn

that the aeration of protective clothing in bright sunlight caused deterioration of the fabric as well as reduced the impregnite content of the garment. Captain Allyn believes that his CWS advisor should have informed him of this fact. (Captain Ehlbert states that while he agreed to the aeration procedure, he was under the impression that the aeration was to be performed in the shade provided by the improvised change sheds which had been erected to accommodate the stevedoring crews). Captain Allyn stated that he realized he was the commanding officer in connection with the unloading activity at the U.S. Naval Magazine, Theodore, Alabama, and as such was fully responsible for the entire operation. He further stated that it was his understanding that the CWS officers responsibility was solely that of staff advisor to the Transportation Corps officers in charge of the unloading operation. Captain Allyn states that a very limited labor pool is available at Mobile, Alabama. Normal stevedoring activities at the Mobile dock utilize the regular full time stevedoring labor available in the Mobile area. The labor supplied to the Strachan Stevedoring Company by local unions, in Captain Allyn's opinion, was the cull of the water front. Furthermore, the working conditions at the dock were greatly complicated by the fact that a new crew was sent each day. This condition alone caused a tremendous problem in that each worker demanded unused protective clothing before going on the job. Clothing many times in excess of normal requirements was thus required to provide protection to the workers. Arrangements had been made for the local laundering of the clothing. (Captain Ehlbert states that he could not always get one day's service from the laundry establishment). Captain Allyn states that he had been successful in obtaining one day's service. In spite of the fact that local laundering was obtained, considerable quantities of protective clothing over and above normal requirements had to be utilized under these conditions. Captain Allyn agrees with Lt. Colonel White in the statement that the port facilities at the U.S. Naval Magazine Dock are generally inadequate for the discharge of toxic cargo. The facilities at the time of this inspection were greatly improved over those which were reported to exist at the commencement of the operation, in that change sheds and supply showers had been constructed to facilitate personnel decontamination and storage racks and supply facilities had been installed. Captain Allyn also states that supply installations which are in support of the operation, are too far distant from Theodore, Alabama, to provide immediate and adequate service. Captain Allyn has made no final report concerning the unloading activity to the Transportation Corps officials at the New Orleans Port of Embarkation. He states that he has made daily telephonic reports to his superiors and that these telephonic conferences have been recorded in the New Orleans office. He believes that transcript of these reports can be obtained from Major Leore, Superintendent of Water Division, New Orleans Port of Embarkation. Captain Allyn stated that the first toxic injuries appeared between 14 and 15 June 1946. At that time, operations were suspended until additional protective equipment, Guard and Security personnel, and competent military medical assistance could be obtained. The operation was resumed on 17 June 1946. When

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questioned why such small car shipments had been made, Captain Allyn stated that plans for shipment of complete trainloads had been unfavorable to the Railway Companies due to a nation-wide car shortage. In view of this situation, the Transportation Corps had agreed to ship in small car lots. Captain Allyn stated that he had had extreme difficulty in enforcing safety regulations. The workers were not cooperative and were guilty of violation of safety regulations and orders. Enforcement of these orders by firing offenders would create unwarranted labor difficulties. One case resulted in a partial "walk-out". In order to get that ship unloaded, too much pressure could not be brought on the stevedores.

b. Remarks by Captain Ehlbert:

Captain Ehlbert states that he is the Chemical Officer of the New Orleans Port of Embarkation. He states that he had arrived at the U.S. Naval Magazine, Theodore, Alabama, when the ship docked and had remained there ever since, except for a one-or-two day trip into New Orleans to make arrangements for additional protective equipment supply. Captain Ehlbert states that many of the CWS Guard and Security Detachment personnel, especially during the last several months, who have arrived aboard ships from Europe were untrained in Guard and Security work. In his opinion, the majority of the personnel thus assigned was entirely incompetent due to the lack of proper training. In his opinion, the only ship to arrive in the southern area with competent Guard and Security detail aboard was the SS Francis Newlands. The detachment aboard the SS Francis L. Lee, the SS Park Benjamin, and SS Isaac Mayer Wise were wholly untrained. In his opinion, the personnel assigned to these vessels had been assigned purely to afford them transportation to the U.S. for separation from the military service. Furthermore, Captain Ehlbert states that the protective and decontamination equipment aboard several of the vessels were inadequate, viz. The U.S. Francis L. Lee was stocked only with gas masks and miscellaneous German protective equipment, the SS Park Benjamin was stocked only with gas masks, and the SS Isaac Mayer Wise was stocked only with Navy oxygen and German oxygen equipment. Upon being questioned concerning the condition of personnel leaving Theodore, Alabama, as guards aboard trains enroute to the Pacific Coast, Captain Ehlbert stated that many of the CWS Guard and Security Detachment personnel who were designated to accompany shipments were mildly affected by toxic vapor [illegible] leaving the U.S. Naval Magazine at Theodore, Alabama. In his opinion, continual working in the dock area, in the ship's holds as well as continual handling of leaking tanks [illegible] resulted in sufficient exposure over a long period of time to produce [illegible] eye irritation. Inasmuch as assignment of Guard and Security Detachment personnel to accompany each rail shipment from the U.S. Naval Magazine was considered more or less of a routine function and inasmuch as all rail shipments prior to 11 July 1946 had resulted in no difficulty, it had been decided by Captain Allyn and Captain Helm that the personnel with mild eye irritation could satisfactorily act as security Guard on the trains. It was believed that this duty would permit the personnel to be away from the dock area over a

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matter of a few days and would afford them an opportunity for a short rest and provide recuperation. Upon being questioned concerning Sergeant Steinberger ..... Sergeant Captain Ehlbert states that Sgt. Steinberg had reported from Amory, Mississippi, to inform him of his physical condition prior to his leaving the railway car unguarded. Based upon the information from Sgt. Steinberger, Captain Ehlbert immediately requested CWS Guard and Security reinforcements to handle the leaking car at Amory, Mississippi. Captain Ehlbert states that he received similar information from Sgt. Woronockiwz prior to the sergeant's departure for a hospital at Memphis, Tennessee. Again Captain Ehlbert requested CWS Guard and Security reinforcements to handle the situation at Memphis. When questioned concerning the training of the stevedoring crews, Captain Ehlbert stated that intensive training had been given the stevedore bosses supervising the crews and the initial crews, however, subsequent crews were not given formal instruction. Captain Ehlbert stated that ho considered this satisfactory la that the stevedoring bosses could explain to their men, the security measures to be enforced. Captain Ehlbert stated that upon opening the hatches of the SS Francis L. Lee that tests had been made to determine whether or not hazardous vapors were present. All tests were negative. During the initial discharging of cargo, periodic checks were made which resulted in negative indication of poison gas. It was not until the operation was well under way and unloading had progressed into the lower hold area that the first presence of toxic vapor was detected. During the discharging when negative tests were obtained, no security measures were enforced — wearing of masks and protective clothing. Upon obtaining positive reaction with the M9 detector kits, normal security measures were effected. Captain Ehlbert stated that the Commanding Officer, New Orleans Port cr Embarkation had appointed r. board of officers to investigate an "accident" which had been reported by southern newspapers as having occurred at the U.S. Naval Magazine Dock, Theodore, Alabama. The investigating board was composed of Lt. Colonel Flynn, Captains O'Neil, Morris, and Ehlbert, all of the New Orleans Port of Embarkation. A copy of the [illegible] proceedings, findings, and recommendations was not available at Theodore, Alabama. Captain Ehlbert states that he had turned over all individual protective supplies and equipment to the Transportation Corps officer who was in charge of the operations. He further states that in his opinion the CWS Guard and Security function is to furnish technical advice to the Transportation Corps officials who are responsible for the overall unloading operations as well as to provide competent details to handle leaking munitions and to perform necessary decontamination work. Captain Ehlbert stated that thirty-three (33) leaking gas [illegible], thirty (30) 1000-pound bombs and three (3) 500-pound bombs were dumped at sea as an emergency measure. These leaking bombs had been off-loaded from the ship and in Captain Ehlbert'c estimation were a menace to the safety of workers employed in the unloading operation. He states that he contacted Lt. Smith, Commanding Officer, U.S. Naval Magazine, and suggested that as an emergency measure, the bombs be disposed of by dumping at sea. He states that Lt. Smith concurred in this proposal. Accordingly, he requested Captain Allyn to provide a tug and barrage to accomplish the dumping. Captain Allyn arranged for an Army tug belonging to the Transportation Corps at the New Orleans Port of Embarkation (Tug 881) to move to Theodore, Alabama, to tow a barge containing the toxic munitions. The actual dumping was performed on 15 or 16 July 1946. Captain Ehlbert did

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not [illegible] the exact locality where the bombs had been dumped, however, estimates that the dumping site was in the Gulf approximately thirty-five (35) miles from the last navigation light. (This estimate would place the locality approximately fifty (50) to sixty (60) miles into the Gulf from the coast line). He states that the tug captain informed him that the dumping was off the regular channel and in an area containing soft bottom. Captain Ehlbert was of the opinion that Lt. Smith knew the exact location of the area. (Subsequent interview with Lt. Smith revealed that he did not know the location of the dumping site). (A request has been made by Lt. Colonel Arthur to Captain Allyn at the New Orleans Port of Embarkation for a copy of the tug captain's report as to the general locality where the toxic munitions could be safely dumped. Captain Ehlbert states that the dumping was accomplished while the tug and barge were in motion. The Captain of the tug subsequently reported the dumping was in approximately one hundred (100) fathoms of water, in a locality where soft bottom prevailed and in an area outside normal traffic lanes. Captain Ehlbert states that at the commencement of the unloading operation, one (1) officer and seven (7) enlisted men of the CWS Guard and Security Detachment were present for duty. Upon request for reinforcements, one (1) sergeant and seven (7) enlisted men were obtained from the CWS Guard and Security Detachment. A third reinforcement from the Guard and Security was obtained 13 July 1946. The CWS strength at the time of this inspection was three (3) officers (including Captain [illegible]), and thirty-four (34) enlisted men of which three (3) officers and thirty (30) enlisted men were available for duty.

c. Remarks by Lt. Colonel White, Commanding Officer, Chemical Warfare Guard and Security Detachment:

Lt. Colonel White stated that he had made an earlier inspection of the activities at the United States Naval Magazine Dock at Theodore, Alabama, between 20 June 1946 and 22 June 1946. Lt. Colonel White states that in his opinion and based upon his inspection of the operations, the unloading was proceeding satisfactorily and that all required safety regulations were in effect. He states that it was extremely difficult to enforce the safety regulations because of the carelessness and negligence of the workers. Lt. Colonel White's report of his inspection is contained in a letter to the Chief, Chemical Warfare Service, dated 12 July 1946 (Copy is attached as Annex IV. On 0 August, it was learned that Lt. Colonel White had not yet forwarded this report to the Chief of the Chemical Warfare Service due to the fact that he desired to add to the paper and to incorporate certain data which he had inadvertently omitted.) During his present inspection, Lt. Colonel White states that he has investigated several leaking toxic bombs on the docks at Theodore, Alabama. In several instances, he has detected fine hair-line spray streams from the bombs. The toxic agent was being forced from the bomb in a steady stream to a distance of some three (3) or four (4) feet. In his opinion this condition resulted from great internal pressure. Lt. Colonel White states that in his opinion, Guard and Security functions at a port where munitions are being discharged should consist in advising the Transportation

Corps officials concerning safety measures and in furnishing technically qualified personnel for necessary decontamination and disposal work. In his opinion these functions have been satisfactorily discharged by the Chemical Warfare Service personnel on duty at the U.S. Naval Magazine dock, Theodore, Alabama. Lt. Colonel White stated that the efficiency of the CWS Guard and Security Detachment at this time was below the standard which had been maintained throughout the war time period. Demobilization of the Army, constant reorganization, continual reassignment of personnel has created serious obstacles in the maintenance of a highly competent and efficiently trained organization. He further states that many of the present non-commissioned officers who hold key positions in the Guard and Security Detachment would not have been rated as first class privates in the war time organization. Lt. Colonel White states that in his opinion the injuries and casualties resulting from the operation at Theodore, Alabama, are largely due to carelessness and negligence on the part of the civilian workers. He is of the opinion that all necessary security measures were taken in accordance with existing regulations which are based upon previous unloading experience and practice.

29. Final check was made with Captain Helm, Medical Corps, on the evening 29 July 1946 to ascertain the total casualties treated to that date. Captain Helm reported that he had not made an actual check of his records, but estimated that the total number of casualties (the term casualty is actually a misnomer for many of the so-called casualties are only minor injury) was two hundred forty-one (241) plus or minus ten (10).

30. Annex V contains two (2) clippings from the Mobile, Alabama, paper concerning operation at the U.S. Naval Magazine. Limited time available to the inspection team did not permit interview with the Brookley Field PRO to obtain a complete clipping file. Lt. Colonel Prentice and Lt. Colonel Allen were instructed to obtain the complete file of Mobile, Alabama, clippings.

31. At the time of the inspection, unloading operations had been suspended on order from Washington. Much of the report concerning prior unloading activities at the U.S. Naval Magazine Dock is based on statements of the personnel participating in that activity. In several places, contradicting statements are noted. Neither log nor journal was maintained by the officer in charge of the operation. Likewise, the CWS Staff Adviser did not maintain a record of events. It is my opinion, at least during the time of the inspection, that there was complete harmony between the CWS personnel and Transportation Corps personnel. Inspection of the German bombs leads to the impression that these are unsuitable for tropical or semi-tropical use, storage, and shipment, however, technical engineering tests will have to be made to definitely verify such impression. (Subsequent inspection of bomb gas fragments, both at Memphis and Washington, D.C., substantiates this earlier opinion). Captain Ehlbert, Captain Allyn, and Mr. Jones, all state that the L & N Railway is exceedingly rough

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insofar as road bed is concerned. In fact after the experience with the five (5) cars of leakers, it had been decided to route the rail movement via other railroads if additional munitions were to be shipped to CWS Arsenals. All the military personnel interviewed at the U.S. Naval Magazine, as well as several of the civilians, were agreed that the difficulty encountered was largely due to carelessness and negligence of the colored stevedores. In fact it appears that the Transportation Corps officer in charge of the operations was confronted with a serious labor problem which had to be handled with great care. One (1) incident is reported where a worker was fired for non-compliance with safety regulations. This individual advocated a general walk-out and it is reported that several of the men walked off the job because of this incident. Lt. Colonel White also reports that he issued several directives to the colored stevedores at different times only to have them perform in the reflective stay manner if at all. One particular case is that of a colored stevedore "hiding out" in a box car for an unauthorized rest or smoke. Lt. Colonel White noticed that this was one of the cars which had previously been contaminated and had not been decontaminated. He immediately ordered the stevedore back to the job and before the man would move, Lt. Colonel White had to repeat his order three (3) times. The man left the car (this incident occurring at night) by the far door but did not go towards the dock activity. Captain Hilbert and Captain Allyn agree that rigid enforcement of safety regulations, when civilian labor is employed, was virtually impossible. They state that enforcement of complete safety regulations would require martial law administered by a group of soldiers equally as large as the stevedoring crew.

5 Annexes:

Annex I - Manifest of SS Francis L. Lee
Annex II - Copy of Lt. Colonel Arthur's letter to Commanding Officer, U.S. Naval Magazine, Theodore, Alabama
Annex III - Captain Kelly's Interim Report
Annex IV - Copy of Lt. Colonel White's 12 July 1946 Report
Annex V - Two News Clippings from MOBILE REGISTER

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ANNEX I - OMITTED

Only one copy of the Ship's Manifest was obtainable by the Inspection Team. This is included in Section 1 of the original copy of this report. It ray be identified from the following data copied from the Army Ocean Manifest Recapitulation Sheet:

Vessel:	ANT 452 Francis L. Lee
Destination:	Cape-May
Date:	Second half of May, 1946
DWT:	3606
MT:	7103

Superintendent, Water Division signing document:

PAUL J. CARR, 1st Lt.

Annex II

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COPY COPY

HEADQUARTERS
NEW ORLEANS PORT OF EMBARKATIONS
New Orleans 12, La.

20 July 1946

SUBJECT: Interim Report Concerning Injuries to Personnel Engaged in Unloading the S.S. Francis L. Lee at Theodore, Alabama.

TO: Lt. Col. Arthur
Chemical Warfare Service
OC-CWS
Washington 25, D.C.

1. Lieutenant James Campbell and the undersigned arrived at this installation on 18 June 1946 in order to be present to assist and advise in the treatment of subject personnel and to advise on precautions in an effort to prevent future injuries.

2. At the time of arrival here investigation disclosed that twenty-four (24) individuals had been or were alleged to have been injured by exposure to mustard gas. Twenty-two (22) of these were patients in the Mobile City Hospital, the other two (2) were at their homes. Through the courtesy of Dr. Acker, physician for the Strachan Shipping Company, we were permitted to examine all patients. They were found to be suffering from mild to severe injuries involving the eyes in four cases, the genitalia in five, and the skin in the remainder. One man claimed to be suffering with abdominal cramps, dyspnea, dysphagia but complete examination revealed no evidence of injury by the gas. The following day eleven (11) other laborers reported for examination and were found to have mild skin irritation and/or mild conjunctivitis.

These patients had been treated as though they were suffering from thermal burns and the treatment was adequate in all instances. It was modified in several cases to agree completely with TMB-235.

Subsequent to this time 273 other individuals have reported to the undersigned for medical care. These have been to a large extent of a[illegible] mild nature and may have required one or two days hospitalization. [illegible]ct number having been hospitalized will be reported in a final r[illegible].

The patients who were in[illegible]d [illegible] ici[illegible]ely to warrant special mention are the following:

Annex III, ltr not zeroxed

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a. J.P., R.C., B.K., and T.L., all stevedores included in the original group mentioned in paragraph two above. These men had moderately severe eye burns developed during their period of observation, signs of pulmonary pathology, and mild lesions of the genitalia, and had almost generalized desquamation. They all recovered and were discharged from the hospital after approximately four (4) weeks. All of these patients were seen by a local ophthalmologist while in the hospital and upon discharge. Patient R.C. was completely recovered upon discharge. Patients J.P. and T.L. were found to be suffering from an exudative retinitis and to have corneal opacities. Their vision was estimated at 50% of normal. The etiology of the retinitis is uncertain. The undersigned has never encountered it or seen it described as a sequela to mustard burns. These patients are being investigated by the insurance physicians. The fourth patient appeared to be well on discharge but did not report to the ophthalmologist for a check-up. The outcome of these cases will be reported whenever definite.

b. Patients D.R. and C.R. suffered from extensive skin and genital burns. D.R. had vesicles from his waist down, involving the entire left leg and the genitalia. He has recovered and was discharged from the hospital today with one of two crusted areas. C.R. had very severe burns of the genitalia and minor burns of the thighs. He has recovered with the exception of approximately 1/2 the skin surface of his penis which has as yet not epithelialized.

c. Patient P.C. sat on a contaminated bar on 9 July and this accident was not discovered for two or three hours. At this time he was promptly decontaminated and sent to the hospital. By the following morning he had extensive vesicles of his buttocks, thighs, and genitalia. He is progressing satisfactorily but will probably have several more weeks of hospitalization.

d. Patient C.L.G., ASN 46015001, has been reported to us as a patient in the Army-Navy Hospital at Hot Springs, Arkansas. He departed this station on 12 July, at which time he had a mild pharyngitis and erythema of the skin.

e. Patient J.S. was admitted to the Mobile City Hospital c[illegible] loss of vision of the right eye. Examination revealed him to h[illegible] mild erythema and edema of the conjunctiva and lids. Examination o[illegible] fundus showed him to be suffering from optic atrophy. Because of t[illegible] was referred to an ophthalmologist for investigation of the atrophy. It is almost certain that this was present long before and completely unrelated to his exposure to gas.

6. Conferences were held on protective measures to attempt to prevent injuries during the remainder of the operations, and recommendations were reported in a letter to Chief, Medical Division dated 21 June and entitled "Recommendations Covering Injuries and Safety Precautions Taken During Unloading of the S.S. Francis L. Lee at Theodore, Alabama".

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These were mainly that all persons engaged in further operations should wear two-layer protective clothing, masks, hoods, and gloves. A considerable amount of difficulty has been encountered in the enforcement of the wearing of the gas mask. The stevedore foremen have been continuously opposed to this measure in that the men would not work while wearing the masks. In spite of this opposition the percentage of the men wearing the masks has increased and during the last several nights of operation it has approached 100%. With this, the number of persons reporting injuries has decreased remarkedly. During the past two nights only a very occasional individual has claimed any injury and these were barely detectable redness of the conjunctiva.

4. Recommendations were made for procedure for unloading future shipments of persistent chemical agents in a letter to Chief, Medical Division on the above subject dated 12 July.

/s/ John D. Helm, Jr.

JOHN D. HELM, JR.
Capt in, MC

cc: Chief, Medical Division
CC-CMD
Edgewood Arsenal, Maryland

Lt. Col. White, OTS

Capt. A.R. Allyn, TC

Capt. H.L. Hilbert, [redacted]

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TO REPORT OF INVESTIGATION CONCERNING RECEIPT OF GERMAN TOXIC MUNITIONS AT MOBILE, ALABAMA AND SHIPMENT OF THESE MUNITIONS TO PINE BLUFF ARSENAL

TELEPHONE CALLS TO AND FROM INSPECTION TEAM

16 July	2000 CST	To Colonel MacArthur (At his residence (from Memphis)).
17 July	0900 CST	To Colonel MacArthur (From Columbus Air Base).
17 July*	1400 CST	To Colonel MacArthur (Colonel Gillet and Lt. Colonel Allen (from Amory, Mississippi)).
[illegible]	[illegible]	To Major Spahn (Mr. Classen) re burster.
18 July*	1030 C3T	So. Colonel MacArthur ro plans (From Naval Magazine).
18 July	1200 CS2	From Colonel Gillet - tentative directive.
13 July	1500 CST	Frca Colonel MacArthur - Directive and orders to Memphis and Amory.
13 July*	1400 CS?	To Colonel MacArthur ro plans orders and instructions.
13 July	1440 CST	From Colonel MacArthur - Change in orders ana re plans.
19 July	1000 CS?	From Colonel MacArthur - Re change of plans.
20 July	0915 CST	From Colonel MacArthur
21 July	1215 CST	From Colonel MacArthur
22 July*	1710 CST	To Colonel MacArthur (White cad Arthur).
23 July*	1230 CST	To Colonel MacArthur
24 July	1G30 CST	To Captain Walker and Lt. Hatmer.
24 July	1700 CST	To Colonel MacArthur

* Placed Collect

Tab 4

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ANNEX 7 - (SITTED)

Only one set of clippings from the MOBILE REGISTER (19 and 20 July 1946 issues) were obtainable by the Inspection Team. These two sets of clippings are included in Section V of the original copy of this report.

1946

COPY COPY

9710 TECHNICAL SERVICE UNIT-CWS
GUARD AND SECURITY
EDGEWOOD ARSENAL, MARYLAND

12 July 1946

SUBJECT: Report of Unloading Operations at Theodore, Alabama and Charleston, South Carolina

TO: Chief, Chemical Warfare Service, Washington 25, D.C.

THRU: Commanding General, Chemical Warfare Center, Edgewood Arsenal, Md.

PART I

1. In compliance with Par 30, SO #128, Headquarters 9710 TSU-CWS, Chemical Warfare Center, Edgewood Arsenal, Maryland, dated 19 June 1946, the undersigned proceeded from Edgewood Arsenal with 150 suits of Protective Clothing by Army Airplane, arriving Mobile, Alabama at 1930, EST, 20 June 1946. The next morning transportation was furnished for the trip to the US Army Ammunition Magazine, Theodore, Alabama, where Ships were being unloaded. Unloading operations on the SS "Francis L. Leary" had been discontinued awaiting the arrival of additional protective clothing.

2. Friday, 21 June, was occupied with a survey of the situation and conferences with various interested individuals and groups. Captain Henry L. Halbert, CWS, Port Chemical Officer, New Orleans Port of Embarkation was in charge of Chemical Activities and had the situation well in hand. Captains John D. Holm, Jr., MC and 1st Lt. Rico A. Campbell, MC of the Medical Division, CC-CWS, Edgewood Arsenal, Maryland, who had been flown from Edgewood on Tuesday, 18 June, had examined all reported injuries and had established an atmosphere of confidence among both Military and Civilian Personnel.

3. Plans were formulated for the resumption of unloading operations on Monday, 24 June. Protective Measures agreed upon were:

(a) All hatches to be uncovered at once and to remain uncovered throughout the operation, and blowers and wind sails to be installed in the most critical holds, especially No. 3.

(b) All stevedores working in holds to wear impregnated clothing and gas masks and work in fifteen (15) to thirty (30) minute shifts.

(c) Stevedores working on docks and in cars to wear impregnated clothing and carry gas masks for immediate adjustment if gas was detected.

(d) Enlisted Personnel of Guard and Security Division, CWS, to be on duty throughout unloading operations, in the various holds, on dock and in cars, equipped with M9 detector Kits, Chalk, and Paper, to make frequent tests for the presence of gas, locate and isolate leaks, and enforce gas

Annex 1

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discipline among the workers.

(e) Showers to be erected and an open shed prepared for hanging clothes and gas masks.

4. On Saturday, 22 June, the undersigned accompanied Captain Helm and Lt. Campbell on their visit to the Mobile City Hospital. See inclosure 1, Memorandum by Captain Helm, MC to Chief, Medical Division, OC-CWS, Edgewood Arsenal, Maryland.

5. Saturday afternoon 1st Lt. Merritt W. Briggs, CWS, Guard and Security, arrived to relieve Lt. Bubsey who was recalled to Edgewood for discharge.

6. On Monday, 24 June, unloading operations were resumed with Lt. Briggs in charge of Guard and Security Personnel. All precautionary measures were strictly observed. As a result only a few minor injuries were reported during the four days of operation, Monday through Thursday, 24-27 June 1946, although a number of leaking E-filled bombs were located and removed from the ship. Several of those were repaired by Lt. Briggs by soldering.

7. It was found upon arrival that considerable publicity had been given by the local press to the injuries sustained by laborers in unloading operations on the SS "Francis L. Lee". A statement prepared by Captain Ehlbert, CWS, Captain Helm, MC, and the Public Relations Officer at Brookley Field was printed on Page 8 of the morning edition and again on Page 7 of the afternoon edition, Thursday 20 June 1946, whereas all other articles were prominently displayed on Page 1. See inclosure No. 2, Clippings from issues of the local press from 18 to 21 June 1946. This led to the appointment by Headquarters, New Orleans Port of Embarkation, New Orleans 12, Louisiana of "a board of officers to investigate and report upon the facts and circumstances surrounding an accident which occurred on the SS "Francis L. Lee", at Theodore, Ala. on 18 June 1946", see inclosure No. 3, Copy of order appointing board.

8. After talking with members of the crew of the SS "Francis L. Lee", Officials of the Stevedoring Company, several of the injured stevedores, and Army and Navy Officers in charge, it is the opinion of the undersigned that a combination of factors contributed to the high casualty rate on Monday, 17 June 1946:

(a) Initial unloading operations proceeded without incident. No evidence of gas was detected until the lower holds were uncovered and then the presence of gas was detected only in Hold 3 which is adjacent to the engine room.

(b) All personnel had been supplied with gas masks and instructed in proper adjustment. Stevedores working in Hold 3 were supplied with impregnated underwear, but since they were unable to wear impermeable outer garments, no other protective equipment was immediately available.

(c) Stevedores were outwardly negligent and in some cases declined to take precautions when specifically advised to do so.

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(d) The temperature on Monday, 17 June 1946 was particularly high.

(e) Military personnel, accustomed to the strong odor of our "Levenstein Mustard" were not aware of degree of concentration of the German Agent.

PART II

1. In compliance with Par 22, SO #127, Headquarters 9710 TSU AWS, Chemical Warfare Center, Edgewood Arsenal, Md., dated 20 June 1946 the undersigned departed Mobile, Ala. at 1310, 22 June 1946, arriving Charleston Small Boat Wet Storage Basin, Charleston, South Carolina 1315, 23 June 1946. A conference was held during the afternoon with Major Donnovan, TC, Executive Officer and 1st Lt. Ralph S. Pizer, CWS, Officer in charge of Guard and Security detachment, relative to unloading operations on the SS "Edward Richardson" and dumping operations under the supervisions of Captain Charles W. Carnes, CWS, Guard and Security Division.

2. The next three days were spent by the undersigned in observing unloading operations on the "Richardson", loading operations on the barges preparatory to dumping operations and in conference with Military, Naval and Coast Guard Officers covering various problems of unloading and dumping operations.

3. Experience with loading munitions at Charleston similar to that at Theodore except the situation was brought under control promptly and the local press did not publicize the incident. See inclosure No. 4, report of Captain Lafon H. Rasmussen, MC, to Chief, Medical Division, OC-CWS, Washington, D.C.

4. Approximately one-hundred and twenty (120) H-filled bombs were removed from the "Richardson", and are being held either on the Dock or on a barge in the harbor. Approximately twenty-three (23) CG-filled M 78 and M 79 bombs were removed from the "Richardson" and are being held on the barge.

CONCLUSIONS:

1. Experience in unloading operations at Theodore, Alabama, Charleston, South Carolina, and Houston, Texas are very similar. Ships have arrived and unloading operations have been commenced without adequate preparations having been made. In each case Guard and Security has been requested by the Port to furnish a detail to escort a shipment to a CWS Depot. As the situation developed more personnel were requested, but very inadequate information was supplied as to nature of operation, type of agent, and equipment required. On two occasions the undersigned has requested to be ordered to the Port to ascertain the needs of Guard and Security Details engaged in these operations.

2. The unloading and transportation of returned Chemical munitions to CWS Arsenals during the summer months is a difficult and somewhat hazardous operation.

Results obtained by Lt. Briggs in a preliminary test indicated that large percentage of the leaking H-filled thin-case, German bombs can be repaired by soldering.

4. In the event a bomb cannot be repaired by soldering the contents can be transferred to fifty-five (55) gallon drums for shipment to destination.

RECOMMENDATIONS:

1. That Guard and Security be informed in advance of the arrival of a Cargo of Chemical Munitions, the approximate amount, type of munitions and the agent or agents expected.

2. That it be authorized to set up an installation for handling such cargo by placing an officer in charge with sufficient trained personnel to supervise unloading and sufficient protective equipment for all personnel engaged in unloading operations.

3. That a Medical Officer, familiar with the treatment of gas casualties be placed on temporary duty at the Port for the duration of the period of unloading.

4. That leaking bombs be either repaired by soldering or the contents transferred to fifty-five (55) gallon drums for shipment to destination.

5. That, if practicable, the return of Chemical Munitions be delayed until cooler weather.

CARLAND H. WHITE
Lt. Col., CWS
Guard and Security Division

4 Incls.
Memorandum, Capt. Helm
Clippings, Mobile papers
[illegible] appointing Board of Off[illegible]
[illegible]rt, Capt. Rasmussen

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APPENDIX D

NOT USED

APPENDIX E

NOT USED

APPENDIX F

NEWSPAPERS / JOURNALS

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ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE AMMUNITION TERMINAL
(U.S. NAVAL AMMUNITION MAGAZINE)

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

APPENDIX F

NEWSPAPERS/JOURNALS

F-1 Newspaper articles during unloading of SS Francis L. Lee
F-2 Newspaper articles after DOD left site

APPENDIX F-1

NEWSPAPER ARTICLES DURING UNLOADING OF SS FRANCIS L. LEE

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THE MOBILE REGISTER
Mobile, Alabama

June 20, 1946

Gas Victims To Recover, Army Officer Announces

Medical Expert Declares Injuries To 21 Are Not Serious; No Permanent Harm Seen.

Capt. John D. Helm, an Army medical officer attached to the medical research laboratory at Edgewater Arsenal, Md., announced here Wednesday night that none of the mustard gas victim* at City Hospital was seriously jnjured. Of the burns suffered by 21 colored stevedores Monday during unloading of 500-pound German aerial gas bombs from a Liberty >hlp at the Theodore Naval-Ammunition Depot, he stated: "None of the injuries were of sufficient severity to suggest there would be permanent damage and complete recovery is anticipated in all instances."

6 Discharged

The medical officer also announced that six of the 21 stevedores affected by what Army authorities termed "a mild vapor concentration" have been discharged from City Hospital and will receive out-patient care.

Three of six of the victims with eye injuries suffered burns to those organs which were described by Capt. Helm as of "moderate severity."

Eleven stevedores, in addition to those suffering eye burns, will be held at City Hospital for two to three weeks. He said most of the burns to arms, hands, legs, face and body were of "minor significance."

"Burns due to these chemicals may be likened to thoae resulting to severe sunburn with blister formations," he explained. "The chief difference between these burns and other type of burns is the fact that the individual experiences no pain at the time he contacts the chemical, and In many cases he is not aware that he is burned."

Capt. Helm said symptoms may not appear for as long as 24 hours after contact.

3860 Tons Of Gas

The colored victims were stevedoes employed by Starchan Shipping Co., in unloading operations aboard the SS Francis L. Lee, which arrived here last week with a cargo of 3860 tons of mustard gas and phosgene aerial bombs shipped from Belgium.

Two white men also were treated for the affects of the vapor. One was an Army chemical warfare technician supervising unloading of the cargo at Theodore and the second was a civilian cargo checker. Neither suffered serious burns and both were released after treatment.

An Army spokesman said cause of the vapor's release was excessive heat in the ship's hold. He said a temperature of 105 degrees resulted in escape of a quantity of the mustard gas in Hold 2 of the Lee Monday.

Effects of the gas on their skin were not apparent until hours after they left the ammunition depot Monday night. Although reports from Theodore to City Hospital attendants Tuesday night indicated that possibly 20 more victims would be hospitalized, no confirmation of this could be found Wednesday.

Safety Devices Installed

Lt. J. R. Chapman, Jr., officer In charge of Army operations at the ammunition depot, stated Wednesday night that additional safety equipment has been installed aboard the partly-unloaded vessel to prevent any recurrence of gas escape or injuries to workmen in the event of such escape.

"All stevedores are protected by gas masks and impregnated clothing and a security detail of experienced Army personnel will be on duty at all times in the vessel's hold and on the wharf where loading is in actual operation." he announced.

Lt. Chapman said the first few days work on the Lee were conducted without accidents and difficulties were experienced only when temperature in the hold began rising.

Ventilation equipment also has been installed in the ship's hold la prevent future rises in temperature, he stated.

An explanation for reports to City Hospital on additional gas burn victims was given by the officer as the "state-of-mind of other workers following the injuries to the 21 stevedores."

He said 11 men who worked with those later admitted to City Hospital reported to the Army dispensary at Theodore with complaints they also were burned.

Physicians who examined them reported to Lt. Chapman that none of this second group were in any way affected by gas.

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THE MOBILE REGISTER
Mobile, Alabama

June 21, 1946

Gases, Injuring 23 Here, Burned Antwerp Seamen

Belgian stevedores two months ago in the port of Antwerp went on a four-day strike after several of them were burned during loading of aerial gas bombs on the SS Francis L. Lee. crew members of the Liberty ship asserted here Thursday night.

Escaping mustard gas vapors injured 23 men Monday at the Theodore naval ammunition depot during unloading operations of the same cargo.

Resumption of work on the Lee in the Belgian port began when authorities acceded to a demand by the stevedores for a "100 per cent increase in pay". The new rate was reported by seamen from the Francis L. Lee as being 100 francs daily, or approximately $2.50.

Th[illegible]o stated German prisoners [illegible]r in the Antwerp area refu[illegible] load the gas bombs during the strike of the Belgians when the prison laborers learned that several of the 500-pound missiles were leaking and had filled the holes of the American vessel with poison vapors.

Other walkouts were reported by the seamen who said they occurred on one of four other vessels being loaded with the bombs in Antwerp. In the case of that ship, they said, more than two months was required to complete the stowing of cargoes because of leakages in several of the bombs.

THE MOBILE PRESS
Mobile, Alabama

July 4, 1946

Seven More Are Burned Here By German Poison Gas Cargo

Longshoremen Treated At City Hospital For Injuries Received On Job At Navy's Theodore Base.

Mobile's City Hospital last night and today WHS called upon for the second time in three weeks to treat a number of colored longshoremen who suffered mustard gas burns, reportedly while unloading a cargo from the S. S. Francis Lee at the Navy's Theodore munitions dump.

The "officer of the day" at the base told a reporter he knew nothing of the incident.

Hospital attendants said four colored men wer treated last night while three additional patients were brought to the hospital this morning.

Burned About Eyes

The patients were said MI be suffering from burns of the eyes.

Less than three weeks ago 23 persons including an Army technician and a civilian checker, were treated at the hospital for burns of the face, eyes, hands and bodies received while unloading a bomb cargo at the munitions depot.

At that time, Army medical authorities from Washington conducted an investigation of the incident and minimized extent of injuries received by the burn victims.

Following the first accident authorities at the base indicated that proper precautionary measures were being taken to protect persons engaged in handling the gas cargoes.

Hospital records listed the following colored mm as being treated for gas burns last ni[illegible] today.

Took Collard 61, [illegible] Conception St.; James Da[illegible] N Bayou St.; Jimmy [illegible] of 419 Patterson St.; J[illegible] 39, of 514 Manassas St.; [illegible] 33, of 453 Earle St.; J[illegible] 25 of MS Texas St., and Jim Willis of 405 S Hamilton St.

Hospital records identified the injured colored men as employes of the Strachan Shipping Co.

Officials of the shipping company

(Continued an Page 4, Col. 3)

'A Part Of Me Has Gone,' Says Writer As Philippines Freed

By AL VALENCIA
(Of the Associated Press Manila Staff)

MANILA—(AP)—They lowered the American flag today. A friend has said goodbye. A part of me is gone...

The Filipino flag stands alone. It is one of the proudest moments of my life.

Feeling of Sadness

But I can't help feeling a sadness in seeing that American flag go down. I was born under that flag. Millions of Filipinos, and thousands who fought and died on Bataan and Corregidor to preserve that flag were born under it.

I have served and confused feelings. What does the future hold? What does the lowering of the American flag mean?

I saw that flag come down once before. That was a dark day in January, 1942. I saw the flag of the Japanese invader fluttering in the bright sunshine in almost the same spot where we Filipinos and Americans assembled today.

There followed three of the blackest years within memory of Filipinos now living.

HJ* Meant Good

The American flag has meant every good thing I have ever known.

And now this jubilation . . . the gun salute . . . the applause. . . .

And High Commissioner McNutt saying A nation is born! Long live the republic of "the Philippines! May Cod bless and prosper the Filipino people and keep them safe and free!"

If I could speak for the 18,000,000 Filipinos I would say to you good people across the Pacific, "Cod bless you. We will never forget."

GAS BURNS

(Continued From Page One)

said the men were engaged in unloading a cargo from the SS Francis Lee.

The SS Francis Lee is identified as the vessel upon which the 23 men received mustard gas burns June 17, and 18, while unloading at Theodore.

At that time the cargo wai identified as an Army shipment of German aerial bombs containing mustard gas and phosgene.

Seeking details of the latest accident, The Press today contacted the Navy base at Theodore. A man who identified himself as "the officer of the day" told a reporter "as far as I'm concerned, I don't know anything happened."

The officer refused to reveal his name.

When the newsman asked the Navy representative to identify himself, the officer said "that's unimportant."

Slams Down Phone

Asked a second time to give his name, the officer slammed the telephone down, ending the conversation.

In Navy parlance, the "officer of the day" is an officer designated to assume responsible duties for a specified day at a Navy base.

A majority of the patients admitted to the hospital June 23 have been discharged, and the few remaining are described as recovering.

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THE MOBILE REGISTER
Mobile, Alabama

July 5, 1946

Brakeman Suffers Gas Burns As Liquid Spills From Car

When he was admitted to City Hospital Thursday night for treatment of what physicians said were mustard (as burns. a brakeman for the L&N Railroad reported they were caused by a liquid escaping from a freight car en route to Hunt* ville from the Naval ammunition depot at Theodore.

Tom Sims. 54. of 161 Lipscomb St. said he was uncoupling between two can of * 27-freight-car train at Flomaton when the liquid fell on him.

He reported that leakage In two of the cars resulted in instructions to the train crew to uncouple and turn back the freight cars which were found to be leaking.

The leaking cars and the remaining 25 In UM train were loaded with 300-pound German aerial mustard gas bombs, Sims declared.

No report was available from Army authorities a: Theodore in charge of unloading operations of the SS Frances Lee. Earlier Thursday and Wednesday night, nine colored stevedores were treated at City Hospital for mustard gas burns they received while working on the Liberty ship.. Three weeks ago, 21

(Page 4, Col.3, BURNS)

Burns

(Continued From Page One)

colored men and two white worker* were bumed by gas which vaporized in the ship's hold.

Following the injuries by escaping gas three weelu ago, Army authorities announced all workmen engaged in unloading operations would be protected from possible gas escape with rubber gloves and other protective clothing as well as gas masks. One of the injured dock workers said Thursday he and others of the unloading crew frequently doffed their masks when in the hold of the ship.

Held for further treatment at the hospital were: Jim Lucas, 25, of 113 Texas St., and Willis Carter, 44. of 405 S. Hamilton St Both suffered eye burns which the attending physician reported were not serious.

Others treated Wednesday night or early Thursday were:

Samuel Huff. 37. of 651½ S. Warrent St.; Sam West, 33. 4S3 Earl St.; Took Collard, 61, 718 & Conception St.; James Davis, 52, 305 N. Bayou SL: Jimmy Williams, 30, 419 Patterson St.: James Sellers, 39, 814 Manalsas SL. and Jim Willls of 403 S. Hamilton St

Two of the 21 colored men admitted to City Hospital tor extensive mustard gas burns June 18 an still undergoing treatment for bums of the eyes. Both are able to see and attending physicians report they will suiter no serious aftereffects.

THE MOBILE REGISTER
Mobile, Alabama

July 6, 1946

Seaman Wants Bonus To Work At Naval Dump

12 Crew Members Treated For Mustard Gas Burns In Latest Incident

A seaman who identified himself as the representative of the Seafarers' International Union (AFL) aboard the SS Frances Lee reported Friday he was placing a demand for "a 100 per cent bonus" for crewmen aboard the vessel after he and 11 other crew members were treated for mustard gas burns at the Navy dispensary at Theodore.

George" Swift of Holllslon. Mass., who said he was SIU representative aboard the Lee, stated the ship's crewmen were seeking "double pay" for the nine-week period the gas has been aboard the ship.

He asserted 12 seamen from the Lee reported to the Navy sick bay Friday with their throats and eyes burned persistently. Swift said a Navy doctor told him the burns were caused by mustard gas.

45 Seamen Treated

The 12 crewmen who reportedly suffered burns brings to 45 the total number of persons who have been treated for mustard gas burns since the Lee began unloading operations at the Navy's munition depot about four weeks ago.

• A watertender in the ship's engine room. Swift said he could smell the gas escaping through the vessel's ventilation system while he [illegible]ted.

[illegible] said the German-made mus[illegible] bombs were "leaky" and [illegible] leaking bombs were placed on [illegible] docks beside the Lee, making [illegible] impossible for crew members to [illegible] to and from the ship without smelling the gas.

An official of the SIU here said he was "making every effort" to get as many of the crewmen from aboard the Lee "as quickly as possible," but pointed out that companies are not required "to pay off crews" until 24 hours after the ship's cargo has been discharged.

Operations Stopped

• In an interview, Swift said unloading operations aboard the Lee had been ceased Friday after nine colored longshoremen were treated at City Hospital within two days for mustard gas burns.

Navy officers at Theodore refused to comment.

Strachan Shipping Co. is local agent for the Lee.

Burn victims from the war gas aboard the Lee include Tom Sims, 54, of 161 Linscomb St., who suffered burns when a liquid fell on him while he worked as a brakeman on a Huntsville-bound Louisville & Nashville Railroad train which was carrying some of the German bombs.

Following treatment of the first burn victims June 17-18, the Army and Navy said precautionary steps would be taken to prevent recurrences.

• Swift said the Navy doctor told him the only certain method for crewmen to protect themselves against the gas would be to wear gas masks "24 hours a day."

The union representative reported there also is a quantity of phosgene, another war gas, aboard the Lee. He quoted the Navy physician as saying after effects such as "lung scars" can result from being exposed to phosgene.

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bombs from a vessel al the Naval Ammunition Depot at Theodore.

Portal Pay Received

Hourly pay scale to colored stevedores engaged in unloading 500 and 1000-pound German nerinl (us bombs from the hold of the Liberty ship Francis L. Lee was revealed to be $3.00 and that rate is paid workmen from the time they leave Mobile In trucks for the night shift until they return to the city at the end of their night's work.

It was also reported each worker is relieved every 30 minutes and returns to the holds after a 30-minute respite period. This measure was described as necessary because of the discomfort o(wearing gas masks.

Over 60 Treated

Reason for failure of contracting longshoremen to furnish a lull complement of 160 -colored workmen to complete unloading * balance of about 750 tons of the gas cargo is that more than 80 stevedores during the past three weeks have undergone treatment for burns due to contact nf their flesh with gas which escaped from containers in the ship's holds during recent temperatures In tl>e holds o(103 degrees.

An Army medical officer, who is a specialist attached to the Chemical Warfare Service, said practically every burn cane since unloading operations began resulted from carelessness nf workmen.

He asserted equipment given stevedores was positive insurance against any but the most minor burns and that any more serious was due to failure nf the colored men to follow instructions.

Salves Are Furnished

"Gas masks, especially impregnated clothing, *nd counteracting salves are furnished the men," He explained, "and burns have continued to occur in some of our

(Cont. 3, THEODORE)

Theodore

(Continued from Page One)

workers because they have failed to wear the equipment or in other ways fail to follow instructions."

A detail of enlisted men of the Chemical Warfare Division's Guard and Security Detail, under Lt. Merritt Briggs, were questioned on the situation and affirmed the statements of the medical officer.

"I have worked on these bombs longer than the stevedores and never raised a gas blister yet," said T/5 James W. Swindle.

The technician and others of his group are assigned to removal of leaking bombs from the Lee's hold as well as maintaining watch during unloading operations to prevent stevedores from committing infractions of regulations. Their task was described by Capt. A. R. Allen, officer in charge of Army unloadings at Theodore, aa considerably more hazardous than lhat of the stevedores.

Majority of the Army men assigned to the detail were reported to receive (SO. monthly before deductions are made.

Nine Mor From Mustard Gas

Admission of nine colored stevedores to City Hospital Thursday brought lo 64 the number of victims of the mustard gas shipment on the S.S Francis Lee.

Those admitted for burns received Wednesday night were J. D Pugh, 27; J. C. Coates, 27; James Williams, 31; Condie Pugh, 24; Mose Williams, 42; Leslie Franklin, 43; all of Prichard and Ed Smith, 47, Washington Ave.; Lewis July, 35, 708½ Lyons St.; and Eugene King, 42, 851 Chestnut St., Mobile.

Most of them were admitted during the afternoon for eye burns. One of the two student nurses burned Wednesday was discharged Thursday.

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THE MOBILE REGISTER
Mobile, Alabama

July 14, 1946

Here's How Theodore IT orkers Combat Nazi Gas Menace

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THE MOBILE REGISTER
Mobile, Alabama

July 14, 1946

Army Keeps Sharp Eye On Navy Dump Workers

Their Shoes, Clothing And Helmets Tested Carefully In Order To Keep Down Gas Burns

The Army is keeping a 24-hour vigil over a treacherous cargo of made-in-Germany mustard gas housed in the holds of the SS Francis Lee moored at the U. S. Naval Magazine, Theodore. The Army is not only keeping a sharp watch over the powerful chemical gas, but is going "all out" to see that stevedores unloading the cargo are protected from gas leaking from faulty containers. Last week approximately 60 colored stevedores were treated (or mustard gas burns.

The SS Lee's cargo was picked up in Antwerp, Belgium, and was originally made by the Germans In the Ruhr Valley. It is being stored in the United States. Its present location will be In Mobile but not permanently.

The Army has lent Capt. John D Helm, Jr., chemical warfare expert, from their Edgewood (Md) Arsenal I" supervise the unloading of the cargo from a protective standpoint.

Workers Safeguarded

"We are doing just about everything possible to protect the worker" Capt. Helm declared. "We are issuing protective clothing, inspecting the ship every few hours and providing protective salves to the bodies of men engaged in unloading the ships. Also we are destroying faulty gas containers by sinking them off shore at a 35-mile distance."

There also are a few secret weapons the Army is using In combating mustard gas. For InXance. Capt. Helm couldn't tell just what the ingredients were that composed the protective balm workers spread over their face and wrists before donning their "man from Mars" suits prior to entering holds of the ship. AH he could divulge was: "It is very effective in keeping mustard gas from irritating the body."

Capt Helm also was mum on just how the Army impregnates clothing worn by those coming in contact

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Gas

(Continued From Face One)

with the gas. "They just do it," he said.

All clothing Issued to the stevedores U tested.

"Men in the chemical warfare units volunteer to test batches of this special clothing before it ever leaves the factory," Capt. Helm said. "If there are any leaks or defects the entire batch is refused as unworthy."

—The "man from Mars" suits are hot and bulky but consist of long woolen underwear, an impregnated suit of treated cotton, all-purpose gas masks and GI shoes. Some workers as an extra precaution, wear military puttees. Impregnated gloves are also part of the working garb:

A mobile ambulance greets workers when they arrive to go on the job around 7 p.m. Workers who have suffered minor burns in the past are given treatment and the protective ointment smeared on their bodies. They then go up and collect their clothing and set off for work. All men; u they parade down the dock are watched carefully by guards to see they are properly attired. It not. they are turned back for the missing parts of their working uniforms. Even gas masks are tried on for fit and working condition in the building housing the dressing room. The ambulance remains at the docks until the men knock off work the following morning.

Suction Instruments

Capt. Helm explained two ways in which a ship or shorage room is tested for gas.

"For vapor leakage we have a small suction instrument with a filter in the center. The instrument sucks up air and when and if the filter turns blue, we know too much mustard gas is present and that the condition is unfit for working men.

"For liquid gas we have a red crayon we mark over a spot which resembles leakage and if that turns blue we know mustard gas is present."

Capt. Helms also pointed out that most of the burns received by stevedores here was through their own carelessness.

"You can tell them what to do and what not to do but they forget and burns result," he said.

For instance, he said a worker will get hot with his gas mask and will remove it to wipe the inside with his gloved hands. Mustard gas may be on his hands but his gloves protect them. Inside his mask. It will touch hi* face and burn his skin or get into their eyes.

All the leaky containers are hauled out into the waters 35-miles from the docks and dumped overboard. The bombs are placed on a barge and towed by an Army tug. A convenient muddy bottom is sought so the shell will immediately anchor itself and stap put.

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THE MOBILE PRESS REGISTER
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July 14, 1946

GI Badly Burned From Mustard Gas

Vapors Leak From Freight In Amory, Miss.

AMORY, Miss.—(AP)—One man was seriously burned here Saturday by mustard gas escaping from a freight car on the St. Louis and San Francisco Railroad. Chief of Police R. E. Brassfield, reported Saturday.

He said the burned man was an unidentified soldier who was treated by Dr. John Murphy, returned Army physician of Amory. The soldier was taken to Columbus Army Air Field, and later flown to Memphis for treatment.

The freight car is on a siding at Bigbee, two miles north of here and a quarter of a mile from the nearest home.

The police chief said the leak was a slow one and there was little danger from it but instructions have been issued to keep all persons away.

E. L. Puckett, Red Cross disaster chairman at Amory, said that he had notified the Red Cross in Atlanta, and that the Army was sending a decontamination squad here by plane from Edgewood, Md.

Puckett said a specialist was also on route from Birmingham and a detachment of military police was coming to Amory from Memphis.

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THE MOBILE REGISTER
Mobile, Alabama

July 15, 1946

8 More Workers Suffer Gas Burns Unloading Vessel

Officials Put Blame On Men's Carelessness Handling Bombs

With eight more victims of mustard gas burns reporting Sunday for treatment at City Hospital, the number of victims of escaping gas in unloading operations on the SS Francis L. Lee at Theodore mounted to 74.

All but two of those suffering skin or eye burns were colored stevedores engaged in transferring 500 and 1000-pound German aerial gas bombs from the Liberty ship which brought the cargo here from Antwerp, Belgium.

Army medical specialists from the Chemical Warfare Service, stationed at the Theodore Naval Ammunition Depot, reported cause of the burns "was due to carelessness of workmen. They said clothing furnished stevedores for their work on the gas cargo Is Impregnated with a chemical counteracting effects of gas vaper and that gas masks are furnished to be worn at all times during work in the ship's hold.

One officer stated all but the first series of bum victims, which occurred June 18, resulted when workmen removed masks or portions of clothing despite explicit orders from Army men stationed on the Francis Lee.

Burns resulting from the handling of the cargo here were described by medical officers as similar in appearance to those caused by excessive sunlight but without the accompanying pain. None of the men burned suffered serious effects although several eye cases have been undergoing treatment—for several weeks.

F-1-9

THE MOBILE REGISTER
Mobile, Alabama

July 16, 1946

Mustard Gas Shipments Impounded At Memphis

MEMPHIS, Tenn.—(UP)—A shipment of captured tierman mustard gas bombs which left a trail of injury and burns from Mobile to Memphis has been impounded at the Memphis general depot, it was learned Monday.

N. N. Hopkins, superintendent of the Missouri Pacific rail terminal here, said eight of the freight cars containing the bombs had been sent to the Army depot for neutralization. At least four of 10 cars developed leaks en route from Mobile.

First trouble with the captured bombs came at the Naval Ammunition Depot docks in Mobile, where 74 longshoremen unloading the bombs from the SS Frances Lee were treated for burns.

Dock hands were paid $40.95 a night for unloading the aerial weapons. Army officials blamed the injuries on workers carelessness in not wearing protective clothing, masks and ointment.

Frisco Railroad officials here disclosed that the first freight car to show leaks was sided between Mobile and

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Gas

(Continued From Page One)

Amory, Miss. Saturday, another car was found to be leaking at Amory. It was sided at Bigbee, Miss., three miles away. Capt. Ralph Saenz, of the military police detachment in Memphis, sent 17 MPs to Amory to guard the contaminated area. Six gas specialists from Edgewood Arsenal, Maryland, flew to Amory.

Dr. John Murphy, Amory veteran doctor, treated seven railroad men and a soldier for burns. The soldier, Sgt. Abraham Steinberg, was hospitalized at the Fourth Ferrying Group Hospital, Memphis, with eye burns. Guy Rorie, 48, Amory conductor of the train, was hospitalized here with burns in his eyes, on his legs and back. And Paul Wright, Amory brakeman, was sent to Columbus, Miss., hospital.

Hopkins said two more cars were discovered leaking in the Memphis rail yards when Army specialists checked the cars which were en route to Baldwin, Ark.

No injuries were reported here, Hopkins said. And the cars were returned to Frisco Lines, which handed them back to the Army for inspection and neutralization.

Mrs. Brigid Davidson was fined $10 in Dundalk, Eire, for the unlawful possession of coal.

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THE MOBILE REGISTER
Mobile, Alabama

July 20, 1946

Mustard Gas Bomb Cargo To Be Reloaded On Ship

Army sources here Friday night announced that the SS Francis L. Lee and its cargo of mustard gas bombs will be sailed out of the Theodore Naval Magazine docks as soon as 500 tons of the bombs now on the dock are reloaded.

Approximately one thousand of the German-manufactured aerial gas bombs will be returned to the holds of the Liberty ship which has been at the Navy decks about 12 miles below Mobile since June 18.

During unloading of part of the 3500-ton cargo, more than TO persons—most of them colored stevedores—underwent treatment for burns caused by escaping gas from the bombs.

Orders for the reloading of the Francis L. Lee and for its rerouting to Charleston came from Washington, it was announced by Capt. A. R. Alien, officer in charge of Army unloading operations at the Theodore depot.

Leaky Cause Order*

He said leaking of gas from the bombs in freight cars while en route from Mobile to Army storage renters resulted in the orders. At least four fully loaded curs of bombs have been held at various points in the South because of leakage.

Reloading operations here will take about three days,

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Gas Bombs

(Continued From Page One)

Capt. Alien reported. He declared that specialists from the Army Chemical Warfare Service will unload the Francis L. Lee when the Liberty ship arrives in Charleston.

Eight hundred tons of bombs are In the ship's holds at the > present time, said Capt. Alien. More than half the cargo shipped here from Antwerp has already moved by rail to undisclosed points where the Army will conduct tests with the gas, reportedly • luperior type to that developed by U.S. technicians.

Colored stevedores here were paid $40.95 per day to unload the fas bombs.

THE MOBILE REGISTER
Mobile, Alabama

August 2, 1946

Gas Cargo Sent From Mobile Denied Entry At Charleston

Telegrams Ask Washington To Sink Vessel Carrying Bombs Which Caused Buriu To More Than 80 Here

Charleston wants no part of the ship which sailed from Mobile last week after a one-month's stay here during which more than 80 persons were burned in handling the vessel's cargo of mustard gas burns.

From the South Carolina port Thursday, the United Press reported the Francis L. Lee had been refused entry by the commanding officer of UK Charleston Ordnance Depot.

An Army tug was dispatched from Charleston to the Liberty ship to prevent its entry there and at the same time telegrams were sent to Washington from officials of the city demanding the ship be sunk out on the high seas.

With 900 tons of 500-pound bomb* remaining of the original 3300-ton cargo shipped to Mobile from Antwerp, Belgium, the Francis L. Lee Thursday night was anchored beyond historic Fort Sumter awaiting word from Washington on the Army ban of its entry.

The vessel was sent out of the Naval Ammunition Depot at Theodore last week to climax ao almost daily series of mustard gas accidents since June 18 while stevedores unloaded the cargo of German bombs. Two white men and over 80 colored dock workers were treated for burns of the eyes and skin when the bombs developed leaks which

(Page 4, Col. 1, GAS)

Gas

(Continued From Page One)

flooded holds of the vessel with vapor.

Despite the use by workers of gas masks and treated clothing, burn victims continued to stream into City Hospital here. Physicians explained the accidents were due to failure of stevedores to follow instructions on the handling of the cargo.

Army officers at Theodore said the Lee was ordered transferred to Charleston where troops from the Chemical Warfare Service would complete unloading operations.

Much of the tonnage of bombs unloaded at Theodore waa placed aboard barge* and sunk in the Gulf when the German missiles Were found to be leaking. Such operations were halted when complaints were made the depth of the water waa insufficient to prevent further trouble from escaping gas.

On at least two occasions, trainmen handling freight cars loaded with bombs en rout* to Army experimental stations from Theodor* were burned.

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THE MOBILE PRESS
Mobile, Alabama

August 16, 1946

SOLDIERS UNLOAD GAS BOMB CARGO

EDGEWOOD ARSENAL, Md.—(AP)—Dressed like "men from Mars," picked Iroopa continued today the careful unloading of 900 tons of German mustard gas shells, some of them faulty, from the hold of the Liberty >hlp Francis L. Lee.

The unloading program, which Jtarted yesterday, culminates four months af trouble and uncertainty for the s: and Its cargo, during which tim ne vessel was shunted from port to port, and some 85 longshoremen and Chemical Warfare Service personnel were injured.

Two soldiers, In sticky, Impregnated clothing and gas masks were hoisting the shells—500 and 1000-pounders—by ones and twos from the vessel and easing them Into barges In th* Blub River for transportation to the arsenal for testing and experimental purposes.

Officials estimated II would take 3) daya of good weather to clear the vessel of Us lethal cargo. ••

The Lee waa lo have left Antwerp in April, but a strike there Delayed her departure s month. Several Belgians were reportedly burned when some of the shells developed leaka in the interim.

She finally got under way for Cape May, N. J. but her orders were changed in midocean and the ship proceeded to Mobile Instead. In Mobile, more leaka reportedly developed and she waa towed to Charleston. S. C.. snd finally sent here. In the meantime, about 120 defective shells were taken off and burned at Horn Island, off Pascagoula, Miss.

F-1-13

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THE MOBILE REGISTER
Mobile, Alabama

More Than 20 Persons Burned By German War Gas: Chemical Warfare Experts Sent Here By Airplane

FIRE AT PEARL

PEARL HARBOR—(AP)—Pacific fleet headquarters reported Tuesday an oil fire had broken out aboard an unidentified ship here, doing slight damage to the side of t repair vessel. Flames were quickly brought under control.

Confiscated In Germany Cause Injuries To Men Unloading Cargo At Theodore Munitions Dump

Twenty colored stevedores, who worked Monday unloading German aerial gas bombs from the hold of a Liberty ship at the Naval Ammunition Depot »t Theodore, were admitted to City Hospital Tuesday for treatment of mustard gas burns.

Treated al Brookley Field's base hospital for similar burns was an Army private, one of several chemical warfare technicians aboard the SS Francis L. Lee, who was supervising unloading of the 3860-ton cargo of 500-pound mustard and phosgene gas aerial bombs.

A third victim, Wallace Villarubas, 73, of New Orleans, was released from Marine Hospital Monday night after treatment for leg burns.

IK More MI) Be Burned

City Hospital attendants reported Tuesday night they were informed by Navy authorities at Theodore to prepare facilities for an additional 1R or more stevedores who worked aboard the vessel Tuesday morning and who may have suffered burns before all work was suspended on the i ...

Many o.' the 20 victims are seriously burned a physician •ltd. Six of the group suffered severe eve burns which doctors asserted may result in loss of eyesight in several cases.

AM received extensive burns of the legs hands arms and body.

Army Moves Beds To Hospital

Because of a shortage of beds in City Hospital Army officials at Brookley Field sent beds for the victims admitted Tuesday morning. Later in the day, an additional 20 hospital beds were sent In the hospital and the Army driver of the truck said he was told they were to be used for 18 more mustard gas victims who, he said, would be sent to City

(Page 2, Col. 3, GAS)

Gas

(Continued From Page One)

Hospital sometime Tuesday night. Although a Navy spokesman at Theodore stated cause of the burns was vaporization of mustard gas due to 105-degree temperatures in the ship's hold, most of the victims reported ropes and wooden cases binding the single bombs were wet, and they believed the moisture was liquid gas.

When questioned at the hospital, all said Hold Number Two at the Francis L. Lee was filled with gas fumes Monday afternoon. None reported any affects until several hours after their work was completed. Each victim said he was unaware of his condition until Tuesday morning, when blisters developed.

Unloading operations Tuesday morning were halted followinf an inspection by Army chemical warfare technicians. One of them, identified at Brookley Field as Pvt. Griffo, received a second-degree leg-burn when he attempted to discover cause of the fumes tr. Hold Two.

Speak Ill Whispers

Several of the colored victims were reported as suffering from the effects of inhaling the poison fas. At least three of them were able to speak Tuesday night only -n hoarse whispers.

Unofficial report] indicate a total of 200 laborers have been engaged in transfering the bomb cargo, shipped here from Antwerp, Belgium. All these stevedores will report to medical authorities for examination Immediately. Jt was said.

Although 19 of the colored victim said they were working in Hold Two, one said he received his burn last Thursday while bandlinr bombs encased In wood In Hold Number One. He insisted that section of the vessel also was filled with fumes, but he was unable to say If anyone other than himself had suffered ill effects tn the work gang.

The stevedores were employed by Stracham Shipping Co., agents here for the Francis L. LAC.

Holds Ordered Sealed

Two medical officers attached to the chemical warfare division of the Army arrived In Mobile by plane from Washington at 4 p.m., and immediately went to the scene. They ordered the ships holds sealed until a ventilating system can be placed in operation. No examination of the cargo half of which already has been unloaded into freight cars—will be made for the next 48 hours or more. Lt. B. L. Smith, USN, reported following their arrival. Lt. Smith 11 attached to the Theodore ammunition depot.

The bomb cargo was shipped here by the U.S. Army for experimental purposes at a chemical warfare station, the location of which was listed as "confidential" by Army authorities.

The colored victims of the mustard gas were listed on records qf City Hospital as:

Sims Daniels, 26, of 302 & Cedar SL: Richard Mayo, O. of 710 a. Dearborn St.: Eddie Minor. 25, of 254 N. Lawrence St.: Richard Cade. 35, 601 S. Conception St.; Jeff Ray. 35, 857 S. Lawrence St.; Joe Safford, 41, 708 Our Alley: Jim Piltomey, 44. 558 Elmira St.; Henry Minor, 44. Prichard; Tom Clemons, 30, 667 N. Cedar St.; Tobe Lawyer 44. 663 Our Alley: Henry Robbins, 29, tot Our Alley; Rayfield Moses, 601 Our Alley: Eddie Hill, 33, 157 N. Pine St.: Claytom Cole, 25, 755 S Warren St.; Willie Pettaway, 32, 505 Washington Ave.; Collie Pettaway, 32, 412 S. Bayou St.; Roosevelt Davis, 506 Delaware St.; Willie Duberry, 33 710 Elmira SL: Dennis Russell, 35, 709 Canal St.; William Carter, 40, 301 Cuba St.

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APPENDIX F-2

NEWSPAPER ARTICLES AFTER DOD LEFT SITE

3916

THE MOBILE PRESS
Mobile, Alabama

January 26, 1968

By HARRY McDONNELL
Press Staff Reporter

The Alabama State Docks will build a $3 million bulk handling plant at Theodore Industrial Park. State Docks Director Houston H. Feaster announced today.

Feaster s announcement came after 3 $410.000 dredging project or. Deer River, awarded by the State Docks had been started to provide a 10.000-foot-long barge channe: to industrial sites in me development.

Star: of the dredging project by Bauer Dredging Co. of Port Lavaca. Tex.. marked a historica: development of the Port of Mobile southward. Port facilities presently extended along the Motile Hiver Iront and as far south as the ocean terminal at Brookley Air Force Base on Mobile Bay.

Feaster said no definite date for start of the new bulk handling facility has been selected but construction will be undertaken in the near future. The bulk handling plant will probably be designed to handle about 2.000 tons of materials per nour, be said.

The dredging contract calls for completion of the project in 90 days. Feaster said. It will provide a channel 12 feet deep with an average bottom width of 100 feet.

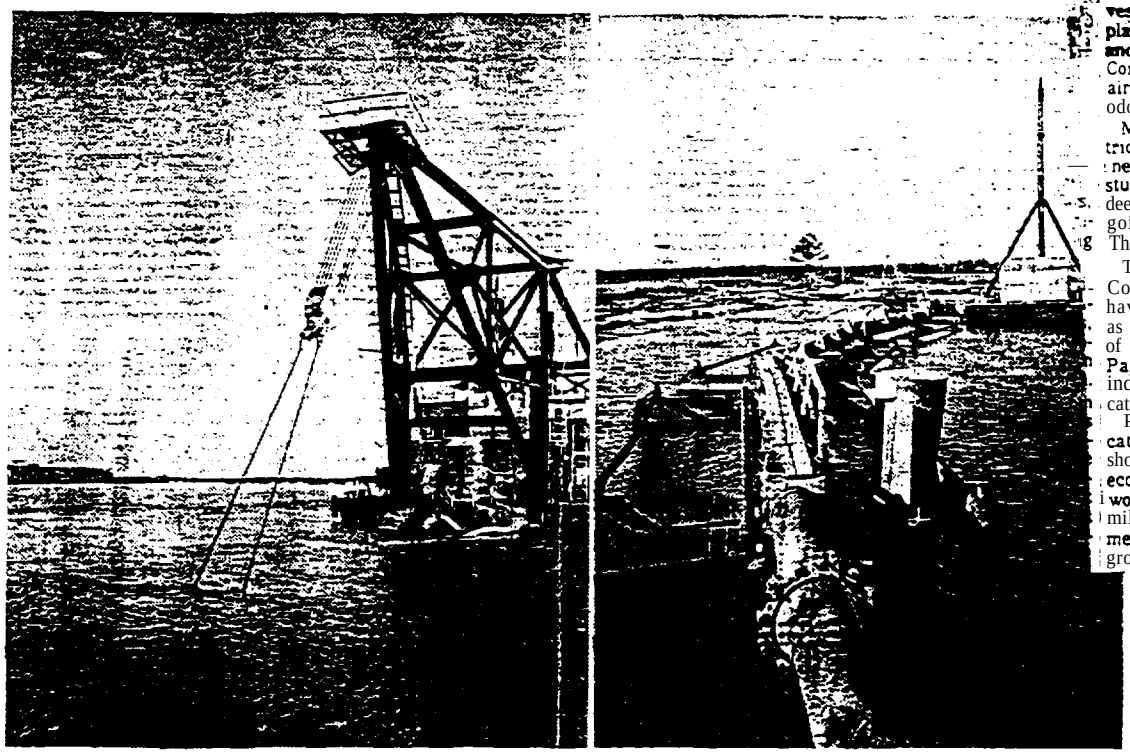
The channel is scheduled to be completed prior to start o: operations at McWane Pipe Company's CO million pig iron pellet plant at the Theodore Industrial Park next August.

It will serve the purpose of bringing barges and light draft vessels to the new $20 million plant, now under construction and to Alabama Petroleum Company's $1 million refinery already in operation a: the Theodore site.

Meanwhile, the Mobile District. U.S. Army Corps of Engineers is continuing feasibility studies on a proposed 50-foot deep channel to enable ocean going vessels to dock a: the Theodore Industrial complex.

The Mobile Area Chamber of Commerce and port interests have urged the 50-foot channel as essential to full development of the new Theodore industrial Park, where $120 million in industries are expected to locate during the next decade.

Port authorities have indicated that their own studies show the deep channel is economically justifiable and would repay the estimated million cost speedily in commerce and new industrial growth.

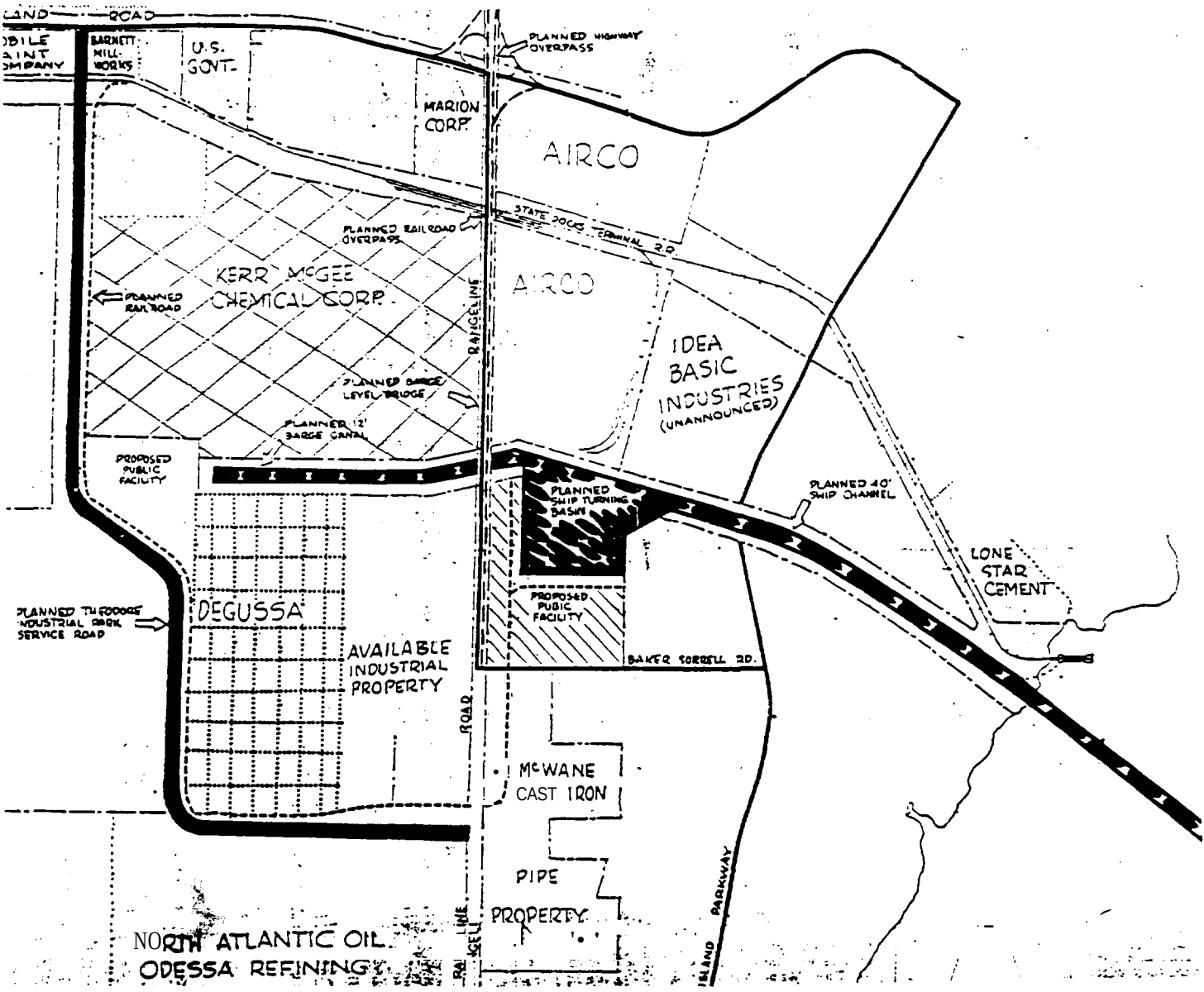


Mobile Press Register Photo by Aaron Turner

PORT DEVELOPMENT SOUTHWARD—A $410.000 dredging project to provide a 12-foot deep barge canal to the new 2,000-acre Theodore Industrial Park was underway today. Above photos show (left) a dredge of Bauer Dredging Co., Port Lavaca. Tex., dredging a 10.000 foot long channel on Deer River from the old Theodore Ammunition Dump dock to sites where $21 million in industrial developments are already under way. Pipe lines (right) from the dredge are dumping the spoil on low lands to build up for additional industrial sites. Tbe industrial park is being developed by the Alabama State Docks in cooperation with the Mobile Industrial Board.

MOBILE PRESS REGISTER
Mobile, Alabama

August 4, 1974



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THE MOBILE REGISTER
Mobile, Alabama

December 14, 1990

Munitions dock being dismantled

By ROYCE HARRISON
Press Register Reporter

Timber by timber, a dock built at Theodore at the outbreak of World War II to handle Army munitions is disappearing.

Declared surplus by the Navy, which Is building Naval Station Mobile next door, the dock was sold io Spectrum Maritime Inc., whose owner is salvaging the heavily creosoted timbers and pilings.

Hal Pierce said sales are picking up as word spreads about his endeavor. Five truckloads were sold to a utility company that aims to build a small bridge In Rome, Ga., and a Mississippi company bought 500 railroad ties from him Thursday, Pierce said.

Tested lor stress and flexure, the wood in the 47-year-old dock has been well preserved by creosoting that originally was about twice as concentrated as in modern products, Pierce said.

National Projects Inc., the prime contractor on the double-deck pier and other improvements lor the Navy homeport, is dismantling the dock and pulling up the pilings.

"We have lor sale more than 100,000 running <eet of heavy timbers and about 2,600 medium to heavy pilings," Pierce said. "This was a big strong pier and will yield an amazing material list."

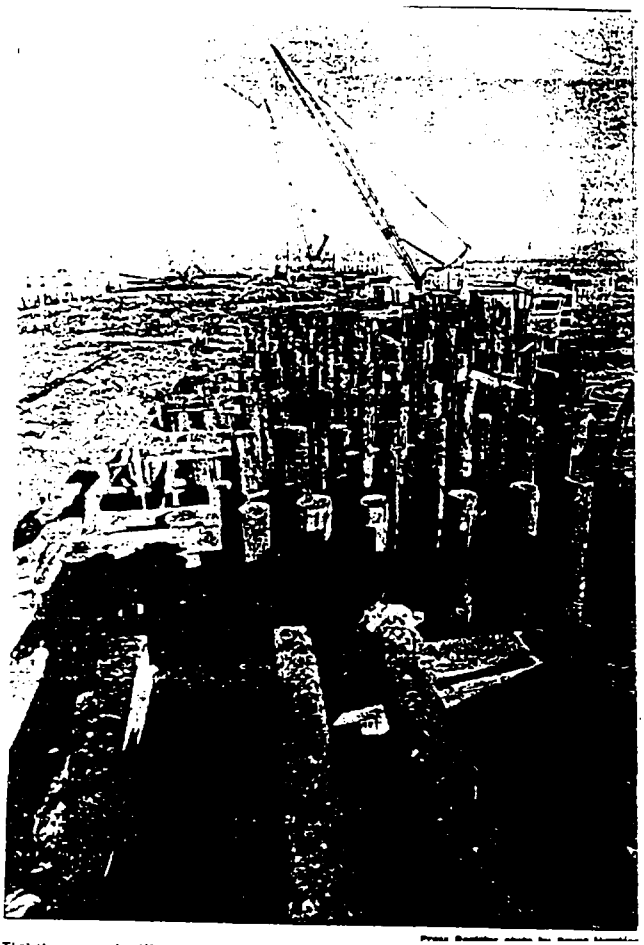
A lot of wood, virtually a small forest, went into the 750-foot-long dock, which rises 11 feet above mean low water beside berths 32 (eel deep,

Built In 1943, the dock served a 1,900-acre Navy ammunition depot that was idled in 1955 and shut down in 1964 In 1965, 1,800 acres were sold to the Alabama State Docks lor $975,000. The docks deeded the land to the Mobile Industrial Development Board, which financed he pu- chase. The depot became the Theodore ndustrial District.

Countless tons of munitions and military supplies crossed Us decking during the two wars In which the dock was pressed into service: World War II and The Korean War.

After the world war, the Army used the dock o send relief supplies. Reactivated in 1951 to upport the war in Korea, the dock handled * ecord volume of shipments. After the fighting nded, the New Orleans Port ol Embarkation, hich operated the depot, reported in 1954 that 0,000 to 50,000 tons of military supplies moved hrough the depot In an average month, a uantity that required five to seven ships to arry.

In the late 1950s, a 62-acre mountain of ourite rose on part of the depot property as the overnment stockpiled 2 million tons of the ore sed in making aluminum The ore a rrived I rom rinidad on Alcoa Steamship Co. vessels and ansferred to barges at the State Docks. The arges took the cargo to the ammunition epot's dock for transfer into dump trucks, hich carried the red ore to the stockpile



Press Register photo by Royce Harrison

Tightly spaced pilings that supported one of the railroad tracks on the Army ammunition depot dock at Theodore have bee* uncovered for removal. The creosot ed timber in the 47-year-old dock 1. being salvaged for resale.

DOCK

■ Continued From I Page 13

Nearby, the new concrete Navy pier contrasts with the old timbers, but the wood will live again somewhere else, Pierce commented

"This material will go into docks and bridges all over south Alabama and will not last long at the salvage price levels being offered," he said. "There's people who are going to get a lot of wood out of it that they wouldn't get any other way

THE HARBINGER
Mobile, Alabama

July 13-26, 1993

CHEMICAL KEYSTONE COP

(continued from page 1)

a report to Congress that named 190 places in America where chemical warfare weapons might have been buried. Among these is an abandoned ammunition depot in Theodore.

The Interim Survey and Analysis Report for the Non-Stockpile Chemical Material Program, compiled by the U.S. Army, lists chemical weapons no one can find. The Pentagon's term for the missing bombs is "non-stockpile chemical material" or NSCM.

The Harbinger obtained an official summary of the military report. It lists five possible chemical weapons sites in Alabama, including Anniston Army Depot, Fort McClellan, and Theodore.

Harvey Perritt, Army Public Affairs spokesman, told the Harbinger that Congress directed the Army to submit a report which "identifies the location, types and quantities of non-stockpile chemical material."

The Army located many suspected burial sites through interviews, old newspapers, archival searches, and military records reviews, he said.

One hundred and ninety sites around the country at 75 locations in 32 states were identified, and that 29 of these were at formerly used defense sites (FUDS), Perritt said. The Theodore Naval Ammunition Magazine is a FUDS.

An incident researched by the Harbinger from the NSCM report involved the Theodore Naval Ammunition Magazine.

"The location was used to unload the S.S. Francis L. Lee which transported German toxic filled munitions from Germany... when it reached Theodore, the cargo was severely deteriorated," the report says.

The military decided to unload the cargo and send it by rail to weapons facilities in northern Alabama, Maryland and Arkansas.

The report continues: "An incident occurred during a rail shipment from Theodore Naval Ammunition Magazine to Pine Bluff (Arkansas) Arsenal. A leaking M47 was discovered during a routine inspection of a railcar in Pondola, Alabama. The bomb was unloaded and the railcar returned to Theodore, Alabama. The disposition of the bomb is unknown." (from Appendix A of report)

Trouble By The Bay

After the S.S. Francis L. Lee docked at Theodore in June, 1946 began what the New York Times called "four months of trouble and uncertainty for the ship."

The German gas poisoned Americans. "According to the Navy spokesman, officers at the scene concluded that gas in the bombs volatilized when temperature reached 105 degrees," the Press Register reported on June 18, 1946.

"The colored victims were stevedores employed by Starnhan Shipping Co., in unloading operation aboard the S.S. Francis L. Lee which arrived here last week with a cargo of 3,860 tons of mustard gas and phosgene aerial bombs shipped from Belgium," the Press Register wrote. "Two white men also were treated for the effects of the vapor."

By the time the gas bombs left Theodore, 65 persons had been injured by the poison.

Big Train To Memphis

Some of the gas bombs were shipped away on trains. Our misfortune continued. At least four of the ten cars developed leaks en route from Mobile.

"Frisco Railroad officials here disclosed that the first freight car to show leaks was S'deC between Mobile and Amory, Miss. Saturday another car was found to be leaking at Amory," the Press Register wrote on July 16, 1946. The railroad handed the bombs back to the Army.

The Army then ordered all unloading at Theodore to stop. "After unloading more than half the bombs from the Liberty ship (the Lee), army sources Friday announced the Lee would be reloaded and sailed to Charleston, where her cargo will be transferred to freight trains by Army technicians skilled in the handling of gas bombs," the Press Register wrote on July 21, 1946. The Army said it planned to dispose of the cargo at sea.

Operation of Hornblow

Mustard gas bombs judged unsafe for shipment to Charleston were disposed of here on the Gulf Coast, the New York Times reported on August 3, 1946. "The Army's Chemical Warfare Service officers have recorded the last round of an unhappy seven-week experience with a troublesome cargo of German mustard gas today, when they reported out 120 large bombs had been destroyed on Horn Island, off Pascagoula, Miss., without mishap.

The destruction, officially listed as operation Hornblow, was accomplished by burning the 500 and 1,000 pound bombs on the open beach."

Lt. Col. William J. Allen, Jr., an Auburn engineering school graduate, supervised the destruction. "Col. Allen, a native of Mobile, said the last group of bombs - 500-pounders - were burned yesterday morning, and that air analysis on the island, offshore and on the mainland, revealed no traces of mustard," wrote the Press Register.

Other gas bombs were dumped in water off Alabama's coast. Exactly where this was done isn't known today.

The Press Register on August 2, 1946 said: "Much of the tonnage of bombs unloaded at Theodore was placed aboard barges and sunk in the Gulf when the German missiles were found to be leaking. Such operations were halted when complaints were made the depth of the water was insufficient to prevent further trouble from escaping gas."

Carolina In The Mind

After the disposals on Horn Island and in the Gulf, the New York Times reported, "But while local CWS officers were wiping their records clean of the gas, part of the cargo still remained aboard the freighter Francis Lee, which brought the bombs to this country early in June for experimental purposes."

The Francis Lee and its remaining 600 tons of leaking mustard gas bombs were ordered to sail to Charleston, S.C.

The drama continued: The ship, the Francis Lee, was so unwelcome at Charleston that Senator Maybank appealed to Secretary of war Patterson to have it moved. It had just arrived from Mobile, Ala., where the citizens did not want it," wrote the New York Times.

"The outlaw ship had in land somewhere to permit unloading the cargo into barges so that the lethal gas...could neither sink or burned." The Navy was ordered a sail in the Edgewood, Maryland arsenal of the Chemical Warfare Service "as a way out."

A Safe Harbor?

Some gas bombs finally arrived at the Edgewood Arsenal on the Chesapeake Bay in northern Maryland. The weapons were designated for tests and experiments.

"Dressed like 'men from Mars' picked troops continued today the careful unloading of 600 tons of German mustard gas shells, some of them faulty, from the hold (X the Liberty ship) Francis L. Lee," the Times reported on August 17, 1946.

"The soldiers, wearing impregnated clothing and gas masks, hoisted the shells, 500- and 1,000-pounders, by one and two's from the vessel and eased them into barges in the Bush River for transportation to the arsenal for tests."

The U.S. government ended all shipments of the German gas from Europe after the S.S. Francis L. Lee fiasco.

Health-related lawsuits followed in Mobile, and series of huge fish kills in the Gulf the next winter were blamed on the German gas bombs dumped at sea. Government experts discounted all claims.

Gone But Now Remembered

The Theodore Naval Ammunition Depot was shipping weapons again by 1950, this time to war in Korea. But it was closed down in a few years.

The 1993 chemical weapons report says about the old depot: "This site is now part of a large commercial, industrial, and transportation complex known at Theodore Industrial Park. The dock where the munitions were unloaded is now the site of U.S. Naval Station, Mobile. Extensive intrusive activities have occurred since the Navy was surplused by GSA (the federal General Service Administration) in 1964."

The Theodore Industrial Park is now home to chemical plants, including the massive German-owned Degussa facility that manufactures cyanide and other chemicals.

CHEMICAL KEYSTONE COPS

by Bill Patterson

"Twenty-one colored stevedores, an Army private attached to the Chemical warfare Service and a civilian employee were severely burned when poison gas escaped from German aerial bombs being unloaded at the nearby Theodore naval ammunition dump."

- Mobile Press Register
June 19, 1946

world war II ended in August 1945. Ships filled with weapons soon returned from Europe and the Pacific, and bottlenecks developed. Morale aboard ships deteriorated.

In Theodore the docks at the backup storage area of the Naval Magazine were busy, though the facilities were under repair. On a hot day in June 1946 the S.S. Francis L. Lee arrived here from Belgium with 3,860 tons of mustard gas bombs.

Remembrance of Poison Gas

Due to poor record-keeping, the disposal sites for many chemical bombs are unknown. In April 1993 the Pentagon sent

(continued on page 20)

THE HARBINGER
Mobile, Alabama

August 17, 1993

GHOSTS FROM THE OUTLAW SHIP

by Bill Patterson

Decades after me "KEEP OUT. PROPERTY OF THE U.S. GOVERNMENT" Signs were tom down, abandoned military bases can oe dangerous.

"Residents...werestunned to learn mat they may live atop a dump of unused World War I weapons, including canisters of chemicals like mustard gas," wrote *USA Today* on January 7. 1993 after construction workers. digging a sewer line in a Washington D.C. neighborhood, unearthed artillery shells.

"Chemical Keystone CODS" in the previous issue of tne *Harbinger* (July 13-26) reported that a Pentagon document released in April. 1993 named tne old Theodore Naval Ammunition Magazine near Mobile for possible clean up of "non-stockpile chemical materiel."

The report described an American vessel, the S.S. Francis L. Lee. which arrived in June. 1946 at Theodore with a load of captured German mustard gas bombs. The weapons were to oe used for experiments, but they began tp leak while being unloaded. Military officials still list one of the bombs as missing.

Who's Counting

A search by me *Harbinger* of the City of Mobile archives, newspaper files, and data bases shows mat 3.860 tons of poison gas bombs were on board the Francis Lee. Between 50 ana 60 tons of the bombs were burned m 1946 on Horn island off Pascagoula, Mississippi, ana another 600 to 900 tons arrived at Edgewood Arsenal m Maryland. What happened to tne remaining 2.500 tons?

Some of the German weapons from me Francis Lee were loadec on barges in Theodore ana sunk in waters off Alabama's coast.

Press accounts say that before the Francis Lee reached Maryland, under tow and "frying a rec flag ana displaying red lights indicating shewas not to be boarded," other oomos were dumped in the Atlantic. Where and in what quantity is no: clear.

Getting The Stories Straight

The Interim Survey ana Analysis Report tor the Non-Stockpile Chemical Mate-

(continued on page 31

OUTLAW SHIP

(continued from page 1)

nelProgram released in April was compiled by tne U.S. Army to trace and document chemical weapons no one can find. At least two Army agencies investigated the lost bombs: me Chemical Welfare Service and the Corps of Engineers.

The *Harbinger* obtained a briefing fact sheet about the old Theodore depot from Patrick Robbins, Chief of Public Affairs for tne Army Corps of Engineers office in Mobile.

The document says the Army cleared the Theodore srte of weapons problems five years ago: "The Mobile District (Corps of Engineers) completed the DERP-FUDS Inventory Report (INPR) in 1988 and concluded mat there was no evidence of ordnance remaining and no further action was recommended."

But the Army is still looking into the old Theodore ammo depot.

The Harbinger spoke on July 16 with Capt. Bill Bruckner, a U.S. Army Public Affairs spokesman. Asked about the Corps' findings, he said, "at the time the Corps made their assessment in 1988 they were unaware that mere were chemical weapons stored there, or that the incident of me S.S. Francis Lee had occured Since mat time, me Chemical Warfare Service has informed them of this."

Tommy Lightcap, in me Hazardous and Toxic Waste and Environmental Support Unit at the Corps in Mobile, said he remembers hearing mat some mustard gas "went over the side." He said the (as dissipates so rapidly in me air that none would remain today.

Lightcap added, "of course, mat area near the docks has been dredged so many times that nothing could possibly be there."

Down In The Dumps

Today the srte where me German poison (as was unloaded after World War II is part of Naval Station Mobile.

The Harbinger spoke on July 16 with Lt. George Mullins in the Public Works

(continued on page 16)

OUTLAW SHIP

(continued from page 5)

office at the base about tne Pentagon report. He said the new. ana soon to be closed, facility has no problem. Describing the old ammo depot as "an Army situation at the time," Mullins said "everything here turned upside down" when the new homeport was built. Mullins said the Base itself is built on creagea materials. ana its "mitigation areas." where environmental laws required the Navy to create wetland acreage, were dug aown 20 to 30 feet.

Muiims said he had never heard of Francis Lee. He said the Army s investigation of the Theodore sue s "a ow. low priority." Me suggested tne *Harbinger* "talk to the Corps of Engineers."

In 1964 tne old depot land became the property of the Alabama State Docks, which sold tne land to tne Navy recently for the homeport.

The Harbinger asked Sarar. Teague, media spokeswoman (or tne State Docks, about the 1946 chemical weaoons incidents cited in the Army report. Teague said, "not 3 soul here would have any knowledge" because ; happened too long ago. She aacea sne had never heard of the Francis Lee either. "News to me," she said.

There She Blows?

The old Theodore ammo depot remains listed on the U.S. Army Potential Ordinance/Chemical Contaminated Srte list.

Should people worry about 50-year-old mustard gas bombs? Some scientists think so, because the mustard bombs dumped in Scandinavian waters by the Allies after World War II are still dangerous.

"Since the end of World War II, Swedish ana Danish fishermen have found lumps of mustard gas jelly as well as rusting and leaking shells m their nets when trawling east of the Danish Island of Bornholm in the Baltic," according to an article in the *Bulletin of the Atomic Scientists* in March, 1991. "In 1984, seven fishermen were badly hurt after taking a leaking shell on board."

"he report adds: "The mustard gas tnat has been retrieved is still potent. When the bombshells rust away tne jelly-like lumps left behind are slowly covered by a new 'shell' of hydrolysis products. inside this new shell the original jelly remains intact."

After the Francis Lee left Theodore m August. 1946, an article m the New *York Times* said: "The outlaw ship had to somewhere to permit unloading the into barges so tnat the letnal gas. be either sunk or burned."

A final report from me Pentag Congress on America's unknown c weapons dumps is due m Novemb

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APPENDIX G

PRESENT SITE PHOTOGRAPHS

Photo 1--Old power plant building near site of terminal dock

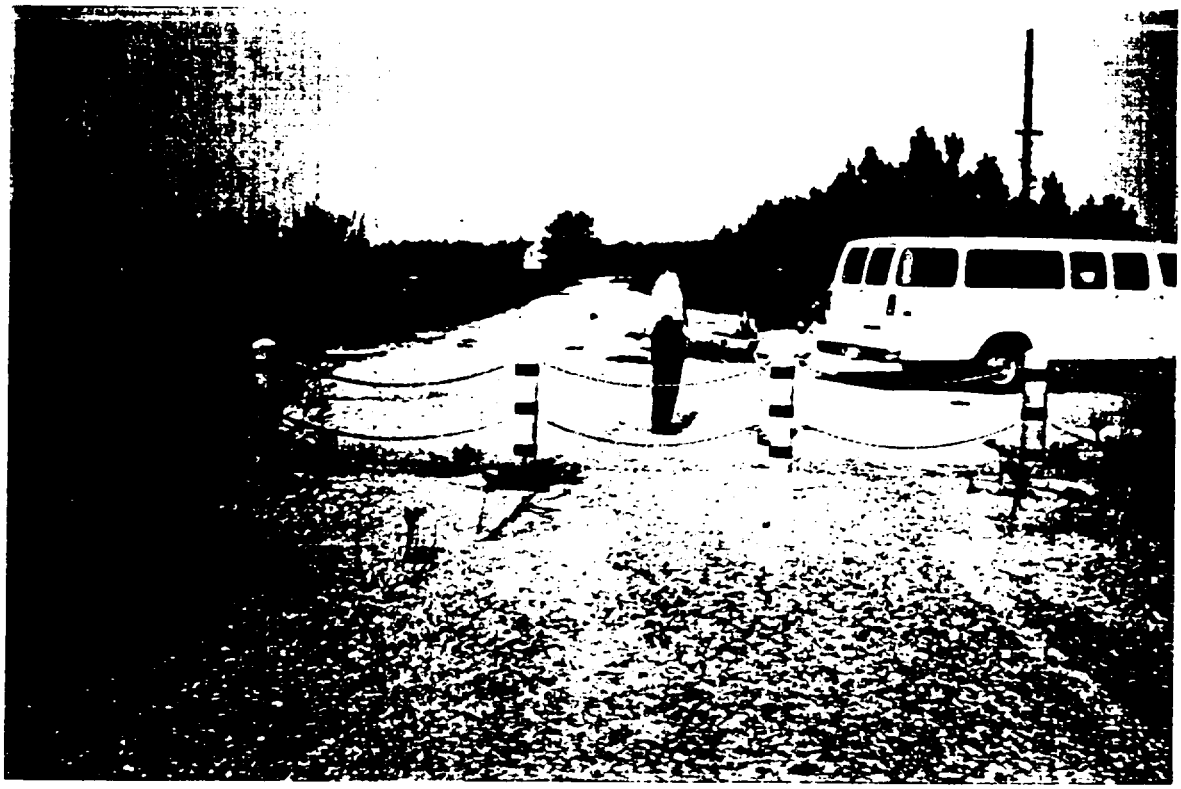

Photo 2--Looking west from site of former dock

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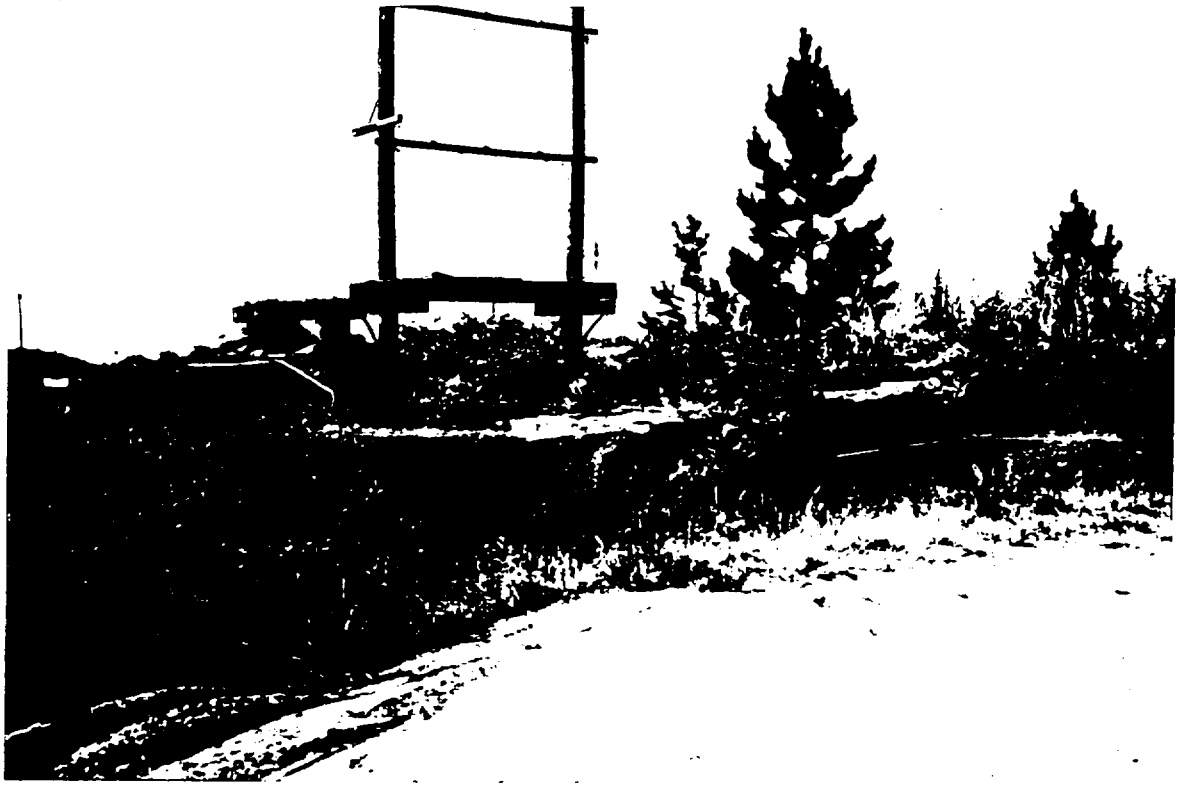

Photo 3--Loading ramp directly behind power plant building

Photo 4--Looking southwest from shore at debris next to former dock area

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Photo 5--Concrete bulkhead at landside of former dock

Photo 6--Looking west at North Atlantic Gulf Terminal Group property

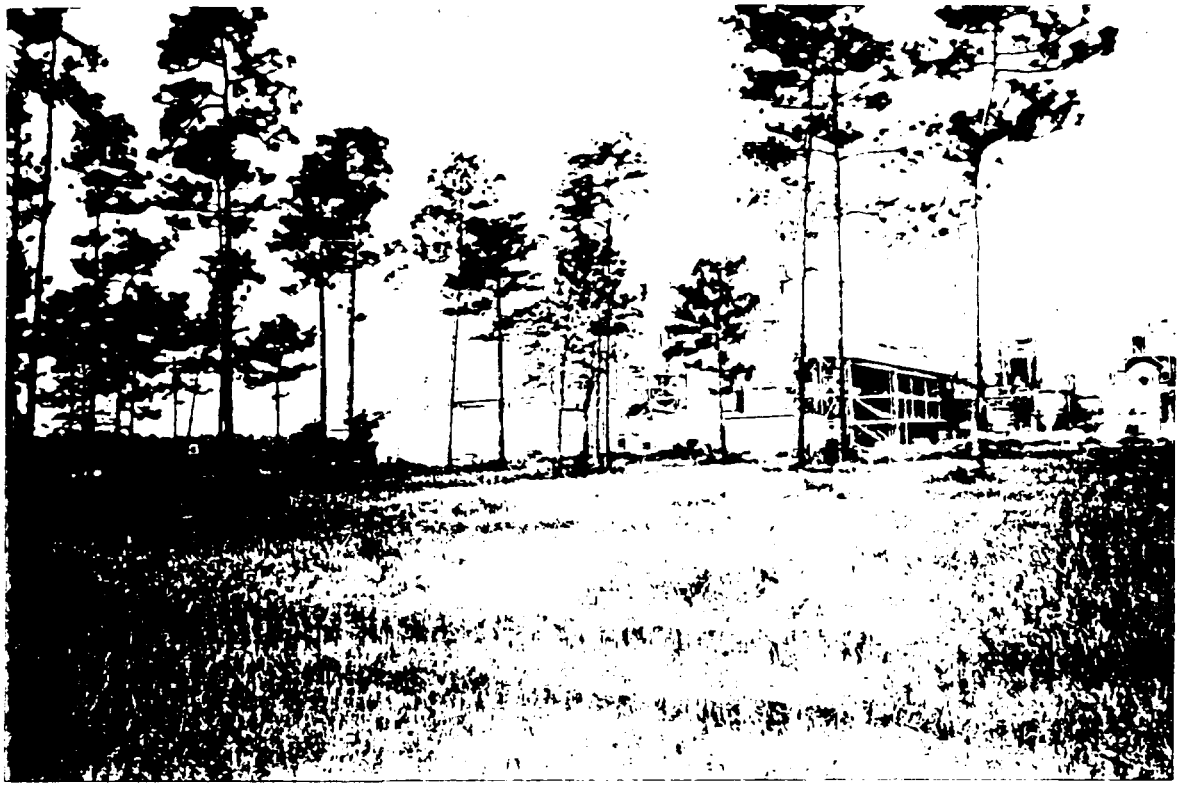

Photo 7--Kerr McGee property
Ammunition storage bunkers in background

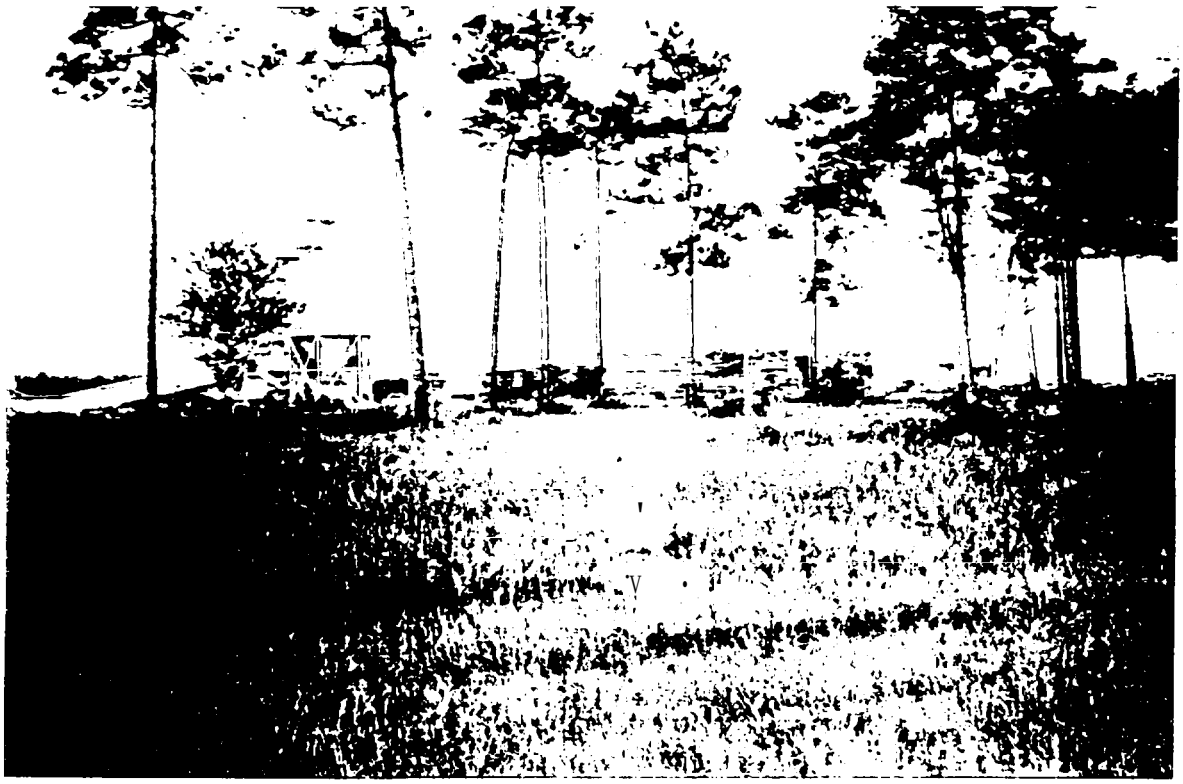

Photo 8--Kerr McGee chemical plant on former ammunition storage bunker area

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The former dock area is part of the new Naval Station Mobile. At the time of our inspection several Navy ships were in Mobile Bay. Base regulations prevented us from taking any pictures of the actual former site of the dock because the ships would have shown up in the background.

APPENDIX H

NOT USED

APPENDIX I

OEW RISK ASSESSMENT CODE FORM

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10 Feb 93
Previous editions obsolete

RISK ASSESSMENT PROCEDURES FOR
ORDNANCE AND EXPLOSIVE WASTE (OEW) SITES

Site Name	THEODORE AMMUNITION TERMINAL	Rater's Name	THOS. R. FREEMAN 1C
Site Location	near Mobile, AL	Phone No.	314-331-8785
DERP Project #	I04AL005800	Organization	CELMS-PM-M
Date Completed	30 SEPT 93	RAC Score	5

OEW RISK ASSESSMENT:

This risk assessment procedure was developed in accordance with MIL-STD 882B and AR 385-10. The RAC score will be used by CEHND to prioritize the remedial action at this site. The OEW risk assessment should be based upon best available information resulting from records searches, reports of Explosive Ordnance Disposal (EOD) detachment actions, and field observations, interviews, and measurements. This information is used to assess the risk involved based upon the potential OEW hazards identified at the site. The risk assessment is composed of two factors, hazard severity and hazard probability. Personnel involved in visits to potential OEW sites should view the CEHND videotape entitled "A Life Threatening Encounter: OEW."

Part I. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel exposure to various types and quantities of unexploded ordnance items.

TYPE OF ORDNANCE
(Circle all values that apply)

A. Conventional Ordnance and Ammunition

	VALUE
Medium/Large Caliber (20 mm and larger)	10
Bombs, Explosive	10
Grenades, Hand and Rifle, Explosive	10
Landmines, Explosive	10
Rockets, Guided Missiles, Explosive	10
Detonators, Blasting Caps, Fuzes, Boosters, Bursters	6
Bombs, Practice (w/spotting charges)	6
Grenades, Practice (w/spotting charges)	4
Landmines, Practice (w/spotting charges)	4
Small Arms (.22 cal - .50 cal)	1
Conventional Ordnance and Ammunition (Select the largest single value)	0

What evidence do you have regarding conventional OEW? None

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B. Pyrotechnics (For munitions not described above.)

	VALUE
Munition (Container) Containing White Phosphorus or other Pyrophoric Material (i.e., Spontaneously Flammable)	10
Munition Containing A Flame or Incendiary Material (i.e., Napalm, Triethlaluminum Metal Incendiaries)	6
Flares, Signals, Simulators	4
Pyrotechnics (Select the largest single value)	0

What evidence do you have regarding pyrotechnics? None

C. Bulk High Explosives (Not an integral part of conventional ordnance; uncontainerized.)

	VALUE
Primary or Initiating Explosives (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, Tetracene, etc.)	10
Demolition Charges	10
Secondary Explosives (PETN, Compositions A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc.)	8
Military Dynamite	6
Less Sensitive Explosives (Ammonium Nitrate, Explosive D, etc.)	3
High Explosives (Select the largest single value)	0

What evidence do you have regarding bulk explosives? None

D. Bulk Propellants (Not an integral part of rockets, guided missiles, or other conventional ordnance; uncontainerized)

	VALUE
Solid or Liquid Propellants	6
Propellants	0

What evidence do you have regarding bulk propellants? None

E. Radiological/Chemical Agent/Weapons

	VALUE
Toxic Chemical Agents (Choking, Nerve, Blood, Blister)	25
War Gas Identification Sets	20
Radiological	15
Riot Control and Miscellaneous (Vomiting, Tear, incendiary and smoke)	5

Radiological/Chemical Agent (Select the largest single value) 0

What evidence do you have of chemical/radiological OEW? None

Total Hazard Severity Value ___
(Sum of Largest Values for A through E--Maximum of 61).
Apply this value to Table 1 to determine Hazard Severity Category.

TABLE 1

HAZARD SEVERITY*

Description	Category	Value
CATASTROPHIC	I	≥21
CRITICAL	II	≥10 <21
MARGINAL	III	≥5 <10
NEGLIGIBLE	IV	≥1 <5
**NONE		0

* Apply Hazard Severity Category to Table 3.

**If Hazard Severity Value is 0, you do not need to complete Part II. Proceed to Part III and use a RAC Score of 5 to determine your appropriate action.

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Part II. **Hazard Probability.** The probability that a hazard has been or will be created due to the presence and other rated factors of unexploded ordnance or explosive materials on a formerly used DOD site.

AREA, EXTENT, ACCESSIBILITY OF OEW HAZARD
(Circle all values that apply)

A. Locations of OEW Hazards

	VALUE
On the surface	5
Within Tanks, Pipes, Vessels or Other confined locations.	4
Inside walls, ceilings, or other parts of Buildings or Structures.	3
Subsurface	2
Location (Select the single largest value)	___

What evidence do you have regarding location of OEW? _____

_____

B. Distance to nearest inhabited locations or structures likely to be at risk from OEW hazard (roads, parks, playgrounds, and buildings).

	VALUE
Less than 1250 feet	5
1250 feet to 0.5 miles	4
0.5 miles to 1.0 mile	3
1.0 mile to 2.0 miles	2
Over 2 miles	1
Distance (Select the single largest value)	___

What are the nearest inhabited structures? _____

_____

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C. Numbers of buildings within a 2 mile radius measured from the OEW hazard area, not the installation boundary.

	VALUE
26 and over	5
16 to 25	4
11 to 15	3
6 to 10	2
1 to 5	1
0	0

Number of Buildings (Select the single largest value) ___

Narrative _____

_____

D. Types of Buildings (within a 2 mile radius)

	VALUE
Educational, Child Care, Residential, Hospitals, Hotels, Commercial, Shopping Centers	5
Industrial, Warehouse, etc.	4
Agricultural, Forestry, etc.	3
Detention, Correctional	2
No Buildings	0

Types of Buildings (Select the largest single value) ___

Describe types of buildings in the area. _____

_____

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E. Accessibility *to* site refers to access by humans to ordnance and explosive wastes. Use the following guidance:

BARRIER	VALUE
No barrier or security system	5
Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as for a barbed wire fence for grazing.	4
A barrier, (any kind of fence in good repair) but no separate means to control entry. Barrier is intended to deny access to the site.	3
Security guard, but no barrier	2
Isolated site	1
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility; or An artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).	0

Accessibility (Select the single largest value) ___

Describe the site accessibility. _____

_____

F. Site Dynamics - This deals with site conditions that are subject to change in the future, but may be stable at the present. Examples would be excessive soil erosion by beaches or streams, increasing land development that could reduce distances from the site to inhabitated areas or otherwise increase accessability.

	VALUE
Expected	5
None Anticipated	0

Site Dynamics (Select largest value) ___

Describe the site dynamics. _____

_____

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Total Hazard Probability Value
(Sura of **Largest Values** for A through **F--Maximum** of 30) ___

Apply this **value** to **Hazard Probability** Table 2 to determine Hazard Probability **Level.**

TABLE 2

HAZARD PROBABILITY

Description	Level	Value
FREQUENT	A	>27
PROBABLE	B	≥21 <27
OCCASIONAL	C	≥15 <21
REMOTE	D	≥ 8 <15
IMPROBABLE	E	<8

* Apply **Hazard** Probability **Level** to Table **3.**

Part III. Risk Assessment. The risk assessment value for this site is determined using the following Table 3. Enter with the results of the hazard probability and hazard severity values.

TABLE 3

Probability Level		FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
Severity Category:						
CATASTROPHIC	I	1	1	2	3	4
CRITICAL	II	1	2	3	4	5
MARGINAL	III	2	3	4	4	5
NEGLIGIBLE	IV	3	4	4	5	5

RISK ASSESSMENT CODE (RAC)

RAC 1 Imminent Hazard - Expedite INPR - Immediately call CEHND-ED-SY--commercial 205-955-4968 or DSN 645-4968.

RAC 2 High priority on completion of INPR - Recommend further action by CEHND.

RAC 3 Complete INPR - Recommend further action by CEHND.

RAC 4 Complete INPR - Recommend further action by CEHND.

RAC 5 Recommend no further action. Submit NOFA and RAC to CEHND.

Part IV. Narrative. Summarize the documented evidence that supports this risk assessment. If no documented evidence was available, explain all the assumptions that you made.

See attached ASR

APPENDIX J

REPORT DISTRIBUTION LIST

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT

THEODORE NAVAL AMMUNITION MAGAZINE

THEODORE, ALABAMA
MOBILE COUNTY

DERP-FUDS NO. **I04AL005800**

APPENDIX J

REPORT DISTRIBUTION LIST

Addressee	No. Copies
Commander, U.S. Army Engineer Division **Huntsville, ATTN: CEHND-ED-SY** P.O. Box 1600 Huntsville, Alabama **35807-4301**	4
Commander, **U.S.** Army Engineer District Mobile, ATTN: **CESAM-PD-ES** P.O. Box 2288 Mobile, Alabama **36628-0001**	1
Commander, U.S. Chemical Material Destruction Agency ATTN: **SFIL-CM** Aberdeen Proving Ground, Maryland **21010-5401**	1
CELMS-ED	1
-ED-G	1
-ED-H	1
-PD	1
-PD-A	1
-PM	1

AK file

EPA

POTENTIAL HAZARDOUS WASTE SITE

FINAL **STRATEGY** DETERMINATION

REGION	SITE NUMBER
IV	AL000000160

File this form in the regional Hazardous Waste Log File and submit • copy to: U.S. Environmental Protection Agency, Site Tracking System. Hazardous Waste Enforcement Task Force *(EN-335)*, 401 M St.. SW. Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET	
Kerr McGee Allied Chem Corp - Kerr McGee		
C. CITY	D. STATE	E. ZIP CODE
Theodore	AlA.	

II. FINAL DETERMINATION

Indicate the recommended action(s) and agency(ies) that should be involved by marking 'X' in the appropriate boxes.

RECOMMENDATION	MARK 'X'	ACTION AGENCY: EPA	STATE	LOCAL	PRIVATE
A. NO ACTION NEEDED	X		X		
B. REMEDIAL ACTION NEEDED. BUT NO RESOURCES AVAILABLE *(If yes, complete Section III.)*					
C. REMEDIAL ACTION *(If yes, complete Section IV.)*					
D. ENFORCEMENT ACTION *(If yee. specify in Part E whether tht case will be primarily managed by the EPA or the State and what type of enforcement action it anticipated)*					

E. RATIONALE FOR FINAL STRATEGY DETERMINATION

Material @ site, iron oxide, should not present problem.

F. IF A CASE DEVELOPMENT PLAN MAS BEEN PREPARED. SPECIFY THE DATE PREPARED *(mo., day, & yr.)*	G. IF AN ENFORCEMENT CASE MAS BEEN FILED, SPECIFY THE DATE FILED *(mo., day, 4 yt.)*

H. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	9 DATE *(mo., day, 4 yt.)*
B. E. Cox, Jr.	205-1832-6728	9/24/81

III. REMEDIAL ACTIONS TO BE TAKEN WHEN RESOURCES BECOME AVAILABLE

List all remedial actions, such as excavation, removal, etc. to be taken as soon as resources become available. See instructions for a list of Key Words for each of the actions to be used in the spaces below. Provide an estimate of the approximate cost of the remedy.

A. REMEDIAL ACTION	B. ESTIMATED COST	C. REMARKS
	$	
	$	
	$	
	$	
	$	
	$	
	$	
	$	
D. TOTAL ESTIMATED COST	$	

EPA Form T2070-5 (10-79)

Continue On Reverse

EPA

POTENTIAL HAZARDOUS WASTE SITE LOG

SITE NUMBER: [illegible]4

MOTE: The initial identification of a potential site or incident should not be interpreted as a finding of illegal activity or confirmation that an actual health or environmental threat exists. All identified [illegible] assessed under the EPA's Hazardous Waste Site Enforcement and Response System 10 determine [illegible] hazard [illegible] actually exists.

SITE NAME: [illegible]

CITY: [illegible]

STATE: [illegible]

ZIP CODE: [illegible]

SUMMARY OF POTENTIAL OR KNOWN PROBLEM

ITEM	DATE OF DETERMINATION OR COMPLETION	RESPONSIBLE ORGANIZATION OR INDIVIDUAL (EPA, State, Contractor, etc.)	PERSON MAKING ENTRY TO LOG FORM	DATE ENTERED ON LOG (mo/day/yr)
1 IDENTIFICATION OF POTENTIAL PROBLEM	[illegible]	[illegible]	[illegible]	[illegible]
2 PRELIMINARY ASSESSMENT	[illegible]	[illegible]	[illegible]	[illegible]
APPARENT SERIOUSNESS OF PROBLEM	[illegible]	[illegible]	[illegible]	
3 SITE INSPECTION	[illegible]	[illegible]	[illegible]	[illegible]
4 b MATENTATIVE DISPOSITION (check appropriate item(s) below)				
4a. NO ACTION NEEDED	[illegible]			
4b. INVESTIGATIVE ACTION NEEDED				
4c. REMEDIAL ACTION NEEDED				
4d. ENFORCEMENT ACTION NEEDED				
5 ULTIMATE STRATEGY DETERMINATION (check appropriate item(s) below)				
5a. NO ACTION NEEDED				
5b. REMEDIAL ACTION NEEDED				
5c. REMEDIAL ACTION NEEDED BUT RESOURCES AVAILABLE				
5d. ENFORCEMENT ACTION NEEDED				
5e. CASE DEVELOPMENT PLAN PREPARED				
5f. ENFORCEMENT CASE FILED OR ADMINISTRATIVE ORDER ISSUED				
STRATEGY COMPLETED				

EPA Form T2070-1 (10-79)

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
EPS FORM 3012-III

INDUSTRIAL NARRATIVE SHEET

1. Site Identification:

Site number: ALD071937890

Site name: Kerr-McGee Chemical Corporation

Site county: Mobile

2. Industrial Narrative Summary:

Company Name: Kerr-McGee Chemical Corporation

Address: P. 0. Box 629
Theodore, AL 36590

Telephone No.: 205/653-8820

Contact: R. A. Napier

Contact: M. W. Merrill

Discussion: Kerr-McGee has operated at this site since 1976. The process involves upgrading ilmenite ore to synthetic rutile by an acid leaching process. The hydrochloric acid used in this process is reclaimed for reuse. Tailings consist of an iron oxide slurry which is reportedly corrosive and EP Toxic for lead. A French drain has been installed to collect contaminated groundwater which is treated in the NPDES treatment system. All solids are placed in the tailings pond and wastewater discharges are monitored. Kerr-McGee is exempt from RCRA regulation as their process is considered beneficiation of ore. Groundwater continues to be monitored and corrective actions taken in conjunction with ADEM regulation. Prior to Kerr-McGee's occupation of the site, the property was a Government Reservation which was used to store ammunition during World War II. At this time the site is being investigated under the Department of Defense Environmental Restoration Program. No environmental problems have been encountered and a copy of the report will be forwarded to ADEM.

3. Disposition:

No further action required under this program. Present activites are being monitored by ADEM and past activites are under investigation. A

copy of the Department of Defense report will be submitted to ADEM when available.

4. Comments:

NA

56/ncr

POTENTIAL HAZARDOUS WAST -I
PRELIMINARY ASSESSMENT
EPS FORM 3012-11

TELEPHONE LOG SHEET

1. Site Identification:
   Site number: ALD 071937890
   Site name: Kerr McGee Chemical Corp.

2. Interview Data: (Party called)
   Name: Mrs. Millie Shields
   Position: Admin. Asst. to Senator Jeremiah Denton
   Firm:
   Address: Room 510, 101 Governors Dr. SE
   Huntsville, Al. 35801
   Telephone No.: 205-895-5105

3. EPS Analyst Data:
   Name: Donalea Dinsmore
   Purpose of call: Request Congressional inquiry of Army activities at Reservation in Theodore
   Form 2070-12 (7-81) P.N.
   Date of call: 7-24-85

4. Interview Narrative Summary: guests that narrative of concerns be sent so all issues are addressed with no confusion

5. Disposition/Comments:

6. Comments: Any additional sites used by this company?
   Location:
   Dates of use:
   Description of waste:

   Comments:

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
EPS FORM 3012-II

TELEPHONE LOG SHEET

1. Site Identification;
   Site number: ALD 071937890
   Site name: Kerr McGee Chemical Corp.

2. Interview Data: (Party called)
   Name: Mr. R. A. Napier
   Position: Environmental Coord. (?)
   Firm: Kerr McGee Chemical Corp
   Address: Rangeline Rd.
   Theodore, Al. 36590
   Telephone No.: 205-653-8820

3. EPS Analyst Data;
   Name: Donalea Dinsmore
   Purpose of call: Confirm activities, question pond usages at facility
   Form 2070-12 (7-81) P.N.
   Date of call; 1-24-85

4. Interview Narrative Summary: Mr. Foster has been transferred to the Columbus, Mp. facility. Directions confirmed - ownership established. Dikes have been raised 5 ft. on tailings pond and anticipated that they will be raised another 3-5 ft. Don't anticipate closure for 4 years. H_2O from french drain is treated in NPDES system and all solids from system placed in tailings pond. Wastewater has been tested periodically for Pb and Cno Pb detected. Also test for Cr + Mn on-site. 6 acre NPDES pond actually 2 in series and acts as polishing pond - Very few solids present - have not been tested for EP Tox. Also catches plant - run-off. Plan submitted 7-21-85 to install monitoring wells around this pond. New pond with liner has been built - now used to catch overflow - Solids returned to tailings pond. This new pond has 0.5 gpm seepage which is caught in underdrain and treated. Will be used in future for tailings. Old pond has approx. dimensions 800'x1000'x15'. Prior to Kerr McGee property was Army reservation - No munitions found during construction. No evidence of contamination problems in groundwater or runoff which Kerr McGee has tested. Army activities are unknown. Some bunkers still present on-site. Ponds are above flood plain and only surge from eg. hurricane will cause problem

5. Disposition/Comments;

Make effort to determine Army activity - K.M. appears to be of no CERCLA concern -

6. Comments: Any additional sites used by this company?
   Location:
   Dates of use:
   Description of waste:
   Comments:

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
EPS FORM 3012-1
EPS ANALYST/REVIEWER CHECKLIST

Site No. ALD071937890
Site Name

Instructions: To be used in conjunction with EPA Form 2070-12 (7-81). Attach on inside front of site folder. Initial and date for all assessment entries under appropriate part/subpart as completed. initial/date in black for final assessment; in red if higher level (additional) assessment is in order. Follow same procedure for review process.

Review Codes: 1-Toxicology Review; 2-Chemical Review; 3-Ecology Review; 4-Chemical Engineer Review; 5-Geotechnical Review; 6-Project Manager Review; 7-Final Review

1. ANALYST/REVIEW STATUS

Form 2070 Part Number	Analyst/ Date	Review Code 1	Review Code 2	Review Code 3	Review Code 4	Review Code 5	Review Code 6	Review Code 7
1.I.-VI.	9/13/85 DD							
							SLW 9/16	SLW 9/16
2.I.								
2.II.								
2.III.								
2.IV.								
2.V.								
2.VI.								
3.I.								
3.II.A								
3.II.B								
3.II.C								
3.II.D								
3.II.E								
3.II.F								
3.II.G								
3.II.H								
3.II.I								
3.II.J								
3.II.K								
3.II.L								
3.II.M								
3.II.N								
3.II.O								
3.II.P								
3.III.								
3.IV.								
3.V.								

*No further assessment/review required, enter NA

ENVIRONMENTAL PROTECTION SYSTEMS, INC.

Alabama RCRA 3012 Site Ranking Scheme
EPS Form 3012-V

Site Name _____

Site Number _____

Preliminary Assessment Ranking Scheme to Determine Which Sites Merit Further Action.

(Select one answer for each of the following seven questions)

1. Are Hazardous Substances Present?
   - A. Confirmed on site! — 10 points _____
   - B. Suspected at site! — 5 points _____
   - C. It is unknown! — 2 points _____
   - D. No hazardous substances — 0 points _____
   - E. RCRA facility only! — 0 points _____

2. Is There a Pollution Dispersal Pathway?
   - A. Direct to surface and/or groundwater. — 5 points _____
   - B. Indirect to surface and/or groundwater. — 4 points _____
   - C. Suspected to surface and/or groundwater. — 3 points _____
   - D. Not known for sure. — 2 points _____
   - E. No pathway. — 0 points _____

3. Characteristics of Human Population?
   - A. High density. — 5 points _____
   - B. Medium density. — 4 points _____
   - C. Low density. — 3 points _____
   - D. No population. — 2 points _____

4. Characteristics of Natural Environment?
   - A. Critical habitat including endangered species, etc. — 5 points _____
   - B. Sensitive habitat. — 3 points _____
   - C. Common less sensitive habitat. — 2 points _____

5. How is Human Population Affected By Site?
   - A. Public utility of drinking water from site. — 5 points _____
   - B. Direct public access to site. — 4 points _____
   - C. Public access to affected surface water. — 3 points _____
   - D. Only potential for human population contact. — 2 points _____
   - E. Low or no potential for contact. — 1 point _____

6. Facility Management Practices at Site?
   - A. Site actively supervised and managed currently with monitoring reports and other permit and report requirements. — 1 point _____
   - B. Site inadequately managed records not up-to-date. — 3 points _____

C. Site not currently managed or regulated. — 4 points _____

D. Abandon site. — 5 points _____

7. Potential Responsible Parties for Site Operations?

A. Controlling party identified and accepts responsibility for site. — 1 point _____

B. Suspected controlling party identified but does not accept responsibility for site. — 4 points _____

C. No responsible party available. — 5 points _____

Ranking Score =

$$\underset{\#1}{\_\_\_\_}\left[\times \underset{\#2}{\_\_\_\_} + \underset{\#4}{\_\_\_\_} + \left(\underset{\#3}{\_\_\_\_} \times \underset{\#5}{\_\_\_\_}\right) + \underset{\#6}{\_\_\_\_} + \underset{\#7}{\_\_\_\_}\right]$$

TABLE 1. Ranking Assessment

NUMERICAL RANGE	PRIORITY ASSESSMENT
0-50	NONE
50-150	LOW
150-300	MEDIUM
300-450	HIGH

Ranking Score:_____

Priority Assessment:_____

UNSCANNABLE

MEDIA

(PHOTOGRAPHS)

HOLLINGERS
U S GOVERNMENT
RESERVATION
U S GOVERNMENT
RESERVATION
North
Deer River
Deer River Poi
Light
Light
THEODORE QUADRANGLE
ALABAMA-MOBILE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 MOBILE 15' QUADRANGLE
N
HOLLINGERS ISLAND QUADRANGLE
ALABAMA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 MOBILE 15' QUADRANGLE
N

2. PROJECT MANAGEMENT SUMMARY

Site Name: KERR-McGEE CHEMICAL CORP.

Site Number: ALD071937890

Owner: KERR-McGEE CHEMICAL CORP.

Operator: —

Site Status: [X] Active / / Inactive [ ] Unknown

Priority: / / High / / Medium / / Low [X] None

3. FINAL DISPOSITION

I. EPS Final Review - Date: 7/16/85

Comments:

Site Inspection Required / / Yes [X] No

II. ADEM Review - Date: 9/30/85

Comments:

Follow-up Action Required [ ] Yes [X] No

III. Final Disposition:

Review & revise Date:

Edited & correct Date:

Transmitted Date:

File close-out Date:

Initiate site inspection Date:

4. ADDITIONAL COMMENTS (ONGOING & FINAL)

POTENTIAL HAZARDOUS WASTE SITE
IDENTIFICATION AND **PRELIMINARY** ASSESSMENT

REGION: IV
SITE NUMBER (to be assigned by Hq): AL104

NOTE: This form is completed for each potential hazardous waste site to help set priorities for site inspection. The information submitted on this form is based on available records and may be updated on subsequent forms as s result of additional inquiries and on-site inspections.

GENERAL INSTRUCTIONS: Complete Sections I and III through X as completely ss possible before Section II (*Preliminary Assessment*). File this form in the Regional Hazardous Waste Log File ond submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Tssk Force (*EN-335*); 401 M St., SW, Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: Mobile Facility Ken McGee
B. STREET (or other identifier): Kangeline Rd P.O. Box 629
C. CITY: Theodore
D. STATE: AL
E. ZIP CODE: 36582
F. COUNTY NAME: Mobile

C. OWNER/OPERATOR (if known)
1. NAME: Kenn McGee Don Schieze
2. TELEPHONE NUMBER: 65[illegible]

H. TYPE OF OWNERSHIP
☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE ☐ 6. UNKNOWN

I. SITE DESCRIPTION
Iron Oxide Pond, Mono-Industrial Landfill

J. HOW IDENTIFIED (i.e., citizen's complaints, OSHA citations, etc.)
Eckhardt Report

K. DATE IDENTIFIED (mo., day, & yr.)

L. PRINCIPAL STATE CONTACT
1. NAME: Daniel E Cooper
2. TELEPHONE NUMBER: 205 832-6728

II. PRELIMINARY ASSESSMENT (complete this section last)

A. APPARENT SERIOUSNESS OF PROBLEM
☐ 1. HIGH ☐ 2. MEDIUM ☐ 3. LOW ☒ 4. NONE ☐ 5. UNKNOWN

C. RECOMMENDATION
☐ 1. NO ACTION NEEDED (no hazard)
☒ 2. SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR: When pit opens
b. WILL BE PERFORMED BY:
☐ 2. IMMEDIATE SITE INSPECTION NEEDED
a. TENTATIVELY SCHEDULED FOR:
b. WILL BE PERFORMED BY:
a 4. SITE INSPECTION NEEDED (low priority)

C. PREPARER INFORMATION
1. NAME: Daniel E. Cooper
2. TELEPHONE NUMBER:
3. DATE (mo., day, & yr.): 12/13/79

III. SITE INFORMATION

A. SITE STATUS
☐ 1. ACTIVE (Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)
☒ 2. INACTIVE (Those sites which no longer receive wastes.) May start-up again
☐ 3. OTHER (specify) (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)

a. IS GENERATOR ON SITE?
☐ 1. NO ☒ 2. YES (specify generator's four-digit SIC Code):

C. AREA OF SITE (in acres)

D. IF APPARENT SERIOUSNESS OF SITE IS HIGH, SPECIFY COORDINATES
1. LATITUDE (deg.-min.-sec.)
2. LONGITUDE (deg.-min.-sec.)

E. ARE THERE BUILDINGS ON THE SITE?
☐ 1. NO ☐ 2. YES (specify):

T2070-2 (10-79)

Continue On Reverse

Continue Front

IV. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

'X'	A. TRANSPORTER	'X'	B. STORER	'X'	C. TREATER	'X'	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION	X	1. LANDFILL
	2. SHIP	X	2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE		3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
	4. TRUCK		4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY	X	4. SURFACE IMPOUNDMENT
X	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM/PHYS. TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify):		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		8. OTHER (specify):
					9. OTHER (specify): Solids Settling		

E. SPECIFY DETAILS OF SITE ACTIVITIES AS NEEDED

IRON OXIDE SOLIDS ARE settled in POND (sludge) see 2a

Kiln hood Fines are Landfilled on site (Solids) see 2c.

V. WASTE RELATED INFORMATION

A. WASTE TYPE

[ ] 1 UNKNOWN [ ] 2 LIQUID [X] 3. SOLID [X] 4. SLUDGE [ ] 5. GAS

B. WASTE CHARACTERISTICS

[ ] 1 UNKNOWN [ ] 2. CORROSIVE [ ] 3. IGNITABLE [ ] 4 RADIOACTIVE [ ] 5 HIGHLY VOLATILE

[ ] 6 TOXIC [ ] 7 REACTIVE [X] 8 INERT [ ] 9 FLAMMABLE

[ ] 10. OTHER (specify):

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT 8.5	AMOUNT	AMOUNT	AMOUNT	AMOUNT 0.5	AMOUNT
UNIT OF MEASURE Tons/Hr	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE Tons/Hr	UNIT OF MEASURE
'X' (1) MI PAINT, PIGMENTS	'X' (1) OILY WASTES	'X' (1) HALOGENATED SOLVENTS	'X' (1) ACIDS	'X' (1) FLYASH	'X' (1) LABORATORY PHARMACEUT.
(2) METALS SLUDGES	(2) OTHER (specify):	(2) NON-HALOGNTD. SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		(3) OTHER (specify):	(3) CAUSTICS	(3) MILLING/ MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMLTG. WASTES	(4) MUNICIPAL
(5) OTHER (specify)			(5) DYES/INKS	(5) NON-FERROUS SMLTG. WASTES	(5) OTHER (specify):
Fe_2O_3 90%			(6) CYANIDE	(6) OTHER (specify):	
TiO_2 10%			(7) PHENOLS	TiO_2 44%	
			(8) HALOGENS	Fe_2O_3 4%	
when operating			(9) PCB	Cl^- 1.4%	
			(10) METALS	when operating	
			(11) OTHER (specify)		

Continue On Page 3

V. WASTE RELATED INFORMATION (continued)

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH MAY BE ON THE SITE (place in descending order of hazard).

4. ADDITIONAL COMMENTS OR NARRATIVE DESCRIPTION OF SITUATION KNOWN OR REPORTED TO EXIST AT THE SITE.

Facility is currently closed, but start-up may occur again within a year.

VI. HAZARD DESCRIPTION

A. TYPE OF HAZARD	B. POTENTIAL HAZARD (mark 'X')	C. ALLEGED INCIDENT (mark 'X')	D. DATE OF INCIDENT (mo., day, yr.)	E. REMARKS
1. NO HAZARD				
2. HUMAN HEALTH				
3. NON-WORKER INJURY/EXPOSURE				
4. WORKER INJURY				
5. CONTAMINATION OF WATER SUPPLY				
6. CONTAMINATION OF FOOD CHAIN				
7. CONTAMINATION OF GROUND WATER	X			Groundwater near surface 3-14 ft No problem Detected
8. CONTAMINATION OF SURFACE WATER				
9. DAMAGE TO FLORA/FAUNA				
10. FISH KILL				
11. CONTAMINATION OF AIR				
12. NOTICEABLE ODORS				
13. CONTAMINATION OF SOIL				
14. PROPERTY DAMAGE				
15. FIRE OR EXPLOSION				
16. SPILLS/LEAKING CONTAINERS/ RUNOFF/STANDING LIQUID:				
17. SEWER, STORM DRAIN PROBLEMS				
18. EROSION PROBLEMS				
19. INADEQUATE SECURITY				
20. INCOMPATIBLE WASTES				
21. MIDNIGHT DUMPING				
22. OTHER (specify):				

VII. PERMIT INFORMATION

A. INDIC. ALL APPLICABLE PERMITS HELD BY THE SITE.

- [X] 1 NPOES PERMIT
- [3] 2 SPCC PLAN
- [ ] 3. STATE PERMIT (specify): _____
- [X] 4. AIR PERMITS
- [ ] S. LOCAL PERMIT
- [ ] 6. RCRA TRANSPORTER
- [ ] 7 RCRA STORER
- [ ] • RCRA TREATER
- [ ] 9 RCRA DISPOSER
- [ ] 10. OTHER (specify): _____

B. IN COMPLIANCE?

- [ ] 1. YES
- [ ] 2 NO
- [X] 3 UNKNOWN

Facility Closed

4. WITH RESPECT TO (list regulation name & number): _____

VIII. PAST REGULATORY ACTIONS

- [ ] 1 A. NONE
- [ ] B. YES (summarize below)

unknown

IX. INSPECTION ACTIVITY (past or on-going)

- [ ] A NONE
- [ ] B. YES (complete items 1,2,3, & 4 below)

1. TYPE OF ACTIVITY	2 DATE OF PAST ACTION (mo., day, it yr.)	3 PERFORMED BY: (EPA/ State)	4. DESCRIPTION

X. REMEDIAL ACTIVITY (past or on-going)

- [ ] A. NONE
- [ ] B. YES (complete items J. 2, 3, & 4 below)

1. TYPE OF ACTIVITY	Z. DATE OF PAST ACTION (mo., day, & yr.)	3. PERFORMED BY: (EPA/State)	4. DESCRIPTION

NOTE: Based on the information in Sections HI through X, fill out the Preliminary Assessment (Section II) information on the first page of this form.

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 1 • SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE: AL | 02 SITE NUMBER: D071937890

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): Kerr-McGee Chemical Corp.

02 STREET, ROUTE NO. OR SPECIFIC LOCATION IDENTIFIER: P.O. Box 629 (Range Line Rd. (Theodore Industrial Park))

03 CITY: Theodore | 04 STATE: AL | 05 ZIP CODE: 36590 | 06 COUNTY: Mobile | 07 COUNTY CODE: 097 | 08 CONG DIST: 01

09 COORDINATES LATITUDE: 30 30 12._ | LONGITUDE: 088 07 54._

10 DIRECTIONS TO SITE (Starting from nearest public road): Take Range Line Road exit off I-10. Kerr McGee is located on the Right side of the road as you travel South.

III. RESPONSIBLE PARTIES

01 OWNER (If known): Kerr-McGee Chemical Corp.

02 STREET (Business, mailing, residential): P.O. 25861

03 CITY: Oklahoma City | 04 STATE: Ok. | 05 ZIP CODE: 73125 | 00 TELEPHONE NUMBER: (405) 270-3701

07 OPERATOR (If known and different from owner):

06 STREET (Business, mailing, residential):

09 CITY: | 10 STATE: | 11 ZIP CODE: | 12 TELEPHONE NUMBER: ( )

13 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL: ____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: ____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☒ A. RCRA 3001 DATE RECEIVED: 11/17/80 (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: _/_/_ (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES DATE 11/5/84 (MONTH DAY YEAR)
☐ NO

BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☒ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: ____ (Specify)
CONTRACTOR NAME(S): ____

02 SITE STATUS (Check one)
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
1976 (BEGINNING YEAR) | ____ (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
Iron oxide slurry containing EP Toxic amounts of lead. Material has been reported as corrosive but testing has not corroborated this.

* 05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
This facility has withdrawn from interim status as their waste is produced in the beneficiation of ilmenite. The slurry is placed in a tailings pond on-site which has a french drain to collect leachate. Groundwater corrective action is continuing regardless of RCRA status. These activities are being monitored by ADEM.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☒ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT: Steve Maurer SCM | 02 OF (Agency Organization): ADEM | 03 TELEPHONE NUMBER: (205) 271-7728

04 PERSON RESPONSIBLE FOR ASSESSMENT: Donalea Dinsmore | 05 AGENCY: | 06 ORGANIZATION: EPS | 07 TELEPHONE NUMBER: (601) 922-8242 | 08 DATE: 9/13/85 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
AL D071937510

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check - that apply)

a A SOLID
B. POWDER, FINES
C C SLUDGE
D OTHER _____ (Specify)
E SLURRY
F LIQUID
G GAS

02 WASTE QUANTITY AT SITE
(Measures of waste quantities must be independent)
TONS 30,000/yr.
CUBIC YARDS 150 000
NO OF DRUMS _____

03 WASTE CHARACTERISTICS (Check a that apply)

L A TOXIC
B CORROSIVE
C RADIOACTIVE
D PERSISTENT
E SOLUBLE
F INFECTIOUS
G FLAMMABLE
H IGNITABLE
HIGHLY VOLATILE
J EXPLOSIVE
K REACTIVE
L INCOMPATIBLE
M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FOS			FDS		
FDS			FDS		
FOS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

EPA FORM 2070-12 (7 81)

EPA

POTENTIAL **HAZARDOUS WASTE** SITE
PRELIMINARY ASSESSMENT
PART 3 • DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: AL
02 SITE NUMBER: D071937890

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A **GROUNDWATER CONTAMINATION** — 02 [X] **OBSERVED** (DATE 1982 - 1983) — [ ] **POTENTIAL** — G ALLEGED
03 **POPULATION POTENTIALLY AFFECTED**
04 NARRATIVE DESCRIPTION
FRENCH DRAIN HAS BEEN INSTALLED TO COLLECT LEACHATE. SHALLOW WELLS SHOW LEAD CONTAMINATION IN THE <0.5 ppm RANGE. One well showed as much as 32 ppm Lead in early 1983. Corrective action continues and both geology and hydrology reports have been supplied. The upper aquifer is not used as drinking water

01 [X] B. SURFACE WATER CONTAMINATION — 02 G OBSERVED (DATE: _____) — [X] **POTENTIAL** — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: < 50
04 NARRATIVE DESCRIPTION
Permits for NPDES discharge have taken into consideration the presence of oyster beds in proximity to the discharge point. Steps have been taken to prevent heavy metal contamination of the surface water and discharge is fully regulated.

01 a C. CONTAMINATION Of AIR — 02 C OBSERVED (DATE _____) — C POTENTIAL — G ALLEGED
03 POPULATION **POTENTIALLY AFFECTED**: _____
04 NARRATIVE DESCRIPTION

01 G D. **FIRE/EXPLOSIVE CONDITIONS** — 02 C OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] **ALLEGED**
03 POPULATION POTENTIALLY **AFFECTED**: _____
04 NARRATIVE DESCRIPTION

01 G E. DIRECT CONTACT — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 G **F** CONTAMINATION OF SOIL — 02 [ ] **OBSERVED** (DATE _____) — [ ] POTENTIAL — G ALLEGED
03 AREA **POTENTIALLY AFFECTED**: _____ (Acres)
04 NARRATIVE DESCRIPTION

01 G G. DRINKING WATER CONTAMINATION — 02 [ ] **OBSERVED** (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION **POTENTIALLY AFFECTED**: _____
04 NARRATIVE DESCRIPTION

01 G H. WORKER **EXPOSURE/INJURY** — 02 [ ] OBSERVED (DATE _____) — G POTENTIAL — [ ] ALLEGED
03 WORKERS POTENTIALLY **AFFECTED**: _____
04 NARRATIVE DESCRIPTION

01 G **I**. POPULATION **EXPOSURE/INJURY** — 02 G OBSERVED (DATE _____) — [ ] POTENTIAL — G ALLEGED
03 POPULATION POTENTIALLY **AFFECTED**: _____
04 NARRATIVE DESCRIPTION

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - **DESCRIPTION** OF **HAZARDOUS CONDITIONS AND INCIDENTS**

I IDENTIFICATION
01 STATE 02 SITE NUMBER
AL D 071937870

II. HAZARDOUS CONDITIONS AND INCIDENTS *(Continued)*

01 ☐ J. **DAMAGE** TO FLORA — 02 a OBSERVED (DATE:) n **POTENTIAL** ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO PAUNA — 02 ☐ OBSERVED **(DATE**) ☐ POTENTIAL ☐ **ALLEGED**
04 NARRATIVE DESCRIPTION *(Include name(s) of species)*

01 ☒ L. CONTAMINATION Of **FOOD** CHAIN — O2 n OBSERVED **(DATE**) ☒ POTENTIAL ☐ **ALLEGED**
04 NARRATIVE DESCRIPTION
Oyster beds are located in the bay in close proximity to this facility. Waste-water is monitored to assure that no heavy metal contamination enters this area. This facility is being actively regulated.

01 a M. UNSTABLE CONTAINMENT OF WASTES *(Spills/runoff/standing liquids/leaking drums)* — 02 ☐ OBSERVED (DATE:) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION **POTENTIAL**LY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO **OFFSITE PROPERTY** — 02 n **OBSERVED (DATE**) P, POTENTIAL n **AI LEGED**
04 NARRATIVE DESCRIPTION

01 C O. CONTAMINATION OF SEWERS. STORM DRAINS. **WWTPs** — 02 - **OBSERVED** (DATE:) C POTENTIAL C ALLEGED
04 NARRATIVE DESCRIPTION

01 C P **ILLEGAL/UNAUTHORIZED** DUMPING — O2 ☐ **OBSERVED** (DATE) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE **DESCRIPTION**

05 DESCRIPTION OF ANY OTHER KNOWN. POTENTIAL. **OR** ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

Although the Kerr McGee property does contain areas where marshes appear during heavy rainfall, the tailings pond is not in the flood plain.

V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA FORM 2070-12 (7-81)

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT

General Information

The Potential Hazardous Waste Site, Preliminary Assessment form is used to record information necessary to make an initial evaluation of the potential risk posed by a site and to recommend further action.

The Preliminary Assessment form contains three parts:

Part 1 — Site Information and Assessment

Part 2 - Waste Information

Part 3 - Description of Hazardous Conditions and Incidents

Part 1 — Site Information and Assessment contains all of the data elements also contained on the Site Identification form required to add a site to the automated Site Tracking System (STS). It is therefore possible to add a site to STS at the Preliminary Assessment stage. Instructions are given below.

Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents are used to record specific information about substances, amounts, hazards, and targets, e.g., population potentially affected, that are used in determining the priority for further action. Parts 2 and 3 are also contained in the Potential Hazardous Waste Site, Site Inspection Report form where they may be used to update, add, delete, or correct information supplied on the Preliminary Assessment.

An Appendix with feedstock names and CAS Numbers and the most frequently cited hazardous substances and CAS Numbers is located behind the instructions for the Preliminary Assessment.

General Instructions

1. Complete the Preliminary Assessment form as completely as possible.

2. Starred items (*) are required before assessment information can be added to STS. The system will not accept incomplete assessment information.

3. To add a site to STS at the Preliminary Assessment stage, write "New" across the top of the form and complete items II-01, 02, 03, 04, and 06, Site Name and Location, and item III-13, Type of Ownership.

4. Data items carried in STS, which are identical to those on the Site Identification form and which can be added, deleted, or changed using the Preliminary Assessment form, are indicated with a pound sign (#). To ensure that the proper action is taken, outline the item(s) to be added, deleted, or changed with a bright color and indicate the proper action with "A" (add), "D" (delete), or "C" (change).

5. There are two options available for adding, deleting, or changing information supplied on the Preliminary Assessment form. The first is to use a new Preliminary Assessment form, completing only those items to be added, deleted, or changed. Mark the form clearly, using "A", "D", or "C", to indicate the action to be taken. If only data carried in STS are to be altered, the Site Source Data Report may be used. Using the report, mark clearly the items to be changed and the action to be taken.

Detailed Instructions

Part 1 Site Information and Assessment

I. Identification: Identification (State and Site Number) is the site record key, or primary identifier, for the site. Site records in the STS are updated based on Identification. It is essential that State and Site Number are correctly entered on each form.

*I-01 State: Enter the two character alpha FIPS code for the state in which the site is located. It must be identical to State on the Site Identification form.

*I-02 Site Number: Enter the ten character alphanumeric code for sites which have a Dun and Bradstreet or EPA "user" Dun and Bradstreet number or the ten character numeric GSA identification code for federal sites. The Site Number must be identical to the Site Number on the Site Identification form.

II. Site Name and Location: If Site Name and Location information require no additions or changes, these items are not required on the Preliminary Assessment form. However, completing these items will facilitate use of the completed form and records management procedures.

#II-01 Site Name: Enter the legal, common, or descriptive name of the site.

#II-02 Site Street: Enter the street address and number (if appropriate) where the site is located. If the precise street address is unavailable for this site, enter brief direction identifier, e.g., NW intersection I-295 & US 99; Post Rd, 5 mi W of Rt. 5.

#II-03 Site City: Enter the city, town, village, or other municipality in which the site is located. If the site is not located in a municipality, enter the name of the municipality (of place) which is nearest the site or which most easily locates the site.

#II-04 Site State: Enter the two character alpha FIPS code for the state in which the site is located. The code must be the same* as in item I-01.

#II-05 Site Zip Code: Enter the five character numeric zip code for the postal zone in which the site is located.

#II-06 Site County: Enter the name of the county, parish (Louisiana), or borough (Alaska) in which the site is located.

#II-07 County Code: Enter the three character numeric FIPS county code for the county, parish, or borough in which the site is located. (The regional data analyst will furnish this data item.)

#II-08 Site Congressional District: Enter the two character number for the congressional district in which the site is located.

II-09 Coordinates: Enter the Coordinates, Latitude and Longitude, of the site in degrees, minutes, seconds and tenths of seconds. If a tenth of a second is insignificant at this site, enter "0".

II-10 Directions to Site: Starting from the nearest public road, provide narrative directions to the site.

III. **Responsible Parties**

#III-01 Site Owner: Enter the name of the owner of the site. The site owner is the person, company, or federal, state, municipal or other public or private entity, who currently holds title to the property on which the site is located.

#III-02 -03 -04 -05 Site Owner Address: Enter the current complete business, residential, or mailing address at which the owner of the site can be reached.

III-06 Site Owner Telephone Number: Enter the area code and local telephone number at which the owner of the site can be reached.

#III-07 Site Operator: If different from Site Owner, enter the name of the operator at the site. The site operator is the person, company, or federal, state, municipal or other public or private entity, who currently, or most recently, is, or was, responsible for operations at the site.

#III-08 -09 -10 -11 Site Operator Address: Enter the current complete business, residential, or mailing address at which the operator of the site can be reached.

III-12 Site Operator Telephone Number: Enter the area code and local telephone number at which the operator of the site can be reached.

#III-13 Type of Ownership: Check the appropriate box to indicate the type of site ownership. If the site is under the jurisdiction of an activity of the federal government, enter the name of the department, agency, or activity. If Other is indicated, specify the type of ownership and name.

III-14 Owner/Operator Notification On File: Check the appropriate box(es) to indicate that the notification required by RCRA (3001) and/or CERCLA (103c, Superfund) have been received. If received, enter the date(s) received. Check none if not received.

IV **Characterization** of **Potential** Hazard

IV-01 On Site Inspection: Check the appropriate box to indicate that the site has been inspected or visited by EPA, a state or local official, or a contractor representative of EPA or a state or local government. Enter the date of the inspection. Check the appropriate box(es) to indicate who visited the site or performed the inspection. If the site visit was performed by a contractor, enter the name of the company.

*IV-02 Site Status: Check the appropriate box(es) to indicate the current status of the site. Active sites are those which treat, store, or dispose of wastes. Check Active for those active sites with an inactive storage or disposal area. Inactive sites are those at which treatment, storage, or disposal activities no longer occur.

IV-03 Years of Operation: Enter the beginning and ending years (or beginning only if operations at the site are on-going), e.g., 1878/1932, of waste treatment, storage, and/or disposal activities at the site. Check Unknown if the years of operation are not known.

IV-04 Description of Substances Possibly Present, Known, or Alleged: Provide a narrative description of hazardous, potentially hazardous, or other substances present, or claimed to be present, at the site,

IV-05 Description of Potential Hazard to Environment and/or Population: Provide a narrative description of the potential hazard the site poses to the environment and to exposed population or wildlife. If no hazard, or potential hazard, exists, provide the basis for that determination.

V. Priority Assessment

*V-01 Priority for Inspection: Check the appropriate box to indicate the priority for further action or inspection. If no further action is required, complete the Potential Hazardous Waste Site, Current Disposition form. The Priority for Inspection assessed must be supported by appropriate data in Part 2 - Waste Information and Part 3 — Description of Hazardous Conditions and Incidents of this form. If no hazardous conditions exist, Part 3 is not required.

VI. Information Available From

VI-01 Contact: Enter the name of the individual who can provide information about the site.

VI-02 Of: If appropriate, enter the name of the Public or private agency, firm, or company and the organization within the agency, firm, or company of the individual named as Contact.

VI-03 Telephone Number: Enter the area code and local telephone number of the individual named as contact.

VI-04 Person Responsible for Assessment: Enter the name of the individual who made the site assessment and assigned the priority rating to the site. The person responsible for the assessment may be different from the individual who prepared the form.

VI-05 Agency: Enter the name of the Agency where the individual who made the assessment is employed.

VI-06 Organization: Enter the name of the organization within the Agency.

VI-07 Telephone Number: Enter the area code and local telephone number of the individual who made the assessment.

VI-08 Date: Enter the date the assessment was made.

Part 2 Waste Information

•I. Identification: Refer to Part 1—I.

II. Waste States, **Quantities, and Characteristics**: Waste States, Quantities, and Characteristics provide information about the physical structure and form of the waste, measures of gross amounts at the site, and the hazards posed by the waste, considering acute and chronic health effects and mobility along a pathway.

*II-01 Physical States: Check the appropriate box(es) to indicate the state(s) of waste present, or thought to be present, at the site. If Other is indicated, specify the physical state of the waste.

•II-02 Waste Quantity at Site: Enter estimates of amounts of waste at the site. Estimates may be in weight (Tons) or volume (Cubic Yards or Number of Drums). Use as many entries as are appropriate; however, measurements must be independent. For

example, do not measure the same amounts of waste as both tons and cubic yards.

*II-03 Waste Characteristics: Check all appropriate entries to indicate the hazards posed by waste at the site. If waste at the site poses no hazard, check Not Applicable.

III. **Waste Category:** General categories of waste typically found are listed here. Enter the estimated gross amount of the category of waste next to the appropriate substance name and enter the unit of measure used with the estimate.

*III-01 Gross Amount: Gross Amount is the estimate of the amount of the waste category found at the site. Estimates should be furnished in metric tons (MT), tons (TN), cubic meters (CM), cubic yards (CY), drums (DR), acres (AC), acre feet (AF), liters (LT), or gallons (GA). Enter the estimated amount next to the appropriate waste category.

*III-02 Unit of Measure: Enter the appropriate unit of measure: MT (metric tons), TN (tons), CM (cubic meters), CY (cubic yards), DR (number of drums), AC (acres), AF (acre feet), LT (liters), or GA (gallons), next to the estimate of gross amount.

III-03 Comments: Comments may be used to further explain, or provide additional information, about particular waste categories.

IV. **Hazardous Substances**: Specific hazardous, or potentially hazardous, chemicals, mixtures, and substances found at the site are listed here. This information may not be available at the Preliminary Assessment stage. Substances for which information is available are to be listed here. For each substance listed those data items marked with an "at" sign (@) must be included.

@IV-01 Category: Enter in front of the substance name the three character waste category from Section III which best describes the substance, e.g., OLW (Oily Waste).

@IV-02 Substance Name: Enter one of the following: the name of the substance registered with the Chemical Abstract Service, the common or accepted abbreviation of the substance, the generic name of the substance, or commercial name of the substance.

@IV-03 CAS Number: Enter the number assigned to the substance when it was registered with the Chemical Abstract Service. Refer to the Appendix for most frequently cited CAS Numbers. CAS Numbers must be furnished for each substance listed. If a CAS Number for this substance has not been assigned, enter "999".

@IV-04 Storage/Disposal Method: Enter the type of storage or disposal facility in which the substance was found: SI (surface impoundment, including pits, ponds, and lagoons), PL (pile), OR (drum), TK (tank), LF (landfill), LM (landfarm), OD (open dump).

IV-05 Concentration: Enter the concentration of the substance found in samples taken at the site.

IV-06 Measure of Concentration: Enter the appropriate unit of measure for the measured concentration of the substance found in the sample, e.g., MG/L, UG/L.

V. **Feedstocks**

V-01 Feedstock Name: If feedstocks, or substances derived from one or more feedstocks, are present at the site, enter the name of each feedstock found. See the Appendix for the feedstock list.

V-02 CAS Number: Enter the CAS Number for each feedstock named. See the Appendix for feedstock CAS Numbers.

VI. **Sources of Information:** List the sources used to obtain information for this form. Sources cited may include: sample analysis, reports, inspections, official records, or other documentation. Sources cited provide the basis for information entered on the form and may be used to obtain further information about the site.

Part 3 Description of Hazardous Conditions and Incidents

*I. **Identification**: Refer to Part 1 – I.

II. **Hazardous Conditions and Incidents**:

II-01 Hazards: Indicate each hazardous, or potentially hazardous, condition known, or claimed, to exist at the site.

II-02 Observed, Potential, or Alleged: Check Observed and enter the date, or approximate date, of occurrence if a release of contaminants to the environment, or some other hazardous incident, is known to have occurred. In cases of a continuing release, e.g.. groundwater contamination, enter the date, or approximate date, the condition first became apparent. If conditions exist for a potential release, check potential. Check Alleged for hazardous, or potentially hazardous, conditions claimed to exist at the site.

II-03 Population Potentially Affected: For each hazardous condition at the site, enter the number of people potentially affected. For Soil enter the number of acres potentially affected.

II-04 Narrative Description: Provide a narrative description, or explanation, of each condition. Include any additional information which further explains the condition.

II-05 Description of Any Other Known, Potential, or Alleged Hazards: Provide a narrative description of any other hazardous, or potentially hazardous, conditions at the site not covered above.

III. **Total Population Potentially Affected**: Enter the total number of people potentially affected by the existence of hazardous, or potentially hazardous, conditions at the site. Do not sum the numbers shown for each condition.

IV. **Comments**: Other information relevant to observed, potential, or alleged hazards may be entered here.

V. **Sources of Information:** List the sources used to obtain information for this form. Sources cited may include: sample analysis, reports, inspections, official records, or other documentation. Sources cited provide the basis for information entered on the form and may be used to obtain further information about the site.

APPENDIX

I. FEEDSTOCKS

CAS Number	Chemical Name
1. 7664-41-7	Ammonia
2. 7440-36-0	Antimony
3. 1309-64-4	Antimony Trioxide
4. 7440-38-2	Arsenic
5. 1327-53-3	Arsenic Trioxide
6. 21109-95-5	Barium Sulfide
7. 7726-95-6	Bromine
8. 106-99-0	Butadiene
9. 7440-43-9	Cadmium
10. 7782-50-5	Chlorine
11. 12737-27-8	Chromite
12. 7440-47-3	Chromium
13. 7440-48-4	Cobalt
14. 1317-38-0	Cupric Oxide
15. 7758-98-7	Cupric Sulfata
16. 1317-39-1	Cuprous Oxide
17. 74-85-1	Ethylene
18. 7647-01-0	Hydrochloric Acid
19. 7664-39-3	Hydrogen Fluoride
20. 1335-25-7	Lead Oxide
21. 7439-97-6	Mercury
22. 74-82-8	Methane
23. 91-20-3	Napthalene
24. 7440-02-0	Nickel
25. 7697-37-2	Nitric Acid
26. 7723-14-0	Phosphorus
27. 7778-50-9	Potassium Dichromate
28. 1310-58-3	Potassium Hydroxide
29. 115-07-1	Propylene
30. 10588-01-9	Sodium Dichromate
31. 1310-73-2	Sodium Hydroxide
32. 7646-78-8	Stannic Chloride
33. 7772494	Stannous Chlorida
34. 7664-93-9	Sulfuric Acid
35. 108-88-3	Toluene
36. 1330-20-7	Xylene
37. 7646-85-7	Zinc Chlorida
38. 7733-02-0	Zinc Sulfate

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
1. 75-07-0	Acetaldehyde
2. 64-19-7	Acetic Acid
3. 108-24-7	Acetic Anhydride
4. 75-86-5	Acetone Cyanohydrin
5. 506-96-7	Acetyl Bromide
6. 75-36-5	Acetyl Chlorida
7. 107-02-8	Acrolein
8. 107-13-1	Acrylonitrile
9. 124-04-9	Adipic Acid
10. 309-00-2	Aldrin
11. 10043-01-3	Aluminum Sulfata
12. 107-18-6	Allyl Alcohol
13. 107-05-1	Allyl Chlorida
14. 7664-41-7	Ammonia
15. 631-61-8	Ammonium Acetate
16. 1863-63-4	Ammonium Benzoata
17. 1066-33-7	Ammonium Bicarbonate
18. 7789-09-5	Ammonium Bichromate
19. 1341-49-7	Ammonium Bifluorida
20. 10192-30-0	Ammonium Bisulfite
21. 1111-78-0	Ammonium Carbamate
22. 12125-02-9	Ammonium Chlorida
23. 7788-98-9	Ammonium Chromate
24. 3012-65-5	Ammonium Citrate, Dibasic
25. 13826-83-0	Ammonium Fluoborate
26. 12125-01-8	Ammonium Fluoride
27. 1336-21-6	Ammonium Hydroxide
28. 6009-70-7	Ammonium Oxalate
29. 16919-19-0	Ammonium Silicofluoride
30. 7773-06-0	Ammonium Sulfamate
31. 12135-76-1	Ammonium Sulfide
32. 10196-04-0	Ammonium Sulfite
33. 14307-43-8	Ammonium Tartrate
34. 1762-95-4	Ammonium Thiocyanate
35. 7783-18-8	Ammonium Thiosulfate
36. 628-63-7	Amyl Acetate
37. 62-53-3	Aniline
38. 7647-18-9	Antimony Pentachloride
39. 7789-61-9	Antimony Tribromide
40. 10025-91-9	Antimony Trichloride
41. 7783-56-4	Antimony Trifluorida
42. 1309-64-4	Antimony Trioxida
43. 1303-32-8	Arsenic Disulfide
44. 1303-28-2	Arsenic Pentoxide
45. 7784-34-1	Arsenic Trichloride
46. 1327-53-3	Arsenic Trioxide
47. 1303-33-9	Arsenic Trisulfide
48. 54242-1	Barium Cyanide
49. 71-43-2	Benzene
50. 65-85-0	Benzoic Acid
51. 100-47-0	Benzonitrile
52. 98-88-4	Benzoyl Chloride
53. 100-44-7	Benzyl Chloride
54. 7440-41-7	Beryllium
55. 7787-47-5	Beryllium Chloride
56. 7787-49-7	Beryllium Fluoride
57. 13597-99-4	Beryllium Nitrate
58. 123-86-4	Butyl Acetate
59. 84-74-2	n-Butyl Phthalate
60. 109-73-9	Butylamine
61. 107424	Butyric Acid
62. 543-90-8	Cadimium Acetate
63. 7789-42-6	Cadmium Bromide
64. 10108-64-2	Cadmium Chlorida
65. 7778-44-1	Calcium Arsenate
66. 52740-16-6	Calcium Arsenite
67. 75-20-7	Calcium Carbide
68. 13765-19-0	Calcium Chromata
69. 592-01-8	Calcium Cyanide
70. 26264-06-2	Calcium Dodecylbenzene Sulfonate
71. 7778-54-3	Calcium Hypochlorite
72. 133-06-2	Captan
73. 63-25-2	Carbaryl
74. 1563-66-2	Carbofuran
75. 75-15-0	Carbon Disulfide
76. 56-23-5	Carbon Tetrachloride
77. 57-744	Chlordane
78. 7782-50-5	Chlorine
79. 108-90-7	Chlorobenzene
80. 67-66-3	Chloroform
81. 7790-94-5	Chlorosulfonic Acid
82. 292148-2	Chlorpyrifos
83. 1066-30-4	Chromic Acetate
84. 7738444	Chromic Acid
85. 10101-53-8	Chromic Sulfate
86. 10049-05-5	Chromous Chloride
87. 544-18-3	Cobaltous Formate
88. 14017-41-5	Cobaltous Sulfamata
89. 56-72-4	Coumaphos
90. 1319-77-3	Cresol
91. 4170-30-3	Crotonaldehyde
92. 142-71-2	Cupric Acetate
93. 12002-03-8	Cupric Acetoarsenite
94. 7447-39-4	Cupric Chlorida
95. 3251-23-8	Cupric Nitrate
96. 5893-66-3	Cupric Oxalata
97. 775848-7	Cupric Sulfate
98. 10380-29-7	Cupric Sulfate Ammoniated
99. 81542-7	Cupric Tartrata
100. 506-77-4	Cyanogen Chloride
101. 110-82-7	Cyclohexane
102. 94-75-7	2,4-D Acid
103. 94-11-1	2,4-D Esters
104. 50-29-3	DDT
105. 333-41-5	Diazinon
106. 1918-00-9	Dicamba
107. 1194-65-6	Dichlobenil
108. 117-80-6	Dichlone
109. 25321-22-6	Dichlorobenzene (all isomers)
110. 266-38-19-7	Dichloropropane (all isomers)
111, 26952-23-8	Dichloropropene (all isomers)
112.8003-194	Dichloropropene-Dichloropropene Mixture
113. 75-99-0	2-2-Dichloropropionic Acid
114.62-73-7	Dichlorvos
115. 60-57-1	Oieldrin
116. 109-89-7	Diethylamine
1t7. 124-40-3	Dimethylamine
118. 25154-54-5	Dinitrobenzene (all isomers)
119. 51-28-5	Dinitrophenol
120. 25321-14-6	Dinitrotoluene (all isomers)
121. 85-00-7	Diquat
122. 298-04-4	Disulfoton
123.330-54-1	Oiuron
124. 27176-87-0	Dodecylbenzenesulfonic Acid
125. 115-29-7	Endosulfan (all isomers)
126. 72-20-8	Endrin and Metabolites
127. 106-89-8	Epichlorohydrin
128. 563-12-2	Ethion
129.100-41-4	Ethyl Benzene
130. 107-15-3	Ethylenediamine
131. 106-93-4	Ethylene Dibromide
132. 107-06-2	Ethylene Dichloride
133. 60-00-4	EOTA
134. 1185-57-5	Ferric Ammonium Citrate
135. 2944-67-4	Ferric Ammonium Oxalate
136. 7705-08-0	Ferric Chlorida

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
137. 7783-50-8	Ferric Fluoride
138. 10421-48-4	Ferric Nitrate
139. 10028-22-5	Ferric Sulfate
140. 10045-89-3	Ferrous Ammonium Sulfate
141. 7758-94-3	Ferrous Chloride
142. 7720-78-7	Ferrous Sulfate
143. 206-44-0	Fluoranthene
144. 50-00-0	Formaldehyde
145. 64-18-6	Formic Acid
146. 110-17-8	Fumaric Acid
147.9841-1	Furfural
148. 86-50-0	Guthion
149. 76-44-8	Heptachlor
150. 118-74-1	Hexachlorobenzene
151. 87-68-3	Hexachlorobutadiene
152. 67-72-1	Hexachloroethane
153. 70-30-4	Hexachlorophene
154. 77-47-4	Hexachlorocyclopentadiene
155. 7647-01-0	Hydrochloric Acid (Hydrogen Chloride)
156. 7664-39-3	Hydrofluoric Acid (Hydrogen Fluoride)
157. 74-90-8	Hydrogen Cyanide
158. 7783-06-4	Hydrogen Sulfide
159. 78-79-5	Isoprene
160. 42504-46-1	I sopropanolamine Dodecylbenzenesulfonate
161. 115-32-2	Kelthane
162. 143-50-0	Kepone
163. 301-04-2	Lead Acetate
164. 3687-31-8	Lead Arsenate
165. 7758-95-4	Lead Chloride
166. 13814-96-5	Lead Fluoborate
167. 7783-46-2	Lead Fluoride
168. 10101-63-0	Lead Iodide
169. 18256484	Lead Nitrate
170. 7428-48-0	Lead Stearate
171. 15739-80-7	Lead Sulfate
172. 1314474	Lead Sulfide
173. 592-87-0	Lead Thiocyanate
174. 58-89-9	Lindane
175. 14307-35-8	Lithium Chromate
176. 121-754	Malthion
177. 110-16-7	Maleic Acid
178. 108-31-6	Maleic Anhydride
179. 2032-65-7	Mercaptodimethur
180. 592-04-1	Mercuric Cyanide
181. 10045-94-0	Mercuric Nitrate
182. 7783-35-9	Mercuric Sulfate
183. 592-85-8	Mercuric Thiocyanate
184. 10415-75-5	Mercurous Nitrate
185. 72-43-5	Methoxychlor
186. 74-93-1	Methyl Mercaptan
187. 80-62-6	Methyl Methacrylate
188. 298404	Methyl Parathion
189. 7786-34-7	Mevinphos
190. 315-18-4	Mexacarbate
191. 75-04-7	Monoethylamine
192. 74494	Monomethylamine
193. 300-76-5	Naled
194. 91-20-3	Naphthalene
195. 1338-24-5	Naphthenic Acid
196. 7440424	Nickel
197. 15699-18-0	Nickel Ammonium Sulfate
198.37211454	Nickel Chloride
199. 12054-48-7	Nickel Hydroxide
200. 14216-75-2	Nickel Nitrate
201. 7786-81-4	Nickel Sulfate
202. 7697-37-2	Nitric Acid
203. 98-95-3	Nitrobenzene
204. 10102-44-0	Nitrogen Dioxide
205. 25154-55-6	Nitrophenol (all isomers)
206. 1321-12-6	Nitrotoluene
207. 30525-89-4	Paraformaldehyde
208. 56-38-2	Parathion
209. 608-93-5	Pentachlorobenzene
210. 87-86-5	Pentachlorophenol
211.85414	Phenanthrene
212. 108-95-2	Phenol
213. 75-44-5	Phosgene
214. 7664-38-2	Phosphoric Add
215. 7723-14-0	Phosphorus
216. 10025-87-3	Phosphorus Oxychloride
217. 1314-80-3	Phosphorus Pentasulfide
218. 7719-12-2	Phosphorus Trichloride
219. 7784-41-0	Potassium Arsenate
220. 10124-50-2	Potassium Arsenite
221. 7778-50-9	Potassium Bichromate
222. 7789-00-6	Potassium Chromate
223. 7722-64-7	Potattium Permanganate
224. 2312-35-8	Propargite
225. 79-09-4	Propionic Acid
226. 123-62-6	Propionic Anhydride
227. 1336-36-3	Polychlorinated Biphenyls
228. 151-50-8	Potassium Cyanide
229. 1310-58-3	Potassium Hydroxide
230. 75-56-9	Propylene Oxide
231. 121-294	Pyrethrim
232. 91-22-5	Quinoline
233. 108-46-3	Resorcinol
234. 7446-08-4	Selenium Oxide
235. 7761-88-8	Silver Nitrate
236. 7631-89-2	Sodium Anenate
237. 7784-46-5	Sodium Arsenite
238. 10588-01-9	Sodium Bichromate
239. 1333-83-1	Sodium Bifluoride
240. 7631404	Sodium Bisulfite
241. 7775-11-3	Sodium Chromate
242. 143-33-9	Sodium Cyanide
243. 25155-30-0	Sodium Dodecylbenzene Sulfonate
244. 7681-49-4	Sodium Fluoride
245. 16721404	Sodium Hydrosulfide
246. 1310-73-2	Sodium Hydroxide
247. 7681-52-9	Sodium Hypochlorite
248. 124-41-4	Sodium Methylate
249. 7632-00-0	Sodium Nitrate
250. 7558-79-4	Sodium Phosphate, Dibasic
251. 7601-54-9	Sodium Phosphate, Tribasic
252. 10102-18-8	Sodium Selenite
253. 7789-06-2	Strontium Chromate
254. 57-24-9	Strychnine and Salts
255. 100-420-5	Styrene
256. 12771-08-3	Sulfur Monochloride
257. 7664-93-9	Sulfuric Acid
258. 93-76-5	2,4,5-T Acid
259. 2008-46-0	2,4,5-T Amines
260. 93-79-8	2,4,5-T Esters
261. 13560-99-1	2,4,5-T Salts
262. 93-72-1	2,4,5-TP Acid
263. 32534-95-5	2,4,5-TP Acid Esters
264. 72-54-8	TDE
265. 95-94-3	Tetrachlorobenzene
266. 127-18-4	Tetrachloroethane
267. 78-00-2	Tetraethyl Lead
268. 107-49-3	Tetraethyl Pyrophosphate
269. 7446-18-6	Thallium (I) Sulfate
270. 108-88-3	Toluene
271. 8001-35-2	Toxaphene
272. 12002-48-1	Trichlorobenzene (all isomers)
273. 52-68-6	Trichlorfon
274. 25323-89-1	Trichloroethane (all Isomers)
275. 79414	Trichloroethylene
276. 25167-82-2	Trichlorophenol (all isomers)
277. 27323-41-7	Triethanolamine Dodecylbenzenesulfonate
278. 121-44-8	Triethylamine
279. 75-50-3	Trimethylamine
280. 541-09-3	Uranyl Acetate
281. 10102-06-4	Uranyl Nitrate
282. 1314-62-1	Vanadium Pentoxide
283. 27774-13-6	Vanadyl Sulfate
284. 108-05-4	Vinyl Acetate
285. 75-35-4	Vinylidene Chloride
286. f300-71-6	Xylenol
287. 557-34-6	Zinc Acetate
288. 52628-25-8	Zinc Ammonium Chloride
289. 1332-07-6	Zinc Borate
290. 7699-45-8	Zinc Bromide
291. 3486-35-9	Zinc Carbonate
292. 764645-7	Zinc Chloride
293.557-21-1	Zinc Cyanide
294. 7783-49-3	Zinc Fluorida
295. 557-41-5	Zinc Formate
* 296. 7779-86-4	Zinc Hydrosulfite
297. 7779-88-6	Zinc Nitrate
298. 127-82-2	Zinc Phenolsulfonate
299. 1314-84-7	Zinc Phosphide
300. 16871-71-9	Zinc Silicofluoride
301. 7733-02-0	Zinc Sulfate
302. 13746-89-9	Zirconium Nitrate
303. 16923-95-8	Zirconium Potassium Fluorida
304. 14644-61-2	Zirconium Sulfate
305. 10026-11-6	Zirconium Tetrachloride

WINDSHIELD SURVEY FORM

1. NAME OK SITE ON ERRIS: Kerr Mr Gee Chemical Corp.

2. EPA I.D. NUMBER OF SITE: ALD 071 937 890

3. STREET ADDRESS OR DIRECTIONS TO SITE: (See attached map):
Theodore Industrial Park
P.O. Box 629

4. CITY: Theodore

5. COUNTY: MOBILE

6. STATE: Alabama ZIP CODE: 36590

7. TELEPHONE NUMBER: (205) 653-8820

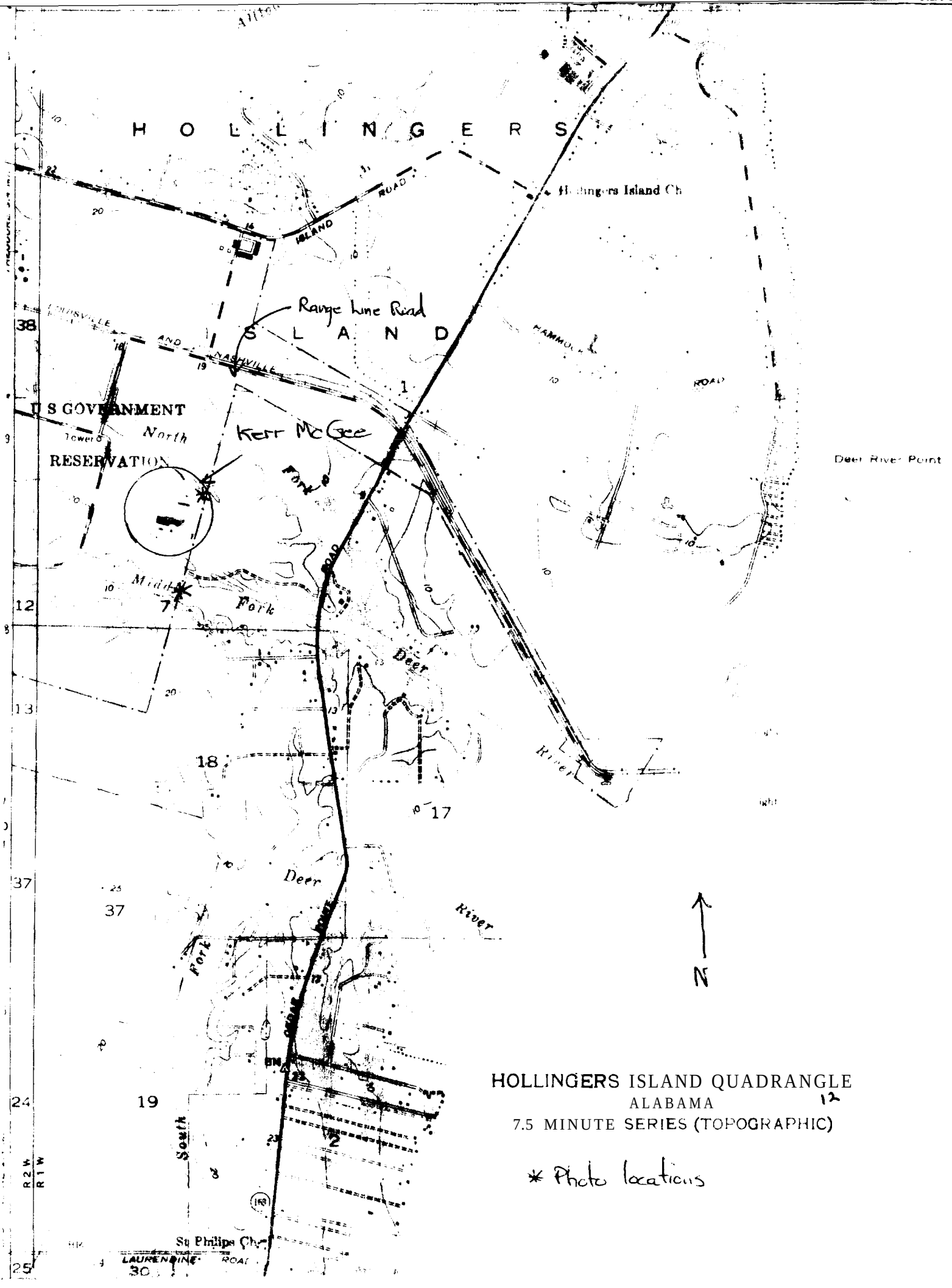
8. PERSON CONDUCTING SURVEY: Steve Maurer - ADEM

9. DATE OF SURVEY: 7/9/85 TIME OF SURVEY: 10:20 A.M.

10. DESCRIPTION OF SITE AND SURROUNDING AREA: Active company, covers large area of industrial park, no nearby residences, people fishing along Middle Fork Deer River south of ant.

11. DESCRIPTION OF AREA? PHOTOGRAPHED: 1 photo TO entrance off Range Line Rd. - Several photos over Middle Fork Deer River.

12. OTHER COMMENTS: (S.W. Foster, Manager, employs 101-150 people, Synthetic Rutile, established 1974 - source: 1982-83 Alabama Directory of Mining and Manufacturing)



HOLLINGERS ISLAND QUADRANGLE
ALABAMA
7.5 MINUTE SERIES (TOPOGRAPHIC)

12

* Photo locations

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT

REGION	SITE NUMBER (re be assigned by Hq)
[illegible]	[illegible]

GENERAL INSTRUCTIONS: Complete Sections I and III through XV of this form as completely as possible. Then use the information on this form to develop a Tentative Disposition (Section II). File this form in its entirety in the regional Hazardous Waste Log File. Be sure to include all appropriate Supplemental Reports in the file. Submit a copy of the forms to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Tack Force (EN-335); 401 M St., SW; Washington. DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET (or other identifier)		
Mobile Facility [illegible]	[illegible] Rd.		
C. CITY	**D. STATE**	**E. ZIP CODE**	**F. COUNTY NAME**
Theodore	[illegible]	[illegible]	Mobile

G. SITE OPERATOR INFORMATION

1. NAME	2. TELEPHONE NUMBER
[illegible]	205/65[illegible]-8820

3. STREET	4. CITY	5. STATE	6. ZIP CODE

H. REALTY OWNER INFORMATION (if different from operator of site)

1. NAME	2. TELEPHONE NUMBER

3. CITY	4. STATE	5. ZIP CODE

I. SITE DESCRIPTION

J. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☑ 5. PRIVATE

II. TENTATIVE DISPOSITION (complete this section last)

A. ESTIMATE DATE OF TENTATIVE DISPOSITION (mo., day, & yr.)	B. APPARENT SERIOUSNESS OF PROBLEM
[illegible]	[ ] 1. HIGH ☐ 2. MEDIUM ☐ 3. LOW [2] *. NONE

C. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, * yr.)
[illegible]	[illegible]	[illegible]

III. INSPECTION INFORMATION

A. PRINCIPAL INSPECTOR INFORMATION

1. NAME	2. TITLE
[illegible]	[illegible]

3. ORGANIZATION	4. TELEPHONE NO. (area code & no.)
[illegible]	[illegible]

B. INSPECTION PARTICIPANTS

1. NAME	2. ORGANIZATION	3. TELEPHONE NO.
[illegible]		

C. SITE REPRESENTATIVES INTERVIEWED (corporate officials, workers, residents)

1. NAME	2. TITLE & TELEPHONE NO.	3. ADDRESS
Don Schee	[illegible]	[illegible]
H.A. [illegible]	[illegible]	
[illegible]	[illegible]	

Continued From Front

III. INSPECTION INFORMATION *(continued)*

D. GENERATOR INFORMATION *(sources of waste)*

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE GENERATED

E. TRANSPORTER/HAULER INFORMATION

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE TRANSPORTED

F. IF WASTE IS PROCESSED ON SITE AND ALSO SHIPPED TO OTHER SITES. IDENTIFY OFF-SITE FACILITIES USED FOR DISPOSAL.

1. NAME	2. TELEPHONE NO,	3. ADDRESS

G. DATE OF INSPECTION *(mo., day, & yr.)*	H. TIME OF INSPECTION	I. ACCESS GAINED BY: *(credentials must be shown in all cases)*
		☑ 1. PERMISSION ☐ 2. WARRANT

J. WEATHER *(describe)*

IV. SAMPLING INFORMATION

A. Mark 'X' for the types of samples taken and indicate where they have been sent e.g., regional lab, other EPA lab, contractor, etc. and estimate when the results will be available.

1. SAMPLE TYPE	2. SAMPLE TAKEN *(mark 'X')*	3. SAMPLE SENT TO:	4. DATE RESULTS AVAILABLE
a. GROUNDWATER			
b. SURFACE WATER			
c. WASTE			
d. AIR			
e. RUN OFF			
f. SPILL			
g. SOIL			
h. VEGETATION			
i. OTHER *(specify)*			

B. FIELD MEASUREMENTS TAKEN *(e.g., radioactivity, explosivity, PH. etc.)*

1. TYPE	2. LOCATION OF MEASUREMENTS	3. RESULTS

Continue On Page 3

Continued From Page 2

IV. SAMPLING INFORMATION *(continued)*

C. PHOTOS

1. TYPE OF PHOTOS

[ ] a. GROUND [ ] b. AERIAL

2. PHOTOS IN CUSTODY OF:

D. SITE MAPPED?

[ ] YES. SPECIFY LOCATION OF MAPS:

E. COORDINATES

1. LATITUDE *(deg.-min.-sec.)*

2. LONGITUDE *(deg.-min.-sec.)*

V. SITE INFORMATION

A. SITE STATUS

[X] 1. ACTIVE (Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)

[ ] 2. INACTIVE (Those sites which no longer receive wastes.)

[ ] 3. OTHER *(specify)*: _____ (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)

B. IS GENERATOR ON SITE?

[ ] 1. NO [X] 2. YES *(specify generator's four-digit SIC Code)*: _____

C. AREA OF SITE *(in acres)*

16 A [illegible]

D. ARE THERE BUILDINGS ON THE SITE?

[ ] 1. NO [X] 2. YES *(specify)*:

VI. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity*(ies)* and details relating to each activity by marking 'X' in the appropriate boxes.

'X'	A. TRANSPORTER	'X'	B. STORER	'X'	C. TREATER	'X'	D. DISPOSER
	1. RAIL		1. PILE		1. FILTRATION		1. LANDFILL
	2. SHIP	X	2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE		3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
	4. TRUCK		4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY	X	4. SURFACE IMPOUNDMENT
	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM./PHYS./TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER *(specify)*		6. OTHER *(specify)*:		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		6. OTHER *(specify)*
					9. OTHER *(specify)*:		

E. SUPPLEMENTAL REPORTS If the site falls within any of the categories listed below, Supplemental Reports must be completed. Indicate which Supplemental Reports you have filled out and attached to this form.

[ ] 1. STORAGE [ ] 2. INCINERATION [ ] 3. LANDFILL [ ] 4. SURFACE IMPOUNDMENT [ ] 5. DEEP WELL

[ ] 6. CHEM/BIO/PHYS TREATMENT [ ] 7. LANDFARM [ ] 8. OPEN DUMP [ ] 9. TRANSPORTER [ ] 10. RECYCLOR/RECLAIMER

VII. WASTE RELATED INFORMATION

A. WASTE TYPE

[ ] 1. LIQUID [ ] 2. SOLID [X] 3. SLUDGE [ ] 4. GAS

B. WASTE CHARACTERISTICS

[X] 1. CORROSIVE [ ] 2. IGNITABLE [ ] 3. RADIOACTIVE [ ] 4. HIGHLY VOLATILE

[ ] 5. TOXIC [ ] 6. REACTIVE [X] 7. INERT [ ] 8. FLAMMABLE

[ ] 9. OTHER *(specify)*:

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

ICS

Continued From Front

II. WASTE RELATED INFORMATION (continued)

2. Estimate the amount (specify unit of measure) of waste by category. mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT: [illegible]	AMOUNT	AMOUNT	AMOUNT	AMOUNT	AMOUNT
UNIT OF MEASURE: tons	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE
X (1) PAINT. PIGMENTS	X (1) OILY WASTES	X (1) HALOGENATED SOLVENTS	X (1) ACIDS	X (1) FLYASH	X (1) LABORATORY, PHARMACEUT.
(2) METALS SLUDGES	(2) OTHER (specify):	(2) NON-HALOGNTD. SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		(3) OTHER (specify)	(3) CAUSTICS	(3) MILLING/MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMELTING WASTES	(4) MUNICIPAL
X (5) OTHER (specify): Fe_2O_3			(5) DYES/INKS	(5) NON-FERROUS SMLTG. WASTES	(5) OTHER (specify):
			(6) CYANIDE	(6) OTHER (specify):	
			(7) PHENOLS		
			(8) HALOGENS		
			(9) PCB		
			(10) METALS		
			(11) OTHER (specify)		

D. LIST SUBSTANCES OF GREATEST CONCERN WHICH ARE ON THE SITE (place in descending order of hazard)

1. SUBSTANCE	2. FORM (mark 'X')			3. TOXICITY (mark 'X')				4. CAS NUMBER	5. AMOUNT	6. UNIT
	a. SOLID	b. LIQ.	c. VAPOR	a. HIGH	b. MED.	c. LOW	d. NONE			

VIII. HAZARD DESCRIPTION

FIELD EVALUATION HAZARD DESCRIPTION: Place an 'X' in the box to indicate that the listed hazard exists. Describe the hazard in the space provided.

☐ A. HUMAN HEALTH HAZARDS

 Continue On Page 5

Continued From Page 4

VIII. HAZARD DESCRIPTION (continued)

☐ B. NON-WORKER INJURY/EXPOSURE

☐ C. WORKER INJURY/EXPOSURE

☐ D. CONTAMINATION OF WATER SUPPLY

☐ E. CONTAMINATION OF FOOD CHAIN

☒ F. CONTAMINATION OF GROUND WATER

[illegible]

☐ G. CONTAMINATION OF SURFACE WATER

Continue On Reverse

Continued From Front

VIII. HAZARD DESCRIPTION *(continued)*

[ ] H. DAMAGE TO FLORA/FAUNA

[ ] I. FISH KILL

[ ] J. CONTAMINATION OF AIR

[ ] K. NOTICEABLE ODORS

[ ] L. CONTAMINATION OF SOIL

[ ] M. PROPERTY DAMAGE

 Continue On Page 7

Continued From Page 6

A. HAZARD DESCRIPTION *(continued)*

[ ] N. FIRE OR EXPLOSION

[ ] O. SPILLS/LEAKING CONTAINERS/RUNOFF/STANDING LIQUID

[ ] P. SEWER, STORM DRAIN PROBLEMS

[ ] Q. EROSION PROBLEMS

[ ] R. INADEQUATE SECURITY

[ ] S. INCOMPATIBLE WASTES

Continue On Reverse

VIII. HAZARD DESCRIPTION *(continued)*

[ ] T. MIDNIGHT DUMPING

[ ] U. OTHER *(specify)*

IX. POPULATION DIRECTLY AFFECTED BY SITE

A. LOCATION OF POPULATION	B. APPROX. NO. OF PEOPLE AFFECTED	C. APPROX. NO. OF PEOPLE AFFECTED WITHIN UNIT AREA	D. APPROX. NO. OF BUILDINGS AFFECTED	E. DISTANCE TO SITE *(specify units)*
1. IN RESIDENTIAL AREAS				
2. IN COMMERCIAL OR INDUSTRIAL AREAS				
3. IN PUBLICLY TRAVELLED AREAS				
4. PUBLIC USE AREAS *(parks, schools, etc.)*				

X. WATER AND HYDROLOGICAL DATA

A. DEPTH TO GROUNDWATER *(specify unit)*	B. DIRECTION OF FLOW	C. GROUNDWATER USE IN VICINITY
D. POTENTIAL YIELD OF AQUIFER	E. DISTANCE TO DRINKING WATER SUPPLY *(specify unit of measure)*	F. DIRECTION TO DRINKING WATER SUPPLY

G. TYPE OF DRINKING WATER SUPPLY

[ ] 1. NON-COMMUNITY ≤ 15 CONNECTIONS* [ ] 2. COMMUNITY *(specify town)* > 15 CONNECTIONS _____

[ ] 3. SURFACE WATER [ ] 4. WELL

 Continue On Page 9

Continued From Page 8

X. WATER AND HYDROLOGICAL DATA (continued)

H. LIST ALL DRINKING WATER WELLS WITHIN A 1/4 MILE RADIUS OF SITE

1. WELL	2. DEPTH (specify unit)	3. LOCATION (proximity to population/buildings)	4. NON-COMMUNITY (mark 'X')	5. COMMUNITY (mark 'X')

I. RECEIVING WATER

1. NAME [illegible]

☐ 2. SEWERS ☑ 3. STREAMS/RIVERS

☐ 4. LAKES/RESERVOIRS ☐ 5. OTHER (specify):

6. SPECIFY USE AND CLASSIFICATION OF RECEIVING WATERS

XI. SOIL AND VECITATION DATA

LOCATION OF SITE IS IN:

☐ 1 A. [illegible] FAULT ZONE ☐ B. KARST ZONE ☐ C. 100 YEAR FLOOD PLAIN ☐ D. WETLAND

☐ E. A REGULATED FLOODWAY ☐ F. CRITICAL HABITAT ☐ G. RECHARGE ZONE OR SOLE SOURCE AQUIFER

XII. TYPE OF GEOLOGICAL MATERIAL OBSERVED

Mark 'X' to indicate the type(s) of geological material observed and specify where necessary, the component parts.

'X'	A. OVERBURDEN	'X'	B. BEDROCK (specify below)	'X'	C. OTHER (specify below)
X	1. SAND				
X	2. CLAY				
	3. GRAVEL				

XIII. SOIL PERMEABILITY

☐ A. UNKNOWN ☐ B. VERY HIGH (100,000 to 1000 cm/sec.) ☐ C. HIGH (1000 to 10 cm/sec.)

☐ D. MODERATE (10 to .1 cm/sec.) ☐ E. LOW (.1 to .001 cm/sec.) ☑ F. VERY LOW (.001 to .00001 cm/sec.)

RECHARGE AREA

☐ 1. YES ☐ 2. NO J. COMMENTS:

H. DISCHARGE AREA

☐ 1. YES ☐ 2. NO 3. COMMENTS:

I. SLOPE

1. ESTIMATE T. or SLOPE 2. SPECIFY DIRECTION OF SLOPE. CONDITION OF SLOPE. ETC.

J. OTHER GEOLOGICAL DATA

 Continue On Reverse

Continued From Front

XIV. PERMIT INFORMATION

List all applicable permits held by the site and provide the related information.

A. PERMIT TYPE (e.g., RCRA, State, NPDES, etc.)	B. ISSUING AGENCY	C. PERMIT NUMBER	D. DATE ISSUED (mo., day, & yr.)	E. EXPIRATION DATE (mo., day, & yr.)	F. IN COMPLIANCE (mark 'X')		
					1. YES	2. NO	3. UNKNOWN
NPDES	AWRC				X		

XV. PAST REGULATORY OR ENFORCEMENT ACTIONS

☒ NONE ☐ YES (summarize in this space)

NOTE: Based on the information in Sections III through XV, fill out the Tentative Disposition (Section II) information on the first page of this form.

SURFACE IMPOUNDMENTS SITE INSPECTION REPORT
(Supplemental Report)

INSTRUCTION
Answer and Explain
•s **Necessary.**

1. TYPE OF IMPOUNDMENT

2. STABILITY/CONDITION OF EMBANKMENTS

3. EVIDENCE OF SITE INSTABILITY *(Erosion, Settling. Sink Holes, etc.)*
☐ YES ☒ NO

4. EVIDENCE OF DISPOSAL OF IGNITA8LE OR REACTIVE WASTE
☐ YES ☒ NO

S. ONLY COMPATIBLE WASTES ARE STORED OR DISPOSED OF IN THE IMPOUNDMENT
☒ YES P NO

6. RECORDS CHECKED FOR CONTENTS AND LOCATION OF EACH SURFACE IMPOUNDMENT
☐ YES ☒ NO

7. IMPOUNDMENT HAS LINER SYSTEM
☒ YES ☐ NO

7a. INTEGRITY OF LINER SYSTEM CHECKED
☐ YES ☐ NO

7b. FINDINGS

8. SOIL STRUCTURE AND SUBSTRUCTURE

9. MONITORING WELLS
☒ YEs ☐ Nc

10. LENGTH. WIDTH, AND DEPTH
LENGTH WIDTH DEPTH

11. CALCULATED VOLUMETRIC CAPACITY

12. PERCENT OF CAPACITY REMAINING

13. ESTIMATE FREEBOARD

14. SOLIDS DEPOSITION
☒ YES ☐ NO

15. DREDGING DISPOSAL METHOD

16. OTHER EQUIPMENT

DEPARTMENT OF THE ARMY
HUNTSVILUE DIVISION, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807

REPLY TO
ATTENTION OF

August 16, 1985

Project Management Branch

Mr. Stephen C. Maurer, Chief
Special Services Section
Land Division
Alabama Department of Environmental Management
1751 Federal Drive
Montgomery, Alabama 36130

Dear Mr. Maurer:

This letter is to confirm your telephone conversation of August 15, 1985 with Mr. Dan Travis, Project Manager, U.S. Army Corps of Engineers, Huntsville, concerning information relating to former Department of Defense (DOD) activities at the Theodore Industrial Park, Mobile County, Alabama. Mr. Travis is the Project Manager for the Defense Environmental Restoration Program (DERP) which is currently investigating former DOD properties in conformance with Public Law 98-473, Continuing Appropriation, 1985 [Conference Report (HR98-1159)].

The previously owned Theodore Army Ammunitions Terminal is at this time being reviewed under DERP for potential environmental hazards due to previous DOD ownership. Your letter of August 12, 1985 requested information that is being investigated. Though an exact date cannot be predicted, this report is tentatively scheduled for completion by October 15, 1985. At that time, a completed report will be submitted to your office.

Should you require further information or assistance, please contact Mr. Dan Travis at 205-895-5140.

Sincerely,

H. O. Everitt
Acting Chief, Engineering Division

AUG 1985
RECEIVED
ADEM
Land Division

ADEM

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

George C Wallace
Governor

1751 Federal Drive
Montgomery, AL
36130
205/271-7700

Field Offices:

P.O. Box 953
Decatur, AL
35602
205/353-1713

Unit 806, Building 8
225 Oxmoor Circle
Birmingham, AL
35209
205/942-6168

4358 Midmost Drive
Mobile, AL
36609
205/343-7841

August 12, 1985

Mr. Frank Shearer
Lead Program Manager
for Environmental Programs
U. S. Army Engineering Division
HNDED - PM
P. O. Box 1600
Huntsville, Alabama 35707

Dear Mr. Shearer:

The Alabama Department of Environmental Management (ADEM) is cu[illegible] conducting a statewide hazardous waste site inventory program u[illegible] cooperative agreement with the U. S. Environmental Protection A[illegible]

In order to complete this inventory program by March 31, 1986, t[illegible] ADEM has retained the services of Environmental Protection Syst[illegible] Inc. (EPS), an engineering consultant firm.

During the course of Investigation by EPS, concern has arisen regarding potential environmental problems from the U. S. Military's former use of property in Theodore, Alabama, as a munition dump. This property is presently known as the Theodore Industrial Park.

For your convenience, a copy of federal quadrangle map sections is enclosed depicting the former U. S. government reservation property boundry.

I would greatly appreciate your assistance in determing the answers to the following questions:

[illegible]ars did the U. S. Military use property in this [illegible]

[illegible]roperty used; i.e., was ammunition stored, was the [illegible] as a proving ground, was any ammunition disposed [illegible] or destroyed on-site? Where did these activities take place?

(3) What, if any, environmental contaminants are likely to be present as a result of any past U. S. Military activities?

(4) Has any environmental testing or assessment effort by the Department of Defense taken place at this property? If so, what were the results of these tests or assessments?

(5) Are there any known areas where ammunition components have been spilled?

(6) Is the Department of Defense aware of any activities on-site by individuals or groups (other than the military) which may pose a potential environmental threat, such as landfilling hazardous materials? If so, at what locations?

The above six questions were submitted by Ms. Donalea Dinsmore of EPS, Inc. Ms. Dinsmore may be contacted at (601) 922-8242 for any needed clarification.

Pleaae direct written response regarding these questions to me at the Alabama Department of Environmental Management, Land Division, 1751 Federal Drive, Montgomery, Alabama 36130.

Your assistance in this matter is greatly appreciated.

Sincerely,

Stephen C. Maurer

Stephen C. Maurer, Chief
Special Services Section
Land Division

SCM:bw

Enclosure

cc: Ms. Donalea Dinsmore
EPS, Inc.

July 18, 1985

~~Mr. S. W. Foster, Manager~~ moved to Columbus, Ms.
Kerr-McGee Chemical Corporation
p. 0. Box 629
Theodore, Alabama 36S90

Dear Mr. Foster:

On March 31, 1985, the Alabama Department of Environmental Management (ADEM) received a grant from the U. S. Environmental Protection Agency (EPA) to conduct a CERCLA Hazardous Waste Site Inventory Program.

The purpose of the Inventory program is to screen and evaluate potential hazardous waste sites and identify any public health or environmental problems these sites may pose.

The list of sites to be screened is determined by EPA, and includes primarily those companies that notified under Section 3005 of RCRA or Section 103(c) of CERCLA (the legislation establishing Superfund).

Since this is a one-time, nonrecurring appropriation, ADEM has elected to complete the Inventory by use of a private contractor. Environmental Protection Systems, Inc. (EPS), Jackson, Mississippi, has been selected to perform the necessary work.

The first task of EPS will be to review Information in ADEM files. However, in order to verify certain information and fill in data gaps, it will be necessary for EPS to contact each company on the inventory list, by telephone. Telephone contacts will be made within a nine-month period, beginning on July 23, 1985.

In some cases, an inspection will be necessary in order to complete the site assessment report. The inspection phase of the inventory is currently scheduled for October 1985 through March 1986.

In order to carry out this program in a reasonable and timely manner, with a minimum of inconvenience to you, I respectfully request your cooperation and assistance.

If you have any questions about the project, please contact me at (205) 271-7728.

Sincerely,

Stephen C. Maurer, Chief
Special Services Program
Land Division

SCM/bw

EPA

PO — ATIAL HAZARDOUS WASTE SITE
TENTATIVE DISPOSITION

REGION IV SITE NUMBER ALD 071 937890

File this form in the regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET
Kerr McGee Chemical Corp	Range Line Rd
C. CITY	**D. STATE** / **E. ZIP CODE**
Theodore (Mobile Co)	AL / 36590

II. TENTATIVE DISPOSITION

Indicate the recommended action(s) and agency(ies) that should be involved by marking 'X' in the appropriate boxes.

RECOMMENDATION	MARK 'X'	ACTION AGENCY: EPA	STATE	LOCAL	PRIVATE
A. NO ACTION NEEDED -- NO HAZARD	X				
B. INVESTIGATIVE ACTION(S) HEEDED (If yea. complete Section III.)					
C. REMEDIAL ACTION NEEDED (II yes, complete Section IV.)					
D. ENFORCEMENT ACTION NEEDED (if yes, specify in Part E whether the case will be primarily managed by the EPA or the State and what type of enforcement action is anticipated.)					

E. RATIONALE FOR DISPOSITION

Present activities monitored by ADEM - beneficiation of ore. Past activities are being investigated by Dept. of Defense (it was an ammunition storage area during WW II)

F. INDICATE THE ESTIMATED DATE OF FINAL DISPOSITION (mo., day, & yr.)

G. IF A CASE DEVELOPMENT PLAN IS NECESSARY, INDICATE THE ESTIMATED DATE ON WHICH THE PLAN WILL BE DEVELOPED (mo., day, & yr.)

H. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
Elizabeth M Shaver	(404) 881-2234	10/9/85

III. INVESTIGATIVE ACTIVITY NEEDED

A. IDENTIFY ADDITIONAL INFORMATION NEEDED TO ACHIEVE A FINAL DISPOSITION.

mark pending

B. PROPOSED INVESTIGATIVE ACTIVITY (Detailed Information)

1. METHOD FOR OBTAINING NEEDED ADDITIONAL INFO.	2. SCHEDULED DATE OF ACTION (mo, day, & yr)	3. TO BE PERFORMED BY (EPA, Contractor, State, etc.)	4. ESTIMATED MANHOURS	5. REMARKS
a. TYPE OF SITE INSPECTION				
(1)				
(2)				
(3)				
b. TYPE OF MONITORING				
(1)				
(2)				
C. TYPE OF SAMPLING				
(1)				
(2)				

Continued From Front

III. INVESTIGATIVE ACTIVITY NEEDED and PART B - PROPOSED INVESTIGATIVE ACTIVITY *(Continued)*

d. TYPE OF LAB ANALYSIS (1)				
(2)				
e. OTHER *(specify)* (1)				
(2)				

C. ELABORATE ON ANY OF THE INFORMATION PROVIDED IN PART B *(on front & above)* AS NEEDED TO IDENTIFY ADDITIONAL INVESTIGATIVE WORK.

D. ESTIMATED MANHOURS BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL ESTIMATED MANHOURS FOR INVESTIGATIVE ACTIVITIES	1. ACTION AGENCY	2. TOTAL ESTIMATED MANHOURS FOR INVESTIGATIVE ACTIVITIES
a. EPA		b. STATE	
c. EPA CONTRACTOR		d. OTHER *(specify)*	

IV. REMEDIAL ACTIONS

A. SHORT TERM/EMERGENCY STRATEGY *(On Site & Off-Site)*: List all emergency actions needed to bring site under immediate control, e.g., restrict access, provide alternate water supply, etc. See instructions for a list of Key Words for each of the actions to be used in the space below.

1. ACTION	2. EST. START DATE *(mo,day,& yr)*	3. EST. END DATE *(mo,day,& yr)*	4. ACTION AGENCY *(EPA, State, Private Party)*	5. ESTIMATED COST	6. SPECIFY 311 OR OTHER ACTION; INDICATE THE MAGNITUDE OF THE WORK REQUIRED
				$	
				$	
				$	
				$	
				$	
				$	

B. LONG TERM STRATEGY *(On Site & Off-Site)*: List all long term solutions, e.g., excavation, removal, ground water monitoring wells, etc. See instructions for a list of Key Words for each of the actions to be used in the spaces below.

1. ACTION	2. EST. START DATE *(mo,day,& yr)*	3. EST. END DATE *(mo,day,& yr)*	4. ACTION AGENCY *(EPA, State, Private Party)*	5. ESTIMATED COST	6. SPECIFY 311 OR OTHER ACTION; INDICATE THE MAGNITUDE OF THE WORK REQUIRED
				$	
				$	
				$	
				$	
				$	
				$	

C. ESTIMATED MANHOURS AND COST BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL EST. MANHOURS FOR REMEDIAL ACTIVITIES	3. TOTAL EST. COST FOR REMEDIAL ACTIVITIES	1. ACTION AGENCY	2. TOTAL EST. MANHOURS FOR REMEDIAL ACTIVITIES	3. TOTAL EST. COST FOR REMEDIAL ACTIVITIES
a. EPA			b. STATE		
c. PRIVATE PARTIES			d. OTHER *(specify)*		

INTRODUCTION

The regulated unit came on-line in 1977. It is a settling/disposal pond with an areal extent of about 19.5 acres and a maximum depth of 8 feet. It is considered a RCRA unit due to the disposed material's low pH and the possible presence of lead. The unit is unlined.

In January 1977, a ground-water quality assessment program was established for the monitoring wells (8) adjacent to the pond. At this time analyses for total iron, total dissolved solids, chloride, and pH were begun. Nine additional wells were installed in October, 1978 and incorporated into the monitoring program. Preliminary results of the assessment indicated the impoundment was adversely affecting the ground water. During September 1979, all the monitoring wells were surveyed for elevation control and monthly measurements of ground water levels in the wells initiated. Hydraulic tests were conducted in October 1979, on all shallow wells to determine the hydraulic coefficients of the aquifer.

In July and August 1980, a french drain leachate collection system was installed around the north and east sides of the pond. An upgradient, or background, monitoring well was established in August 1981, as part of the RCRA program. The french drain system was extended to include the south and west sides in October-November 1981. An additional 8 wells were installed in July 1982, to monitor subsurface conditions on the west and south sides.

SITE HYDROGEOLOGY

Soils. The general stratigraphy beneath the site consists of about 15-20 feet of fine sand to silty or clayey sand underlain by some 50 feet of low permeability gray clay. Both of these units are probably alluvial and low terrace deposits of Pleistocene and Holocene age. Beneath the clay layer is another aquifer of fine sands. See Figures 2 and 3 for generalized cross sections and Figure 1 for their location. Also see Appendix A for available drilling logs.

A number of laboratory permeability tests were conducted on soil samples taken from test borings around the pond. The horizontal permeabilities in the sand deposit varied from 4.3 X 10^{-4} cm/sec to 6.2 X 10^{-7} cm/sec, with an average of 1.14 X 10^{-4} cm/sec. These values are typical of a silty sand. The vertical permeabilities for the sand deposit varied from 6.7 X 10^{-4} to 2.2 X 10^{-7} cm/sec with an average of 1.15 X 10^{-5} cm/sec. The vertical permeabilities of the underlying clay strata ranged from 2.5 X 10^{-8} cm/sec to 3.4 X 10^{-8} cm/sec. A permeability test was also conducted on the settled out materials in the bottom of the pond. This test showed permeabilities (3.5 X 10^{-5} cm/sec) slightly higher than the underlying sand. Table 1 lists the actual test results.

Bedrock. No bedrock investigations were conducted at the site. It would appear from regional data that a consolidated bedrock formation would occur at a fairly deep interval from the surface. For the purposes of this study, the gray clay underlying the site will be considered to form an impermeable barrier to the downward migration of constituents of concern. Analytic data from wells screened in this layer would tend to support this assumption.

Ground Water Regime. As mentioned previously there are two primary aquifers beneath the site: the one found in the alluvial sands above the 50 foot plus gray clay and the fine sand formation beneath this clay. The upper aquifer is not generally used for water supplies. The lower aquifer, however, is capable of a million gallons per day yield and is exploited by a number of wells in the area.

In the report area the alluvial aquifer generally occurs under unconfined or water table conditions; however there are known localized areas where the sand and gravel deposits are overlain by clay lenses which can produce artesian conditions. These are not thought to be present beneath the pond.

Ground-water flow before the impoundment was constructed was in a southeasterly direction. However releases from the pond have created a localized recharge mound which, prior to the installation of the french drain, could be measured in the surrounding monitoring wells.

The alluvial aquifer is recharged principally from rainfall; though some recharge results fom irrigation, streams, lakes, and upward leakage from deeper aquifers. There are several places on the facility property where the water table is at or near the land surface. This has resulted in intermittent marshes during heavy rainfall events.

The site has several creeks flowing through it and is close to several others. (See Figure 4.)

ASSESSMENT AND CORRECTIVE ACTION

Having recognized from the chemical analyses of water taken from the monitoring wells that the impoundment was affecting the alluvial aquifer, site management commissioned the installation of a french drain. The system was designed to consist of a continuous, gravity feed, 6-inch PVC pipe sloping at a rate of 3×10^{-3} feet/foot from the northwest corner towards the southeast and eventually running along all sides of the impoundment. (See Figures 5 and 6). Water collected by this system is first deposited in a sump at the southeast corner where it is subsequently pumped to another area of the site for treatment. The drain pipe varies from 6 to 9 feet beneath the ground surface and is surrounded by a graded envelope of gravel and sand. The average discharge rate for the combined system has been measured at about 60 gpm. Since its installati9n the system has handled an estimated 72 million gallons of contaminated water.

The company submitted an assessment report dated September 27, 1983 to the State outlining in part what they believe to be the results to date of their system. The relevant excerpts are found in Appendix C. There are a number of claims made in this report which do not appear to be supported by the accompanying data. The major areas will be discussed below on a point by point basis.

1. "The installation of the french drain has reversed the local ground-water flow."

The available data support the fact that the installation of the french drain has lowered by 1 to several feet the water levels in the wells close (within 100 feet or so) to it. E-2, which is greater than 150 feet from the drain does not show any affects from the dewatering. (See Table 2 for selected well distances.) Since the drain is essentially a passive dewatering operation its overall affect should be to lower the water table in its immediate area to a depth not less than that of its own. Being of a passive nature, one would not expect an affect on the water regime below the base of the drain. It is therefore difficult to accept the argument that water flowing in the 11-14 foot thick sand interval above the gray clay but below the bottom of the drain will in fact migrate up to the drain, much less reverse its direction.

2. "The ground-water flow configuration (determined frôm the analog model) in the alluvial aquifer shows that all ground waters that exit beneath the pond on all sides are captured by the french drain."

This model, shown in cross section in figure 15 of Appendix C, can only be based on 1 of 2 assumptions, neither of which is valid. The first would be that contaminated water escaping the pond itself will not affect the entire 12 foot interval between the bottom of the pond and the clay base, but will rather maintain itself right at the surface of the aquifer (note that the pond is 8 feet deep and that water leaking on the up-gradient side of the pond would have a travel distance of some 1250 feet to get to the down gradient side to allow it to flow into the 6-9 foot deep drain. Since the water in the pond will tend to be heavier than the water in the aquifer due to its high TDS content this is highly unlikely. The other assumption is that all water flowing from beneath the pond is intercepted by the drain as shown in the Appendix figure. This assumption has the water flowing against gravity. A situation that could only happen if there were a vacuum of sorts applied to the drain (i.e. *a* pump) or there is an impermeable wall at the drain extending from the surface to the gray clay. Since this is a passive system and no impermeable wall exists this theory isn't acceptable either.

3. It is stated that by contrasting 4 contour maps of TDS concentrations over 3 years it is apparent that there has been a vast improvement in the ground-water quality of the alluvial aquifer adjacent to the ponds. (See Figures 20-23 in Appendix C for the maps.) It is further stated that the most important conclusion that can be drawn from contrasting these 4 maps is that no further migration of leachate is

Test Boring Number	Sample Interval (feet)	Lithologic Description	Horizontal Permeability (cm/sec)	Horizontal Permeability (ft/day)	Vertical Permeability (cm/sec)	Vertical Permeability (ft/day)
*TH-1-75	0-1	Fine White Sand	- - - -	- - - -	1.3×10^{-4}	3.69×10^{-1}
*TH-2-75	0-2	Fine White Sand	- - - -	- - - -	2.1×10^{-4}	5.95×10^{-1}
•TH-3-75	0-2	Orange 4 Gray Sandy Clay	- - - -	- - - -	9.2×10^{-5}	2.61×10^{-1}
•TH-4-75	0-2	Orange & Gray Sandy Clay	- - - -	- - - -	5.1×10^{-6}	1.45×10^{-2}
B-1-75	34.5-36	Gray Silty Clay	- - - -	- - - -	3.4×10^{-8} 2.5×10^{-8}	9.6×10^{-5} 7.09X10-5
B-1-79	0-2	Fine Tan Sand	- - - -	- - - -	2.2×10^{-7}	6.23×10^{-4}
B-1-79	7.5-9.5	Fine Tan Sand	2.3×10^{-5}	6.52×10^{-2}	1.3×10^{-6}	3.69×10^{-3}
B-I-79	12-13.5	Fine Tan Sand	- - - -	- - - -	6.7×10^{-4}	1.90
B-6-79	10.5-12	Gray Sand	- - - -	- - - -	4.1×10^{-7}	1.16×10^{-3}
B-11-79	4.5-6	Silty Clay Sand	6.2×10^{-7}	1.76×10^{-3}	2.1×10^{-6}	5.95×10^{-3}
B-11-79	9-10.5	Fine Brown Silty Sand	- - - -	- - - -	4.3×10^{-7}	1.22X10-3
B-14-79	3-4.5	Fine Brown Silty Sand	2.1×10^{-6}	5.95×10^{-3}	6.2×10^{-7}	1.76×10^{-3}
B-14-79	12-13.5	Gray Sand	4.3×10^{-4}	1.22	2.7×10^{-5} 1.5×10^{-4}	7.65×10^{-2} 4.25×10^{-1}
B-1-78	0-2	Stratified Iron Oxide Tailings	- - - -	- - - -	3.1×10^{-5}	8.79×10^{-2}

Table 1. Summary of Laboratory Permeability Tests Conducted on Soils and Sediment From the Pond Area.

Monitor Well	Saturated Thickness(ft)	Elevation of Water Table (ft) 10-79	Distance from Waste Pond(ft)	Transmissivity (gpd/ft)	Horizontal Permeability ft/day, (cm/sec)
North-1	10.12	17.35	12E	74.80	.99 (3.49 $\times 10^{-4}$)
Nortn-2	12.66	19.49	130	1.41	.01 (5.2 $\times 10^{-6}$)
North-3	13.33	19.33	153	11.20	.11 (3.88 X 10-5)
North-4	13.90	19.65	110	22.44	.22 (7.64 X 10^{-5})
North-SH	10.75	19.47	125	115.0	1.43 (5.06 X 10^{-4})
Nortr,-E	9.00	17.35	no	74.80	1.11 (3.9 X 10^{-4})
Cast-1	10.98	17.83	85	2.00	.02 (8.61 $\times 10^{-6}$)
East-2	10.25	16.34	232	3.45	.05 (1.59 X 10^{-5})
East-3	11.86	17.67	93	4.12	.05 (1.64 X 10^{-5})
East-4	10.90	17.48	104	3.74	.05 (1.62 X 10^{-5})
East-SH	8.11	17.72	85	128.0	2.11 (7.45 X 10^{-4})
South-SH	9.4	18.72	155	121.0	1.72 (6.09 X 10^{-4})
West-SH	12.73	20.13	105	2.09	.02 (7.77 X 10^{-6})
MEAN				43.40	.61 (2.1 X 10^{-4})

Table 2. **Summary** of **Transmissivity** and Field Permeability **Data;** Plus **Dis**[illegible] of Wells From the Pond.

This statement, especially the part that no further migration is taking place, needs some clarification. First, there is no attempt here to explain why 3 of the wells continue to show increasing, highly elevated TDS readings-- each on a different side of the pond. (See Table 3 below.) And while it is true that the majority of wells are showing some improvement, 13 of the 21 shallow wells still have pH's in the 3 and 4 ranges compared to 6 as a background. Recovery, if occurring, does not appear to be happening very quickly.

TABLE 3. TDS and pH Readings For Selected Wells Over Time.

Well	pH		TDS	
	1/81	1/83	1/81	1/83
WS	4.2	3.9	1010	8770
El	4 .7	3.8	5040	12560
	7/82	10/83	7/82	10/83
N5	3.4	3.4	12120	20000

An additional point also needs to be made here concerning the impact the site's sampling technique may have on their result*. The facility evacuates and samples its wells using a PVC bailer with a bottom ball check valve. They stated during conversations with them that the water is always taken from the top of the column. The amount of water removed varies from evacuation to dryness to less than a casing volume. In the latter case this may not be enough to ensure that formation water is being sampled. Furthermore water found in these wells may be stratified with the pollutant plume tending to be more towards the bottom of the well. This is especially possible since it can be assumed that the french drain is intercepting the top portion of the more highly contaminated waters that are part of the pond's mound.

4. "Because the principal aquifer in the area is the [lower one], the calculation of travel time for fluids in the pond to migrate through the 43-51 foot layer of clay is important. ...Based upon the average velocity it would take a minimum of about 389 years for the fluids in the pond to travel vertically through the 43 feet (minimum thickness) of gray clay..."

The above conclusion is based on a straight application of Darcey's Law using permeability data obtained from boring samples. In general this is acceptable. However, in this case the fluid of concern is highly acidic and many field and laboratory tests have demonstrated that an acid environment is very detrimental to a clay's impermeability characteristics. This was not considered in the report and should be further investigated before the estimate of some 400 years to break through is accepted.

5. "Using the same velocity equation as above, the period of time for seepage fluids from the pond to travel horizontally through the alluvial aquifer to the nearest discharge point (Middle Fork ___ River) can be estimated. Assuming an average horizontal permeability of 6.0×10^{-1} ft/day for the alluvial aquifer, an average gradient of .005 and a sand porosity of .25%, the average fluid velocity would be .012 ft/day. This velocity would indicate that a minimum of approximately 457 years would be required for the seepage fluids to travel the 2000 feet distance to the [river]."

While this may or may not be a good estimate of travel time for the pollutant plume, it does not satisfy 265.93(d)(4) as to defining the extent of migration. Most of the present monitoring wells are within 150 feet of the pond and a majority of them are showing below normal PH. This would imply continuing impact from the pond as well as a fluid velocity considerably higher than .012 ft/day and it is unlikely that this impact would abruptly end at these wells-- the plume must extend somewhat further out. Well E-2, which is over 200 feet east and about even with the pond's north/south centerline, is a good example of the type of demonstration that is needed. The concentration values of constituents of interest in this well show that it is largely unaffected by the site activities. However, the original flow direction of the ground water beneath the pond was southeast not east so it very well may be that E-2 is not positioned to intercept an extended migration. More wells are needed to its south to be able to completely demonstrate that no further migration is occurring.

6. "Forward Monitoring Program"

The findings stated in the initial paragraphs of this section have been questioned above so there is no need to belabor the point. There are 4 recommended monitoring changes that were made to the State and have been implemented.

The first two involve changing water level determination frequencies from weekly to quarterly and changing drain discharge measurement frequencies from weekly to monthly. These appear very reasonable.

The third recommendation however, involves the reduction of the number of wells sampled for hazardous constituents from 21 to 9. While the argument that quarterly sampling 21 wells at this stage of the program may be valid, it is not clear that the wells proposed to remain in the program are the ones that should be there. Table 4 shows the last sampling results for all the wells with an asterisk indicating which wells are proposed to remain in the program. Two things are readily apparent from examination of this table. The first is that the site has picked the least contaminated wells on each side for monitoring. The second is that it has chosen to not monitor on a quarterly basis those wells most likely to be down gradient of the general ground water flow, i.e. southeast to south (S-2, SE, E-5, E-1). In addition their designated up gradient well (NW) has been eliminated from the quarterly monitoring program. The State should definitely reconsider allowing the site to implement these proposals.

The fourth recommendation, which proposes that all the monitoring wells be sampled once a year is acceptable.

Table 4. Analytic Results of Monitoring Wells 10/6/83.

Well	Chloride mg/l	PH Std. Units	TDS mg/1
ES*	20	4.9	190
ED	5.6	5.6	57
NS*	420	3.9	670
ND	10	6.0	60
SS*	630	4.2	840
SD	7.5	5.9	45
WS 1/	6800	3.3	10400
WD 1/	6.6	6.0	89
El	12030	3.3	17000
E2*	12	6.0	80
E3	30	5.6	93
E4	20	6 .0	98
E5	210	3.7	330
NE	13	5.8	59
NW	15	6.3	51
SE	290	3.9	520
SW*	12	5. 3	44
S1*	90	4 .4	130
S2	590	3.8	770
W1*	3790	4 .0	5900
N1	10	5.8	63
N2*	230	4 .4	330
N3*	140	5.5	200
N4	2180	4.2	3100
N5	13310	3.4	20000

SAMPLING PROCEDURES

A sampling and analysis plan was available for inspection at the site. A copy of this plan, with amendments, is included as Appendix D of this history. The plan was not followed by the technicians taking the samples.

The sampling and analysis plan as submitted to EPA is not adequate for the following reasons.

1. well evacuation. The plan calls for 3 well volumes to be removed, if by pump, and 1 to be removed if by bailer or, in the presence of a low permeability formation, evacuation to dryness. The provision to remove only one casing volume is not sufficient. Furthermore in the field the technicians stated it would take far more bailers to evacuate 1 casing volume from the deep wells than they were willing to pull. This casts serious doubts on whether the site is sampling

Table 5. January 23, 1984 Split Sampling Results.

	Cl^-		pH		Iron		Lead		TOC		TOX	
Well	Site	EPA	Site	EPA	Site	EPA	Site	EPA*	Site	EPA	Site*	EPA*
ES	27	25.3	4.2	3.32	1.4	18.3	<.05	53	-	-	_	-
ED	5.2	4.02	5.6	4.69	.56	.98	<.05	10	_	-	-	-
NS	380	350	4.0	3.70	100	132	<.05	4.9	_	-	-	-
ND	6.3	5.28	5.9	5.7	2.2	4.05	<.05	7.9	-	-	-	-
SS	220	234	3.8	3.42	29	78.7	<.05	<1.0	-	-	-	-
SD	5.0	4.27	5.3	5.05	.66	1.07	<.05	8.9	_	-	-	-
E2	9.6	8.04	5.9	5.32	.07	9.05	<.05	<1.0	2.1	10.1	<10	32
NW	7.2	6.53	6.0	5.85	12	29.3	<.05	22	12	9.96	<10	44
SW	11	10.1	4.8	4.60	.10	1.0	<.05	<1.0	_	-	-	-
S1	49	47.2	4.0	3.80	.93	1.76	<.05	6.2	<1.0	5.96	11	57
W1	3300	3230	3.8	3.5	1200	1110	<.05	21	-	-	-	-
N2	350	356	5.5	4.88	47	89.4	<.05	2.0	_	-	-	-
N3	170	177	5.2	4.1	28	61.0	<.05	<1.0	1.2	7.84	11	34

* Reported in ug/l. All other analyte data in mg/l.

Table 6. Dates of Analysis for Each Parameter.

Parameter	EPA	SITE
TOC	2/9	2/6
TOX	2/28	-
PH	1/25	1/23
Chloride	1/27	1/24
Iron	1/30	2/1
Lead	1/30	2/1

fresh formation water or stagnant.

2. Appropriateness of Bailer. So long as the site was sampling only inorganics the use of a PVC bailer could not be challenged. However, they are now, as part of their sampling program, looking for TOC and TOX. This calls into question the use of an instrument that has been shown to be able to contribute through adsorption, absorption, and desorption biases in organic testing.

3. Sampling Handling. The plan calls for site filtering of samples for lead and iron analysis. This has, according to conversations with site personnel and the contractor, never been done. Furthermore there are no container or preservative comments on what needs to be done for TOX and TOC samples. Cleaning procedures are probably adequate for gross metal and salt analysis but a deionized water wash of a braided synthetic cord and a PVC bailer are not sufficient to ensure against possible cross contamination from organics (TOC & TOX).

4. Analytical Methods. Methods are specified in the plan by reference to several Standard Methods published by EPA. Since these references provide several different techniques for analysis, failure to specify which makes it difficult to determine, unless very good records are kept, what exact method was employed.

5. Chain of Custody. The Chain of Custody statement, which merely says chain of custody will be on standard company forms, does not give sufficient specificity to allow for a determination of adequacy.

SPLIT SAMPLING AND CHEMISTRY

Results from the January 23, 1984 split sampling are shown in Table 5 and the dates of analysis for the individual parameters in Table 6. The site utilizes a unique sample preparation method for the chloride, iron, and lead analytes. This procedure calls for allowing the samples, which are collected in 1/2 gallon plastic bottles, to sit overnight before decanting the supernatant from the settled out solids. The supernatant, which is intended for metals analysis, is then fixed without filtering with nitric acid.

As can be seen from Table 5, the iron and pH results from the different labs are substantially different, while the chloride and lead results are fairly close. In a series of conversations with the site's laboratory it was determined by them, in response to the results, that samples taken in a subsequent April sampling had radically different (lower) pH's after sitting for 3 weeks than when tested on the day of their withdrawal. If the assumption is made that this pH change begins almost immediately then the lower pH in the EPA samples is due to chemical changes that occurred in the two days prior to their testing. Since the EPA lab was instructed to use the site's handling method, the first opportunity to fix the water for future metals analysis would happen on the fourth day after their withdrawal. This could mean that any iron that would have been tied up on the suspended soil or as hydrolysis complexes at the time of withdrawal would begin to go back into solution as the pH fell-- hence explaining the higher iron levels in the EPA results. This mechanism would also affect the lead levels but

would not apply to the chlorides. However, the total lead levels in the samples appear to be so low that their overall change is not readily apparent.

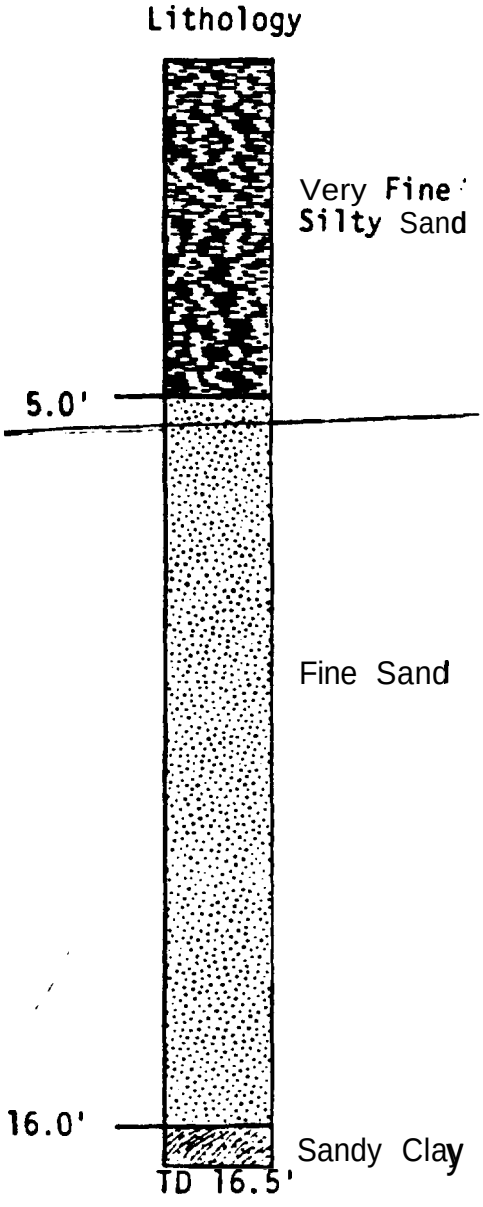
The above explanation for the differences in the metals and pH but not the salt is only an educated guess as the site does not test for a sufficient number of analytes to determine total reactions.

Both the TOC and TOX findings are also substantially different. The reasons for this are not apparent. The site does not handle organics. However, the generally higher levels found in the EPA data are not sufficiently high enough to indicate gross contamination. Whether some organic contaminant is somehow getting into the pond and subsequently out of it can not currently be ascertained because the site has never tested their upgradient well for these parameters.

APPENDIX A

DRILLIHG LOGS

WELL E-5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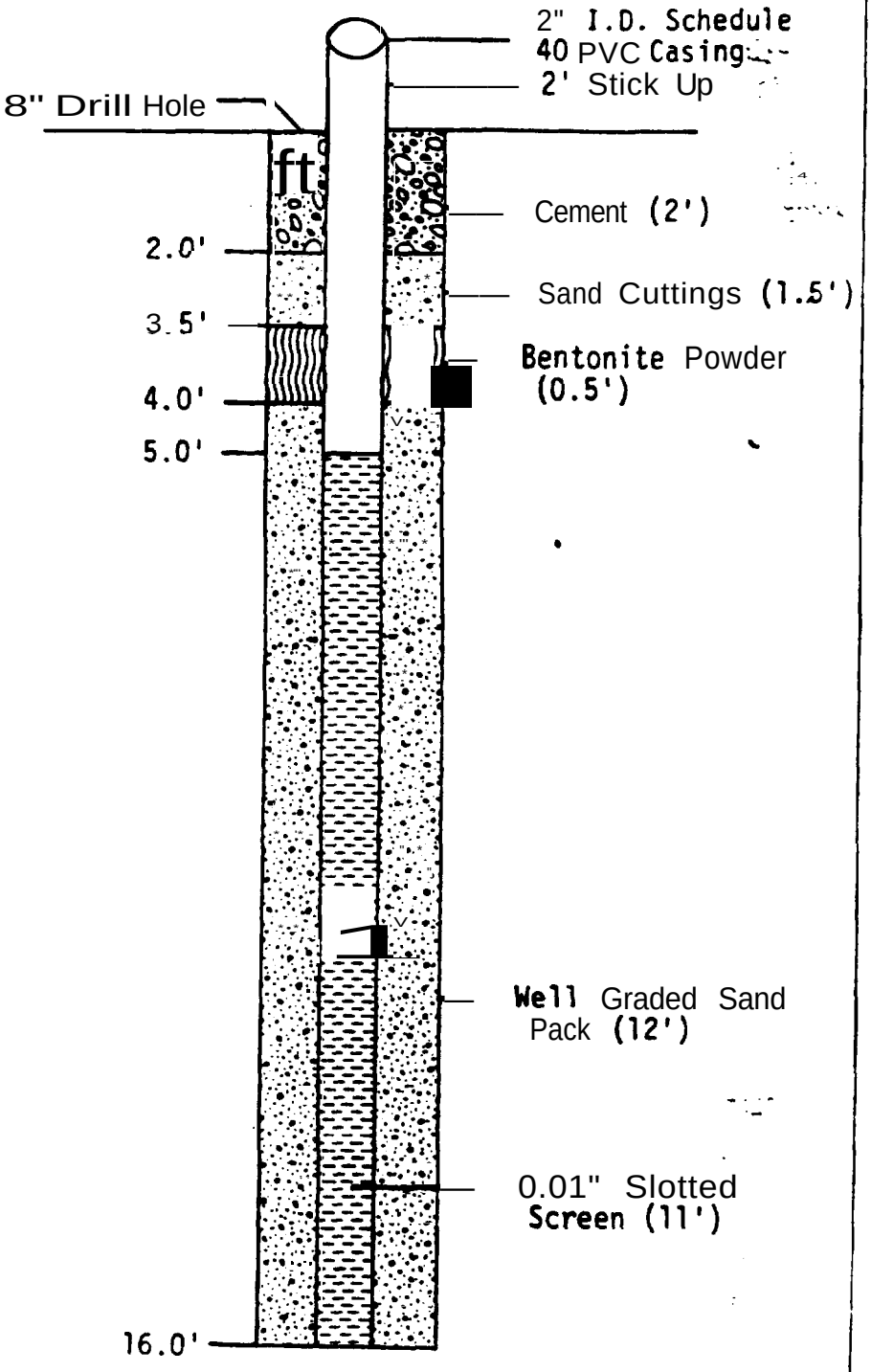
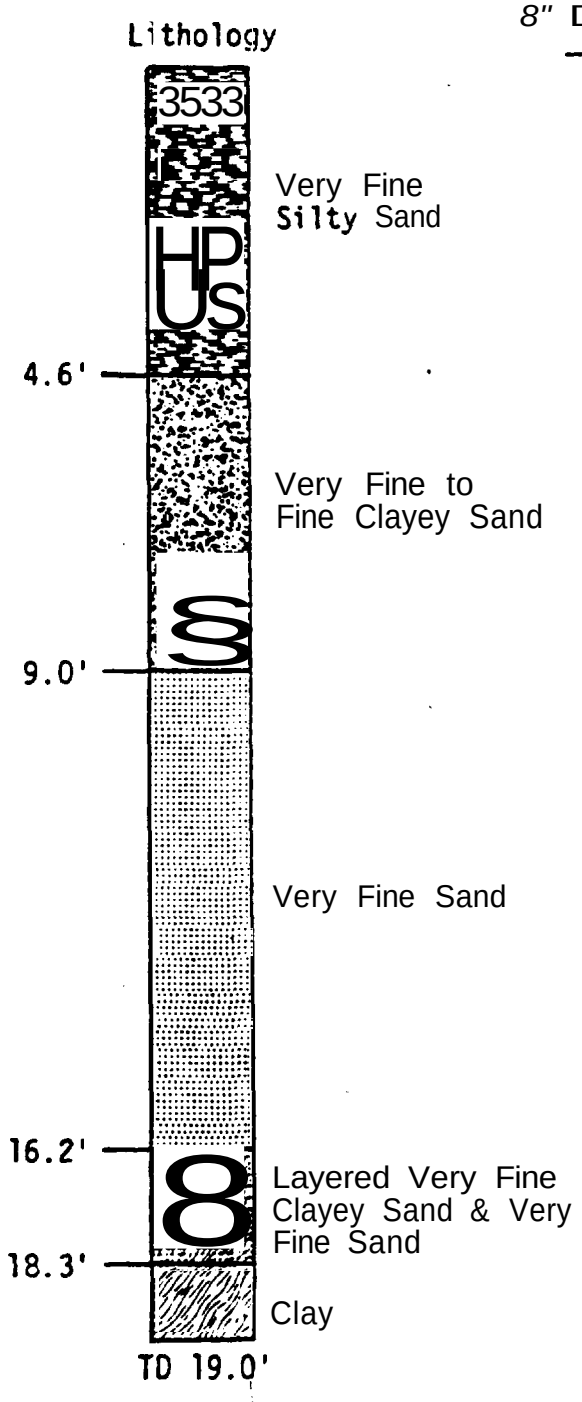
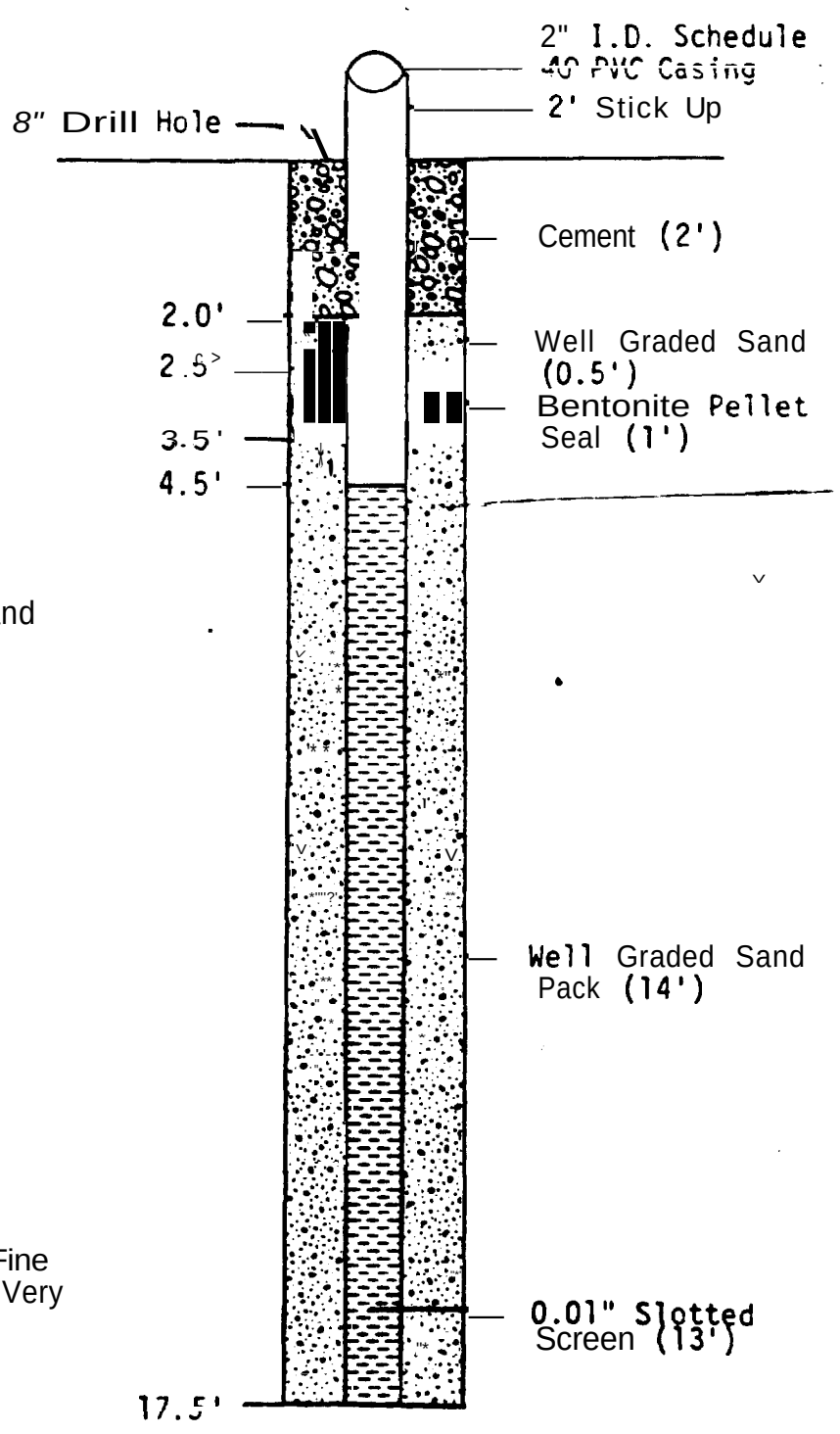
Very Fine Silty Sand
5.0'
Fine Sand
16.0'
Sandy Clay
TD 16.5'

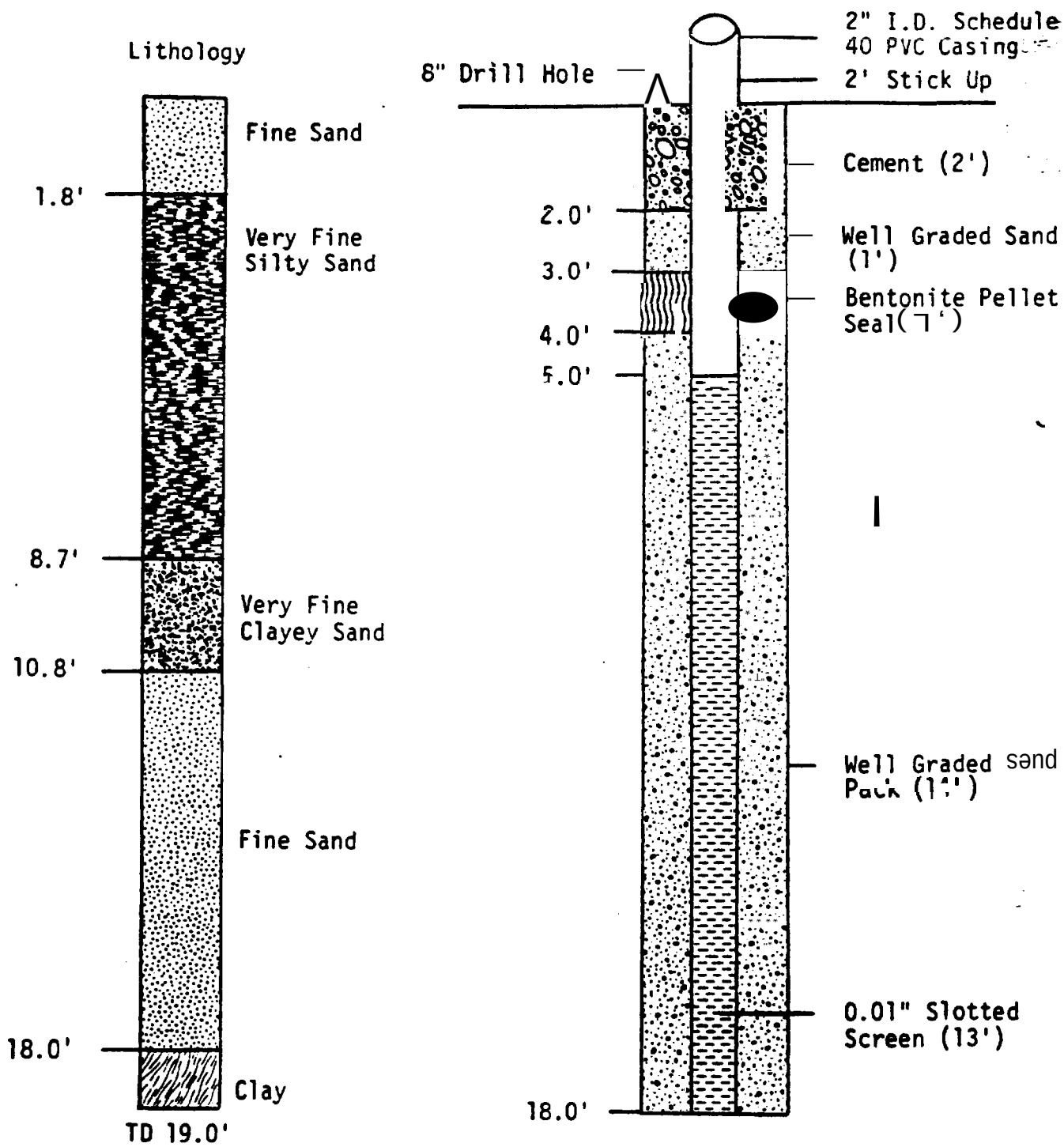

2" I.D. Schedule 40 PVC Casing
2' Stick Up
8" Drill Hole
Cement (2')
2.0'
Sand Cuttings (1.5')
3.5'
Bentonite Powder (0.5')
4.0'
5.0'
Well Graded Sand Pack (12')
0.01" Slotted Screen (11')
16.0'

WELL W2


Lithology
3533
Very Fine
Silty Sand
4.6'
Very Fine to
Fine Clayey Sand
9.0'
Very Fine Sand
16.2'
Layered Very Fine
Clayey Sand & Very
Fine Sand
18.3'
Clay
TD 19.0'

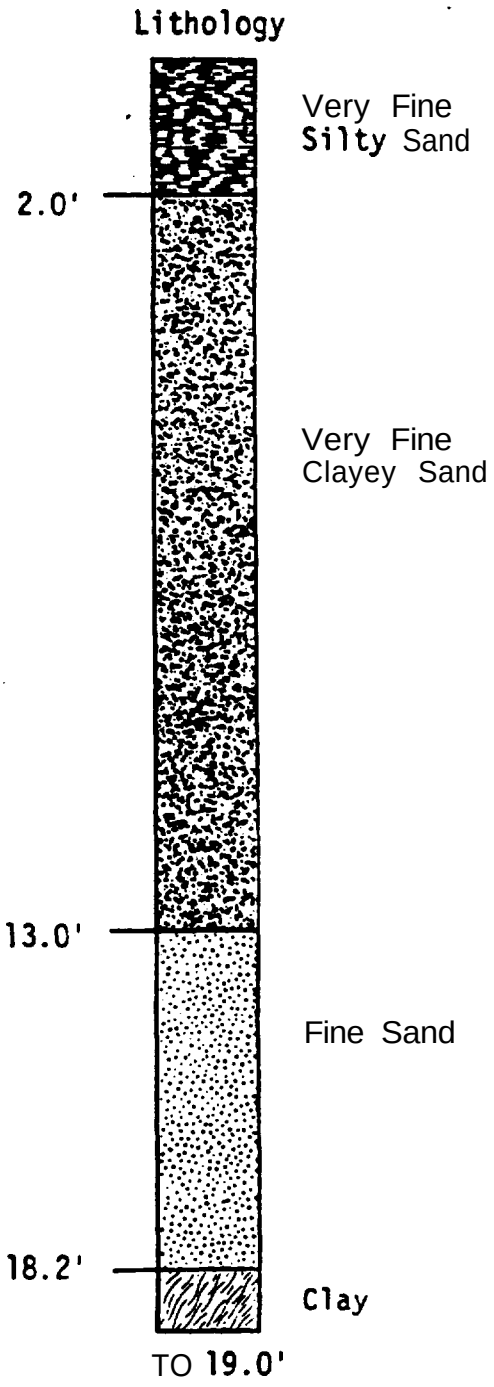

2" I.D. Schedule
40 PVC Casing
2' Stick Up
8" Drill Hole
Cement (2')
2.0'
Well Graded Sand
(0.5')
Bentonite Pellet
Seal (1')
3.5'
4.5'
Well Graded Sand
Pack (14')
0.01" Slotted
Screen (13')
17.5'

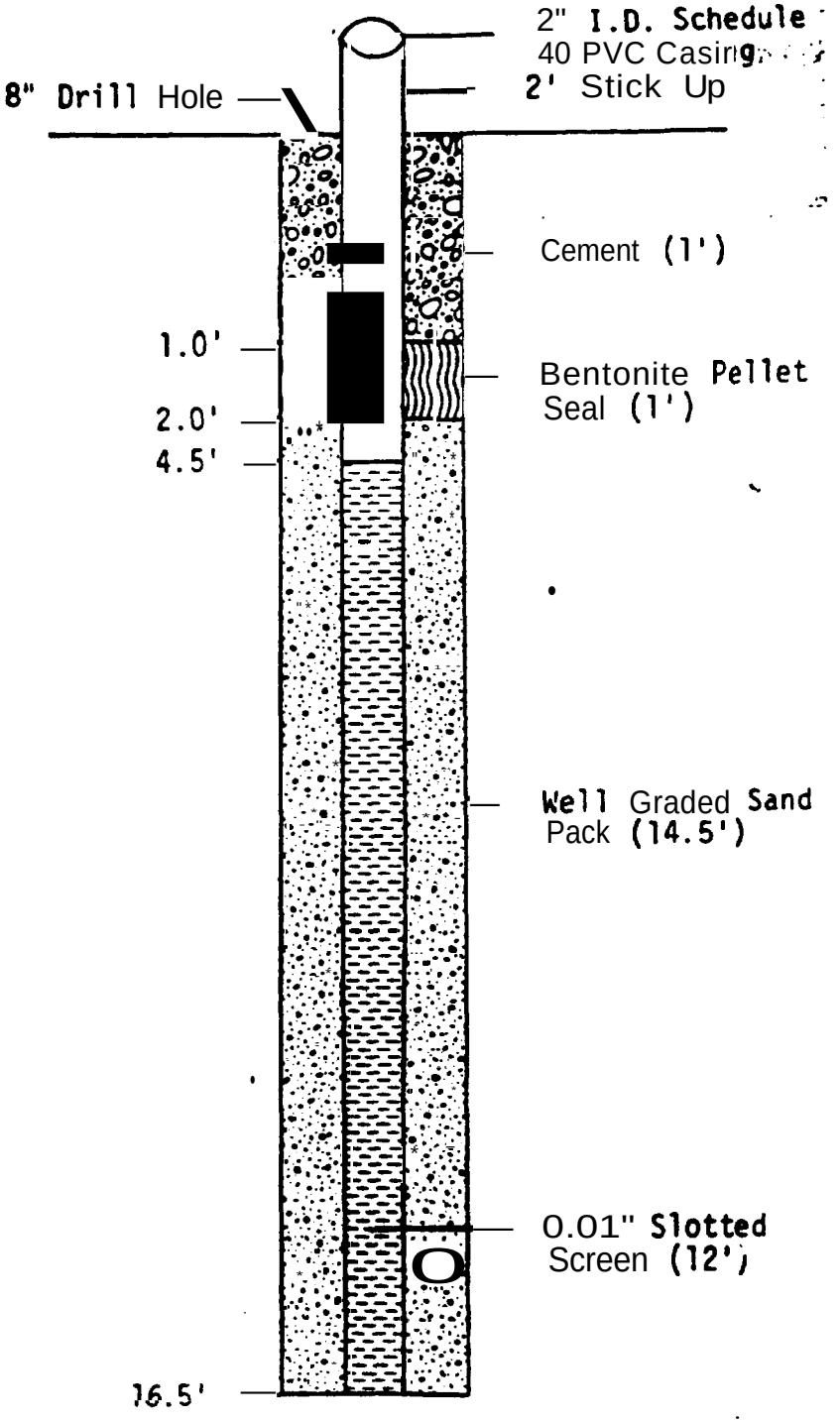
WELL SE



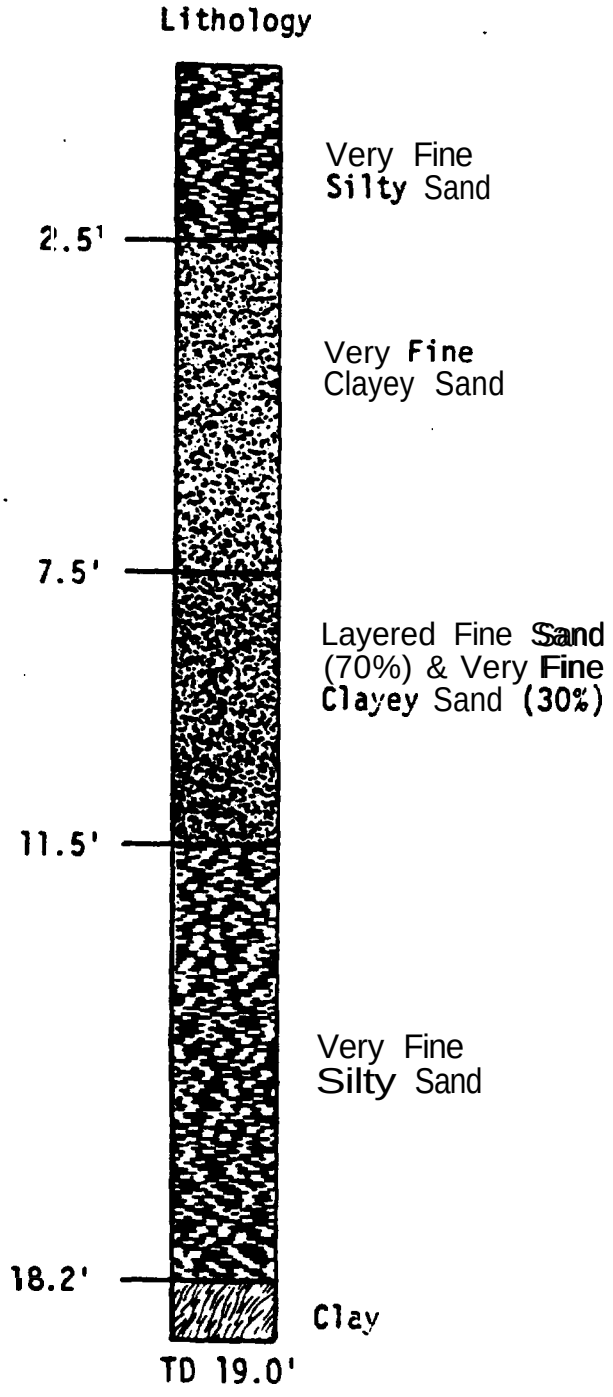
Lithology
Fine Sand
1.8'
Very Fine
Silty Sand
8.7'
Very Fine
Clayey Sand
10.8'
Fine Sand
18.0'
Clay
TD 19.0'
8" Drill Hole
2" I.D. Schedule
40 PVC Casing
2' Stick Up
Cement (2')
2.0'
Well Graded Sand
(1')
3.0'
Bentonite Pellet
Seal(1')
4.0'
5.0'
Well Graded sand
Pack (1')
0.01" Slotted
Screen (13')
18.0'

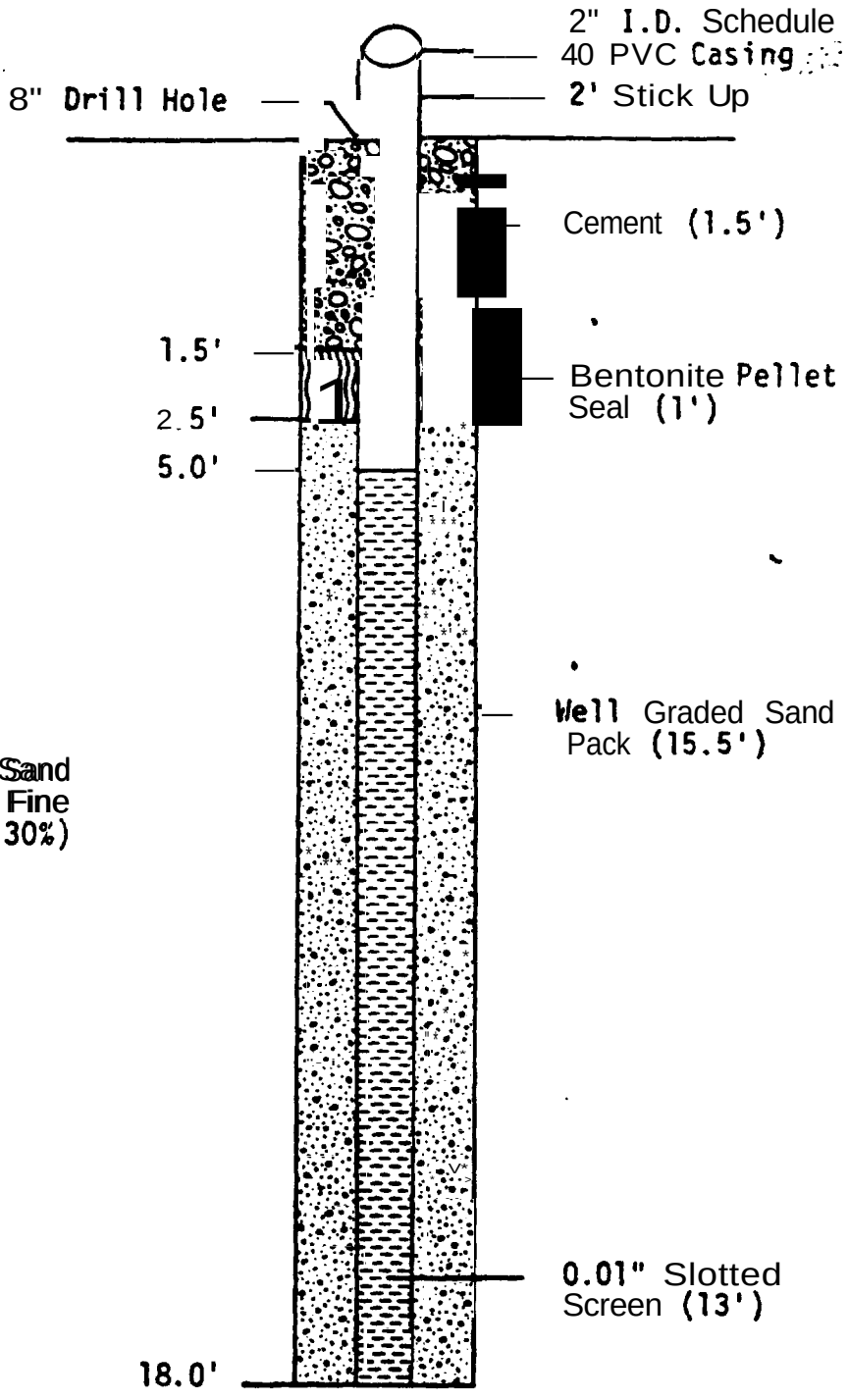
WELL N5


Lithology
Very Fine Silty Sand
2.0'
Very Fine Clayey Sand
13.0'
Fine Sand
18.2'
Clay
TO 19.0'

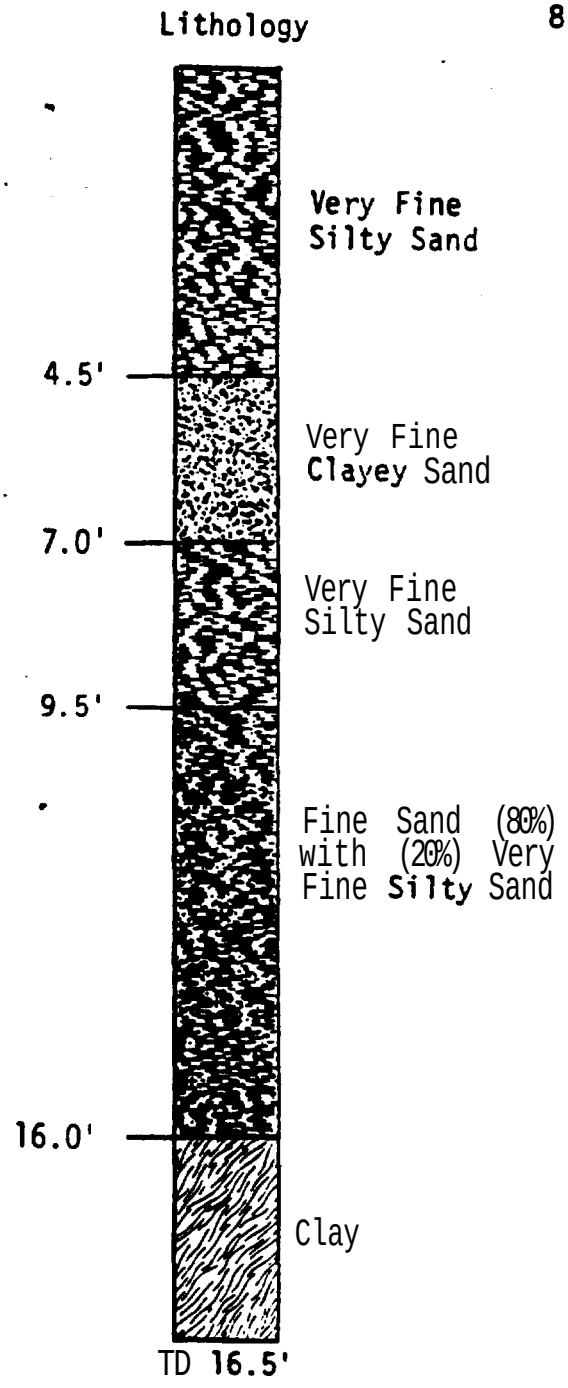

2" I.D. Schedule 40 PVC Casing
2' Stick Up
8" Drill Hole
Cement (1')
1.0'
Bentonite Pellet Seal (1')
2.0'
4.5'
Well Graded Sand Pack (14.5')
0.01" Slotted Screen (12')
16.5'

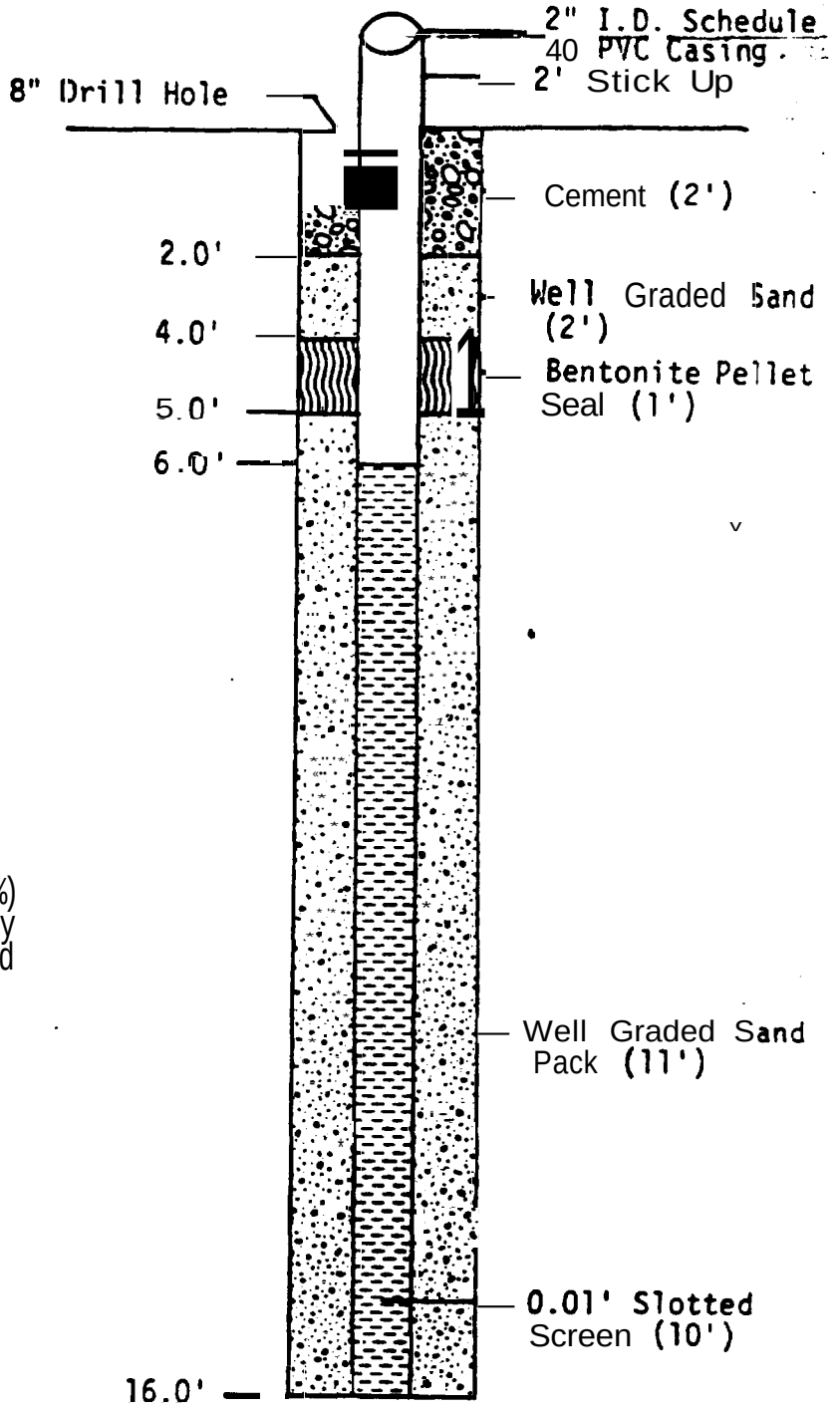
WELL S-2


Lithology
Very Fine Silty Sand
2.5'
Very Fine Clayey Sand
7.5'
Layered Fine Sand (70%) & Very Fine Clayey Sand (30%)
11.5'
Very Fine Silty Sand
18.2'
Clay
TD 19.0'

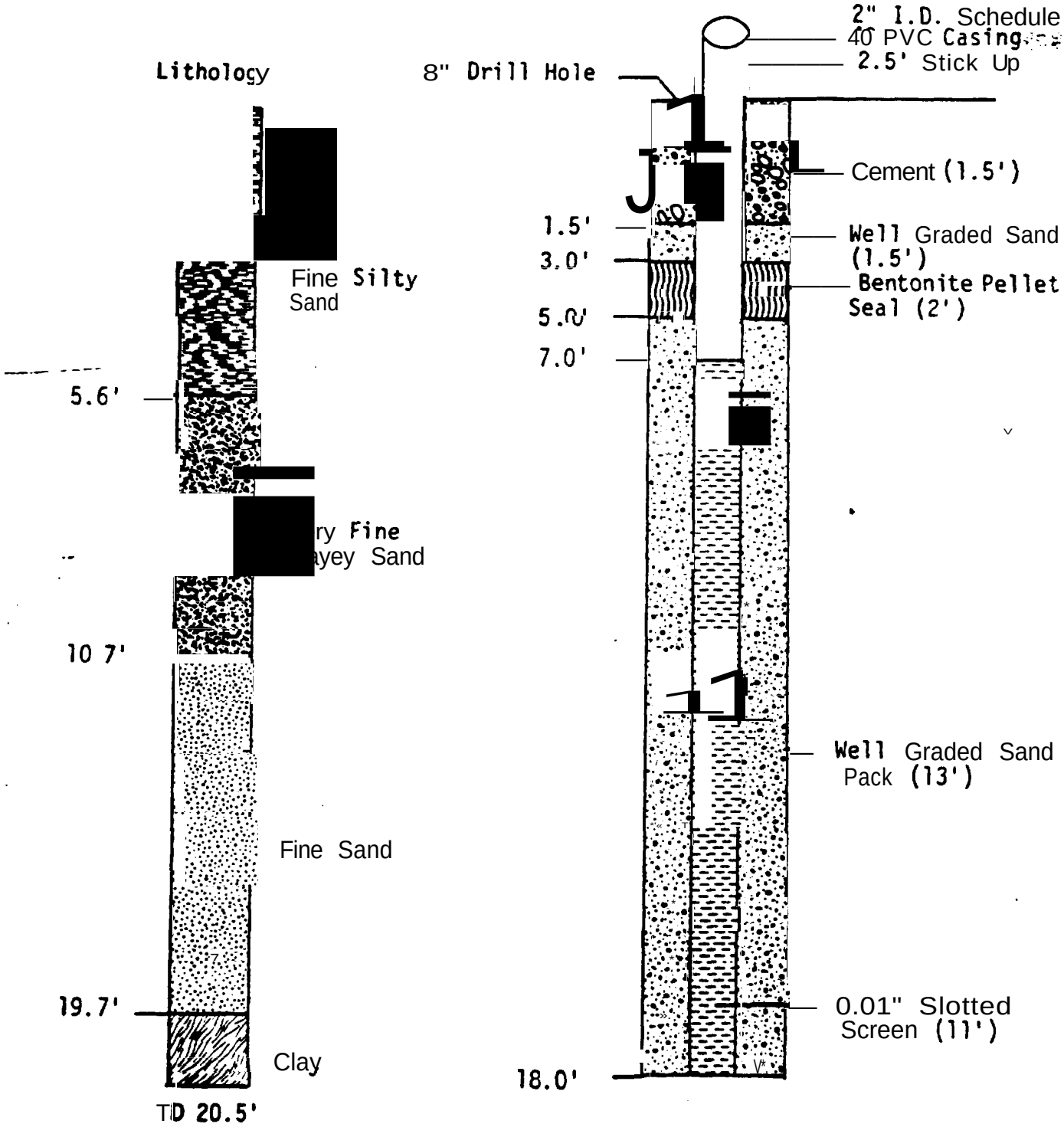

2" I.D. Schedule 40 PVC Casing
8" Drill Hole
2' Stick Up
Cement (1.5')
1.5'
Bentonite Pellet Seal (1')
2.5'
5.0'
Well Graded Sand Pack (15.5')
0.01" Slotted Screen (13')
18.0'

WELL SW

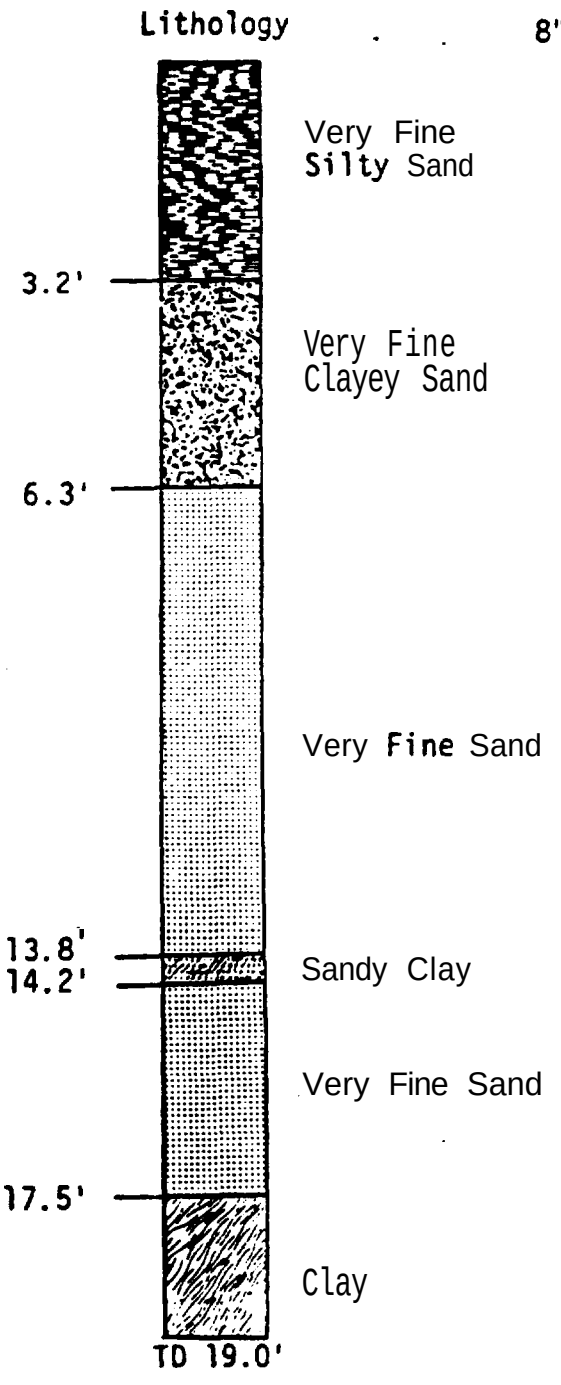

Lithology
Very Fine Silty Sand
4.5'
Very Fine Clayey Sand
7.0'
Very Fine Silty Sand
9.5'
Fine Sand (80%) with (20%) Very Fine Silty Sand
16.0'
Clay
TD 16.5'

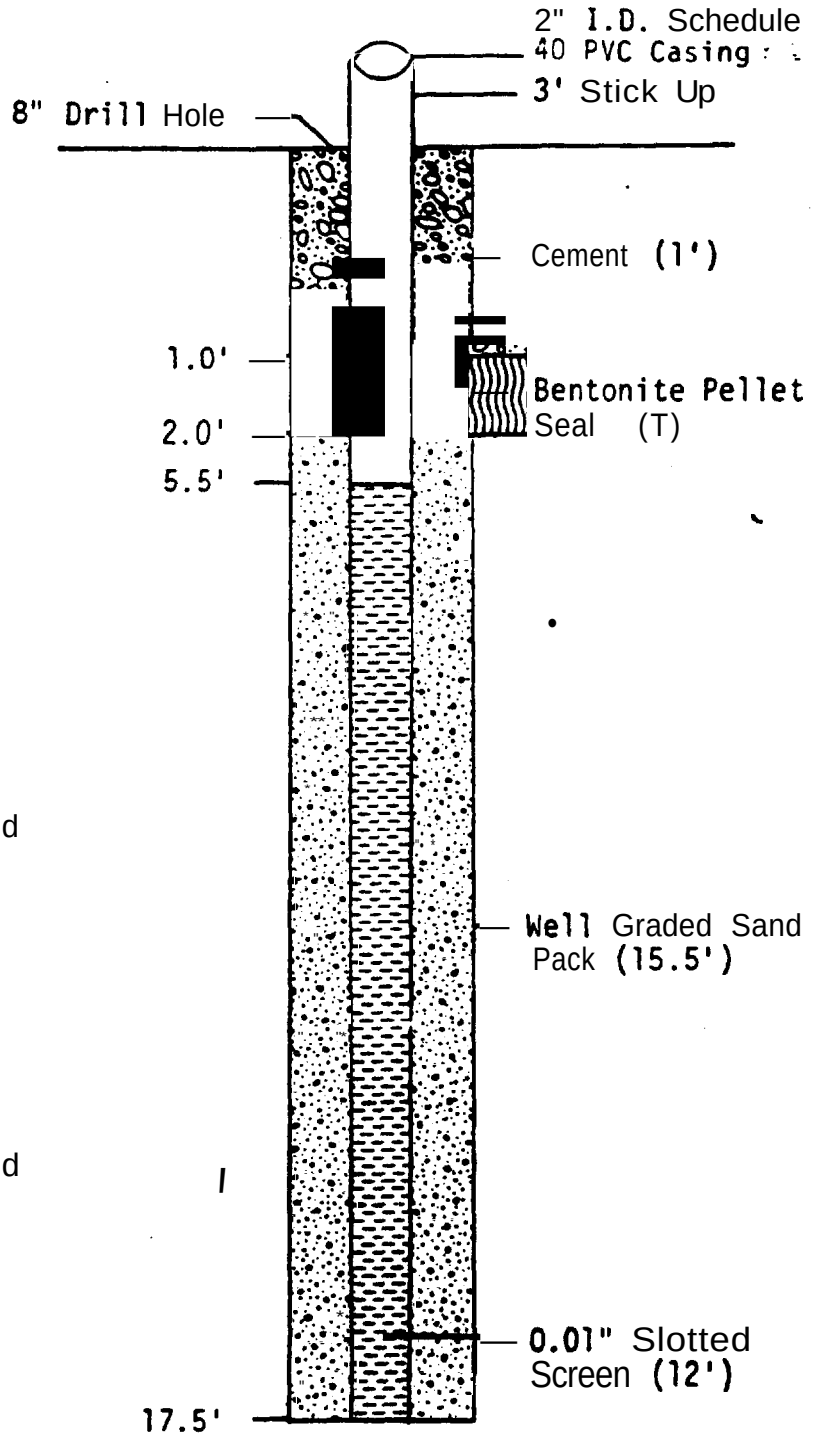

2" I.D. Schedule 40 PVC Casing
2' Stick Up
8" Drill Hole
Cement (2')
2.0'
Well Graded Sand (2')
4.0'
Bentonite Pellet Seal (1')
5.0'
6.0'
Well Graded Sand Pack (11')
0.01' Slotted Screen (10')
16.0'

WELL S-1


Lithology
Fine Silty Sand
5.6'
ry Fine
ayey Sand
10 7'
Fine Sand
19.7'
Clay
TD 20.5'
8" Drill Hole
2" I.D. Schedule 40 PVC Casing
2.5' Stick Up
Cement (1.5')
1.5'
3.0'
5.0'
7.0'
Well Graded Sand (1.5')
Bentonite Pellet Seal (2')
Well Graded Sand Pack (13')
0.01" Slotted Screen (11')
18.0'

WELL W1


Lithology
Very Fine Silty Sand
3.2'
Very Fine Clayey Sand
6.3'
Very Fine Sand
13.8'
14.2'
Sandy Clay
Very Fine Sand
17.5'
Clay
TD 19.0'


2" I.D. Schedule 40 PVC Casing
3' Stick Up
8" Drill Hole
Cement (1')
1.0'
Bentonite Pellet Seal (T)
2.0'
5.5'
Well Graded Sand Pack (15.5')
0.01" Slotted Screen (12')
17.5'

APPENDIX B

CHEMICAL ANALYSES

Well
East Shallow

Parameter	Chloride rag/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
Date							
1/23/84	27	4.2	—	1.4	<.05	—	-
10/6/83	20	4.9	190	1.5	0.12	-	-
7/6/83	43	4.0	140	5.0	<.05	-	-
1/6/83	46	4.2	170	2.2	0.21	-	-
1/5/83	54	4.6	160	4.5	0.09	-	-
10/7/82	22	5.4	130	.29	0.37	-	-
7/29/82	51	4.6	160	.94	0.05	-	-
1/6/82	80	4.5	140	14	-	-	-
./7/82	130	4.3	240	34	-	-	-
.0/6/81	73	5.4	150	8.8	-	-	-
7/2/81	310	3.9	500	110	-	-	-
3/6/81	740	4.0	1130	290	-	-	-
/9/81	1000	4.0	1880	410	-	-	-
0/7/80	-	-	-	-	-	-	-
/8/80	-	-	-	-	-	-	-
/1/80	9100	2.8	14000	3400	-	-	-
/3/80	7950	3.2	11480	2800	-	-	-
0/9/79	7200	3.1	10200	2500	-	-	-
/11/79	6900	2.8	10000	2700	-	-	-
/6/79	5100	3.0	7230	2100	-	-	-

Well
East Deep

'arameter	Chloride mg/l	pH Std. Units	TDS mg./l	Iron mg./l	Lead mg./l	TOC mg./l	Tux ug/l
ate							
/23/84	5.2	5.6	—	.56	<.05	-	-
0/6/83	5.6	5.6	57	.09	<.05	-	-
X6/83	16	5.0	59	3.7	<.05	-	-
X6X83	4.3	5.5	49	.88	<.05	-	-
/5/83	9.5	5.7	39	1.4	<.05	-	-
0/7/82	7.0	5.2	38	.42	<.05	-	-
/29/82	5.9	5.6	48	.88	<.01	-	-
X6X82	5.0	5.3	24	1.1	-	-	-
X7/82	7.0	5.2	60	1.4	-	-	-
0/6/81	8.0	5.2	46	.45	-	-	-
X2X81	4.7	5.3	55	.74	-	-	-
X6X81	6.3	5.8	41	.62	-	-	-
/9/81	6.2	6.3	65	1.5	-	-	-
)/7/80	17	4.0	54	.22	-	-	-
/8/80	-	-	-	-	-	-	-
/1/80	48	3.7	130	5.7	-	-	-
/3/80	26	4.6	79	5.4	-	-	-
)/9/79	7.5	6.6	39	.82	-	-	-
/11/79	39	4.6	93	13	-	-	-
/6/79	19	5.6	57	4.6	-	-	-

Well
North Shallow

Parameter	Chloride mg/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TUX ug/1
Date							
1/23/84	380	4.0	-	100	<.05	-	-
.0/6/83	420	3.9	670	110	<.05	-	-
'/6/83	150	3.6	220	9.6	<.05	-	-
1/6/83	110	3.9	140	10	<.05	-	-
75/83	220	4.2	260	32	<.05	-	-
0/7/82	1100	4.2	1500	320	<.05	-	-
729/82	550	3.4	700	73	<.01	-	-
/6/82	420	3.5	510	120	-	-	-
/7/82	1240	3.2	1500	320	-	-	-
0/6/81	1280	4.0	1750	460	-	-	-
/2/81	790	4.5	1160	320	-	-	-
/6/81	830	3.6	1270	370	-	-	-
/9/81	1420	3.9	2820	560	-	-	-
0/7/80	1260	2.9	2050	280	-	-	-
/8/80	3480	3.0	5430	1400	-	-	-
/1/80	2900	2.9	4600	1200	-	-	-
/3/80	2590	3.7	3800	1100	-	-	-
0/9/79	2700	3.6	3800	1100	-	-	-
/11/79	2300	3.6	3300	1100	-	-	-
/6/79	1800	4.2	2250	760	-	-	-

Well
North Deep

'arameter	Chloride mg/1	pH Std. Units	IDS my/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
ate							
/23/84	6.3	5.9	-	2.2	<.05	-	-
0/6/83	10	6.0	60	.01	<.05	-	-
/6/83	6.5	5.8	85	4.3	<.05	-	-
/6/83	7.2	5.9	54	4.0	<.05	-	-
/5/83	6.6	6.3	36	.026	<.05	-	-
0/7/82	5.6	5.9	55	1.4	<.05	-	-
729/82	8.0	6.0	62	2.9	<.01	-	-
/6/82	5.0	5.9	42	2.2	-	-	-
/7/82	12.0	5.8	37	1.6	-	-	-
0/6/81	6.8	5.7	38	0.28	-	-	-
/2/81	7.4	5.4	73	4.5	-	-	-
/6/81	5.8	6.3	56	4.0	-	-	-
/9/81	10	6.6	83	8.5	-	-	-
0/7/80	17	5.8	57	0.70	-	-	-
/8/80	9.4	6.3	77	9.2	-	-	-
/1/80	45	4.9	120	6.2	-	-	-
/3/80	21	6.5	76	5.9	-	-	-
0/9/79	8.8	6.6	46	14	-	-	-
/11/79	15	6.1	58	1.8	-	-	-
/6/79	9.5	6.5	48	15	-	-	-

Well
South Shallow

Parameter	Chloride mg/1	pH Std. Units	IDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
ite							
'23/84	220	3.8	-	29	<.05	-	-
1/6/83	630	4.2	840	210	<.05	-	-
'6/83	740	3.4	900	204	<.05	-	-
'6/83	910	3.6	1350	420	<.05	-	-
5/83	1060	3.8	1480	420	<.05	-	-
/7/82	6830	3.4	9980	2700	<.05	-	-
29/82	5960	3.4	8000	2200	<.05	-	-
6/82	5820	3.4	8090	2200	-	-	-
7/82	5150	3.0	7020	1900	-	-	-
/6/81	8010	3.3	10700	3000	-	-	-
\ 2/81	6780	3.2	11800	2700	-	-	-
6/81	4950	3.4	8880	2200	-	-	-
9/81	4160	3.6	8360	1700	-	-	-
/7/80	1960	2.6	3610	520	-	-	-
3/80	1670	3.2	2800	590	-	-	-
1/80	600	4.1	920	140	-	-	-
3/80	280	3.9	360	63	-	-	-
/9/79	160	4.0	260	30	-	-	-
11/79	64	4.9	140	15	-	-	-
5/79							

Well 1
South Deep

Parameter	Chloride mg/l	PH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	TOX ug/l
Date							
1/23/84	5.0	5.3	-	0.66	<.05	-	-
10/6/83	7.5	5.9	45	0.52	<.05	-	-
7/6/83	5.9	5.4	55	1.2	<.05	-	-
4/6/83	7.0	5.4	48	1.2	<.05	-	-
1/5/83	12	6.3	56	0.23	<.05	-	-
10/7/82	16	4.9	83	0.07	<.05	-	-
7/29/82	5.3	5.4	42	0.76	<.01	-	-
4/6/82	7.0	5.5	34	0.88	-	-	-
1/7/82	14	5.1	60	1.0	-	-	-
10/6/81	11	4.6	39	0.19	-	-	-
7/2/81	20	5.1	76	4.1	-	-	-
3/6/81	7.8	5.9	57	2.7	-	-	-
1/9/81	18	4.8	75	1.1	-	-	-
10/7/80	13	4.5	190	0.63	-	-	-
7/8/80	10	5.0	65	2.2	-	-	-
4/1/80	9.8	4.8	64	0.60	-	-	-
1/3/80	6.7	5.8	54	1.4	-	-	-
10/9/79	5.1	6.2	45	2.0	-	-	-
7/11/79	4.0	5.9	34	2.7	-	-	-
4/2/79	4.1	5.5	33	2.9	-	-	-

Well
West Shallow

Parameter	Chloride mg/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	-	-	-	-	-	-	-
7/6/83	6800	3.3	10400	2500	<.05	-	-
4/6/83	7010	3.4	10180	2300	<.05	-	-
1/5/83	6120	3.9	8770	2200	<.05	-	-
10/7/82	5660	3.3	8100	2100	<.05	-	-
7/29/82	5940	3.4	7740	2200	<.05	-	-
4/6/82	5120	3.5	7200	2300	-	-	-
1/7/82	4220	3.6	6050	2000	-	-	-
10/6/81	1610	4.2	2520	990	-	-	-
7/2/81	1200	4.1	1710	510	-	-	-
3/6/81	600	3.9	790	210	-	-	-
1/9/81	520	4.2	1010	180	-	-	-
10/7/80	91	3.3	100	4.9	-	-	-
7/8/80	39	4.0	100	.88	-	-	-
4/1/80	18	5.4	82	.55	-	-	-
1/3/80	7.9	6.1	100	1.1	-	-	-
10/9/79	6.9	5.4	34	13	-	-	-
7/11/79	4.9	5.6	42	19	-	-	-
4/2/79	5.5	5.8	58	2.5	-	-	-

Well
West Deep

Parameter	Chloride mg/1	pH Std. Units	IDS mg/1	Iron mg/1	Lead mg/1	TX mg/1	TUX ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	-	-	-	-	-	-	-
7/6/83	6.6	6.0	89	3.4	<.05	-	-
4/6/83	5.8	6.1	67	1.6	<.05	-	-
1/5/83	6.8	6.9	55	1.8	<.05	-	-
10/7/82	12	6.1	100	.29	<.05	-	-
7/29/82	5.1	6.2	68	.86	-	-	-
4/6/82	5.0	6.3	57	1.7	-	-	-
1/7/82	6.2	6.3	80	3.4	-	-	-
10/6/81	5.3	6.0	42	2.8	-	-	-
7/2/81	10	6.3	73	3.9	-	-	-
3/6/81	5.6	6.4	61	1.8	-	-	-
1/9/81	7.4	6.4	73	1.1	-	-	-
10/7/80	7.2	6.1	63	.92	-	-	-
7/8/80	11	6.6	67	1.9	-	-	-
4/1/80	14	6.1	100	1.1	-	-	-
1/3/80	11	6.2	64	.32	-	-	-
10/9/79	9.6	6.4	62	2.4	-	-	-
7/11/79	5.2	6.7	60	1.6	-	-	-
4/2/79	4.8	6.0	48	4.0	-	-	-

Well
El

Parameter	Chloride mg/1	pH • Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	12030	3.3	17000	3700	<.05	-	-
7/6/83	10300	3.2	15600	3200	<.05	-	-
4/6/83	8740	3.4	14090	3200	<.05	-	-
1/5/83	8580	3.8	12560	2900	<.05	-	-
10/7/82	8930	3.3	12700	2700	<.05	-	-
7/29/82	7720	3.4	10680	2600	<.01	-	-
4/6/82	6310	3.5	8550	2000	-	-	-
1/7/82	6470	3.4	8340	2100	-	-	-
10/6/81	5620	3.5	8240	2000	-	-	-
7/2/81	4600	3.3	7400	1600	-	-	-
3/6/81	2460	4.7	3880	850	-	-	-
1/9/81	2550	4.7	5040	740	-	-	-
10/7/80	2040	2.8	3990	520	-	-	-
7/8/80	1580	3.7	2670	510	-	-	-
4/1/80	1300	4.3	2300	400	-	-	-
1/3/80	790	3.8	1100	5.6	-	-	-
10/9/79	550	3.7	750	130	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
E2

Parameter	Chloride mg/l	PH Std. Units	TDS mg/l	Iron mg/l	Lead my/1	TOC mj/1	[illegible]
Date							
1/23/84	9.6	5.9	—	.07	<.05	2.1	<1[illegible]
10/6/83	12	6.0	80	.36	<.05	1.9	1.
7/6/83	8.3	5.9	74	3.4	<.05	1.6	-
4/6/83	11	5.9	81	.21	<.05	0.8	1[illegible]
1/5/83	9.0	6.6	7U	.52	<.05	0.4	2-
10/7/82	20	6.0	100	.30	<.05	-	-
7/29/82	6.9	6.0	89	.20	<.05	-	-
1/6/82	13	6.2	58	1.3	-	-	-
1/7/82	7.0	6.1	100	.94	-	-	-
10/6/81	9.2	6.2	82	9.8		-	-
7/2/81	18	6.4	76	1.6	-	-	-
3/6/81	5.4	6.9	67	.72		-	-
1/9/81	6.7	6.4	120	16		-	-
10/7/80	10	6.4	78	.65		-	-
7/8/80	8.1	6.5	92	36		-	-
4/1/80	8.3	6.0	76	13		-	-
1/3/80	7.1	6.1	84	7.8	-	-	-
10/9/79	17	6.3	77	10		-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
E3

Parameter	Chloride mg/l	pH Std. units	TDS mg/l	Iron my/1	Lead mg/l	TOC mg/l	Tu ug
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	30	5.6	93	.07	<.05	-	-
7/6/83	40	5.6	110	9.8	<.05		
4/6/83	35	5.0	110	.19	<.05		
1/5/83	20	6.5	100	.22	<.05		
10/7/82	16	6.0	82	1.4	<.05		
7/29/82	59	5.5	140	1.2	<.01		
4/6/82	72	5.6	140	4.0	-		
1/7/82	69	3.8	150	1.5	-		
10/6/81	35	5.2	120	5.8	-		
7/2/81	84	5.4	270	10	-		
3/6/81	77	5.3	130	4.3	-		
1/9/81	100	4.3	220	7.4	-		
10/7/80	270	4.5	540	68	-		
7/8/80	-	-	-	-	-		
4/1/80	320	4.9	540	67	-		
1/3/80	140	3.6	230	13	-		
10/9/79	70	5.7	160	12	-		
7/11/79	-	-	-	-	-		
4/2/79	-	-	-	-	-		

Well
E4

Parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	[illegible] ug/l
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	20	6.0	98	.11	<.05	-	-
7/6/83	28	5.9	100	5.4	<.05	-	-
4/6/83	30	5.8	100	.28	<.05	-	-
1/5/83	20	6.5	100	.22	<.05	-	-
10/7/82	16	6.0	82	1.4	<.05	-	-
7/29/82	16	6.0	100	.27	<.01	-	-
4/6/82	16	6.0	94	1.1	-	-	-
1/7/82	17	5.8	130	4.5	-	-	-
10/6/81	33	5.7	77	17	-	-	-
7/2/81	22	6.2	94	2.3	-	-	-
3/6/81	31	6.2	59	.92	-	-	-
1/9/81	40	6.1	130	.69	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	620	4.8	850	200	-	-	-
4/1/80	370	4.6	600	110	-	-	-
1/3/80	160	3.5	220	24	-	-	-
10/9/79	80	5.4	150	11	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
E5

Parameter	Chloride mg/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	210	3.7	330	37	.23	-	-
7/6/83	3350	2.7	4670	590	8.2	-	-
4/6/83	2860	2.9	3610	440	11	-	-
1/5/83	8960	3.0	12170	1000	32	-	-
10/7/82	930	3.6	1430	300	<.05	-	-
7/29/82	3790	3.3	4720	720	.33	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
NE

Parameter	Chloride mg/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/l
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	13	5.8	59	.72	<.05	-	-
7/6/83	13	5.6	61	4.0	<.05	-	-
4/6/83	13	5.6	81	2.8	<.05	-	-
1/5/83	13	6.6	60	.72	<.05	-	-
10/7/82	15	5.7	74	1.8	<.05	-	-
7/29/82	15	5.7	90	.47	<.01	-	-
4/6/82	16	5.7	53	3.0	-	-	-
1/7/82	15	5.6	80	2.9	-	-	-
10/6/81	14	6.2	68	5.5	-	-	-
7/2/81	16	6.0	90	5.0	-	-	-
3/6/81	14	5.9	88	2.2	-	-	-
1/9/81	17	6.5	130	5.5	-	-	-
10/7/80	17	5.2	76	.90	-	-	-
7/8/80	17	6.0	100	6.2	-	-	-
4/1/80	20	5.7	62	2.3	-	-	-
1/3/80	18	5.6	66	2.6	-	-	-
10/9/79	17	6.0	55	24	-	-	-
7/11/79	-	-	-		-	-	-
1/2/79	-	-	-	-	-	-	-

Well
Nw

'arameter	Chloride my/1	pH Sta. Units	IDS mg/1	Iron mg/1	Lead mg/1	TOC my/1	TOX ug/l
late							
/23/84	7.2	6.0	-	12	<.05	12	<10
0/6/83	15	6.3	51	1.0	<.05	5.2	2 < . >
/6/83	14	5.3	170	3.6	<.05	6.0	-
/6/83	16	6.1	86	7.4	<.05	6.5	15
/5/83	8.9	5.8	72	.60	<.05	4.2	2[illegible]
0/7/82	24	5.6	100	.08	<.05	-	-
/29/82	6.4	5.9	100	3.0	<.01	-	-
/6/82	6.9	6.2	100	.80	-	-	-
/7/82	15	6.2	160	.53	-	-	-
.0/6/81	11	6.2	98	2.4	-	-	-
72/81	-	-	-	-	-	-	-
;/6/81	-	-	-	-	-	-	-
./9/81	-	-	-	-	-	-	-
.0/7/80	-	-	-	-	-	-	-
78/80	-	-	-	-	-	-	-
l/1/80	-	-	-	-	-	-	-
73/80	-	-	-	-	-	-	-
.0/9/79	-	-	-	-	-	-	-
'/11/79	-	-	-	-	-	-	-
l/2/79	-	-	-	-	-	-	-

Well
SE

Parameter	Chloride mg/l	pH - std. Units	IDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	TOX ug/l
Eate							
1/23/84	-		-	-	-	-	-
10/6/83	290	3.9	520	44	<.05	-	-
7/6/83	260	4.0	430	78	<.05	-	-
4/6/83	210	4.1	350	74	<.05	-	-
1/5/83	210	5.0	280	57	<.ub	-	-
10/7/82	190	5.0	280	8.4	<.05	-	-
7/29/82	200	5.7	410	60	<.01	-	-
4/6/82	-	_	-	-	-	-	-
1/7/82	-	-	-	-	-	-	_
10/6/81	-	_	-	-	-	-	-
7/2/81	-	_	-	-	-	-	-
3/6/81	-	_	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	_	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	_	_	_
4/2/79	-	-	-	-	-	-	-

Well
S.

Parameter	Chloride mg/1	pH std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mj/1	[illegible]
Date							
./23/84	11	4.8	-	.10	<.05	-	-
.0/6/83	12	5.3	44	2.2	<.05	-	-
76/83	11	4.7	51	.44	<.05	-	-
:/6/83	9.0	4.6	38	.22	<.05	-	-
./5/83	15	5.2	28	.35	<.05	-	-
.0/7/82	11	4.2	61	.10	<.05	-	-
729/32	10	4.4	62	.38	<.01	-	-
./6/82	-	-	-	-	-	-	-
77/82	-	-	-	-	-	-	-
0/6/81	-	-	-	-	-	-	-
/2/81	-	-	-	-	-	-	-
/6/81	-	-	-	-	-	-	-
/9/81	-	-	-	-	-	-	-
0/7/80	-	-	-	-	-	-	-
/8/80	-	-	-	-	-	-	-
71/80	-	-	-	-	-	-	-
/3/80	-	-	-	-	-	-	-
.0/9/79	-	-	-	-	-	-	-
'/11/79	-	-	-	-	-	-	-
72/79	-	-	-	-	-	-	-

parameter	Chloride mg/l	pH Std. Units	TDS mg/l	Iron mg/l	Lead mg/l	TOC mg/l	TOC ug/l
Date							
1/23/84	49	4.0	-	.93	<.05	<1.0	11
10/6/83	90	4.4	130	1.6	<.05	3.1	32
7/6/83	100	3.8	150	7.0	<.05	1.4	-
4/6/83	170	3.9	200	13	<.05	2.2	<10
1/5/83	360	4.4	460	62	<.05	3.2	25
10/7/82	1530	4.3	2050	510	<.05	-	-
7/29/82	880	3.6	1200	240	<.01	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-		-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-		-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
S2

Parameter	Chloride mg/1	pH std. units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TO[illegible] ug[illegible]
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	590	3.8	770	77	<.05	-	-
7/6/83	670	3.4	850	170	<.05	-	-
4/6/83	1030	3.7	1280	260	<.05	-	-
1/5/83	1300	4.1	2000	390	<.05	-	-
10/7/82	2880	3.7	4130	520	<.05	-	-
7/29/82	2470	3.6	3080	730	<.05	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
W1

Parameter	Chloride mg/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
Date							
1/23/84	3300	3.8	–	1200	<.05	-	-
10/6/83	3780	4.0	5900	1300	<.05	-	-
7/6/83	1580	3.9	2320	630	<.05	-	-
4/6/83	1250	4.3	1860	420	<.05	-	-
1/5/83	1300	4.8	2100	450	<.05	-	-
10/7/82	3100	4.0	4470	520	<.05	-	-
7/29/82	1700	4.6	2340	580	<.01	-	-
4/6/82	-	-	-	-	-	-	-
1/7/82	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	-	-	-	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
N1

Parameter	Chloride mg/1	PH Std. units	IDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	10	5.8	63	1.6	<.05	-	-
7/6/83	7.6	5.7	65	2.5	<.05	-	-
4/6/83	6.7	5.7	42	2.3	<.05	-	-
1/5/83	8.6	6.4	70	1.1	<.05	-	-
10/7/82	8.0	6.0	71	4.4	<.05	-	-
7/29/82	8.8	5.8	59	.44	<.01	-	-
4/6/82	8.4	6.1	46	1.5	-	-	-
1/7/82	9.0	5.5	00	4.2	-	-	-
10/6/81	8.0	5.8	67	5.4	-	-	-
7/2/81	7.4	6.3	73	6.2	-	-	-
3/6/81	7.8	6.4	110	12	-	-	-
1/9/81	10	6.5	110	12	-	-	-
10/7/80	7.0	5.9	80	3.6	-	-	-
7/8/80	8.0	6.3	230	47	-	-	-
4/1/80	11	6.1	50	44	-	-	-
1/3/80	9.1	6.5	62	21	-	-	-
10/9/79	11	6.4	66	75	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
N2

parameter	Chloride mg/1	PH Sta. Units	TDS mg/1	Iron mg/1	Lead mg/1	TUC mg/1	P[illegible] ug/[illegible]
Date							
1/23/84	350	5.5	-	47	<.05	-	-
10/6/83	230	4.4	330	22	<.05	-	-
7/6/83	230	5.2	380	60	<.05	-	-
4/6/83	300	5.5	390	46	<.05	-	-
1/5/83	420	5.8	520	110	<.05	-	-
10/7/82	470	4.8	660	80	<.05	-	-
7/29/82	300	4.4	490	63	<.01	-	-
4/6/82	340	5.6	490	95	-	-	-
1/7/82	920	5.0	1290	330	-	-	-
10/6/81	540	3.9	860	160	-	-	-
7/2/81	120	4.3	230	29	-	-	-
3/6/81	110	5.7	160	30	-	-	-
1/9/81	100	5.6	230	14	-	-	-
10/7/80	87	3.4	170	2.1	-	-	-
7/8/80	99	3.5	240	23	-	-	-
4/1/80	310	3.2	350	69	-	-	-
1/3/80	300	3.4	340	55	-	-	-
10/9/79	3500	3.4	4900	1500			
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
N3

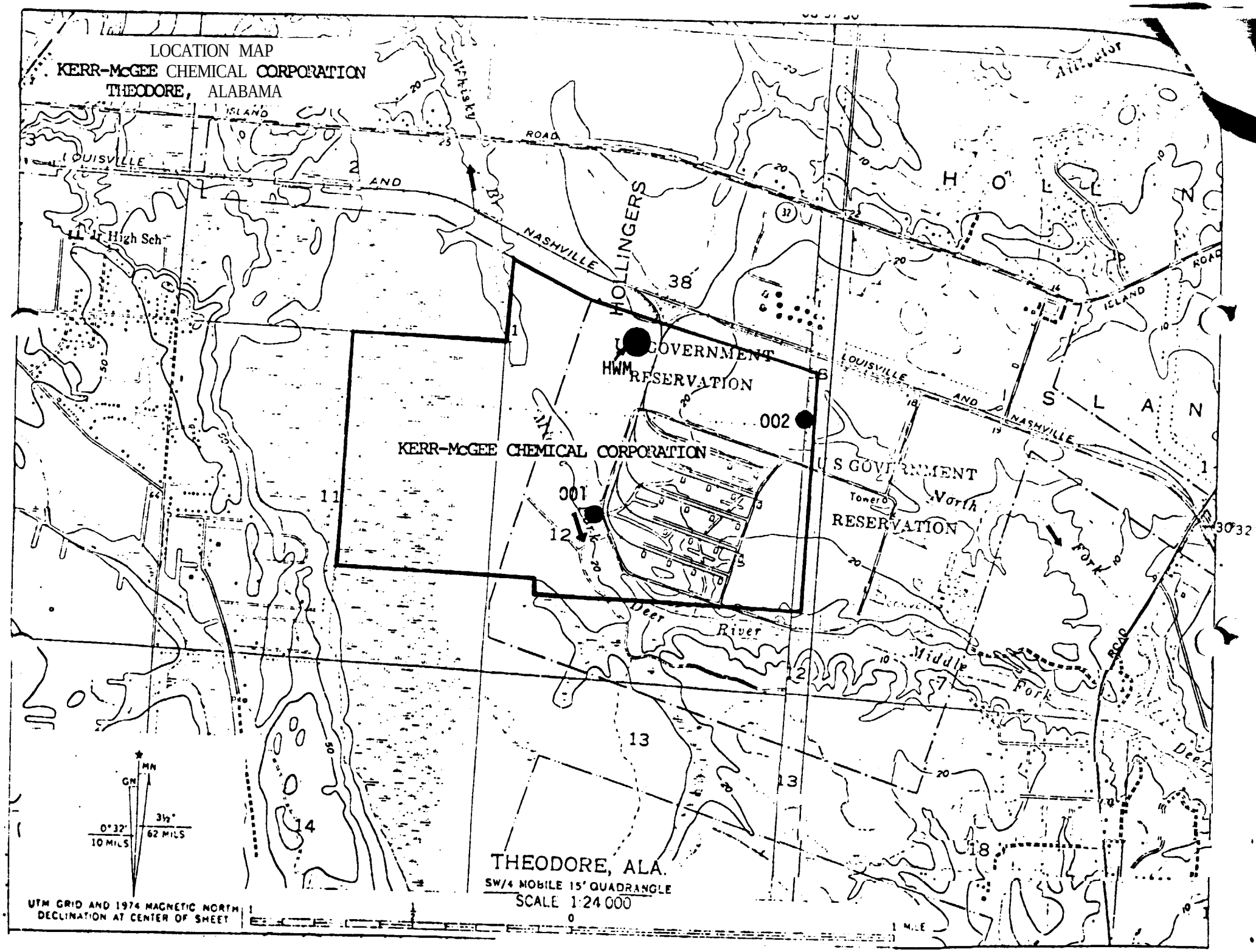
Parameter	Chloride mg/1	pH std. units	TJS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/l
Date							
1/23/84	170	5.2	–	28	<.05	1.2	11
10/6/83	140	5.5	200	16	<.05	3.5	2[illegible]
7/6/83	310	4.8	460	110	<.05	2.4	–
4/6/83	300	4.5	440	120	<.05	0.9	2[illegible]
1/5/83	370	4.4	490	140	<.05	0.6	2[illegible]
10/7/82	140	5.3	210	17	<.05	–	–
7/29/82	420	5.0	650	190	<.01	–	–
4/6/82	630	4.6	840	280	–	–	–
1/7/82	1670	4.0	2050	580	–	–	–
10/6/81	160	5.4	270	30	–	–	–
7/2/81	300	5.0	570	140	–	–	–
3/6/81	190	4.3	800	240	–	–	–
./9/81	610	4.0	1200	250	–	–	–
.0/7/80	130	3.3	290	8.2	–	–	–
'/8/80	220	3.8	360	54	–	–	–
1/1/80	650	3.4	1000	230	–	–	–
./3/80	320	3.5	430	80	–	–	–
.0/9/79	840	3.8	1100	350	–	–	–
'/11/79	–	–	–	–	–	–	–
/2/79	–	–	–	–	–	–	–

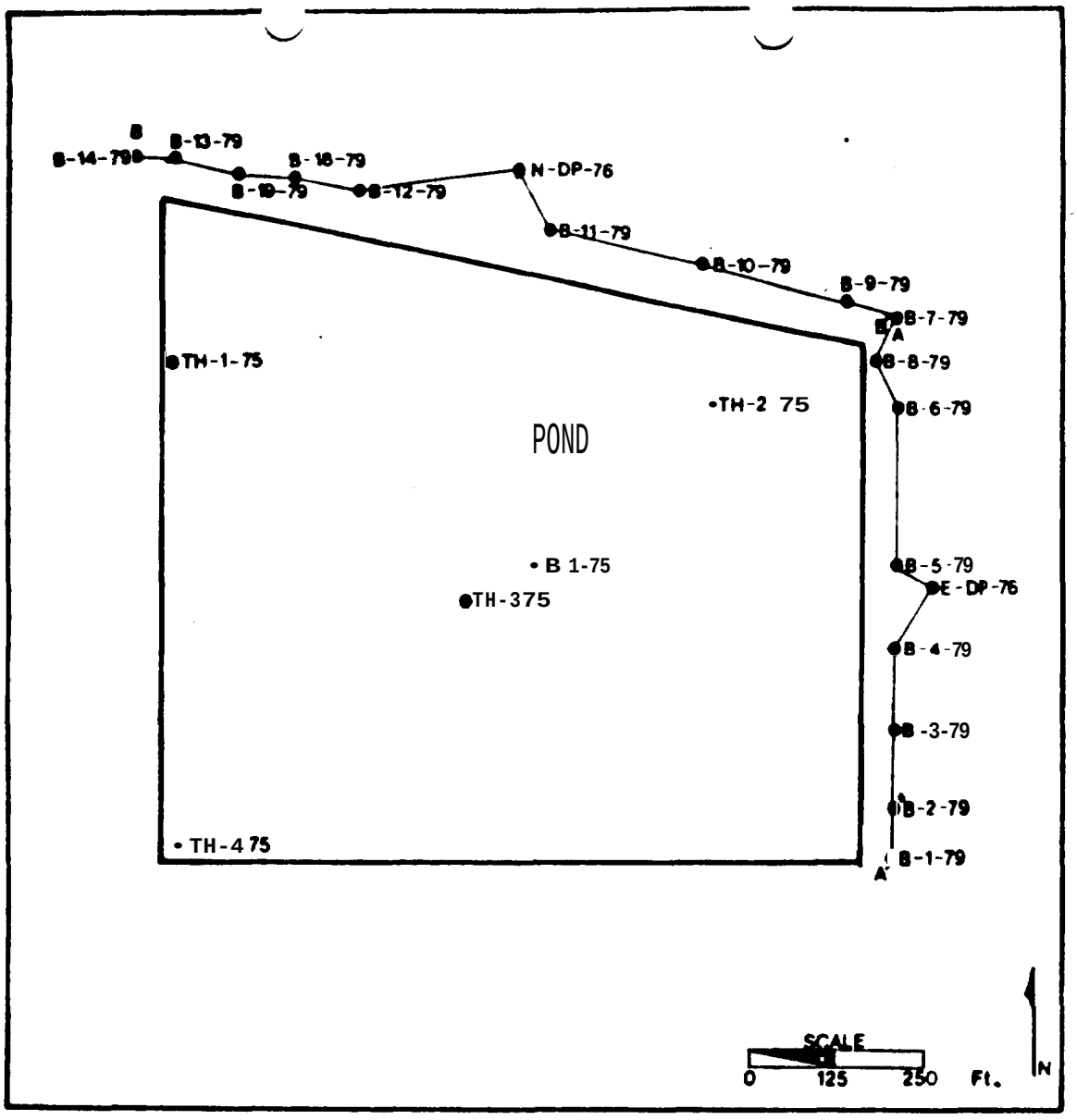
Well
N4

Parameter	Chloride mg/1	pH Std. Units	IDS mg/1	Iron mg/1	Lead my/1	TOC mg/1	TOX ug/1
Date							
1/23/84	-	-	-	-	-	-	-
10/6/83	2180	4.2	3100	760	<.05	-	-
7/6/83	2030	4.7	3920	800	<.05	-	-
4/6/83	1850	4.5	2810	850	<.05	-	-
1/5/83	2300	4.5	3050	870	<.05	-	-
10/7/82	2530	4.2	3550	920	<.05	-	-
7/29/82	2060	4.2	3100	910	<.05	-	-
4/6/82	2270	4.0	3100	940	-	-	-
1/7/82	3620	3.9	4770	1500	-	-	-
10/6/81	3600	4.2	4200	1600	-	-	-
7/2/81	2060	4.8	3330	940	-	-	-
3/6/81	590	4.3	3420	890	-	-	-
1/9/81	2750	3.9	5520	1000	-	-	-
10/7/80	3220	3.0	6260	1400	-	-	-
7/8/80	3230	3.0	5950	1300	-	-	-
4/1/80	2700	3.4	4400	1000	-	-	-
1/3/80	1950	3.5	2500	660	-	-	-
10/9/79	1400	4.5	2000	490	-	-	-
7/11/79	-	-	-	-	-	-	-
4/2/79	-	-	-	-	-	-	-

Well
N5

Parameter	Chloride mg/1	pH Std. Units	TDS mg/1	Iron mg/1	Lead mg/1	TOC mg/1	TOX ug/l
Date							
1/23/84	—	-	-	-	-	-	-
10/6/83	13310	3.4	20000	5000	<.05	-	-
7/6/83	12560	3.2	19500	4800	<.05	-	-
4/6/83	10690	3.2	15290	4300	<.05	-	-
1/5/83	11700	3.6	15440	3900	<.05	-	-
10/7/82	10100	3.2	5100	3500	<.05	-	-
7/29/82	8620	3.4	12120	3000	<.01	-	-
4/6/82	-	-	-	-	-	-	
1/7/8	-	-	-	-	-	-	-
10/6/81	-	-	-	-	-	-	-
7/2/81	-	-	-	-	-	-	-
3/6/81	-	-	-	-	-	-	-
1/9/81	-	-	-	-	-	-	-
10/7/80	-	-	-	-	-	-	-
7/8/80	-	-	-	-	-	-	-
4/1/80	—	-	—	-	-	-	-
1/3/80	-	-	-	-	-	-	-
10/9/79	-	-	-	-	-	-	-
7/11/79	-	-	-	-	-	-	-


LOCATION MAP
KERR-McGEE CHEMICAL CORPORATION
THEODORE, ALABAMA
KERR-McGEE CHEMICAL CORPORATION
HWM
U.S. GOVERNMENT RESERVATION
U.S. GOVERNMENT RESERVATION
001
002
HOLLINGERS
LOUISVILLE AND NASHVILLE
ISLAND ROAD
Whisky Br
Jr High Sch
Deer River
Middle Fork
North Fork
Tower
THEODORE, ALA.
SW/4 MOBILE 15' QUADRANGLE
SCALE 1:24 000
UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
MN
GN
0°32'
10 MILS
3½°
62 MILS
1 MILE



B-7-79● TEST BORINGS

Figure 1. Location of Soil Test Borings and Geologic Gross Sections at Site.

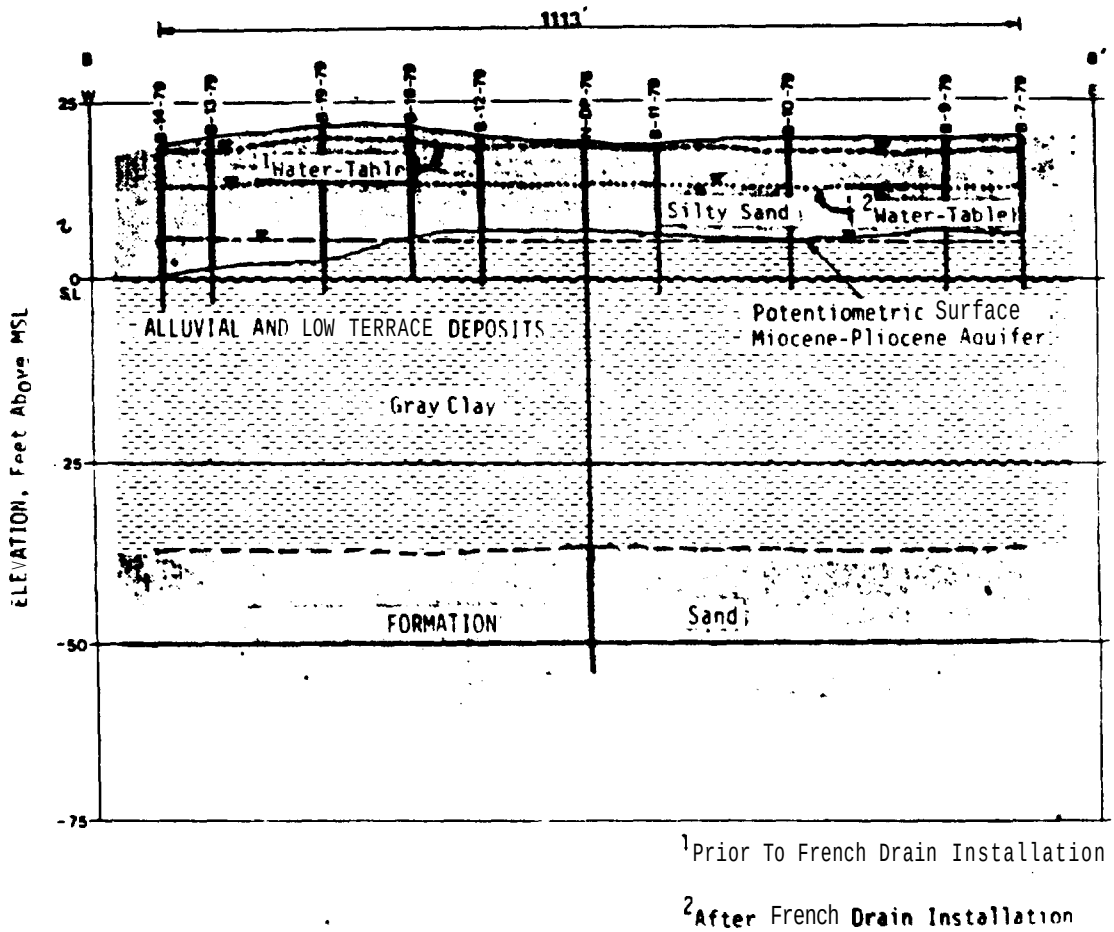


Figure 2. **Deatailed** East-West Geologic **Cross** Section of Pond Area.

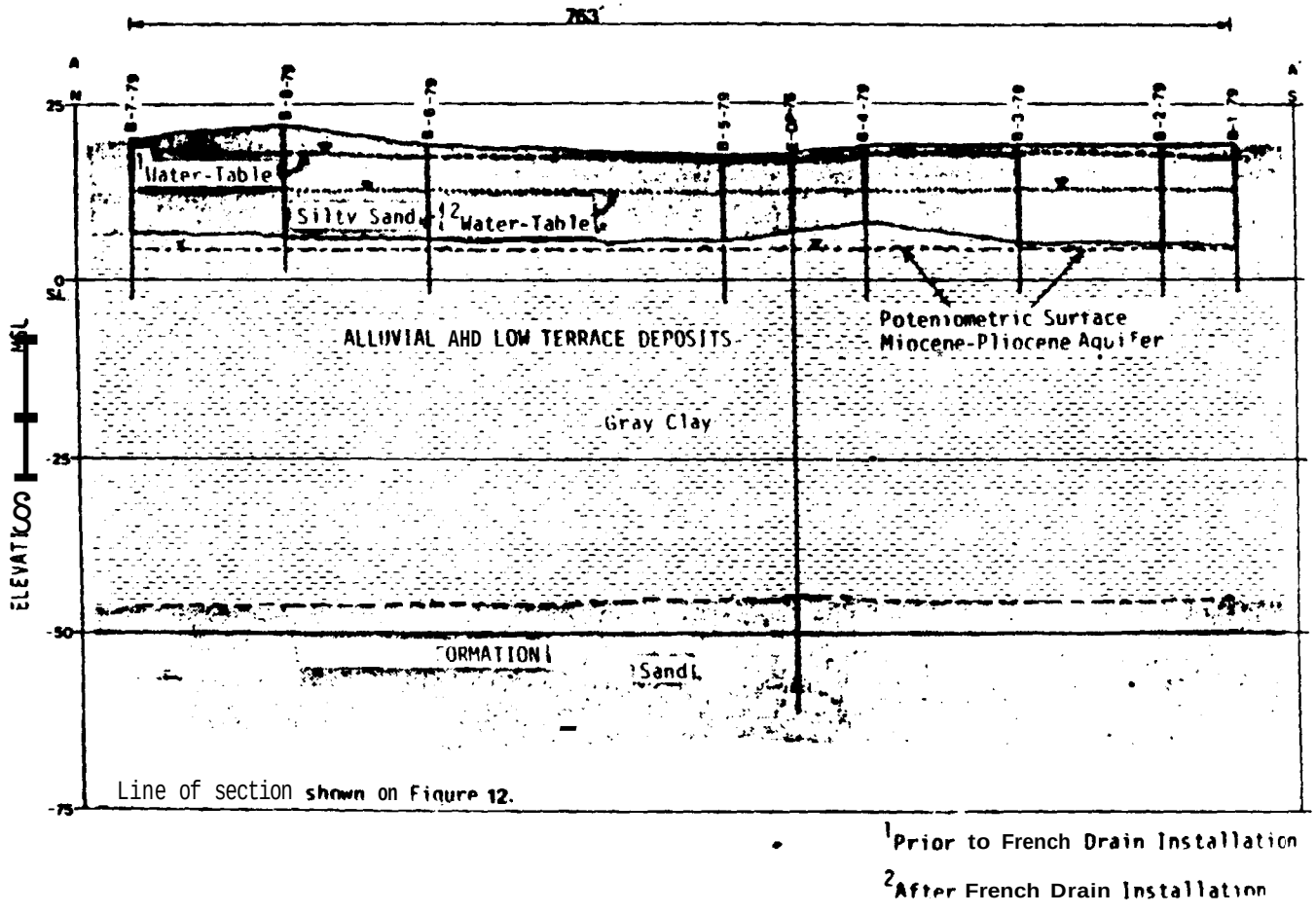


Figure 3. **Detailed** North-South **Geologic Cross Section** of Pond Area.

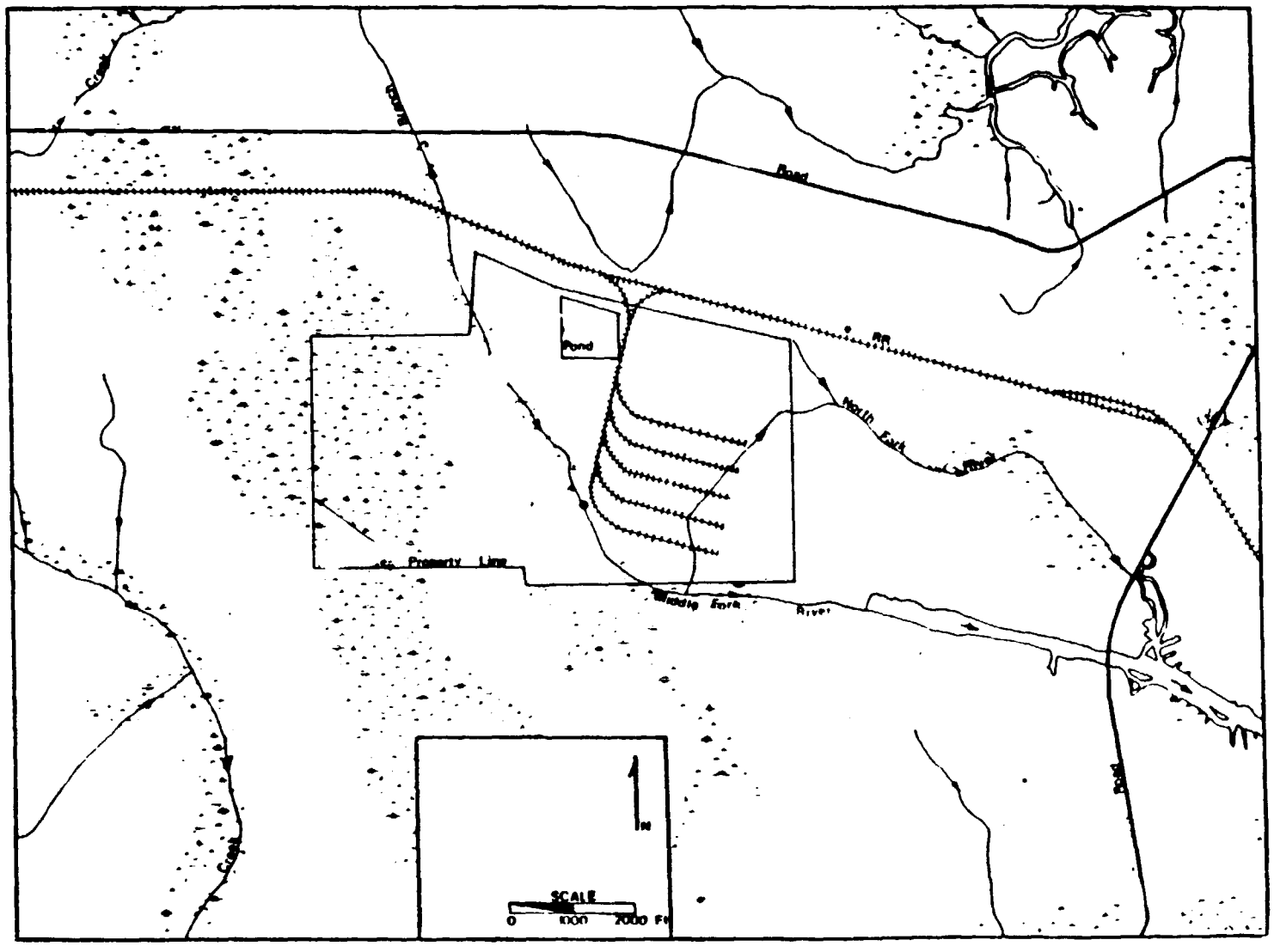
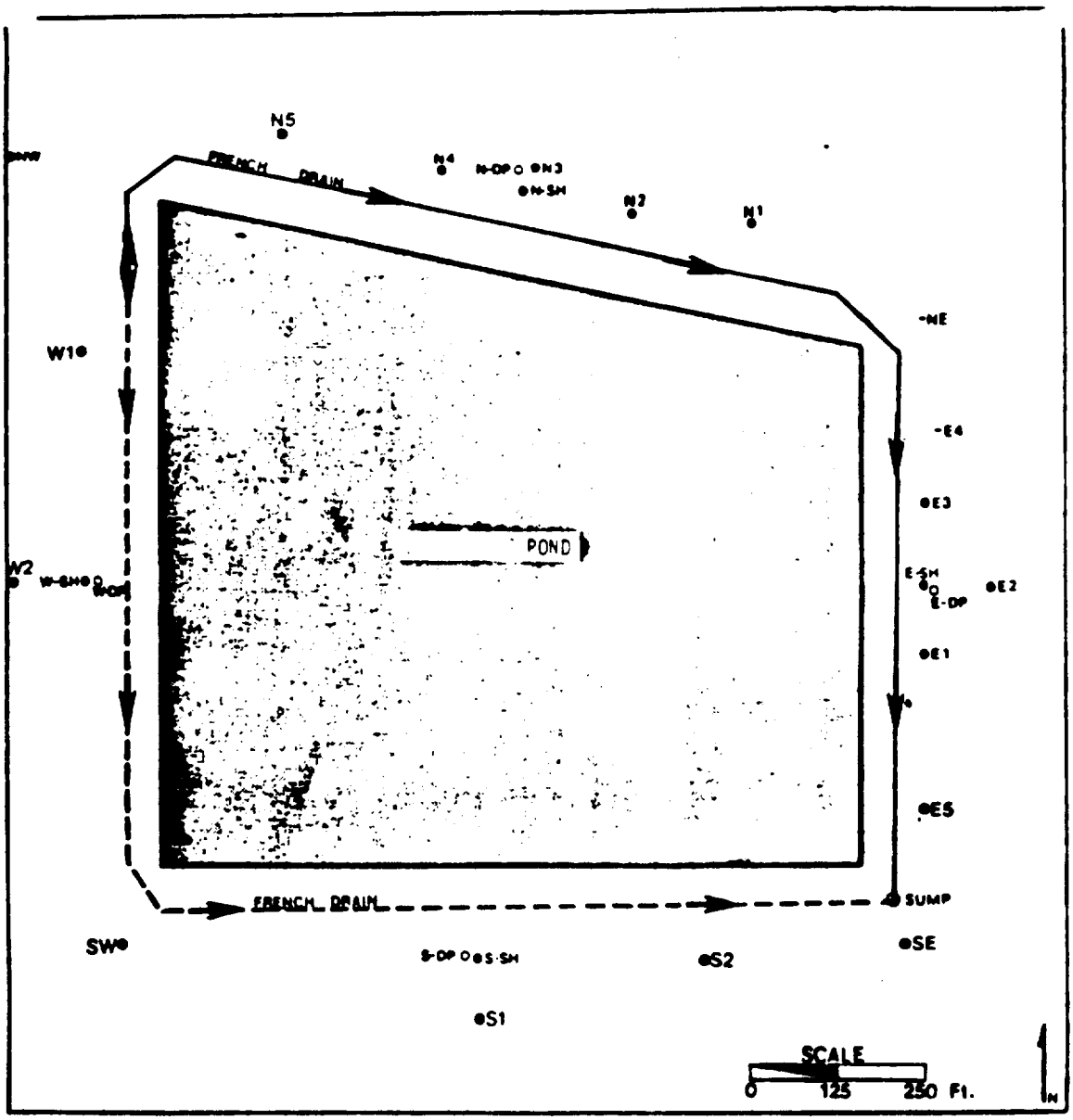


Figure 4. Detailed Map of Site and Surrounding Area.



o MIOCENE-PLIOCENE AQUIFER MONITORING WELL
• ALLUVIAL AQUIFER MONITORING WELL
FRENCH DRAIN, North and East sides (Completed 9-80)
FRENCH DRAIN, West and South sides (Completed 12-81)
FLOW DIRECTION IN DRAIN

Figure 5. French Drain and Monitoring Well Locations.

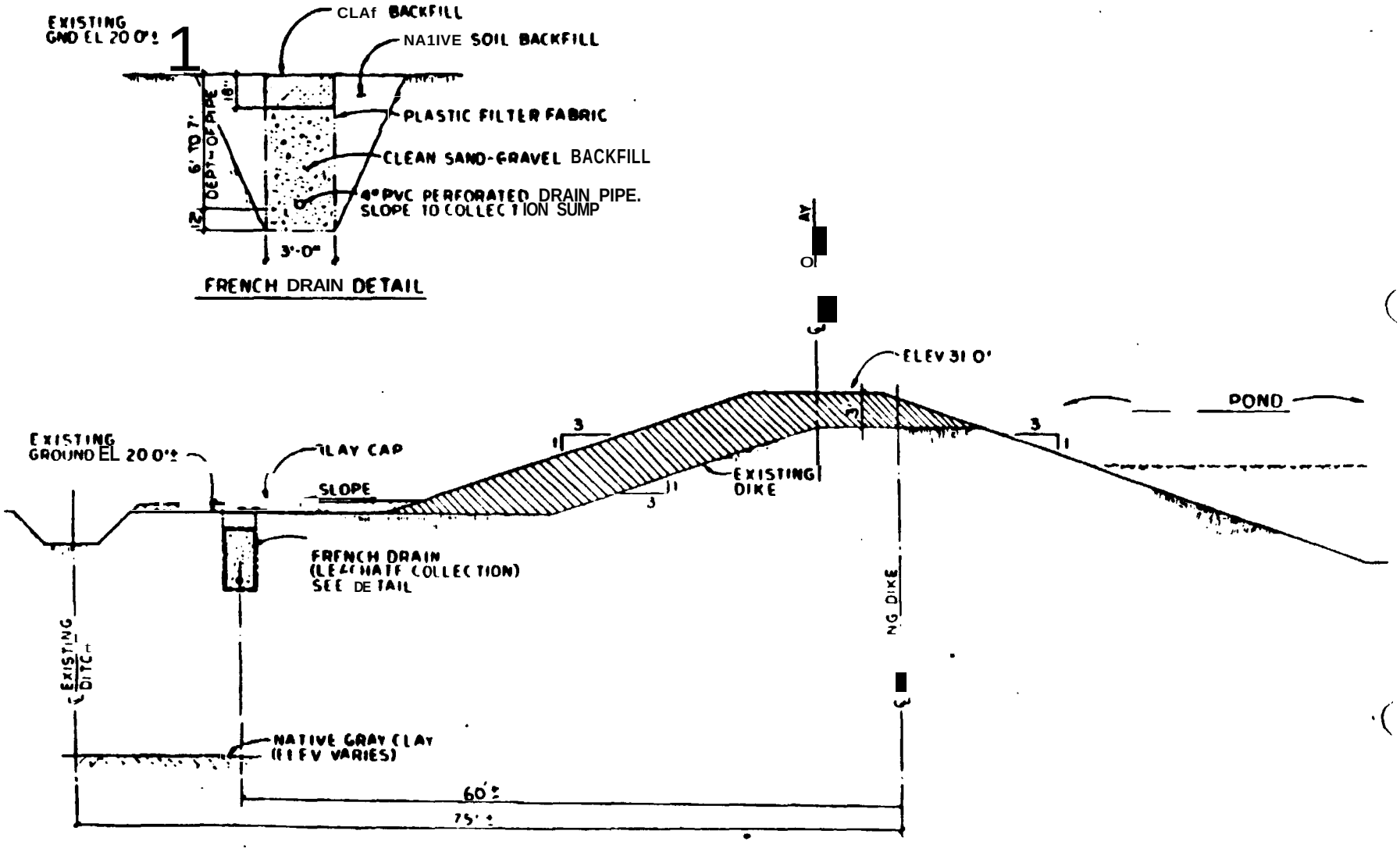


Figure 6. Detail of Pond and French Drain Construction.

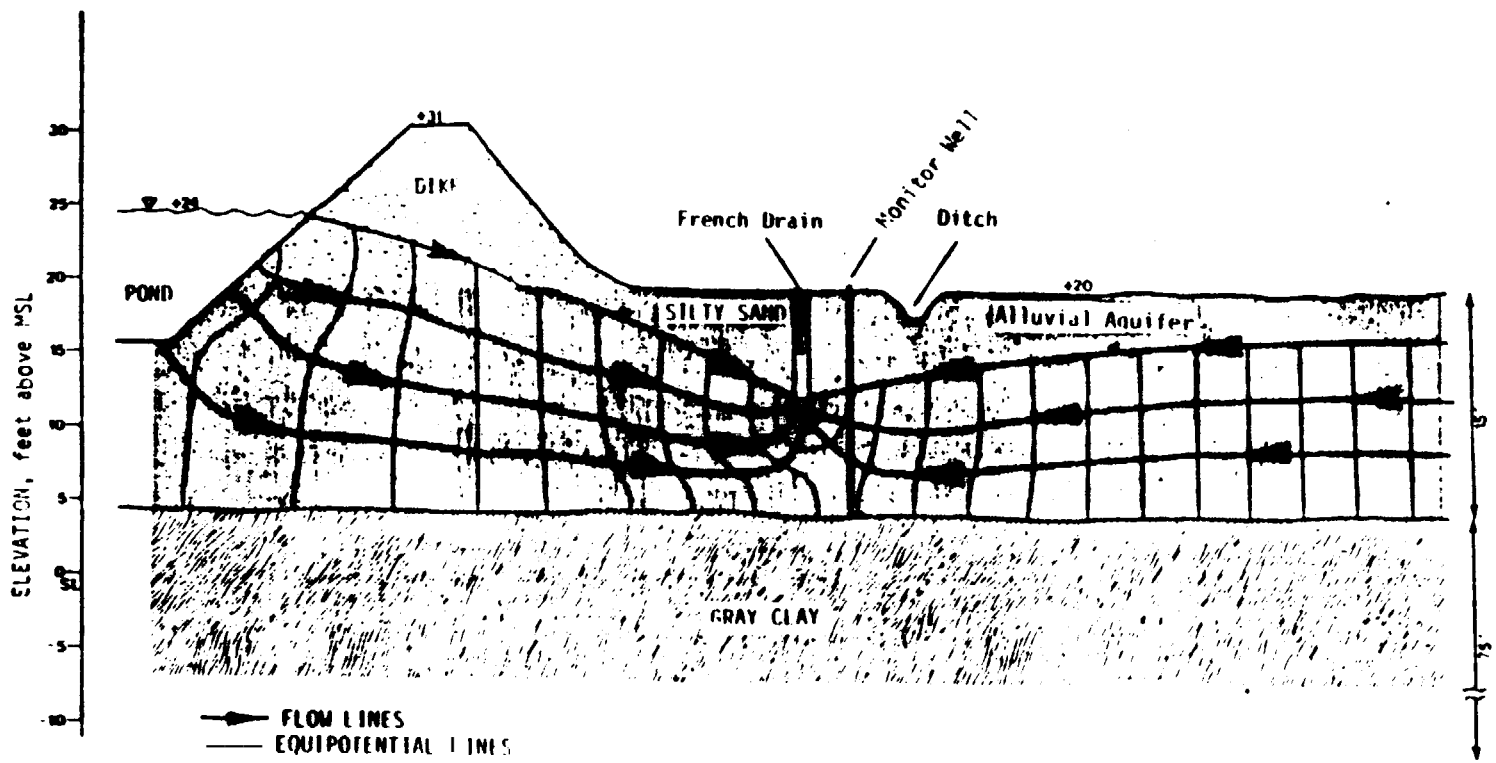


FIGURE 15. CROSS SECTION SHOWING THE PATTERNS OF POTENTIAL AND FLOW IN THE ALLUVIAL AQUIFER

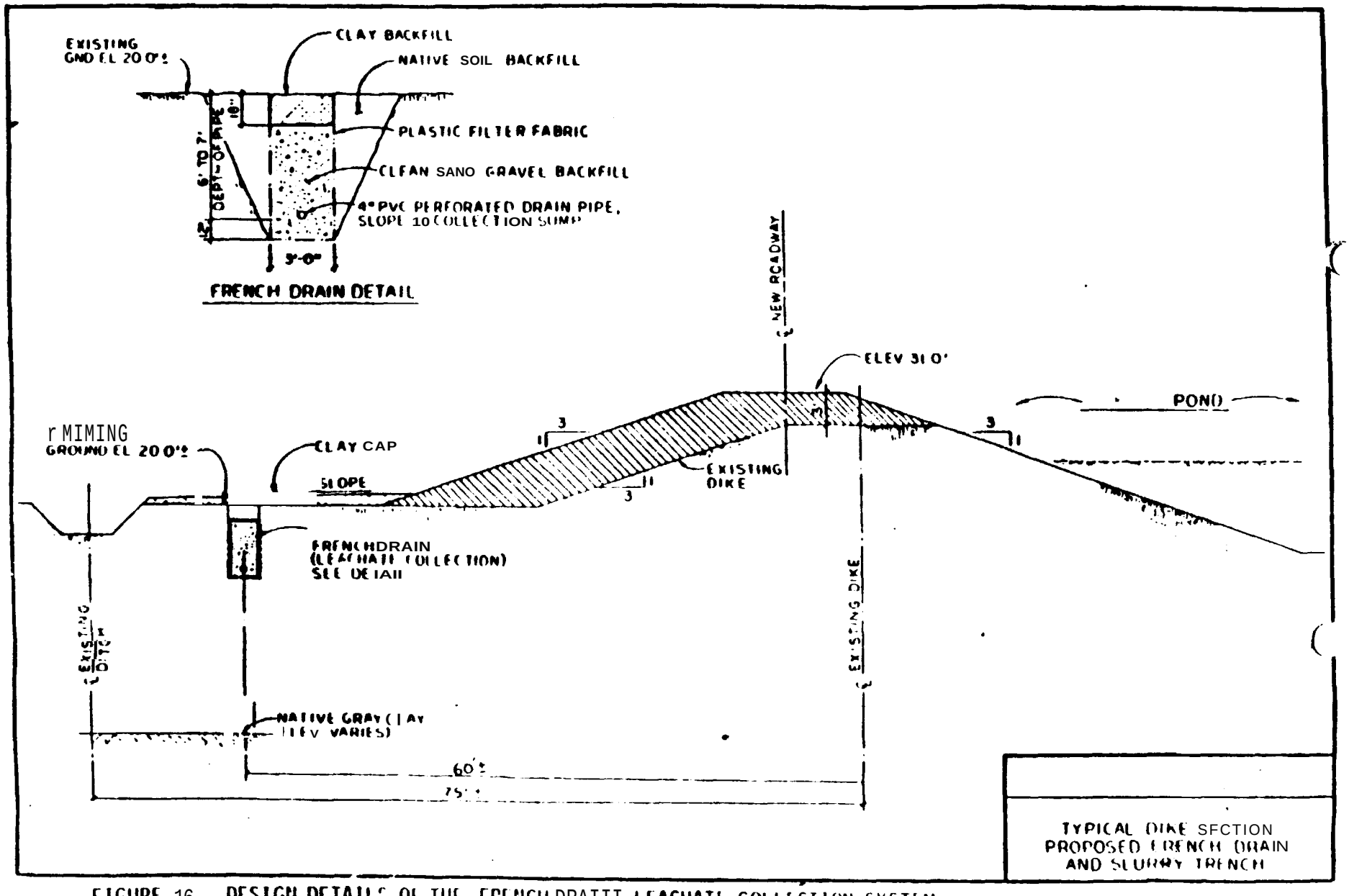


FIGURE 16. DESIGN DETAILS OF THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM

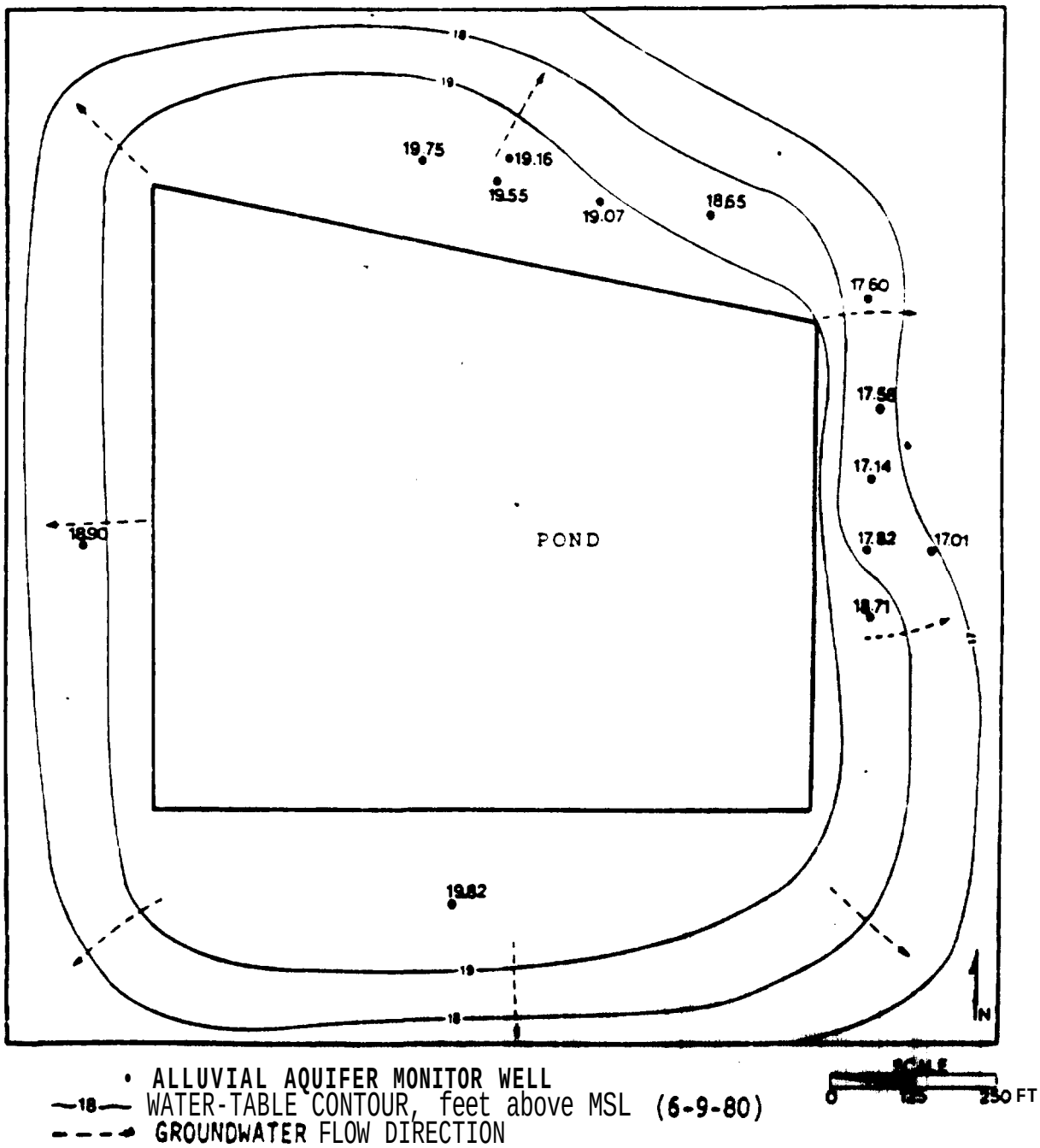
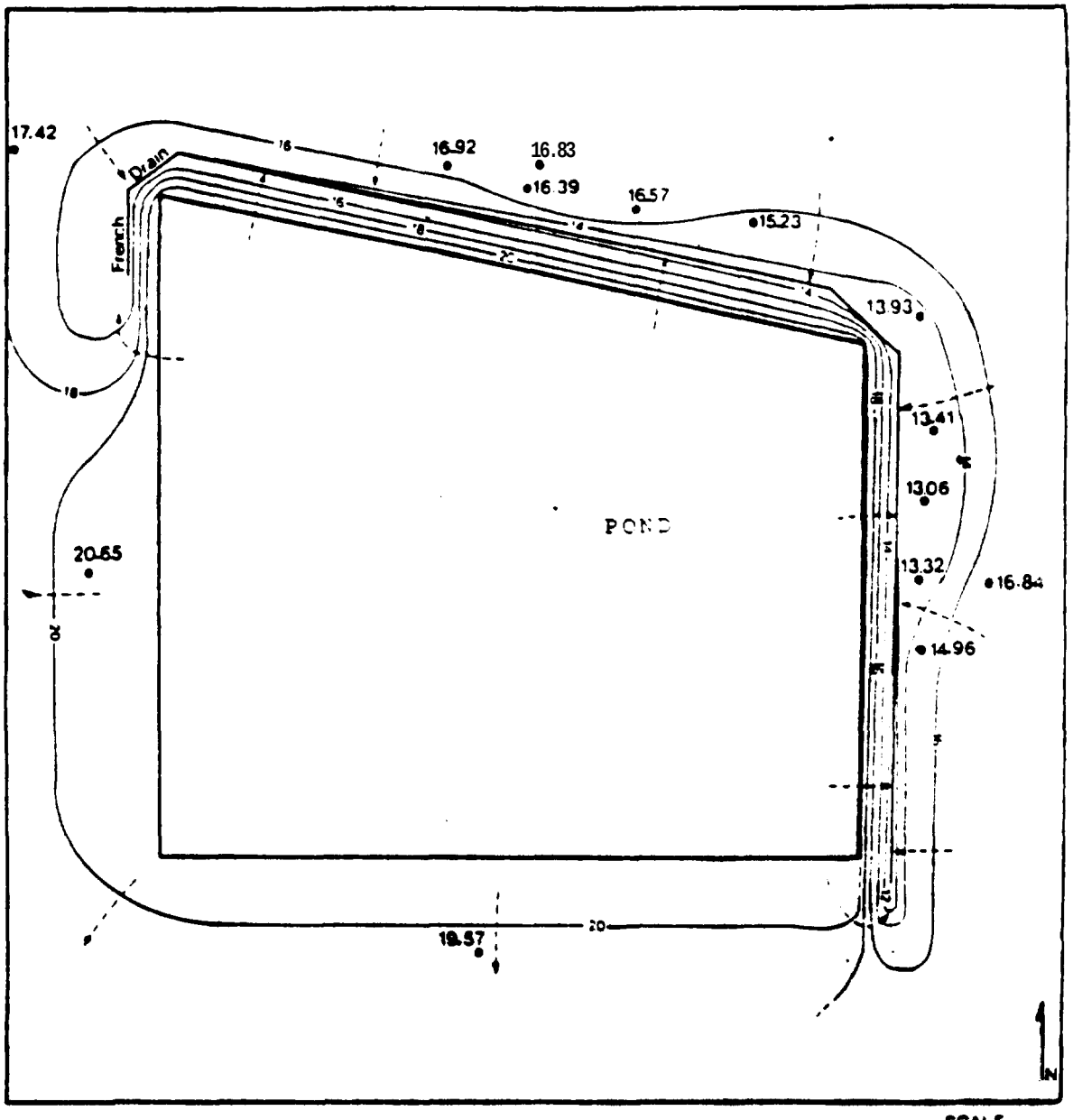


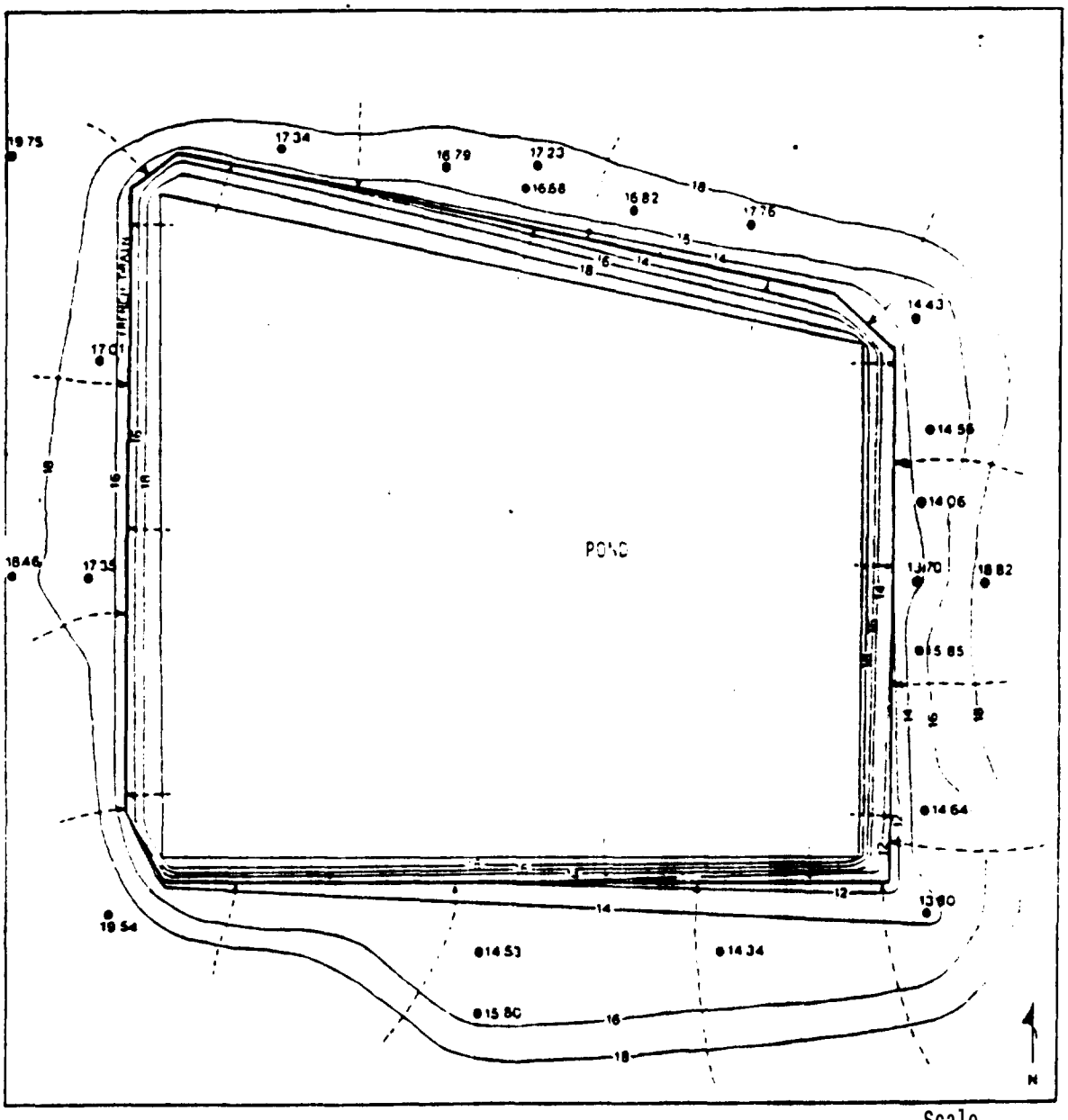
FIGURE 17. WATER-TABLE MAP OF THE ALLUVIAL AQUIFER ONE MONTH PRIOR TO INSTALLATION OF THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM AROUND THE . POND, NORTH AND EAST SIDES.



• ALLUVIAL AQUIFER MONITOR WELL
—16— WATER-TABLE CONTOUR, feet above MSL (9-1-81)
- - - → GROUNDWATER FLOW DIRECTION

SCALE
0 125 250 FT

FIGURE 18 WATER-TABLE MAP FOR THE ALLUVIAL AQUIFER 13 MONTHS AFTER THE INSTALLATION OF THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM AROUND THE NORTH AND EAST SIDES OF THE POND.



• ALLUVIAL AQUIFER MONITOR WELL

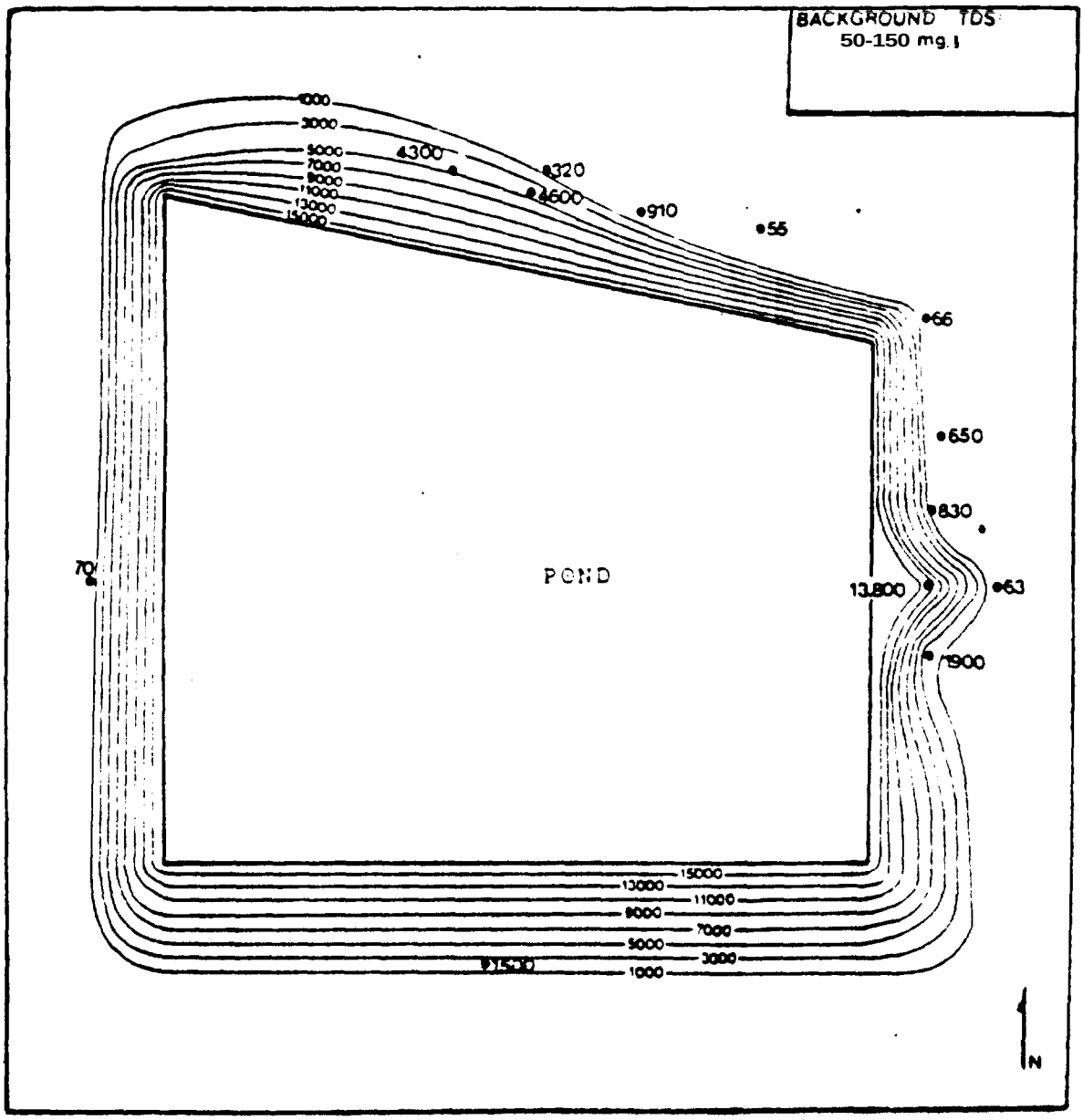
—16— WATER-TABLE CONTOUR, FEET ABOVE MSL (8-1-83)

- - - → GROUNDWATER FLOW DIRECTION

Scale

0 100 200'

FIGURE 19. WATER-TABLE MAP FOR THE ALLUVIAL AQUIFER 19 MONTHS AFTER THE INSTALLATION OF THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM AROUND THE WEST AND SOUTH SIDES OF THE POND.



• ALLUVIAL AQUIFER MONITOR WELL
--1000- LINE OF EQUAL TOTAL DISSOLVED SOLIDS CONTENT, mg/1
650 TOTAL DISSOLVED SOLIDS CONTENT, mg/1 (6-11-80)

SCALE
0 125 250 FT

FIGURE 20. AREAL DISTRIBUTION OF TOTAL DISSOLVED SOLIDS CONTENT IN THE ALLUVIAL AQUIFER ONE MONTH PRIOR TO INSTALLATION OF THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM, NORTH AND EAST SIDES.

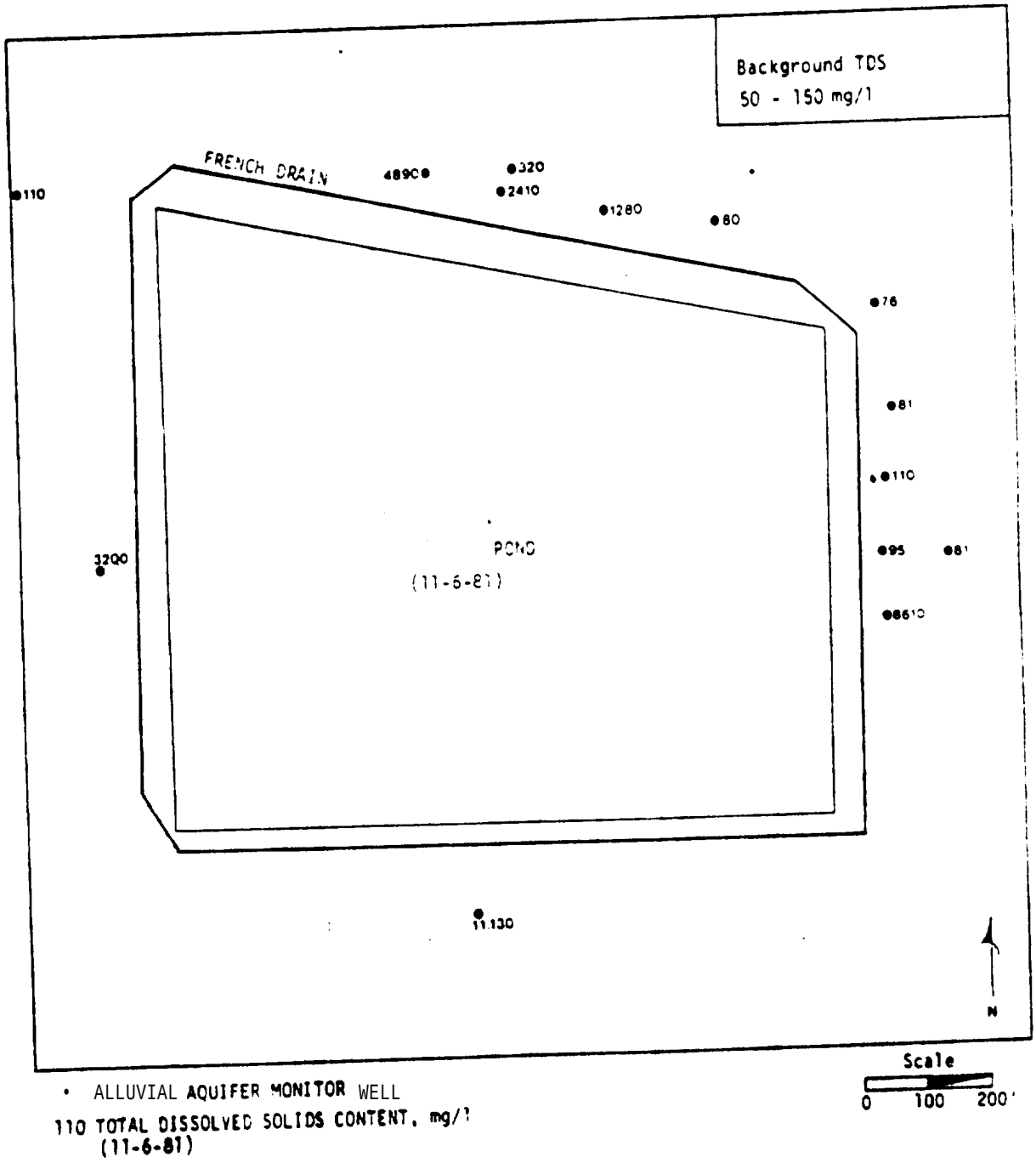
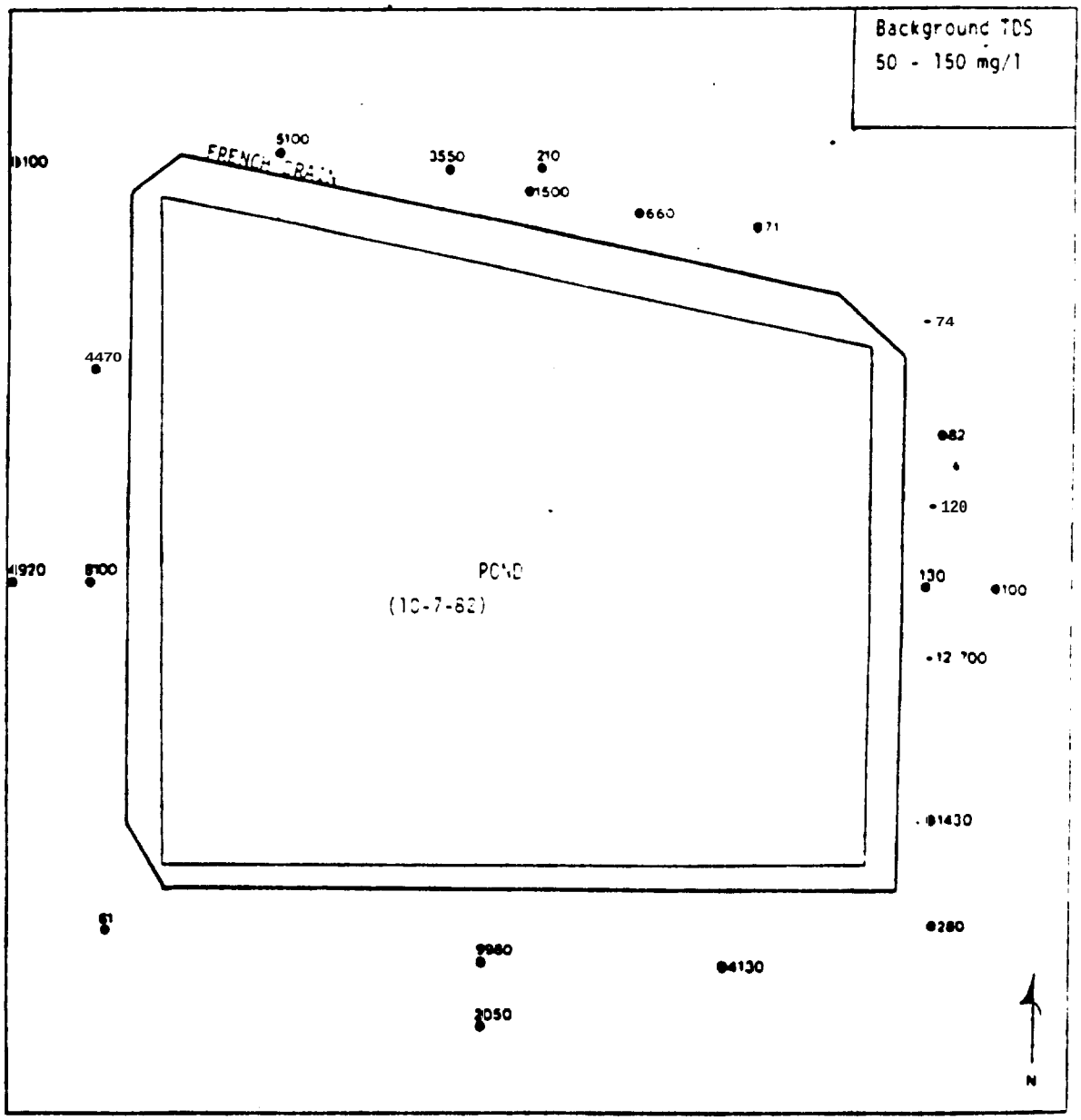
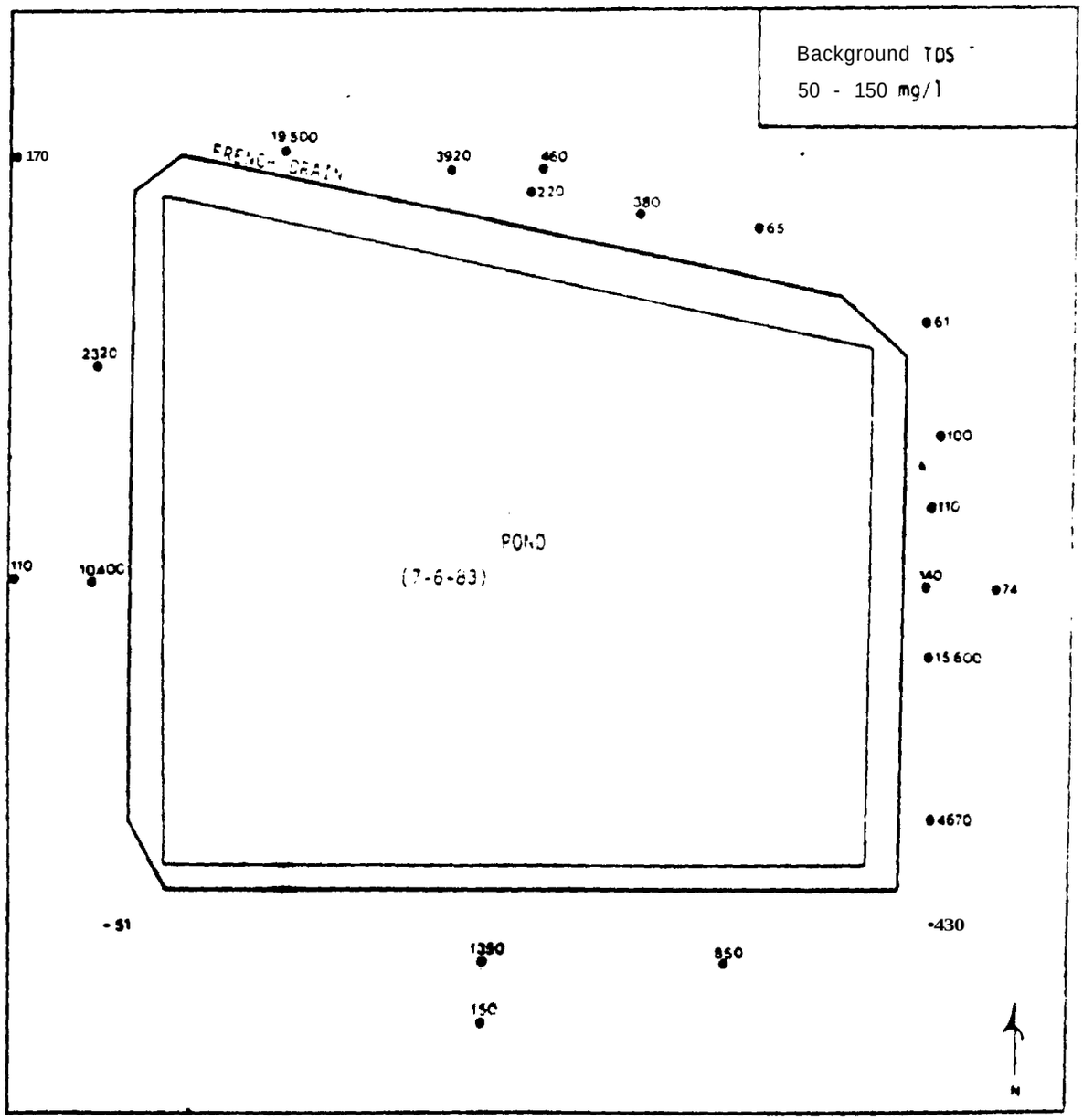


FIGURE 21. AREAL DISTRIBUTION OF TOTAL DISSOLVED SOLIDS CONTENT IN THE ALLUVIAL ALLUVIAL AQUIFER ONE MONTH PRIOR TO INSTALLATION 0 THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM, WEST AND SOUTH SIDES.



• ALLUVIAL AQUIFER MONITOR WELL
130 TOTAL DISSOLVED SOLIDS CONTENT, mg/l (10-7-82)

FIGURE 22 AREAL DISTRIBUTION OF TOTAL DISSOLVED SOLIDS CONTENT IN THE ALLUVIAL AQUIFER 10 MONTHS AFTER INSTALLATION OF THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM, WEST AND SOUTH SIDES.



• ALLUVIAL AQUIFER MONITOR WELL

140 TOTAL DISSOLVED SOLIDS CONTENT, mg/l (7-6-83)

FIGURE 23. AREAL DISTRIBUTION OF TOTAL DISSOLVED SOLIDS CONTENT IN THE ALLUVIAL AQUIFER 34 MONTHS AFTER INSTALLATION OF THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM, NORTH AND EAST SIDES; AND 22 MONTHS AFTER INSTALLATION ON THE WEST AND SOUTH SIDES.

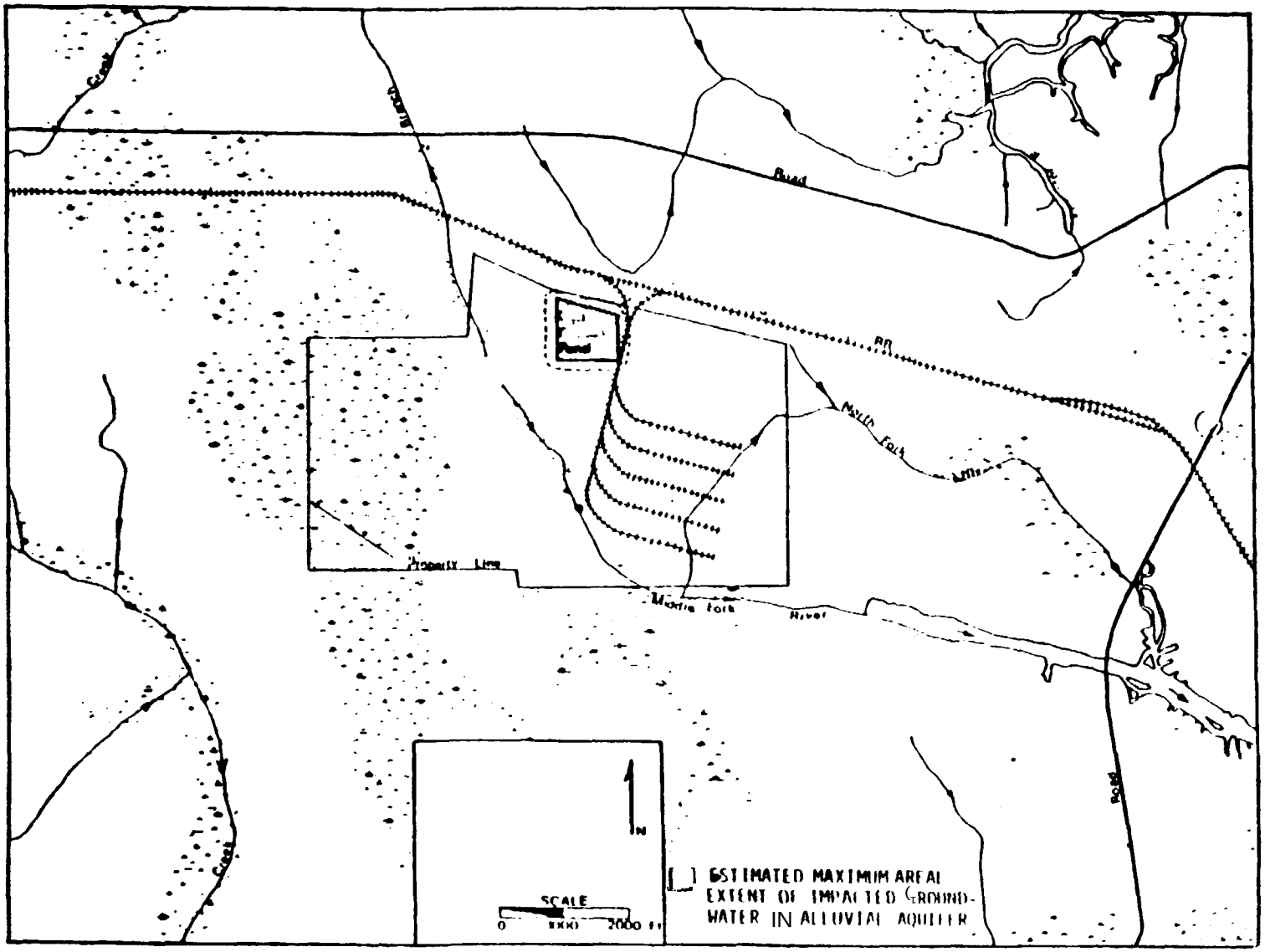
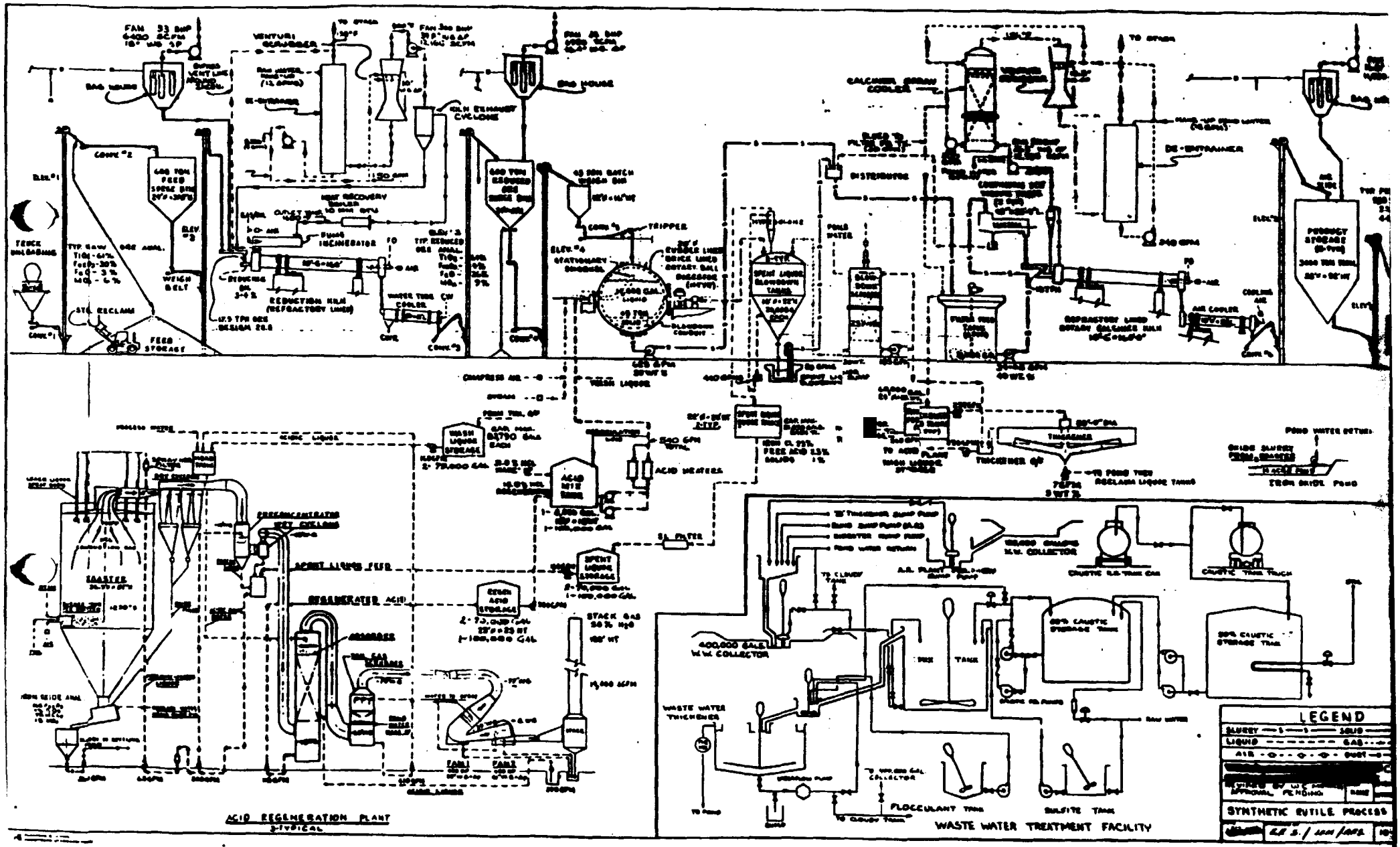
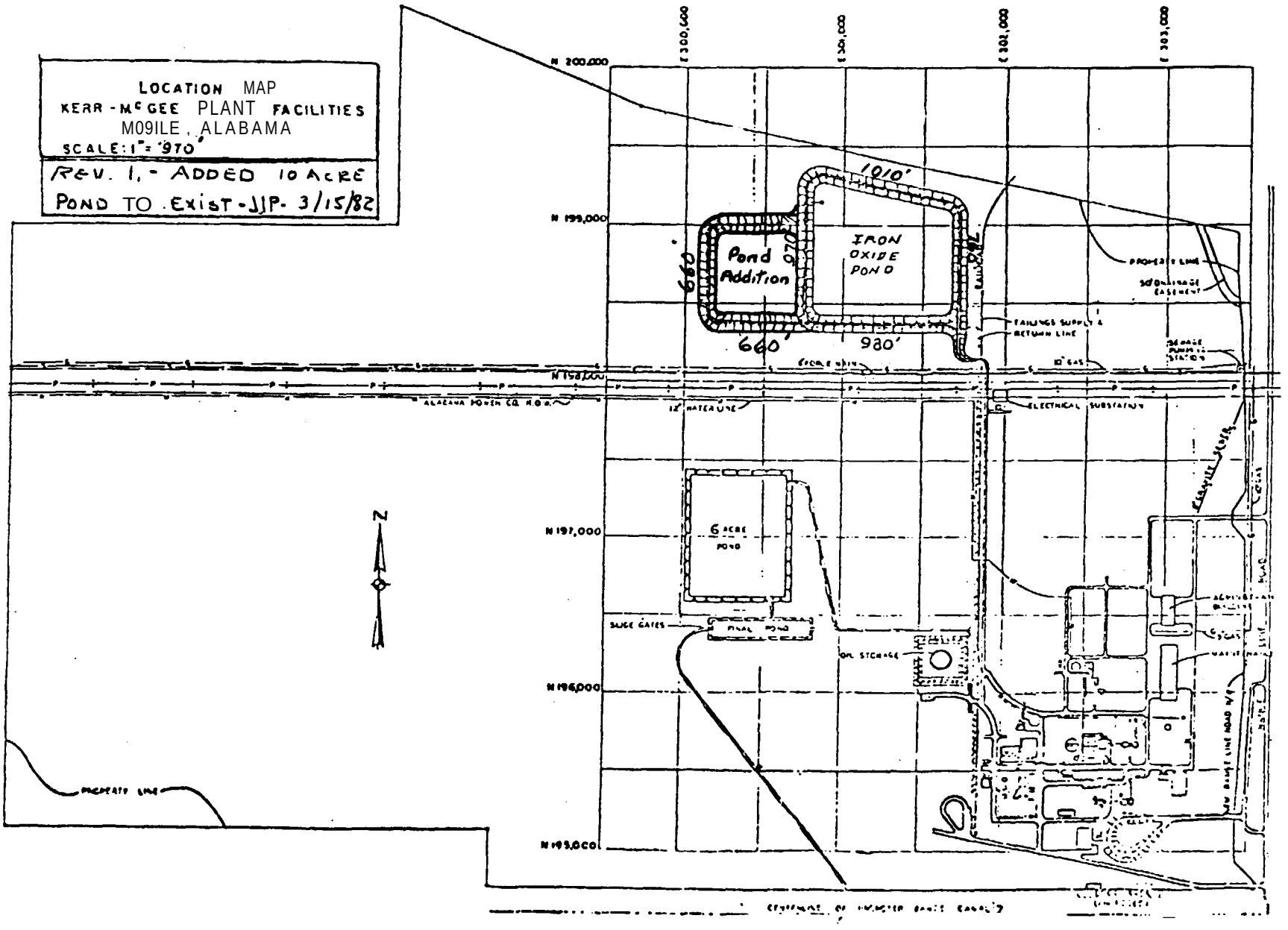


FIGURE 24 MAXIMUM EXTENT OF IMPACTED GROUNDWATER IN THE ALLUVIAL AQUIFER PRIOR TO INSTALLATION OF THE FRENCH DRAIN LEACHATE COLLECTION SYSTEM, NORTH AND EAST, WEST AND SOUTH SIDES.



ACID REGENERATION PLANT
3-TYPICAL
WASTE WATER TREATMENT FACILITY
LEGEND
SYNTHETIC RUTILE PROCESS
400,000 GALS W.W. COLLECTOR
WASTE WATER THICKENER
FLOCCULANT TANK
SULFITE TANK
CAUSTIC TANK TRUCK
REGENERATED ACID
SPENT LIQUOR FEED
ACID HEATERS
THICKENER
TRIPPER
DISTRIBUTOR
DE-ENTRAINER
REDUCTION KILN (REFRACTORY LINED)
FEED STORAGE
WEIGH BELT

DRAWING (see page 4)



Form Approved OMB No. 158-S80004

KERR-McGEE

March 22, 1982

MAR 1982
RECEIVED
Health Dept.
Solid Waste

Mr. B. E. Cox, Jr.
Hazardous and Industrial Waste Section
Division of Solid and Hazardous Waste
Environmental Health Administration
State Office Building
Montgomery, Alabama 36130

Dear Mr. Cox:

We have received your letter of February 26, 1982 concerning the iron oxide pond at the Kerr-McGee Chemical Corporation facility at Theodore, Alabama. Iron oxide generated during the synthetic rutile process is stored as an aqueous slurry in this fourteen-acre surface impoundment built in 1976. This impoundment will probably reach capacity in late 1982 and we are, therefore, planning an expansion of ten acres.

This design capacity increase is allowable under Section 4-261.04(a) of the Alabama Hazardous Waste Management Regulations and as such is not considered a "new" facility. Waste characteristics and daily flow rates will not be changed.

We estimate the cost of the expansion to be approximately $1,750,000 and the cost of a comparable entirely new facility to be approximately $4,250,000. Since expansion cost is less than fifty percent of the total cost, "reconstruction" as defined in Section 4-261-04(d) will not occur, thereby making this change allowable during interim status.

If this proposal is acceptable, we will prepare an engineering report for this expansion. This report will then be submitted to your Division and the Alabama Water Improvement Commission together with a revised RCRA Part A permit application.

We believe the foregoing summarizes our understandings of discussions with you and Mr. Mike Smith of your staff, and meets your requirements. We would very much appreciate your early review and approval so we can expedite this project.

Sincerely,

S. W. Foster
Facility Manager

TLB:SWF:js
CC: Mr. James Scarbrough, Region IV EPA
Mr. John Poole, AWIC

KERR-McGEE

MOBILE FACILITY • POST OFFICE BOX [illegible] • THEODORE, ALABAMA [illegible]

November 8, 1983

Mr. B. E. Cox, Jr., Chief
Hazardous Waste Section
Land Division
Alabama Department of Environmental Management.
State Capitol
Montgomery, Alabama 36130

Dear Mr. Cox:

Kerr-McGee Chemical Corporation respectfully requests approval to construct a solid waste landfill at the Mobile Facility for the disposal of approximately 3,000 cubic yards of inert scrap material accumulated during the operating life of this plant. The scrap material consists of lined and unlined pipe, plastic, teflon, rubber, iron, wood, trash, crushed barrels, etc. No hazardous materials will be placed in the landfill.

The proposed site is not located within a flood plain. The bottom grade of the fill will be a minimum of five feet above the seasonal high ground water table.

The landfill will be constructed by excavating an area 100' by 200' by 7' deep The scrap material will be placed in the excavated area, followed by backfilling and grading to prevent standing water. A clay cap will be placed on the backfill material which will then be covered with native topsoil, fertilized, limed, and seeded to establish a permanent grass cover.

The landfill will only be used for disposal of materials presently stored in our scrap pile. Once these materials are placed in the fill and covered, the fill will be permanently closed.

Should you or your staff have any questions regarding this matter, please contact our Environmental Engineer, Mr. Alex Napier.

Sincerely,

S. W. Foster
Facility Manager

NOV 1983
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Land Division

SWF:js
Enclosure
CC: Mr. R. A. Napier
Ms. Sonja Massey, ADEM
Mr. H. A. Perkins
Mr. J. H. Stallings
3.36.01
3.01.07

ADEM

ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

George C. Wallace
Governor

1751 Federal Drive
Montgomery, AL
36130
205 271 7700

Field Offices

P.O. Box 953
Decatur, AL
205 353 1713

Jon 1 806 Building 8
225 Oxmoor Circle
Birmingham, AL
35209
205 942-6168

1358 Midmost Drive
Mobile, AL
36609
205 343-7841

October 8, 1984

MEMORANDUM

TO: Bernard E. Cox BEC

FROM: Margaret E. Markey MEM

Subject: Inspection of Kerr-McGee Chemical Corporation Facilities, September 13, 1984

On the above date the writer and Mike Piznar visited the Kerr-McGee Corporation Mobile facility to familiarize ourselves with the facility and determine its regulatory status under the Alabama Hazardous Waste Managment Act. Messrs. Alex Napier, Haywood Perkins, Sidney Foster and John Stallings of Kerr-McGee accompanied us throughout our visit.

Kerr-McGee has requested withdrawal of their Part A because the company feels it is exempt from regulation under Section 4-230.03(b)(7) of the Alabama Hazardous Waste Management Regulations (Part 261.4(b)(7)), because the hazardous waste generated at Kerr-McGee is an iron oxide waste resulting from the beneficiation of ilmenite.

The attached drawings outline the ilmenite beneficiation process. Ilmenite, an ore consisting of iron, titanium and oxygen, is processed per the attached drawings to remove the iron as ferric oxide, leaving a relatively pure form of titanium dioxide. No chemical conversion of titanium dioxide occurs during the process.

The iron oxide waste produced from this process is hazardous due to the corrosivity characteristic. This waste is currently stored in a large surface impoundment, which has leaked and caused ground water contamination due to high iron and low pH. Kerr-McGee has installed a French drain around this impoundment which collects contaminated ground water (mainly as liquid leaks out of the impoundment). This ground water is treated in the facility wastewater treatment plant is discharged under an NPDES permit. No other regulated units exist at this facility.

Kerr-McGee plans to continue its ground water corrective action program whether or not their facility is exempt under RCRA. When questioned, Mr. Napier indicated that Kerr-McGee intends to close out the large impoundment in the near future (i.e., when the currently unused smaller impoundment has been adequately lined) by neutralizing the waste in place.

From our inspection, it appears that Kerr-McGee qualifies for exemption from regulation under Section 4-230.03(b)(7). However, the facility should be closely monitored as an industrial waste facility to insure proper management of their iron oxide waste in the future.

MEM/sjw

Attachments (2)

File: Kerr-MGee - TSDF ✓

KERR-McGEE

KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA

September 26, 1984

Mr. B. E. Cox, Jr., Chief
Industrial and Hazardous Waste Section
Land Division

Mr. James H. Scarbrough, Chief
Residuals Management Branch
Region IV
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: Kerr-McGee Chemical Corporation
Mobile Facility
Theodore, Alabama 36582
EPA ID ALD071937890
Surface Impoundment Modifications
and Repairs

Gentlemen:

A beneficiation process for impure titanium dioxide ore (ilmenite) has been operated by the Kerr-McGee Chemical Corporation at their Mobile Facility near Theodore, Alabama, since 1977. Iron oxide waste produced in the process has been disposed in a nineteen-acre impoundment. A ten-acre expansion of this impoundment was completed and placed into service on June 12, 1984.

The new Impoundment Included a lower compacted clay underliner, a middle leak detection/collection system and a synthetic Hypalon liner. From samples collected in the leak detection/collection system, it was determined the Hypalon liner 1s leaking. the solid iron oxide waste has been routed back to the original impoundment.

In order to protect the clay underliner,

However, the reduced capacity of the original impoundment will allow operation of the Mobile Facility for only two months before it is filled with iron oxide waste.

Thompson Engineering Testing, Inc.
Geotechnical. Materials and Environmental Engineers • Laboratories
Post Office Drawer 9637 • Mobile, Alabama 36691

October 17, 1984

Kerr McGee Chemical Corporation
P.O. Box 629
Theodore, Alabama 36582

Attention: Mr. Alex Napier

Subject: Iron Oxide Pond Modification Project
Kerr McGee Chemical Corporation
Mobile Facility

Gentlemen:

As requested, we have reviewed our files and calculations as well as those performed by others regarding seepage evaluations for the subject containment pond. Furthermore, additional geotechnical data related to slope stability calculations and dike improvement design details have been compiled.

We present the following for your consideration and action:

1) The original seepage calculations and methodology provided Kerr McGee and its consultant by our firm for the perimeter drain system are summarized on the attached computation sheets 1 and 2 for the east and north sides of the pond. A total flow of 28536 gpd (summation of north side at 16546 gpd and east side at 11,990 gpd) was predicted for the two sides. This value equals 19.81 gpm.

2) This assumption, due to the geometrically concentric deposits of underlying impermeable clays about the south and west sides, was doubled when the completed drainage loop was installed. Consequently, a total of 39.62 gpm operating flow was predicted.

3) Historical records maintained by Kerr McGee indicate that normal operating flows for the total loop system have been on the order of 40 gpm, reflecting excellent field-to-prediction conditions.

4) Maximum predicted flows during peak rainfall periods (peak flows are primarily due to outside seepage conditions in lieu of pond seepage rates) were presented as 108 gpm for the entire system in our 1979 analysis, Job No. 2542-79-141-E. Maximum reported peak flows have been on the order of 104 gpm. Again, excellent correlation was achieved.

5) Reiterating our predictions presented in the recent August 20, 1984 submittal, total increases in flow due to the the second phase, full height increase in liquid level in the pond should not exceed a predicted flow of 26 percent over existing. Again, maximum (yet unrealistic) theoretical increases of 110 percent are obtained if permeabilities of dike and iron oxide are set equal to the permeable silty sands outside of the containment system. The total maximum theoretical flow of 220 gpm is still well within the treatment capability of the plant. It is emphasized again, however, that the maximum theoretical value cannot be justified and has been used only to reflect the conservative capability of the system.

6) The perimeter drain system, after review of construction plans and drawings, included a six diameter drain pipe in lieu of the previously reported four inch pipe and is quite capable of transmitted all anticipated, as well as maximum theoretical, flows.

7) Final slope stability calculations employing conservative input strength parameters for both the Phase I and Phase II dike construction schemes are presented as an attachment to this transmittal. Our method of calculations included a computer aided program based on Bishops method of slices developed by the Division of Research of the Kentucky Department of Highways in cooperation with the U.S. Department of Transportation. Unrealistically high and elevated phreatic surfaces (seepage lines) were conservatively employed in the analyses. Field exploration and monitoring at the site indicate that seepage lines will be well below those assumed (on the order of six to eight feet), producing factors of safety well above those presented.

8) First phase construction will include raising the dike system five feet above existing.

9) In addition to the use of relatively impermeable sand clay soil in the compacted dike section (permeabilities between 5 x 10 and 1 x 10^{-7} cm/sec), the proposed inboard dike slopes will be constructed with a triple layer ballasted geomembrane system for slope protection and additional phreatic surface reduction. The system will include an initial woven geotextile layer place on

the inboard dike face, followed by a 10 mil thick polyethelene sheeting layer, protected by an additional geotextile layer thereon. The lining system will be ballasted and top keyed for protection against wind and wave action.

If any questions arise regarding these matters, please advise.

Respectfully,

THOMPSON ENGINEERING TESTING, INC.

Henry R. Seawell, III, P.E.
Alabama Registration No. 12958
Senior Consulting Engineer

HRS/lr

Enclosures: Seepage Calculation Sheets 1 and 2
Slope Stability Analysis

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 26 1984

DEC 1984
RECEIVED
ADEM
Land Division

OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Hazardous Waste Determination on the Kerr-McGee Chemical Corporation Plant in Theodore, Alabama

FROM: John P. Lehman, Director
Waste Management and Economics Division (WH-565)

TO: James H. Scarbrough, Director
Residuals Management Branch
Region IV

In response to your request of October 17, 1984, we have reviewed the material describing the processes and waste streams at the Kerr-McGee plant in Theodore, Alabama. We conclude that the acidic iron oxide waste generated by the facility's acid recovery unit is excluded from regulation under Subtitle C of RCRA by the mining waste exclusion in Section 3001(b)(3)(A)(ii) of the Resource Conservation and Recovery Act. This provision excludes wastes from the "extraction, beneficiation, and processing of ores and minerals, including phosphate rock and overburden from the mining of uranium ore."

Kerr-McGee uses hydrochloric acid to digest ilmenite ($FeTiO_3$) into synthetic rutile (TiO_2). This beneficiation process produces a waste stream consisting of hydrochloric acid and ferric oxide. Since this is a beneficiation process, both of these wastes are excluded from Subtitle C regulation by the mining waste exclusion. The fact that the hydrochloric acid is generally regenerated and reused, rather than discarded, (though some hydrochloric acid may become entrained with the discarded iron oxide slurry), does not affect the application of the exclusion; these wastes still fall within the mining waste exclusion because they are generated by beneficiation of an ore.

It is true that the mining waste exclusion does not apply to "solid wastes, such as spent solvents, pesticide wastes, and commercial chemical products, that are not uniquely associated with these mining and allied processing operations ..." 45 FR at 76619. For example, 1, 1, 1-trichlorethane used as a solvent to clean machinery would not be covered under the mining waste exclusion. However, since digestion using

hydrochloric acid is an integral part of the process, i.e., the acid is "uniquely associated" with this beneficiation procedure, this provision does not apply to the Kerr-McGee process.

You have cited my memorandum to Henry Schroeder, Region VIII Project Officer for Utah, dated September 24, 1982, as support for your position. However, we conclude that the situations at Kerr-McGee and Kennecott Copper are not comparable. Kerr-McGee is removing hydrochloric acid from the wastestream of a beneficiation process, producing a second wastestream. In other words, the wastestream from this removal process is derived from the original wastestream. Therefore, the regulatory status of the original wastestream (i.e., whether or not it is excluded from regulation as a mining waste) is relevant in determining the regulatory status of the second wastestream. In the Kennecott situation, however, there were two separate processes at issue, each producing its own distinct wastestream. Therefore, the regulatory status of one wastestream did not affect the regulatory status of the other.

Even if the ferric oxide waste at Kerr-McGee was not a by-product of ore beneficiation and, therefore, within the mining waste exclusion, I am not certain that it would be a corrosive waste, as defined in 40 CFR §261.22. A waste exhibits the characteristic of corrosivity if the waste is either:

(1) "aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5 ..." or

(2) "liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year ...."

In your memorandum, you indicate that the pH range of the slurry is 2.0 to 5.0. Therefore, it is not clear whether this waste would meet the first criterion if it were tested. Of course, the waste would be corrosive if it meets the second test above.

If you need additional information, please contact Dr. Dexter Hinckley (382-7917).

file: KERR-McGEE TSD

RZ- If you agree with this, let's draft a similar letter granting withdrawal (i.e. -

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DEC 14 1984

4AW-RM

Mr. Don Schiesz
Vice President and General Manager
Pigment Division
Kerr-McGee Chemical Corporation
Oklahoma City, Oklahoma 73125

Re: Request for Exclusion Under §261.4(b)(7) ("Beneficiation of Ores") and Withdrawal of the Part A Application for the Mobile Facility (AID 071 937 890) Located in Mobile County on Rangeline Road, Theodore Industrial Park, Theodore, Alabama 36582

Dear Mr. Schiesz:

This is in response to your letter of August 7, 1984, subject as above.

Vie understand that your operation consists of the processing of ilmenite ore to separate out the contaminant iron, yielding a synthetic rutile (high concentration of TiO_2). The ilmenite is first reduced with heat in the presence of fuel oil; subsequently, the iron is leached out by HCl digestion; finally, the spent acid liquor is regenerated to produce HCl for recycling. The resulting iron oxide (Fe_2O_3) slurry is then discharged to a disposal surface impoundment. Because the Fe_2O_3 slurry is a solid waste resulting from the beneficiation of raw ilmenite ore, we agree with your contention that it is excluded from being a hazardous waste under §261.4(b)(7).

Since you apparently have no other activity at your site which is regulated under RCRA, your request for withdrawal of your Part A will now be processed, beginning with the preparation of a public notice.

Please be advised that EPA Headquarters' opinion was solicited in this matter. A copy of their response is enclosed.

In light of the above, you will not be required to submit a Part B application, as requested by our letter of July 10, 1984.

DEC 1984
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ADEM
Land Division

3286

Any questions pertaining to the above should be directed to Jack Harvanek at 404/881-3067.

Sincerely yours,

James H Scarbrough

James H. Scarbrough, Chief
Residuals Management Branch

Enclosure

cct Buddy Cox, Alabama Department of Environmental Management
James Neal, Alabama Department of Environmental Management
Margaret Markey, Alabama Department of Environmental Management
James Holdaway, Haste Compliance Section

File: KERR MCGEE
TSD/WITHDRAWN

MAY 71985

4WD-RM

Mr. Don Schiesz
Vice President and General Manager
Pigment Division
Kerr-McGee Chemical Cocporation
Oklahoma City, Oklahoma 7312S

Re: Request tor Exclusion Under §261.4(b)(7) ("Beneficiation of Ores") and Withdrawal of the Part A Application tor the Mobile Facility (ALD 071 937 890) Located in Mobile County on Rangeline Road, Theodore Industrial Park, Theodore, Alabama 36582

Dear Mr. Schiesz:

This is a follow up to our letter of December 14, 1984, in which we indicated that withdrawal ot your Part A application was being processed. We have now made the determination that your site is not RCRA regulated, and your facility has been placed on "non-handler" status in our data system.

Any convents pertaining to the above should be directed to Jack Marvanek at 404/881-3067.

Sincerely yours,

Janes H. Scarbrough, Chief
Residuals Management Branch
Waste Management Division

cc: Daniel E. Cooper, Alabama Department of Environmental Management
R. Alex Napier, Kerr-McGee, Mobile Facility

MAY 1985
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ADEM
LAND DIVISION

LAND PROGRAM

1982 Hazardous Waste Generator and On-Site TSO Facility Annual Report

Mobile Facility

Solid Waste RECEIVED 1982 MAR

1

NOTE: Read all Instructions prior to completing this form.

I. Installation EPA ID Number: AL D 0 7 1 1 9 3 7 8 9 0

II. Name of Installation: Kerr-McGee Chemical Corporation - Mobile Facility

III. Location of Installation: Rangeline Road - Theodore Industrial Park
(Street or Route Number)

Theodore (City or Town) * Mobile (County) Alabama (State) 36590 (Zip Code)

IV. Installation Contact: Robert A. Napier (Name) 205-653-8820 (Area Code) (Telephone Number)

V. Waste Identification:

Line Number	A. EPA Waste Number	B. Description of Waste	C. Quantity Generated (LBS)	D. Amount of Waste by Handling Method: 1. Handling Method Code	2. Quantity Stored, Treated Disposed, or Recovered On-Site	Shipped to Off-Site Treatment Disposal, or Recovery Facility: 3. Quantity	4. Facility EPA ID No./Recovery Facility Name
				D85			
1.	D002	Iron Oxide contaminated with lead and chromium	103,420,000	Surface Impoundment	152,944,785	N/A	N/A
2.	D007	See Above	See Above	See Above	See Above	N/A	N/A
3.	D008	See Above	See Above	See Above	See Above	N/A	N/A
4.							
5.							

(If more space Is needed, check ☐ and complete Attachment I)

VI. Closure Cost Estimate for Facilities $ 1,084,550.00

VII. Cost Estimate for Post-Closure Monitoring and Maintenance (Disposal Facility Only) $ 238,800

VIII. Certification:

S. W. Foster — (Signature)

S. W. FOSTER — (Print or Type Name)

PLANT MANAGER — (Title)

I certify under penalty of law that I have personally examined and am familiar with the Information submitted In this and all attached documents and that based on my Inquiry of those Individuals Immediately responsible for obtaining the Information I believe that the submitted Information Is true, accurate and complete. I am aware that there are significant penalties for submitting false Information

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

LAND PROGRAM

19 83 Hazardous Waste Generator and On-Site TSD Facility Annual Report

NOTE: Read all instructions prior to completing this form.

I. Installation EPA ID Number: AL D 0 7 1 1 9 3 7 8 9 0

II. Name of Installation: Kerr-McGee Chemical Corporation

III. Location of Installation: Rangeline Road, Theodore, Industrial Park
(Street or Route Number)

Theodore (City or Town) | Mobile (County) | Alabama (State) | 36590 (Zip Code)

IV. Installation Contact: Alex Napier (Name) | 205 (Area Code) | 653-8820 (Telephone Number)

V. Waste Identification:

Line Number	A. EPA Waste Number	B. Description of Waste	C. Quantity Generated (LBS)	D. Amount of Waste by Handling Method: 1. Handling Method Code	2. Quantity Stored, Treated Disposed, or Recovered On-Site	Shipped to Off-Site Treatment Disposal, or Recovery Facility: 3. Quantity	4. Facility EPA ID No./Recovery Facility Name
1.	D002 D008	Corrosive Iron Oxide Contaminated with Lead	52,000,000	D85-Surface Impoundment	52,000,000	0	
2.							
3.							
4.							
5.							

(If more space is needed, check ☐ and complete Attachment I)

VI. Closure Cost Estimate for Facilities $ 1,150,000.00

VII. Cost Estimate for Post-Closure Monitoring and Maintenance (Disposal Facility Only) $ 8,500.00/year

VIII. Certification:

S W Foster (Signature) | S. W. Foster (Print or Type Name) | Facility Manager (Title)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents and that based on my inquiry of those individuals immediately responsible for obtaining the information I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
LAND PROGRAM
1984 Hazardous Waste Generator and On-Site TSD Facility Annual Report

NOTE: Read all instructions prior to completing this form.

I. Installation EPA ID Number: ALD071913890

II. Name of Installation: Kerr-McGee Chemical Corporation, Mobile Facility

III. Location of Installation: Rangeline Road, Theodore Industrial Park
(Street or Route Number)

Theodore, (City or Town) Mobile (County) Alabama (State) 36582 (Zip Code)

IV. Installation Contact: Robert A. Napier (Name) (205) 653-8820 (Area Code) (Telephone Number)

V. Waste Identification:

Line Number	A. EPA Waste Number	B. Description of Waste	C. Quantity Generated (LBS)	D. Amount of Waste by Handling Method: 1. Handling Method Code	2. Quantity Stored, Treated Disposed, or Recovered On-Site	Shipped to Off-Site Treatment Disposal, or Recovery Facility: 3. Quantity	4. Facility EPA ID No./Recovery Facility Name
1.	D002 D008	Corrosive Iron Oxide Contaminated with Lead	98,970,000	D85-Surface Impoundment	98,970,000	0	
2.							
3.							
4.							
5.							

(If more space is needed, check ☐ and complete Attachment I)

VI. Closure Cost Estimate for Facilities $ 1,195,600.00

VII. Cost Estimate for Post-Closure Monitoring and Maintenance (Disposal Facility Only) $ 8,800.00/year

VIII. Certification:

M W Merrill (Signature) M. W. Merrill (Print or Type Name) Facility Manager (Title)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents and that based on my inquiry of those individuals immediately responsible for obtaining the information I believe that the submitted information is true, accurate and complete. I am aware that there are [illegible]

SITE REPORT

Place: Kerr-McGee
Mobile County

ID #
Date: 7/29/82 8:30 a.m. until 1:00 p.m

Ronald F. Ford - Pollution Control Specialist
Pam Lawson - Student Aide
Robert Alex Napier - Environmental Engineer - Kerr McGee Chemical
Emery E. Baya - Vester Thompson, Jr., Inc.
Mike Nance - Vester Thompson, Jr., Inc.

The wells had been bailed out the day before by Vester Thompson employees. They had measured the volume of water in the wells and removed four volumes. The wells were two inch diameter P.V.C. pipe. They were placed in a manner so as to sample the top two aquafiers. They called the wells North, East, South and West, shallow or deep. The background well was to the North-west.

The samples were duplicate grab-samples. The samples were taken and the pH and temperature were measured at the site.
Those measures were as follows:

E-D	pH	5.4 , 5.48	temp. 64°F
E-S	PH	4.4 , 4.41	temp. 60°F
N-D	pH	6.0 , 5.73	temp. 62°F
N-S	pH	3.6 , 3.53	temp. 68°F
N.W.	PH	5.95, 5.87	temp. 62°F
W.D.	PH	6.1 , 6.10	temp. 62°F
W.S.	pH	3.25, 3.29	temp. 26°C
S.D.	pH	5.15, 5.02	temp. 26°C
S.S.	PH	3.2 , 3.22	temp. 23°C

The samples were collected and preserved in the following manner:
One ½ gallon plastic jug - iced
One ½ gallon plastic jug - 7ml - 10ml H_2SO_4
One ½ gallon plastic jug - 7ml - 10ml HN03
One gallon glass bottle - iced

The chain of custody was maintained by the sample being locked in the truck when not in sight of a state employee. Also, I.D. cards are filled out for each sample. The samples are logged in a bound log book and assigned I.D. numbers. The samples are tested by standard EPA and ASTM methods.

The time and observation made about each well is noted on the lab results report sheet. The results of all the lab tests are also reported.

Results: The Arsenic and Barium parameters equal or exceed the primary drinking water standards in nearly all of the shallow wells. The pH and the Specific Conductance parameters show a significant difference between shallow and deep wells. The company has already taken steps to attenuate the environmental impact that they have enacted on the area.

Next Visit: July 29, 1983

Ronald F. Ford, Pollution Control Specialist

Date October 13, 1982

Attachments: (1) Lab Reports

lh

(MOBILE CO)

ADEM

ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

ail ng Address:
ate Capitol
onigomery, AL
,130
5/834-1303

eld Offices:

O Bo- 953
ecatur, AL
602
5/353 1713

ml 806 Building 8
5 Oxmoor Circle
rmingham, AL
209
5 942-6168

5E Midmost Drive
obile, AL
609
5 343-7841

6: Demetropolis Rd.
ite10
obile, AL
609
5 660-0150

January 18, 1984

BEL

MEMORANDUM

TO: IW Files

FROM: Charles Fleming

Re: ALD 071 937 890
Kerr-McGee, Proposed Landfill

On January 5, 1984, Buddy Cox and I met with Alex Napier, a representative of Kerr-McGee, at their facility in Theodore, Alabama. The purpose of our visit was to inspect the site of a proposed industrial non-hazardous, on site landfill and to look at the waste intended for disposal. The proposed site is located within the facilities property boundary. The area is underlain by a gray clay material and was determined to be suitable for its intended purpose. The material to be disposed of was scrap pipe, miscellaneous trash, concrete, and other plant debris all of which is non-hazardous. Jim Neal is sending a letter of approval for this project. The landfill is a "one shot" project and is not intended for a on going landfilling operation.

CF/sjw

VESTER J. THOMPSON, JR., INC.
CHEMICAL, MATERIALS AND GEOTECHNICAL LABORATORIES
3707 COTTAGE HILL ROAD
MOBILE, ALABAMA 36609
TELEPHONE 205/666-2443

RDER NO. 1182-82-379-CL

LIENTS NO.

LABORATORY NO. 26611-16

REPORT NO. 1.

REPORT

May 31, 1982

REPORT OF: Extraction Procedure Tests of Solid Waste Material

REPORT TO: Kerr McGee Chemical Corporation
P.O. Box 629
Theodore, AL 36582

Attention: Alex Napier

Date Sample Submitted to Laboratory: 5/5/82

ANALYSIS

Sample Identification:	E. Side Fe Oxide Pond 5/4/82	S. Side Fe Oxide Pond 5/4/82	N. Side Fe Oxide Pond 5/4/82
Lab No.:	26612	26613	26614
Extraction Test Conditions			
Weight Of Solid Phase Extracted, gms	25	25	25
Equivalent Volume of Liquid Phase Extracted, mls	4.5	2.4	6.1
Final Volume Extract, mls	404.5	402.4	406.1
Initial pH of Mixture	2.9	2.8	2.8
Volume of Acetic Acid (0.5N) Required to Maintain Mixture at pH 5.0, mls	0	0	0
Analysis of Extract			
Total Chromium as Cr, mg/l	0.24	0.12	0.21
Hexavalent Chromium as Cr, mg/1	<.05	<.05	<.05
Total Lead as Pb, mg/1	8.4	5.2	8.4

(Cont.)

REPORT ON SAMPLE BY CLIENT APPLIES ONLY TO SAMPLE. REPORT ON SAMPLE BY US APPLIES ONLY TO LOT SAMPLED.
INFORMATION CONTAINED HEREIN IS NOT TO BE USED FOR REPRODUCTION EXCEPT BY SPECIAL PERMISSION.
SAMPLES RETAINED FOR THIRTY DAYS MAXIMUM AFTER DATE OF REPORT UNLESS SPECIFICALLY REQUESTED

ANALYSIS

Sample Identification:	WWTP Underflow 5/4/82	Slurry Line Discharge 5/4/82
Lab No.:	26615	26616

Extraction Test Conditions

Weight of Solid Phase Extracted, gms	50	25
Equivalent Volume of Liquid Phase, mls	84	146
Final Extract Volume, mls	884	546
Initial pH of Mixture	2.3	2.4
Volume of Acetic Acid (0.5N) Required to Maintain Mixture at pH 5.0, mls	0	0

Analysis of Extract

Total Chromium as Cr, mg/l	<.01	1.3
Hexavalent Chromium as Cr, mg/1	<.05	<1
Total Lead as Pb, mg/1	0.095	49

Sample Identification:	W. Side Fe Oxide Pond 5/4/82
Lab No.:	26611

Analysis of Filtrate

Total Chromium as Cr, mg/1	4.3
Hexavalent Chromium as Cr, mg/1	<1
Total Lead as Pb, mg/1	180

The extraction test tests and procedures were conducted in accordance with the methods published in "Test Methods for the Evaluation of Solid Wastes, Physical/Chemical Methods," SW 846, U.S. Environmental Portection Agency, Office of Solid Waste, Washington, D.C. Since the suspended residue in W. Side Fe Oxide Pond sample was less then 0.5%, the analyses were conducted directly on the filtered (0.45 μ) portion of the sample.

If you have any questions, please advise.

VESTER J. THOMPSON, JR., INC.

James C. Sciple

JCS/mar

STATE OV ALABAMA
WATER IMPROVEMENT COMMISSION

PERMIT FOR DISCHARGE
Issued To:

Kerr-McGee Chemical Corporation
Theodore, Alabama

Plans, specifications and other information for the design, construction, and operation of waste treatment facilities having been approved by CM staff of the office of the Alabama Water Improvement Commission, Montgomery, Alabama, in accordance with Act No. 1260, Acts of Alabama, Regular Session, 1971; and having determined that the project was constructed in accordance with the approved plans and specifications, a permit is hereby issued for the discharge of treated wastes from the facility described as follows:

> An acid [illegible] plant for the recovery of hydrochloric acid from the [illegible] process, a fourteen (14) acre tailings pond for the [illegible] of process waste solids and the [illegible] of process [illegible] and two (2) acre final settling pond for receiving [illegible] effluents of process wastes from the tailings pond and non-process wastes including tank farm impoundment runoff, cooling tower blowdown, steam condensate, boiler blowdown, and water softener backwash.

The purpose of said treatment facilities is to provide treatment of wastewaters resulting from the beneficiation of ilmenite ore to produce synthetic rutile. The effluent from the above described facilities is to be discharged into the Middle Fork of the Bear River.

This permit for discharge as described above is hereby issued subject to the following conditions:

1. The approval of the Water Improvement Commission;

2. The rules and regulations of the said Water Improvement Commission now or hereafter adopted;

3. The provisions of Act No. 1260, Acts of Alabama, Regular Session, 1971, supra, and amendments now or hereafter adopted;

4. The waters discharged under this permit shall not contain materials likely to be: toxic or otherwise injurious to fish, aquatic life, or wildlife; detrimental to the health and welfare of the public; or restrictive to use of the stream for agriculture, livestock watering, navigation or other beneficial purposes;

5. The effluent shall not violate applicable water quality standards now or hereafter adopted;

6. The characteristics of the treated waste shall not exceed the following limits:

Discharge Serial 001: Tank Farm Impoundment [illegible]noff, Cooling Tower Blowdown, Steam Condensate, Boiler Blowdown, and Water Softener Backwash

Parameter	Daily Average	Daily Maximum
Flow	0.026 MGD	0.039 MGD*
Temperature	—	90°F
Total Suspended Solids	10.8 lbs/day (50 mg/l)	24.4 lbs/day (75 mg/l)
Total Dissolved Solids	1301 lbs/day (6000 mg/l)	2927 lbs/day (9000 mg/l)
Chlorides	750 lbs/day (3500 mg/l)	1708 lbs/day (5250 mg/l)
Iron (total)	0.30 lbs/day (1.40 mg/l)	0.90 lbs/day (2.80 mg/l)
Chromium (total)	0.05 lbs/day (0.25 mg/l)	0.16 lbs/day (0.50 mg/l)
Zinc	0.02 lbs/day (0.07 mg/l)	0.05 lbs/day (0.14 mg/l)
pH	6.0 - 9.0 std. units	—

[redacted]ly [redacted] flow limitation not applicable during rainfall events

* The [redacted] waste shall [redacted] monitored in a manner approved by the [redacted] staff;

► The [redacted] plan for containment of contaminated ground water in the [redacted] surrounding the tailings pond as approved by the Geological Sur[redacted] Alabama shall be available for immediate implementation upon a di[redacted] from the staff;

9. The [redacted] shall expire * the time of startup of Kerr-McGee Chemical Corporation's titanium dioxide plant at Theodore, Alabama.

Signed: Ira L. Myers

Ira L. Myers, M.D., Chairman
Water Improvement Commission

James W. Warr

James W. Warr
Chief Administrative Officer
Water Improvement Commission

Issued [redacted] of December, 1976.

This [redacted] supersedes all previously issued permits.

HAZARDOUS WASTE DISPOSAL FACILITY

FINAL CLOSURE PLAN

IRON OXIDE POND

KERR-MCGEE CHEMICAL CORPORATION

MOBILE FACILITY

THEODORE, ALABAMA

FEBRUARY 1981

I. Description of Final Closure

A. General Description

The iron oxide disposal pond will be drained of all free liquids into a new pond via a gate and pipe at the southwest corner of the pond. The surface will be allowed to dry prior to placing the final cover on the pond. The piping into the pond will be removed prior to final closure and will be decontaminated prior to disposal or will be reused in the new pond.

B. Control of Pollutant Migration

1. Ground Water

The final cover will be a low permeability clay material in order to reduce ground water contamination. A ground water collection system consisting of a french drain and disposal to the plant waste water treatment system will also reduce the chances of ground water contamination.

2. Surface Water

Surface water will have no contact with the iron oxide waste material. Any surface water collected prior to complete closure will drain to the new pond.

3. Air

There will be no air contamination prior, during or after closure of the facility.

C. Control of Surface Water Infiltration and Pooling

Surface water infiltration will be controlled by use of a low permeability clay soil and by the proper sloping to facilitate run off from the facility. Pooling of surface water will also be controlled by a proper slope for run off.

D. Control of Erosion

Erosion will be controlled by the use of topsoil and the necessary grass to maintain a year round vegetation cover of the facility.

II. Inventory of Waste Material

Approximately 125,000 cubic yards of waste material are ~~presently~~ in the surface impoundment at the present time. Also the impoundment has a constant water level of approximately 11 feet. Approximately 80,000 tons of iron oxide will be placed in the surface impoundment per year at a near constant rate. The water will remain until the new pond is constructed. The objective is to fill the old pond with the iron oxide prior to closure.

III. Schedule for Final Closure

The following are estimated dates based on present data:

A. Date when waste will no longer enter the old pond - May 1983

B. Date when installation of final cover will begin - May 1984

C. Date when final cover will be completed - October 1984

IV. Cost of Final Closure

The following is an estimate of the cost of final closure and monitoring and maintenance: $995,000,

M.2 - SITE MAINTENANCE FORM

" ACTION: _ *

EPA ID: ALD071937890

SITE NAME: KERR MCGEE CHEMICAL CORP SOURCE: H • _____ _ *

STREET: RANGE LINE RD CONG DIST: 01 * _____ _ *

CITY: THEODORE ZIP: 36590 - _____ _____-____ *

CNTY NAME: MOBILE CNTY CODE: 097 * _____ __ *

LATITUDE: 30/30/12.0 LONGITUDE: 088/07/54.0 * __/__/__._ ___/__/__._ *

SMSA: 5160 HYDRO UNIT: 03160205 * ____ _____ *

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N " _ _ _ _ *

NPL INO: N NPL LISTING DATE: NPL DELISTING DATE: * _ __/__ __/__ *

APPROACH: SITE CLASS: * ___ __ *

SITE/SPILL IDS: * __ __ __ __ __ *

RPM NAME: BETSY SHAVER RPM PHONE: 404-881-2234 * _____ ___-___-____ *

DIOXIN TIER: REG FLD1: REG FLD2: 4 * ____ _____ _ *

RESP TERM: PENDING (X) NO FURTHER ACTION (> " PENDING (_> NO FURTHER ACTION (_) *

ENF DISP: NO VIABLE RESP PARTY ( ) VOLUNTARY RESPONSE ( ) * _ _ *

ENFORCED RESPONSE < > COST RECOVERY <) * _ _ *

SITE DESCRIPTION:

THIS SITE IS CURRENTLY USED FOR BENEFICIATION OF ORE. AT ON * _____ *

E TIME IT WAS A DEPT. OF DEFENSE AMMUNITION STORAGE AREA. * _____ *

* _____ *

* _____ *

M.2 - ALIAS/ALIAS LOCATION MAINTENANCE FORM

* ACTION: _ *

SITE: KERR MCGEE CHEMICAL CORP

EPA ID: ALD071937890 ALIAS SEO NO: 01

ALIAS NAME: KERR-MCGEE SOURCE: S * _____ _ *

ALIAS LOCATION * ACTION: _ *

CONTIGUOUS PORTION OF SITE? C * _ *

STREET: PLEASANT GROVE CONG DIST: 07 * _____ __ *

CITY: THEODORE ST: AL ZIP: 35127 * _____ __ _____-____ *

CNTY NAME: MOBILE CNTY CODE: 073 * _____ ___ *

LATITUDE: 33/29/36.0 LONGITUDE: 086/S8/12.0 * __/__/__.__ ___/__/__.__ *

SMSA: 1000 HYDRO UNIT: 03160112 * ____ _____ *

ALIAS DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

M.2 - PROGRAM MAINTENANCE FORM

* ACTION: _ *

SITE: KERR MCGEE CHEMICAL CORP

EPA ID: ALD071937890 PROGRAM CODE: H01 PROGRAM TYPE: * _ *

PROGRAM QUALIFIER: ALIAS LINK : * * *

PROGRAM NAME: SITE EVALUATION * *

DESCRIPTION:

* *
* *
* *
* *

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: KERR MCGEE CHEMICAL CORP
PROGRAM: SITE EVALUATION

EPA ID: ALD071937890 PROGRAM CODE: H01 EVENT TYPE: DS1

FMS CODE: EVENT QUALIFIER: EVENT LEAD: E * _ ___ _ *

EVENT NAME: DISCOVERY STATUS: * _____ _ *

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START:	__/__/__	__/__/__	__/__/__
COMP :	COMP :	COMP : 79/10/01	__/__/__	__/__/__	__/__/__

HO COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR « AMENDMENT # STATUS STATE X

* _____ _____ __ ___ *

M.2 - EVENT MAINTENANCE FORM

" ACTION: _ *

SITE: KERR MCGEE CHEMICAL CORP
PROGRAM: SITE EVALUATION

EPA ID: ALD071937890 PROGRAM CODE: H01 EVENT TYPE: PA1

FMS CODE: EVENT QUALIFIER: EVENT LEAD: S * _ ___ _ *

EVENT NAME: PRELIMINARY ASSESSMENT STATUS: * _____ _ *

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START:	__/__/__	__/__/__	__/__/__
COMP :	COMP :	COMP : 79/12/01	__/__/__	__/__/__	__/__/__

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR • AMENDMENT • STATUS STATE X

* _____ _____ __ ___ *

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: KERR MCGEE CHEMICAL COPP
PROGRAM: SITE EVALUATION

EPA ID: ALD071937890 PROGRAM CODE: H01 EVENT TYPE: PA2

FMS CODE: EVENT QUALIFIER: EVENT LEAD: S * _ ___ _ *

EVENT NAME: PRELIMINARY ASSESSMENT STATUS: * _____ _ *

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START: 85/10/01	__/__/__	__/__/__	__/__/__
COMP :	COMP :	COMP : 85/10/09	__/__/__	__/__/__	__/__/__

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR t AMENDMENT # STATUS STATE X

* _____ _____ __ ___ *

M.2 - COMMENT MAINTENANCE FORM

SITE: KERR MCGEE CHEMICAL CORP

EPA ID: ALD071937890

COM NO	COMMENT	ACTION
001	PART A- ON FILE	* _ _____ *
		* _____ *

M.2 - REGIONAL UTILITY MAINTENANCE FORM

SITE: KERR MCGEE CHEMICAL CORP

EPA ID: ALD071937890

REG CODE: HSCX-01 " ACTION: _ *
DESCRIPTION: EXPLOSIVES * _____ *
* _____ *
DATE1: * __/__/__ *
DATE2: * __/__/__ *
DATE3: * __/__/__ *
FREE FIELD: * _____ *

REG CODE: 4C85-01 * ACTION: _ *
DESCRIPTION: CERCLA FY8S COOPERATIVE AGREEMENT * _____ *
* _____ *
DATE1: * __/__/__ *
DATE2: * __/__/__ *
DATE3: * __/__/__ *
FREE FIELD: * _____ *

REG CODE: 4REF-01 * ACTION: _ *
DESCRIPTION: REFERRAL TO DEPT. OF DEFENSE INSTALLATION RESTORA- * _____ *
TION PROGRAM * _____ *
DATE1: * __/__/__ *
DATE2: * __/__/__ *
DATE3: * __/__/__ *
FREE FIELD: DOD * _____ *

M.2 - REGIONAL UTILITY MAINTENANCE FORM

SITE: KERR MCGEE CHEMICAL CORP

EPA ID: ALD071937890

REG CODE: 4STS-01

DESCRIPTION: STS SITE IDENTIFIED IN ECKHART SURVEY

ACTION: _

DATE1: __/__/__

DATE2: __/__/__

DATE3: __/__/__

FREE FIELD: