

**DRAFT 7003 ORDER AND POTENTIALLY  
RESPONSIBLE PARTY SEARCH LETTER REPORT  
FORMER SHUMAKER NAVAL AMMUNITION DEPOT**

**Prepared for**



**U.S. Army Corps of Engineers, Tulsa District  
1645 S. 101st East Avenue  
Tulsa, Oklahoma 74128-4629**

**December 20, 2000**

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# **DRAFT 7003 ORDER AND POTENTIALLY RESPONSIBLE PARTY SEARCH LETTER REPORT FORMER SHUMAKER NAVAL AMMUNITION DEPOT**

## **1.0 INTRODUCTION**

### **1.1 PROJECT OVERVIEW**

HydroGeoLogic, Inc. (HydroGeoLogic) received Task Order No. 04 under Contract No. DACA56-00-D-2011 to provide services to the U.S. Army Corps of Engineers (USACE)-Tulsa District. As part of this task order, HydroGeoLogic has developed this Draft 7003 Order and Potentially Responsible Party (PRP) Search Letter Report to discuss the U.S. Navy's activities at the former Shumaker Naval Ammunition Depot (Shumaker NAD) in Camden, Arkansas. In particular, HydroGeoLogic has examined the activities of the U.S. Navy and subsequent property owners and operators at the 14 priority sites identified in the Draft Resource Conservation and Recovery Act (RCRA) § 7003 Consent Order, which was first issued to the Department of the Navy by the U.S. Environmental Protection Agency (EPA), Region 6, on July 21, 2000, and was then revised and reissued to the Department of Defense (DOD) on September 6, 2000. These priority sites largely correspond with the 15 areas of interest identified by Parsons Engineering Science, Inc. (Parsons) in the "Phase I - Site Prioritization Report" dated January 2000.

For each of these individual priority sites, or for the former Shumaker NAD property as a whole, HydroGeoLogic does not believe that the EPA has met its burden of proof for initiating action against the Department of the Navy and/or the DOD under § 7003. In particular, HydroGeoLogic has not located information that would indicate that, as must be established to issue a § 7003 order, an imminent and substantial endangerment exists as a result of Navy activities at the individual priority sites or for the property of the former ordnance plant as a whole.

### **1.2 SITE BACKGROUND**

Construction of the Shumaker Naval Ordnance Plant (which became known as the Shumaker NAD on November 5, 1945), was initiated on October 7, 1944, at the height of World War II, when an urgent need for rocket production facilities was identified. On April 25, 1945, the first rocket production line, "M-2," was placed into operation, 5 months and 4 days after work at the plant had commenced. By the end of World War II, approximately 20,000 persons were employed in the construction and operation of the plant. Designed exclusively for the loading, assembly, testing, and storage of ordnance rockets, the rocket production facilities, magazines, warehouses, railroads, roads and administrative, industrial, and housing facilities were about 60 percent complete when the original contract was terminated on November 5, 1945, following the end of World War II. By August 1949, restrictions on funds caused the Shumaker NAD to be switched from reduced operational status to maintenance status, with approximately 125 employees.

Following the outbreak of the Korean War in June 1950, the demand for rockets increased, and the Shumaker NAD resumed production in August 1950. By late 1950, employment had

increased to about 1,800. Employment reached a peak of 3,500 persons. In February 1956, while still employing 1,600 persons in rocket production, the Navy announced plans to close the Shumaker NAD and place the facility on “housekeeping” status within 12 to 15 months. The plant had been enlarged to twice its World War II capacity for a total investment of around \$200 million. In 1957, National Fireworks Corporation received a safety plaque in recognition of 2 million manhours of production at Shumaker NAD without a disabling injury. On June 30, 1957, all contracts with National Fireworks Ordnance Corporation were completed, and the Navy again resumed operation of the plant.<sup>1</sup> In the 1957/1958 fiscal year, about 60 persons were engaged in production with about 350 employed in plant maintenance and administration. On December 3, 1959, the Navy announced it had no further need for Shumaker NAD. It was advertized for sale in December 1960.

In April 1961, Brown Engineering Corporation of Houston, Texas, a subsidiary of Brown & Root, Inc., submitted the highest bids for Parcels 1, 2, 4, and 5 of the Shumaker NAD. A quitclaim deed whereby the U.S. Government transferred property to Brown Engineering was executed on July 19, 1961.

By 1987, 37 companies and 4,200 employees operated on property owned by Brown Engineering, which had changed its name to Highland Resources, Inc., and the property name to Highland Industrial Park. In the early 1990s, Highland Resources, Inc., changed its name to Highland Industrial Park, Inc. (HIP).

## **2.0 SITE ELIGIBILITY FOR THE ISSUANCE OF A RCRA § 7003 ORDER**

### **2.1 LEGAL REQUIREMENTS FOR INITIATING ACTION**

The information presented in this section outlines the legal requirements for initiating action under a § 7003 order as such requirements are presented in an EPA guidance document entitled “Guidance on the Use of Section 7003 of RCRA,” dated October 1997 (hereinafter referred to as “the EPA guidance document”). However, this discussion does not address threshold jurisdictional requirements for EPA’s issuance of such an order against the DOD or a DOD service component. HydroGeoLogic is deferring an evaluation of this threshold legal issue, as well as corollary issues associated with the relief that may be sought by EPA under a § 7003 order.

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<sup>1</sup> HydroGeoLogic conducted library and online research using sources such as Moody’s guides, the Capital Changes Reporter, Dun & Bradstreet, CDB Infotek, and Hoover’s Online, but was unable to determine the current status of National Fireworks Ordnance Corporation. Presumably the corporation has been dissolved. According to a short history of the company prepared by a local historian in Hanover, Massachusetts, where the company was founded, “[a]fter World War II many changes, subdivisions, and acquisition brought about the dissolution of the old National Fireworks.”

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## **2.2 ANALYSIS OF RCRA § 7003 REQUIREMENTS**

According to the EPA guidance document, there are three basic requirements for initiating action under RCRA § 7003: (1) conditions may present an imminent and substantial endangerment to health or the environment; (2) the potential endangerment stems from the past or present handling, storage, treatment, transportation, or disposal of any solid or hazardous waste; and (3) the person has contributed or is contributing to such handling, storage, treatment, transportation, or disposal. These requirements are described in the EPA guidance as follows:

### **2.2.1 Conditions May Present an Imminent and Substantial Endangerment to Health or the Environment: “The Endangerment Standard”**

In order to demonstrate the existence of environmental conditions that may present an imminent and substantial endangerment to health or the environment, documentation and scientific evidence is generally required. However, courts have broadly interpreted this endangerment standard. Courts interpreting the “imminent and substantial endangerment” provision of § 7003 have found that an “endangerment” is an actual, threatened, or potential harm to health or the environment. Based on the words “may present” in § 7003, courts have said that neither certainty nor proof of actual harm is required, only a “risk” of harm. Proof of off-site migration is not required if there is proof that the wastes, where they are presently located, may present an imminent and substantial endangerment.

The courts have ruled that an endangerment is “imminent” if the present conditions indicate that there may be a future risk to health or the environment even though the harm may not be realized for years. It is not necessary for the endangerment to be immediate or considered an emergency. These courts have found that an endangerment is “substantial” if there is reasonable cause for concern that health or the environment may be seriously harmed. It is not necessary that the risk be quantified.

The following are identified as factors that may be considered in evaluating whether the endangerment standard is met at a given site: (1) the levels of contaminants in various media; (2) the existence of a connection between the solid or hazardous waste and air, soil, groundwater, or surface water; (3) the pathway(s) of exposure from the solid or hazardous waste to the receptor population; (4) the sensitivity of the receptor population; (5) bioaccumulation in living organisms; (6) visual signs of stress on vegetation; (7) evidence of wildlife mortalities, injuries, or disease; (8) a history of releases at the facility or site; (9) staining of the ground; and (10) “missing” (i.e., unaccounted for) solid or hazardous waste. It is important to note, however, that in any given case, one or two factors may be so predominant as to be determinative of the issue.

## **2.2.2 The Potential Endangerment Stems from the Past or Present Handling, Storage, Treatment, Transportation, or Disposal of Any Solid or Hazardous Waste**

### **2.2.2.1 Handling**

EPA needs to show that one of the following types of activity has occurred or is occurring: the handling, storage, treatment, transportation, or disposal of solid or hazardous waste. The EPA guidance indicates that the broadest of these five categories, and therefore the easiest to demonstrate, is “handling” solid or hazardous waste. The RCRA statute does not include a definition of “handling.” EPA agrees with one court that has applied a dictionary definition of “handle” as “to deal with or have responsibility” for something.

### **2.2.2.2 Storage**

When determining whether particular activities may constitute “storage” of solid waste or hazardous waste under § 7003, the EPA guidance states that EPA regions should apply the definition set forth in RCRA § 1004(33), 42 U.S.C. § 6903(33). Although that definition refers to hazardous waste only, the guidance states that the regions may apply an analogous definition when addressing the possible storage of solid waste.

### **2.2.2.3 Treatment**

RCRA’s definition of “treatment” again refers to hazardous waste but not solid waste. EPA disagrees with courts that have ruled that the definition applies strictly to hazardous waste. The EPA guidance provides the following definition of “treatment”: any method, technique, or process objectively designed to change the physical, chemical, or biological character or composition of any solid waste so as to render it safer for transport, amenable for recovery, amenable for storage, or reduced in volume.

### **2.2.2.4 Transportation**

Although there is no statutory definition of “transportation,” the RCRA regulations include the following definition of “transportation” at 40 CFR Part 260.10: “the movement of hazardous waste by air, rail, highway, or water.” Again, this regulatory definition refers to hazardous waste only, and the EPA guidance states that the regions may apply an analogous definition when addressing the transportation of solid waste.

### **2.2.2.5 Disposal**

EPA and the majority of courts maintain that the “leaking” of waste satisfies the RCRA definition of “disposal.” This is the basis for EPA’s interpretation that the reference to “disposal” in § 7003 therefore applies to passive contamination and both intentional and unintentional disposal practices.

### **2.2.2.6 Definition of “Solid or Hazardous Waste”**

The RCRA statute and the RCRA regulations both contain definitions of “solid waste” and “hazardous waste.” The statutory definitions are broader and thus more inclusive in terms of classifying a material as a hazardous or solid waste. It is EPA’s position that the broader statutory definitions should be used when evaluating § 7003 actions, and at least two courts have recognized this approach. If the material meets either of the statutory definitions for “hazardous waste” or “solid waste,” then EPA states that the material should be considered a “solid waste” or “hazardous waste,” as appropriate, for purposes of § 7003.

### **2.2.3 The Person Has Contributed to Such Handling, Storage, Treatment, Transportation, or Disposal**

#### **2.2.3.1 Person**

RCRA § 7003 specifies that “any person” includes any past or present generator, past or present transporter, or past or present owner or operator of a TSD facility. § 1004(15) of RCRA defines “person” as including an individual, corporation, and political subdivision of a state, as well as each department, agency, and instrumentality of the United States.

The 1984 amendments to RCRA clarified that the term “any person” includes any past or present generator, transporter, or owner or operator of a TSD facility. Furthermore, the legislative history of those amendments notes that “[Section 7003] has always reached those persons who have contributed in the past or are presently contributing to the endangerment, including but not limited to generators, regardless of fault or negligence.” H.R. Rep. No. 1133, 98th Cong., 2d Sess., 130 Cong. Reg. H.11137 (October 3, 1984).

#### **2.2.3.2 Contributed or Contributing**

EPA relies on Congressional reports and court cases cited in the EPA guidance document to support its position that any person “who has contributed or is contributing to such handling, storage, treatment, transportation, or disposal” includes persons who have contributed or are contributing to activities that may present an endangerment, regardless of fault or negligence. The guidance document refers to one circuit court that has stated that the plain meaning of “contributing to” is “to have a share in any act or effect.” Based on this interpretation, it may not be necessary for EPA to prove that the person had control over the activities that may create an imminent and substantial endangerment. For example, one court has held that a person contributed to the handling and disposal of pesticide-related wastes because that person had (1) contracted with a company that formulates commercial grade pesticides through a process that inherently involves the generation of wastes, and (2) maintained ownership of those pesticides throughout the process.

The EPA guidance document offers examples of “contributors” for purposes of § 7003 as follows: (1) an owner who fails to abate an existing hazardous condition of which he or she is aware; (2) a person who owned the land on which a facility was located during the time that solid waste leaked from the facility; (3) a person who operated equipment during the time that solid waste

leaked from that equipment; (4) a person who installed equipment that later leaked; (5) a person who simply provided a receptacle for existing wastes; (6) a generator who sold below grade materials to a reclamation facility in order to dispose of them; and (7) a county that sited, licensed, and franchised a privately owned and operated landfill for the disposal of industrial wastes.

### **3.0 PRIORITY SITES AT THE FORMER SHUMAKER NAD**

In the § 7003 Order the sites are divided into first order and second order priority sites. (See Figure 1 for the locations of these sites.) The priority sites as identified by the EPA Draft § 7003 Order are based on the 15 areas of interest identified by Parsons in the “Phase I - Site Prioritization Report” dated January 2000. The two lists differ only in that the EPA has combined the Rocket Test Range and the Rocket Burn Area, which are listed separately by Parsons, and has replaced the Barricaded Rail Sidings Area identified by Parsons with the Munition and Ordnance Storage Bunkers site. (See Table 1.) Also noteworthy is the fact that many of the areas of primary concern to Parsons do not correspond with the first priority sites as listed by the EPA. The Draft § 7003 Order does not provide any clarifications for the changes.

Provided in Table 2 are details concerning the materials used by the identified operators at each of the 14 priority sites identified in the Draft § 7003 Order. For each priority site, HydroGeoLogic discusses in Sections 3.1 through 3.14 activities performed by the Navy and subsequent operators at that site. Please note that HydroGeoLogic did not have access to HIP records, so it is unlikely that all parties that operated subsequent to the Navy have been identified. However, HydroGeoLogic, by using sources such as the local chamber of commerce and historical newspapers, believes that it has identified most of the subsequent operators of significant size.

The apparently incomplete nature of the Draft § 7003 Order has complicated HydroGeoLogic’s response. The complication stems from the inability to clearly determine the site (or sites) addressed by the Draft § 7003 Order. One of the key requirements for issuing a § 7003 Order is providing sufficient evidence that all of the statutory requirements have been met. The vague quality of the order does not appear to meet this requirement. The order does not include a clear description of the property addressed by the order. The language of the order suggests, as seen in the following excerpts, that the order addresses the entire 68,417.82 acres that comprised the entire depot:

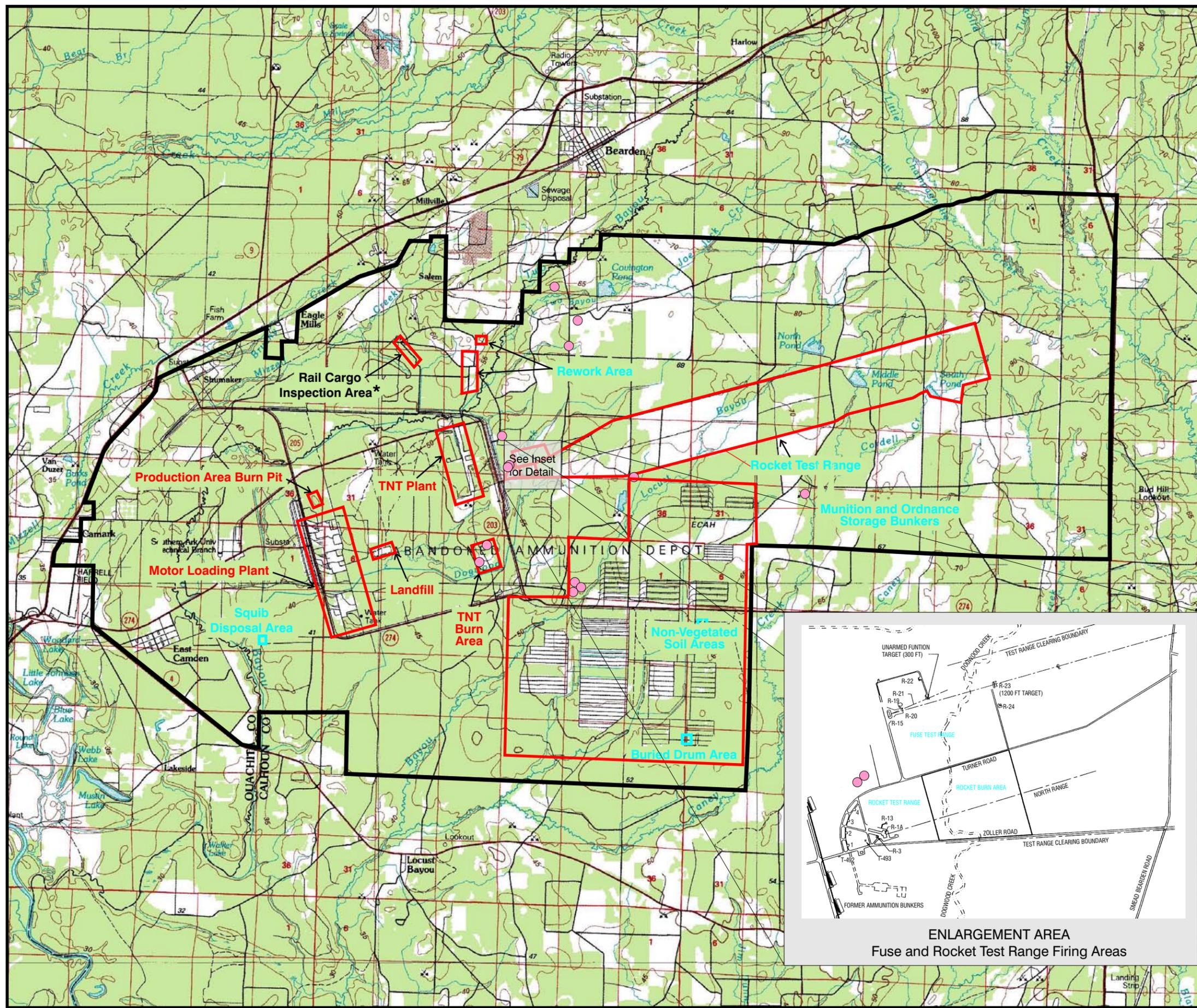
From Section III: “This Order requires the Respondent to ... perform Interim Measures at the Site.”

From Section V: “The Facility is a former Naval Ammunition Depot,” and “The site was operated by the U.S. Navy.”

From Section VII: “The [Interim/Stabilization Measures] Workplan shall include ... the following elements: (1) post warning signs where contamination exists” and “(2)

**Figure 1**  
**Site Map**  
**Shumaker NAD**  
**Camden, Arkansas**

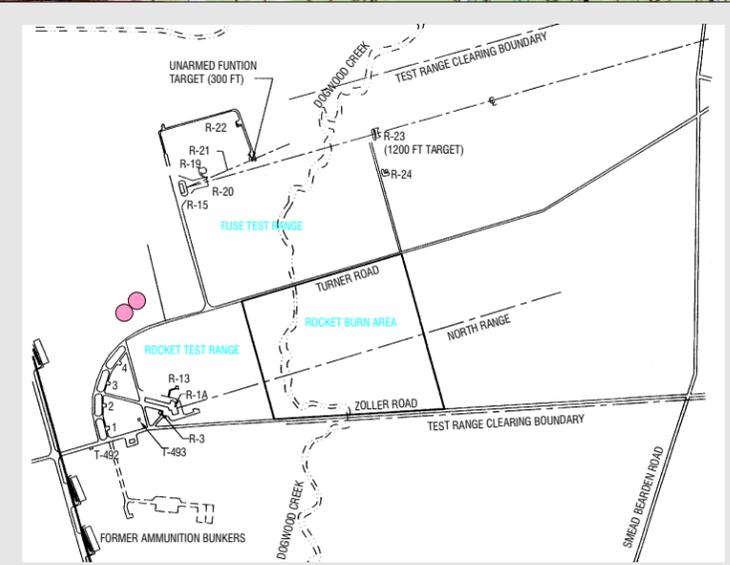
U.S. Army Corps of Engineers  
 Tulsa District



**Legend**

-  Shumaker NAD Boundary
-  Area/Site Boundary
-  Ordnance Disposal Well
-  TNT Plant First Order Priority Site
-  Rework Area Second Order Priority Site
-  Rail Cargo Inspection Area/Barricaded Rail Sidings Area

**Notes:**  
 The Ordnance Disposal Wells comprise a first order priority site.  
 The Munition and Ordnance Storage Bunkers site was not identified in Parsons' "Phase I - Site Prioritization Report."  
 The Rail Cargo Inspection Area/Barricaded Rail Sidings Area was not identified as a priority site in the Draft § 7003 Order.



**ENLARGEMENT AREA**  
 Fuse and Rocket Test Range Firing Areas

Filename: X:\TUL001\0408\Site\_map.cdr  
 Project: TUL001-0408  
 Created by: cfarmer 10/12/00  
 Revised: 12/20/00 cf  
 Source: USGS - Camden AR., 1:100,000 Topographic Map, 1986; SDCOET 443



**Table 1**  
**Priority Site List**

<b>Site Name</b>	<b>Draft § 7003 Order Classification</b>	<b>Parsons Area No.</b>	<b>Comments</b>
TNT Plant	First Order Priority Site 1	9	
Motor Loading Plant	First Order Priority Site 2	10	
Sewer and Drainage Lines	First Order Priority Site 3	12	
“Deep Well” Disposal	First Order Priority Site 3	5	
TNT Burn Area	First Order Priority Site 4	4	
Landfill	First Order Priority Site 1	8	
Production Area Burn Pit	First Order Priority Site 2	15	This site is also known as the Loral Vought Open Burn/Open Detonation Facility, the Thermal Treatment Area, and the Demo Burn Site.
Rocket Test Range/ Rocket Burn Area	Second Order Priority Site 1	1, 3	Parsons separated the two sites and numbered each.
Rework Area	Second Order Priority Site 2	7	
Non-vegetated Soil Areas	Second Order Priority Site 3	11	
Buried Drum Area	Second Order Priority Site 4	6	Parsons also refers to this site as the Buried Depth Charge Casing Area.
Munitions and Ordnance Storage Bunkers	Second Order Priority Site 5		Parsons did not identify this site as an area of interest.
Squib Disposal Area	Second Order Priority Site 6	13	
Fuse Test Range	Second Order Priority Site 7	2	
Barricaded Rail Sidings Area		14	This area, also referred to as the Rail Cargo Inspection Area, was identified by Parsons in the “Phase I - Site Prioritization Report” but was not listed by the EPA as a priority site.

**Table 2**  
**Owners and Operators**  
**Shumaker Naval Ammunition Depot**

Site No.	Site Name	Period Navy Operated at Site	Navy Operations at Site	Materials Used by Navy	Current Owner(s)	Site Tenant(s)	Period Tenant Operated at Site	Materials Used by Tenant/Owner
1	TNT Plant	1945–1957 (12 years)	Loaded 2.75-, 5-, and 11.75-inch rocket warheads and inserted mechanical fuses, decontaminated site	Trinitrotoluene (TNT), Cyclotetramethylene-tetranitramine (RDX), Explosive D (Ammonium Picrate), Composition B (RDX, TNT, and wax), HBX (RDX, TNT, and Aluminum), Tetryl (Nitramine) Ammonium Nitrate, Aluminum Powder, Steel, Sodium Sulfite, Acetone, Alcohol, Natural Gas, Fuel Oil, Paint	Highland Industrial Park (HIP)	Baldwin Electronics Inc. (BEI)  Boeing Company  Vought Corporation (LTV Aerospace, Loral Vought Systems Corporation, Lockheed Martin Vought Systems)  General Dynamics Corporation (Hughes Missile Systems, Raytheon Missile Systems)  Hitech, Inc.  Meraco  Mining Services International  Arkansas Reclamation Co.	1966–1996 (30 years)  1978–1980  1978–1992?  1981–2000 (19 years)  1980s–2000  1987  1987  1991–2000 (9 years)	Potassium Perchlorate, Sodium Nitrate, Potassium Nitrate, M-10 (Nitrocellulose, Potassium Sulfate and Diphenylamine), Sulfur, Carbon, Aluminum Powder  Unknown  Unknown (M42 grenade-type munitions for MLRS)  Unknown (Viper weapons system) Freon 113  RDX, TNT, Cyclotetramethylenetetranitramine (HMX), Titanium Tetrachloride, Xylenes, Acetone,  Unknown  Unknown  Metals

**Table 2 (continued)**  
**Owners and Operators**  
**Shumaker Naval Ammunition Depot**

Site No.	Site Name	Period Navy Operated at Site	Navy Operations at Site	Materials Used by Navy	Current Owner(s)	Site Tenant(s)	Period Tenant Operated at Site	Materials Used by Tenant/Owner
2	Motor Loading Plant	1945–1958 (13 years)	Loaded 2.75-, 5-, and 11.75-inch rocket motors, and Sidewinder missile motors, decontaminated site	Ballistite (Nitrocellulose, Nitroglycerin, and Diphenylamine), Black Powder (Sodium Nitrate, Charcoal, and Sulfur), Plastic Inhibitor, Bonding Cement, Match Composition, Steel, Copper	HIP	Camden Manufacturing Company (subsidiary of Aerojet General Corporation)  Baldwin Electronics, Inc. (BEI)  Stromberg-Carlson, Inc.  St. Clair Rubber Company  Highland Resources Inc. (HIP)  Lee Way Motor Freight  Roadway Express  MB Associates (Tracor Aerospace, Inc., Marconi Aerospace, Inc., BAE Systems)  Atlantic Research Corporation (ARC)  Vought Corporation (LTV Aerospace, Loral Vought Systems Corporation, Lockheed Martin Vought Systems)	1966–1973?  1966–1996 (30 years)  1967–1975  1974–1980 (6 years)  1974–1981  1978–1981  1978–1987  1978–2000 (22 years)  1979–2000 (21 years)  1980–2000	Pyrotechnics, Classified Ordnance, Anti-riot Control Agents, Metals  Ballistite, Black Powder, Barium Nitrate, Sodium Nitrate, 1,1,1-Trichloroethane (1,1,1-TCA), Acetone, Freon 113, Lead, Cadmium, Grenades  Trichloroethylene (TCE)  1,1,1-TCA, TCE  Unknown  Unknown  Unknown  Acetone, 1,1,1-TCA, <i>n</i> -hexane  Ammonium Perchlorate, Freon TF, 1,1,1-TCA, HMX, Methylene Chloride, Aluminum, RDX, Lead-based Explosives, Nitrated Ester, Composite Class B Propellants, Double-base Class A Propellant, Squibs, Igniters, Pyrotechnics  Toluene, 1,1,1-TCA, 1,1,2,2-Tetrachloroethane, Acetone, Glycol Ethers, Chlorobenzene, Chloroform, Chromium, Dichlorobenzene, Dichloromethane, Diisocyanates, Freon 113, Isopropyl Alcohol, Methyl Ethyl Ketone, Methylene Bis(phenyl isocyanate), Butyl Alcohol, Phenol, Phosphoric Acid, Sulfuric Acid, Xylenes
3	Sewer and Drainage Lines	1945–1961 (16 years)	Disposed of waste water from personal hygiene and building washdown	Soap, Sodium Sulfite, Sodium Sulfide, Acetone	HIP	All	1961–2000 (39 years)	Soap, Unknown
4	“Deep Well” Disposal	1960	Disposed of inert (plaster loaded) warheads	Steel, Plaster	HIP, International Paper Company	None	Not Applicable	Not Applicable

**Table 2 (continued)**  
**Owners and Operators**  
**Shumaker Naval Ammunition Depot**

Site No.	Site Name	Period Navy Operated at Site	Navy Operations at Site	Materials Used by Navy	Current Owner(s)	Site Tenant(s)	Period Tenant Operated at Site	Materials Used by Tenant/Owner
5	TNT Burn Area	1945–1961 (16 years)	Disposed of ordnance-related materials by burning on the ground, graded area subsequently, decontaminated site	TNT, RDX, HBX, Black Powder, Composition B, Aluminum	Georgia-Pacific	None	Not Applicable	Cyanide, 2,6-Dinitrotoluene (DNT), Diethyl-phthalate
6	Landfill	1945–1961 (16 years)	Disposed of commercial, industrial, and household solid waste from the Billkitts housing area	Pallets, Band Iron, Office Waste, Household Waste, DDT	HIP, Weiner Estate	None	Not Applicable	Polynuclear Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), Di- <i>n</i> -butyl Phthalate, Freon TF, Zinc, Lead, Copper, Cadmium, Iron, Arsenic
7	Production Area Burn Pit	None	Used as construction staging area?	Building Materials	HIP	LTV Aerospace (Loral Vought Systems Corporation, Lockheed Martin Vought Systems)	1981?–2000 (19 years)	None
8	Rocket Test Range/Rocket Burn Area	1946–1961 (15 years)	Used for flight testing of rockets, burning of rocket motors and surplus ammunition, decontaminated site	2.75-inch Rockets, Rocket Motors, Surplus Ammunition	HIP, International Paper Company	Pace-Caribe, Inc. (Pace Corporation, AMBAC Industries, Inc., Celesco Corporation, MB Associates, Tracor MBA, Tracor Aerospace, Marconi Aerospace, BAE Systems)  Dixie Chemical Corporation  Susquehanna Corporation	1963–2000 (37 years)  1966  1970	Explosives, Pyrotechnics, Potassium Perchlorate, Potassium Nitrate, Hexane, Boron, Magnesium, Barium, Cadmium, Chromium, Lead  Explosives, Pyrotechnics  Explosives, Pyrotechnics
9	Rework Area	1955–1961 (6 years)	Defused and refused rocket and guided missile warheads, washed explosives from rocket warheads, decontaminated site	TNT	International Paper Company, HIP, and BEI	Pace-Caribe, Inc. (Pace Corporation, AMBAC Industries, Inc.)  GOEX, Inc.  Accurate Arms Company Inc.	1963–1970s  1981–1989? (8 years)  1990?–2000	Pyrotechnics, Flares, Explosives  TNT, Pentaerythritetranitrate (PETN)  Nitrocellulose, Nitroglycerin
10	Non-vegetated Soil Areas	1945–1961 (16 years)	Unused	None	HIP	Unknown  National Technical Systems (NTS, Olin Ordnance)	1961–1990 (29 years)  1991–2000 (9 years)	Unknown  RDX, TNT, HMX, Tetryl, PETN, Lithium
11	Buried Drum Area	1945–1961 (16 years)	Used to provide access to magazines	None	HIP	Unknown  Austin Powder Company  Hitech, Inc.	1961–1978  1979–2000 (21 years)  1985–1998 (13 years)	Unknown  TNT, PETN, RDX, Torpex, Composition B, Hexolite, Pentolite, Cyclotol  RDX, HMX, TNT

**Table 2 (continued)  
Owners and Operators  
Shumaker Naval Ammunition Depot**

Site No.	Site Name	Period Navy Operated at Site	Navy Operations at Site	Materials Used by Navy	Current Owner(s)	Site Tenant(s)	Period Tenant Operated at Site	Materials Used by Tenant/Owner
12	Munitions and Ordnance Storage Bunkers	1945–1961 (16 years)	Used to store explosive materials, finished rocket motors, and warheads, decontaminated site	Ammonium Picrate, TNT, Ballistite, Composition B, Ammonium Nitrate, RDX, Aluminum Powder	HIP, International Paper Company	Unknown  Austin Powder Company  LTV Aerospace (Loral Vought Systems Corporation, Lockheed Martin Vought Systems)  BEI  Day & Zimmerman  NTS (Olin Ordnance)	1961–1978  1979–2000 (21 years)  1980–2000? (20 years?)  1990s?  1990s  1991–2000 (9 years)	Unknown  TNT, PETN, RDX, Torpex, Composition B, Hexolite, Pentolite, Cyclotol  Explosives  Explosives  Explosives  RDX, TNT, HMX, Tetryl, PETN, Lithium
13	Squib Disposal Area	1945–1951 (6 years)	Burned defective squibs in pits, removed scrap metal	Pyrotechnic Materials	HIP	None	Not Applicable	None
14	Fuse Test Range	1952–1961 (9 years)	Used to test rocket fuses, decontaminated site	Rocket Fuses, Rocket Warheads	HIP	Pace-Caribe, Inc. (Pace Corporation, AMBAC Industries, Inc., Celesco Corporation, MB Associates, Tracor MBA, Tracor Aerospace, Marconi Aerospace, BAE Systems)  Dixie Chemical Corporation  Susquehanna Corporation	1963–2000 (37 years)  1966  1970	Explosives, Pyrotechnics, Potassium Perchlorate, Potassium Nitrate, Hexane, Boron, Magnesium, Barium, Cadmium, Chromium, Lead  Explosives, Pyrotechnics  Explosives, Pyrotechnics

investigate, propose, and implement remedies for the areas of potential UXO risks identified in the Site Prioritization Report.”

Although this language implies that the order address and implement the entire former depot, the purpose and necessary elements of a § 7003 Order suggest that this must be an incorrect interpretation. The initial Findings of Fact state that the former depot consisted of 68,417.82 acres and was operated by the Navy from 1944 until 1957. The Findings of Fact also list a number of current owners and tenants of the former depot property, including numerous industrial companies. To assume that a party that has not operated for over 40 years on 68,000 acres of property, largely operated subsequently by numerous industrial companies using hazardous wastes, to be the primary contributor of risks that constitute imminent and substantial endangerments spanning the entire property is irrational. Furthermore, a directive to control access to an area as ambiguously described as “where contamination exists, as known by visual observations and sampling data” is not a legitimate exercise of authority contemplated by the statute.

If the content of the draft order becomes the final order, HydroGeoLogic’s conclusion is that the EPA has failed to prove that the Navy has contributed to an imminent and substantial danger.

Although a literal interpretation of the order seems to address the entire property, HydroGeoLogic has chosen to respond as if the order addressed a more reasonable objective, the First and Second Order Priority Sites referenced in the order. A properly written § 7003 Order would have included sufficient evidence to support the EPA’s charge that the Navy has contributed to the creation of an imminent and substantial danger at each of the sites. Because this order lacks sufficient support for each of the sites, HydroGeoLogic’s determination of whether each site constitutes an imminent and substantial endangerment is based on evidence collected through HydroGeoLogic’s research of publicly available information.

For each priority site, HydroGeoLogic has assessed the evidence of the following three elements necessary to establish liability under RCRA § 7003.

- Evidence exists of past or present handling, storage, treatment, transportation or disposal, of a hazardous or solid waste.
- Conditions may present an imminent and substantial endangerment to health or the environment.
- The party has contributed or is contributing to such handling, storage, treatment, transportation or disposal that is causing the endangerment.

Former Navy operations meet the first element of liability at 12 of the 14 priority sites. However, HydroGeoLogic has located no evidence of an imminent and substantial endangerment at any of the sites. Therefore, the Navy has not contributed to an endangerment at the sites. Because the second and third elements of liability have not been satisfied, HydroGeoLogic does not believe that transition the issuance of a RCRA § 7003 order is appropriate for any of these sites.

### **3.1 SITE 1 - TNT PLANT**

#### **3.1.1 Background**

The TNT Plant comprised 88 buildings laid out on a north and south line with two rocket warhead loading and assembly lines originating at a central building and extending in opposite directions. Each line had facilities for melting, pouring, and fusing rocket heads. In addition, each line had associated buildings for the storage, processing, and delivery of TNT to the assembly line.

TNT was not manufactured at the TNT Plant; it was steam-melted there. The warhead for the 11.75-inch “Tiny Tim” rocket was filled with 150 pounds of TNT. The warhead for the 5-inch High Velocity Aircraft Rocket (HVAR) was filled with 7.9 pounds of TNT. The warhead for the 5-inch Spinner rocket was filled with 2.8 pounds of TNT. The warhead for the 2.75-inch “Mighty Mouse” rocket was filled with HBX (40 percent RDX, 38 percent TNT, 17 percent aluminum powder, and 5 percent desensitizers) or composition B (59 percent RDX, 40 percent TNT, and 1 percent wax). All Navy warhead filling activities in the TNT Plant ceased in early 1957.

#### **3.1.2 Decontamination by the U.S. Navy of the TNT Plant**

Extensive decontamination of the TNT Plant was performed by the U.S. Navy prior to July 1957. The inside and outside of all buildings and equipment were thoroughly washed with sodium sulfite neutralizing solution. All tanks, sumps, and drains were pumped dry, cleaned, soaked in sodium sulfite solution, and rinsed.

#### **3.1.3 Activities at the TNT Plant After 1961**

In November 1966, Baldwin Electronics, Inc. (Baldwin) commenced operations in the TNT Plant, producing 1.82 million 2.75-inch rockets. Baldwin occupied Building H-116 producing M267 and M274 practice warheads, and the M261 high-explosive warhead for the HYDRA-70 2.75-inch rocket system. In the late 1970s, Baldwin changed its name to BEI Electronics. BEI blended smoke powder (potassium perchlorate and aluminum powder) in practice warheads, and a mixture of M-10 (nitrocellulose, potassium sulfate, and diphenylamine) and black powder (75 percent sodium or potassium nitrate, 15 percent charcoal, and 10 percent sulfur) in high-explosive warheads. Baldwin occupied the facilities until 1996.

By 1978 and through 1980, the Boeing Company and Vought Corporation (Vought) occupied buildings in the TNT Plant. The activities of Boeing are unknown. Vought produced rapid-fire rocket warheads for its Multiple Launch Rocket System (MLRS). It produced the launch pod container in Building H-104, and assembled warheads in Building H-106. The MLRS warhead comprised several foam pack containers holding 644 M42 grenade-type munitions and a bursting mechanism. In May 1984, Vought changed its name to LTV Aerospace and Defense Corporation. In 1988, LTV received a contract from the U.S. Army to produce a new binary chemical warhead. In August 1992, LTV was purchased by Loral Corporation and became Loral Vought Systems Corporation.

In 1981, General Dynamics operated at the site producing parts and assembling the Viper weapons system. In September 1992, Hughes Missile Systems Company purchased General Dynamics' government contracts, materials, and equipment. In 2000, Hughes was sold to Raytheon Missile Systems (Raytheon). Raytheon continued to operate at the site during 2000.

In the mid-1980s, HITECH, Holdings Inc. (HITECH), a subsidiary of Primex Technologies, Inc., commenced manufacturing explosive ordnance at the former TNT Plant. Operations involved blending, loading, assembling, and packing explosives that included RDX, HMX (cyclotetramethylenetetranitramine), and TNT. HITECH also produced HYDRA-70 2.75-inch rocket warheads and motors, and test-fired them. Rework and retrofitting were also performed. In 1999, HITECH, teamed with General Dynamics, commenced work on a 5-year \$1.268 billion contract for HYDRA-70 rockets. HITECH continued to operate at the site during 2000.

By 1987, Meraco, and Mining Services International operated at the site. In 1991, the Arkansas Reclamation Company commenced operations associated with the HIP landfill, located south of the TNT Plant. This was a metals salvaging company formed as a joint venture between Highland Resources, Inc., and Walter Erman & Company. Arkansas Reclamation Company continued to operate at the site during 2000. HydroGeoLogic believes that HIP's tenants are likely responsible for any contamination found in the TNT Plant.

## **3.2 SITE 2 - MOTOR LOADING PLANT**

### **3.2.1 Background**

The Motor Loading Plant consisted of 88 buildings, comprising 5 separate plants for assembling Navy rocket motors. The first rocket motor was produced on the M-2 line on April 25, 1945. Buildings M-3, M-7, and M-8 were completed later in 1945. In August 1945, construction ceased and production was reduced to a level in keeping with peacetime requirements. Buildings M-11, M-12, and M-14 were completed in 1951, during the Korean War. In 1961, the motor loading plant was sold to Brown Engineering.

### **3.2.2 Activities at the M2/M3 Complex**

The M2/M3 complex (two assembly lines) was built for the assembly of rocket motors for the 11.75-inch diameter "Tiny Tim" air-to-surface aircraft rocket. These rocket motors were assembled during World War II, only.

The 11.75-inch rocket was 10 feet 3 inches long and weighed 1,284 pounds. The motor tube was made of commercial steel oil-well casing. The motor included a propellant charge of four dry-extruded ballistite grains, each weighing 37 pounds. Ballistite is a "double base" smokeless powder propellant composed of 60 percent nitrocellulose, 39 percent nitroglycerin, and 1 percent diphenylamine.

The ballistite propellant was supplied to the M3/M3 complex as cruciform (cross-shaped) charges. The ballistite grains were trimmed to the proper dimensions before loading. Plastic inhibitor strips were bonded to the propellant grain using ethyl lactate and butyl alcohol. An igniter, containing black powder (75 percent sodium nitrate, 15 percent charcoal, and 10 percent sulfur),

and an electric squib to ignite the charge were added. Operations in the M2/M3 complex principally involved solid compounds, and no open or bulk explosives were employed.

### **3.2.2.1 Decontamination by the U.S. Navy of the M2/M3 Complex**

By February 1961, all buildings, equipment, and ducts had been decontaminated by washing with hot and cold water. All solvent and inhibiting fluid containers had been steam cleaned. The exterior area surrounding the buildings had been mowed, raked, and treated with weed killer after inspection to remove any ballistite contamination.

### **3.2.2.2 Activities at the M2/M3 Complex After 1961**

From July 1967 through June 1975, Stromberg-Carlson, Inc., a subsidiary of General Dynamics, manufactured telephones and telephone switching equipment in Building M-143, and spilled trichloroethylene (TCE) at the site. In 1994, the State of Arkansas, Department of Pollution Control and Ecology (ADPCE), required that soil and groundwater be remediated in the area of Building M-143.

In November 1966, Camden Manufacturing Company, a subsidiary of Aerojet General Corporation, commenced producing ordnance for the U.S. Air Force. By February 1968, Camden Manufacturing employed 594 workers in pyrotechnics, metal parts production, and fabrication. By June 1968, Camden Manufacturing was the largest employer in the Camden area, employing over 1,000 workers and operating 4 production lines. When defense requirements dropped after the Vietnam War, Aerojet General closed its operations in Camden. Camden Manufacturing had ceased to operate at the site by 1974.

Also by 1974, the St. Clair Rubber Company, a manufacturer of adhesives and rubber products, occupied buildings in the M2/M3 complex. In 1980/1981 St. Clair Rubber Company moved to a warehouse near the M12/M14 complex. By 1989, it had changed its name to Evans-St. Clair, Inc., and continued to operate at the site through 2000. The EPA Toxic Release Inventory (TRI) indicates that between 1990 and 1998, Evans-St. Clair released toluene, 1,1,1-trichloroethane, and TCE.

By 1978, Lee Way Motor Freight occupied buildings in the M2/M3 complex and operated there until at least 1981. By 1978, Roadway Express occupied buildings in the M2/M3 complex and operated there until at least 1987.

In April 1980, Vought won a \$3.5-billion contract from the DOD to build the MLRS. The MLRS comprised 12 computer-fired rockets mounted in a movable platform on an armored vehicle. The armored vehicle and some electronic components were made in plants outside Arkansas. All other components were manufactured at HIP. In 1981, Vought occupied Buildings M-3, M-143, and others and built additional buildings. Vought's tasks included manufacturing the rocket warheads and testing the rockets. Vought's key subcontractors, Atlantic Research Corporation (ARC) and Brunswick Corporation, also located to HIP. Operating out of Buildings M-2, M-8, M-21, M-85A-H, M-142 and others, ARC manufactured composite-propellant rocket motors (that included ammonium perchlorate (AP)) and other components. Brunswick Corporation fabricated rocket launch tubes in inert warehouse 5-SH-1.

In late 1982, Vought changed its name to LTV Missiles and Electronics Group. In January 1983, LTV won a \$5.2-million contract from the United Kingdom for 4 MLRS launchers, 108 practice rockets, and other training equipment. It had already produced 1,374 rockets and 12 launchers at HIP. In 1991, LTV won a multi-million dollar contract to supply 1,000 VT-1 surface-to-air missiles to France.

In February 1992, LTV announced it was selling its aircraft and missile businesses to a new company jointly owned by Lockheed Corporation and Martin Marietta Corporation; the new company was to be known as Lockheed Martin Vought Systems (LMV). LTV's 950 workers at HIP were not impacted by this change. In April 1992, LTV won a \$46.2-million contract to produce 29 MLRS and 58 trainer pods for the U.S. Army National Guard. LTV had already received contracts worth \$185 million to supply the MLRS to the National Guard. In January 1993, LMV was assessed a penalty of \$45,000 for permit violations. The EPA TRI indicated that between 1987 and 1998, LMV released toluene, 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, acetone, glycol ethers, chlorobenzene, chloroform, chromium, dichlorobenzene, dichloromethane, diisocyanates, Freon 113, isopropyl alcohol, methyl ethyl ketone, methylene bis(phenylisocyanate), *n*-butyl alcohol, phenol, phosphoric acid, sulfuric acid, and xylenes. LMV continued to operate at the M2/M3 facilities during 2000. HydroGeoLogic believes that HIP's tenants are responsible for all contamination found at the M2/M3 Complex.

### **3.2.3 Activities at the M7/M8 Complex**

The M7/M8 complex (two assembly lines) was built for the assembly of rocket motors for the 5-inch high velocity aircraft rocket "HVAR Holy Moses," and the 5-inch high velocity Spinner rocket. The M7/M8 complex was used to assemble 5-inch rocket motors for a few months in 1945, and then at a peacetime rate until August 1949. With the onset of the Korean War, 5-inch rocket motors were again assembled at the M7/M8 complex from August 1950 until June 1957. For a short time thereafter the Navy loaded a small number of 5-inch Sidewinder missile motors.

The HVAR rocket was 72 inches long and weighed 140 pounds. The motor included a 4.2-inch, 24-pound propellant charge of ballistite grain. The Spinner rocket was 30 inches long and weighed 50 pounds. The motor included a ballistite charge of 10 pounds. The motor for the Sidewinder missile also contained ballistite. The ballistite was loaded in the 5-inch steel motor tubes with inhibitor strips and igniter, in a similar manner to loading in the M2/M3 complex.

#### **3.2.3.1 Decontamination by the U.S. Navy of the M7/M8 Complex**

By February 1961, all buildings, equipment, and ducts, together with the exterior of buildings, had been decontaminated as described for the M2/M3 complex.

#### **3.2.3.2 Activities at the M7/M8 Complex After 1961**

In 1974, Highland Resources Inc., East Camden and Highland Railroad, Inc., and Celesco Industries, Inc. (Celesco), occupied buildings in the M7/M8 complex. The first two companies were involved with the management of operations at the site. Celesco manufactured military explosives.

By 1978, MB Associates (formerly Celesco) moved to Buildings M-7, M-25A-E, M-75A-E, and others. MB Associates became Tracor MBA, then Tracor Aerospace Inc., Marconi Aerospace, and finally BAE Systems. The company manufactured airborne electronic warfare systems and countermeasures. In 1983, Tracor failed to comply with state regulations governing the treatment, storage, and transportation of hazardous wastes and was issued a Consent Administrative Order by the ADPCE. In 1991, Tracor generated over 7 tons of hazardous waste. BAE Systems continued to operate at the M7/M8 complex during 2000.

From 1979, ARC occupied Buildings M-2, M-8, M-21, M-85A-H, M-142, and others. ARC manufactured composite-propellant rockets (containing AP), igniter materials, and squibs. Test firings of up to 125 rocket motors per day were also conducted.

On March 23, 1983, waste explosives burned by ARC caused detonation “throwing burning explosives several hundred yards out of the burn pit and setting fire to the surrounding timber.” The ADPCE concluded that ARC was in violation of “virtually all of the RCRA regulations.” In April 1983, ARC manufactured rocket motors for the MLRS, Viper, and Chaparral weapons. Reconditioning of motor casings also took place. When a flaw was discovered in a motor, the AP propellant was removed under high water pressure, the water/propellant solution was mixed with sawdust, and the mixture was burned at the site. Activities also included grinding AP to reduce its particle size. This process generated waste Freon TF contaminated with AP. The ADPCE found 112 drums of AP contaminated solvent, and 200 to 300 empty drums at the site.

In June 1983, ARC burned on-site HMX, stabilized nitrated ester, three composite Class B propellants, a double base Class A propellant, and finely ground AP. During 1985, ARC burned on-site 507,040 pounds of composite propellant from rocket motor production; 2,500 pounds of double base propellant scrap; 61,140 pounds of composite propellant from outdated motors; 7,680 pounds of double base propellant from reclaimed cases; 2 pounds of scrap from squibs and igniters; 509 pounds of unsafe igniters; 25,375 pounds of sawdust/water/AP; and 2,565 pounds of ground AP. In 1988, ARC burned on-site 586,534 pounds of scrap composite propellant. In November 1988, ARC was assessed a \$20,000 penalty for permit violations. In 1989, ARC burned on-site 62,150 pounds of methylene chloride; 39,600 pounds of Freon; 437,930 pounds of composite propellant; 1,270 pounds of scrap high explosive; 30,520 pounds of scrap oxidizer; and 36 pounds of pyrotechnics.

In July 1993, ARC burned on-site AP, aluminum, HMX, RDX, and lead-based explosives. AP was identified in high concentrations in surface water samples, and ARC was notified by the ADPCE that it had a “serious problem of contamination” around the open burn unit from surface-water runoff and percolation, and from aerial deposition. ARC was ordered to perform a full hydrogeologic assessment. Aluminum and AP were identified as contaminants of concern in groundwater. The burning of AP on-site was subsequently discontinued.

In August 1996, ARC was again found to be operating in noncompliance at its open burn facility. Violations continued to exist in January 1997, and the ADPCE requested that a RCRA Facility Investigation be performed. The investigation found sources of AP in the ARC-constructed Chaparral Washout Building 52 used for washing out Chaparral Missile motors from the early-to mid-1980s and in ARC’s open burn unit. Further sampling of soil and groundwater to delineate the extent of the AP plume was recommended. ARC continued to operate in the M7/M8 area

during 2000. HydroGeoLogic believes that HIP's tenants are responsible for all contamination found at the M7/M8 Complex.

### **3.2.4 Activities at the M12/M14 Complex**

The M12/M14 complex (one assembly line) was built during the Korean War for the assembly of rocket motors for the 2.75-inch diameter folding-fin aircraft rocket FFAR "Mighty Mouse." The 2.75-inch rocket was 48 inches long and weighed 18 pounds. The motor included a cylindrical grain of ballistite. The ballistite was loaded in the 2.75-inch steel motor tubes with inhibitor strips and igniter, in a manner similar to loading operations in the M2/M3 complex.

#### **3.2.4.1 Decontamination by the U.S. Navy of the M12/M14 Complex**

By February 1961, all buildings, equipment, and ducts, together with the exterior of buildings, had been decontaminated as described for the M2/M3 complex.

#### **3.2.4.2 Activities at the M12/M14 Complex After 1961**

In November 1966, Baldwin commenced production of 2.75-inch rocket motors in the M12/M14 complex. Baldwin's initial contract was for 1.82 million rocket motors with the possible addition of 3.6 million. By June 1967, 300 workers were employed, and Baldwin had produced more than 1 million rocket motors. In September 1967, Baldwin received a \$4.1-million contract for the production of electronic devices for ordnance systems and an additional \$1.6-million contract for the production of 2.75-inch rocket motors. In May 1970, Baldwin received an additional contract for an additional 1.08 million rocket motors. In the late 1970s, Baldwin changed its name to BEI Electronics. In 1986, BEI burned on-site off-specification propellant grains and grenades, in violation of Section 4(4) of the Arkansas Code. In August 1990, BEI entered into a Consent Administrative Order with the ADPCE and paid a fine of \$20,000. In November 1990, 13 drums of BEI chemicals were discovered in El Dorado, Arkansas, one of which fell off a trailer and self-ignited, burning the container and contents. The chemicals involved were later identified as barium nitrate and sodium nitrate. BEI ceased operations in the M12/M14 complex at the end of August 1996. HydroGeoLogic believes that HIP's tenants are likely responsible for all contamination found at the site.

### **3.3 SITE 3 - SEWER AND DRAINAGE LINES**

#### **3.3.1 Background**

Sewage was treated in an on-site sewage treatment plant. Influent flowed through 24 miles of 4-inch to 24-inch vitreous clay and cast iron pipe and effluent flowed into the Ouachita River via Two Bayou Creek. The drainage system comprised 61 miles of drainage channels and 548 miles of roadside and tail ditches. The volume of liquids used by the Navy in the production of rockets at Shumaker NAD was very small compared to the volume of solids used. In the Motor Loading Plant, adhesives were the only liquids used.

#### **3.3.2 Decontamination by the U.S. Navy of the Sewer and Drainage Lines**

All sewer and drainage lines in the TNT Plant were decontaminated thoroughly. All wash room facilities were washed and treated with sodium sulfite until clean. All floor drains were steam cleaned with sodium sulfite solution and flushed with water. The ground areas around the discharge ends of floor drains were neutralized with sodium sulfite solution. Outside sumps were pumped clear of water, sediment was removed and sent to the burning ground for disposition by burning, and sump pits were thoroughly washed and treated with sodium sulfite until clean. Sodium sulfite solution was applied to areas in outside drainage ditches. Settling pits on the east and west sides of Buildings H-115 and H-116 were cleaned and filled with sodium sulfite solution and rinsed with water. Magazines and magazine ramps were washed with sodium sulfite and rinsed. The hardtop surfaces around the loading docks of magazines were neutralized with sodium sulfite. The ground areas beneath the wooden rubbish docks were neutralized with sodium sulfite after the wooden rubbish docks had been removed and burned.

#### **3.3.3 Activities Involving the Sewer and Drainage Lines After 1961**

Over the past 39 years (since 1961), HIP's tenants have used the sewer and drainage lines, many for ordnance-related activities. The Navy owned the site for only 16 years, and it was in non-operational status for a number of those years. HydroGeoLogic believes that HIP's tenants are likely responsible for any contamination found in the Sewer and Drainage Lines.

### **3.4 SITE 4 - "DEEP WELL" DISPOSAL**

Navy documents indicate that numerous shallow dug water wells, located in the outlying wooded and old homestead places within the depot, were filled with inert (plaster loaded) head projectiles of various sizes together with some steel Mk 149 fuses. The wells were filled to a minimum of 8 feet from the surface with such inert material, and the top 8 feet were filled with gravel and soil. The inert projectiles and fuses contained by these wells were considered safe for any type of handling; however, disposition as scrap metal was not recommended. HydroGeoLogic does not believe that the warheads and fuses contain explosive compounds.

### **3.5 SITE 5 - TNT BURN AREA**

#### **3.5.1 Background**

During production and closure operations, TNT, RDX, aluminum, HBX, black powder, and Composition B were transported to the TNT Burn Area, placed on the ground, and burned. The area was then graded. Inspections were performed by the Naval Inspector General, the Inspector General of the Bureau of Ordnance, and the Commandants of the Naval Districts and River Commands.

#### **3.5.2 Decontamination by the U.S. Navy of the TNT Burn Area**

In February 1961, the Navy indicated that the TNT Burn Area would be rendered safe for any suitable purpose. However, it recommended that authority for surface and deep excavation be issued only after consultation with a competent safety explosive engineer or authority. A former Navy employee confirmed that the Navy had decontaminated the area.

#### **3.5.3 Activities at the TNT Burn Area After 1961**

The site was purchased by Brown Engineering and is now owned by Georgia Pacific for timber production. In 1982, Georgia Pacific sampled the area and found cyanide (101 parts per million (ppm)), 2,6-dinitrotoluene (DNT) (5.266 ppm), and diethyl-phthalate (6.666 ppm). In 1999, the TNT Burn Area was littered with ordnance-related metal parts and empty drums not associated with 1950s Navy rockets. HydroGeoLogic believes that HIP's tenants are likely responsible for the contamination found at the site.

### **3.6 SITE 6 - LANDFILL**

#### **3.6.1 Background**

The Navy operated a landfill, located east of the Motor Loading Area, for the disposal of pallets, band iron, and other solid waste from the plant and Bilkitts housing area. In the 1940s, DDT was sprayed by the Navy from aircraft to control malaria. Aerial photographs from 1960 show neat rows of trenches and mounded material.

#### **3.6.2 Decontamination by the U.S. Navy of the Landfill**

No decontamination of this area was conducted by the Navy because the area was not contaminated.

#### **3.6.3 Activities at the Landfill After 1961**

The land was sold to Brown Engineering in 1961. It continued to be used by the community of East Camden for the disposal of solid waste. In September 1983, seven soil samples were collected and the insecticides DDT, DDE, and DDD were found in concentrations under 1 ppm—below levels of concern. Compounds found in surface soil at elevated concentrations included

polynuclear aromatic hydrocarbons (PAHs) (53.3 ppm), copper, iron, zinc, arsenic, cadmium, lead, polychlorinated biphenyls (PCBs) (1.5 ppm), and di-*n*-butyl phthalate (32 ppm).

According to ARC's RCRA Facility Investigation of its burn pit area, the landfill could be a source of AP in area groundwater; however, AP concentrations are significantly higher north of, and upgradient from, the landfill. The two identified source areas for AP contamination, Building 52 and the burn pit area, are located nearby north of the landfill. Furthermore, AP was not a component of any Navy rocket produced at Shumaker NAD.

In 1999, the landfill was littered with empty drums, cans, bottles, and powders of post-Navy vintage. One of the drums was labeled "Freon TF Solvent," which has been used by ARC at the adjoining M7/M8 complex since 1979. The landfill area is currently owned by HIP and the Weiner Estate, and is managed for timber production. HydroGeoLogic believes that HIP's tenants are likely responsible for contamination found at the site.

### **3.7 SITE 7 - PRODUCTION AREA BURN PIT**

In the early 1980s, LTV constructed a metals parts building over the site, and the top 6 feet of soil were removed for the building foundation. HydroGeoLogic does not believe that the site is contaminated.

### **3.8 SITE 8 - ROCKET TEST RANGE/ROCKET BURN AREA**

#### **3.8.1 Background**

The Navy conducted flight testing on the Rocket Test Range to determine satisfactory performance of rockets. The Rocket Test Range, a cleared area 8-miles long and 1-mile wide, was equipped with a number of test launchers and observation towers, located along the sides of the range, to permit visual spotting of fired rounds and the transmission of data to the main control tower for plotting. Photographic coverage, through the use of synchronized high-speed cameras, was used to assist in the analysis of any malfunctions. The only dangerous item known to have been fired on the range was 2.75-inch rockets with a small token charge of high explosive, to indicate fuse functions. The Archive Search Report (ASR) mistakenly identifies tree trunks and tree cleared areas in 1951 aerial photographs as indications that "the field was used for target practice on a regular basis." The ASR also mistakenly identifies signs of tree-clearing activities as "small craters and scarred areas."

The Rocket Burn Area was located in a portion of the Rocket Test Range, uprange from the firing area. Between 1959 and 1961, surplus ammunition was burned in the Rocket Burn Area. Ordnance items were hauled in, mixed with bales of hay, and set on fire. In 1961, the firing area and near vicinity were sold to Brown Engineering; the remainder of the Rocket Test Range was sold to International Paper.

### **3.8.2 Decontamination by the U.S. Navy of the Rocket Test Range/Rocket Burn Area**

By April 1960, a Statement of Clearance had been issued for the Rocket Test Range by Headquarters, U.S. Army 52D Ordnance Detachment, Pine Bluff Arsenal, Arkansas. The area had been “given a careful search and had been cleared of all dangerous or explosive material reasonably possible to detect.” It was stated these presented a slight hazard if they had not all been recovered. It was recommended that all tracts on the Rocket Test Range be used for any suitable purpose. The Rocket Burn Area was included within the Rocket Test Range.

### **3.8.3 Activities at the Rocket Test Range/Rocket Burn Area After 1961**

In February 1965, the Arkansas Gazette reported that International Paper had planted pine seedlings on the 8-mile Rocket Test Range. There was no mention of any danger from unexploded ordnance in 1965.

Since 1963, the following operators manufactured, tested, and burned explosives and pyrotechnic devices in the former firing area of the Rocket Test Range: Pace-Caribe, from 1963 (later named Pace Corporation, Celesco Corporation, AMBAC Industries, Inc., MB Associates, MBA, Tracor MBA, Tracor Aerospace, Marconi Aerospace, BAE Systems); Dixie Chemical, from 1966; and Susquehanna Corporation, from 1970.

Pace-Caribe (and its subsequent company names) operated from Building R-1 and others. In early 1982, Tracor MBA burned, without a permit, thousands of pounds per month of explosives including magnesium Teflon binder, potassium perchlorate, potassium nitrate, hexane, and boron. At this time, the field and pits used for open burning were littered with ash and residue. In 1989, Tracor Aerospace burned over 1,000 pounds per month of off-specification explosives. In 1991, Tracor generated over 14,000 pounds of such waste. In 1993, Tracor burned 14,163 pounds of waste explosives in violation of ADPCE regulations. The newly named BAE Systems continued to operate at the site during 2000.

HydroGeoLogic believes that the rocket warheads and ordnance-related metal parts found at the Rocket Test Range during the 1990s were discarded items of HIP’s tenants. Baldwin, which became BEI, and Pace, which became Tracor and then BAE, each manufactured millions of 2.75-inch rockets at HIP. These and other companies tested and burned millions of pounds of ordnance at the site over the past 37 years. The hand grenade, grenade simulator, blasting cap, time fuse, “Zuni” warhead, 105-mm HC smoke canisters, M49 surface trip flares, and 60-mm projectile body all postdate the Navy’s activities at the site. Also, the 2.75-inch warhead photographed by Parsons is not of the design produced by the Navy in the early 1950s.

## **3.9 SITE 9 - REWORK AREA**

### **3.9.1 Background**

In 1955, the Navy built two rework facilities for defusing, rework, and refusing of rocket warheads. In 1957, a small facility for washing explosives from rocket warheads was completed. The Rework Area was sold to International Paper in July 1961.

### **3.9.2 Decontamination by the U.S. Navy Activities of the Rework Area**

Navy documents from February 1961 indicate that all buildings, structures, facilities, equipment, and adjacent land area would be decontaminated to the extent necessary to render such improvements safe for any use with the application of good safety practices. They also stated that any extensive structural repair, remodeling, demolition, and excavation of the adjacent land must be exercised with extreme care. The use of burning devices and the application of force such as impact power tools should be authorized only after consultation with a competent safety engineer or authority. Surface or deep soil excavation surrounding the land area within 200 feet from Buildings RW-11 and RW-13, and the settling pond should be authorized only after consultation with a competent safety engineer or authority.

### **3.9.3 Activities at the Rework Area After 1961**

From 1963, Pace-Caribe made pyrotechnical products and flares at the site. By June 1970, it employed more than 500 people and had changed its name to Pace Company, a Division of AMBAC Industries, Inc. The Camden News described it as the “manufacturing focal point for pyrotechnic and explosive devices in the area.”

By 1981, GOEX, Inc. (GOEX) had moved to the site to formulate custom explosives utilizing mixtures of TNT and PETN (pentaerythritetranitrate). The facility generated red water (containing TNT) as a by-product. The facility had a drainage system to divert the water to two ponds located southeast of the plant. In December 1982, the ADPCE ordered GOEX to cease discharging red water from its storage ponds. In December 1982, GOEX also transported sludge to a “burn area.” A Consent Administrative Order was executed on May 23, 1983. By November 1983, the two wastewater ponds had been burned, and soil samples indicated TNT and PETN concentrations within acceptable levels. The ponds were then covered with sand/soil and closed. By 1986, GOEX’s primary operation involved pouring pre-formulated explosives into molds and testing the final product. GOEX, as a small quantity generator (less than 100 kilograms per month), was not required to comply with the interim status groundwater, closure/postclosure, or liability insurance requirements.

In the 1990s, Accurate Arms Company, Inc. (Accurate Arms) manufactured double-base smokeless powders based on nitrocellulose and nitroglycerin in the former Rework Area. It continued to operate during 2000. Parts of the Rework Area are currently owned by GOEX, BEI, and International Paper. HydroGeoLogic believes that HIP’s tenants are likely responsible for all contamination found at the Rework Area.

### **3.10 SITE 10 - NON-VEGETATED SOIL AREAS**

The Non-vegetated Soil Areas are located in the Magazine Area adjacent to Magazine 3AT2. The Navy used the magazines for storage purposes only. Ordnance production activities were not performed in this area while the Navy owned the site. December 1956 aerial photographs show no signs of activity at Magazine 3-AT2. October 1964 aerial photographs show ground scarring and vehicle tracks to the south and southwest of Magazine 3-AT2. Considerably more ground scarring to the west and south of Magazine 3-AT2 appears in February 1972 aerial photographs. Progressively less ground scarring appears in March 1989 and February 1994 aerial photographs.

The non-vegetated soil area appears to have developed after 1961. Without the assistance of HIP, HydroGeoLogic was unable to identify the leasees of Magazine 3-AT2 during the 1964 to 1972 period. The current tenant of Magazine 3AT2 is National Technical Systems (NTS).

### **3.11 SITE 11 - BURIED DRUM AREA**

The Buried Drum Area is located in the southernmost Magazine Area, 17-AT. A drum labeled “Depth Charge Case January 23, 1942,” was found in the area. The Navy dealt exclusively with rockets and a few missile motors. It did not handle depth charge cases at the site.

Many ordnance-related businesses have operated in the Magazine Area since 1961. These include Austin Powder from 1979; HITECH from the mid-1980s; and International Ordnance, which became Camden Ordnance, National Technical Systems (Olin Ordnance), and Day & Zimmerman, from the 1990s.

Austin Powder manufactured TNT-based cast boosters that included PETN, RDX, and aluminum powder. Austin Powder made the composite explosives Composition B (TNT/RDX), Hexolite (TNT/RDX), Pentolite (PETN/TNT), Cyclotol (TNT/RDX), and Torpex (TNT/RDX/aluminum). Torpex was used in Navy depth charges during World War II. Austin Powder’s burning ground was adjacent to the Buried Drum Area, where the “Depth Charge Case” was found.

In 1988, Austin Powder burned approximately 60 pounds of waste explosives weekly in the “Ballistics Area” off Blandy Road in the southernmost Magazine Area, 17-AT. The area was not dyked to prevent runoff or run-on, nor was fire protection afforded to adjacent property. In April 1989, Austin Powder paid a fine of \$32,500 to the ADPCE. Austin Powder continued operating at the site during 2000.

In 1985, HITECH transported waste explosives, including RDX, HMX, and TNT, from the former TNT Plant to a burn site located directly behind the 16-AT magazine area. The waste explosives were burned on a steel-lined concrete pad. An air permit was obtained that allowed open burning of up to 150 pounds per month of explosives generated on-site. In March 1990, the permit was modified to allow HITECH to open burn up to 219 pounds per month of non-acute hazardous waste. It also allowed for propylene oxide operations in the area of the 8-AT magazines. Burning operations continued at the 16-AT site until September 1997, except for 15 pounds of explosive waste burned in June 1998. HITECH was subsequently found to have operated without a hazardous waste permit from August 1985 through June 1998. In July 1999, HITECH was fined over \$200,000. The site is located adjacent to Austin Powder’s burning ground, but Torpex is not indicated on HITECH’s waste manifests.

HydroGeoLogic believes that the buried drums have been discarded by HIP’s tenants. It is possible that Austin Powder removed Torpex from old World War II depth charge cases, recycled it in its own Torpex cast boosters, burned the waste Torpex from the depth charge cases at its burning ground, and left the empty cases in the area.

## **3.12 SITE 12 - MUNITION AND ORDNANCE STORAGE BUNKERS**

### **3.12.1 Background**

Ordnance storage bunkers or magazines were built at Shumaker NAD to store explosive materials and the finished rocket motors and warheads. Some were built in 1945, but most were constructed in 1951, 1952, and 1953.

### **3.12.2 Decontamination by the U.S. Navy of the Munition and Ordnance Storage Bunkers**

Navy documents indicate that decontamination was required at each magazine formerly used for the storage of bulk explosives, using a minimum of 50 gallons of 17 percent sodium sulfide solution. Floor drains were to be plugged on the outside of the buildings and the solution was to completely fill the drains. The outside dock and inside floor, walls, ceiling, and doors were to be scrubbed with solution. Special effort was made to clean cracks, crevices, and expansion joints. The solution was required to remain overnight in each magazine before rinsing with a fire hose. Also, magazines formerly used for the storage of ammonium picrate (Explosive D) were required to have their ventilators thoroughly cleaned with sodium sulfide solution.

### **3.12.3 Activities at the Munition and Ordnance Storage Bunkers After 1961**

Most of the Munition and Ordnance Storage Bunkers were sold to Brown Engineering in 1961, but those located north of Lewis Road were sold to International Paper. Many ordnance-related businesses have operated in the Magazine Area since 1961. These include Austin Powder, HITECH, NTS, International Ordnance, which became Camden Ordnance, National Technical Systems (Olin Ordnance), and Day & Zimmerman.

In April 1979, Austin Powder leased 6 acres from HIP for detonation testing of explosives manufactured on-site and for the open burning of waste explosives. Austin Powder manufactured TNT-based cast boosters, used PETN, RDX, and aluminum, and leased 31 buildings for its operations. TNT was melted in steam-jacketed vessels, combined with one or more other explosives, and poured into cylindrical-shaped boosters. During the melt-pour operation, explosive dust and chips fell on the floor and were swept up or washed out of the building and collected. The sweepings and off-specification or outdated explosives were taken to the burn area (described in Section 3.11, above) several times per week. Approximately 60 pounds of waste explosives were burned weekly. In December 1988, Austin Powder was found to be illegally discharging hazardous waste. A Consent Administrative Order was issued in March 1989.

In the 1980s, LTV occupied magazines in the 12-LC area where material was sent for rework. BEI leased magazines in two areas for the storage of reject compounds.

From the early 1990s, Day & Zimmerman manufactured munitions in the area of Magazines 15-AT1 through 15-AT25. The company generated 3 cubic yards per year of sludge and discharged wastewater into a tributary of Locust Bayou.

In 1991, NTS leased a testing facility from HIP. It obtained a permit to perform an aggravated test on missiles, warheads, 105-mm tank ammunition, and natural gas fuel tanks. In July 1999, NTS applied for a permit to construct a rotary kiln incinerator for propellants, explosives, and pyrotechnic materials. NTS proposed to burn RDX, TNT, HMX, Tetryl (a derivative of methyl aniline), and PETN.

In 1999, Camden Ordnance, a former operator in the Magazine Area, was declared bankrupt. Waste left at the site included less than 1,000 pounds of fuses, igniters, boosters, and flares. HydroGeoLogic believes that HIP's tenants are likely responsible for all contamination found in the Magazine Area.

### **3.13 SITE 13 - SQUIB DISPOSAL AREA**

Information about this site was provided by an engineer who worked at Shumaker NAD between 1949 and 1955. Batches of defective squibs containing small amounts of explosive were destroyed in pits in the area. Following incineration, all remaining materials were removed and disposed of as scrap metal. In the location identified by the engineer as the Squib Disposal Area, HydroGeoLogic observed two large ground scarred areas in the 1956 photographs. Aerial photographs from 1972 reveal that this area became revegetated. HydroGeoLogic does not believe that the site is contaminated.

### **3.14 SITE 14 - FUSE TEST RANGE**

#### **3.14.1 Background**

The Fuse Test Range was a small area located north of the Rocket Test Range. It was used by the Navy to test rocket fuses.

#### **3.14.2 Decontamination by the U.S. Navy of the Fuse Test Range**

By April 1960, a Statement of Clearance had been issued by Headquarters, U.S. Army 52D Ordnance Detachment, Pine Bluff Arsenal, Arkansas. The Fuse Test Range had been “given a careful search and had been cleared of all dangerous or explosive material reasonably possible to detect.” It was recommended the Fuse Test Range be used for any suitable purpose.

#### **3.14.3 Activities at the Fuse Test Range After 1961**

In 1961, the Fuse Test Range was sold to Brown Engineering. Since 1963, the area has been occupied by the tenants of the Rocket Test Range. Pace-Caribe (and its subsequent company names) operated from Building R-15 and others. Further details are provided under Section 3.8. HydroGeoLogic believes that HIP's tenants are likely responsible for all ordnance-related items found on the Fuse Test Range.