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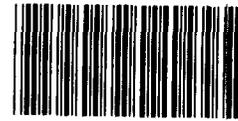
United States General Accounting Office

Report to the Honorable
Bernard J. Dwyer,
House of Representatives

August 1992

MILITARY ORDNANCE

Cleanup Activities at the Former Raritan Arsenal

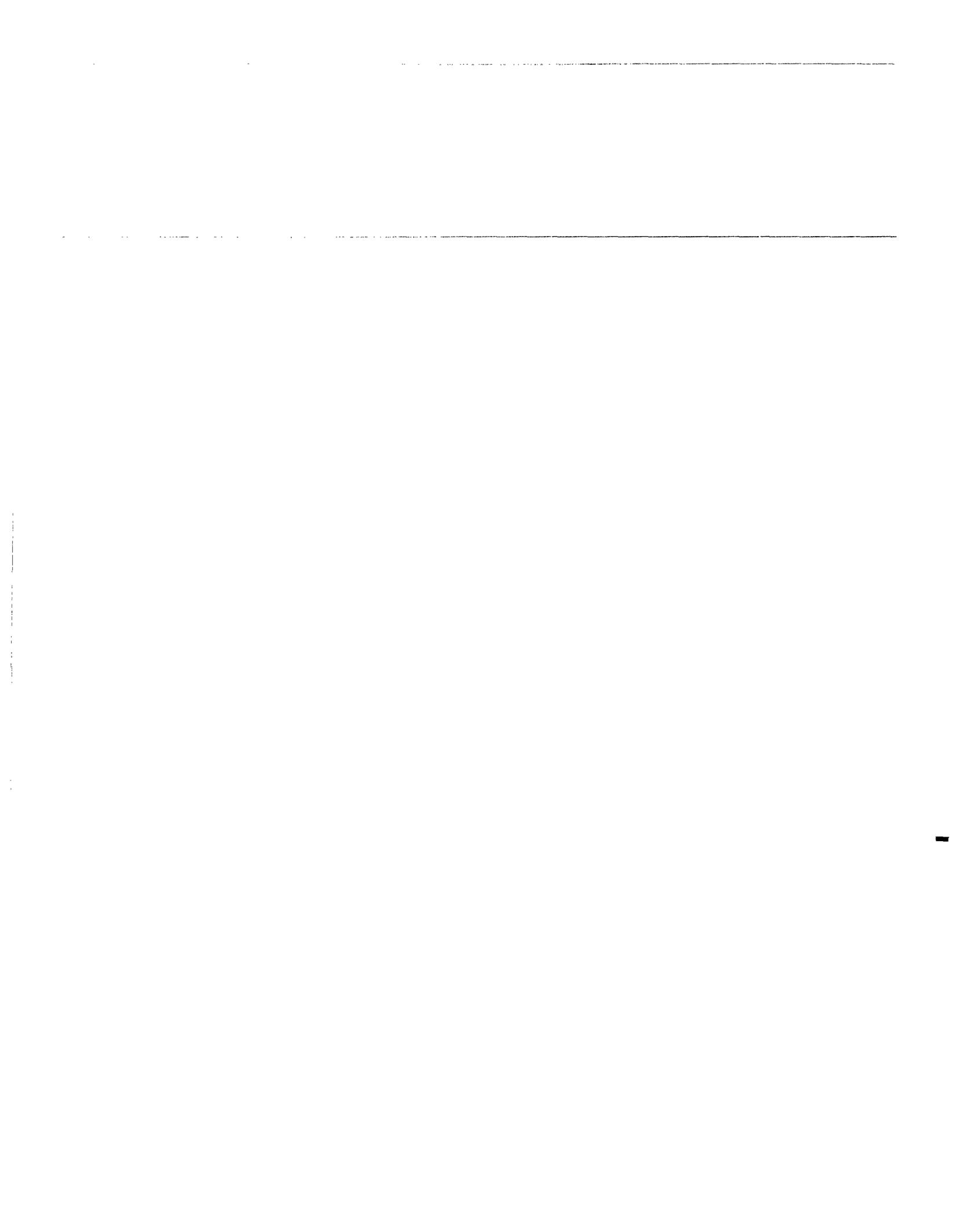


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GENERAL



**National Security and
International Affairs Division**

B-246200

August 27, 1992

The Honorable Bernard J. Dwyer
House of Representatives

Dear Mr. Dwyer:

As you requested, we reviewed the Department of Defense's (DOD) efforts to clean up the former Raritan Arsenal in Edison, New Jersey, which is contaminated with ordnance and hazardous waste. You also asked us to identify which federal agency has the responsibility to certify the completeness of the ordnance cleanup at the formerly used defense site.

Background

The Raritan Arsenal was a 3,200-acre Army facility in operation from 1917 to 1963. Its operations included receiving, storing, shipping, transferring, and packing ammunition, including projectiles, fuzes, pyrotechnics, grenades, boosters, and trinitrotoluene (TNT). From 1919 through World War II, accidental explosions reportedly scattered ordnance fragments over large areas and into the ground. In addition, Raritan personnel used various chemicals for fumigation purposes and disposed of these and other chemicals, such as mustard agent, by burying them in the ground.

In 1962, the government declared Raritan excess to the Army's needs, and, as a result, Raritan began to phase out its military activities. In 1963, personnel from the Letterkenny Army Depot evaluated the site for contamination. In its report on the evaluation, the Depot designated 17 areas that were potentially contaminated with ordnance or hazardous waste.¹

After Raritan completed phasing out its military activities in 1964, DOD transferred the land to the General Services Administration, which then sold or transferred some of the land to private parties and government agencies, including the Environmental Protection Agency (EPA). Since that time, the land has been developed considerably. The site now contains a community college, a public park, an industrial park, two hotels, and a day-care center.

Section 211 of the Superfund Amendments and Reauthorization Act of 1986 (P.L. 99-499) intends that DOD have the responsibility for the cleanup

¹The Army Corps of Engineers recently increased the number of contaminated areas to 21.

of ordnance and hazardous waste at both active and formerly used defense sites. The Army Corps of Engineers manages cleanup efforts on formerly used defense sites for DOD. Whenever ordnance contamination poses an imminent or substantial danger to the public health or the environment, the Corps is responsible for handling the cleanup. Hazardous waste cleanups must meet standards established by EPA. No specific standards, such as parts per million, exist for ordnance cleanups.

Results in Brief

Activities to clean up ordnance at Raritan were expected to be completed in mid-1993. However, due to funding constraints, the Corps' current plan shows the work may continue into fiscal year 1995. Hazardous waste cleanup efforts are also taking place at Raritan but are still in the early investigative stage and will take much longer than the ordnance cleanup.

No federal statute or regulation requires the Corps or EPA to formally certify that cleanups have met specific standards. We identified no detrimental effects of the lack of such a requirement.

Status of Ordnance and Hazardous Waste Cleanups

In 1987, the Corps conducted a preliminary contamination evaluation at Raritan. During the evaluation, ordnance was found and removed. Since that time, a contractor was hired and is conducting an ordnance investigation and disposing of ordnance found.

As of May 1992, the Corps had spent \$4.5 million and found and destroyed over 100,000 pieces of ordnance and over 12,000 pounds of TNT. The Corps awarded a follow-on contract in April 1992 for cleaning up the ordnance in the remaining areas. Ordnance cleanup may continue into fiscal year 1995.

The Corps is also conducting a remedial investigation and feasibility study to address hazardous waste contamination at Raritan. The purpose of the investigation is to determine the extent, volume, and type of hazardous waste. Some of the contamination may have come from chemicals in explosive powder that leaked from the ordnance due to deterioration of the ordnance casings. Chemicals were also used and disposed of at Raritan. The purpose of the feasibility study is to establish criteria for cleaning the site, identify and screen cleanup alternatives, and analyze the technology and cost of the alternatives. As of May 1992, \$2.7 million was spent for studies of and tests for hazardous waste. The Corps plans to award a remedial design contract in 1995 for the cleanup of hazardous waste.

Certification of Cleanup Is Not Required

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (P.L. 96-510), as amended by the Superfund Amendments and Reauthorization Act, requires federal agencies to meet EPA standards when cleaning up hazardous waste. The amended act also requires the Secretary of Defense to carry out an environmental restoration program regarding releases of hazardous substances at facilities currently and formerly under the jurisdiction of the Secretary. The Secretary of Defense is authorized under the act to detect and dispose of unexploded ordnance found on formerly used defense sites.

The extent of EPA and state involvement in hazardous waste or ordnance cleanups depends on whether a facility is placed on the National Priorities List (NPL), a list of sites with high hazardous substances rankings. If a facility is on the list, EPA's involvement in the cleanup process is substantially greater. Agencies with facilities on the NPL must, in consultation with EPA and the involved state, conduct remedial investigations and feasibility studies for the facility and enter into interagency agreements with EPA for the expeditious cleanup by the agency.

Similar consultations are generally required for non-NPL DOD sites (such as Raritan), but DOD is not formally required to use the procedures established for cleanups of NPL sites. For non-NPL DOD sites, a work plan is prepared prior to cleanup of hazardous wastes or ordnance. The work plan states what work is to be done and, where applicable, what standards are to be met. The plan is then agreed to by the agency, the state, and EPA. When the work is completed,² an administrative record is prepared to show that the work has been completed as agreed to in the work plan.

No federal statute or regulation requires the agency or EPA to make a certification per se for cleanups of either NPL or non-NPL sites; the administrative record is the document that details the extent of the cleanup performed. Nevertheless, EPA must approve the delisting of NPL sites.

According to DOD, hazardous waste cleanups are based on the risk to the public health and the environment posed by the contamination at a site, and DOD is currently using the best available technology to reduce this risk. In Raritan's case, the risk would be determined by the concentration level of the site's contaminants and the degree to which the public is exposed to

²We use the word "complete" in this report to mean that all ordnance or hazardous waste that presents an imminent danger to the public health or environment has been removed.

them. The degree of risk depends on the site's current and future use. Currently, Raritan is only partially developed.

According to the Corps, surveying Raritan's entire 3,200 acres is not feasible because a major portion of the land has been developed. Unlike hazardous waste, the nonexplosive portion of ordnance does not migrate or produce a plume that helps determine the area in which it is buried. Ordnance tends to stay where it is, and if it is buried very deep, current technology may not be able to detect the metal. While the Corps is not required to certify to any specific standards regarding the degree of the cleanup of the ordnance, Corps officials advised us that they intend to be able to state with a high degree of confidence that all ordnance presenting an imminent danger to the public health or the environment has been removed.

The lack of a certification requirement has had no effect on the Corps' efforts in cleaning up Raritan. In our opinion, simply certifying that the cleanup is complete would not necessarily limit any party's liability in the event that additional ordnance is later found. The Corps has accepted the responsibility for cleaning up all ordnance presenting an imminent danger to the public health and the environment at Raritan, even though some of the deeds transferring the property contained clauses for the current owners "to assume all risk for all claims for personal injuries and property damage...and save harmless...the United States of America...against any and all liabilities, claims,...resulting from immediately or remotely, the possible contaminated conditions,...."

Agency Comments

We requested comments from DOD, EPA, and New Jersey's Department of Environmental Protection and Energy. In oral comments, DOD and EPA program officials agreed with the substance of the report but asked that we clarify certain statements. We changed the report to reflect their comments where appropriate. In written comments (see app. II), New Jersey's Case Manager noted that the state considers ordnance to be a hazardous waste subject to EPA standards under Public Law 96-510, as amended. However, in a follow-up telephone conversation, the Case Manager agreed that state requirements would be satisfied as long as DOD (1) kept her department informed of actions it was taking and (2) stated, once the cleanup had been completed, that it had a high degree of confidence that all ordnance presenting an imminent danger to the public health and the environment had been removed.

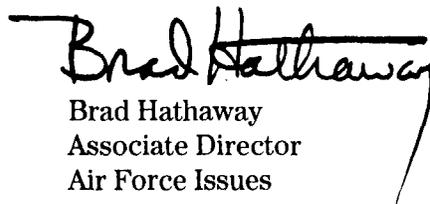
Scope and Methodology

We analyzed statutory and regulatory requirements that are applicable to Raritan and govern the cleanup of ordnance and hazardous waste. We reviewed available documents and interviewed officials at DOD and EPA headquarters in Washington, D.C.; EPA's regional office in New York; the Army Corps of Engineers' North Atlantic Division, Huntsville Division, and Kansas City district offices; and the New Jersey Department of Environmental Protection and Energy. We also visited the former Raritan Arsenal and interviewed officials from the park authority, the community college, and the township of Edison; developers of the land on the Raritan site; and an individual from an environmental special interest group. We conducted our review between July 1991 and June 1992 in accordance with generally accepted government auditing standards.

Unless you publicly announce this report's contents earlier, we plan no further distribution until 5 days after the report's issue date. At that time we will send copies to the Secretaries of Defense and the Army; the Administrator, Environmental Protection Agency; the Director, New Jersey Department of Environmental Protection and Energy; and appropriate congressional committees. We will also make copies available to others on request.

Please contact me on (202) 275-4268 if you or your staff have any questions concerning this report. Major contributors to this report are George J. Wooditch, Assistant Director; and Gregory K. Harmon, Evaluator-in-Charge.

Sincerely yours,



Brad Hathaway
Associate Director
Air Force Issues

Contents

Letter		1
Appendix I		8
Cleanup Activities at the Former Raritan Arsenal	Ordnance	8
	Hazardous Waste	13
Appendix II		16
Comments From the State of New Jersey		
Table	Table I.1: Ordnance Found and Destroyed at the Former Raritan Arsenal Between May 1991 and June 1992	10
Figures	Figure I.1: Potentially Contaminated Areas at the Former Raritan Arsenal	9
	Figure I.2: Adapter Boosters Found Buried Behind North Hall on the Middlesex County College Campus	11
	Figure I.3: 37-mm Projectiles Being Prepared for On-Site Demolition	13

Abbreviations

DOD	Department of Defense
EPA	Environmental Protection Agency
NPL	National Priorities List
TNT	Trinitrotoluene

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Cleanup Activities at the Former Raritan Arsenal

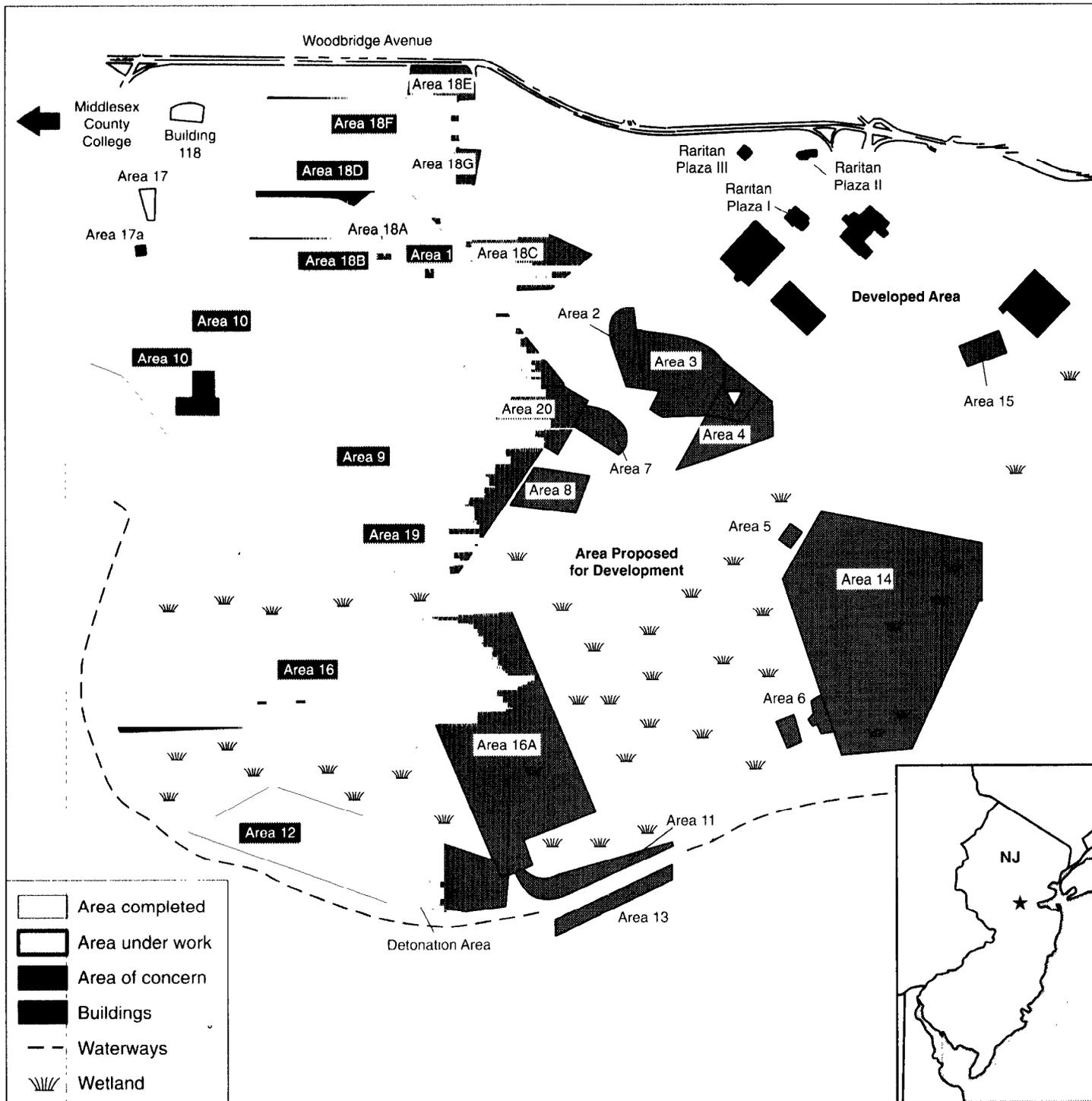
In 1987, the Army Corps of Engineers conducted a study to determine whether chemical and/or ordnance contamination was present at the former Raritan Arsenal. In 1990, the evaluation confirmed the presence of buried ordnance and hazardous waste contamination of the soil and groundwater at Raritan. In December 1991, the Secretary of Defense submitted to Congress a report that described the cleanup activities at Raritan. The report stated that since the processes for cleaning up ordnance and hazardous waste were different, the cleanup activities for each would be conducted separately. According to the Corps, the activities will be closely coordinated to ensure that all ordnance and hazardous waste that present an imminent danger to the public health or the environment are removed from the site.

Ordnance

In July 1991, the Army Corps of Engineers' Huntsville Division was given the responsibility for ordnance cleanup at Raritan. In accordance with the work plans, the Corps hired a contractor (Metcalf and Eddy, Inc.) to determine whether other potentially contaminated areas existed in addition to the 17 areas identified by the Letterkenny Army Depot in 1963. To make this determination, the contractor conducted archive searches and interviews with former Raritan personnel. The contractor found that some of the 17 potentially contaminated areas identified by Letterkenny were larger than previously indicated and that 4 additional areas might be contaminated. The 21 potentially contaminated areas at Raritan are shown in figure I.1.

**Appendix I
Cleanup Activities at the Former Raritan
Arsenal**

Figure I.1: Potentially Contaminated Areas at the Former Raritan Arsenal



Source: Army Corps of Engineers and Rand McNally

**Appendix I
Cleanup Activities at the Former Raritan
Arsenal**

Areas suspected to be contaminated with ordnance can be surveyed with a metal detector. According to the Corps, surveying all of Raritan with a metal detector is not feasible because the site is too large and much of the area now contains structures, paved areas, underground pipes, and other metallic objects. If the suspected areas are found to be contaminated, the Corps will need to plan and implement cleanup activities. Until May 1992, the Corps contracted with IT Corporation to handle ordnance removal and disposal. The current contractor is EOD Technologies.

Current Efforts

The Corps has been concentrating its efforts in areas 1, 4, 10, 16, and 17 and around building 118 in area 21, since these locations pose the greatest concern for the public health and the environment. Areas 1 and 17 were surveyed with a metal detector, and no ordnance was found. Ordnance was found within areas 4, 10, 16, and 21. Contractor activities began ordnance cleanup activities in May 1991 and may continue the cleanup through fiscal year 1995. Between May 1991 and June 1992, over 100,000 pieces of ordnance were found and destroyed. The type of ordnance, number of pieces of each, and location in which each was found are shown in table I.1.

Table I.1: Ordnance Found and Destroyed at the Former Raritan Arsenal Between May 1991 and June 1992

Type of ordnance	Number of pieces	Location
MK II adapter boosters	83,352	Building 118
37-mm projectiles	30,149	Area 16
French rifle grenades	54	Area 11
75-mm projectiles	21	Area 4
French rifle grenades	13	Area 10
Other adapter boosters	9	Area 4
MK II grenades	9	Area 11
20-mm projectiles	8	Area 11
MK 23 practice bomb	1	Area 4
9.2-inch projectile	1	Area 4
155-mm projectile	1	Area 4
Mortar round	1	Area 3

Operations involving trinitrotoluene (TNT) removal from ordnance resulted in TNT deposits in the soil in area 4. The contractor has been separating the TNT residue from the soil, and as of June 1992, 12,360 pounds of TNT residue had been found and destroyed. According to information found during the archive research, the contamination in area 10 (Thomas A.

**Appendix I
Cleanup Activities at the Former Raritan
Arsenal**

Edison County Park) is thought to have been caused in part by two magazine explosions.

During Raritan's operations, area 16 contained approximately 70 ordnance storage facilities. According to Corps officials, this area may have become contaminated by former Raritan employees' burying ordnance there or transporting soil there to be used as fill material around the facilities. As of March 1992, the area around two building sites had been cleaned up. The rest of the area will be cleaned up by April 1994.

Ordnance was discovered twice on the site of building 118, now the North Hall on the campus of Middlesex County College. According to the archive search, in 1962 adapter boosters and grenades were found, and in 1987 additional adapter boosters were discovered. Although the area had been considered decontaminated, a former Raritan employee believed additional grenades were buried in the ground. As of June 1992, no grenades had been found on this site, but additional adapter boosters were found. According to the Corps, the site around building 118 had been cleared of adapter boosters as of April 1992. Figure I.2 shows adapter boosters found buried behind North Hall on the Middlesex County College.

**Figure I.2: Adapter Boosters Found
Buried Behind North Hall on the
Middlesex County College Campus**



Note: More than 83,000 adapter boosters were found buried in the soil, and some were found buried in concrete behind North Hall (Building 118). Adapter boosters are approximately 8 inches long.

Source: Army Corps of Engineers.

**Appendix I
Cleanup Activities at the Former Raritan
Arsenal**

The Corps stores the ordnance found in locked boxes in a fenced area, and security personnel guard the boxes until the ordnance can be disposed of. According to the Corps, the projectiles and adapter boosters were relatively stable, since the projectiles could, under normal circumstances, only cause harm by being fired from a gun, and the boosters needed a fuze to be detonated. (The Corps had not found fuzes in any of the boosters.) The other types of ordnance found were also relatively stable. On June 9, 1992, we were advised that MK II grenade fuzes were found but were not tested for stability prior to being destroyed.

The Corps determined that the safest method for disposing of the ordnance was to conduct an on-site demolition. The demolition site is located in area 12 by the Raritan River. According to the Corps' Community Relation Plan, the Corps coordinates closely with fire and emergency personnel during demolition activities to ensure safety. The local community was concerned about excessive noise during demolition activities. In June 1991, the Corps modified its on-site demolition procedures to mitigate the excessive noise. The Corps believes the change in procedures resolved the noise problem. Figure I.3 shows 37-mm projectiles being prepared for on-site demolition.

Figure I.3: 37-mm Projectiles Being Prepared for On-Site Demolition



Note: These 37-mm projectiles, which are approximately 4 inches long, are being prepared for disposal in the detonation area located in area 12. These 37-mm projectiles were found in area 16, where over 30,000 were unearthed

Source: Army Corps of Engineers

Future Efforts

In April 1992, the Corps awarded a follow-on contract to investigate and remove ordnance from the remaining areas. The Corps has already found some ordnance in two of these areas. A mortar round was found in area 3, and 54 French rifle grenades, 9 MK II grenades (unfuzed), and 8 20-mm projectiles were found in area 11.

Hazardous Waste

To address hazardous waste contamination at Raritan, the Corps is conducting a remedial investigation and feasibility study. The purpose of the remedial investigation is to determine the type and extent of contamination at the site by collecting and analyzing groundwater, soil, and surface water samples. The purpose of the feasibility study is to establish criteria for cleaning the site, identify and screen cleanup alternatives, and analyze the technology and cost of the alternatives.

The first phase of the remedial investigation at Raritan will focus on the 17 areas where ordnance or hazardous waste was buried, which the Letterkenny Army Depot identified in 1963. The second phase of the study

will focus on the additional four areas identified by the contractor and any areas from the first phase of the study that require further sampling.

During a 1985 evaluation of EPA's property at Raritan, EPA discovered a new hazardous waste site—a man-made pond. The site, now known as area 18A, appeared to have been used as a dump for hazardous substances. Several chemicals were found in the pond, including trichloroethene, the chemical found at the highest concentration, which potentially poses a significant threat. The Corps has agreed to clean up the pond.

According to the Corps' Community Relation Plan, the Corps will solicit the public's comments on the cleanup alternatives identified by the feasibility study before a cleanup method is selected. The Corps plans to award a remedial design contract in 1995 to start cleanup of hazardous waste contamination on the site.

The Corps also suspects that hazardous waste may have been disposed of in area 5. Potassium cyanide and red fuming nitric acid were buried in the area after Raritan personnel stopped using them as fumigants. However, Corps officials stated that previous investigations have not confirmed the presence of potassium cyanide in the area. A special Army unit will evaluate the site to determine whether potassium cyanide and red fuming nitric acid are present.

Former Mustard Agent Repository

Area 5 is suspected to be contaminated with hazardous waste that needs to be cleaned up. A portion of this area was used as a disposal site for mustard agent, which was used in chemical warfare during World War I. Mustard agent, in either its liquid or solid form, can cause burns, blindness, and death.

From 1943 to 1945, when Raritan was used as a shipping port, bomb casings and containers that developed leaks were transported to area 5 for disposal. Leaking bomb casings and containers were also transported by barge from other locations to Raritan for disposal in this area. Corps officials stated that these disposal operations in area 5 were of a very small magnitude. Some of these bomb casings and containers were filled with mustard agent.

The U.S. Army Chemical Corps was responsible for disposing of the mustard agent. The disposal procedure used consisted of digging a pit 5 feet by 5 feet by 5 feet, pouring the mustard agent out of the bomb casing

**Appendix I
Cleanup Activities at the Former Raritan
Arsenal**

or container into a neutralizing solution in the pit, and then placing the bomb casing or container into the pit. The pit was then covered with dirt, and signs were posted over it that indicated the date of burial and the type of agent buried. Five different pits were used to dispose of the mustard agent. The area has warning signs posted and is surrounded by a 6-foot chain link fence topped with three strands of barbed wire to prevent unauthorized access.

The mustard agent, combined with the neutralizing solution, was buried in an unlined trench in the area. The Corps' preliminary assessment of the area indicated that it was not an immediate threat to the public. The Corps is currently conducting environmental studies to determine the presence and/or the extent of the contamination.

Comments From the State of New Jersey



State of New Jersey
Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
CN 028
Trenton, NJ 08625-0028

Scott A. Weiner
Commissioner

Karl J. Delaney
Director

Honorable Frank C. Conahan
Assistant Comptroller General
US General Accounting Office
Washington, DC 20548

29 JUN 1992

Dear Mr. Conahan:

Re: Former Raritan Arsenal
Edison Township, New Jersey
GAO Draft Report

The New Jersey Department of Environmental Protection and Energy (Department) has reviewed the General Accounting Office's Draft Report entitled "Cleanup Activities at the Former Raritan Arsenal" and has the following comments:

The report states that the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (P.L. 96-510) (CERCLA) requires federal agencies to meet Environmental Protection Agency (EPA) standards when cleaning up hazardous waste, and certify the completeness of the cleanup. The document then states that this act does not apply to the cleanup of ordnance, since ordnance has not been specifically classified as a hazardous waste.

It should be noted that the US Army Corps of Engineers (USACOE) has been performing all remediation at the site pursuant to CERCLA authority. Under this authority, the USACOE was not required to obtain permits for any on-site activities relative to the CERCLA remedial action. It is the Department's position that the entire cleanup must be performed pursuant to CERCLA authority, i.e. the certification of ordnance cleanup must be required. Please be advised that the state considers ordnance a hazardous waste since it exhibits the characteristic of reactivity, in accordance with N.J.A.C. 7:26-8.11(a)6.

If you have any questions, please contact me at (609) 633-1455.

Sincerely,

Handwritten signature of Gwen Barunas in cursive.

Gwen Barunas, Case Manager
Bureau of Federal Case Management

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