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FEDERAL FACILITIES COMPLIANCE ACT:

Final National Comprehensive Groundwater Monitoring Report

FEDERAL FACILITIES COMPLIANCE ACT: FINAL NATIONAL COMPREHENSIVE GROUNDWATER MONITORING EVALUATION REPORT

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Prepared by

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EXECUTIVE SUMMARY

Final National Comprehensive Groundwater Monitoring Evaluation Report

The Federal Facilities Compliance Act of 1992 (FFCA) amended the waiver of sovereign immunity for federal facilities with regard to the Resource Conservation and Recovery Act (RCRA). In order to comply with the FFCA provision, comprehensive groundwater monitoring evaluations (CME) were to be performed by the Environmental Protection Agency at regulated federal facilities during Fiscal Year (FY) 1993. Based on discussion with Congressional staff, 22 federal facilities were selected by the Environmental Protection Agency's Office of Waste Programs Enforcement in order to provide a detailed report of the status of federal facility groundwater monitoring systems. This final national CME report details the results of the 22 CMEs.

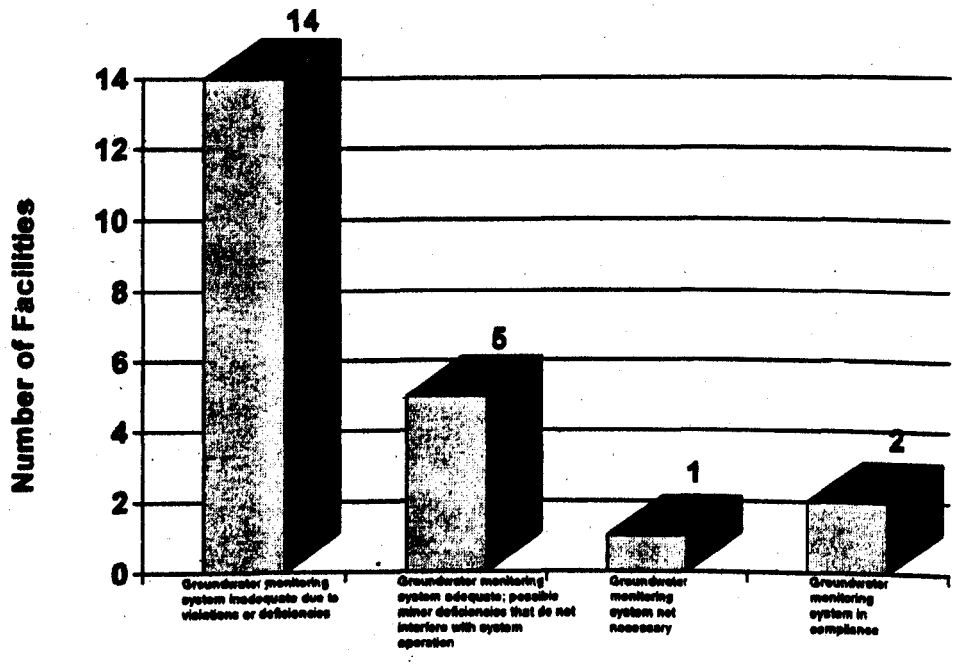
A CME is an in-depth evaluation of the groundwater monitoring program employed at a facility that manages hazardous waste in a surface impoundment, landfill, land treatment unit, or waste pile. The objective of a CME is to determine whether a facility has in place a groundwater monitoring program that is adequately designed, operated, and maintained to detect releases or to define the rate and extent of contaminant migration from a unit regulated under RCRA. Violations of RCRA groundwater monitoring requirements fall into the following four categories: 1) failure to adequately characterize the geology and hydrogeology of the site, 2) failure to properly locate wells, 3) failure to properly construct or maintain wells, and 4) failure to provide an appropriate or adequate sampling and analysis plan (SAP) or procedures.

The 22 facilities selected for this national CME report include: 14 Department of Defense (DoD) facilities (8 Army, 4 Air Force, and 2 Navy), 7 U.S. Department of Energy (DOE) facilities, and 1 U.S. Coast Guard (USCG) facility. As a result of the CME inspections, 19 of the 22 facilities (86 percent) were found to be in noncompliance with requirements for groundwater monitoring under RCRA and only 3 (14 percent--two DOD and one DOE facility) were found in compliance with RCRA requirements that govern groundwater monitoring. At the DOE facility that was in compliance, no groundwater monitoring system was legally required. Of the 19 facilities in noncompliance, 14 facilities (64 percent--8 DoD, 5 DOE, and 1 USCG) were reported to have inadequate groundwater monitoring systems, and 5 facilities (23 percent--5 DOD facilities) had adequate groundwater monitoring systems with deficiencies. Figure ES-1 summarizes these results.

The violations and deficiencies related to groundwater monitoring system noted at federal facilities during the CMEs can be reduced by correctly following the "Final RCRA Groundwater Monitoring Evaluation Guidance" (OSWER Directive 9950.2, December 1986) and "RCRA Groundwater Monitoring Technical Enforcement Guidance Document" (EPA Document 530-SW-86-055) for preparing a groundwater monitoring system and SAP to monitor groundwater in areas in which one or more disposal units regulated under RCRA are found. In addition, Chapter 11 of the Office of Solid Waste's (OSW) SW-846 "Test Methods for Evaluating Solid Waste" identifies certain designs and practices which meet the performance requirements for hazardous waste facility permit regulations promulgated in Title 40 Code of Federal Regulations (CFR) Part 265.

While the primary focus of this report is on the technical findings of 22 CME inspections conducted in FY93, the U.S. Environmental Protection Agency's Federal Facilities Enforcement Office requested from each of the EPA regions, information on additional CMEs at federal facilities conducted in FY93, FY94 and FY95 . This information is summarized in Appendix B of this report.

Figure ES-1
Groundwater Monitoring System Status at Federal Facilities Inspected for the National CME Report



1.0 INTRODUCTION

On October 6, 1992, the Federal Facilities Compliance Act of 1992 (FFCA) was passed into law. The FFCA amends the waiver of sovereign immunity for federal facilities with regard to the Resource Conservation and Recovery Act (RCRA). The FFCA's legislative history indicates that its primary purpose is to ensure that federal facilities are treated in the same manner as privately owned facilities in regard to compliance with RCRA requirements.

Section 104 of the FFCA directs the U.S. Environmental Protection Agency (EPA) to perform a thorough inspection (namely, a compliance evaluation inspection [CEI]) of every federal facility that treats, stores, or disposes of hazardous waste, for compliance with RCRA regulations. In addition, the FFCA directs EPA to conduct a comprehensive groundwater monitoring evaluation (CME) at facilities requiring groundwater monitoring unless such an evaluation was conducted during the 12-month period preceding the date of enactment of the FFCA.

A CME is an in-depth evaluation of the groundwater monitoring program employed at a facility that manages hazardous waste in a surface impoundment, landfill, land treatment unit, or waste pile. The objective of a CME is to determine whether a facility has in place a groundwater monitoring program that is adequately designed, operated, and maintained to detect releases or to define the rate and extent of contaminant migration from a regulated unit as required under 40 Code of Federal Regulations (CFR), Parts 264, 265, and 270. Violation of the groundwater monitoring program required by RCRA regulations is considered a high-priority violation under EPA's agency-wide Enforcement Response Policy of 1987 (ERP). Each of the federal facilities that are not in compliance with RCRA groundwater monitoring requirements are to be tracked in the RCRA Information System (RCRIS) as significant noncompliers (SNC) in accordance with the ERP of 1987 and Draft Revised ERP of March 1995. SNCs are based on high priority violations (HPV). Information in RCRIS also may be used to confirm the SNC or HPV status of a facility.

In order to comply with the FFCA provision, comprehensive groundwater monitoring evaluations (CME) were to be performed by the Environmental Protection Agency at regulated federal facilities during Fiscal Year (FY) 1993. Based on discussion with Congressional staff, 22 federal facilities were selected by the Environmental Protection Agency's Office of Waste Programs Enforcement. The selected federal facilities are RCRA-regulated treatment, storage, or disposal facilities (TSDF) that

require groundwater monitoring. The CME inspections were conducted to determine if federal facility groundwater monitoring systems comply with RCRA as directed by the FFCA. This National CME Report details the results of 22 CME inspections only, not on subsequent enforcement actions. Based on the results reported in the draft version of this report, the U.S. Environmental Protection Agency's Federal Facilities Enforcement Office requested from each of the EPA regions, supplemental information on facilities where CMEs were conducted in FY93, FY94 and FY95. This information is located in Appendix B of the report.

2.0 FACILITIES INSPECTED

Twenty-two CME inspections were conducted at federal facilities in 1993. The facilities inspected included 14 Department of Defense (DoD) facilities (8 Army, 4 Air Force, and 2 Navy), 7 U.S. Department of Energy (DOE) facilities and 1 U.S. Coast Guard (USCG) facility (see Figure 1). Table 1 lists the federal facilities inspected in each EPA region and summarized in this report. Figure 2 shows the locations of the facilities. Common wastes generated and stored at the federal facilities include process wastewater, waste solvents, waste oils, radioactive wastes, electroplating wastes, asbestos, explosives, and pesticides (see Figure 3). Information on waste management practices indicated that at 21 of the 22 facilities, liquid wastes were treated or disposed of in surface impoundments. Other methods of waste storage and disposal noted at the facilities include landfilling, land treatment, open burning or open detonation (OB/OD), incineration, and tanks (see Figure 4). Summaries of the CMEs, CME results, and the EPA points of contact (when provided) for each federal facility are presented in Appendix A.

3.0 CONCLUSIONS

A facility is required to install groundwater monitoring systems around any land-based management units. These systems must be able to detect releases from the units or monitor existing contaminant plumes. A facility is in violation of RCRA groundwater monitoring requirements if a required groundwater monitoring system is not in place. Generally, deficiencies and violations fall into the following four categories:

Figure 1
Types of Federal Facilities Inspected for the National CME Report

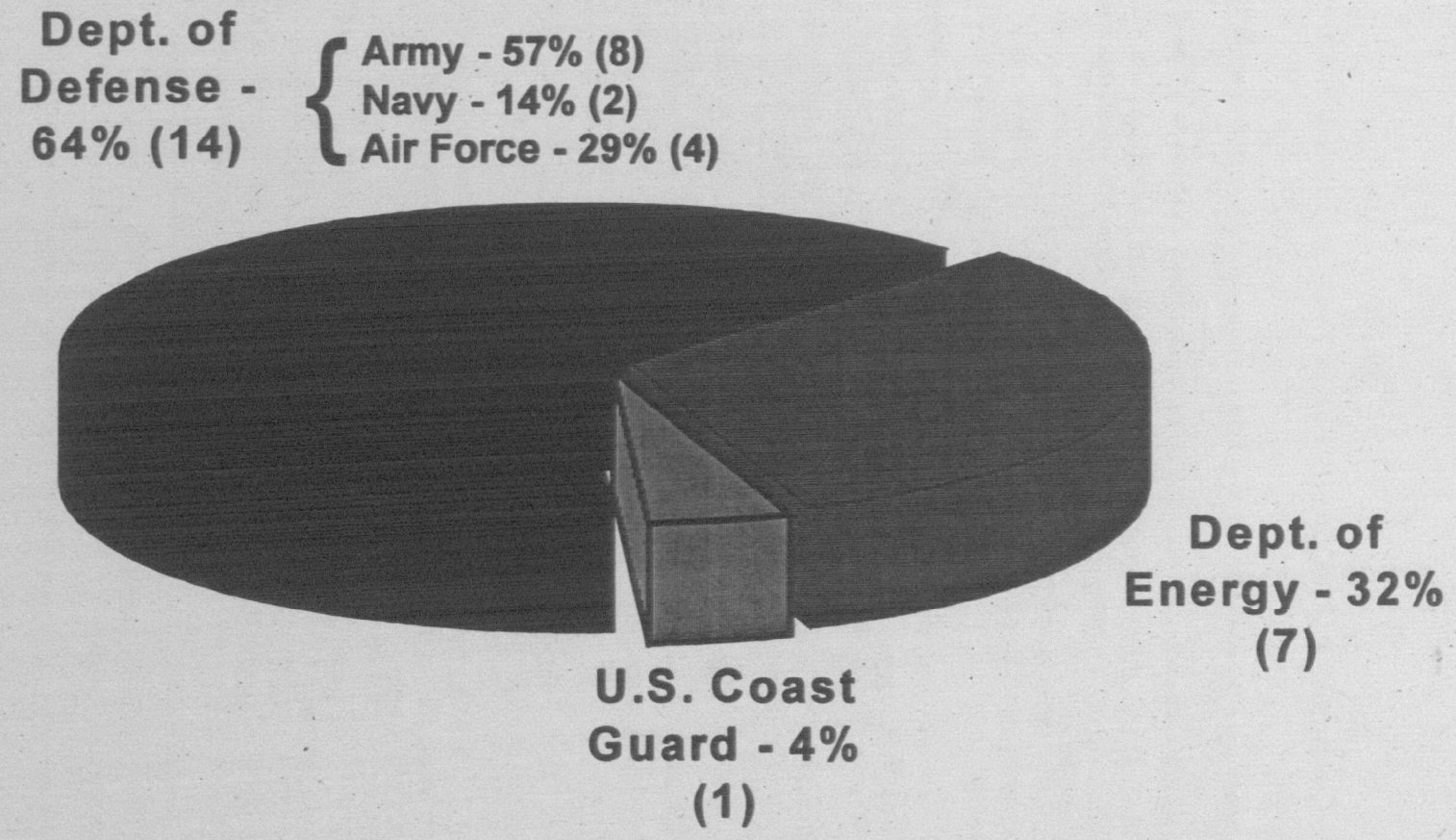
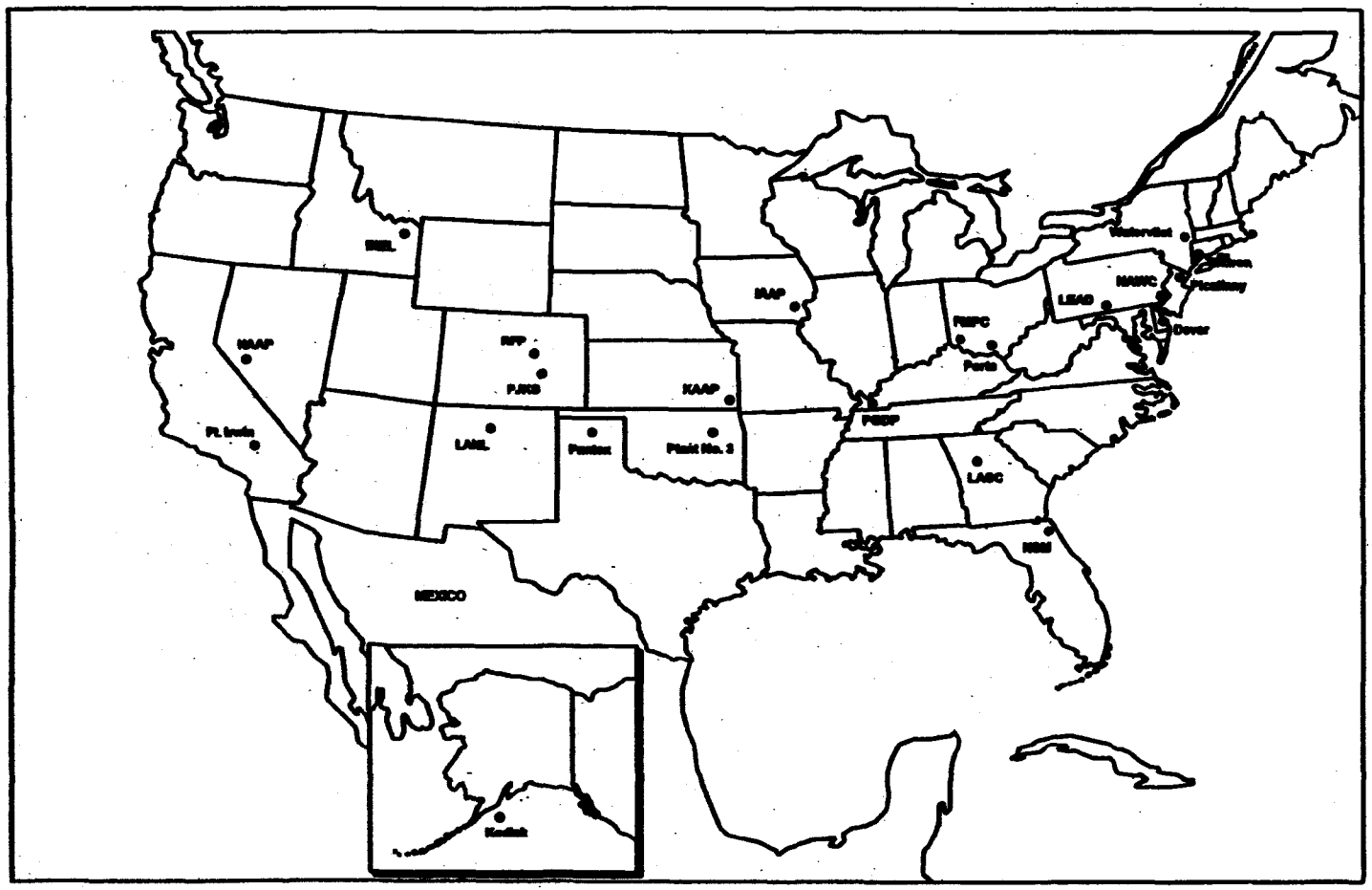


TABLE 1

FEDERAL FACILITIES INSPECTED FOR THE NATIONAL CME REPORT

Facility	Region	Facility	Region
Stratford U.S. Army Engine Plant (Allied Signal, formerly Textron), Connecticut	1	U.S. Air Force Plant No. 3 (Plant No. 3), Oklahoma	6
Picatinny Arsenal (Picatinny), New Jersey	2	U.S. DOE Los Alamos National Laboratory (LANL), New Mexico	6
Watervliet Arsenal (Watervliet),New York	2	U.S. DOE Pantex Plant (Pantex), Texas	6
Naval Air Warfare Center (NAWC), Pennsylvania	3	Iowa Army Ammunition Plant (IAAP), Iowa	7
Letterkenny Army Depot (LEAD), Pennsylvania	3	Kansas Army Ammunition Plant (KAAP), Kansas	7
Dover Air Force Base (Dover), Delaware	3	U.S. Air Force Plant PJKS (PJKS), Colorado	8
U.S. DOE Paducah Gaseous Diffusion Plant (PDGP), Kentucky	4	U.S. DOE Rocky Flats Plant (RFP), Colorado	8
U.S. Air Force Plant No. 6, Lockheed Aeronautical Systems (LASC), Georgia	4	Hawthorne Army Ammunition Plant (HAAP), Nevada	9
U.S. Naval Station Mayport (NSM), Florida	4	U.S. Army Fort Irwin (Ft. Irwin), California	9
U.S. DOE Feed Material Production Center (FMPC), Ohio	5	U.S. DOE Idaho National Engineering Lab (INEL), Idaho	10
U.S. DOE Portsmouth Gaseous Diffusion Plant (Ports), Ohio	5	U.S. Coast Guard Kodiak Support Center (Kodiak), Alaska	10

Figure 2
Locations of Federal Facilities Inspected for the National CME Report



Note: See Table 1 for descriptions of abbreviations

Figure 3
Types of Wastes Managed at Federal Facilities Inspected for the National CME Report

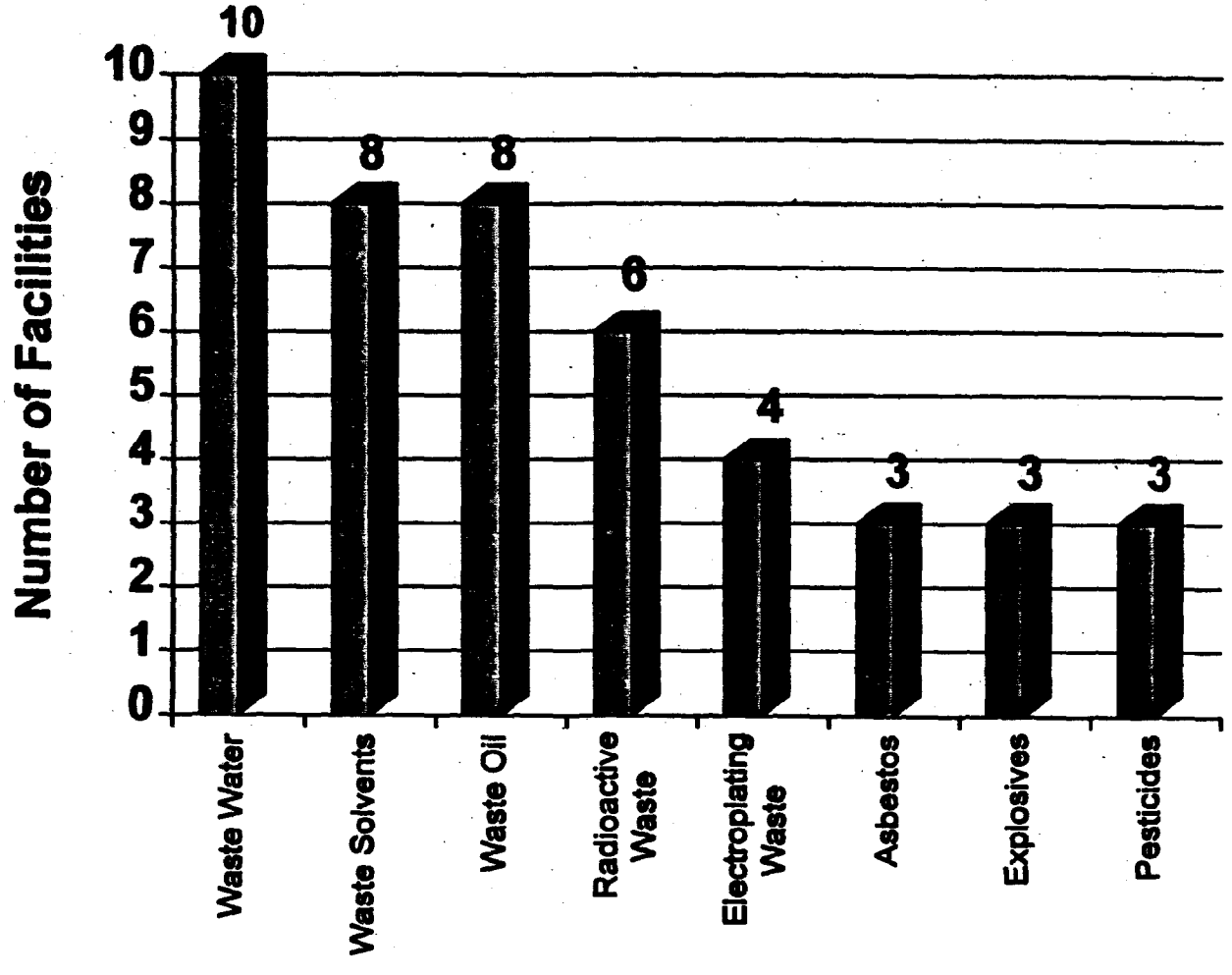
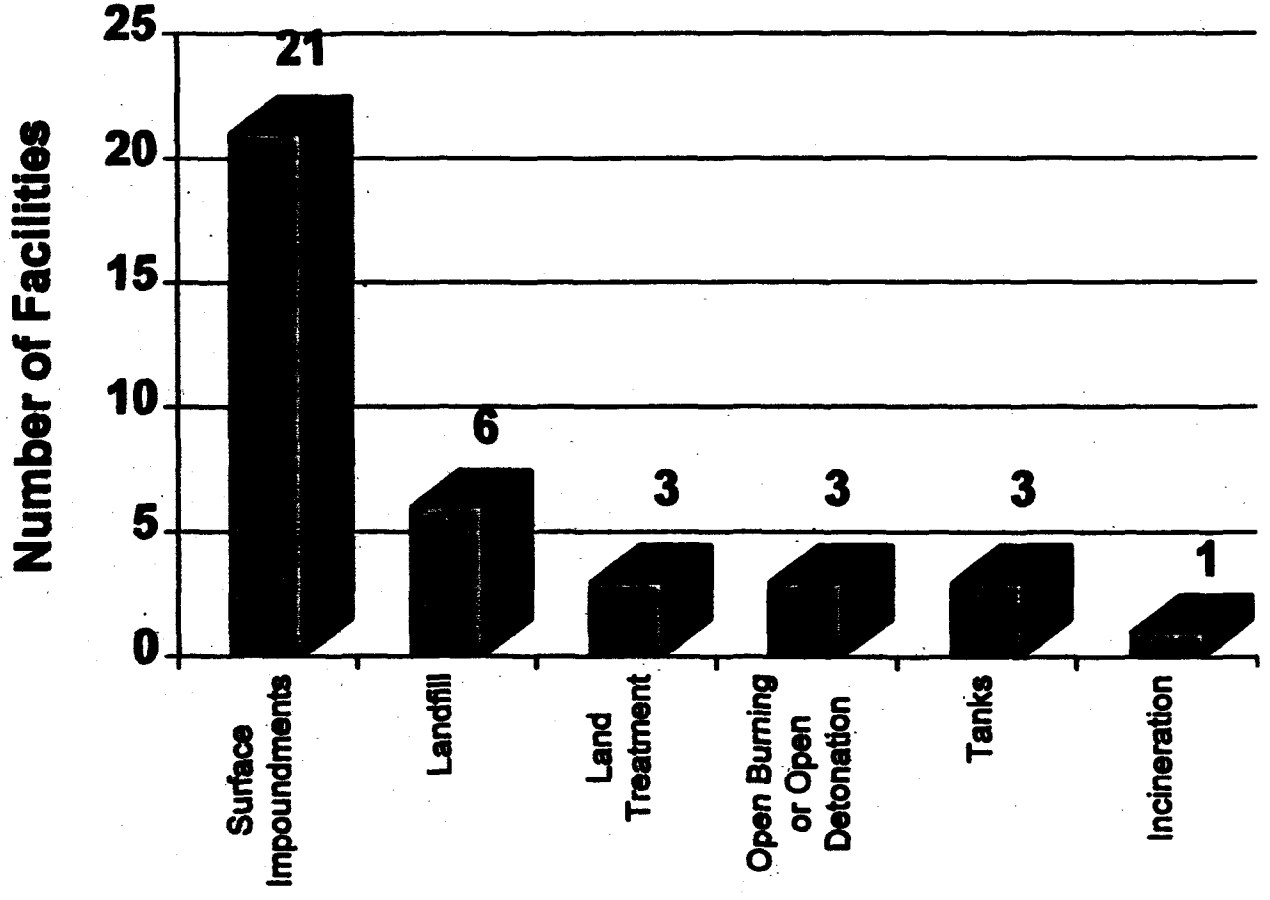


Figure 4
Methods of Waste Storage and Disposal at Federal Facilities Inspected for the National CME Report



- Inappropriate or inadequate sampling and analysis plan (SAP) or procedures
- Failure to properly construct or maintain wells
- Failure to adequately characterize site geology and hydrogeology
- Failure to properly locate wells

Table 2 presents a more detailed description of common violations and deficiencies found within each category at the federal facilities. The most numerous groundwater monitoring requirement deficiencies included: failure to fully characterize the vertical and horizontal extent of contaminant plumes (9 occurrences), failure to adequately characterize geology and hydrogeology (8 occurrences), failure to use a sufficient number of wells to determine groundwater flow rates and directions (7 occurrences), failure to adequately document design and construction of monitoring wells (5 occurrences), and failure to provide an adequate SAP (5 occurrences). The groundwater monitoring system violations and deficiencies at federal facilities noted in Table 2 can be reduced by correctly following the Final RCRA Groundwater Monitoring Evaluation Guidance" (OSWER Directive 9950.2, December 1986) and "RCRA Groundwater Monitoring Technical Enforcement Guidance Document" (EPA Document 530-SW-86-055). The latter document referenced above clearly describes activities that should be performed and documented to meet requirements for groundwater monitoring under RCRA. In addition, Chapter 11 of the Office of Solid Waste (OSW) SW-846 "Test Methods for Evaluating Solid Waste" identifies certain designs and practices which meet the performance requirements for hazardous waste management facility permit regulations promulgated in Title 40 Code of Federal Regulations (CFR) Part 265.

An adequate monitoring system, as determined by the CME inspectors, included such items as a sufficient number of monitoring wells, both upgradient and downgradient; proper location of the monitoring wells; and proper screened intervals. Fourteen (64 percent) facilities were reported to have inadequate groundwater monitoring systems, 5 (23 percent) facilities had adequate groundwater monitoring systems with deficiencies, two (9 percent) facilities had a groundwater monitoring system that was in compliance, and 1 (4 percent) facility was not required to have a groundwater monitoring system (see Figure 5). The facility where a system was not required was considered to be in compliance. Two (9 percent) of the 14 facilities that had inadequate monitoring systems were not in compliance because neither facility had installed the required groundwater monitoring system.

Although a facility may have an adequate groundwater monitoring system, it may not be in compliance if it does not meet all of the groundwater monitoring requirements established under RCRA. Requirements related to records keeping and documentation may not interfere with the physical operation and monitoring of the system, but, if a facility does not fulfill the requirements for these activities, the facility is in violation of the requirements for groundwater monitoring under RCRA and is therefore considered deficient.

Figure 6 shows the compliance status by EPA Region of each facility inspected. EPA Region 4 was the only region in which all inspected federal facilities were in compliance with the requirements under RCRA for groundwater monitoring while all of the facilities inspected in Regions 1, 3, 8, 9, and 10 had inadequate monitoring systems. In EPA Regions 2, 5, 6, and 7, federal facilities with either inadequate or adequate groundwater monitoring systems with deficiencies were identified. Figure 7 shows the compliance status by federal agency of the 22 inspected facilities.

Nineteen of 20 (95 percent) federal facilities which had installed groundwater monitoring systems, have detected groundwater contamination attributable to the RCRA-regulated units. Common constituents found at these facilities include volatile organic compounds (VOC); metals and other inorganic analytes, radionuclides, hydrocarbons, and explosives (see Figure 8).

In addition to groundwater monitoring at RCRA-regulated disposal units at the federal facilities, 17 of 22 (77 percent) facilities are conducting environmental investigations and restorations at their respective facilities, according to information provided in the CME reports. Some of these additional investigations are addressing environmental contamination resulting from RCRA-regulated disposal units. These additional investigations include: RCRA facility investigations (RFI); remedial investigations (RI) conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and RIs conducted under the Installation Restoration Program (IRP). Information on environmental investigations or restorations at two facilities where groundwater contamination has been detected was not provided the CME reports.

TABLE 2

COMMON VIOLATIONS AND DEFICIENCIES AT FEDERAL FACILITIES INSPECTED FOR THE NATIONAL CME REPORT

Sampling and Analysis (9 facilities deficient)	Well Construction and Maintenance (12 facilities deficient)	Site Characterization (13 facilities deficient)	Well Placement (11 facilities deficient)
Failure to provide an adequate sampling and analysis plan (5 occurrences)	Failure to adequately document the design and construction of monitoring wells (5 occurrences)	Failure to use a sufficient number of wells to determine groundwater flow rates and directions (7 occurrences)	System not capable of detecting LNAPLs and DNAPLs (3 occurrences)
Failure to follow appropriate QA/QC procedures (2 occurrences)	Wells improperly screened or constructed with more than one screened interval (3 occurrences)	Failure to fully characterize the horizontal and vertical extent of the contaminant plume (9 occurrences)	Likely pathways of contamination are not intersected by monitoring wells (4 occurrences)
Failure to describe laboratory QA/QC procedures (1 occurrence)	Turbid samples due to inadequate well maintenance (1 occurrence)	Failure to consider aquifers hydraulically connected to the uppermost aquifer (4 occurrences)	Less than three downgradient monitoring wells (6 occurrences)
Failure to establish background concentrations (1 occurrence)	Cracked or "floating" concrete aprons around wells, allowing infiltration of surface water (3 occurrences)	Facility has not detailed any preferential contaminant migration pathways (2 occurrences)	Failure to construct or properly locate a background monitoring well (5 occurrences)
Failure to describe analytical methods used in the laboratory (1 occurrence)	Well depth measurements significantly different from constructed depth (1 occurrence)	Seasonal variations have not been adequately characterized (1 occurrence)	
Equipment not properly calibrated (1 occurrence)	Improper drilling methods used to construct wells (1 occurrence)	Failure to establish boundaries for the regulated units (1 occurrences)	
Insufficient monitoring of required parameters (2 occurrences)	Failure to perform test to determine proper screen and filter pack size (1 occurrence)	Failure to adequately characterize geology and hydrogeology (8 occurrences)	
Purged water from wells not disposed of properly (2 occurrences)	Unlabelled wells (1 occurrence)		
Sampling data and reports not submitted in a timely manner (2 occurrences)	Damaged wells not repaired in a timely manner (1 occurrence)		
Inadequate statistical analysis of data from wells (4 occurrences)	Standing water between the well riser and casing (1 occurrence)		

TABLE 2 (continued)

COMMON VIOLATIONS AND DEFICIENCIES AT FEDERAL FACILITIES INSPECTED FOR THE NATIONAL CME REPORT

Sampling and Analysis (9 facilities deficient)	Well Construction and Maintenance (12 facilities deficient)	Site Characterization (15 facilities deficient)	Well Placement (11 facilities deficient)
Incorrect decontamination procedures used during sampling (1 occurrence)			
Incorrect sample preservation techniques (1 occurrence)			
Incorrect analytical methods used (1 occurrence)			

Figure 5
Groundwater Monitoring System Status at Federal Facilities Inspected for the National CME Report

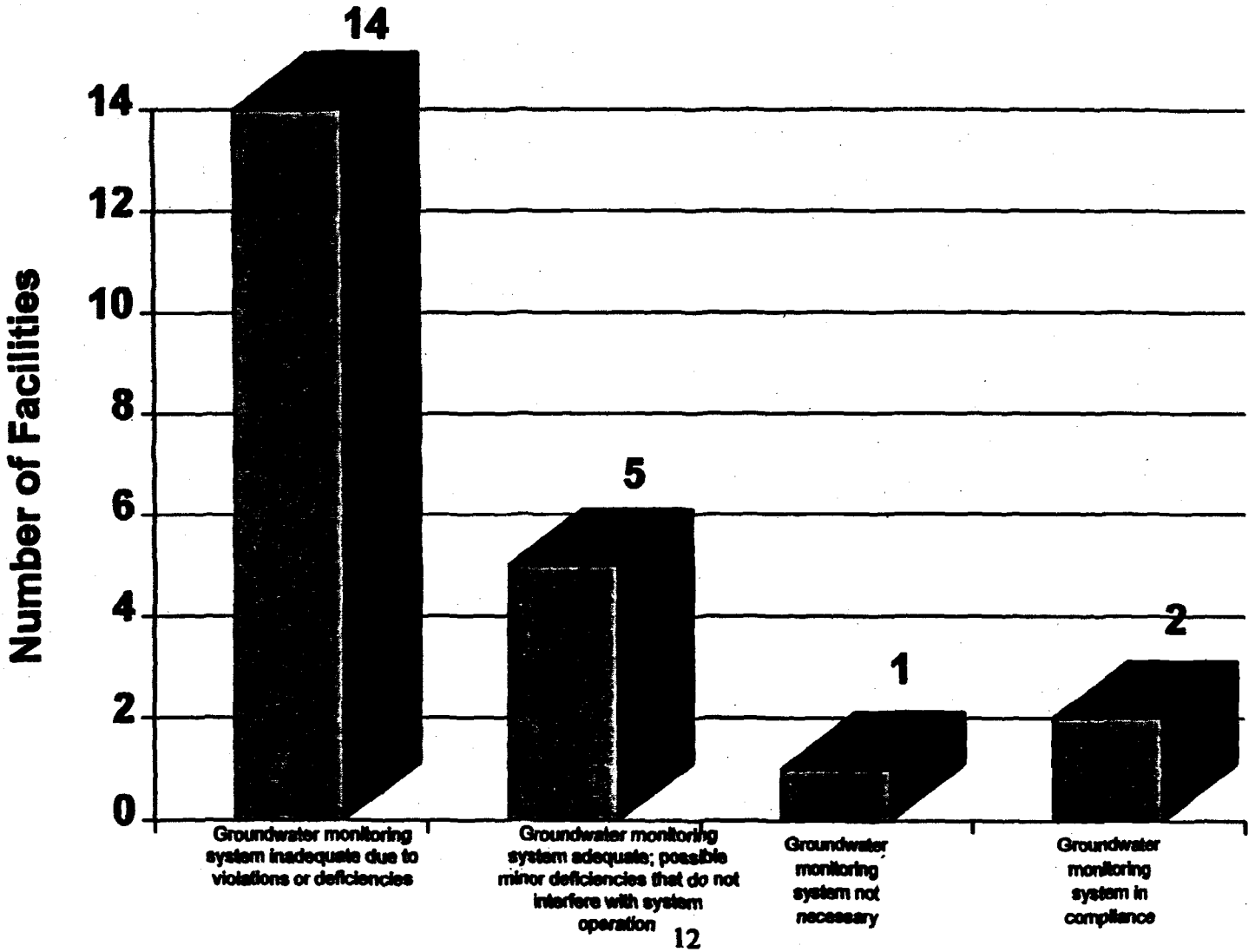
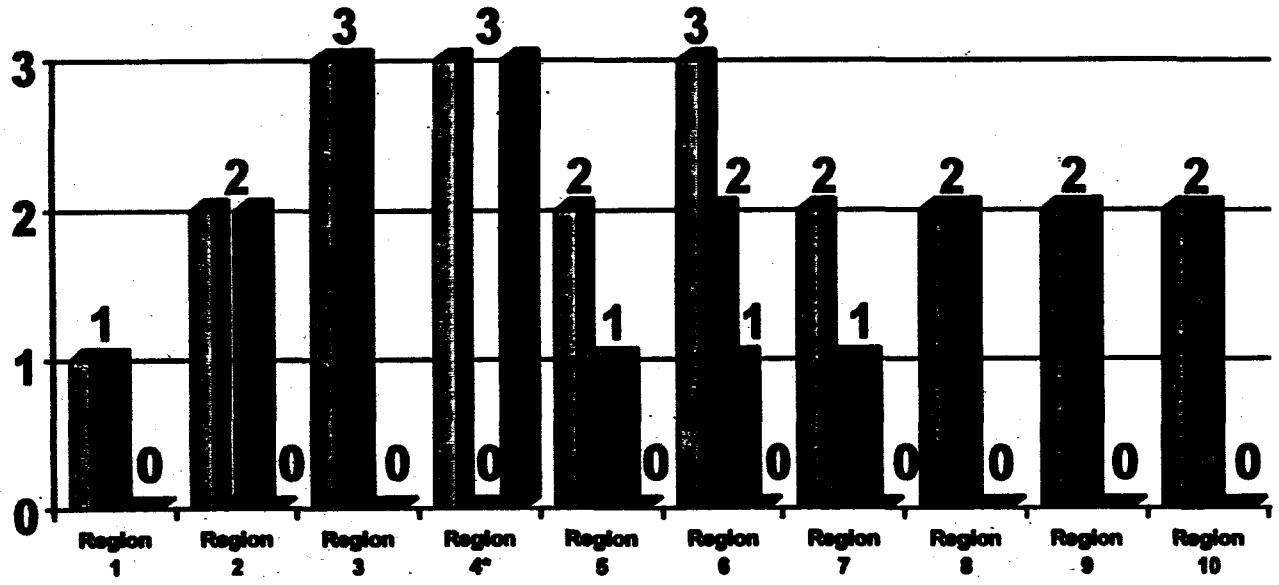
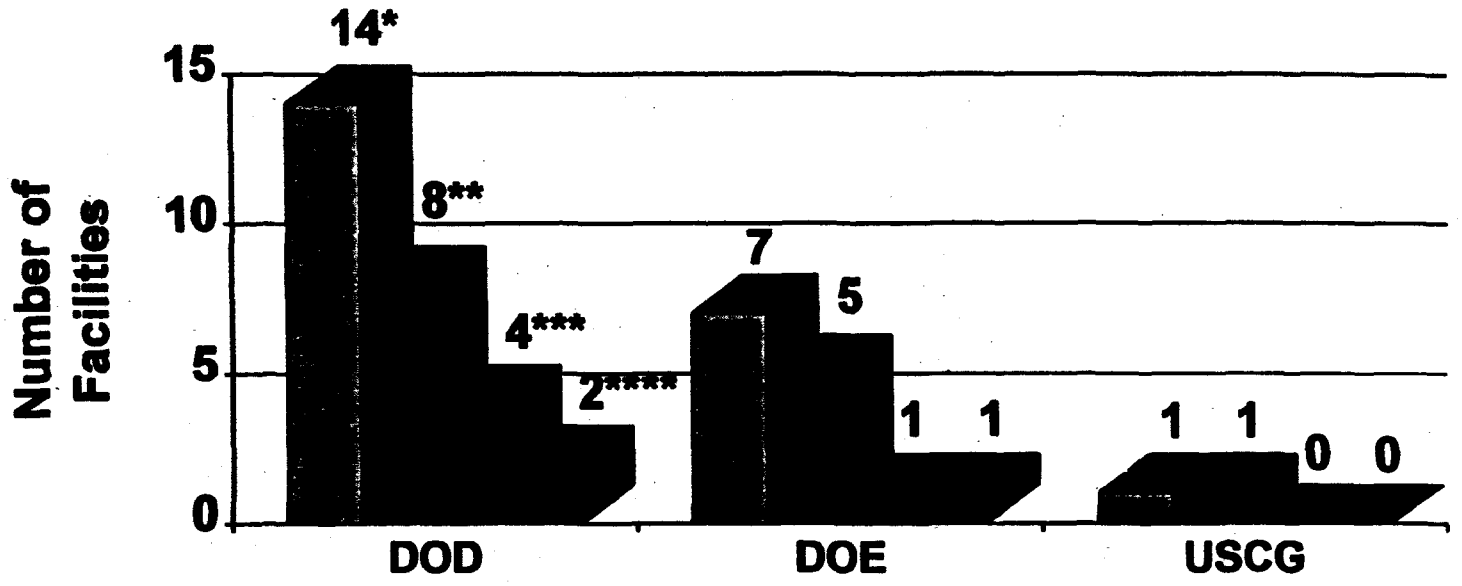


Figure 6
Number of Federal Facilities Inspected for the National CME Report and Status of Groundwater Monitoring Systems in Each EPA Region



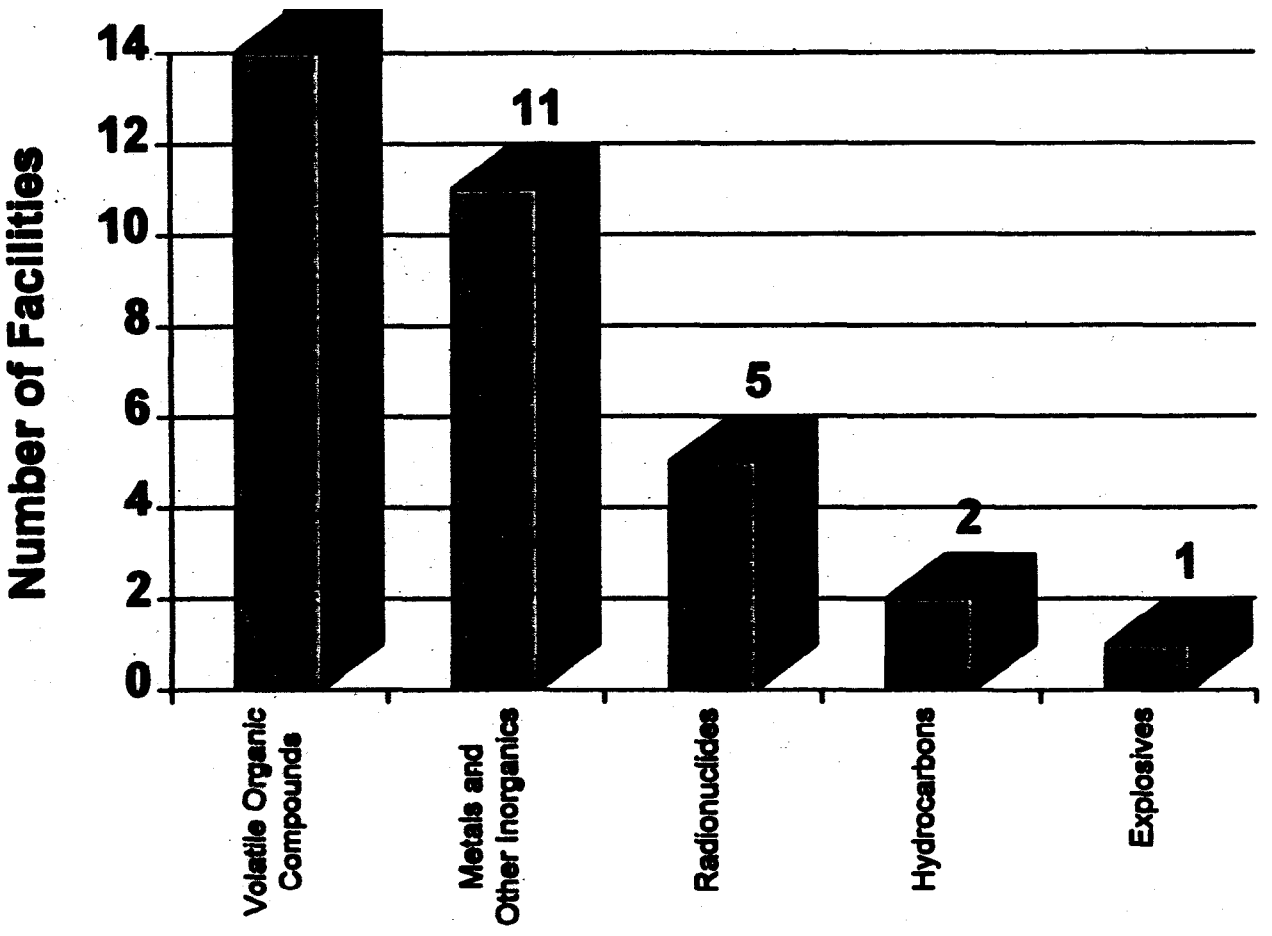
* Monitoring system not required at one facility in Region 4, considered to be in compliance

Figure 7
Number of DOD, DOE, and USCG Facilities Inspected for the National CME Report Status of Groundwater Monitoring Systems



* Includes 2 Navy, 4 Air Force, and 8 Army facilities
** Includes 1 Navy, 2 Air Force, and 5 Army facilities
*** Includes 1 Air Force and 3 Army facilities
**** Monitoring system not required at one DOD facility; considered to be in compliance (includes 1 Navy and 1 Air Force facility)

Figure 8
Types of Contaminants Detected by Groundwater Monitoring Systems at Federal Facilities Inspected for the National CME Report



APPENDIX A

FACILITY-SPECIFIC COMPREHENSIVE GROUNDWATER MONITORING EVALUATION SUMMARIES FOR FISCAL YEAR 1993

CONTENTS

Stratford U.S. Army Engine Plant (Allied Signal)

Facility Location and Background

The Allied Signal facility is located in Stratford, Fairfield County, Connecticut. The facility currently manufactures gas turbine jet, helicopter, and tank engines for military use. Former facility activities included machining, finishing, assembling, and testing engines. The facility is bordered on the north by industrial buildings, on the east by the Housatonic River, on the south by a marsh formerly used as a landfill, and on the west by the Bridgeport Sikorsky Airport.

Wastes Generated and Stored

Wastes currently generated by facility activities include solvents, electroplating liquids and sludges, and stripping and rinse solutions. Until 1987, these wastes were disposed of and treated in four on-site surface impoundments that included three adjacent sludge drying lagoons and one flow equalization lagoon. The wastes are currently batch-treated in an on-site wastewater treatment plant. Sludges generated from this treatment are handled as hazardous wastes and are shipped off site for disposal.

Facility Geology and Hydrogeology

The geology underlying the facility consists of heterogeneous stratified glacial sand and gravel deposits separated by a thick, lenticular, peat layer that is located about 6 to 10 feet below ground surface (bgs). The glacial sand and gravel deposits are the main aquifer beneath the facility. Regional groundwater flow direction in the aquifer is southeast toward the Housatonic River. However, the peat layer causes groundwater mounding near on-site surface impoundments. Groundwater mounded by the peat layer flows radially above the peat layer and discharges to nearby tidal marine surface water bodies.

Groundwater Monitoring System

In 1987, the facility implemented a groundwater monitoring assessment program as part of its Resource Conservation and Recovery Act (RCRA) Part B permit requirements. The facility installed 22 wells to monitor the groundwater by the surface impoundments. The monitoring wells are screened in the shallow, intermediate, and deep zones of the glacial sand and gravel aquifer. Groundwater samples from the wells are analyzed for volatile organic compounds (VOC), total organic carbon (TOC), total organic halogens (TOX), total cyanide, metals, and chloride.

CME Results

The compliance monitoring evaluation (CME) determined that the groundwater monitoring system at the facility was inadequate because of the following violations and deficiencies:

- Groundwater flow directions and rates not properly defined
- Geology and hydrogeology beneath the facility not fully characterized
- Samples from background and downgradient wells not properly collected and analyzed
- Background and downgradient wells not properly constructed to yield representative samples
- Downgradient wells not located to ensure immediate detection of contamination migrating from the regulated unit
- Failure to characterize the contaminant plume

Other Activities

There were no other environmental activities reported at the facility.

EPA Point of Contact: **Kenneth Rota**
Telephone No.: **(617) 573-5739**

Picatinny Arsenal (Picatinny)

Facility Location and Background

The Picatinny facility is located in Dover, Morris County, New Jersey. The facility encompasses about 6.75 square miles and is operated by the U.S. Army as a base of operations for the U.S. Army Armament Research, Development, and Engineering Center. Research and development of explosives, propellants, and metal parts occur at the facility. Nuclear munitions and radiological material research is also conducted at the facility.

Wastes Generated and Stored

The CME at the Picatinny facility focused on the Building 24 and 95 areas. Building 24, built in 1942, was used for metal plating, deburring, and cartridge case production. The building was gutted in 1960, and a new plating facility was installed along with two exterior, unlined lagoons constructed on the southwest side of the new plating building. Wastewater from the new plating building was sent to the lagoons for treatment. Wastes from the metal plating and degreasing operations included spent cyanide, chromic acid solutions, and rinsewaters. Metal sludges were produced from wastewater treatment. The sludge was sent off site for disposal. In 1981, the unlined lagoons were replaced with concrete lagoons. Treated wastewater in the concrete lagoons was discharged to Bear Swamp Brook. The lagoons were subsequently closed, and the bottoms of the lagoons were excavated to 10 feet bgs and disposed of off site.

Building 95 was used for plating and etching printed circuit boards. Waste water produced from the plating and etching operations contained trichloroethane, trichloroethene, copper, lead, tin, and chromic and sulfuric acid etchant wastes. The waste water was treated in the waste water treatment facility in Building 95, and, along with filtrate waste, was pumped to two nearby sand filter lagoons and a sludge drying bed. Effluent from the treatment was discharged to Green Pond Brook. In 1981, the lagoons and sludge drying bed were closed and replaced with treatment tanks.

Facility Geology and Hydrogeology

The Picatinny facility is located in a long narrow valley formed by the Green Pond Syncline. Pleistocene-aged glacial deposits and Cambrian-aged bedrock formations underlie the facility. The glacial deposits range from 160 to 190 feet thick and consist of deltaic sand and gravel deposits underlain by glaciolacustrine silt and sand deposits. The glaciolacustrine deposits are in turn underlain by a lower sand and gravel deposit. Bedrock beneath the facility consists of the Early to Middle Cambrian-aged Leithville Formation. The Leithville Formation consists of interbedded, coarse-grained dolomite and calcitic dolomite with quartz and dolomitic sandstone. Groundwater beneath the facility is present in the unconfined deltaic sand and gravel deposits, the lower sand and gravel deposits, and the Leithville Formation. The lower sand and gravel deposits and the Leithville Formation are confined by the glaciolacustrine unit. Groundwater flow in the aquifers beneath the facility is southeast with discharge to the Green Pond Brook. Near Building 24 of the arsenal, surface water from Bear Swamp Brook recharges groundwater in the unconfined deltaic sand and gravel deposits.

Groundwater Monitoring System

The facility installed 18 monitoring wells near Building 24 and six monitoring wells near Building 95 to meet their RCRA comprehensive groundwater monitoring requirements. Groundwater samples from these monitoring wells are analyzed for VOCs, TOC, total and dissolved metals, phenols, total suspended solids (TSS), and total dissolved solids (TDS). Chlorinated solvents and metals have been detected in groundwater plumes emanating from Buildings 24 and 95. The groundwater plume from Building 24 extends downgradient to Green Pond Brook.

CME Results

The CME determined that the groundwater monitoring system at the facility was adequate. However minor deficiencies were noted regarding the sampling and analysis plan and in field sampling procedures. The New Jersey Department of Environmental Protection subsequently conducted an Operation and Maintenance (O&M) inspection of Picatinny Arsenal in FY95 and found no violation.

Other Activities

The Picatinny facility is currently on the National Priorities List (NPL), and as part of an agreement between the U.S. Environmental Protection Agency (EPA) and U.S. Army, all RCRA groundwater monitoring requirements for the facility will be met as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial investigation/feasibility study (RI/FS).

EPA Point of Contact: **Ronald Voelkel**
Telephone No.: **(212) 637-3156**

Watervliet Arsenal (Watervliet)

Facility Location and Background

The Watervliet facility is located in Watervliet, New York, about 3.5 miles northeast of Albany. The facility was established in 1813 to produce small arms ammunition, gun carriages, and leather goods. Currently, the facility manufactures tubes and tube assemblies for cannons and cannon components. The facility occupies about 140 acres and is bordered on the north and south by residential areas, on the east by the Hudson River, and on the west by the Town of Colonie.

Wastes Generated and Stored

The primary hazardous wastes generated at the facility are acid and reactive wastes containing cyanide, chromic acid, and heavy metals from tube plating operations. Other wastes generated at the arsenal include spent solvents from degreasing operations; sodium cyanide, barium chloride, and sodium nitrate from metal hardening operations; paint-related wastes, soluble oils from lubrication; pesticides; cleaning solutions; and laboratory wastes such as mercury and sulfuric and phosphoric acid. Facility wastes are sent to an on-site treatment facility. Sludge from this treatment is dewatered through gravity filtration in five sludge drying beds. Reportedly, Bed No. 1 was the only bed used for dewatering.

The sludge drying beds were the subject of the CME conducted at the Watervliet facility. The beds were constructed of concrete in 1968. From 1972 to 1985, Bed No. 1 was used as an emergency holding tank for untreated hazardous wastes. In 1987, Bed No. 1 was closed and removed, and about 150 cubic yards of soil from the Bed No. 1 was excavated.

Facility Geology and Hydrogeology

The Watervliet facility is located on postglacial river terraces of the Hudson River. Fill and fluvial deposits overlying bedrock underlie the facility. The fill deposits consist of shale fragments, furnace cinders, metal fragments, clay brick fragments, and quartz cobbles. The fluvial deposits are encountered down to 20 feet bgs and consist of river channel sand and gravel. Bedrock beneath the facility is of the Snake Hill Formation. This formation consists of a fissile slate that has been fractured and folded. The primary aquifer beneath the facility is in the Snake Hill Formation. Groundwater in

this formation is unconfined and is present predominantly in fractures. Slug tests indicate that the hydraulic conductivity of the aquifer is about 2 to 3 feet per year.

Groundwater Monitoring System

The Watervliet facility installed five wells to monitor groundwater near the sludge drying beds. Groundwater contamination has been detected in other areas of the facility; however, these areas are being addressed under a RCRA facility investigation (RFI).

CME Results

No violations were noted in the CME conducted at the facility. Minor deficiencies were noted; however, the groundwater monitoring system at the facility was considered to be adequate.

Other Activities

The facility is currently conducting an RFI to address groundwater contamination.

EPA Point of Contact: **Ronald Voelkel**
Telephone No.: **(212) 637-3156**

Naval Air Warfare Center (NAWC)

Facility Location and Background

The NAWC facility is located in Bucks County, Pennsylvania, about 20 miles north of downtown Philadelphia. NAWC is a federally-owned facility operated by the U.S. Navy (USN). NAWC began operations in 1944 and is the principal Naval laboratory for research, development, testing, and evaluation of naval aircraft systems.

Wastes Generated and Stored

Hazardous waste at the NAWC facility is generated by laboratories and vehicle and aircraft maintenance activities. Hazardous waste storage facilities include two surface impoundments (SI No. 1 and SI No. 2, respectively), an underground storage tank (UST No. 18), and a centralized container storage area at Building 15. The two surface impoundments were the subject of the CME. These concrete-lined impoundments received electroplating waste water treatment sludge from an on-site operation. The sludge is a listed RCRA hazardous waste (F006). Groundwater monitoring systems are required under RCRA at both impoundments.

Facility Geology and Hydrogeology

Bedrock beneath the facility consists of micaceous siltstone interbedded with medium-grained quartzitic sandstone. The thickness of these bedrock units range from 5 to 25 feet. Overburden soil thickness ranges from 6 to 16 feet, thinning to the north in the vicinity of the facility's surface impoundments. Soil types in the facility area consist of brown silt with thin beds of arkosic sand. General groundwater flow direction in the overburden aquifer is north toward an unnamed tributary of Little Neshaminy Creek. Estimated horizontal velocities in this aquifer range from 0.2 to 67 feet per year.

Groundwater Monitoring System

NAWC has installed five monitoring wells near the surface impoundments to monitor groundwater. One well is located upgradient and four wells are located downgradient of the impoundments. Currently, groundwater samples from the wells are analyzed for total metals only.

CME Results

The CME determined that the groundwater monitoring system at the facility is inadequate because of the following deficiencies and violations:

- The RCRA monitoring wells are not screened in the aquifer of concern.
- The location of upgradient and downgradient monitoring wells is not clear.
- It is not apparent if the monitoring wells were properly constructed. Well logs for the monitoring wells were not available at the time of the CME inspections.
- The sampling and analysis plans for the RCRA wells were not made available to the inspectors conducting the CME.

Other Activities

NAWC is on the NPL (Superfund) and is currently undergoing investigation under the Superfund program. Three sites (Waste Burn Pit No. 1, the Sludge Disposal Pit, and Waste Burn Pit No. 3) have been identified for investigation under Superfund.

EPA Point of Contact: **Christopher Pilla**
Telephone No.: **(215) 597-5996**

Letterkenny Army Depot (LEAD)

Facility Location and Background

The LEAD facility is located in Franklin County, Pennsylvania, 5 miles north of the City of Chambersburg. The facility covers 19,520 acres on the western side of the Cumberland Valley. The facility was established in 1942 with the primary mission of ammunition storage. Since 1942, the depot's mission has increased to include: 1) overhauling, rebuilding, and testing of wheeled and tracked vehicles; 2) issue and shipment of chemicals and petroleum; and 3) maintenance, demilitarization, and modification of ammunition.

Wastes Generated and Stored

Industrial waste water generated by the facility was collected and conveyed to the industrial waste water treatment plant (IWWTP). A 1,000,000-gallon lagoon was constructed as a portion of the IWWTP between 1954 and 1957. This unlined lagoon reportedly contained sludges, oils, and industrial wastes. In 1967, leakage from the lagoon prompted its excavation and reconstruction. The two new lagoons (Lagoons 361 and 362) were constructed within the original lagoon perimeter using reinforced concrete. The reconstructed lagoons had a total capacity of 1.6 million gallons and range from 5 to 6 feet deep. Operation of the lagoons discontinued in December 1988.

The IWWTP is currently used to treat facility waste water. Sludges and waste water generated from the treatment process were stored in the two new surface impoundments until their deactivation in 1988. Contaminants associated with the lagoon waste water and sludges are primarily halogenated volatile organic compounds (VOC) and metals.

The IWTP lagoons area has been confirmed as a major contaminant source within the LEAD. Previous studies indicated that groundwater contamination had occurred due to sinkhole development in the former unlined waste lagoon and subsequent release of hazardous sludges and liquids approximately 20 years ago. The current concrete-lined lagoons are potential contaminant sources due to cracks discovered in the bottom of the southern lagoon in 1986. The levels of groundwater contamination currently observed in the IWWTP lagoons area are the highest levels measured in the southeastern area at LEAD.

Migration of contaminants off site is evident from groundwater and surface water discharges from the IWWTP lagoons area. The rate and direction of contaminant migration in groundwater from the IWWTP lagoons could not be determined because of the complex nature of the fractured limestone aquifer; however, contaminant migration direction appears to be generally east-northeast based on contaminant distribution in off-site wells.

Facility Geology and Hydrogeology

The LEAD facility is located in the Great Valley section of the Valley and Ridge physiographic province. This area, known locally as the Cumberland Valley, extends northeast to southwest direction across the central part of Pennsylvania.

The facility is underlain by five geologic units: (1) the Chambersburg Formation, (2) the St. Paul Group, (3) the Pinesburg Station Formation, (4) the Rockdale Run Formation, and (5) the Martinsburg Formation. The lagoons are situated on the St. Paul limestone close to the contact with the Pinesburg Station dolomites.

Groundwater flow beneath the facility is controlled by the structural orientation of the geologic units, elevation of the water surface, and geomorphology. Within the limestones of the Chambersburg Formation and St. Paul Group, groundwater flow is predominantly through solution channels and enlarged fractures typical of karst terrains. Groundwater also occurs in the weathered overburden which covers the bedrock at variable thicknesses throughout the facility. Based on historical data, groundwater elevation in the lagoon area is often 10 to 15 feet above the bedrock surface. Short-term changes in water level elevation of as much as 10 feet in one day in response to heavy rainstorms have been observed. This response is a feature typical of a karst terrain.

Regional groundwater movement is primarily northeastern along the regional strike of the underlying geological units. In general, the discharge area for groundwater from the facility's lagoon area is Rowe Run, which is aligned with the strike.

Predicting contaminant migration in this geological setting is difficult due to the complexity of flow paths. Tracer studies conducted in 1987 to 1989 report that fluorescein from the facility's lagoons flowed bi-directionally along the strike, both to the southwest and to the northeast to a total of six

springs and ten wells. Flow velocities in different parts of the actively functioning aquifer vary from 4 to 300 feet per hour.

Groundwater Monitoring System

The present RCRA detection monitoring program at the LEAD facility consists of one upgradient (background) and five downgradient (detection) monitoring wells. Three of the detection monitoring wells, wells TW-1, TW-2, and TW-3, are located immediately adjacent to the lagoons. The other two, wells 81-10 and 82-2, are located approximately 200 feet north and 400 feet southeast of the lagoons, respectively. A background well, TW-4, is located approximately 100 feet west of the lagoons. All wells were drilled to the depth of unweathered bedrock surface and were screened in the shallow, weathered rock formation.

Historical records of potentiometric readings do not always indicate that TW-4 is upgradient of the lagoons. It is suspected that a groundwater surface mound exists beneath the lagoons because of the release from the lagoons. After the completion of the lagoon excavation, groundwater measurements taken during recent operation and maintenance inspections indicate that well TW-4 is upgradient of the lagoons.

CME Results

The CME determined that the groundwater monitoring system at the facility was inadequate because of the following violations or deficiencies:

- The horizontal and vertical extent of the contaminant plume had not been defined.
- The current system could not monitor or characterize groundwater flow in the underlying complex karst terrain.
- Monitoring wells were improperly constructed.
- Minor deficiencies were noted in the facility sampling and analysis plan and sampling procedures.

Other Activities

There were no other environmental activities reported at the facility.

EPA Point of Contact: **Christopher Pilla**
Telephone No.: **(215) 597-5996**

Dover Air Force Base (Dover)

Facility Location and Background

The Dover facility is located in Dover, Kent County, Delaware and occupies about 3,700 acres, including annexes, easements, and leased property. The facility is the headquarters of the 436th Air Wing of the Air Mobility Command. Operations at the facility began in 1941.

Wastes Generated and Stored

Wastes generated at the Dover facility from aircraft maintenance and operations include fuels, oils, solvents, paint and paint thinner. Industrial wastewaters are also generated by engine shops, aircraft wash racks, and engine parts plating shops. Empty pesticide containers and transformers containing polychlorinated biphenyls (PCB) have also been generated at the facility.

Except for industrial waste waters, all wastes were originally disposed of in landfills or pits at the facility. Industrial waste waters were directed to the North Drainage Ditch until 1963, when the base implemented a separation system in an industrial waste basin area known as Site WP-21. Site WP-21 was the subject of the CME inspection. Site WP-21 consists of two concrete accepting basins, unlined secondary basins, two oil/water separators, and two clay lined settling lagoons. In 1969, effluent discharge to the North Drainage Ditch was discontinued and routed instead to the base sanitary treatment system. In 1975, the base was connected to the Kent County Regional Waste Water Treatment Plant. In 1986, Site WP-21 was excavated to about 12 feet bgs, backfilled, covered with a cap, and certified closed.

Facility Geology and Hydrogeology

The geology beneath the Dover facility consists of unconsolidated Pleistocene- and Tertiary-aged deposits. The only Pleistocene-aged deposit beneath the facility is the Columbia Formation. This formation is about 40 feet thick and is comprised of fluvial silts and sands. Beneath the Columbia Formation are five Miocene-aged formations. The first formation is the Kirkwood Formation, a silty clay layer 20 to 28 feet thick. The second formation is the Frederica Formation, a glauconitic sand and gravel unit about 22 feet thick. The third formation is an unnamed silt and clay layer about 85 feet thick. The fourth formation is the Cheswold Formation, a sand and gravel unit containing shells that is

50 to 75 feet thick. The fifth and final Miocene-aged formation is an unnamed silty, clayey sand layer about 100 feet thick. Underlying the Miocene-aged formations is the Eocene-aged Piney Point Formation, a marine sand unit containing shells that is over 200 feet thick.

The main aquifers in the area are the Columbia Formation and the Cheswold and Piney Point Formations. The Columbia Formation is an unconfined water table aquifer that furnishes water to domestic and agricultural groundwater users near the Dover facility. Groundwater in this aquifer flows south and southeast with a mean hydraulic conductivity of 8.31 feet per day. The Cheswold and Piney Point Formations provide water for about 80 percent of the total municipal and industrial groundwater users in Kent County. The facility receives its water from seven wells screened in these aquifers. The overlying Kirkwood Formation has a hydraulic conductivity of 8×10^{-5} to 4×10^{-4} feet per day and inhibits the movement of groundwater from overlying formations into the Cheswold and Piney Point Formations.

Groundwater Monitoring System

Dover installed six monitoring wells near Site WP-21 to monitor groundwater in the area. Groundwater samples from the wells are analyzed for the parameters included in 40 CFR Part 264 Appendix IX. VOCs and lindane have been detected in the groundwater samples from the wells.

CME Results

The CME determined that the groundwater monitoring system at the facility is inadequate because the horizontal and vertical extent of the contaminant plume is not defined and the presence of dense, nonaqueous-phase liquids (DNAPL) has not been investigated.

Other Activities

The Dover facility is currently undergoing comprehensive environmental investigation under the Installation Restoration Program (IRP).

EPA Point of Contact: **Harry Daw**
Telephone No.: **(215) 597-3177**

U.S. DOE Paducah Gaseous Diffusion Plant (PGDP)

Facility Location and Background

The PGDP facility is located in the northwestern corner of Kentucky in western McCracken County, about 10 miles west of Paducah, Kentucky, and 3 miles south of the Ohio River. The facility is located on a reservation of approximately 1,545 acres and occupies about 960 acres. The remaining reservation area is an uninhabited buffer zone that surrounds the facility. Bordering the U.S. Department of Energy (DOE) reservation to the north and northeast is the Tennessee Valley Authority Shawnee Steam Plant located on the Ohio River. An Allied Signal plant is located across the river near Metropolis, Illinois, northeast of the steam plant. The PGDP facility is owned and operated by the DOE and began operations in 1952. The facility is currently managed by Martin-Marietta Energy Systems. Uranium hexafluoride gas produced by the Allied Signal plant is supplied as feed stock for PGDP, who then performs the first step in the enrichment process of the uranium feed stock. The PGDP facility then provides the enriched feed stock to gaseous diffusion plants in Portsmouth, Ohio, and Oak Ridge, Tennessee.

Wastes Generated and Stored

Hazardous, nonhazardous, radioactive, and mixed wastes have been generated and disposed of at the facility. The Resource Conservation and Recovery Act (RCRA) unit of concern at the PGDP facility is the C-404 Low-Level Radioactive Waste Landfill located in the west-central area of the facility. The C-404 landfill was originally an aboveground holding pond with compacted earth floors and a 6-foot high clay, dike walls. The unit was operated from 1951 to 1986 and was closed with a multilayered cap under RCRA in 1987. Materials placed in this area include approximately 3,200 curies of technetium-99 (Tc-99); 3,200 tons of uranium, 450 drums of Extraction Procedure toxic wastes (cadmium, selenium, and lead); and unknown amounts of solvents. The C-404 landfill is subject to groundwater monitoring requirements based on the constituents placed in the unit. The landfill has a post-closure permit issued by the State of Kentucky that delineates groundwater monitoring requirements specified by state and federal regulations.

Facility Geology and Hydrogeology

The PGDP facility is located on the Mississippi Embayment. The stratigraphic sequence in the region consists of Cretaceous-, Tertiary-, and Quaternary-aged sediments unconformably overlying Paleozoic Era bedrock. The Paleozoic Era bedrock beneath the facility consists of Mississippian-aged limestone. The bedrock is overlain by coastal plain deposits that include the Upper Cretaceous-aged Tuscaloosa gravels, the Upper Cretaceous-aged McNairy Formation comprised of interbedded and interlensing sands, and the Paleocene-aged Porters Creek clay. The Porters Creek clay layer is overlain by Eocene-aged sediments comprised of interbedded and interlensing sand, silt, and clay. Miocene- through Pleistocene-aged deposits unconformably overlie the Eocene-aged strata and are grouped together as Continental Deposits. The Continental Deposits are divided into a lower unit consisting of a basal gravel or sandy gravel facies and an upper fine-grained clastic unit composed of mostly clay and sand. Windblown loess and recent or Holocene Ohio River alluvial flood plain material forms the surficial deposits at the PGDP facility and overlies the Continental Deposits.

The stratigraphic units beneath the facility are grouped into the following hydrogeologic systems: 1) the shallow groundwater system (SGS) consisting of sands and gravels present throughout the predominantly clayey silt of the upper Continental Deposits; 2) the regional gravel aquifer (RGA) in the lower Continental Deposits and consisting of the Quaternary-aged sand and gravel facies and Holocene alluvium present adjacent to the Ohio River; 3) the Terrace gravels that consist of Pliocene-aged gravel deposits overlying the Porters Creek clay layer and the Eocene-aged sands; and 4) the McNairy Flow System consisting of interbedded and interlensing sand, silt, and clay.

Interconnections between the SGS and RGA aquifer systems allows vertical migration of groundwater. The RGA is the major water supply aquifer for this area. Pump tests conducted at the facility show an average hydraulic conductivity of 0.034 centimeters per second. Groundwater flows north in the RGA. In 1988, contamination was found in off-site drinking water wells north of the facility. The contamination included Tc-99 and TCE.

Groundwater Monitoring System

The PGDP facility has installed 12 monitoring wells to monitor groundwater near the C-404 landfill. These wells are installed in four nested clusters, and each nest contains three wells. One of the wells in

the cluster monitors groundwater in the SGS. The remaining two wells monitor the RGA. Groundwater samples from the wells are analyzed for volatile organic compounds, semivolatile organic compounds, pesticides, polychlorinated biphenyls, metals, and select radionuclides.

CME Results

No deficiencies were found during the CME. It was concluded that the present groundwater monitoring system meets all applicable state and federal guidelines. The CME report also states that the records, bookkeeping, and quality assurance/quality control programs in place at the PGDP facility are complete and should be used as a model for other federal facilities.

Other Activities

The PGDP facility is currently conducting a remedial investigation/feasibility study under the Comprehensive Environmental Response, Compensation, Liability Act to investigate and remediate off-site groundwater contamination.

EPA Point of Contact: **Larry Lamberth and Jeanneane Gettle**
Telephone No.: **(404) 347-7603**

U.S. Air Force Plant No. 6 (Lockheed)

Facility Location and Background

Lockheed Aeronautical Systems Company (LASC) is currently the contract operator at Plant No. 6 for the U.S. Air Force. The facility is located in Marietta, Cobb County, Georgia, and occupies approximately 714 acres of a 3,336-acre military complex that includes Dobbins Air Force Base and a U.S. Naval Air Station. The area around the military complex is heavily developed and zoned for residential, commercial, and industrial use. The LASC facility specializes in the construction and modification of aircraft and has been in operation since 1942.

Wastes Generated and Stored

The Resource Conservation and Recovery Act (RCRA)-regulated facilities at the LASC facility include the B-10 Aeration Basin and the B-90 Surface Impoundment. The B-10 Aeration Basin Area has been the site of all industrial waste water treatment operations for the facility and originally consisted of earth-bottomed (unlined) concrete treatment tanks for cyanide and chromate wastes. After 1972, this area was converted into an aeration basin and received three types of wastes: 1) treated effluent derived from plating operations, 2) storm water runoff from the flight line and manufacturing area, and, 3) industrial waste stream surges generally resulting from a chemical spills. Closure was completed at the B-10 Aeration Basin in 1989, and the unit is currently undergoing post-closure monitoring. During closure, samples collected from the basin indicated that cadmium; chromium; fluoride; sulphate; phenols; total organic carbon; freon; tetrachloroethene; trichloroethene (TCE); 1,1,1-trichloroethane (TCA); and jet fuel compounds were present in the sediment and sludge at the bottom of the basin. Groundwater samples collected from wells around the site indicate that groundwater has been impacted.

The B-90 Surface Impoundment was constructed and began operations in 1969 for disposal of heavy metal sludges previous disposed of in the B-10 Aeration Basin area. The impoundment received mostly heavy metal hydroxides, paint residues, and miscellaneous waste materials that included sulfates, fluorides, chlorides, lime, iron, oils, and cyanide. The unit was RCRA closed in 1988 and is currently undergoing post-closure monitoring. Samples from the monitoring wells at the unit frequently contain chlorobenzene; TCE; 1,1,1-TCA; 1,2-dichloroethane (DCA); trans-1,2-dichloroethene (DCE); 1,1-DCA; pentachlorophenol; 1,1-DCE; sulfate; sodium; and iron at elevated concentrations.

Facility Geology and Hydrogeology

The LASC facility is located on a gently rolling plateau that slopes gradually southeast. The land surface has been cut by several small stream channels, including Walkers Gorge, Rottenwood Creek, and Poorhouse Creek, which all ultimately drain south-southeast to the Chattahoochee River. Surficial deposits at the facility consist of residual soils derived from in-place weathering of the underlying igneous and metamorphic bedrock. These soils are primarily micaceous, clayey silts and micaceous sandy silts. Bedrock at the site consists principally of metamorphic gneiss and schist and some igneous granite. Metamorphic rock within southeastern Cobb County occurs in wide belts that dip southeast. Igneous rocks occur as granitic intrusions into the older metamorphic rock. The resulting structural deformities have produced planes of secondary permeability along which groundwater movement occurs. These secondary permeability zones consist of fault planes, fractures, shear zones, and planes of schistosity resulting from folding and intrusive contacts around the margins of large intrusive bodies.

Groundwater flow is southeast, reflecting the regional dip of the bedrock surface. The groundwater flow velocity in the area has been calculated to be 192 feet per year, using a hydraulic conductivity of 4.7×10^{-4} centimeters per second. Groundwater is seldom used as a public water supply source locally, primarily because of limited well yield. Most of the public water supply in the vicinity of the LASC facility is from surface water sources.

Groundwater Monitoring System

LASC has installed 27 wells near the B-90 Surface Impoundment and 30 wells near B-10 Aeration Basin to monitor the groundwater.

CME Results

The CME concluded that the groundwater monitoring system at the facility is adequate. The CME report found the LASC facility to be in compliance with all applicable groundwater monitoring regulations. Recommendations concerning standard operating procedures for on-site sampling were noted to strengthen the overall program.

Other Activities

There were no other environmental activities reported at the facility.

EPA Point of Contact: **Jeff Pallas**
Telephone No.: **(404) 347-7603**

U.S. Naval Station Mayport (NSM)

Facility Location and Background

The NSM facility is located in Mayport, Duval County, Florida, on the northern portion of a peninsula bounded on the east by the Atlantic Ocean and on the north and west by the St. Johns River. The NSM facility is operated by the U.S. Navy and is primarily involved in the intermediate-level maintenance and repair of equipment and naval vessel propulsion units. Additionally, three prime civilian contractors operate facilities at NSM: Atlantic Marine, North Florida Shipyards, and Global Associates.

Wastes Generated and Stored

Hazardous waste generated by the NSM facility include toxic halogenated, ignitable, toxic/ignitable, Extraction Procedure toxic, reactive/toxic, and corrosive wastes.

The Resource Conservation and Recovery Act (RCRA) land disposal facility at NSM consists a neutralization basin near Building 1241 of the facility, which is located along the southern bank of the St. Johns river. This basin was used for storing low pH (less than 2) corrosive waste water residue from boiler operations. The basin was also used to store treated nonhazardous wastewater from the anion/cation exchange process used in boiler operations.

Facility Geology and Hydrogeology

The geology beneath the NSM facility consists of unconsolidated deposits of sands, silts, and clays overlying a thick sequence of marine carbonates. The surficial aquifer beneath the NSM facility extends to a depth of approximately 70 feet below ground surface and consists of unconsolidated deposits of sands, shells, silts, and clay, that vary in lithology, thickness, and permeability. The Hawthorn Group underlies the surficial aquifer and acts as a confining unit. A secondary artesian aquifer exists within the Hawthorn Group and consists of lenses of phosphatic sandy limestone and dolostone interbedded with calcareous, phosphatic sandy clays and clayey sands. The Floridan Aquifer system is the principal source of potable water in the region and is composed of Oldsmar, Lake City, Avon Park, and Ocala Group limestone. Also included in the Floridan aquifer system are a few

discontinuous, thin, water bearing zones in the lower part of the Hawthorn Group. General groundwater flow direction in the vicinity of the neutralization basing is north.

Groundwater Monitoring System

The CME report does not contain specific information describing the groundwater monitoring system and the network of monitoring wells in the system. Therefore, the groundwater monitoring system is not summarized.

CME Results

The CME determined that the facility does not require a groundwater monitoring system. The RCRA-regulated unit was deactivated in January 1992, has been certified clean-closed, and therefore, is in compliance. The groundwater monitoring system for the unit was discontinued after the unit's closure.

Several facility investigations are currently being conducted at NSM under the Superfund program. According to the Florida Department of Environmental Protection, any required RCRA remedial measures at the facility would be designated as applicable or relevant and appropriate requirements (ARAR) and conducted under Superfund.

Other Activities

There were no other environmental activities reported at the facility.

EPA Point of Contact: **Jeff Pallas**
Telephone No.: **(404) 347-7603**

DOE Feed Material Production Center (FMPC)

Facility Location and Background

The FMPC facility is located in Fernald, Ohio, about 20 miles northwest of Cincinnati. The facility occupies about 1,050 acres in a rural and agricultural setting and began operations in early 1950. The facility manufactured fuel elements, target cores, and other uranium products for use in U.S. Department of Energy (DOE) nuclear reactors and also to store small amounts of thorium. Production activities at the facility ended in 1991.

Wastes Generated and Stored

The facility is divided into the Production Area, the Waste Pit/K65 Area, and other suspect areas. Currently, 48 Resource Conservation and Recovery Act hazardous waste units are present throughout these areas. Wastes generated from uranium production were stored in the Waste Pit/K65 Area. This area consists of six waste storage pits in the northwest corner of the facility property. The Waste Pits were the subject of the CME.

Facility Geology and Hydrogeology

The geology beneath the FMPC facility consists of surficial glacial till overlying sand and gravel outwash. The till consists of low permeability silty clay and is about 20 to 40 feet thick. Isolated lenses of high permeability sand are present in the till. To the east and south, the till unit thins and grades into a silty sand deposit described as a Pleistocene lake deposit. Paddys Run, a stream along the western boundary of the facility, has eroded through the glacial till in the northwest portion of the facility and the lake deposit in the southwest portion of the facility, exposing the underlying sand and gravel outwash. The sand and gravel outwash is about 160 feet thick. A silty clay layer about 10 to 20 feet thick divides the sand and gravel outwash; however, borings indicate that the clay layer is not continuous.

Groundwater is present in the sand lenses in the till and in the sand and gravel outwash. Perched groundwater in the till sand lenses has caused a mounding effect near the northwest corner of the facility where Waste Pits are located. Groundwater in the sand and gravel outwash aquifer (the Great

Miami Aquifer [GMA]) is unconfined, and groundwater flows east toward the Great Miami River. The hydraulic conductivity of the outwash is about 70 feet per year. Paddys Run receives runoff and seep water from the Waste Pit area. Surface water from Paddys Run recharges the GMA to the south where Paddys Run has eroded through the till. The Southern Ohio Water Company uses wells screened in the GMA about 0.75 mile east of the facility.

Groundwater Monitoring System

In 1985, FMPC began groundwater detection monitoring for Waste Pit No. 4. The facility currently monitors 33 wells along the facility boundary. In 1988, Comprehensive Environmental Response, Compensation, Liability Act (CERCLA) remedial investigation/feasibility study (RI/FS) activities began at the FMPC facility. Data from CERCLA monitoring wells are also considered for RCRA groundwater monitoring activities as part of an approved alternate groundwater monitoring program. Groundwater samples from the monitoring wells are analyzed for a variety of organic, inorganic, radiological, and indicator parameters. Elevated levels of sodium; sulfate; total dissolved solids; conductivity; gross alpha and beta radiation; radium; uranium; phenolics; chloride; nitrate; potassium; strontium; and 1,1,1-trichloroethane have been detected in groundwater beneath the facility.

CME Results

The CME determined that the groundwater monitoring system at the facility is adequate; however, minor deficiencies concerning well maintenance and sampling were noted.

Other Activities

The FMPC facility is currently conducting a RI/FS under CERCLA to investigate contamination resulting from facility activities.

EPA Point of Contact: **James Saric**
Telephone No.: **(312) 886-0992**

DOE Portsmouth Gaseous Diffusion Plant (Ports)

Facility Location and Background

The Ports facility is located in Pike County about 5 miles south of Piketon, Ohio. The Ports facility is owned by the U.S. Department of Energy (DOE) and operated by the U.S. Enrichment Corporation. The active portion of the facility consists of about 1,000 acres situated on a 4,000-acre DOE reservation. The Ports facility has been in operation since 1954 and enriches uranium-235 by a gaseous diffusion process. The enriched uranium is used as fuel in commercial nuclear reactors and U.S. Navy power reactors.

Wastes Generated and Stored

The Ports facility has generated and stored various nonradioactive hazardous wastes. These wastes have included hazardous wastes with the characteristics of ignitability and toxicity, listed hazardous wastes including spent halogenated solvents and spent nonhalogenated solvents, and hazardous wastes listed for toxicity and acute toxicity. Radioactive wastes include, but are not limited to, uranium isotopes and technetium-99, a manmade radioactive element.

Seven Resource Conservation and Recovery Act (RCRA)-regulated units exist at the Ports facility. These units include surface impoundments (X-230J7, X-616, X-701B, and X-701C), landfills (X-735 and X-749), and land treatment (X-231B) units. All of these units except for the X-701B surface impoundment have been closed or are undergoing closure.

Facility Geology and Hydrogeology

The geology beneath the Ports facility generally consists of 30 to 40 feet of unconsolidated deposits overlying clastic bedrock deposits of Mississippian age. The uppermost aquifer is the Gallia sand and gravel, which averages 3.4 feet in thickness and ranges from 0 to 10 feet thick. It is overlain by 20 to 30 feet of silt and clay. The Gallia aquifer is the primary aquifer of concern associated with contaminant migration. Over most of the facility, the Gallia aquifer is underlain by and in contact with the Berea Sandstone, making the Gallia and the Berea Sandstone the uppermost aquifer. The Berea Sandstone is about 30 feet thick. Vertical groundwater flow is downward from the Gallia to the Berea

Sandstone. Horizontal groundwater flow at Ports is heavily influenced by several surface water bodies. In general, groundwater flows toward these surface water bodies, which act as discharge points for groundwater.

Groundwater Monitoring System

The Ports facility has installed 86 wells near 5 of the 7 RCRA-regulated units to monitor the affect of the units on groundwater.

CME Results

The CME concluded that the facility was inadequate and in violation of all groundwater monitoring requirements at units X-230J7 and X-701C because no groundwater monitoring system was in place. At unit X-725, statistical analysis are not performed to determine if the unit affects groundwater quality. At units X-231B, X-616, and X-749, the facility is in violation for not determining the extent of groundwater contamination. At unit X-735, the facility is in violation because 1) statistical analysis are not performed to determine if the unit affects groundwater quality, 2) background data for the first four quarters of sampling was not submitted in a timely manner, 3) pH data was no submitted with the 1991 and 1992 annual report, 4) the 1991 annual report was not submitted in a timely manner. The facility is also deficient because a total of 10 groundwater monitoring wells at four units were damaged and in need of repair and the sampling and analysis plan governing groundwater sampling and analysis is inadequate in four areas.

Other Activities

RCRA corrective action is currently being undertaken at the Ports facility. A total of 88 units were investigated during the RCRA facility investigation stage and the corrective action process has moved almost entirely into the corrective measures study stage. In addition, several interim remedial actions have been undertaken at the facility.

EPA Point of Contact: **Sally Averill**
Telephone No.: **(312) 886-4439**

U.S. Air Force Plant No. 3 (Plant No. 3)

Facility Location and Background

The Plant No. 3 facility, located in Tulsa, Oklahoma, is owned by the U.S. Air Force, and operated by McDonnell Douglas. The facility began operations in 1941 and currently manufactures aircraft parts and subassemblies. Rockwell International uses the facility for research engineering and production of components for aircraft and navigational equipment.

Wastes Generated and Stored

The facility has two Resource Conservation and Recovery Act (RCRA)-regulated surface impoundments for managing sludge generated by an industrial waste water treatment plant. The surface impoundments began operation in 1952 and were certified closed in 1990.

Facility Geology and Hydrogeology

The CME report does not contain information pertaining to facility geology and hydrogeology.

Groundwater Monitoring System

In 1987, McDonnell Douglas began an accelerated groundwater monitoring program at the surface impoundments because of statistical increases in total organic halogens in downgradient wells. The facility has 18 monitoring wells near the surface impoundments to monitor groundwater.

CME Results

The CME concluded the groundwater monitoring system at the facility was adequate; however, minor deficiencies were noted.

Other Activities

Currently, the facility is conducting an Installation Restoration Program (IRP) investigation. The IRP, along with a RCRA facility assessment conducted in 1987, identified 26 units, 11 of which will be investigated under a RCRA facility investigation required in the facility's RCRA permit.

EPA Point of Contact: **Ronald Crossland**
Telephone No.: **(214) 655-6480**

DOE Los Alamos National Laboratory (LANL)

Facility Location and Background

The LANL facility is located in Los Alamos, Los Alamos County, New Mexico, about 40 miles northwest of Santa Fe. The LANL facility began in 1943 and consist of research facilities for space technology, nuclear weapons, health and medical research, nuclear reactors, basic nuclear and particle physics, and nonnuclear ordnance.

Wastes Generated and Stored

Radioactive and hazardous wastes generated from activities at the LANL facility are stored in 23 Materials Disposal Areas (MDA). These MDAs include surface impoundments and landfills. In addition, canyons at the facility receive wastes such as radioactive effluent, treated sanitary effluent, and cooling tower blowdown.

Facility Geology and Hydrogeology

The LANL facility is situated on the Pajarito Plateau on the east flank of the Jemez Mountains. Geology beneath the LANL facility consists of volcanic and sedimentary deposits. Alluvial deposits are present on mesa tops and in canyons in the area. The uppermost unit widely encountered beneath the LANL facility is the Bandelier Tuff, a Pleistocene-aged ash flow tuff. Beneath the Bandelier Tuff are the Pliocene- to Pleistocene-aged Cerros del Rio Basalts, which consists of basalt flows, breccias, and scoria. The Pliocene- to Pleistocene-aged Puye Formation is the next layer. This formation is a fanglomerate comprised of cobbles and sand and is interstratified in places with the Cerros del Rio Basalts. The Miocene- to Early Pliocene-aged Santa Fe Group is located beneath the Puye Formation. The Santa Fe Group consists of conglomerates, sandstones, and mudstones.

Groundwater in the area occurs in three areas: 1) as perched water in the alluvial deposits, 2) as perched water in the Puye Formation, and 3) as groundwater in the main aquifer. The main aquifer consists of portions of the Santa Fe Group in the western area of the Pajarito Plateau and the lower Puye Formation in the central and eastern areas of the Pajarito Plateau. Eleven wells in three well fields supply water to the facility, the cities of Los Alamos and White Rock, and Bandelier National

Monument. The depth to water in the main aquifer varies from 600 to 1,200 feet below ground surface. The main aquifer is confined and separated from perched groundwater in the alluvial deposits and Puye Formation by 350 to 620 feet of tuff and volcanic sediments. Hydraulic conductivity for the main aquifer ranges from 20 to 345 feet per year.

Groundwater Monitoring System

The LANL facility currently has a facility-wide groundwater monitoring program that utilizes 43 wells. These wells include 19 public water supply wells and 7 test wells. In addition, groundwater is also monitored from 33 springs that discharge along the eastern edge of the Pajarito Plateau to White Rock Canyon. Water samples are analyzed for volatile organic compounds, semivolatile organic compounds, pesticides, polychlorinated biphenyls, metals, radionuclides, and nonradionuclides. Tritium has been detected in groundwater samples from 200 feet below ground surface.

CME Results

The CME concluded that the groundwater monitoring system at the facility is inadequate. Groundwater flow rates and directions are not adequately characterized. In addition, the facility has not determined whether the aquifer of concern is confined or unconfined. Additional sampling of new Resource Conservation and Recovery Act wells should also be conducted.

Other Activities

The CME report did not describe any additional environmental investigations at the facility.

EPA Point of Contact: **Greg Lyssy**
Telephone No.: **(214) 665-8317**

DOE Pantex Plant (Pantex)

Facility Location and Background

The Pantex facility is located in Pantex, Carson County, Texas, about 17 miles northeast of Amarillo. Pantex began operations in the 1940s and is presently used to assemble and disassemble nuclear arms.

Wastes Generated and Stored

Acid wastes generated at Building 11-14 were discharged to the 11-14 Pond and neutralized with lime. Building 11-14 was later used for high explosive synthesis research and the 11-14 Pond was then designated an emergency discharge pond; however, it is not clear if the pond was ever used for this purpose. The pond was taken out of service in the late 1980s. The CME report stated that clean closure was attempted, but contamination attributable to the pond was detected. The Texas Water Commission subsequently required the installation of monitoring wells assumably to determine the source of the contamination.

Facility Geology and Hydrogeology

The geology beneath the Pantex facility consists of clay and sand. Clay is present in borings at 30 to 75 feet below ground surface (bgs). Clayey and silty sand is present at about 100 to 110 feet bgs. A thick sand unit is located beneath the clayey and silty sand layer at up to 285 feet bgs. A clayey unit is present at the bottom of the borings. Groundwater beneath Pantex is located in the thick sand unit at about 276 feet bgs. This sand unit is actually a perched aquifer and is part of the Pliocene-aged Ogallala Aquifer, a major supply source of fresh water for the Texas panhandle. Groundwater flow in the aquifer is southwest.

Groundwater Monitoring System

The Pantex facility has four monitoring wells used to monitor groundwater near the 11-14 Pond. These wells are screened at the bottom of the perched aquifer. Trace amounts of organics have been detected in the monitoring wells; however, organic contamination has reportedly been detected in all facility

monitoring wells. The CME report stated that the groundwater contamination beneath Pantex is not suspected to be attributable to the 11-14 Pond.

CME Results

The CME concluded that the groundwater monitoring system at the facility is inadequate because the direction of groundwater flow had not been accurately determined. Because of this deficiency, monitoring wells may not be correctly placed so that one is upgradient and three are downgradient from the 11-14 Pond.

Other Activities

The facility is currently involved in an Environmental Restoration Program (ERP) and is conducting a facility-wide groundwater investigation. The ERP is designed to evaluate the effects of the facility on the surrounding environment.

EPA Point of Contact: **Not Available**
Telephone No.: **Not Available**

Iowa Army Ammunition Plant (IAAP)

Facility Location and Background

The IAAP facility is a government owned, contractor operated facility operated and maintained by Mason & Hanger-Silas Mason Company, Inc. (Mason & Hanger) under the supervision of the U.S. Army. The IAAP facility is located near the town of Middleton, Des Moines County, Iowa. The facility covers 19,127 acres. Approximately 7,751 acres are used as farmland; 7,500 acres are forested; and the remaining acreage is dedicated for the production, storage, and shipping of munitions.

The facility began operations in 1941 producing munitions for use in World War II. Production ceased in 1945, was resumed for the Korean conflict in 1949, and continue today. The IAAP facility currently loads, assembles, and packs munitions items and components including primers, detonators, fuzes, and boosters.

Wastes Managed and Stored

Current wastes produced at IAAP include a variety of explosive laden sludges, wastewater, lead contaminated sludges, ashes from incineration of explosive wastes, and waste solvents from industrial and laboratory operations.

The CME inspection focused on two disposal areas: the Inert Landfill and the Line 6 area. The Inert Landfill is located in the west central portion of the facility and measures 160 feet long by 100 feet wide and 25 feet deep. Landfill operations have been conducted at this area since 1941. The Inert Landfill has generally been operated as a sanitary landfill for the disposal of scrap lumber, household, and cafeteria wastes. From November 1980 to October 1983, the Inert Landfill also received Resource Conservation and Recovery Act (RCRA) listed wastes, explosives contaminated wastes, explosive waste incinerator ash, and contaminated processor waste. The Inert Landfill was capped and closed in 1989 in accordance with RCRA guidelines.

The Line 6 area was operated as a detonator production facility from 1941 to 1981 and encompasses about 30 acres in the west-central portion of the facility. Waste water containing explosives and lead wastes generated at the Line 6 area was pumped into sumps located throughout the facility for

treatment. From the sumps, waste water was pumped into stainless-steel tanks for desensitization of the explosives in the water prior to disposal. The desensitized water was the discharged through gravel filter beds before entering adjoining drainage ditches. The Line 6 area was closed in 1989 in accordance with RCRA guidelines.

Facility Geology and Hydrogeology

The CME report does not contain information pertaining to facility geology and hydrogeology.

Groundwater Monitoring System

The IAAP facility uses nine monitoring wells near the Line 6 area and seven monitoring wells near the Inert Landfill to monitor the effect of these units on groundwater. Analysis of groundwater from these wells is not discussed in the CME report.

CME Results

The CME report concluded that the groundwater monitoring system at the facility is adequate with deficiencies. The CME report does, however, recommend remeasurement of monitoring well elevations in the Line 6 area.

Other Activities

The CME report did not describe any additional environmental investigations at the facility.

EPA Point of Contact: **Harry Gabbert**
Telephone No.: **(913) 551-7652**

Kansas Army Ammunition Plant (KAAP)

Facility Location and Background

The KAAP facility is located in Parsons, Labette County, Kansas, covers about 13,727 acres, and is under the jurisdiction of the U.S. Armament, Munitions, and Chemical Command. The facility was established in 1941 and is operated by a private contractor, Day and Zimmermann, Inc., to load, assemble, and pack ammunition for the U.S. Department of Defense. The KAAP facility is also responsible for the receipt, surveillance, maintenance, renovation, demilitarization, salvage, storage, and issue of assigned munitions. The CME focused only on the 700 Area, which is part of the facility's active munition storage area. The 700 Area covers about 38 acres and is used to load, assemble, and pack the M-55 detonator, M-219 lead cup, booster charges, and explosion charges. The 700 Area began operations in 1942.

Wastes Generated and Stored

Wastes generated by the 700 Area include explosives and metal compounds including RDX (cyclotrimethylene and trinitramine), lead azide, lead styphnate, tetryl, tetracene, PBX (RDX, polystyrene, and dioctylphthalate), HMX (cyclotetramethylene tetranitramine), barium nitrate, mercury fulminate, and sump bottom sludges. These wastes were generated during building washdown. The waste water from the washdown then flowed to concrete sumps. In the past, the waste water was pumped from the sumps or allowed to overflow into drainage ditches, which led to two ponds south and west of the 700 Area. The solids were allowed to settle in the ditches, from which they were periodically removed and placed in the Burn Area. The sumps and ditches were used until 1987, when an industrial waste water treatment plant became operational. Waste water now flows to this treatment plant. Treated effluent from the treatment plant is discharge to a drainage ditch.

Facility Geology and Hydrogeology

The KAAP facility is situated on unconsolidated, Pleistocene-aged terrace clays and recent flood plain alluvial clay, sand, and gravel deposits. These deposits overlie Middle Pennsylvania-aged limestones, sandstones, and shales. Groundwater near the facility is present in both the unconsolidated materials and bedrock. Better quality groundwater is obtained from the unconsolidated materials; therefore,

public water supplies for the area are obtained from the unconsolidated materials. The depth to the water table in the unconsolidated materials is generally less than 50 feet below ground surface. The water table occurs in a saturated zone at the contact between the unconsolidated deposits and bedrock. Surface water from the area is drained by the Neosho River and Labette Creek.

Groundwater Monitoring System

The KAAP facility has 22 monitoring wells in the 700 Area to monitor the groundwater quality. The wells are screened in the unconsolidated deposits and bedrock. Reportedly, groundwater contamination has been detected in the monitoring wells. The CME report does not indicate which specific contaminants were detected in the groundwater.

CME Results

The CME concluded that the groundwater monitoring system at the facility is inadequate. The following deficiencies and violations were noted:

- The system cannot detect dense nonaqueous phase liquids or light nonaqueous phase liquids.
- The extent of the groundwater plume has not been defined.
- The geology and hydrogeology has not been adequately characterized.
- Aquifer interconnections and preferential contaminant migration pathways have not been investigated.
- Monitoring wells are not properly constructed or maintained to prevent contamination of samples.
- Improper drilling methods were used to install the monitoring wells.
- Monitoring well screens are inadequately located to detect contamination.

Other Activities

In addition to the 700 Area, 24 other units at the facility may be affecting groundwater. These units are being addressed by a Resource Conservation and Recovery Act facility investigation.

EPA Point of Contact: **Not Available**
Telephone No.: **Not Available**

U.S. Air Force Plant PJKS (PJKS)

Facility Location and Background

The PJKS facility is located Waterton, Colorado, near the foothills of the Colorado Front Range and about 20 miles southwest of Denver. The facility covers 464 acres and is surrounded by approximately 5,200 acres of land owned by the Martin Marietta Company. From 1957 to present, activities at the facility have included Titan I, II, and III missile and launch device assembly, engine testing, and research and development. The Martin Marietta Company has been the principal operator of the PJKS facility. Activities performed at the facility have included equipment cleaning, fuels development, general maintenance, and engine test firing.

Wastes Generated and Stored

Typical wastes generated by facility activities have included fuel and oxidizer contaminated deluge waste water; fuel purification and development wastes; solvent, alcohol, acid, and caustic cleaning wastes; fluorine and nitrogen tetroxide gases; waste lubricants; and oils. Historically, wastes were either treated and discharged into surface waters, reused as process waters, or transferred to Martin Marietta Astronautics Group property for disposal.

Decontamination Trailer Tanks at the Central Support Building, an Open Detonation/Open Burning (OD/OB) component of the Ordnance Thermal Treatment Area, and Pond T-8A, have previously been included in one or more Resource Conservation and Recovery Act (RCRA) Part A or Part B Permit Applications. These areas were the subject of the CME.

Facility Geology and Hydrogeology

The CME report does not contain information pertaining to facility geology or hydrogeology.

Groundwater Monitoring System

Prior to 1987, 32 groundwater monitoring wells were installed throughout the facility by various contractors. Documents indicate limited sampling of these wells. In 1987, a Comprehensive

Environmental Response, Compensation, and Liability Act (CERCLA) remedial investigation/feasibility study (RI/FS) was conducted at the facility. During the RI/FS, 94 alluvial and bedrock groundwater monitoring wells were installed. During a supplemental study to the RI/FS, an additional 27 monitoring wells were installed.

Information derived from comprehensive sampling events in May 1991, December 1991, and January 1992 confirms the presence of at least eight contaminant plumes in alluvial groundwater and three in bedrock groundwater. The following parameters have been analyzed for: volatile organic compounds, base neutral acids, dissolved metals, mercury, nitrate-nitrite, explosives, total recoverable hydrocarbons, and hydrazines.

CME Results

The CME determined that the groundwater monitoring system at the facility is inadequate. The following deficiencies and violations were noted:

- The groundwater monitoring system in place is not capable of determining whether groundwater has been affected by hazardous wastes at the regulated units.
- Upgradient background wells and downgradient wells have not been designated.
- The boundaries for the regulated units have not been defined.
- Sieve and hydrometer grain size analyses have not been performed on boring samples in order to determine the proper screen size and filter pack sizes.
- Monitoring well screens up to 30 feet in length have been installed, making it difficult to sample appropriate aquifer depths.
- Initial background concentration values and the arithmetic mean and variance values for groundwater upgradient of the regulated units have not been determined.
- The arithmetic mean and the variance has not been calculated for the downgradient wells used for comparing these well concentrations with background well concentrations.

- An outline of a comprehensive groundwater quality assessment program capable of deterring the concentration, rate of movement, and extent of hazardous wastes in groundwater has not been prepared.

- A groundwater quality assessment plan has not been prepared.

- Recordkeeping and reporting requirements have not been met, consequently preventing an annual RCRA groundwater quality assessment report from being filed with the Regional Administration by March 1 following each calendar year.

- The uppermost aquifer has not been defined.

Other Activities

The facility is conducting an RI/FS under CERCLA to investigate contamination at the facility.

EPA Point of Contact: **George Dancik**

Telephone No.: **(303) 293-1506**

DOE Rocky Flats Plant (RFP)

Facility Location and Background

The RFP facility is located in Golden, Jefferson County, Colorado, about 16 miles northwest of Denver, covers about 6,550 acres of federally-owned land, and is operated by EG&G Inc. The facility was constructed in 1951 to manufacture plutonium, beryllium, uranium, and stainless steel components for nuclear weapons, as well as to recover chemicals and purify radionuclides from spent materials.

Wastes Generated and Stored

Wastes generated by the RFP facility include solid wastes, hazardous wastes, low- and high-level radioactive wastes, mixed hazardous and radioactive wastes, and Toxic Substance Control Act (TSCA) wastes. Waste management activities have historically included container storage, tank storage and treatment, surface impoundment storage and treatment, land treatment, landfilling, and incineration. The facility is currently under a moratorium mandated by the U.S. Department of Energy preventing the shipment of hazardous and radioactive wastes off site until appropriate disposal facilities and methods are developed and located.

Facility Geology and Hydrogeology

The RFP facility is located 4 miles east of the Front Range of the southern Rocky Mountains, along the western edge of the Colorado Piedmont. The facility is built on Quaternary-aged alluvial fans that have been dissected and reworked by fluvial processes. These deposits overly the Upper Cretaceous-aged Arapahoe Formation, Laramie Formation, Fox Hills Sandstone, and Pierre Shale. The Quaternary-aged deposits are hydraulically connected with the weathered portions of the upper Arapahoe and Laramie Formations and comprise the uppermost aquifer beneath the facility. The unweathered portions of the Arapahoe and Laramie Formations consist mostly of sandy claystones and very fine grained, clayey sandstones with very low porosity and are considered to be aquitards or confining units. The facility is drained by Walnut, Woman, and Rock Creeks, which all flow east.

Groundwater Monitoring System

Currently, 430 monitoring wells and piezometers are included in the facility groundwater monitoring program. Groundwater samples from the wells are analyzed for volatile organic compounds; semivolatile organic compounds; base neutral acids; total and dissolved metals; other inorganics; orthophosphates; gross alpha and beta radiation; and other radionucleides including total and dissolved uranium, tritium, plutonium, and americium. VOCs, total metals, and radionuclides have been detected in some portion of the upper hydrostratigraphic units and are the primary groundwater contaminants. However, it was stated in the CME report that it could not be determined if the total metals and radionuclides are attributable to the facility or are present at background levels.

CME Results

The CME concluded that the groundwater monitoring system at the facility is inadequate. Improvements in the groundwater monitoring program have been made since 1988; however the facility still needs to: 1) improve the management of the sampling program, including training of sampling personnel; 2) gain a better and more complete understanding of the hydrologic conditions at the facility; and 3) consolidate and interpret existing data to determine areas needing further study.

Other Activities

Based on an agreement with the U.S. Environmental Protection Agency and the Colorado Department of Health, the facility will conduct Resource Conservation and Recovery Act facility investigations and Comprehensive Environmental Response, Compensation, and Liability Act remedial investigations at 16 hazardous waste management units.

EPA Point of Contact: Gary Kleeman
Telephone No.: (303) 294-1071

Hawthorne Army Ammunition Plant (HAAP)

Facility Location and Background

The HAAP facility is located in Hawthorne, Mineral County, Nevada, about 135 miles south of Reno, and occupies about 148,517 acres of federal land on the south shore of Lake Walker. The facility began operations in 1928 and was operated by the U.S. Navy. The facility is now occupied by the U.S. Army. Routine facility operations and maintenance is provided by a private contractor, Day and Zimmerman/Basil Corporation. The HAAP facility supports the U.S. Army, U.S. Navy, and Air Force with facilities to receive, load, maintain, store, issue, and dispose of ammunition and explosive ordnance. The HAAP facility also renovates, recovers, and disposes of unserviceable ammunition and explosives. The Western Area Demilitarization Facility (WADF) and the 101 Area were the focus of the CME.

Wastes Generated and Stored

Hazardous wastes generated by the HAAP facility are primarily consist of explosive materials, ammonium picrate, nitrocellulose, and other materials such as organic solvents, acids, and metals.

Three inground, steel-reinforced concrete tanks are used for sludge basins and three surface water impoundments in the WADF area. From 1983 to 1989, the sludge basins received waste waters and sludges from various operations at the HAAP facility. The HAAP facility installed seven monitoring wells to monitor groundwater near the sludge basis. The surface water impoundments are located near the sludge basins. Reportedly, only one impoundment was ever used. The HAAP facility also installed seven monitoring wells to monitor the groundwater near the surface impoundments. Arsenic, lead, and gross alpha radiation contamination was detected in wells near the surface impoundments. The HAAP facility is in the process of closing the basins and impoundments.

The 101 Area contains three surface impoundments. Soil contamination was discovered near these impoundments. The HAAP facility installed eight monitoring wells to monitor groundwater near the impoundments. Contaminants detected in groundwater samples from the wells include explosives with nitrogen compounds, ammonium picrate, RDX, barium, lead, and nitrate.

Facility Geology and Hydrogeology

The HAAP facility is located in the Basin and Range Physiographic Province in a parallel block-faulted basin occupied in part by Walker Lake. The facility is underlain by Quaternary- and Tertiary-aged unconsolidated deposits that have been eroded from surrounding mountains. The unconsolidated deposits consist of silt- to cobble-sized sediments and form alluvial fans and aprons. Beneath the unconsolidated sediments are Cretaceous-aged intrusive granitic rocks and the Triassic-aged Excelsior Formation. The Excelsior Formation is mostly an intermediate to felsic fine-grained, clastic, and tufaceous unit. Depth to groundwater in the vicinity of the WADF and 101 Area ranges from 15 to 170 feet below ground surface. Groundwater flow is north towards Walker Lake; however, groundwater flow to the north is affected by pumping from production wells for the City of Hawthorne. Water levels indicate that groundwater may be under semiconfined or confined conditions. In addition to the City of Hawthorne, HAAP obtains water from groundwater and operates nine production wells for this purpose. These wells vary in depth from 312 to 850 feet bgs.

Groundwater Monitoring System

The HAAP facility has installed 14 monitoring wells near WADF and eight monitoring wells near the 101 Area to monitor the effect of the units on groundwater.

CME Results

The CME concluded that the groundwater monitoring system at the facility is inadequate. The following deficiencies and violations were noted:

- The vertical extent of the uppermost aquifer and any aquifer interconnections are not defined.
- Groundwater flow directions and rates have not been determined.
- Downgradient monitoring wells should be place to ensure immediate detection of contaminants.
- Monitoring wells with multiple screened intervals should not be used for monitoring.
- The extent of groundwater plumes should be defined.

Other Activities

The HAAP facility is currently undergoing an Installation Restoration Program to investigate all units identified at the facility.

EPA Point of Contact: **Tony Terrell**
Telephone No.: **(415) 744-2029**

U.S. Army Fort Irwin (Ft. Irwin)

Facility Location and Background

The Ft. Irwin facility is located 35 miles northeast of Barstow, San Bernadino County, California, in the Mojave Desert approximately 5 miles south of the Death Valley National Monument. The U.S. Naval Weapons Center China Lake adjoins the facilities western boundary, while land to the east, south, and north is under the jurisdiction of the U.S. Bureau of Land Management.

The facility is a large-scale U.S. Army troop training center covering approximately 640,000 acres. The facility has served as a desert warfare armor training center since 1941 and is currently designated as the National Training Center. In addition, leased or permitted areas exist within the facility boundaries that are under the control of the California National Guard, NASA Jet Propulsion Laboratory, and U.S. Air Force.

Wastes Generated and Stored

The main waste producing operation at Ft. Irwin is facility vehicle maintenance. A 1982 report sponsored by the facility estimates that approximately 30,000 to 35,000 liters per month of waste oils were being generated by vehicle and aircraft maintenance activities. The report assumes that all waste oils were contaminated with cleaning solvents and hydraulic fluid. Other hazardous wastes generated at Ft. Irwin include solvents, paints, asbestos, pesticides, acidic and basic wastes, and explosives contaminated materials. Approximately 94 regulated hazardous waste units are present at the facility, including landfills, waste water treatment plants and fire-fighting training areas.

Facility Geology and Hydrogeology

The Ft. Irwin is located in the Western Mojave Desert portion of the Basin and Range Physiographic Province. The region is characterized by low mountain ranges and broad alluvial basins. The structural geology of Ft. Irwin facility consists mainly of a series of ranges formed from uplifted, tilted fault blocks or volcanic intrusions or extrusions, separated by basins resulting from depressed or down-dropped blocks. Erosion of the uplands and subsequent deposition of eroded material in the basins has

resulted in thick sequences of valley alluvium and associated alluvial fans extending to the flanks of the ranges.

The geologic units at the facility range from PreCambrian-aged metamorphic and metasedimentary rocks to Cenozoic-aged volcanic and sedimentary rocks. Generally, the oldest units, which are part of the Garlock series, consist of chert, marble, phyllite, gneiss, schist, limestone, and shale. Late Tertiary-aged gravel deposits unconformably overlie the basement units at a maximum exposed thickness of 300 feet. Quaternary-aged gravels, silts, and clays unconformably overlie both the basement rocks and Tertiary-aged granitic gravels. The maximum thickness of the Quaternary-aged deposits is estimated to be 600 feet. Additionally, several major fault zones occur in the facility region.

Dry lakes and groundwater basins occur frequently in the alluvial basins in this region. Four major groundwater basins have been identified within facility boundaries: Irwin, Bicycle, Langford, and Coyote Basins. Wells within the Irwin, Bicycle, and Langford Basins supply drinking water for the facility. These are separate basin systems, although limited connection can exist between the Irwin and Langford Basins in periods of high groundwater levels.

Groundwater recharge occurs primarily as a result of direct percolation of rainfall, and groundwater flow directions are generally oriented toward the center of the basins. Aquifer tests conducted at the Irwin Basin indicate that the transmissivity of the aquifer ranges from 2,300 to 40,000 gallons per day per foot, and groundwater gradients range from 25 to 50 feet per mile.

Groundwater Monitoring System

The Ft. Irwin facility uses 16 monitoring wells to monitor the effect of the regulated units on groundwater.

CME Results

The CME concluded that the groundwater monitoring system at the facility is inadequate. The following deficiencies and violations were noted:

- The uppermost aquifer has not been identified.

- The groundwater flow rates and directions are not properly determined.
- Background and downgradient wells are not located properly.
- Groundwater samples were not properly collected and analyzed.

Other Activities

The facility is participating in the Installation Restoration Program to investigate and remediate contamination at the facility.

EPA Point of Contact: **Chris Prokop**
Telephone No.: **(415) 744-2045**

DOE Idaho National Engineering Laboratory (INEL)

Facility Location and Background

The INEL facility covers 890 square miles in southeastern Idaho, about 45 miles west of Idaho Falls. The INEL facility was established in 1949 as the National Reactor Testing Station. The CME focused on two East and West Percolation Ponds that are unlined in the Idaho Chemical Processing Plant (ICPP) at INEL. The ICPP was built in 1949 to handle and reprocess spent nuclear fuel from research and naval reactors. Reprocessing no longer occurs at the ICPP. Land surrounding INEL is primarily used for grazing.

Wastes Generated and Stored

The East and West Percolation Ponds were put into use in 1984 and 1985, respectively. The ponds were designed to hold nonradioactive to high-level mixed radioactive wastes. Currently, the Eastern Percolation Pond is undergoing closure and is not in use.

Facility Geology and Hydrogeology

Geology underlying the ICPP consists of a sequence of basalt flows to a depth of at least 1,275 feet below ground surface (bgs). The basalt flows are interbedded with 15 to 20 sedimentary layers. Individual basalt flow groups and sedimentary interbeds are not continuous across the ICPP. A veneer of surficial sediment ranging from 2 to 73 feet thick covers the basalt at the ICPP. Near the East and West Percolation Ponds, surficial sediments are 40 to 50 feet thick. The Snake River Plain Aquifer (SRPA) is the main aquifer beneath the facility. The aquifer is located about 450 feet bgs and is used as a source of drinking water for the facility. Three perched groundwater zones have been identified beneath the ICPP: 1) one at the contact of the surficial sediment and basalt, 2) one at the 130-foot interbed, and 3) one in a vesicular basalt layer about 350 to 400 feet bgs. Groundwater in the aquifer at the 130-foot interbed appears to be a direct result of the operation of the percolation ponds.

Groundwater Monitoring System

The current groundwater monitoring system near the ponds consists of four downgradient monitoring wells and one upgradient monitoring well. Chromium has been detected in the monitoring wells near the East and West Percolation Ponds; however, based on results from other monitoring wells at the INEL facility, a plume of radioactive-contaminated groundwater has been detected in the SRPA. The source of this plume has been identified, in part, as the percolation ponds.

CME Results

The CME concluded that the groundwater monitoring system at the facility is inadequate. The following deficiencies and violations were noted:

- The current monitoring system cannot immediately detect releases of contaminants.
- Monitoring wells are not properly located upgradient and downgradient of the East and West Percolation Ponds.
- Groundwater samples were not adequately or properly analyzed.
- The SAP was determined to be inadequate.
- The uppermost aquifer has not been defined.
- Seasonal variations in groundwater elevations and flow directions have not been defined.

Other Activities

The INEL facility is currently undergoing a Comprehensive Environmental Response, Compensation, and Liability Act remedial investigation/feasibility study to investigate facility contamination.

EPA Point of Contact: **Cheryl Williams**
Telephone No.: **(206) 553-2137**

U.S. Coast Guard Kodiak Support Center (Kodiak)

Facility Location and Background

The Kodiak in Kodiak, Alaska, was established during World War II as a U.S. Naval base. In 1972, the U.S. Navy turned the facility over to the U.S. Coast Guard (USCG), which has maintained and operated it as a base. The Laundry Site and the Motor Gasoline (MOGAS) Site were inspected during the CME.

Wastes Generated and Stored

The Laundry Site building was originally constructed in 1941 and later expanded. Between 1941 and 1987, USCG personnel are reported to have disposed of spent dry cleaning solvent still bottoms on the ground outside the south side of the building. Approximately 5 gallons of tetrachloroethene (PCE) still bottoms were disposed of this way each week. Carbon tetrachloride may also have been disposed of at the Laundry Site.

The MOGAS Site includes 18 25,000-gallon steel underground storage tanks installed in 1951 or 1952 by the U.S. Navy for aviation fuel and motor gasoline storage when the support center was a Naval Air Station. After the USCG assumed jurisdiction of the support center in 1972, the tanks were apparently initially used solely for motor gasoline storage. The USCG later used the tanks for storing waste oil, off-specification fuels, and waste solvents. Each tank is 10 feet in diameter and 40 feet long. The facility removed all liquids from the 18 MOGAS Site tanks in November and December 1991 as required by the U.S Environmental Protection Agency.

Facility Geology and Hydrogeology

The bedrock geology beneath the USCG facility consists of the Cretaceous-aged Kodiak Formation, a dark gray to black mudstone, siltstone, sandstone, and conglomerate metamorphosed to fine-grained shale and slate. A discontinuous layer of glacial till up to 15 feet thick overlies ice-scoured bedrock. The Nyman Peninsula in particular has scoured, rounded bedrock hills at elevations of less than 300 feet above mean sea level overlain by an average of 3 feet of till. Where till is absent, bedrock may outcrop or be overlain by organic-rich silt, volcanic ash, or vegetation and soil. Bedrock and surface

deposits at the Laundry Site generally resemble those described for the entire facility. Bedrock is overlain by 3 to 22 feet of compacted gravel and sand fill and surface sediments.

Water table elevations in the Laundry Site closure plan show that groundwater elevations measured in 1988 and 1989 varied seasonally up to 4.25 feet. The highest levels were measured in February and the lowest levels were measured in October.

The MOGAS Site is on a broad hilltop near the northeast-southwest trending ridge of the Nyman peninsula. Bedrock and surface deposits at the MOGAS Site generally resemble those described for the entire facility. According to the MOGAS Site closure plan, groundwater elevations vary seasonally up to 3 feet. The depth to groundwater varies from less than 3 feet bgs (bgs) to greater than 10 feet bgs.

Groundwater Monitoring System

The U.S. Geological Survey (USGS) installed 11 monitoring wells in the vicinity of the Laundry Site in 1988 and 1989 to investigate groundwater quality. Analytical results for samples collected from these wells show detectable concentrations of tetrachloroethene (PCE); trichloroethene (TCE); trans 1,2-dichloroethene (DCE); 1,2-dichloroethane (DCA); vinyl chloride; chloroform; methylene chloride; lead; cadmium; and total petroleum hydrocarbons (TPH). Five additional well points were installed in 1992 at the Laundry Site. Of the volatile organic compounds detected in the well points at the Laundry Site, the highest concentrations of cis/trans 1,2-DCE; PCE; TCE; vinyl chloride; and xylenes were detected in wells located at the Laundry Site area of disposal and in a well located east of the Laundry Site. A groundwater divide is present west of the Laundry Site building, corresponding with a bedrock high in this area. The aerial extent of the groundwater contaminant plume remains undefined. Additional downgradient monitoring wells screened in deposits overlying bedrock therefore appear necessary.

The USGS installed five monitoring wells at the MOGAS Site in 1988 and 1989 to investigate groundwater quality. Chloroform; toluene; 1,1,1-trichloroethane (TCA); lead; and TPH were detected in groundwater samples from the wells.

CME Results

The CME concluded that the groundwater monitoring system at the facility is inadequate. The following deficiencies in the facility's groundwater monitoring program have been identified for the Laundry Site and MOGAS Site:

- The 11 USGS wells installed in 1988 and 1989 were not placed or constructed in accordance to Resource Conservation and Recovery Act requirements and specifications.
- The facility has not sampled and analyzed for the appropriate parameters relevant to detection groundwater monitoring.
- The facility has not prepared an outline for an assessment groundwater monitoring program.
- The facility has not statistically evaluated any previously collected groundwater analytical data.
- The facility has not developed and submitted a plan for an assessment groundwater monitoring program.
- The facility has not adequately determined the concentrations and rate and extent of migration of hazardous wastes or of constituents in groundwater.
- The horizontal and vertical extent of the groundwater contaminant plume has not been defined.
- The facility has not submitted the initial groundwater assessment report containing the determinations required under 40 Code of Federal Regulations (CFR) 265.93(d)(4).
- The facility has not submitted annual groundwater assessment reports.
- On a quarterly basis during the first year of groundwater monitoring, the facility has not reported the concentrations of values of the drinking water suitability parameters listed in 40 CFR 265.92(b)(1) or identified the parameters exceeding maximum contaminant levels.
- On an annual basis, the facility has not reported the concentrations or values of the groundwater contamination indicator parameters listed in 40 CFR 265.92(b)(3) for each well and the required evaluations of these parameters.

- On an annual basis, the facility has not reported the results of evaluations of groundwater surface elevations measured under 40 CFR 265.92(e).

Other Activities

The facility is conducting a facility-wide Resource Conservation and Recovery Act facility investigation.

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APPENDIX B

SUPPLEMENTAL RESULTS REPORTED FOR CMEs CONDUCTED IN FISCAL YEARS 1993, 1994 AND 1995

APPENDIX B

Based on review of the draft version of this report, the U.S. Environmental Protection Agency's Federal Facilities Enforcement Office requested all EPA Regions to provide the status of facilities where CMEs were conducted in FY94 and FY95. When provided, information on CMEs conducted in FY93 (in addition to the 22 contained in Appendix A of this report) is included as well.

A total of 18 CMEs were performed in FY94 and FY95. In FY94, seven facilities were found adequate/ without violations, two were found adequate with deficiencies, and one facility was inadequate. In FY95, five facilities were found adequate/without violations, two were found adequate with deficiencies, and one facility report is currently under review. Based on information for Regions reporting FY93 CMEs, four facilities were found without violations and one was found to have deficiencies.

A Regional summary is presented below:

Region 1

No CMEs were conducted in FY94 or FY95. (Note: There is only one Federal facility required to conduct groundwater monitoring in Region 1.)

Region 2

No CMEs were conducted in FY94 or FY95. (Note: There are only two Federal facilities required to conduct groundwater monitoring in Region 2.)

Region 3

CMEs conducted in FY94

U.S. Army Radford AAP New River - A CME was conducted on 11/3/94 by the State and no deficiencies were detected during this inspection.

Region 3 (continued)

U.S. Navy Air Development Center Warminster - EPA conducted a CME in April of 1994. EPA concluded that the facility's groundwater monitoring system in place at the time did not meet state requirements for location and well screen placement and was therefore inadequate.

CMEs conducted in FY95

U.S. Navy Surface Weapons Center Dahlgren - A CME was conducted 4/18/95 and no deficiencies were detected.

U.S. Navy MCCDC Quantico - The facility has recently installed monitoring wells. A CME was conducted by the State on 9/26/95 and no violations were found.

NASA Goddard Space Flight Center Wallops - An adequate groundwater monitoring system was installed and the State conducted a CME on 8/8/95 which indicated no deficiencies.

Region 4

CMEs conducted in FY93

U.S. Navy Public Works Center, Pensacola, Florida
Last CME - 2/4/93; No violations.

Marshall Space Flight Center, Madison County, Alabama
Last CME - 6/9/93; No violations.

U.S. Air Force Tyndall, Bay County; Florida
Last CME - 7/27/93; No violations.

U.S. Naval Air Station Jacksonville, Jacksonville, Florida
Last CME - 7/13/93; No violations.

CMEs conducted in FY94

U.S. Marine Corps Logistics Base 555, Albany, Georgia
Last CME - 9/23/94; No violations.

Region 4 (continued)

U.S. Marine Corps Station, Cherry Point, North Carolina
Last CME - 9/28/94; No violations.

CMEs conducted in FY95
DOE/WSRC Savannah River Site, Aiken, South Carolina
Last CME - 4/27/95; No violations.

Region 5

No CMEs were conducted in FY94 or FY95.

Region 6

CMEs conducted in FY94:
U.S.Army Fort Bliss Air Defense
Adequate system in place with deficiencies.

U.S. Air Force Kirtland AFB
Adequate system in place, no significant deficiencies.

U.S. Army White Sands Missile Range HELSTF
Adequate system in place, no deficiencies.

U.S. Army White Sands Missile Range Temp F
Adequate system in place, no deficiencies.

U.S. Air Force Kelly AFB
Adequate system in place, with deficiencies.

U.S. Army Red River Army Ammo Depot
Adequate system in place, no deficiencies.

Region 6 (continued)

CMEs conducted in FY95:

U.S. NASA Martin Marietta

Adequate system in place, no deficiencies.

U.S. NASA White Sands Test Facility

Adequate system in place, no deficiencies.

U.S. Army Longhorn Army Ammo Plant

Adequate system in place, few deficiencies.

Region 7

No CMEs were conducted in FY94 or FY95.

Region 8

CMEs conducted in FY93

U.S. Army Tooele Army Depot (North)

last CME 9/30/93; State correspondence with facility to correct deficiencies reported in last CME report.

CMEs conducted in FY95

US Army Dugway Proving Grounds

CME conducted by State 9/95; inspections results are currently under review.

Region 9

No CMEs were conducted in FY94 or FY95.

Region 10

No CMEs were conducted in FY94 or FY95.