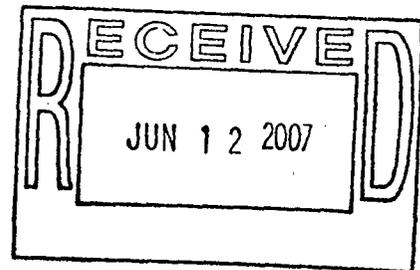


**Preliminary Close Out Report**  
**Rocky Flats Plant (USDOE)**  
**Central and Peripheral Operable Units**

September 2006

ADMIN RECORD



Prepared by  
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Region 8  
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U.S. Environmental Protection Agency  
September 2006

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**Central and Peripheral Operable Units**

Approval by: Max H. Dodson 9/29/06  
Date  
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## Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
CAD	Corrective Action Decision
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CFR	Code of Federal Regulations
CHWA	Colorado Hazardous Waste Act
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FR	Federal Register
IHSS	Individual Hazardous Substance Site
IAG	Interagency Agreement
NPL	National Priorities List
OU	Operable Unit
OSWER	Office of Solid Waste and Emergency Response
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFLMA	Rocky Flats Legacy Management Agreement
ROD	Record of Decision
USFWS	United States Fish and Wildlife Service

## **I. Introduction**

This Preliminary Closeout Report documents that the U.S. Department of Energy (DOE), the potentially responsible party, with oversight by the U.S. Environmental Protection Agency (EPA) and the Colorado Department of Public Health and Environment (CDPHE), has completed construction activities at the Rocky Flats Plant. The Rocky Flats Plant is a National Priorities List (NPL) site and was remediated in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and the Resource Conservation and Recovery Act (RCRA). RCRA is administered in Colorado through the Colorado Hazardous Waste Act (CHWA), by CDPHE. To the extent practicable, the selected remedies are also consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Prior to completion of the Rocky Flats Plant CAD/ROD, DOE used the CERCLA removal process to perform accelerated actions to remove contaminated soils, decontaminate and demolish buildings, close two landfills, and install three groundwater treatment systems. Sitewide physical completion of accelerated actions was verified on October 13, 2005 and are operating within designed perimeters. All accelerated actions are summarized in the FY 2005 Final Historical Release Report which was approved by CDPHE and EPA on March 2, 2006.

In the CAD/ROD, the Site was configured into two Operable Units (OUs). The Central OU consolidates all areas that require further remedial actions. The Peripheral OU surrounds the Central OU and requires no remedial action. The boundary of the Central OU was also drawn considering the practicalities of future land management.

The selected remedy for the Central OU consists of environmental monitoring and continued operation and maintenance of engineered structures such as landfill covers and groundwater treatment systems and adds institutional and physical controls. The remedy for the Peripheral OU is no action.

## **II. Summary of Site Conditions**

### **A. Background**

Rocky Flats Plant was established in 1951 as part of the United States' nationwide nuclear weapons complex to manufacture nuclear weapons components. Other support activities included chemical recovery and purification of recyclable transuranic radionuclides and research and development in metallurgy, machining, nondestructive testing, coatings, remote engineering, chemistry, and physics. Manufacturing activities, accidental industrial fires and spills, and support activities including waste management resulted in the release of hazardous substances, hazardous wastes, and hazardous waste constituents to air, soil, sediment, groundwater, and surface water at Rocky Flats.

Rocky Flats Plant (CERCLIS ID Number CO78590010526) is a CERCLA NPL Site. The Site is located in the Denver metropolitan area, approximately 16 miles northwest of Denver, Colorado, and 10 miles south of Boulder, Colorado (Figure 1). Nearby communities include the Cities of

Arvada, Broomfield, and Westminster, Colorado. The majority of the Site is located in Jefferson County, with a small portion located in Boulder County, Colorado. Rocky Flats Plant was proposed for inclusion on the CERCLA NPL on October 15, 1984 (49 Federal Register [FR] 40320, October 15, 1984), and the listing became final on September 21, 1989 (54 FR 41015, October 4, 1989).

The majority of Rocky Flats structures were located within an approximate 300-acre industrial area at the center of the property. Some buildings and infrastructure systems became contaminated. Leaking storage drums, unlined disposal trenches, surface water impoundments, and leaking underground tanks contributed to the contamination of soils at the Site.

Contaminants released to the environment include (but are not limited to) plutonium-239/240, americium-241, uranium, carbon tetrachloride, tetrachloroethene (PCE or Perc), trichloroethene, nitrates, and chromium. Volatile organic compounds, nitrate, and uranium contaminated shallow groundwater. The radioactive elements plutonium, uranium, and americium contaminated soils. The potential for radioactive particles on soil to become airborne during strong winds or to be transported to streams was a concern.

In compliance with the Rocky Flats National Wildlife Refuge Act of 2001, the Peripheral OU, where no restrictions are required, will be transitioned to the Rocky Flats National Wildlife Refuge. Potential future users of the wildlife refuge include wildlife refuge workers and wildlife refuge visitors.

## **B. Site Regulatory Framework**

*The 1986 Compliance Agreement* - - On July 31, 1986, DOE, EPA and CDPHE entered into a Compliance Agreement (CERCLA VIII-86-08 and RCRA VIII-86-06) that established milestones for major environmental operations and investigations at the Site, and requirements for compliance with CERCLA. This agreement also established roles and requirements for compliance with RCRA and CHWA, through compliance with interim status requirements and submittal of permit applications and closure plans for hazardous waste units. Under this agreement, DOE and Rockwell identified over 2,000 waste generation points and 178 Solid Waste Management Units (SWMUs) and RCRA/CHWA-regulated closure Sites.

*The Interagency Agreement (IAG)* - - The 1986 Compliance Agreement did not reflect the requirements of the 1986 Superfund Amendments and Reauthorization Act, including the requirements governing federal facilities under Section 120 of CERCLA. In addition, the environmental priorities at the Site had been clarified in light of the investigations that had taken place under the 1986 Compliance Agreement. For these reasons, DOE, EPA and CDPHE negotiated the IAG (Federal Facility Consent Order CERCLA VIII-91-03, RCRA [3008{h}] VIII-91-07, and State of Colorado Docket #91-01-22-01), which was signed on January 22, 1991. The IAG organized remedial activities into 16 OUs, based upon similarities of geography, contaminants, or other interrelationships.

*The Rocky Flats Cleanup Agreement (RFCA)* - - On July 19, 1996, DOE, EPA and CDPHE signed RFCA (Federal Facility Agreement and Consent Order CERCLA VIII-96-21, RCRA

[3008{h}] VIII-96-01, and State of Colorado Docket #96-07-19-01). RFCA expanded the cleanup scope to include the disposition of all buildings (not included in the IAG), and changed the regulatory approach in several other significant respects. RFCA coordinated all of DOE's cleanup obligations under CERCLA, RCRA and CHWA into a single document. RFCA will be terminated and superseded by the Rocky Flats Legacy Management Agreement (RFLMA). The purpose of RFLMA is to establish the regulatory framework for implementing the final remedial action and ensuring that the final remedial action remains protective of human health and the environment.

### **C. Accelerated Actions**

RFCA implemented an accelerated action approach toward work at the Site, focusing on Individual Hazardous Substance Sites (IHSSs) rather than the larger OUs. Accelerated action cleanup levels for building disposition, soil, water, and sediments were established pursuant to a process set up in RFCA which considered ARARs and risk assessment/risk management and involved public participation. Accelerated actions performed at Rocky Flats, in accordance with the CERCLA removal process, included the following:

- All special nuclear materials were packaged and shipped to other DOE facilities, including:
  - Approximately 21 tons of weapons-grade material; and,
  - Approximately 100 tons of plutonium residues and 30,000 liters of plutonium and enriched uranium solutions, which were processed to meet transportation and receiver site requirements;
- Over 800 structures were decontaminated to the degree necessary and removed, including five major plutonium facilities and two uranium facilities totaling over one million square feet;
- 1,457 gloveboxes, many of them highly contaminated with radioactive materials, were decontaminated, removed from their buildings and disposed of off-site;
- 690 tanks, many of which were highly contaminated, were decontaminated, removed and shipped off-Site;
- 421 IHSSs, Potential Areas of Concern, Under Building Contamination Sites, and Potential Incidents of Concern were investigated and dispositioned either by accelerated actions or by a determination that no accelerated action was required;
- Engineered covers were installed on the Present Landfill and the Original Landfill;
- Three groundwater treatments systems (addressing contamination from the Solar Ponds, East Trenches disposal area, and the Mound Site disposal area) and one seep treatment system (at the Present Landfill) were installed and continue to operate; over 11 million

gallons of groundwater and five million gallons of seep water have been successfully treated to date;

- All waste from cleanup and closure activities was managed and packaged appropriately, and shipped for off-site disposal, including
  - Over 15,000 cubic meters (m<sup>3</sup>) of transuranic and transuranic mixed waste;
  - Over 500,000 m<sup>3</sup> of low-level and low-level mixed radioactive wastes (this includes contaminated soils from areas such as the 903 Pad and Lip Area);
  - Over 820,000 m<sup>3</sup> of sanitary waste, much of it building debris; and,
  - Over 4,300 m<sup>3</sup> of non-radioactive hazardous waste.

Sitewide physical completion of accelerated actions was verified on October 13, 2005. All accelerated actions are summarized in the FY 2005 Final Historical Release Report which was approved by CDPHE and EPA on March 2, 2006.

#### **D. Central and Peripheral Operable Units**

In the CAD/ROD, the Site was configured into two OUs. The Central OU consolidates all areas that may require further remedial actions. The Peripheral OU surrounds the Central OU and requires no remedial action. The boundary of the Central OU was also drawn considering the practicalities of future land management.

Per 40 CFR 300.430(f), the selected remedy for the Peripheral OU is no action.

Per 40 CFR 300.430(f), the selected remedy for the Central OU consists of environmental monitoring and continued operation and maintenance of engineered structures such as landfill covers and groundwater treatment systems, and adds institutional controls and physical controls. DOE will continue to perform environmental monitoring for surface water and groundwater. No further routine monitoring of air, soil, sediment, or ecological resources (plants and animals) will be required. DOE will inspect and maintain engineered components of the remedy so as to ensure their continued effective operation. DOE will install signs along the perimeter of the Central OU to notify the wildlife refuge worker and wildlife refuge visitor that they are at the boundary of the Central OU. DOE will construct and maintain physical controls as necessary to protect engineered components of the remedy, monitoring locations and survey points so as to ensure that they continue to function as designed. DOE will institute the following institutional controls for the Central OU:

1. The construction and use of buildings that will be occupied on a permanent or temporary basis (such as for residences or offices) is prohibited. The construction and use of storage sheds or other non-occupied structures is permitted, consistent with the restrictions contained in institutional controls 2 and 3 below, and provided such use does not impair any aspect of the response action at Rocky Flats.

2. Excavation, drilling, and other intrusive activities below a depth of three feet are prohibited, except for remedy-related purposes and routine or emergency maintenance of existing easements, in accordance with pre-approved procedures.
3. No grading, excavation, digging, tilling, or other disturbance of any kind of surface soils is permitted, except in accordance with an erosion control plan (including Surface Water Protection Plans submitted to EPA under the Clean Water Act) approved by CDPHE or EPA. Any such soil disturbance shall restore the soil surface to preexisting grade.
4. Surface water may not be used for drinking water or agricultural purposes.
5. The construction or operation of groundwater wells is prohibited, except for remedy related purposes.
6. Digging, drilling, tilling, grading, excavation, construction of any sort (including construction of any structures, paths, trails, or roads), and vehicular traffic are prohibited on the covers of the Present Landfill and the Original Landfill, except for authorized response actions.
7. Activities that may damage or impair the proper functioning of any engineered component of the response action, including but not limited to any treatment system, monitoring well, landfill cap, or surveyed benchmark, are prohibited. These activities include, but are not limited to, any treatment system, monitoring well, landfill cap, or surveyed benchmark.

Physical controls will consist of signage installed along the perimeter of the Central OU to notify the wildlife refuge worker and wildlife refuge visitor that they are at the boundary of the refuge maintained by USFWS.

DOE is responsible for implementing, maintaining, reporting on, and enforcing the institutional controls. These institutional controls will be contained in an environmental covenant for the Central OU that will be granted by DOE to CDPHE.

#### **E. Future Use**

The Rocky Flats National Wildlife Refuge Act of 2001 (Public Law 107-107, Subtitle F, 16 USC 668dd) (Refuge Act) provides that future ownership and management of the Rocky Flats Site shall be retained by the United States. Under the Refuge Act, upon completion of cleanup and closure of Rocky Flats Site, the Secretary of Energy shall transfer administrative jurisdiction over certain Rocky Flats Site lands to the Secretary of Interior for the purposes of establishing the Rocky Flats National Wildlife Refuge. The U.S. Fish and Wildlife Service is the Department of Interior agency responsible for wildlife refuge management. Under the Refuge Act, the Secretary of Energy will retain administrative jurisdiction over those Rocky Flats Plant engineered structures used for carrying out a response action and any lands or facilities related to a response action or other actions to be carried out by the Secretary of Energy at the Rocky Flats Site. The final delineation of lands to be transferred to the Secretary of Interior is identified in the CAD/ROD (see Figure 2). The land transfer is expected to occur in 2007.

### III. Demonstration of Cleanup Activity Quality Assurance/Quality Control

Rocky Flats Plant was remediated in accordance with RFCA. RFCA integrated requirements of CERCLA, RCRA, and CHWA for Rocky Flats into a single regulatory agreement. Accelerated actions were conducted under the following CDPHE and EPA approved decision documents: Proposed Action Memoranda, Interim Measure/Interim Remedial Actions, Decommissioning Operations Plans, and RFCA Standard Operating Protocols. Many of these decision documents also served as design/implementation documents. Where separate design/implementation documents were required, these were approved by EPA and CDPHE. The decision documents and design/implementation documents adhered to approved quality assurance /quality control plans. All confirmatory samples (soil excavation), independent verification (buildings), and evaluations of materials and workmanship (landfills) were performed in accordance with the appropriate decision documents and design/implementation documents. DOE used accelerated actions to remove contaminated soils, disposition buildings, close two landfills and install three groundwater treatment systems.

EPA and CDPHE provided regulatory oversight on a daily basis to review accelerated action progress and adherence to QA/QC protocols defined in the decision documents. Deviations or field level changes to decision documents were documented and resolved.

DOE and EPA analytical methods were used pursuant to approved plans for all confirmation sampling and monitoring during accelerated action activities. EPA and CDPHE determined that analytical results were accurate to the degree needed to assure satisfactory execution of the accelerated actions.

### IV. Activities and Schedule for Site Completion

Task	Estimated Completion	Responsible Organization
Implementation of Institutional and Physical Controls	December 2006	DOE
Monitoring Plans	Ongoing	DOE
Operation and Maintenance Plans	December 2006	DOE
Five-Year Review	September 2007	DOE
Partial Deletion (OU 3 and Peripheral OU)	January 2007	EPA
Approve Final Close Out Report	Upon meeting groundwater remediation goals	EPA
Final Deletion	Upon meeting groundwater remediation goals	EPA

## **V. Summary of Remediation Cost**

The total cost of the cleanup since 1995 is about \$10 billion. This cost includes DOE's 1995 and 2000 contracts with Kaiser-Hill, which total nearly \$8 billion; the cost of DOE's Rocky Flats Field Office, which totals about \$760 million; and the cost of other DOE Sites' support of the Rocky Flats project, which totals about \$138 million; estimated future costs such as pension and benefits liabilities, estimated at approximately \$1 billion over 60 years; long-term surveillance and maintenance of the Site, projected cost adjusted for inflation is \$303 million through 2080; and the potential acquisition of some private mineral rights at Rocky Flats, for which the Congress authorized \$10 million in January 2006. DOE is responsible for long-term stewardship costs.

EPA's oversight cost for the cleanup since 1995 is approximately \$8,391,839. EPA oversight of long-term surveillance and maintenance is projected to cost approximately \$34,612,619 (adjusted for inflation) through 2080.

## **VI. Five-Year Review**

A CERCLA Five-Year Review was conducted in 2002. Pursuant to CERCLA Section 121(c), the next CERCLA Five-Year Review will be completed by the end of September 2007. The Five-Year Review will be statutory because hazardous substances were left onsite above levels for unlimited uses and unrestricted exposure. Subsequent CERCLA Five-Year Reviews will be conducted until remediation goals are met.

## **VII. References**

DOE, 2006, Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE), September 2006.

DOE, 2006, Rocky Flats Environmental Technology Site Proposed Plan, July 2006.

DOE, 2006, RCRA Facility Investigation – Remedial Investigation/Corrective Measures Study – Feasibility Study Report for the Rocky Flats Environmental Technology Site, Golden, Colorado, June 2006.

DOE, 2006, FY2005 Final Historical Release Report, June 2006.

DOE, EPA, and CDPHE, 1996, Final Rocky Flats Cleanup Agreement, July 1996.

GAO, 2006, Nuclear Cleanup of Rocky Flats, United States Government Accountability Office Report to Congressional Requesters, July 2006.

U.S. Environmental Protection Agency (EPA), 2000. *Close Out Procedures for National Priorities List Sites*, EPA-540-R-98-016, OSWER Directive 9320.2-9A-P, PB98-963223, Office of Emergency and Remedial Response, Washington, D.C., January 2000.

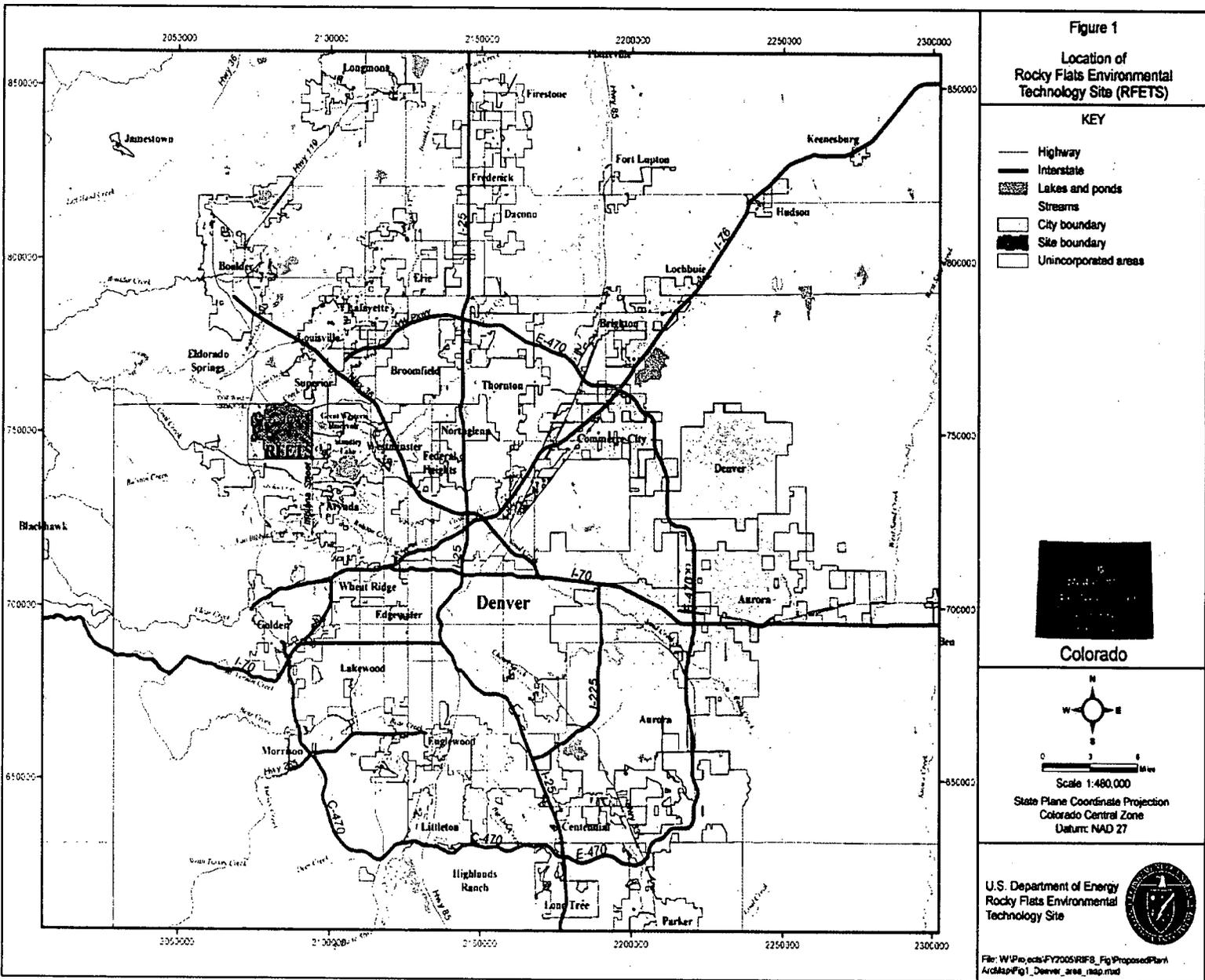


Figure 1 Rocky Flats Plant, Jefferson and Boulder Counties, Colorado

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Figure 2. Boundaries of the Peripheral and Central Operable Units

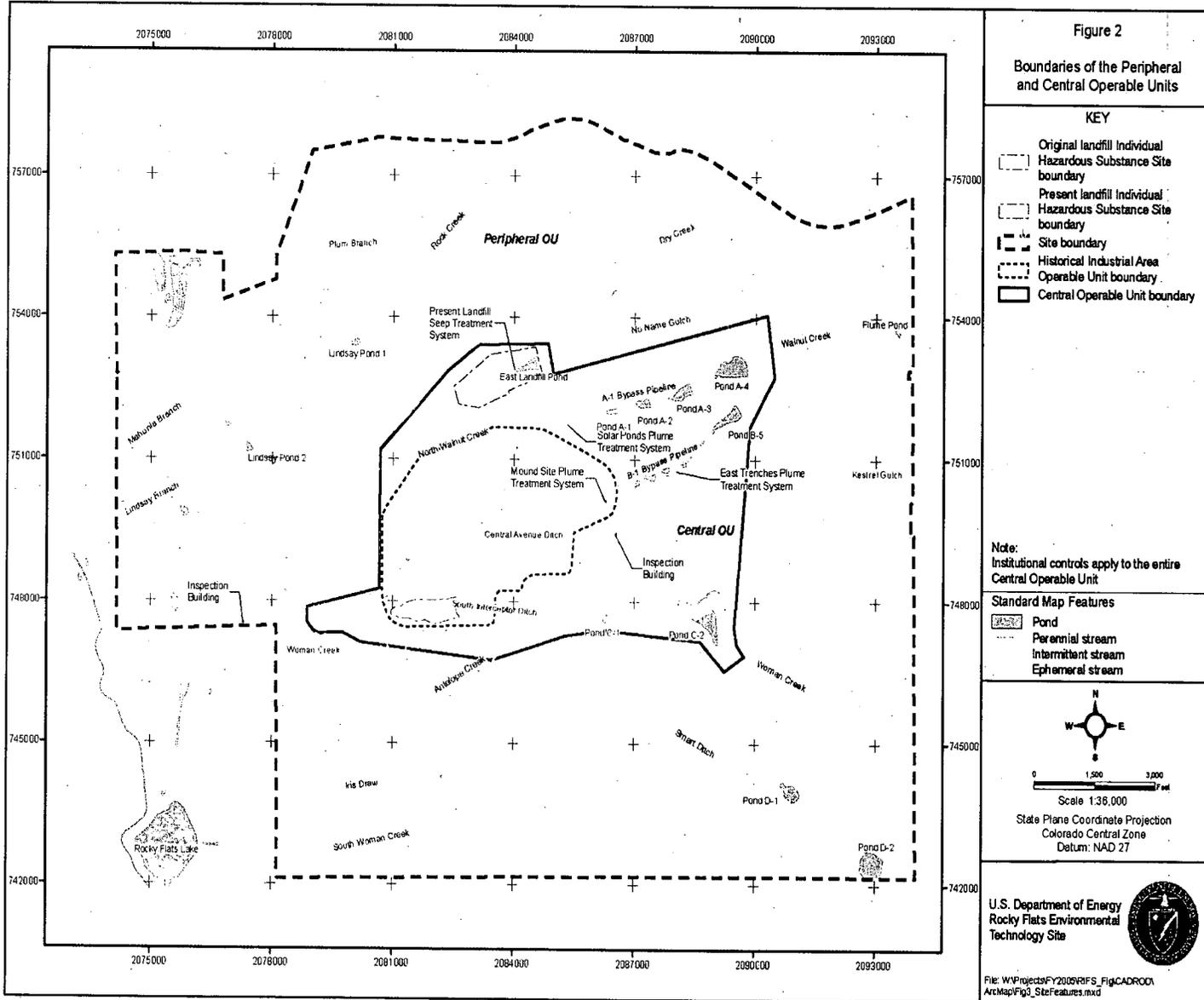
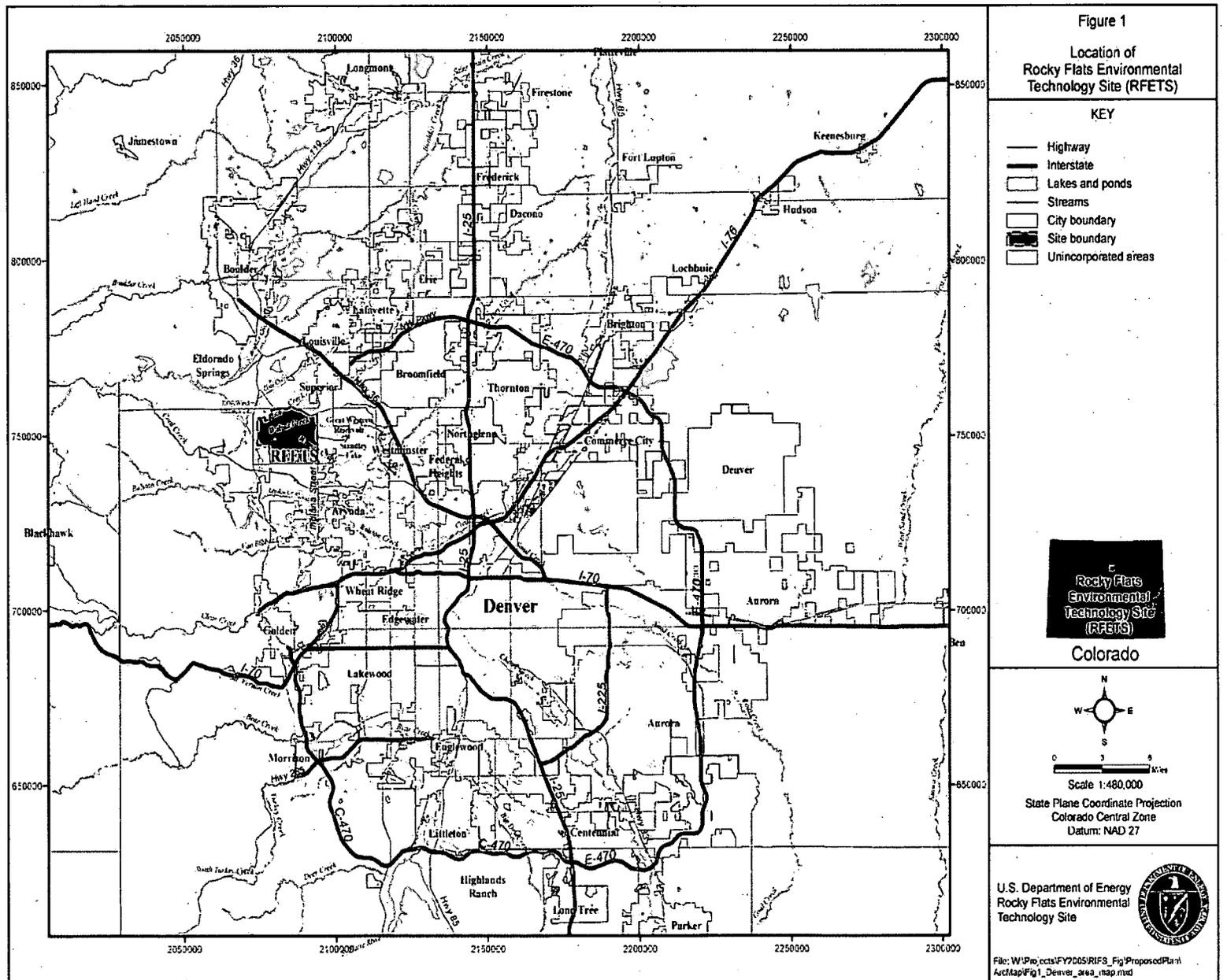


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Figure 2. Boundaries of the Peripheral and Central Operable Units

