

1998

**ROCKY FLATS
LOCAL IMPACTS INITIATIVE**

MARKET OVERVIEW

PRESENTED BY:

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REAL ESTATE ECONOMISTS, DEVELOPMENT ADVISORS & PROJECT MANAGERS
DENVER • PORTLAND

ROCKY FLATS INDUSTRIAL AREA TRANSITION TASK FORCE

Market Analysis Executive Summary

INTRODUCTION

As part of the planning effort for the reuse of the Rocky Flats Industrial Area, Leland Consulting Group (LCG), Real Estate Economists and Development Advisors, was retained to conduct a market and economic assessment of projected growth impacts in the market area surrounding Rocky Flats. This assessment was an integral part of the overall reuse plan, as it provided guidance in anticipating where development opportunities may occur in both the short- (1998 to 2006) and long-term (2006 to 2015). It also offered empirical evidence of development trends with respect to user profiles and preferred real estate product types. Armed with this type of assessment, the Rocky Flats Industrial Area Transition Task Force (the Task Force) could be ensured that the land use plan derived from this process was grounded in market and economic reality.

SUMMARY OF KEY FINDINGS

Short-Term (1998 to 2006)

- ◆ The Northwest sector in which the Rocky Flats site is situated will capture an increasing share of future Denver metropolitan area development growth, with most of the near-term (1998-2006) growth occurring along the U.S. Highway 36 corridor.
- ◆ The Rocky Flats site and surrounding area will continue to be a secondary development location within the Northwest sector.
- ◆ Current positive business location variables which affect the Rocky Flats site include those associated with the Northwest sector, i.e., a highly-skilled available labor force, relatively low-cost utilities, and high quality of life.
- ◆ Current negative business location variables which affect the Rocky Flats site include relatively poor transportation linkages and access, lack of major users and destination development, negative perception of historic land use, and the uncertainty about future availability of development sites.
- ◆ Opportunities for short-term utilization of existing buildings may exist for tenants involved in the site environmental remediation effort.
- ◆ Even as the site is incrementally cleaned up, given its secondary location and the lack of certainty about future uses and availability, it is unlikely that other users would be attracted to existing buildings for anything but temporary uses.

Long-Term (2006 to 2015)

- ◆ The negative perception of Rocky Flats will affect its ability to capture future market share, though it is not clear by how much. A "healing" process may be accelerated by public investment in transitional uses.
- ◆ Improvements to access, i.e., Northwest Parkway, are required to bolster Rocky Flats' competitive position for long-term development growth.

- ◆ Future positive business location variables which could affect the Rocky Flats site include its proximity to the U.S. Highway 36 corridor (and potential linkage via Northwest Parkway), highly-skilled available labor, relatively low-cost utilities, and high quality of life.
- ◆ Future negative business location variables which could affect the Rocky Flats site include the negative perception of historic land use, relatively poor transportation linkages and access and the potential lack of development identity, if major users and/or destination development does not occur nearby.
- ◆ Users that are most likely to locate at Rocky Flats include Light Industrial, Research & Development, and High Tech industries. These are similar to users already represented within the Northwest sector. The facility requirements for these industries are relatively unique, thereby supporting build-to-suit, not rehabilitation/re-use, opportunities.
- ◆ The retention of buildings at Rocky Flats will not likely facilitate the long-term redevelopment of the site. Unlike other redevelopment sites, the existence of buildings serving as a reminder of previous activities may in fact deter redevelopment efforts at Rocky Flats.
- ◆ Most of the successes in accelerating reuse/redevelopment opportunities at other weapons production facilities have come from building on the "core competencies" of these facilities -- intellectual capacity and cutting-edge technology. Technology transfer to private sector applications has been furthered by the availability of intellectual capacity at the facility and within the market area, but are still hindered by the negative perception associated with historical on-site activities.
- ◆ The success of long-term economic development alliances between these types of facilities and the local community will depend on prevailing market and economic conditions, broad-based support and cooperation from key public and private stakeholders, and a balanced perspective on the facility's historical activities.

METHODOLOGY

As part of the market and economic assessment for the Rocky Flats site, LCG was retained to conduct analyses of the following:

- ◆ Historical development growth in the Denver metropolitan area for office and industrial uses;
- ◆ Future growth projections in the Denver region for population, households and employment;
- ◆ The Northwest sector's historical share of office and industrial development growth;
- ◆ Competitive factors which determine the Rocky Flats site's ability to capture future office and industrial development growth;
- ◆ Attributes of the Northwest sector and the Rocky Flats site which will attract development growth in the future;
- ◆ The reuse/redevelopment experiences of other nuclear facilities throughout the U.S.; and
- ◆ Potential short-term and long-term development opportunities which could emerge within, or near the Rocky Flats facility.

The work completed and presented herein includes: a market analysis of projected office and industrial development, both within the Denver metropolitan area and the Northwest sector; a business location profile which compares Rocky Flats' competitive position to other office/industrial concentrations in the Denver metropolitan area; and a summary of case study research related to environmental/eco-industrial parks.

MARKET ANALYSIS BY LAND USE TYPE

Overall Market Opportunities and Constraints

The first step in the market analysis of various land use types was to set the market context for both historical and future development growth in the Denver metropolitan area, the Northwest sector and, ultimately, the Rocky Flats site. Opportunities and constraints within this market context were then identified and used to form the foundation of LCG's development projections. These factors include:

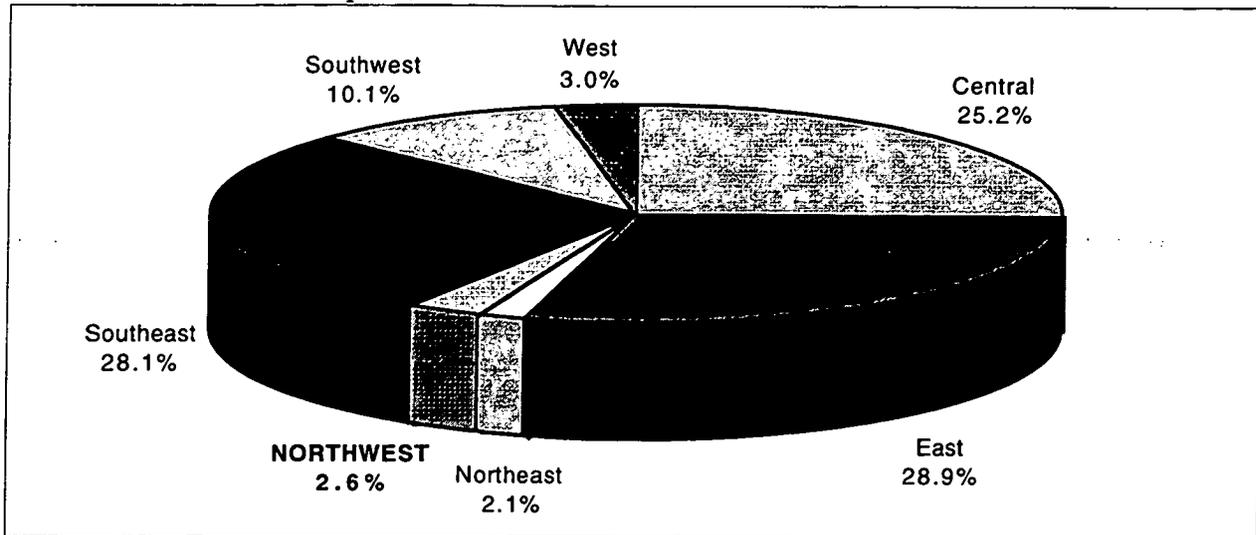
- ◆ The Rocky Flats site is scheduled to be fully decontaminated as early as the year 2006. Over the next nine years, then, the site will be in various stages of "clean-up". Full reuse and/or redevelopment of the site cannot therefore take place until after 2006, at the earliest. Any interim reuse could not occur until the plutonium is removed from the site.
- ◆ Recent and current office and industrial development patterns in the northwest sector of the Denver metropolitan area that are clustered along U.S. Highway 36 in developments such as Interlocken, Church Ranch and Centennial Valley, will continue into the foreseeable future and will accelerate as a critical mass of companies and industries is established.
- ◆ Due to its relatively remote location and difficult access within the Northwest sector, the Rocky Flats site is currently considered a secondary location for development growth.
- ◆ The Denver metropolitan area will be in a unique, yet challenging, development position for the near and long-term, with the introduction of four major mixed-use, infill developments (Stapleton, Lowry, Fitzsimons, and Central Platte Valley), all competing to attract private investment in the form of office and industrial development.
- ◆ The Rocky Flats site, and the area surrounding it, will face potential competition for development growth from these and other large-scale projects throughout the Denver metropolitan area. These include the U.S. Highway 36 Corridor, the Denver International Airport Gateway area, the Lowry Redevelopment project, the Stapleton Redevelopment project, and the I-70 East, I-70 West, I-25 South and E-470 Corridors.

Office Development

Historical Development

- ◆ Historical office development absorption in the Denver metropolitan area has averaged 1.3 million square feet annually over the past eight years.
- ◆ As shown in Figure 1, over the past eight years, the Northwest sector's share of historical office absorption was approximately 2.6%. The Northwest sector's overall share of existing office development is approximately 3%.

Figure 1
Historical Office Development Capture
Percent Share of Net Absorption, 1990-1997



Source: Fuller and Company and Leland Consulting Group

- ◆ The Northwest sector's office inventory has historically consisted of local service professional space. In comparison to regional office concentrations such as Downtown and the Denver Tech Center, the Northwest office market has historically been considered a Class "B" or "C" submarket. In recent years, however, office concentrations have emerged in business parks along the U.S. Highway 36 Corridor, e.g., Interlocken, Centennial Valley and Church Ranch. These concentrations include Class "A" office and/or "flex" space, which serves both office and industrial tenants. Development at Interlocken, in particular, has significantly upgraded the office inventory in the Northwest sector.

Future Development

Demand for new office space is derived from three principal sources: expansion of existing industry, relocation of new companies into the market, and creation of new firms. The first two factors are addressed through an analysis of employment projections by industry classification. The third factor, creation of new firms, is addressed by including a factor for self-employed individuals, a sector historically not recorded in state-based employment calculations. Table 1 summarizes future demand for office space within the Denver region over the next twenty three years, encompassing the Rocky Flats analysis period. This reflects demand for office space generated by employment growth. A final adjustment is made for turnover rate to account for the movement of existing tenants into new buildings, to arrive at total annual demand for office square footage.

Table 1
Regional Office Demand
1997-2020

1997 Denver Metropolitan Area Employment**:	1,089,600
2000 Denver Metropolitan Area Employment**:	1,144,800
2020 Denver Metropolitan Area Employment**:	1,492,200
Total Employment Growth:	
1997-2000	55,200
2000-2020	347,400
Annual Average Increase:	
1997-2000	18,400
2000-2020	17,400
Annual Demand for Office Employees:	
1997-2000	11,100
2000-2020	10,400
Office Square Feet Per Employee:	200
Total Annual Office Demand (Square Feet):	
1997-2000	2,220,000
2000-2020	2,080,000
Annual Demand for Office SF (Including Turnover):	
1997-2000	4,720,000
2000-2020	4,580,000
* Includes Adams, Arapahoe, Denver, Douglas and Jefferson Counties.	
** Includes self-employed workers.	

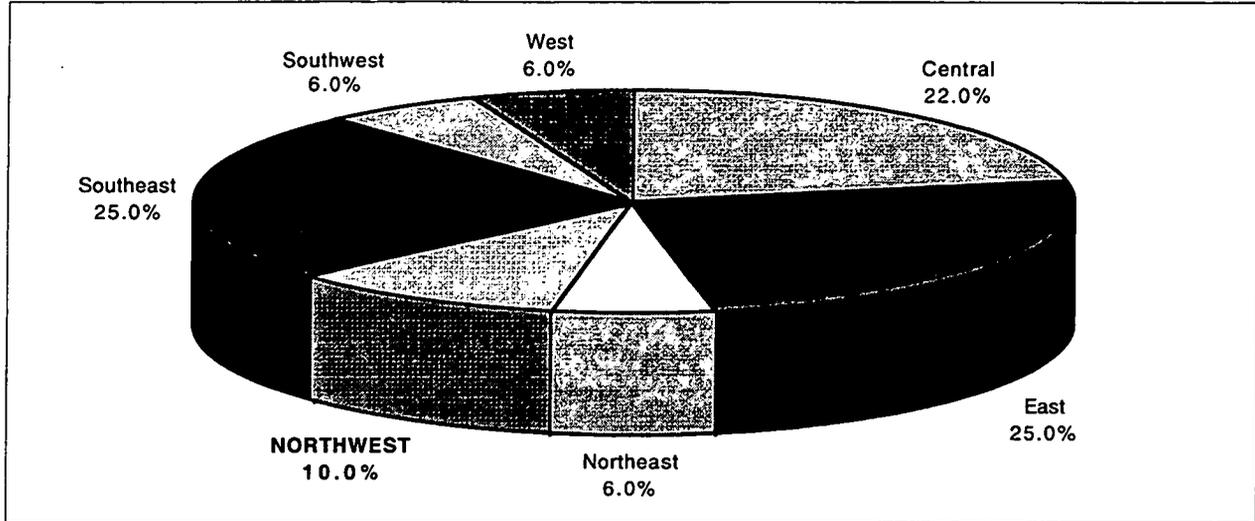
Source: Colorado Department of Labor and Employment; Denver Regional Council of Governments; and Leland Consulting Group

Northwest Sector Share

- ◆ The Northwest sector's future share of Denver metropolitan area office growth will be enhanced by the following factors:
 - the continuation of current regional office development patterns (increasing concentration along U.S. Highway 36 Corridor)
 - the opportunity for development of high-end, signature office space in key locations between Denver and Boulder
 - the continued growth of the Northwest sector's traditional local-serving office base

- ◆ As shown in Figure 2, the Northwest sector is expected to capture approximately 10% of office growth in the metropolitan area over the next 20 to 25 years. However, the Rocky Flats site, without significant improvements in access, will likely continue to be a secondary office location and therefore capture a limited share of the sector's office growth over this period.

Figure 2
Projected Office Development Capture
Percent Share of New Development, 1997-2020



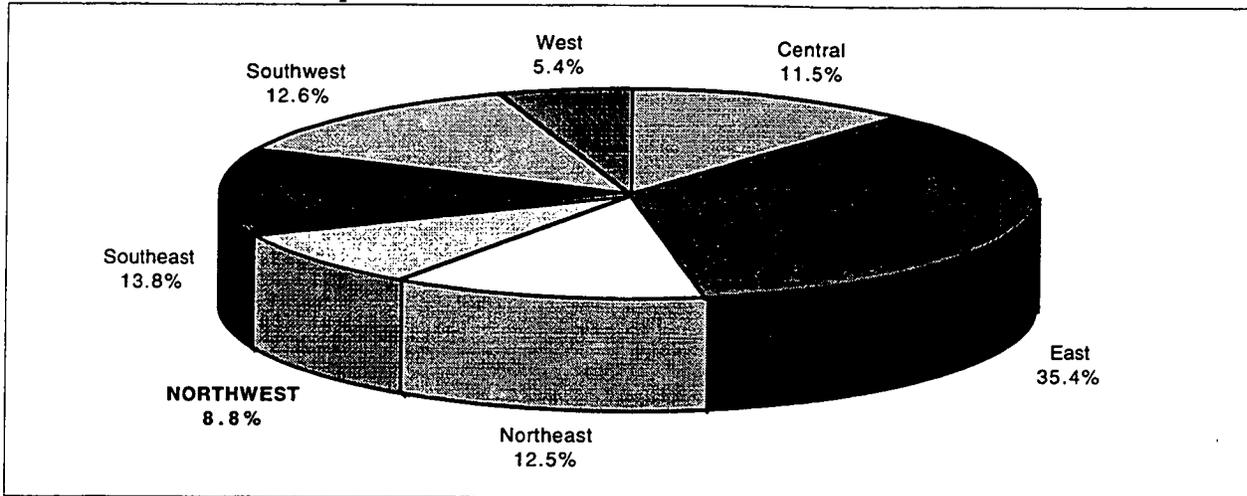
Source: Leland Consulting Group

Industrial Development

Historical Development

- ◆ Historical industrial development absorption in the Denver metropolitan area has averaged 2.4 million square feet annually over the past eight years.
- ◆ As shown in Figure 3, over the past eight years, the Northwest sector's share of historical industrial absorption was approximately 8.8%. The Northwest sector's overall share of existing industrial development is approximately 6%.

Figure 3
Historical Industrial Development Capture
Percent Share of Net Absorption, 1990-1997



Source: Fuller and Company and Leland Consulting Group

- ◆ The Northwest sector's industrial inventory has historically consisted of concentrations of manufacturing and office/warehouse space along the U.S. Highway 36 Corridor. Some areas of warehouse/distribution and light industrial development also exist along the I-70 West Corridor. The Northwest industrial market has historically attracted average lease rates for warehouse/distribution space and above average lease rates for manufacturing and office/warehouse space. In recent years, the U.S. Highway 36 Corridor has attracted a significant number of R&D users, taking advantage of the Corridor's easy access to Boulder's high tech industry base.

Future Development

Similar to office space, demand for new industrial space is also derived from the expansion of existing industry, relocation of new companies into the market, and creation of new firms. The first two factors are addressed through an analysis of employment projections by industry classification. The third factor, creation of new firms, is addressed by including a factor for self-employed individuals, a sector historically not recorded in state-based employment calculations. Table 2 summarizes future demand for industrial space within the Denver region over the Rocky Flats analysis period. This reflects demand for industrial space generated by employment growth. A final adjustment is made for turnover rate to account for the movement of existing tenants into new buildings, to arrive at total annual demand for industrial square footage.

Table 2
Regional Industrial Demand
1997-2020

1997 Denver Metropolitan Area Employment**:	1,089,600
2000 Denver Metropolitan Area Employment**:	1,144,800
2020 Denver Metropolitan Area Employment**:	1,492,200
Total Employment Growth:	
1997-2000	55,200
2000-2020	347,400
Annual Average Increase:	
1997-2000	18,400
2000-2020	17,400
Annual Demand for Industrial Employees:	
1997-2000	3,680
2000-2020	3,480
Industrial Square Feet Per Employee:	
	550
Total Annual Industrial Demand (Square Feet):	
1997-2000	2,024,000
2000-2020	1,914,000
Annual Demand for Industrial SF (Including Turnover):	
1997-2000	5,394,000
2000-2020	5,284,000
* Includes Adams, Arapahoe, Denver, Douglas and Jefferson Counties.	
** Includes self-employed workers.	

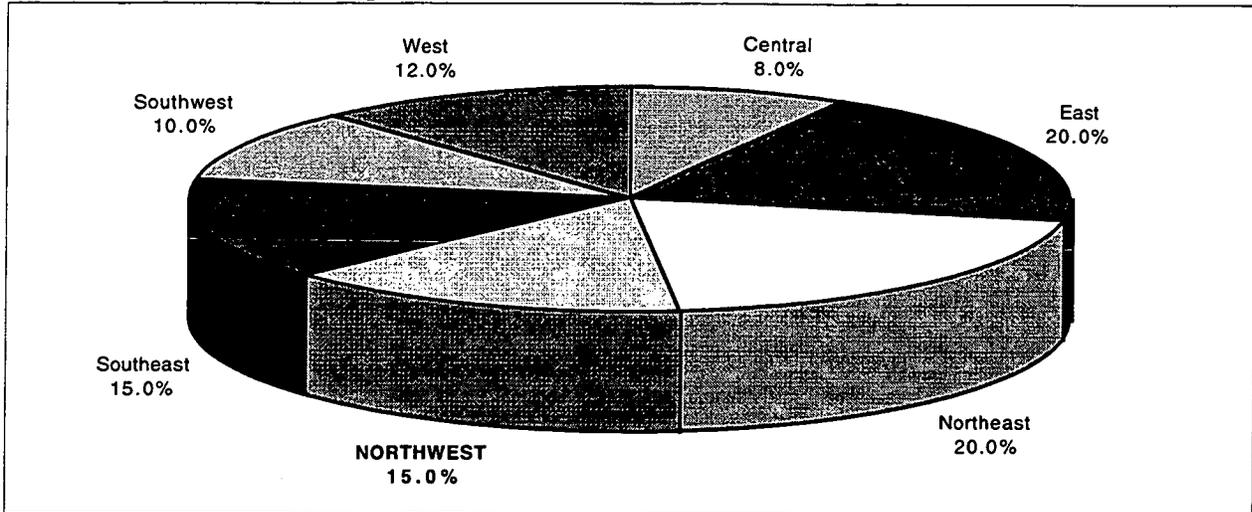
Source: Colorado Department of Labor and Employment; Denver Regional Council of Governments; and Leland Consulting Group

Northwest Sector Share

- ◆ The Northwest sector's future share of Denver metropolitan area industrial growth will be enhanced by the following factors:
 - the continuation of current regional industrial development patterns (increasing concentrations along the I-70 West and U.S. Highway 36 Corridors)
 - the accelerated development of higher-end R&D space targeted to Boulder County's high tech industry base
 - the continued growth of the Northwest sector's traditional industrial base

- ◆ As shown in Figure 4, the Northwest sector is expected to capture approximately 15% of industrial growth in the metropolitan area over the next 20 to 25 years. The Rocky Flats site, with improvements in access, has the potential to capture a significant share of the sector's industrial growth over this period.

Figure 4
Projected Industrial Development Capture
Percent Share of New Development, 1997-2020



Source: Leland Consulting Group

- ◆ Industry trends suggest a high level of demand in the future for "flex" space -- a hybrid office/industrial product type which can accommodate a broader range of tenant types and activities than either traditional office or industrial space. Industries attracted to this type of space include high tech, R&D, and light manufacturing -- industries that have already established concentrations along the U.S. Highway 36 Corridor. The Northwest sector provides several opportunities to develop this type of "flex" space -- most notably in existing business parks such as Interlocken, Church Ranch and Centennial Valley.
- ◆ Given the general price sensitivity of industrial users, the Rocky Flats site and the area surrounding it, could emerge as a lower-cost location for tenants seeking proximity to the U.S. Highway 36 Corridor.

BUSINESS LOCATION PROFILE

To gauge Rocky Flats' competitive position for future development growth within the Denver metropolitan area, comparisons between the Northwest sector and other concentrations of office/industrial space (existing and proposed) were made relative to the following key locational criteria:

- ◆ Labor force characteristics;
- ◆ Access to business support services;
- ◆ Transportation availability;
- ◆ Utility costs/availability;
- ◆ Land/building costs/availability;
- ◆ Local business climate;
- ◆ Financial resources; and
- ◆ Quality of life.

Based on the comparison to other office/industrial areas in the Denver metropolitan area, Rocky Flats was evaluated for its strengths and weaknesses as an overall business location. Summary comments regarding these strengths and weaknesses are presented below.

- ◆ Current positive business location variables which affect the Rocky Flats site include those associated with the Northwest sector, i.e., a highly-skilled available labor force, relatively low-cost utilities, and a high quality of life.
- ◆ Current negative business location variables which affect the Rocky Flats site include relatively poor transportation linkages and access, lack of major users and destination-oriented development, negative perception of historic land use, and the uncertainty about future availability of development sites.
- ◆ Future positive business location variables which could affect the Rocky Flats site include its proximity to the U.S. Highway 36 corridor, highly-skilled available labor, relatively low-cost utilities, and high quality of life.
- ◆ Future negative business location variables which could affect the Rocky Flats site include the negative perception of historic land use, relatively poor transportation linkages and access and the potential lack of development identity, if major users and/or destination development does not occur nearby.

In addition to an analysis of Rocky Flats' (and the Northwest sector's) competitive position relative to general business location variables, an evaluation of competitive position by facility type was also conducted. The results of this analysis are summarized in Chart 1.

Chart 1
Competitive Position By Facility Type

Office/Industrial Concentration	Admin. Office	Domestic Hdqtrs.	High Tech	Intl. Hdqtrs.	Light Indust.	R&D
U.S. Hwy. 36 Corridor/ Rocky Flats	6	6	4	6	6	3
Lowry/Stapleton/Fitzsimons	2	2	2	1	1	2
E-470 Corridor	1	1	1	2	2	1
Boulder (CU)	7	7	7	7	7	7
I-25 South Corridor	3	5	5	5	5	5
I-70 West Corridor	5	4	3	3	3	4
I-70 East Corridor	4	3	6	4	4	6

Source: Leland Consulting Group

- ◆ As shown in Chart 1, the U.S. Highway 36 Corridor/Rocky Flats area appears to be in the best competitive position for high tech and R&D facilities. These are similar to users already represented within the Northwest sector. The facility requirements for these industries are relatively unique, thereby supporting build-to-suit, not rehabilitation/re-use, opportunities.

CASE STUDY RESEARCH

At the request of the Task Force and to provide additional context for the Rocky Flats re-use/redevelopment strategy, LCG conducted a case study of environmental/eco-industrial parks. The results of this case study research are summarized below.

Environmental/Eco-Industrial Parks

Environmental/Eco-Industrial parks can be defined as a consortium of businesses that cooperate with each other and with the local community to efficiently share resources (information, materials, water, energy, infrastructure and natural habitat), leading to economic gains, gains in environmental quality, and equitable enhancement of human resources for the business and local community. Following are examples of projects which exemplify these concepts.

Site:	Fairfield Ecological Industrial Park
Location:	Baltimore, Maryland
Key Features:	<ul style="list-style-type: none">◆ 1,300+ acres zoned for heavy industrial development -- 60 businesses operating◆ Intermodal transportation opportunities and mass transit commuting options◆ Linkages between tenants and training providers◆ Business information networks within park for material reuse and collaborative efforts
Target Uses/Users:	<ul style="list-style-type: none">◆ Clean manufacturing or commercial uses which practice environmental responsibility -- 1 to 3 large companies (350-500 employees each)◆ Environmental technology providers -- 8 to 10 (50-100 employees each)◆ "Multipliers" or service/environmental companies -- 10+ (10-50 employees each)◆ Expansion of existing employers
Resources Available:	<ul style="list-style-type: none">◆ Direct funding through City from HUD Empowerment Zone Grant◆ Baltimore Development Corporation◆ Potential for EDA, EPA, DOE and State funding

Success Factors/Challenges

- ◆ Ability to offer meaningful incentives to entice firms to operate in "green" manner
- ◆ Create eco-manufacturing research facility including education/training for workers converting to environmental technologies

Site:	Brownsville Eco-Industrial Park
Location:	Brownsville, Texas
Key Features:	<ul style="list-style-type: none">◆ Based on regional approach to materials exchange -- IS ("industrial symbiosis")◆ Eco-industrial park is only a component of IS concept -- not driving force◆ Emphasizes small businesses and agriculture
Target Uses/Users:	<ul style="list-style-type: none">◆ Potential materials exchanges with industry in Brownsville and Matamoros, Mexico◆ Small businesses and agricultural companies
Resources Available:	<ul style="list-style-type: none">◆ Brownsville Economic Development Council◆ US Department of Commerce◆ City of Brownsville, Port of Brownsville

Success Factors/Challenges

- ◆ Create an industrial "road map" identifying opportunities to increase operating efficiencies of new and existing industries in region
- ◆ Regional coordination for economic development with Brownsville Economic Development Council

Site:	Riverside Eco-Park
Location:	Burlington, Vermont
Key Features:	<ul style="list-style-type: none">◆ Agricultural/Industrial park in urban setting◆ Emphasizes bio-energy (green electricity from bio-mass fuels) and living system (living machines, which capture thermal energy for commercial greenhouse production of fish, organic vegetables, and water purification)
Target Uses/Users:	<ul style="list-style-type: none">◆ Existing companies specializing in bio-energy and living systems◆ Concentrating on expanding existing businesses – recruitment will come later
Resources Available:	<ul style="list-style-type: none">◆ CDBG funds◆ Burlington Electric Company◆ City Dept. of Public Works◆ Potential funding from EPA and DOE◆ In-Kind contributions from local service providers

Success Factors/Challenges

- ◆ Take two systems (bio-energy and living systems) from R&D, through commercialization, to spin-off industry creation on-site
- ◆ Increased self-sufficiency of local community for food
- ◆ Increased recreational and educational opportunities

Site:	Burnside Eco-Industrial Park
Location:	Halifax, Nova Scotia
Key Features:	<ul style="list-style-type: none">◆ Six-year multi-disciplinary, multi-institutional research and education project involving an existing industrial park◆ Cooperative partnership between academic, government, developer, and tenant interests
Target Uses/Users:	<ul style="list-style-type: none">◆ Energy and resource conservation audit firms◆ Survey and database firms (industrial, social and brain power inventories)◆ Recyclers and waste managers ("scavengers and decomposers")
Resources Available:	<ul style="list-style-type: none">◆ Federal/Provincial Sustainable Development Fund◆ Private foundations◆ Halifax Regional Municipality◆ Academic Institutions

Success Factors/Challenges

- ◆ Ensure flexibility in implementation of environmental regulations
- ◆ Increased participation by capital owners
- ◆ Creation of a technical extension service

**Environmental Conditions
Rocky Flats
Environmental Technology Site
Golden, Colorado**

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EXECUTIVE SUMMARY

This Technical Memo summarizes the existing environmental conditions and the environmental conditions that may exist after cleanup of the Rocky Flats Environmental Technology Site, Denver, Colorado. This memo also includes an evaluation of the constraints that may be imposed by post-closure environmental conditions on the future development of the Industrial Area at the site.

Existing Environmental Conditions. Rocky Flats' 6,450, mostly undeveloped acres contribute greatly to the extensive regional open space system in the northwest quadrant of the metro Denver area. Jefferson County, Boulder County, and City of Boulder Open Space Departments, other municipal parks and open space departments, and Denver Water manage lands in the regional open space system.

The region has a semi-arid climate characteristic of much of the southern Rocky Mountain region. The predominant wind direction is from the northwest and the site is noted for its high wind gusts. The site is permitted by the Colorado Department of Public Health and Environment to release a variety of radiological and hazardous air pollutants. Released pollutants include "criteria" pollutants for which National Ambient Air Quality Standards have been established, and other potentially-toxic pollutants, called hazardous air pollutants. The six criteria pollutants emitted at the site are carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, particulate matter less than 10 microns in diameter, and lead. Hazardous air pollutants emitted at the site include gases, such as chlorine, metals, such as beryllium, and chlorinated hydrocarbons, such as trichloroethane. Concentrations of all air pollutants on- and off-site have been below applicable standards.

Rocky Flats is located on a flat bench at an elevation of about 6,000 feet. The largest geologic unit on the site is the Rocky Flats Alluvium, which is the main source of sand and gravel mined on the site. TXI/Western Aggregates operates an aggregate quarry in the northwest corner of the site. It has received permits to expand along the site's western edge.

Plutonium and americium in soils exist at several locations at the site. The most significant source in soils is on the eastern side of the Industrial Area, called the 903 Pad. In the vicinity of the 903 Pad, plutonium and americium concentrations in soils exceed 1,000 pCi/g. Generally, concentrations of radionuclides in the vicinity of buildings are low; additional soil characterization will be conducted after building decommissioning and demolition.

Three different water-bearing zones are found at the site—the upper alluvial zone, the lower aquitard, the Laramie-Fox Hills Aquifer. In some locations, the upper water-bearing zone is not sufficiently saturated to sustain a well and dries up during the year. Underlying the upper water-bearing zone is an aquitard (a water-bearing zone with restrictive water movement). Water in the aquitard moves very slowly due to the clayey textures of the bedrock. The regional Laramie-Fox Hills Aquifer is present 600 or more feet below the aquitard. In some locations, particularly beneath the Industrial Area, the shallow water-bearing zone beneath the site is contaminated with radionuclides such as plutonium and americium, volatile organic compounds such as trichloroethene, and metals. The aquitard is less contaminated than the shallow aquifer. Studies have

indicated that the Laramie-Fox Hills Aquifer is unlikely to contain contaminants released from the site.

Three intermittent streams drain the site. Woman Creek flows east into a series of detention ponds C-1 and C-2. When it reaches certain levels, Pond C-2 is discharged periodically into Woman Creek Reservoir. The detention ponds are used to settle out suspended sediments and other contaminants. Standley Lake, a water supply reservoir about ½ mile east of the site, no longer receives Woman Creek flows. Walnut Creek flows east into Great Western Reservoir, also east of the site. Great Western Reservoir is no longer used for drinking water storage. Rock Creek flows northeast into Boulder Creek.

The primary vegetation types on site are xeric tallgrass prairie, mesic mixed grasslands, tall upland shrub, wetlands, and riparian woodlands. Much of the habitat along drainageways is supported by perennial seeps distributed throughout the site. The Colorado Natural Heritage Program believes the site's xeric tallgrass prairie is the largest example of xeric tallgrass prairie remaining in Colorado, or perhaps North America. The Colorado Natural Heritage Program identified four areas at or near Rocky Flats as significant conservation sites.

The U.S. Fish and Wildlife Service has listed the Preble's Meadow Jumping Mouse as a threatened species. It is found in streamside riparian habitat along Rock and Walnut Creeks.

The Colorado State Historic Preservation Officer has determined that 64 buildings within the Industrial Area are significant historically because of their role in the Cold War Era. These buildings comprise the Rocky Flats Historic District under the National Register of Historic Places. This designation requires photo and other documentation, but does not mandate building preservation.

Findings and Conclusions. The Post Buckley team has the following findings and conclusions about the post-closure environmental constraints and opportunities.

1. Preserving the Buffer Zone as open space will make a significant contribution to the existing regional open space. When used as open space, the Buffer Zone will play an important role in protecting ecological resources and serving as a community separator.
2. Intensive development in the Industrial Area will keep the site fragmented and maintain lower effectiveness as wildlife habitat.
3. The Federal government does not own the majority of the subsurface minerals, including none beneath the Industrial Area. Development of the Industrial Area is potentially restricted because it is underlain by mineable aggregate owned by private parties. Permitted mining in the Buffer Zone to the west of the Industrial Area will restrict use and development of this area over the next 20 to 30 years.
4. DOE currently plans to ship plutonium off-site to DOE's Savannah River facility for final disposition beginning in 2002. If the shipment plan is not approved, plutonium will be stored in Building 371 or a new Interim Storage Vault at the site until the material is shipped off-site to a yet-to-be identified repository by 2015. DOE will make a decision in 1998 on whether to build an on-site

plutonium vault. Use of the Industrial Area will be significantly restricted as long as plutonium is stored on-site. Radioactive, hazardous and sanitary waste is proposed for disposal off-site.

5. Cleanup of the Protected Area may result in some or all of the area being capped. The capped area will require institutional controls to ensure integrity of the caps for an extremely long time (>1,000 years). Final cleanup levels and future site use controls will be incorporated in a Record of Decision at the end of cleanup. Zones X2 and X3 will most likely have caps. Zones 3A, 3B and 3C are less certain to have caps; final cleanup plans will depend on the nature and extent of contamination found under the buildings after demolition.
6. The Preamble to the Rocky Flats Cleanup Agreement indicates that when cleanup activities are completed, all on-site surface water and all surface and ground water leaving the site will be of acceptable quality for all uses, including domestic water supply. Ground water quality off-site will support all uses. The upper water-bearing zone at the site is poorly suited as a water supply source. Future site restrictions will include a prohibition on use of the site's ground water for drinking water.
7. Constraints to commercial use of the site during cleanup include security, health and safety concerns resulting from the proximity to plutonium.
8. The Preble's Meadow Jumping Mouse is unlikely to affect future development of the Industrial Area. The proximity of the Industrial Area to suitable mouse habitat provides an opportunity for environmental education.
9. The Montane sedge (a wetlands grass), Argos skipper, and hops blue (both butterflies) are the state rare species found on the site with the greatest potential for federal listing as endangered.
10. The xeric tallgrass prairie found at Rocky Flats is very rare in Colorado and is one of the largest remaining in the state and perhaps in North America. It occurs in Zone 1A and the Buffer Zone.
11. Wetlands are unlikely to affect future development of the Industrial Area outside of the riparian areas in the Protected Area.
12. If all the buildings that are primary and secondary contributors to the Rocky Flats Historic District are removed, the District will no longer exist. If some buildings are retained, the Colorado State Historic Preservation Officer will reevaluate whether sufficient resources exist to maintain a Historic District. No restrictions on demolition of or interior or exterior modifications to buildings that are primary or secondary contributors to the Historic District will remain after suitable documentation has been developed for the National Archives.

ENVIRONMENTAL CONDITIONS ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

PURPOSE AND METHODS

This Technical Memo summarizes the existing environmental conditions and the environmental conditions that may exist after cleanup of the Rocky Flats Environmental Technology Site, Denver, Colorado. This memo also includes an evaluation of the constraints that may be imposed by post-closure environmental conditions on the future development of the Industrial Area at the site. ERO Resources Corp. completed this assessment in support of the analysis and planning effort undertaken by a team lead by Post Buckley Schuh & Jernigan, Inc. for the Industrial Area Transition Task Force of the Rocky Flats Local Impacts Initiative.

The assessment was comprised of three components—

- A site visit
- Interviews with open space planners in the region and other individuals knowledgeable about the site
- Review of documents provided by RFLII and DOE

Much of the description of the existing environmental conditions came from the *Cumulative Impacts Document*, recently completed by the U.S. Department of Energy, Rocky Flats Field Office.¹ The document provides an updated baseline of the cumulative impacts to the site's workers, public and environment from site operations and conditions. It serves as an updated baseline of activities and associated environmental impacts described in the 1980 *Final Environmental Impact Statement for the Rocky Flats Plant Site*, issued by DOE. Other documents used in this analysis are footnoted. Unless otherwise footnoted, the Cumulative Impacts Document is the source of conditions described in this report.

¹ U.S. Department of Energy. Cumulative Impacts Document. September 1997.

EXISTING ENVIRONMENTAL CONDITIONS

REGIONAL OPEN SPACE

Rocky Flats' 6,450, mostly undeveloped acres contribute greatly to the extensive regional open space system in the northwest quadrant of the metro Denver area. Jefferson County, Boulder County, and City of Boulder Open Space Departments, other municipal parks and open space departments, and Denver Water (Figure 1) manage lands in the regional open space system. Not all open lands shown on the map are permanently dedicated for open space. These open lands protect important plant, wildlife, and cultural resources, provide recreation opportunity, and contribute to flood control and water quality protection. Taken together, these lands create a sizeable community separator between Boulder and the Denver metropolitan area, thus helping define urban development. A significant, recent addition to the regional open space system was Jefferson County's purchase of the 708-acre Ranson/Homestead Ranch, west of Rocky Flats.

Open space is of great importance to Coloradans, as witnessed by the considerable acreage already protected and ongoing efforts to conserve even more lands. Also, in 1992, voters redirected lottery funds to create the Great Outdoors Colorado Fund in support of open space.

Concern over development in the foothills along the Front Range resulted in an ongoing project to identify open space conservation priorities in the mountain backdrop. The Front Range Mountain Backdrop project, which is being coordinated by the five Front Range counties (Larimer, Boulder, Jefferson, Douglas, and El Paso), identified the open areas along Highway 93, west of Rocky Flats, as very significant foreground areas of the backdrop. In addition, the second phase of that project has targeted the area extending from west of Highway 93 at Rocky Flats up into the foothills as a priority conservation area.

CLIMATE AND AIR QUALITY

Site Climate

The region has a semi-arid climate characteristic of much of the southern Rocky Mountain region. Site temperatures generally are moderate, with occasional large diurnal

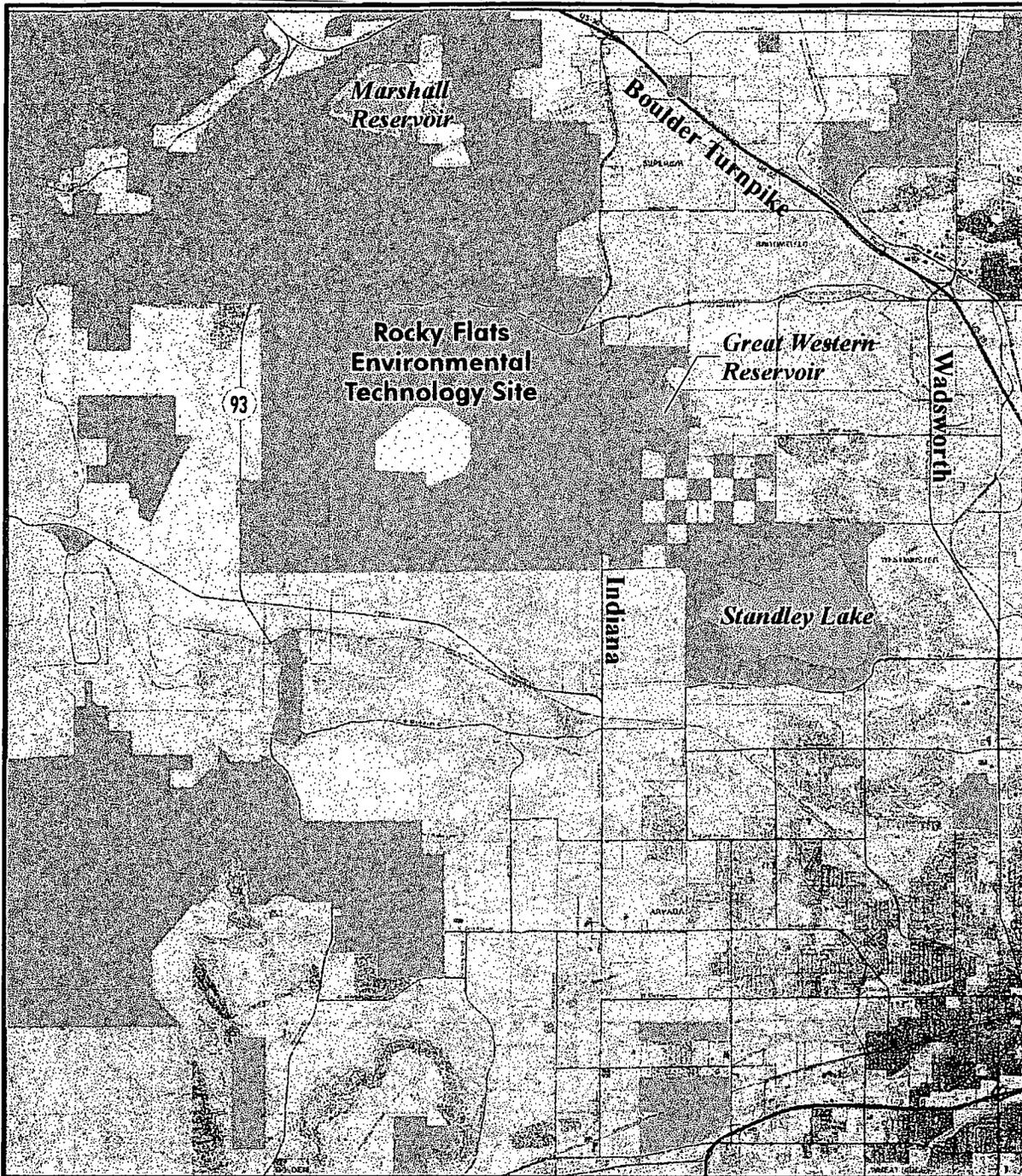
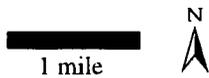


FIGURE 1
Regional Open Space System

-  Open Lands
-  Buffer Zone
-  Core Industrial Area



**INDUSTRIAL AREA
 FUTURE USE PLAN**

Industrial Area Transition Task Force
 Rocky Flats Local Impacts Initiative
 Arvada, Colorado

PBS&J, Inc. Project Team
 Denver, Colorado

and annual ranges. The mean annual temperature is about 52° F with temperature ranging from -25° F in the winter to 105° F in the summer. Mean annual precipitation is about 15 inches, with spring as the wettest season. Average annual snowfall is 75 inches.

The predominant wind direction is northwesterly and the site is noted for its high wind gusts. Highest windspeeds occur during the winter as westerly storms called chinooks. Windstorms at the site typically last 8 to 16 hours. Gusts exceeding 100 miles per hour occur every 3 to 4 years.

Air Quality

The site is permitted by the Colorado Department of Public Health and Environment to release a variety of radiological and hazardous air pollutants. Released pollutants include "criteria" pollutants for which National Ambient Air Quality Standards have been established, and other potentially-toxic pollutants, called hazardous air pollutants. The six criteria pollutants emitted at the site are carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone, particulate matter less than 10 microns in diameter, and lead. Hazardous air pollutants emitted at the site include gases, such as chlorine, metals, such as beryllium, and chlorinated hydrocarbons, such as trichloroethane. Concentrations of all air pollutants on- and off-site have been below applicable standards.

GEOLOGY, MINERALS AND SOILS

Geology and Minerals

Rocky Flats is located on a flat bench at an elevation of about 6,000 feet. The site slopes gently to the east. Three streams that originate along the Front Range dissect the site. Moderately steep slopes are common adjacent to the streams. Surface water is discussed in greater detail in the *Ground and Surface Water Hydrology* section.

Geologic units consist of unconsolidated surficial deposits, such as alluvial and colluvial deposits, and bedrock. The most widespread unconsolidated deposit on the site is the Rocky Flats Alluvium, which covers the undissected areas of the site, including the Industrial Area. It is the main source of sand and gravel mined on the site. TXI/Western Aggregates operates an aggregate quarry in the northwest corner of the site. It has received permits to expand west and south of the site. Constraints imposed by this

expansion are discussed in the *Mineral Development* section. Besides sand and gravel, no other significant mineral resources have been identified on the site. Other alluvial deposits are found along stream floodplains and terraces.

Colluvial deposits cover steep hillsides adjacent to the area's streams. The deposits were derived from alluvial material and bedrock and range in thickness from 3 to 15 feet. Artificial fill is found beneath man-made structures, such as road dams and buildings.

Beneath the surficial deposits are three sedimentary formations—the Arapahoe Formation, the Laramie Formation, and the Fox Hills Sandstone. The Arapahoe Formation is composed of interbedded sandstones, siltstones, and claystones and ranges from 0 to 50 feet in thickness. The Laramie Formation underlies the Arapahoe Formation and has similar lithology. It is 600 to 800 feet thick. The Fox Hills Sandstone is 90 to 140 feet thick.

Seven faults have been identified in the shallow bedrock within the site. Investigations of several faults underlying the Protected Area determined that no geologically recent (i.e., less than 500,000 years ago) movement has occurred along these faults.

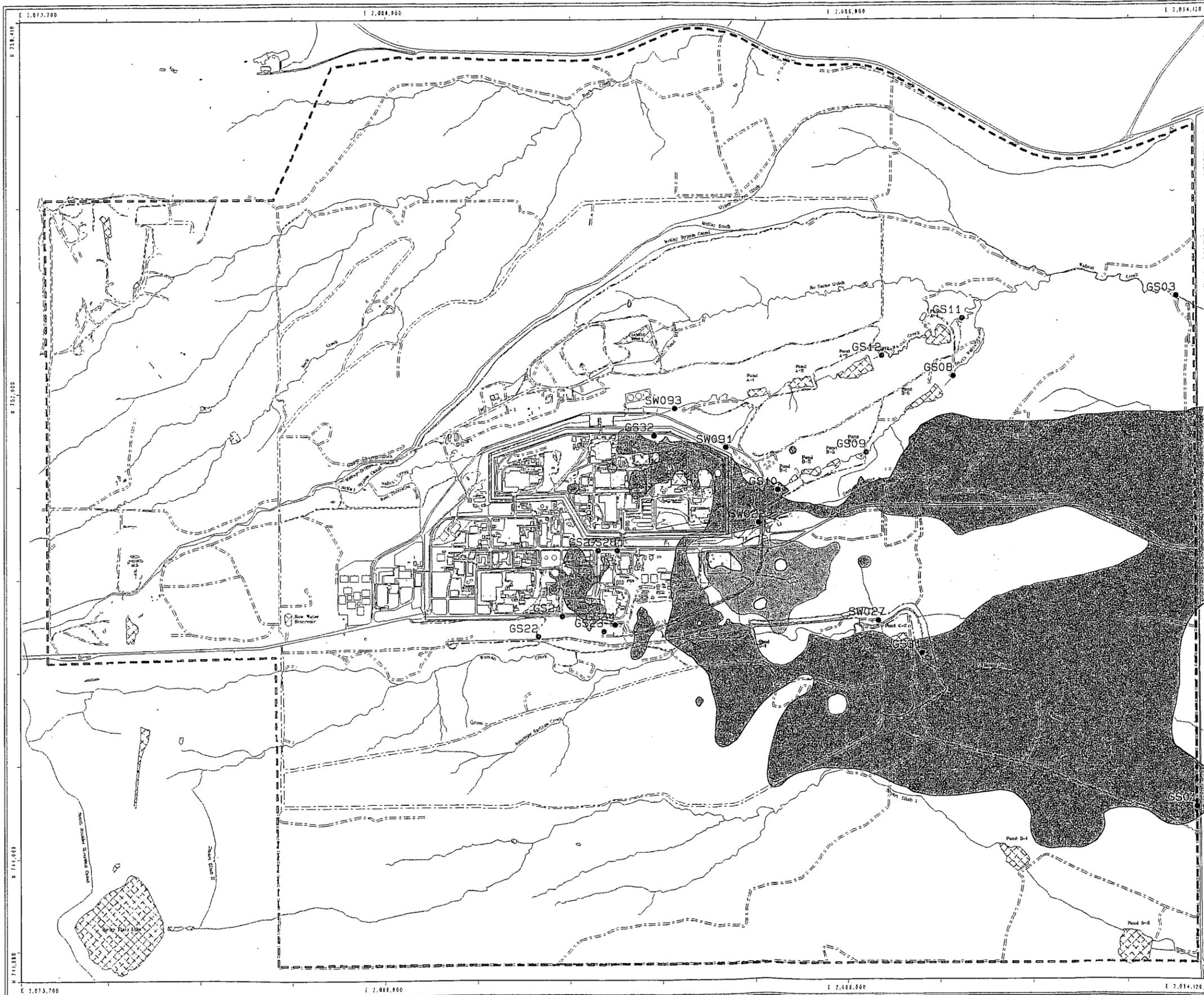
Soils

Soils in the western portion of the site are predominantly deep, have sandy surfaces and clayey subsoils, and have large amounts of rock fragments throughout the profile. Flatirons soils are the dominant soils in the Industrial Area and on the benches in the western portion of the site. In the eastern portion, soils generally have clayey textures and few rock fragments. Depth to bedrock varies between 20 to more than 60 inches. Loamy soils are found along the lower stream channels. The soils in the Industrial Area are suitable for building construction.

Soil Contamination

Radionuclides. All plutonium and americium found in the environment are artificial and man-made. Two sources of plutonium are found on-site—global sources, which are residual deposition from past atmospheric testing of nuclear weapons, and local site

Figure 2.
Distribution of Plutonium-239/240
in Surface Soil



EXPLANATION

-  Less than 1 pCi/g
-  1 pCi/g or greater but less than 10 pCi/g
-  10 pCi/g or greater but less than 100 pCi/g
-  100 pCi/g or greater but less than 1000 pCi/g
-  1000 pCi/g or greater
-  Selected SW Monitoring Stations

Standard Map Features

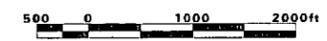
-  Buildings & other structures
-  Lakes and ponds
-  Streams, ditches, or other drainage features
-  Fences
-  Rocky Flats boundary
-  Paved roads
-  Dirt roads

DATA SOURCE:
 Buildings, fences, hydrography, roads and other structures from 1974 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs, 1/95

NOTE:
 Contours were developed using data from surface soil sampling locations shown in Figures 4-3. Contours were edited using professional judgement from grids created by Krieger.



Scale = 1 : 21330
 1 inch represents approximately 1778 feet



State Plane Coordinate Projection
 Colorado Central Zone
 Datum: NAD27

U.S. Department of Energy
 Rocky Flats Environmental Technology Site

Prepared by:



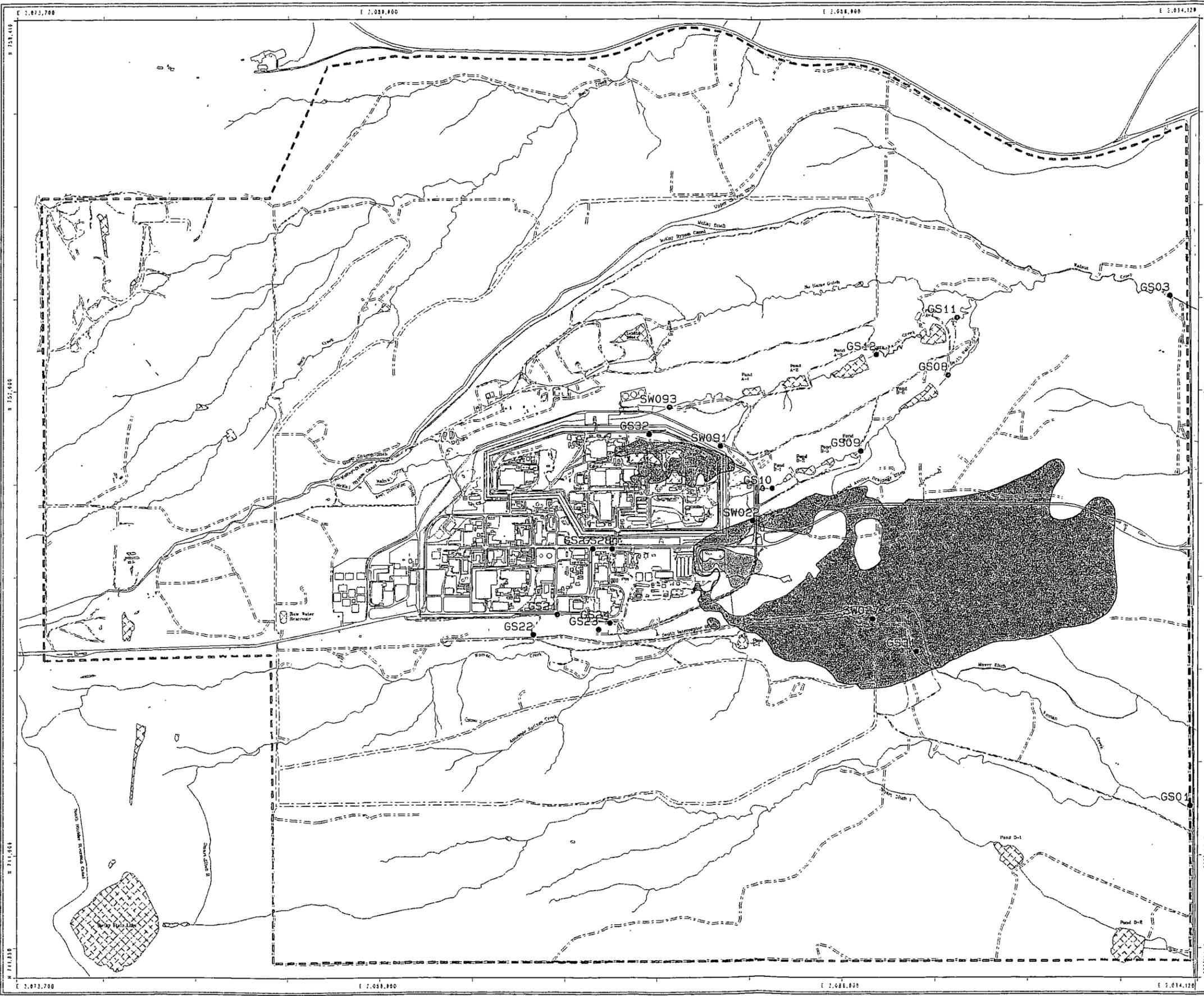
Rocky Mountain Remediation Services, L.L.C.
 Geographic Information Systems Group
 Rocky Flats Environmental Technology Site
 P.O. Box 464
 Golden, CO 80402-0464

MAP ID: 97-0130

August 15, 1997

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Figure 3.
Distribution of Americium-241
in Surface Soil



EXPLANATION

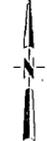
- Less than 1 pCi/g
- 1 pCi/g or greater but less than 10 pCi/g
- 10 pCi/g or greater but less than 100 pCi/g
- 100 pCi/g or greater but less than 1000 pCi/g
- 1000 pCi/g or greater
- Selected SW Monitoring Stations

Standard Map Features

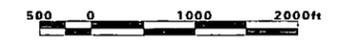
- Buildings & other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Rocky Flats boundary
- Paved roads
- Dirt roads

DATA SOURCE:
 Buildings, fences, hydrography, roads and other structures from 1984 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the photographs: 1/95

NOTE:
 Contours were developed using data from surface soil sampling locations shown in Figure 4-3. Contours were edited using professional judgement from grids created by kriging.



Scale = 1 : 21330
 1 inch represents approximately 1778 feet



State Plane Coordinate Projection
 Colorado Central Zone
 Datum: NAD27

U.S. Department of Energy
 Rocky Flats Environmental Technology Site

Prepared by:

Rocky Mountain Remediation Services, L.L.C.
 Geographic Information Systems Group
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MAP ID: 97-0130

August 15, 1997

jgms/roflats/figs/97-0130/fig3a.mxd

sources, which are releases from handling plutonium at the site. Average measured plutonium concentrations in the Denver area from global fallout are 0.04 (pCi/g).²

Plutonium and americium exist in soils at several locations at the site. By far, the most significant location is on the eastern side of the Industrial Area, called the 903 Pad. In the vicinity of the 903 Pad, plutonium and americium concentrations exceed 1,000 pCi/g (Figure 2 and Figure 3).³ Other locations of plutonium and americium in soils include the Protected Area and the parking area for Building 444. Generally, concentrations of radionuclides in the vicinity of buildings are low; additional soil characterization will be conducted after building decommissioning and demolition.

Nonradiological soil contaminants. Soils contaminated with metals or volatile organic compounds are found at several locations on the site. Contaminated soils contribute to surface and ground water and surface water contamination, discussed in greater detail in the *Ground and Surface Water Hydrology* section.

The Rocky Flats Cleanup Agreement, signed in 1996, governs cleanup of soil and water, and decontamination of buildings at the site. Cleanup is underway and is expected to be completed between 2006 and 2015 depending on funding levels and availability of sites to receive wastes and special nuclear materials.

GROUND AND SURFACE WATER HYDROLOGY

Ground Water

Local Hydrogeology. The site is located within the Denver Groundwater Basin. Three different water-bearing zones are found at the site—the upper alluvial zone, the lower aquitard, the Laramie-Fox Hills Aquifer. The uppermost water-bearing zone consists of unconfined saturated portions of the alluvial and weathered bedrock strata beneath the site. Ground water levels typically peak in May or June, then decline throughout the summer and fall as precipitation decreases and snowmelt ceases. In some locations, the upper water-bearing zone is not sufficiently saturated to sustain a well and

² U.S. Department of Energy. Cumulative Impacts Document. p. 4-17. September 1997.

³ U.S. Department of Energy. Summary of existing data on actinide migration at the Rocky Flats Environmental Technology Site. RF/RMRS-97-074.UN. September 1997.

dries up during the year. Ground water flow direction is controlled largely by surface topography. On terraces and ridges, flow is to the east-northeast. In areas dissected by east-trending stream drainages, it flows to the north or south into the drainages. Ground water flows generally parallel the direction of surface flows along stream channels.

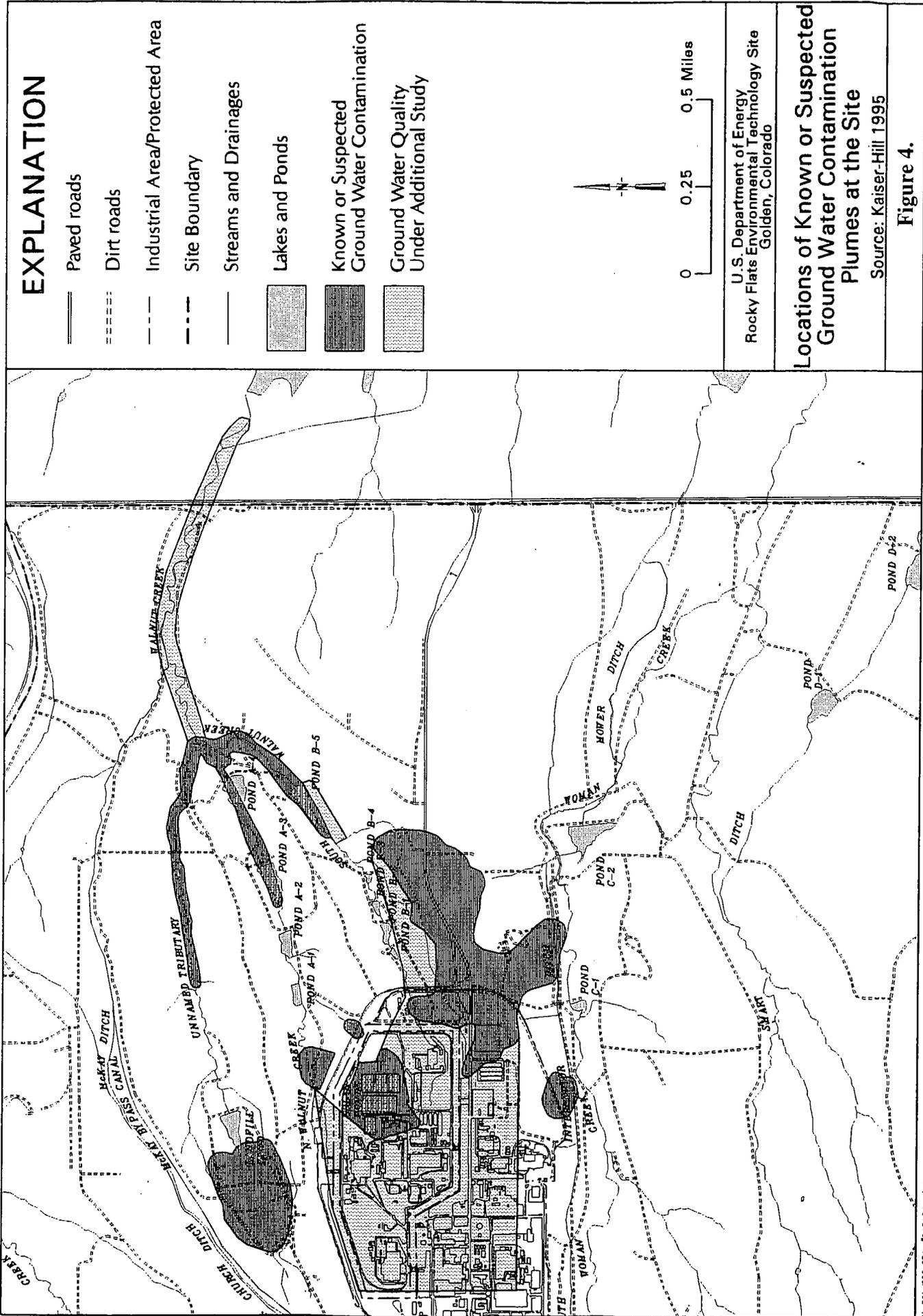
Underlying the upper water-bearing zone is a zone of unweathered bedrock, primarily claystone, of the Laramie and Arapahoe Formations. Water in this zone, formally called an aquitard (a water-bearing zone with restrictive water movement), moves very slowly due to the clay content and low permeability of the bedrock. This zone is between 600 and 800 feet thick. The regional Laramie-Fox Hills Aquifer is present beneath the aquitard. It is composed of the lower sandstone unit of the Laramie Formation and the Fox Hills Sandstone, and is confined by the overlying aquitard.

Springs and Seeps. Springs and seeps are common along the upper margins of the site's stream drainages. Discharges from most springs and seeps are not controlled. Currently, however, discharges from seeps in the 881 Hillside area, 903 Pad and Solar Evaporation Ponds are collected, sampled, and treated before being released.

Ground Water Contamination. The shallow water-bearing zone beneath the site is contaminated with radionuclides, such as plutonium and americium, volatile organic compounds, such as trichloroethene, and metals. Locations of known or suspected ground water contamination plumes are shown in Figure 4. The aquitard is less contaminated than the shallow aquifer. Contaminant plumes are usually localized, and no defined plumes in the lower aquitard have been identified. Contaminant migration studies have indicated that the Laramie-Fox Hills Aquifer beneath the site is unlikely to be contaminated.

Surface Water

Surface Water Characteristics. Three intermittent streams drain the site. Woman Creek drains about 41 percent of the site south of the Industrial Area. Woman Creek flows east into a series of detention ponds C-1 and C-2. When it reaches a certain water level, Pond C-2 is discharged into Woman Creek Reservoir, located between the site boundary and Standley Lake. The detention ponds are used to settle out suspended sediments and other contaminants. Standley Lake, a water supply reservoir about ½ mile



EXPLANATION

- Paved roads
- - - - - Dirt roads
- Industrial Area/Protected Area
- - - - - Site Boundary
- Streams and Drainages
- [Stippled Box] Lakes and Ponds
- [Diagonal Lines Box] Known or Suspected Ground Water Contamination
- [Dotted Box] Ground Water Quality Under Additional Study

0 0.25 0.5 Miles

U.S. Department of Energy
 Rocky Flats Environmental Technology Site
 Golden, Colorado

Locations of Known or Suspected Ground Water Contamination Plumes at the Site

Source: Kaiser-Hill 1995

Figure 4.

east of the site, no longer receives Woman Creek flows. The north side of the Industrial Area and all of the Protected Area, or about 33 percent of the site, are drained by Walnut Creek. Walnut Creek flows east into Great Western Reservoir, also east of the site. Great Western Reservoir is no longer used for drinking water storage. The Rock Creek basin, which drains about 26 percent of the site, is in the northwest portion of the site. It flows northeast into Boulder Creek.

Surface Water Discharges. The National Pollutant Discharge Elimination System (NPDES) permit program regulates discharges of pollutants into waters of the United States. Because the site is a Federal facility, the Environmental Protection Agency and not the Colorado Department of Public Health and Environment (CDPHE) administers the NPDES permit. The site's NPDES permit expired in 1989 and has been extended administratively since then. The EPA issued a public notice on its proposed renewal permit, but it has not issued a final permit as of December 1997.

Surface water discharges in the Walnut Creek and Woman Creek drainages are regulated by a series of detention ponds. North Walnut Creek has four ponds (referred to as the A-series ponds); South Walnut Creek has five ponds (B-series ponds); and Woman Creek has two ponds (C-series ponds). DOE collects and CDPHE analyzes water samples from the terminal ponds. Water being discharged is monitored to evaluate whether concentrations of pollutants in the discharge were less than that specified in the NPDES permit, and less than the surface water quality stream standards set by the Colorado Water Quality Control Commission, which have been integrated into the RFCA.

Releases from the site since it began operation as a nuclear weapons plant have contaminated the sediments in Standley Lake and Great Western Reservoir with radionuclides and other contaminants. DOE has funded two water projects to isolate surface water supplies from potential surface water contamination that might flow from the site. Carter Lake water was purchased as a replacement for Broomfield's Great Western Reservoir; Woman Creek Reservoir was constructed to intercept Woman Creek flows and to protect the water quality in Standley Lake. The cities of Westminster,

Thornton, and Northglenn constructed the Standley Lake Diversion Project to divert potentially contaminated water from Woman Creek before it can reach Standley Lake.

VEGETATION

Plant Communities. About 75 percent of the site is vegetated by three native upland grassland communities—the mesic (moist) mixed grasslands, xeric (dry) mixed grasslands, and short grasslands. In the western Buffer Zone, cobbly soils derived from the Rocky Flats alluvium support a ponderosa pine woodland. Shrubs, such as wax currant and skunkbrush, and forbs, such as mountain parsley and mountain bladderpod, found in association with the pines are more typical of the coniferous woodlands that dominate the eastern margin of the Front Range. Upland shrub communities are found at seeps in all drainages. Much of the vegetation in the Industrial Area is disturbed.

Riparian communities are found along the three major streams on the site. Native trees, such as cottonwood, and shrubs, such as wild rose and western snowberry, comprise the riparian communities.

Conservation Areas. The Colorado Natural Heritage Program (CNHP) identified four areas at or near Rocky Flats as significant conservation sites.⁴ One of the sites, the Rocky Flats Conservation Site, has what the CNHP believes is the largest example of xeric tallgrass prairie remaining in Colorado, or perhaps North America (Figure 5). It occurs to the immediate west and south of the Industrial Area. Overall, the CNHP rates the site of very high significance.

In its final report, the CNHP had five recommendations regarding the site's natural heritage resources—

- Establish a Rocky Flats natural resource management roundtable to include outside expertise
- Cooperate with local landowners regarding routine management activities
- Develop an integrated natural resource management strategy
- Continue to monitor ecological processes and elements at the site

⁴ Natural Heritage Resources of the Rocky Flats Environmental Technology Site and their Conservation. Phase II: The Buffer Zone. Prepared the Colorado Natural Heritage Program, December 8, 1995.

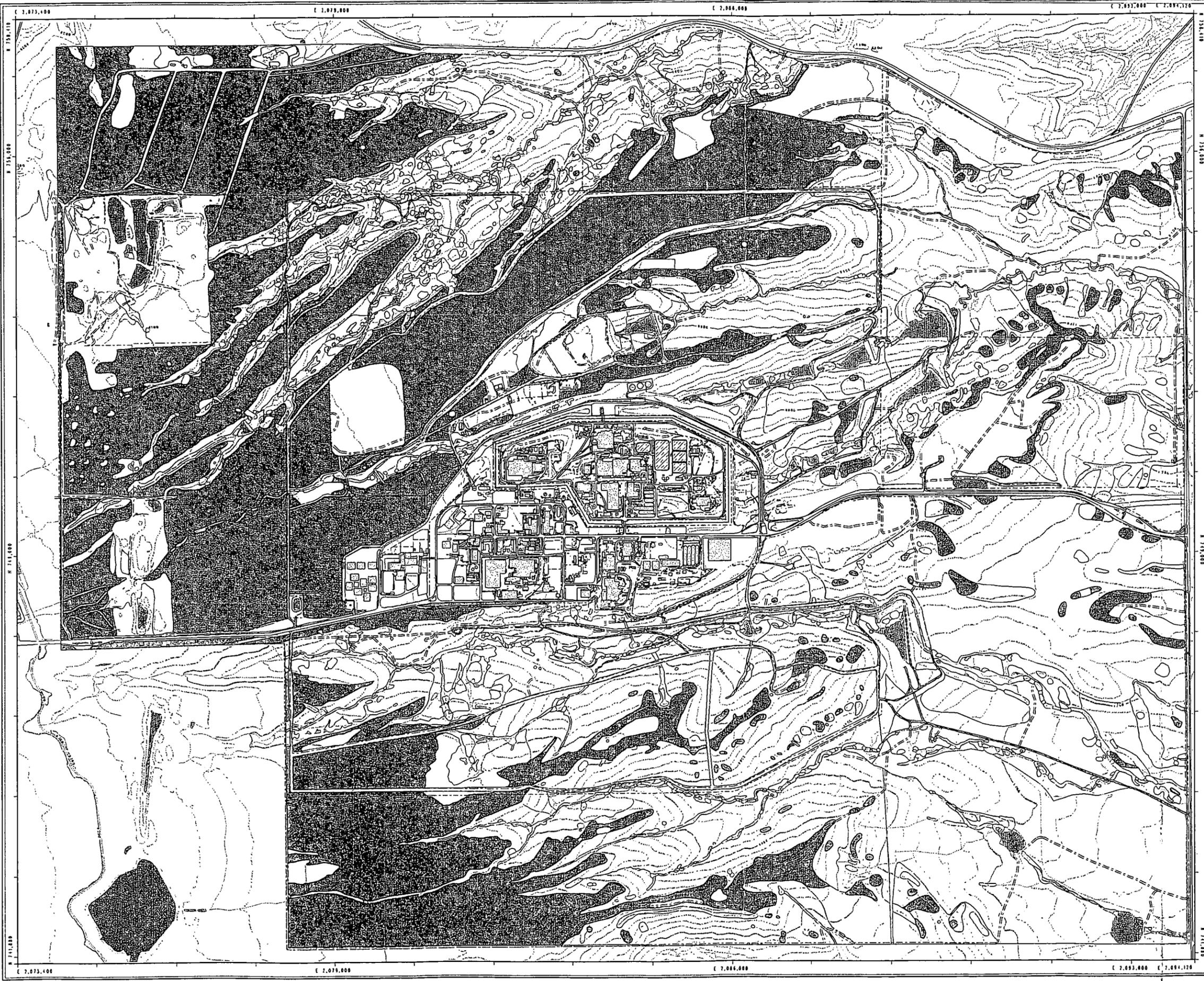


Figure 5.
Distribution of
Xeric Tallgrass Prairie
Rocky Flats Environmental Technology Site

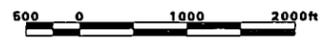
EXPLANATION

- Xeric Tallgrass Prairie
- Standard Map Features**
- Buildings and other structures
- Solar evaporation ponds
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Contour (20-Foot)
- Paved roads
- Dirt roads

DATA SOURCE:
 Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G BSL, Las Vegas. Digitized from the orthophotographs, 1/95. Topology (contours) were derived from digital elevation model (DEM) data by Interplan Knowledge (IKI) using ESRI Arc TIN and LATTICE to process the DEM data to create 5-foot contours. The DEM data was captured by the Remote Sensing Lab, Los Angeles, NV 1334 Aerial Flyover at 10 (7) meter resolution. The DEM post-processing performed by MK, Winter 1997.



Scale = 1 : 20450
 1 inch represents approximately 1704 feet



State Plane Coordinate Projection
 Colorado Central Zone
 Datum: NAD27

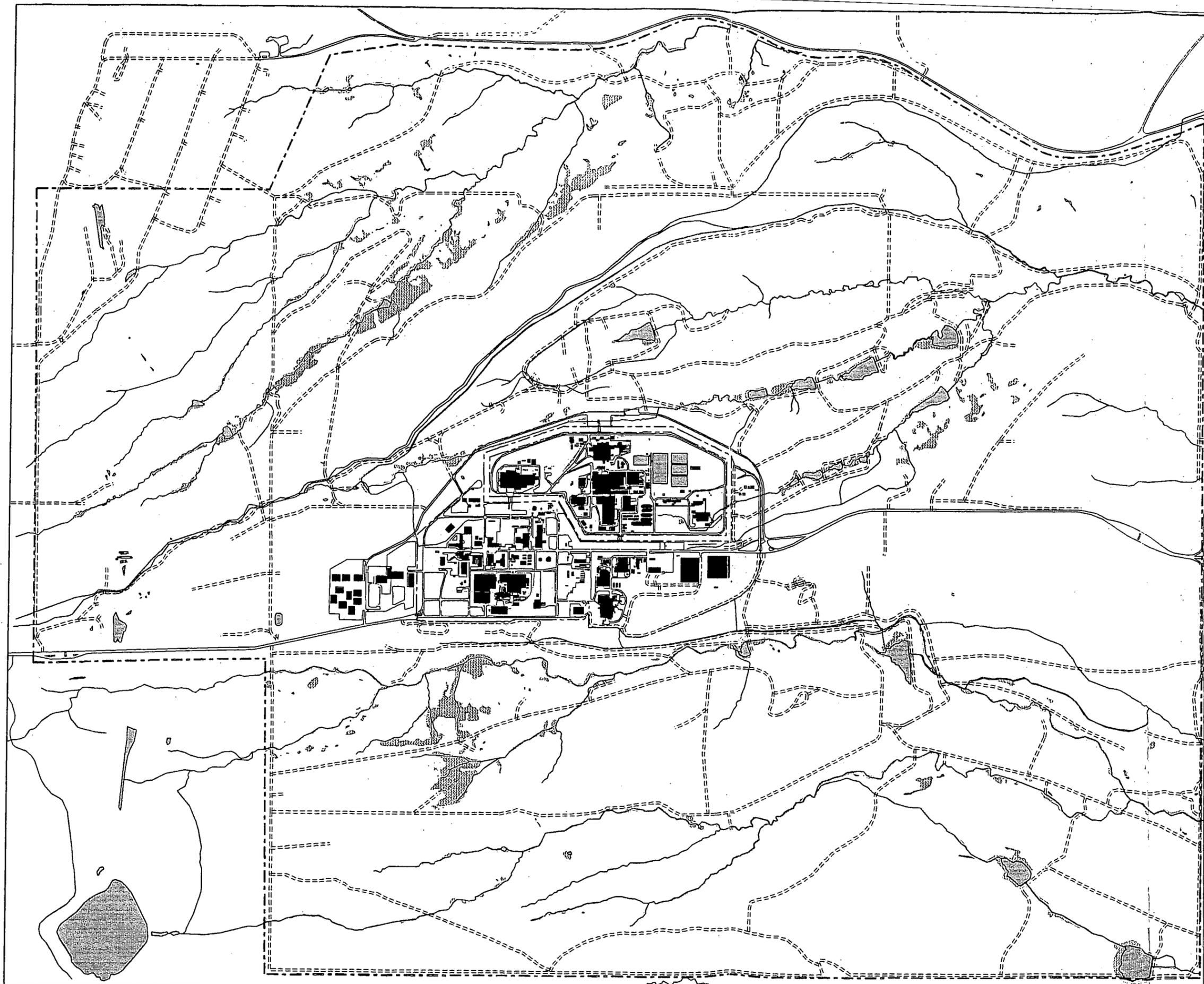
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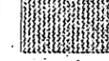
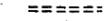
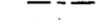


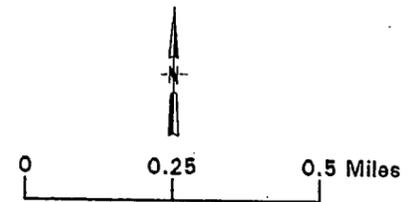
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 Golden, CO 80402-0484

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EXPLANATION

-  Wetlands
-  Paved roads
-  Dirt roads
-  Industrial Area/Protected Area
-  Site Boundary
-  Streams and Drainages
-  Lakes and Ponds
-  Buildings and Structures



U.S. Department of Energy
 Rocky Flats Environmental Technology Site
 Golden, Colorado

Jurisdictional Wetlands Identified at the Site

Source: Wetland areas as identified by
 EG&G as of November 22, 1994.

Figure 6.

**Preble's Meadow Jumping Mouse
Designated Protection Areas**

Figure 7.

LEGEND

-  Known Habitat
-  Suitable Habitat
-  Supporting & Other Protected Vegetation

Standard Map Features

-  Buildings and other structures
-  Lakes and ponds
-  Streams, ditches, or other drainage features
-  Fences and other barriers
-  Contours (20' intervals)
-  Rocky Flats boundary
-  Paved roads
-  Dirt roads

DATA SOURCE:
Buildings, roads, and fences provided by Facilities Eng.
EG&G Rocky Flats, Inc. - 1991.
Hydrology provided by USGS - (data unknown).
Preble's Meadow Jumping Mouse data provided by PTI Environmental Services Ecology Group - 1997.

DISCLAIMER:
This map is based on best current knowledge as of November, 1997.
As research on the species continues, this map will undergo further revision.
Be sure to use the most current map for planning.



Scale = 1 : 21330
1 inch represents approximately 1778 feet



State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

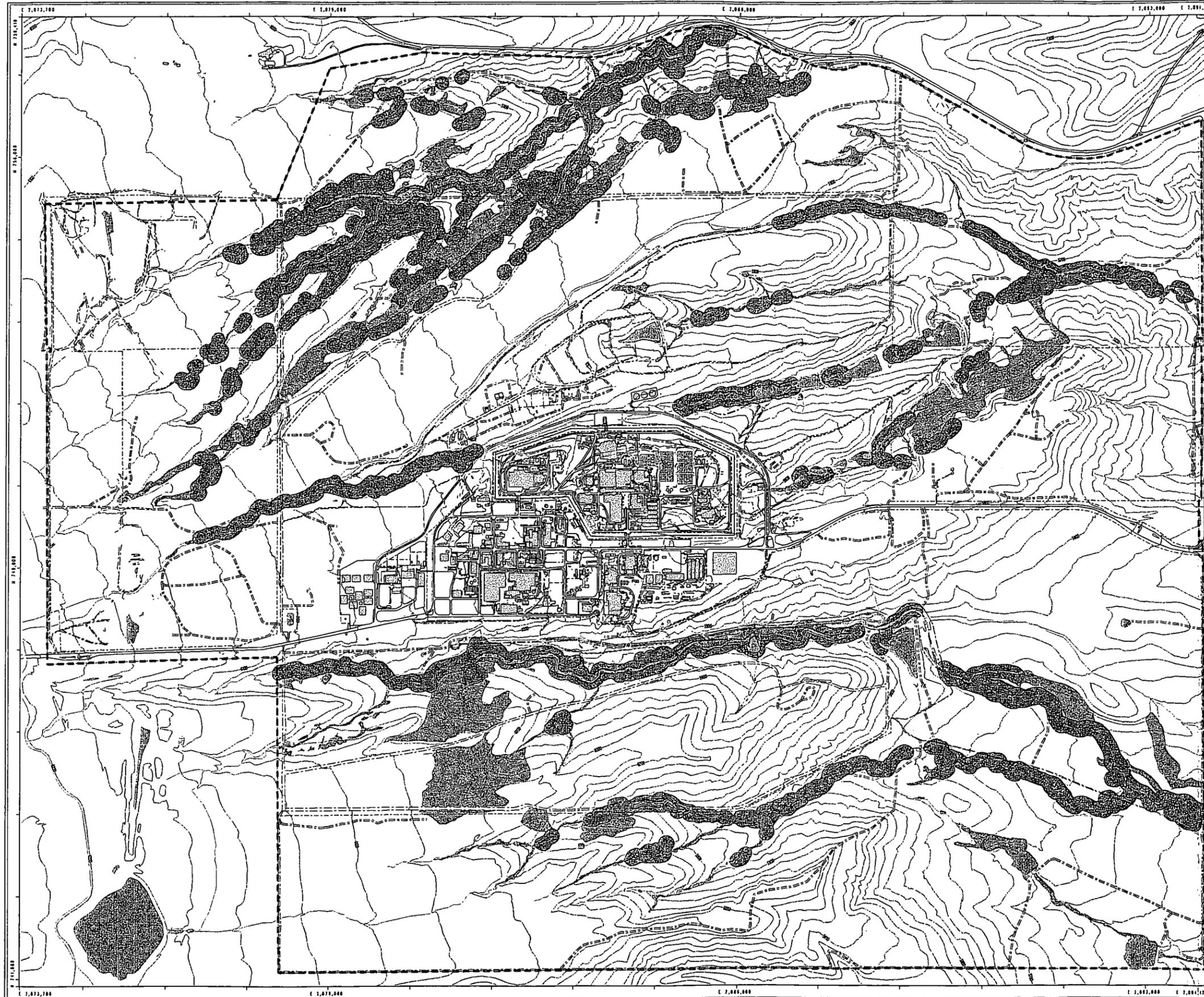
Prepared by:

PTI ENVIRONMENTAL SERVICES

MAP ID: 'pt98-001'

November 24, 1997

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- Designate the site as a DOE National Environmental Research Park

Wetlands. Wetlands regulated by the U.S. Army Corps of Engineers are found along the floodplains and lower slopes of the site's three main drainages (Figure 6). A small wetland/riparian area exists east of the Protected Area. Nearly all of the site's 124 acres of regulated wetlands are located in the Buffer Zone.

WILDLIFE

The most common big game species at the site is the mule deer. The site's current mule deer population, which uses the site year-round, is estimated at 130 to 135 individuals. In recent years, the white tail deer has increased its use of the site. Desert cottontails, muskrats and porcupines are other mammals that use the site. Raptors, such as red-tailed hawks, great horned owls and ferruginous hawks, and waterfowl, such as mallards and Canada geese, also use the site. Low and intermittent stream flows in all streams limit the presence of fish and other aquatic species at the site.

SPECIES OF SPECIAL CONCERN

Species Currently Listed as Threatened or Endangered

Federal threatened or endangered species known to frequent the site include the bald eagle and peregrine falcon. These raptors are visitors to the site and may occasionally hunt for small mammals or birds on the property. No suitable nesting or roosting habitat is found on the site for these birds.

The U.S. Fish and Wildlife Service has recently listed the Preble's Meadow Jumping Mouse as threatened. It is found in streamside riparian habitat along Rock and Walnut Creeks (Figure 7). Although several areas of potential Ute ladies'-tresses orchid habitat were identified in the Buffer Zone, no orchids have been found onsite.

Candidate Species

Candidate species are species that may be listed as threatened or endangered in the future. If listed, such species could adversely affect Industrial Area use. Candidate species include the Colorado butterfly plant and mountain plover. Neither of these species has been observed at the site, but potential habitat is present. Colorado butterfly

plant could be found in moist wetland and riparian habitat similar to Ute ladies'-tresses orchid habitat. Mountain plovers prefer shortgrass prairie habitat, which is less common at the site. Because these species have not been previously observed at the site, optimal habitat may not be present.

A number of species that were formerly federal candidates for listing as threatened or endangered by the U.S. Fish and Wildlife Service, are known to be found at Rocky Flats. These species include eastern short-horned lizard, Baird's sparrow, western burrowing owl, ferruginous hawk, loggerhead shrike, and white-faced ibis. Recent revisions to the way federal species are listed have eliminated these species as current candidates for listing. As additional information becomes available, these species may be reconsidered for federal listing.

Colorado Species of Concern

Colorado species of concern, as identified by the CNHP, that are known to be found at the site include Merriam's shrew, black-crowned night heron, grasshopper sparrow, hops blue, Arogos skipper, northern leopard frog, long-billed curlew, greater sandhill crane, American white pelican, and montane sedge. In addition, two rare plant communities—xeric tallgrass prairie and plains cottonwood riparian woodland—are found at the Flats. In addition to the species mentioned previously, the site has suitable habitat for 65 or more federal or state species of concern.

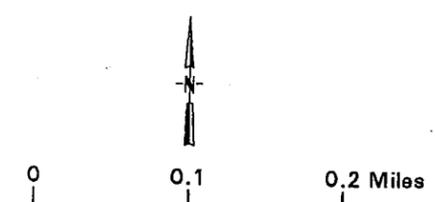
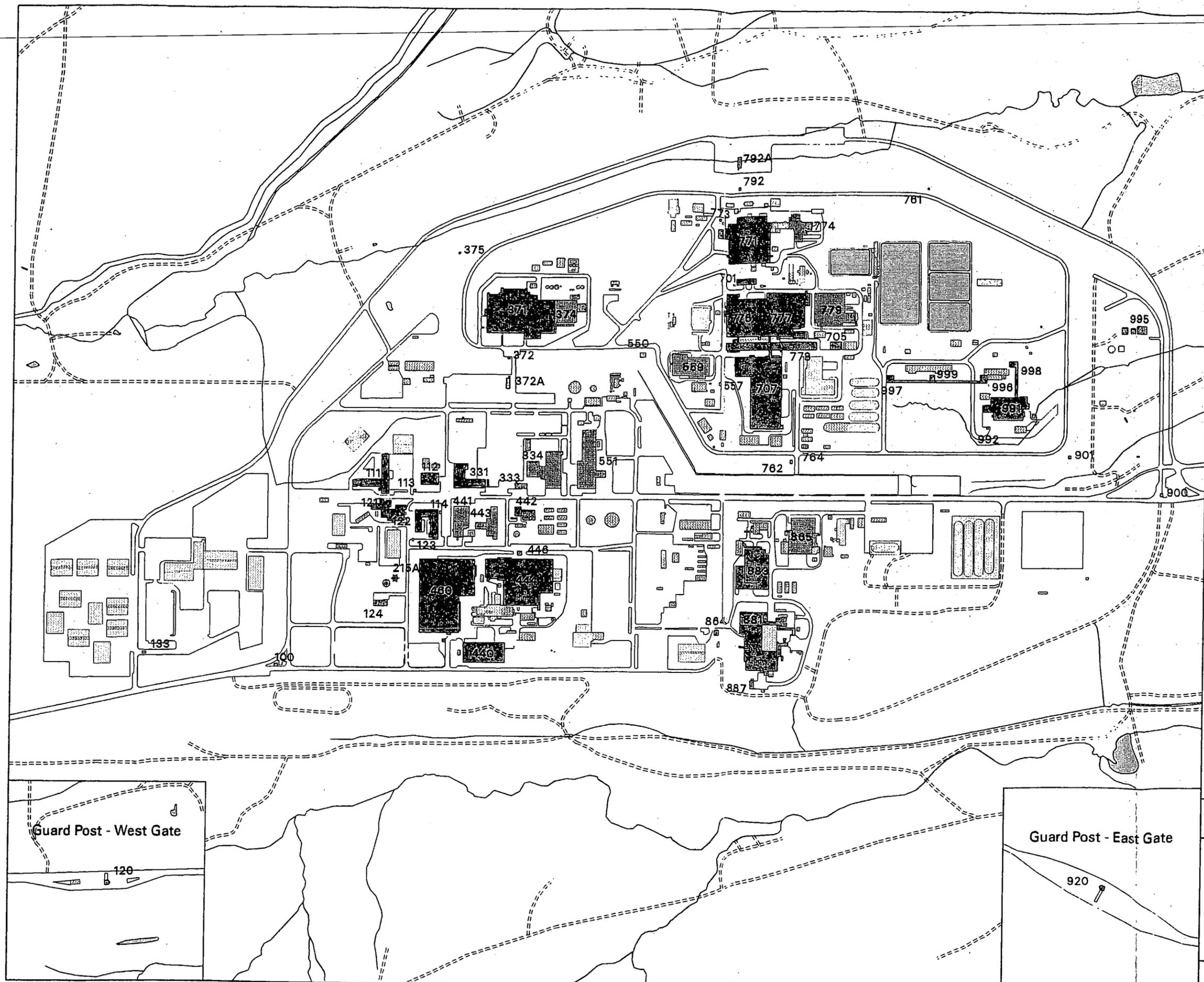
CULTURAL RESOURCES

Five prehistoric, 38 historic sites and 15 isolated historic finds have been identified in the Buffer Zone. No Traditional Cultural Properties eligible for inclusion on the National Register of Historic Places have been identified at the site. The State Historic Preservation Officer (SHPO) did not consider any of the historic resources eligible for inclusion on the National Register of Historic Places. The Industrial Area has not been surveyed for prehistoric resources because of the extensive disturbance in the Area.

In 1951, the Department of Energy purchased the site for a nuclear weapons facility. The site was one of 13 sites in the United States used for nuclear weapons production during the Cold War Era. SHPO has determined that 64 buildings within the Industrial

EXPLANATION

-  Paved roads
-  Dirt roads
-  Industrial Area/Protected Area
-  Site Boundary
-  Streams and Drainages
-  Lakes and Ponds
-  Buildings and Structures
-  Primary Contributors to the Rocky Flats Historic District
-  Secondary Contributors to the Rocky Flats Historic District



U.S. Department of Energy
Rocky Flats Environmental Technology Site
Golden, Colorado

Locations of Cold War Era
Resources in the Rocky Flats
Historic District

Figure 8.

Area are significant historically because of their role in the Cold War Era. Listed buildings include 49 primary contributors to the production of weapons, and 15 secondary contributors to the central mission of the plant (Figure 8). These buildings comprise the Rocky Flats Historic District, a Historic District under the National Register of Historic Places. Buildings 440, 460 and 883 are primary contributors and Building 125 is a secondary contributor.

During site cleanup, DOE will demolish and remove all buildings within the Protected Area, and all buildings outside the Protected Area, unless DOE and other stakeholders decide that some buildings are reusable. If all the buildings that are primary and secondary contributors to the Rocky Flats Historic District are removed, the District will no longer exist. If some buildings are retained, the SHPO will reevaluate whether sufficient resources exist to maintain a Historic District.

INTERMEDIATE ENVIRONMENTAL CONDITIONS AND CONSTRAINTS

GENERAL

The Rocky Flats Plant began operations in 1952. Since that time, numerous laws have been passed that regulate the storage, treatment and disposal of hazardous and radioactive waste. The laws most relevant to the site cleanup are the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), and the Colorado Hazardous Waste Act (CHWA). These laws define hazardous substances, hazardous wastes and pollutants. Materials defined as hazardous substances and hazardous wastes have been produced and disposed or released at various locations on the site. Because of these releases, the site is listed on the National Priorities List, which includes properties with the highest priority for cleanup pursuant to EPA's Hazard Ranking System. Sites on this list commonly are called Superfund sites.

The DOE, CDPHE and EPA have entered into several agreements over the past 12 years that governed environmental operations and investigations at the site. In July 1996, these agencies signed a Federal Facility Agreement and Consent Order, commonly called

the Rocky Flats Cleanup Agreement.⁵ The purpose of the RFCA is to establish the regulatory framework for achieving site cleanup. Under the Agreement, the CDPHE is the lead regulatory agency for all cleanup activities in the Industrial Area and the EPA is the lead regulatory agency for all cleanup activities in the Buffer Zone and offsite. The Agreement does not govern management of Special Nuclear Material or residues, nor does it govern the management of building deactivation and decontamination for future DOE missions. The Defense Nuclear Facilities Safety Board will continue oversight of these activities. This agreement is discussed in greater detail in the following section.

ROCKY FLATS CLEANUP AGREEMENT

As part of the RFCA, a vision for Rocky Flats was developed along with goals in support of the vision. The Rocky Flats Vision is—

- “To achieve accelerated cleanup and closure of Rocky Flats in a safe, environmentally protective manner and in compliance with applicable state and federal environmental laws;
- To ensure that Rocky Flats does not pose an unacceptable risk to the citizens of Colorado or to the site’s workers from either contamination or an accident; and
- To work toward the disposition of contamination, wastes, buildings, facilities and infrastructure from Rocky Flats consistent with community preferences and national goals.”

The RFCA indicates the following goals will be accomplished in support of the Vision—

- “The highest priority at Rocky Flats is to reduce the risks posed by plutonium, other special nuclear materials, and transuranic wastes.
- Other wastes presently stored on-site, generated during cleanup, and removed from buildings during cleanup and demolition will be collected, consolidated, treated where necessary, and placed in safe, monitored, and retrievable storage to await ultimate disposition.
- The quality of water supplies of the communities surrounding Rocky Flats will be protected. In addition, the water leaving the site will be of acceptable quality for any use.

⁵ Federal Facility Agreement and Consent Order between the U.S. Environmental Protection Agency, State of Colorado, and U.S. Department of Energy, CERCLA VIII-96-21, RCRA (3008(h)) VIII-96-01, State of Colorado Docket # 96-07-19-01. July 19, 1996.

- All buildings will be cleaned up as needed so that they can either be demolished or converted to other appropriate uses.
- At a minimum, given current technology and resources, Rocky Flats will be cleaned up to allow open space uses in the Buffer Zone, restricted open space or industrial use for most of the existing Industrial Area, and other appropriate uses. Where possible, the site will be cleaned up to the maximum extent feasible.
- Local elected officials, local government managers, RFLII, CAB, other groups and citizens will continue to be consulted.”⁶

The RFCA describes both the criteria and a process for determining which geographic areas of the site, such as individual hazardous substance sites and operable units, may become candidates for no action or no further action. The RFCA establishes a four-step process in making such a determination—

- Conduct a source evaluation
- Conduct a background comparison
- Conduct a CDPHE conservative screen
- Perform a baseline risk assessment, which includes both a human health risk assessment and an ecological risk assessment

Most of the decontamination and decommissioning at the site is being conducted as an “accelerated action” subject to the review and approval of the appropriate regulatory agency. CDPHE will be the Lead Regulatory Agency regarding any facility for retrievable, monitored storage or disposal of remediation wastes, regardless of whether the facility is located in the Industrial Area or Buffer Zone. In the Industrial Area, CDPHE will review all planned accelerated actions. Following implementation of all planned accelerated actions, CDPHE and EPA will evaluate the site conditions and make final remedial/corrective action decisions for each management area.

SITE ACCESS

According to the RFCA Preamble, site access will be controlled consistent with cleanup efforts and the need for a safety and security zone around weapons useable fissile material on-site. The RFCA allows non-DOE activities to take place during cleanup in

⁶ Appendix 9, Rocky Flats Cleanup Agreement, July 19, 1996.

areas other than the Buffer zone provided they do not adversely affect cleanup and closure operations.⁷ However, DOE policy is to not make facilities available while plutonium is stored on site.

Access during cleanup operations also will likely be restricted due to health concerns associated with air-borne contaminants. Air-quality standards are different for a "co-located worker" and a "maximally exposed individual." A co-located worker is a site worker who does not necessarily perform work that results in radiological exposure, but who may be exposed to releases that occur. The maximally exposed individual is a hypothetical member of the general public who resides near the site at a hypothetical location where maximum dose from all pathways is received. This individual is assumed to reside at this location 24 hours per day, 365 days per year.⁸ For the co-located worker, the Federal radiological dose standard is 5,000 millirem per year (mrem/yr). The DOE has a more stringent dose standard of 2,000 mrem/yr, and the site has adopted a more stringent dose standard of 750 mrem/yr for site workers. For the maximally exposed individual, the radiological dose standard is 10 millirem per year.⁹ DOE has estimated that during closure, the maximally exposed co-located worker would receive an annual dose of 5.4 millirem per year. If a member of the general public uses the site during cleanup, she would become the maximally exposed individual with an annual dose of 5.4 millirem per year.

For non-radiological and non-carcinogenic air pollutants, health risks are evaluated in terms of a hazard quotient. The hazard quotient is the ratio of the exposure concentration to the concentration at which adverse effects are expected. The hazard index sums the hazard quotients. A hazard index greater than 1 is the threshold at which some adverse human health effects could be expected. DOE estimates the hazard index for the co-located worker is 1.2 during cleanup.¹⁰

⁷ Rocky Flats Cleanup Agreement, p. 5.

⁸ Cumulative Impacts Document, pp. 4-74 through 4-92.

⁹ Cumulative Impacts Document, p. 4-57.

¹⁰ Cumulative Impacts Document, p. 5-57.

Figure 9.
Mineral Rights at
Rocky Flats Environmental
Technology Site

-  Private
-  Government
-  Both Government and Private

- Standard Map Features**
-  Buildings and other structures
 -  Lakes and ponds
 -  Streams, ditches, or other drainage features
 -  Rocky Flats boundary
 -  Paved roads
 -  Dirt roads

DATA SOURCE:
 Buildings, names, hydrography, roads and other
 structures from 1984 aerial fly-over data
 captured by EG&G RSI, Las Vegas.
 Digitized from the orthophotograph, V95



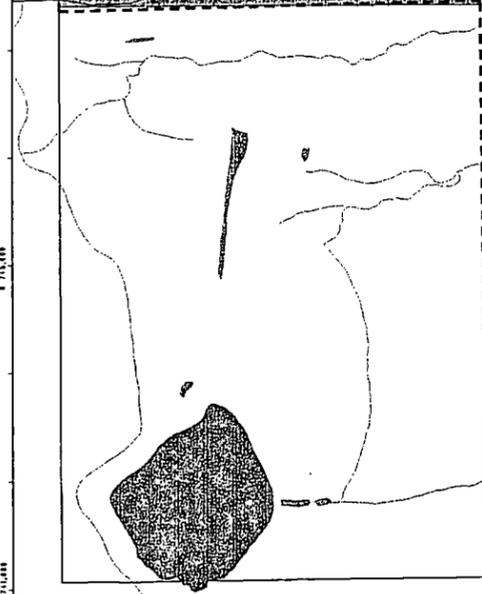
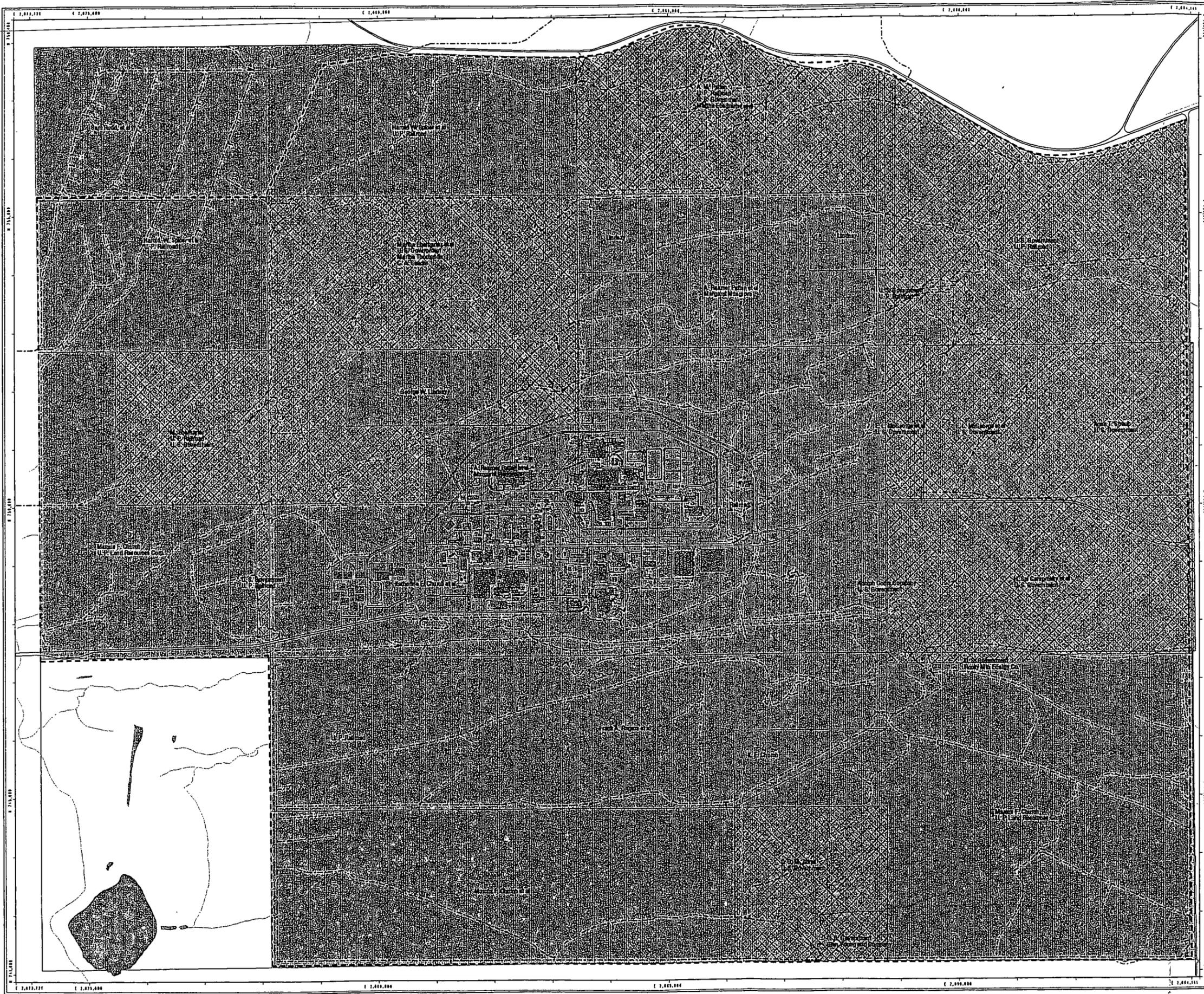
Scale = 1 : 20450
 1 inch represents approximately 1704 feet



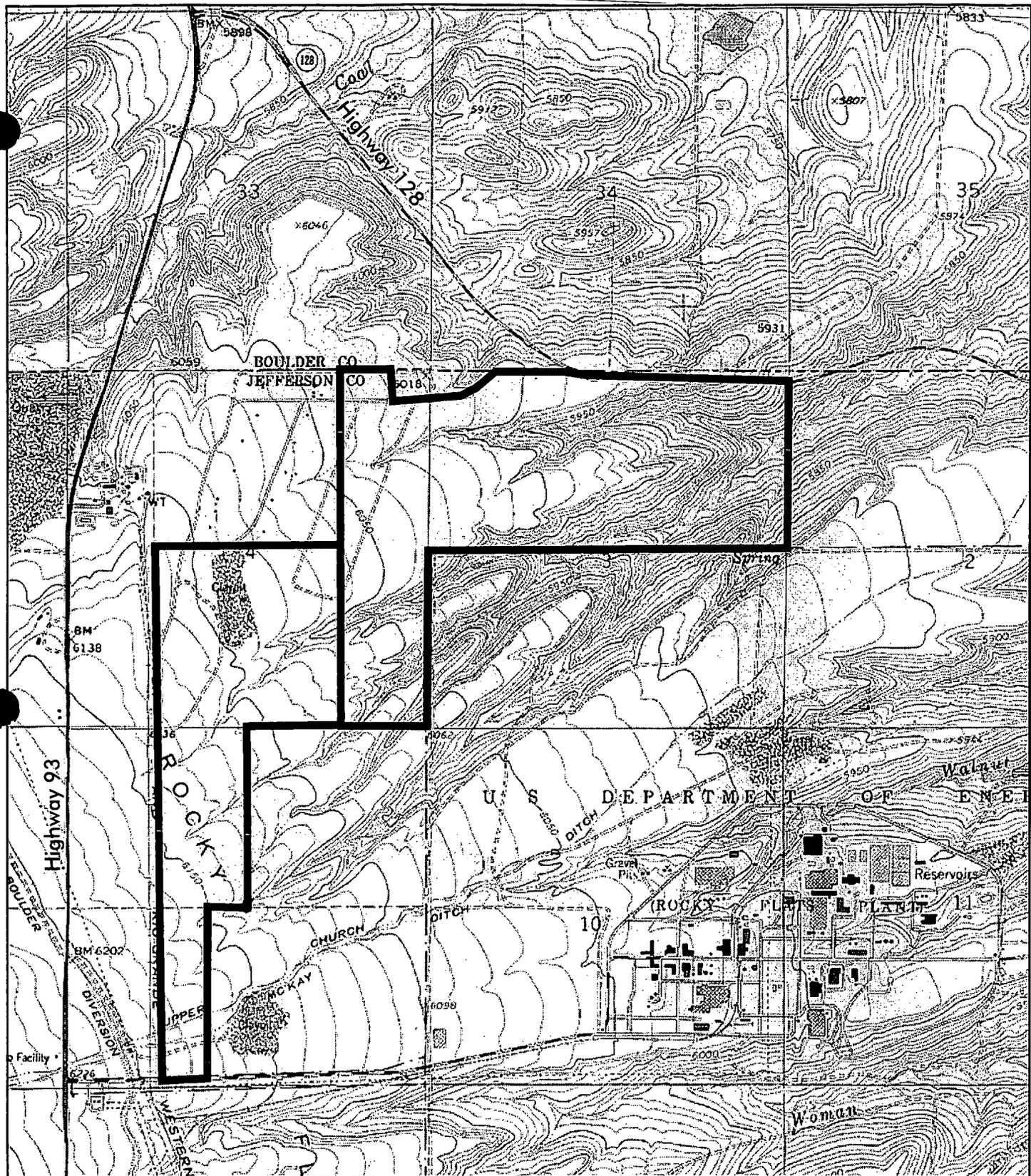
State Plane Coordinate Projection
 Colorado Central Zone
 Datum: NAD27

U.S. Department of Energy
 Rocky Flats Environmental Technology Site

Prepared by:
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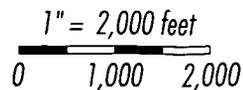
figs 11/25-97-map-am-1a/m-in-light/m-ineral.am



ERO

ERO Resources Corp.
 1842 Clarkson Street
 Denver, CO 80218
 (303) 830-1188
 Fax: 830-1199

Figure 10.
 Permitted expansion of
 TXI/Western Aggregate operations



POST-CLOSURE ENVIRONMENTAL CONDITIONS AND CONSTRAINTS

OPEN SPACE

After cleanup of the site is complete and regardless of the reuse plan for the core Industrial Area, the Buffer Zone is planned to be preserved and managed as open space. This will make a significant contribution to the existing system of regional open space, some of which is immediately adjacent to Rocky Flats.

Some institutional controls may be placed on the use of the Buffer Zone, particularly closer to the Industrial Area. The subsequent *Waste Disposal* section discusses institutional controls in greater detail.

Future management of the Buffer Zone has not yet been established. An existing open space program or consortium of programs to manage the open space system at Rocky Flats are likely possibilities.

MINERAL DEVELOPMENT

The surface estate at the site is owned by the Federal government and is managed by Kaiser-Hill LLC for the DOE. The federal government and numerous private parties own the subsurface or "mineral estate." The Federal government does not own the majority of the mineral estate, including none beneath the Industrial Area (Figure 9). Colorado law provides that a subsurface mineral right owner has the right to use that part of the surface reasonably required to extract and develop the subsurface mineral interests, while surface owners have the right to have the subsurface mineral estate developed in a reasonable manner and to have any adverse impacts upon the surface property associated with mineral development mitigated. Development of the Industrial Area is potentially restricted because it is underlain by mineable aggregate owned by private parties.

Owners of mineral rights in the western Buffer Zone have leased them to TXI/Western Aggregates, Inc. TXI/Western Aggregates received a mine permit from the Colorado Mined Land Reclamation Board to mine sand and gravel in the western portion of the Buffer Zone (Figure 10).¹¹ Approved in 1991, the permit covers about 280 acres along the western edge of the site. TXI/Western Aggregates is currently mining this area.

¹¹ Colorado Mined Land Reclamation Board. Permit M-91-035 and Amendment 001.

An amendment, approved in 1995, covers an additional 425 acres along the site's northern and western property boundary. In 1997, TXI/Western Aggregates also was issued a permit to mine Section 16, the State-owned section at the southwest corner of the site. The amendment to the 1991 permit included two stipulations, neither of which has been satisfied.¹² Mining will remove 20 to 30 feet of material. In 1997, the Sierra Club filed suit against the DOE alleging that DOE failed to comply with the National Environmental Policy Act by approving an access road to be used in the mining operation. The litigation was pending in January 1998.¹³

WASTE DISPOSAL

DOE has committed to remove site wastes, contaminated building debris and other materials and dispose of them in off-site locations. According to a Discussion Draft of *Accelerating Cleanup: Focus on 2006*, significant quantities will need to be shipped to other states for management.¹⁴ Estimated quantities of cleanup materials that will be generated and current and planned destination of these materials for disposal is shown in Table 1.

The RFCA Preamble indicates that DOE has targeted removal of weapons-useable fissile material (plutonium or highly enriched uranium) as soon as possible, beginning no later than 2010 and to be completed by 2015. DOE currently plans to ship plutonium off-site to DOE's Savannah River facility for final disposition beginning in 2002. If the shipment plan is not approved, plutonium will be stored in Building 371 or a new Interim Storage Vault at the site until the material is shipped off-site to a yet-to-be identified repository by 2015. DOE will make a decision in 1998 on whether to build an on-site plutonium storage vault. Transuranic waste (radioactive waste contaminated with elements heavier than uranium in concentrations above 100 nanocuries per gram) will be shipped to the Waste Isolation Pilot Plant (WIPP) in New Mexico as soon as the facility

¹² Memo from Carl Mount, Colorado Department of Natural Resources, Division of Minerals and Geology, to Cheryl Linden, Colorado Attorney General's Office, June 18, 1997.

¹³ Telephone conversation between Carl Mount, Colorado Department of Natural Resources, Division of Minerals and Geology and Richard Trenholme, ERO Resources Corp., January 22, 1998.

¹⁴ U.S. Department of Energy. *Accelerating Cleanup: Focus on 2006, Rocky Flats Environmental Technology Site. Discussion Draft, Volume 1.* June 1997.

Table 1. Estimated quantities of cleanup materials and current and planned destination of these materials for disposal.

Material Type	Estimated Quantity	Current or Planned Disposal Destinations
Plutonium metal	6,600 kilograms	Savannah River Site, South Carolina
Plutonium oxide	3,200 kilograms	Los Alamos National Lab, New Mexico
Plutonium contaminated residues	106,000 kilograms	Waste Isolation Pilot Plant, New Mexico Pantex Plant, Texas
Enriched uranium	6,700 kilograms	
Transuranic waste (includes mixed waste)	15,000 cubic meters	Waste Isolation Pilot Plant, New Mexico Idaho National Engineering Laboratory, Idaho (then to WIPP)
Low-level waste (includes mixed waste)	138,000 cubic meters	Hanford Site, Washington Envirocare, Utah Nevada Test Site, Nevada Oak Ridge Reservation, Tennessee
Hazardous waste	2,400 cubic meters	Chem Waste Management, California, Illinois Rollins Environmental, Texas
Asbestos	No quantities provided	Hanford Site, Washington
Solid waste	12,200 cubic yards annually	Off-site in a permitted sanitary landfill

Sources: U.S. Department of Energy. Accelerating Cleanup: Focus on 2006, Rocky Flats Environmental Technology Site. Discussion Draft, Volume 1. pp. ES-11-12. June 1997.

U.S. Department of Energy. Rocky Flats Environmental Technology Site Cumulative Impact Document. September 1997.

is permitted to receive wastes. WIPP has not received final EPA and State of New Mexico permits. EPA issued a draft certification in October 1997, with a final decision expected in April 1998. Other special nuclear material and plutonium residues that are not weapons useable fissile materials or transuranic waste will be shipped off-site as soon as receiver sites are identified and approved.

DOE will demolish all nuclear production facilities. Uncontaminated foundations and utilities may be capped and/or left in place. This decision will be made after the nature and extent of contamination beneath the buildings is determined. DOE plans to leave uncontaminated underground storage tanks in place.

The RFCA indicates budgetary, technological, safety or other considerations may require that some wastes be disposed of in-place or stored on-site in a safe and retrievable manner for many years. DOE and Kaiser-Hill have committed to disposing of all hazardous and radioactive wastes off-site. DOE will remain responsible for the monitoring and maintenance of facilities and institutional controls necessary to prevent

exposure from, and any release of, other chemical or radiological contamination. For example, cleanup of the Protected Area may result in some or all of the area being capped. The capped area will require fencing and institutional controls to ensure integrity of the caps for an extremely long time (>1,000 years). Final cleanup levels and future site use controls will be incorporated in a Record of Decision at the end of cleanup.

SOIL CONTAMINATION AND ACTION LEVELS

As part of the RFCA, "action levels" or concentrations at which action will be taken were established for surface water, ground water, surface soils and subsurface soils. Potential contaminants of concern include radionuclides, volatile organic compounds and metals. The Action Levels and Standards Framework (Attachment 5) of the RFCA describes the action levels and their basis, and action determinations.¹⁵ A final framework for implementing the action levels does not exist for the actinides in all media, and for most contaminants in ground water.

Interim soil action levels for radionuclides were adopted in October 1996 after the RFCA was signed. Action levels for radionuclides in surface soils have been recommended not to exceed that which will impart to a human receptor (e.g., an open space user of the buffer zone or an office worker in the Industrial Area) an annual radiation dose of more than 15 millirems. In accordance with the RFCA and the Rocky Flats Vision, institutional controls may be applied at the site. These controls may include prohibition of residential development at the site, or use of the site's ground water. Due to the long-lived nature of the radionuclides at the site, action levels also consider a hypothetical future resident. The action level recommended is not to exceed that which will impart to a hypothetical future resident an annual radiation dose of more than 85 millirems.¹⁶

The DOE has agreed to support and fund a community-based advisory group to oversee an independent evaluation of the model used to translate contamination levels

¹⁵ Action Levels and Standards Framework (Attachment 5) of the Rocky Flats Cleanup Agreement, July 19, 1996.

¹⁶ Action Levels for Radionuclides in soils for the Rocky Flats Cleanup Agreement. U.S. Department of Energy, U.S. Environmental Protection Agency, and Colorado Department of Public Health and Environment. October 31, 1996.

into radionuclide soil action levels. The purposes of the project are to obtain an independent scientific determination of the appropriate model to be used to set a site-specific soil action level for radionuclides in the soils at Rocky Flats and recommend changes as appropriate. The evaluation will be conducted and peer-reviewed by acknowledged experts chosen by an independent oversight panel. The 13-member oversight panel includes six members of local government, two members of the public interest community, three members from the technical community, two members of the general public most affected by Rocky Flats, and one member of the Rocky Flats Citizen Advisory Board.¹⁷

BUILDING CONTAMINATION

Most of the plutonium contamination is inside buildings in the Protected Area. DOE proposes to decontaminate and demolish all buildings in the Protected Area and most of the buildings in the Industrial Area. DOE is developing a framework for action levels in buildings similar to the framework developed for soils. Eight buildings in the Industrial Area were identified for potential reuse in the June 1997 cleanup plan. DOE in consultation with stakeholders will make the final decision regarding building reuse.

SURFACE AND GROUND WATER CONTAMINATION

The signatory parties of the RFCA (DOE, CDPHE, EPA) are committed to the protection of water supplies of the downstream communities during and after cleanup. Protection of all surface water uses will be a basis for making interim soil and ground water cleanup and management decisions.

According to the RFCA's Preamble, when cleanup activities are completed, all on-site surface water and all surface and ground water leaving the site will be of acceptable quality for all uses, including domestic water supply. Ground water quality off-site will support all uses. On-site ground water will not be used for any purpose unrelated to the

¹⁷ Review of Radionuclides in Soils Cleanup Action Level Modeling. Draft Project Description (Corrected Version II). November 11, 1997.

cleanup.¹⁸ Because of the low yield (the rate at which wells can be pumped) of the uppermost water-bearing zone, it is unlikely to be used as a water supply source.

SPECIES OF SPECIAL CONCERN

Preble's Meadow Jumping Mouse has been found in each of the three main drainages at the site and its probable range includes drainages throughout the site (Figure 7). The U.S. Fish and Wildlife Service (USFWS) listed the species as threatened in May 1998. The USFWS, the Colorado Department of Natural Resources and other stakeholders are in the preliminary stages of developing a Habitat Conservation Plan for the species. Because of the sizable population and extent of suitable habitat for the species at the site, most of which is in the Buffer Zone, the site probably will play an important role in the future conservation of the species. The Fish and Wildlife Service typically requires a 100-foot buffer zone between development and suitable mouse habitat. The species is unlikely to affect future development of the Industrial Area.

Wetlands are located primarily along the site's drainages (Figure 6). Because of past site development, no wetlands are found in the Industrial Area outside the Protected Area. Wetlands are unlikely to affect future development of the Industrial Area.

The xeric tallgrass prairie found at Rocky Flats is very rare in Colorado and is one of the largest remaining in the state and perhaps in North America, according to the CNHP. It occurs to the immediately west and south of the Industrial Area. A number of the wildlife species at the site rely on these undisturbed grassland habitats. Activities that would disturb or fragment the xeric tallgrass prairie would reduce the value of this large intact ecosystem and the wildlife that rely on it.

The majority of the state species of concern are relatively rare in Colorado, but are not threatened globally. Currently, no legal protection under the Endangered Species Act or other legislation protects state rare species or plant associations. The following state rare species have the greatest potential for federal listing as endangered in the future. Montane sedge (*Carex oreocharis*) is an extremely rare Colorado plant species found in the Rocky Flats Conservation Site. It is uncommon globally, but its status is not well

¹⁸ Rocky Flats Cleanup Agreement, July 19, 1996, p.4.

known. The Arogos skipper (*Atrytone arogos*) and hops blue (*Celestrina* sp.) are imperiled butterflies in Colorado. The Arogos skipper is associated with the xeric tallgrass habitats and the hops blue was found in the upper Rock Creek drainage. The hops blue is imperiled globally, but there are taxonomic questions about the species.

For species not currently under consideration for listing, it is difficult to predict the future federal listing of threatened or endangered species. The listing process is typically slow and arduous due to staff shortages at the USFWS, lack of species data, the large number of species of concern, and political issues.

CULTURAL RESOURCES

The DOE entered into a Programmatic Agreement (June 1997) with the SHPO that describes how the DOE will protect historic facilities from adverse effects pending documentation of the properties' significant features for the National Archives.¹⁹ The Agreement covers activities associated with site cleanup and closure, such as deactivation, alteration, and demolition of site buildings. Under the Agreement, once a facility's features have been documented through photographs, drawings and a narrative report, the historically significant information has been preserved, and the facility itself no longer will require protection. No restrictions on demolition of or interior or exterior modifications to buildings that are primary or secondary contributors to the Historic District will remain after suitable documentation has been developed for the National Archives.²⁰

¹⁹ Programmatic Agreement among the Department of Energy Rocky Flats Field Office, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation regarding historic properties at the Rocky Flats Environmental Technology Site. June 30, 1997.

²⁰ Telephone conversations between Richard Trenholme, ERO Resources, Karen Hardy, SHPO, and Trisha Powell, DOE, November 1997.

**INDUSTRIAL AREA
INFRASTRUCTURE EVALUATION**

**Rocky Flats Environmental
Technology Site**

Prepared for:

Industrial Area Transition Task Force
Rocky Flats Local Impacts Initiative
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March, 1998

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EXECUTIVE SUMMARY

This technical memo presents an evaluation of the existing infrastructure systems serving the Industrial Area of the Rocky Flats Environmental Technology Site (RFETS) in Jefferson County, Colorado. The following systems are discussed:

- Electric Power Delivery and Distribution System
- Potable Water Supply System
- Sanitary Sewer Collection and Treatment System
- Natural Gas Delivery and Distribution System
- Roadway Transportation System

The evaluation of each system begins with a brief description of each of these systems in terms of on-site and off-site conditions. This is followed by a general discussion of the type and extent of modifications necessary for each of these systems to support redevelopment options for reuse of the Industrial Area. Schematic diagrams of the area of the Industrial Area being studied and schematic layouts of each of the primary infrastructure systems is also included.

Other infrastructure systems evaluated to a lesser extent include Steam Generation and Distribution, Solid Waste Collection and Disposal, Fire Protection and Hazardous Materials, Security, Telecommunications and Rail Service.

The following summarizes the major findings and conclusions of the infrastructure evaluation:

1. The infrastructure systems in place at the facility have been constructed over the life of the facility, primarily in the period of the 1950's through the 1980's. There has been very little recent construction and or upgrades to any of the systems. Current Department of Energy (DOE) policy is to "operate systems to failure".
2. Transportation to the site is via State Highways and County Roads. Redevelopment in the Industrial Area can be served by the existing regional transportation network without a noticeable decrease in level of service. Construction of additional regional transportation improvements, such as the "Northwest Parkway", will enhance access to the site and the surrounding area.
3. The on-site road system is in fair condition. If retained, it could serve existing buildings provided that improvements are made to create a looped system within the developed area. However, on-site roads do not meet current Jefferson County standards. If the on-site road system is demolished during cleanup then a new road system would be required to serve existing and future buildings. This could follow the current alignments of existing roads and could be constructed to current standards.

4. Currently, the City and County of Denver Board of Water Commissioners provides Rocky Flats with raw water through a contract with the Department of Energy (formerly the Atomic Energy Commission). After cleanup and possibly in the interim, it is possible that water service could be contracted with the City of Arvada, which has plans to serve the area to the west and has mains in 72nd Avenue, to the south. This would require the construction of a main along SH-93 and modification/replacement of an existing water main between SH-93 and the Industrial Area. DOE has a contractual obligation to provide water to support Buildings 060 and 061, which are privately owned buildings leased to DOE at the west entrance to the site.

Currently, raw water is treated on-site and is stored in elevated and at-grade storage tanks. To serve future on-site development, retention of the treatment plant (built in the early 1950's) is not feasible but retention and use of the elevated storage tank is possible. On-site distribution of potable water and provision of fire protection for buildings to be retained can utilize the existing trunk system, with modifications to isolate the zone from other areas and to create a looped system. If the on-site distribution system is demolished a new system will need to be constructed. Kaiser Hill is currently studying potable water supply options for the interim cleanup period to support the site.

5. There is an on-site wastewater treatment plant east of the Protected Area that currently serves Rocky Flats and releases treated effluent into the Walnut Creek drainage. This effluent is detained in special basins but is eventually discharged into the Great Western Reservoir, which is no longer used for drinking water storage. The existing wastewater treatment facility will be demolished during cleanup which may leave the site without treatment facilities during the interim period.

Kaiser Hill is currently studying wastewater treatment options for the interim cleanup period, which includes contracting for service. This would require extension of a main to SH-93 where it could tie into a main extending to the existing main in 72nd Avenue. Modifications to the existing on-site collection system would also be required, including combination of gravity mains and lift stations. If the existing on-site collection system is demolished, then a new system would need to be constructed to support redevelopment.

6. Electricity to the site is provided by the Public Service Company of Colorado, some of it under WAPA allocations. Facilities include two high voltage transmission line feeds to the Industrial Area and approximately four electrical substations. With minor modifications, a substation can be retained in the western portion of the Industrial Area to serve existing and future development. On-site electrical distribution could be retained to serve selected buildings. If the on-site electrical distribution system is demolished a new system would need to be constructed to serve redevelopment.
7. Natural gas is provided to the site under special Department of Defense contracts, which would need to be replaced by conventional service agreements if redevelopment of the site

occurs. The existing delivery and distribution systems appear to be adequate to serve on-site development. However, if these facilities are removed during cleanup, they would need to be replaced with new facilities to support redevelopment.

8. The existing central steam plant and above ground distribution system for building heating on the site are to be abandoned as the buildings are either vacated or demolished as part of the cleanup process. As necessary during the interim period, heating in individual buildings will be provided by individual boilers.
9. Solid waste service to the site is currently provided by private contractor and sanitary waste is disposed of off-site. A similar arrangement could be established for redevelopment in the Industrial Area. One cell of a four cell phase solid waste landfill has been constructed northwest of the Industrial Area in the Buffer Zone for use by the site's contractor. However, this facility has not yet been used. Additional permits (or amendments to permits) and maintenance would be required to convert this facility to non-DOE use. Because the facility has remained unused for a period of time, the integrity of the liner system would have to be evaluated prior to initiating use.
10. Fire protection and hazardous material response is provided by a crew and on-site fire station operated by the site's contractor. The high level of service reflects the materials and activities presently on-site. A new arrangement (possibly including the annexation of the area into an adjoining fire district or a cooperative arrangement with the DOE caretakers) would be necessary to provide future fire protection for redevelopment on the site, after cleanup.
11. Security for the site is provided by a private contractor and is related to nuclear facility requirements and the presence of plutonium on the site. These requirements will change once plutonium has been removed. Security services for the site after cleanup could be provided by private contract or by an arrangement with a neighboring jurisdiction.

Section 1: INTRODUCTION

The purpose of this Technical Memo is to summarize the findings regarding the on-site and off-site infrastructure related to the Industrial Area of the Rocky Flats Environmental Technology Site (RFETS). This evaluation was conducted in support of the analysis and planning effort undertaken by the Post Buckley Schuh & Jernigan (PBS&J) project team for the Industrial Area Transition Task Force of the Rocky Flats Local Impact Initiative (RFLII) between September, 1987 and February, 1998.

This evaluation is to be used as one of the factors to be considered in determining the future use of the Industrial Area after cleanup is complete. The report includes background information, a summary of the initial assumptions upon which this evaluation is made, information on the existing infrastructure systems both on-site and off-site to, and suggested improvements and or modifications to these systems that would need to be made in order to provide services to the site after cleanup if the site is redeveloped. A summary of findings and conclusions related to the individual infrastructure systems is also concluded.

For the purpose of this evaluation, the area referred to as the "Industrial Area" is depicted graphically on Figure 1.3. It includes the six buildings under consideration for retention (Buildings 125, 130, 130W, 131, 460, 440, and 850), two buildings that were considered for the National Conversion Pilot Project (NCPP) and the associated parking areas, drives, roadways, site entrance drives, and future expansion areas.

Section 2: METHODOLOGY

This evaluation is based on a variety of data sources that have been made available to the PBS&J design team between September, 1997 and February, 1998. Numerous visits to the Rocky Flats Site were conducted by PBS&J staff members over the course of this study. These visits involved visual observation and evaluation of the infrastructure systems, discussions with RFETS and sub-contractor utility and facility staff and extensive analysis of the physical condition of the various infrastructure system components. In addition, interviews were conducted in person and by telephone, with existing utility providers, potential service providers, authorities from surrounding jurisdictions, and other entities pertinent to this evaluation.

The majority of the information compiled and evaluated in this analysis was provided by the Department of Energy (DOE) and Kaiser-Hill Staff, through interviews, round-table discussions, and work sessions.

Existing reports, records, evaluations, service contracts, and previous recommendations were reviewed, and in some cases, information from those reports is incorporated herein. Specific reference to data compiled by others is footnoted.

The evaluation and presentation of this research concentrates on the following infrastructure component systems:

- Electric Power Delivery and Distribution System
- Potable Water Supply System
- Sanitary Sewer Collection and Treatment System
- Natural Gas Delivery and Distribution System
- Roadway Transportation System

Other infrastructure systems evaluated to a lesser extent include:

- Steam Generation and Distribution
- Solid Waste Collection and Disposal
- Fire Protection and Hazardous Materials
- Security
- Telecommunications
- Rail Service

Section 3: EVALUATION OF DATA

The evaluation of the individual infrastructure systems is presented in terms of the two distinct types of systems that serve existing facilities at Rocky Flats: (1) on-site infrastructure systems, and (2) off-site service provider systems.

The on-site systems were evaluated as to existing condition, useful life, ability to be converted to serve the portion of the site that is under consideration to be retained, and potential for expansion to serve the existing buildings and future development in the Industrial Area.

The following criteria and base assumptions were used for the evaluation of the on-site systems:

- The selective retention of portions of the existing infrastructure systems to serve the portion of the industrial area retained for development is possible and feasible from the viewpoint of DOE as long as the proposal does not increase costs. Although the current plan calls for systems to be "operated to failure", there are no regulations, requirements, or previous commitments that would preclude this selective retention and privatization of the utility systems.
- The transition to "private" operation of this portion of the Industrial Area will occur after cleanup, now planned in the year 2006 (Ten Year Plan).
- Normal and customary maintenance, repair, and replacement of the system components will occur under the stewardship of DOE and its contractor between the date of this evaluation and when these systems could be made available to the community. Portions of the infrastructure may be "privatized" before the Industrial Area (or portions thereof) is made available to the community, however costs for operation and maintenance would still be paid by DOE.
- In the cases where direct observation of the infrastructure system components is impossible, current adequate service to the facilities is considered "prima facie" evidence that the systems are currently in operable and adequate condition.
- The site will be remediated to the levels currently anticipated prior to transition of the Industrial Area, and there will be no adverse consequences related to residual contamination or radioactivity on the site.
- Infrastructure in the Protected Area (PA) will be eliminated during the clean-up process, as well as any systems in the Industrial Area that are not identified for retention.
- There will be no restrictions to full development within the portion of the Industrial Area that is the subject of this study. There will be no concerns related to excavation, removal of soil or debris, or groundwater contamination.

- The redevelopment of the site would generate demands on infrastructure systems similar to other industrial parks, office centers, research facilities, and similar districts currently in existence throughout the United States.
- Complete control, if not ownership, of the existing infrastructure systems will be transferred to the operators of the facility upon decommissioning and conversion to "private" operation.
- Storm sewer systems currently in use will remain intact as necessary to provide adequate site drainage within the areas to be retained. Because of a lack of information, no specific evaluation of this system is included in this report.
- At the time of this evaluation, selected buildings, specifically Buildings 125, 130, 130W, 131, 460, 440, and 850, have been preliminarily identified by RFLII for possible retention. Utility infrastructure would need to serve these buildings and possible future construction in the general vicinity. Two other buildings were set aside for possible use by the National Conversion Pilot Project.
- The current philosophy pursued by the facility operations staff within DOE and its sub-contractors is that of "operation to failure," meaning that the existing infrastructure systems are being repaired and maintained only to the extent absolutely necessary to assure the bare minimum levels of service required to sustain the current mission.
- The existing off-site service supply systems were investigated as to applicability to the retained service requirements, the ultimate service requirements, and any required improvements to allow service to the projected configuration of the site. In the case of potable water supply and sanitary sewer collection, projected extensions of existing systems to serve this site by surrounding service providers have been contemplated.

Section 4: INFRASTRUCTURE SYSTEMS

The following evaluations are separated into individual service categories. Maps of the portions of the on-site service systems suggested for "selective retention" are presented as figures within this report. Anticipated extensions of off-site services to the site are also presented on the area wide map.

The evaluations for each system begin with a description of the existing system, followed by recommended modifications to the system to serve the future development within the Industrial Area. Modifications to serve existing and future development are described in terms of on-site and off-site improvements.

Electrical Distribution System:

Existing System

"In general terms, the condition of the electrical system was found to be good. Substation transformer capacity is well above minimum requirements, resulting in above-average losses." ¹ This distribution system appears in good condition for its age, and can be expected to meet the requirements of the retained Industrial Area conversion with only normal maintenance.

Public Service Company of Colorado (PSCo) has had an exclusive franchise to provide electric service to the site. Western Area Power Administration (WAPA) power from its Loveland area project supplies approximately 15% of the current RFETS.

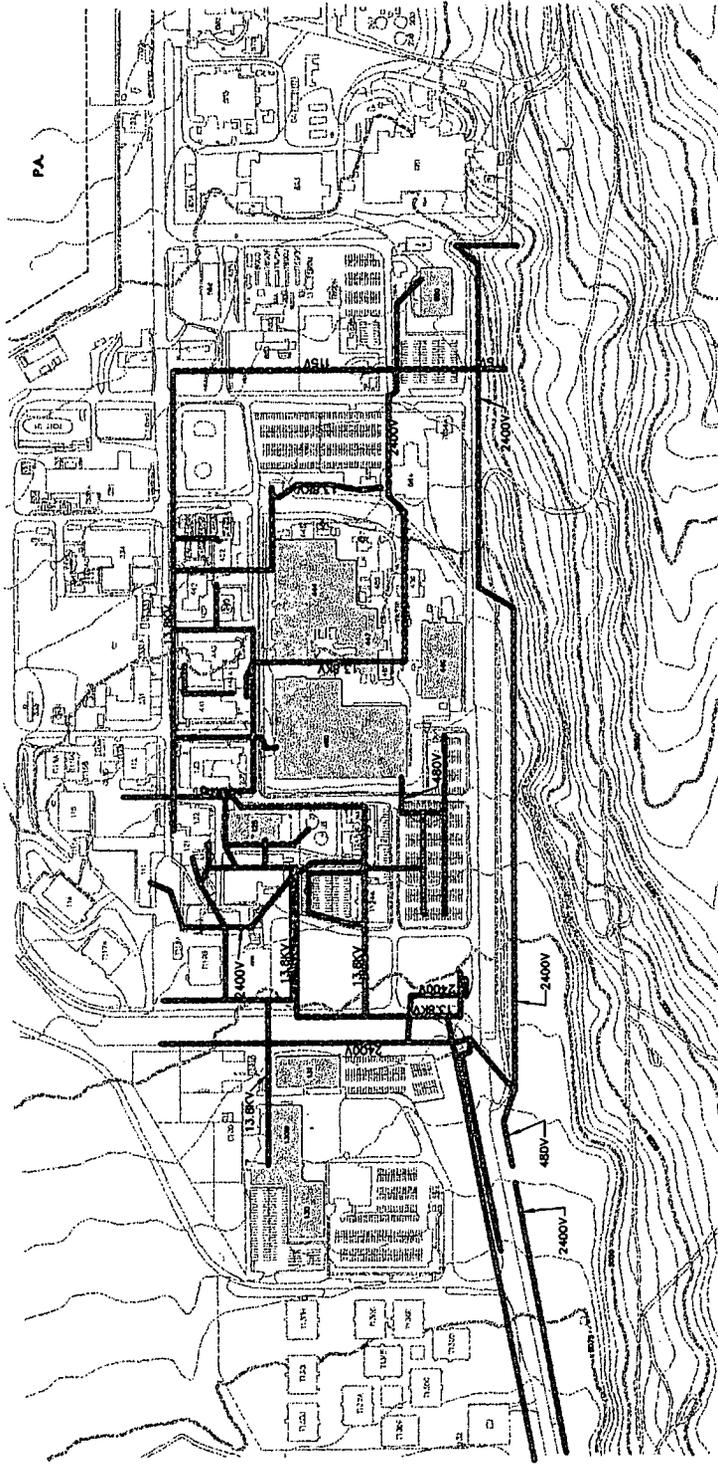
Electrical Power is currently supplied to the site via three 115 kV transmission lines from PSCo's Planview, Eldorado, and Ralston substations on the PSCo transmission grid. Two of these transmission lines serve the north switch yard to Rocky Flats, located north of the Protected Area (PA). The other line serves the PSCo substation (T132) located at the southwest corner of RFETS.

The area preliminarily identified for retention as the Industrial Area is currently served by the T132 substation feed. There are provisions to manually switch service from this feed to the two entering the site via the PA.

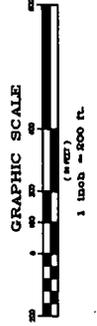
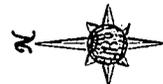
The medium voltage on-site distribution system consists of a combination of overhead and underground construction. Individual building transformers supplied by this system have secondary voltages ranging from 120/240V to 2.4/4.16kV.

PSCo has evaluated the existing electrical distribution system in terms of assuming the operation and maintenance of the system if the Industrial Area is redeveloped. PSCo has indicated that

¹ Utility Options Study: Phase 1 Final Report Rocky Flats Environmental Technology Site - ZRHD, Inc. March, 1997



PLANT ELECTRICAL LINES
MAIN LINE



PREPARED FOR
BOOTH PLANTS LOCAL IMPACT INITIATIVE
10000 W. BOOTH BLVD. SUITE 200
BOOTH PLANTS, CO. 80010

PLANT ELECTRICAL LINES CHANGE INSTRUMENTATION PLAN BOOTH PLANTS INDUSTRIAL TECH. CTR. GILBERT COUNTY, COLORADO		Drawn by Scale f = 800	Checked by File No.	Date Scale 6/24/00	No. REVISIONS Issued Appr.	Date
Job No. 6882	Drawn by [Signature]	Scale f = 800	Checked by [Signature]	Date 6/24/00	No. REVISIONS Issued Appr.	Date

Figure 1.1 Electrical System.

although it could maintain the current electrical distribution system as it is now configured, the 13.8 kV ("delta") system on-site is non-standard for PSCo, which normally uses a 13.2kV (four wire "y") system. This situation is the same as exists on other Federal installations in the region such as Lowry and Fitzimmons.

If PSCo were to assume ownership of the electrical distribution system at RFETS, it would plan on making significant investments to convert it to the PSCo standard. This is the same approach as PSCo is taking toward the redevelopment of Lowry and Fitzimmons. Because of this, PSCo has determined that these existing electrical distribution systems have zero financial value to PSCo.

Proposed On-Site Modifications

Based on the assumptions that the PA will be capped, and the existing facilities within that area removed or made unavailable, the retention of the T132 substation feed would seem to be essential. Secondary service from the existing feeds from the north would be considered. Retention of the existing on-site medium voltage distribution system and individual building transformers within the area projected to be retained is shown on Figure 1.1.

It is assumed that PSCo will own and/or operate all the on-site distribution systems when the conversion to private operation is achieved. Final design of any modifications to these systems will be at their direction however for the purposes of this evaluation, the extent of the system to be retained, and the proposed modifications to that system are assumed to be as detailed on Figure 1.1.

Proposed Off-Site Modifications

There are no off-site improvements anticipated that would be directly related to this project. PSCo may desire to make system improvements, however this would be beyond the scope of this study.

Potable Water Supply System:

Existing System

RFETS contracts with the Denver Water Department for raw untreated water from the Ralston Reservoir south of the plant site. DOE is responsible for transmission of this raw water to the site, which currently occurs via either open ditch in the summer months, and a pipeline from the reservoir during the winter months. The raw water is delivered to the site into a raw water holding reservoir on the extreme westerly portion of the site.

The contract with Denver Water² for this 1.5 million gallons per day has been the subject of much analysis of late, with the general consensus being that the contract will expire when DOE relinquishes the site to other than directly related services. There is a possible value to the contract with Denver, relating to the provisions of the Moffet Tunnel Supply agreements, and existing court decrees, however evaluation of these avenues fall outside the scope of this report.

RFETS currently operates a Water Treatment Plant (Building 124) on the site. This plant, built in 1953 has a capacity of 1 million gallons per day, roughly twice the current peak demand for the site. The plant is supplied raw water from the on-site holding pond via 12-inch and 10-inch mains. The treated water is pumped into elevated and ground level tanks with capacities of 300,000 gallons and 500,000 gallons respectively. The condition of the tanks is considered to be good at present.

The on-site water distribution system is a well looped system, with ample cross connections throughout the site. The majority of the system is comprised of cast iron piping, with some other materials such as ductile iron pipe used on a lesser basis. The overall condition of the system varies from poor to good, depending upon the area being studied. It has been reported that there are significant system losses due to leaks in the distribution system. However, soil conditions in the area are not particularly harsh to this pipe type, and failures have been primarily confined to areas where soil movement has physically displaced the pipe. Normal operating pressures for the system have been in the 62 psig to 65 psig range.

DOE also has a contractual obligation to provide water to support Buildings 060 and 061, which are privately owned buildings leased to DOE at the west entrance to the site.

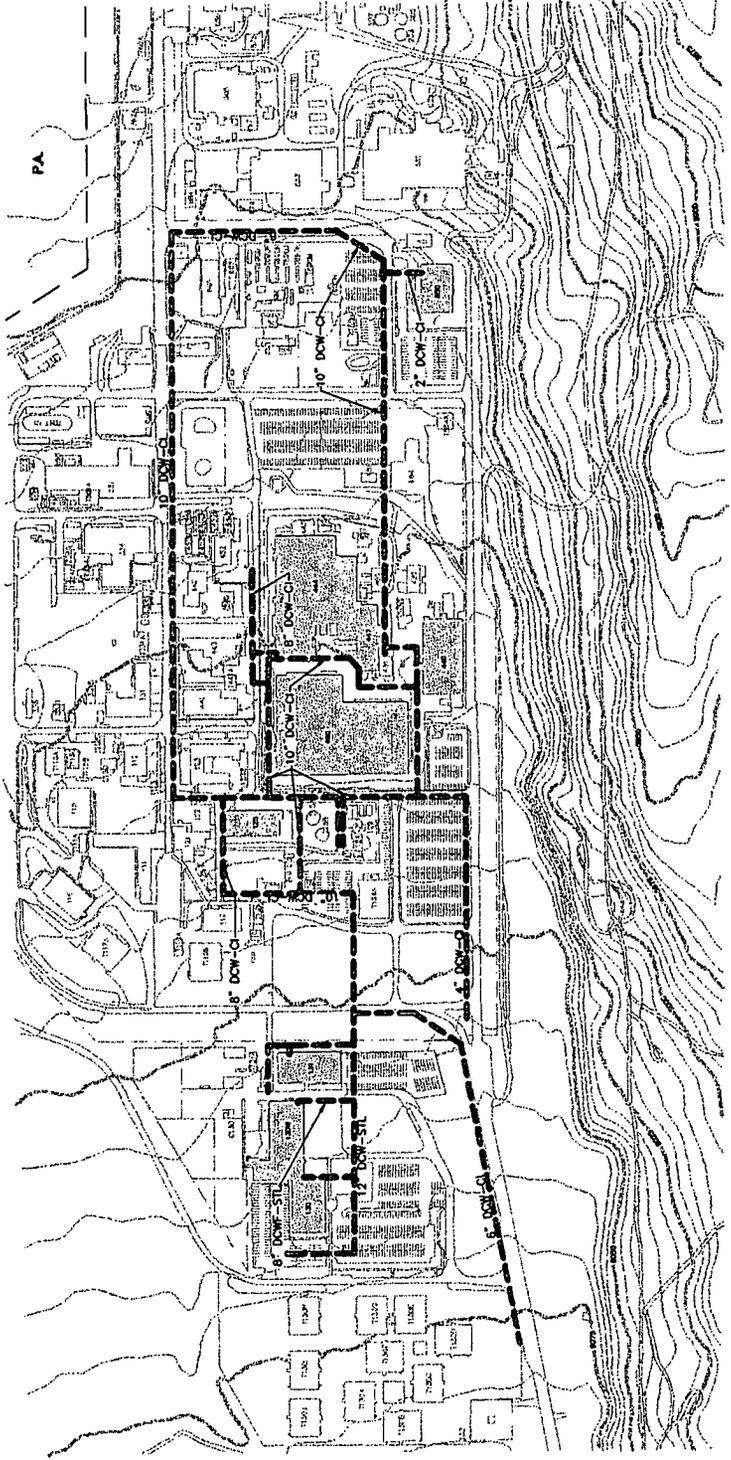
Proposed On-Site Modifications

Based on the projected service levels required for the initially retained Industrial Area, and the ultimate build-out demands, and factoring in the likelihood that raw water would not be readily available after privatization, the retention of the water treatment plant is not contemplated.

Retention of the on-site elevated water tank, and the portion of the distribution system shown on Figure 1.2 is recommended if the site is to be redeveloped. The elevated water tank will provide system storage, pressure control and fire protection for the reuse of the Industrial Area.

Some additional on-site construction is anticipated to adequately loop the portion of the system anticipated to be retained. In addition, many of the isolation valves and post indicating valves in the system cannot be operated, and have to be replaced to support redevelopment.

² "Contract for Sale of Raw Water", File No. 256, Doc. No. 326, 28 October, 1952, between City and County of Denver, Board of Water Commissioners, and The Dow Chemical Company and the U.S. Atomic Energy Commission.



PLANT DOMESTIC COLD WATER SYSTEM
MAIN LINE

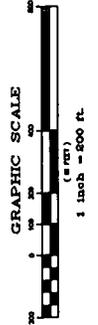
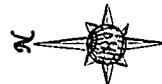


Figure 1.2 Water Distribution System

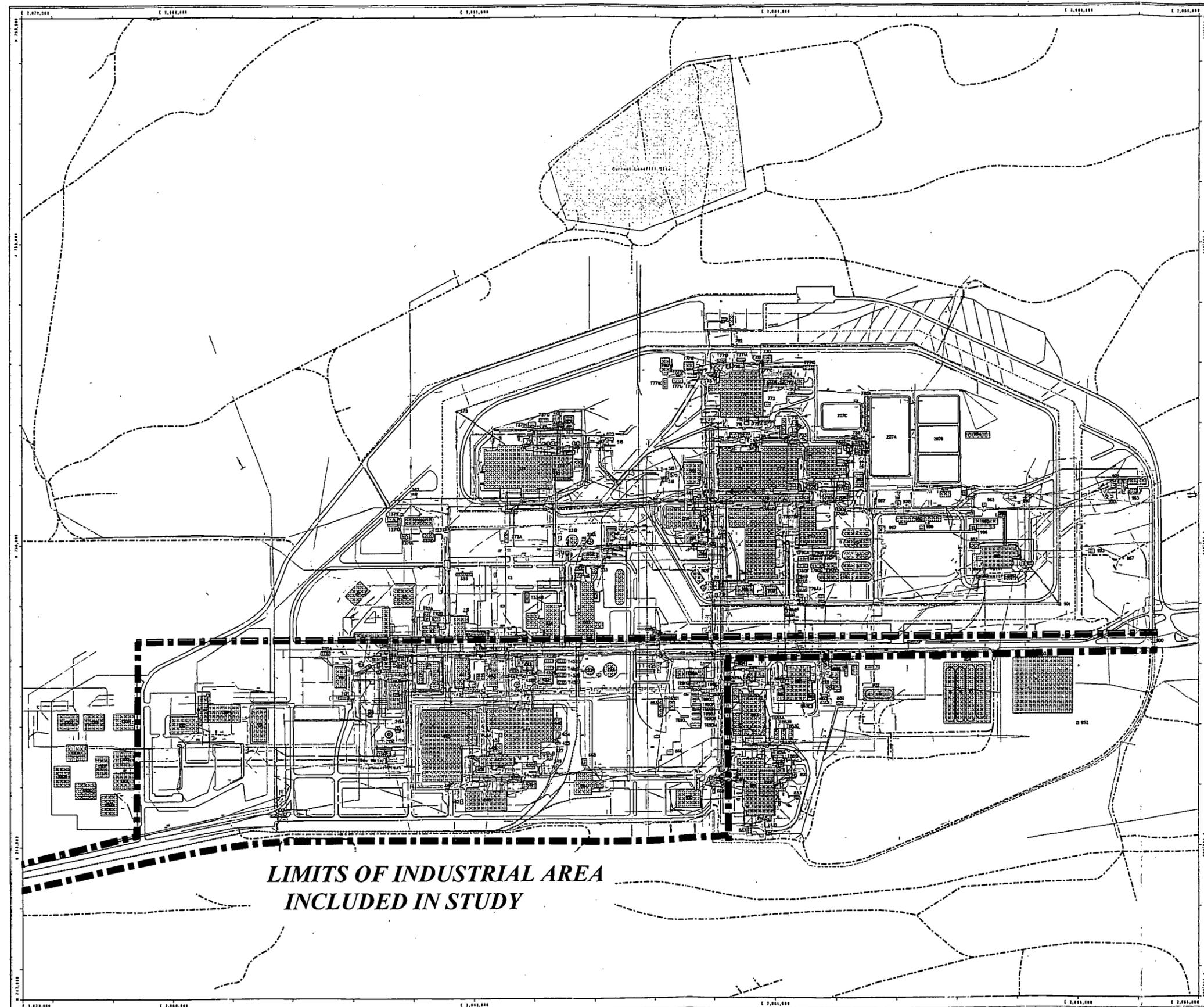
REVISIONS
NO. DATE
BY
DESCRIPTION

PLANT DOMESTIC COLD WATER SYSTEM
 ON-SITE INFRASTRUCTURE PLANS
 ROCKY FLATS ENVIRONMENTAL TECH. CTR.
 JEFFERSON COUNTY, COLORADO

Job No. 5682
 Sheet No. 1 of 1

Drawn by [Name]
 Checked by [Name]
 Scale 1" = 200'
 Date [Date]
 PLOT NO. [Number]
 PROJECT NO. [Number]

No.	REVISIONS	Date	Appr.	Date



**Rocky Flats Plant
Infrastructure
(Industrial Area)**
*** Draft ***

- EXPLANATION**
- Alarms
 - Communications
 - Electrical (above & below ground)
 - Natural Gas
 - Process Waste
 - Sanitary Sewer
 - Storm Drainage
 - Water
 - Abandoned utility lines

- Standard Map Features**
- Buildings or other structures
 - Fences
 - Paved roads
 - Dirt roads
 - Railroads

DATA SOURCES:
Map features, buildings, road names, etc. provided
by Facilities Dept., EG&G Rocky Flats, Inc., 1982.
Highway data for APP is believed to be from USGS O&A
data, 1981.



Scale: 0 500 1000
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

**LIMITS OF INDUSTRIAL AREA
INCLUDED IN STUDY**

U.S. Department of Energy
Rocky Flats Plant

Prepared by:
EG&G ROCKY FLATS
Rocky Flats Plant
P.O. Box 464
Golden, Colorado 80402-0464

MAP ID: INFRA-STR-A-01 May 11, 1984

Figure 1.3 Industrial Study Area

A water main from the off-site service main in State Highway 93 into the site would be required to support redevelopment. This is a distance of approximately 8,000 linear feet, and is contemplated as an 8 inch main. This extension is shown on Figure 1.3.

Additional replacement and supplemental mains may be required to complete the ultimate build out of the private Industrial Area, under a full redevelopment scenario, however the system shown on Figure 1.2 is intended to be adequate to provide potable water distribution to those buildings initially retained.

Proposed Off-Site Modifications

The Rocky Flats Industrial Area (and the entire RFETS) is not within the projected service area of any of the service providers in the vicinity of the site. The Jefferson Center Comprehensive Development Plan, approved by the Jefferson County Board of County Commissioners, the City of Arvada, and the Jefferson Center Metropolitan District, lists the RFETS as "*Planned Growth Area Jefferson Center / City of Arvada*"³

Discussions with the City of Arvada Utility Department staff, and with the Jefferson Center Metropolitan District (JCMD) staff indicate a willingness to provide services to this area.

The development of the Jefferson Center Metropolitan District within the City of Arvada is currently underway. Annexation of the land between State Highway 93 and Rocky Flats is the next phase, and is currently anticipated within 2 years. Water mains have been installed by the Jefferson Center Metropolitan District to the southwest corner of the site, at the intersection of State Highway 72 and State Highway 93. This is an 8 inch main, capable of supplying the demands of the anticipated retained Industrial Area.

The overall service plan for the Jefferson Center Metropolitan District involves extension of water mains along State Highway 93, past the west entrance to the site. The timing of this extension is unknown at this time, and it is not currently funded. Typically, these systems are funded by the Jefferson Center Metropolitan District through the sale of bonds, and once constructed by the Jefferson Center Metropolitan District, the mains are deeded to the City of Arvada for operation and maintenance. The Jefferson Center Metropolitan District does not have maintenance capabilities or facilities.

A possible scenario for providing water service to the Industrial Area would be for the user/developer of the Industrial Area to enter into a contract with, or annex into the Jefferson Center Metropolitan District for utility service to the site. This would allow the Jefferson Center Metropolitan District the opportunity to issue bonds for the construction of the necessary main extensions to the site. This service arrangement is available to the DOE for interim service to the site during the "de-construction" of the facility as well, and if used in that manner, may be the fore runner to the service plan for the private use industrial site. It is generally known that DOE

³ Jefferson Center Comprehensive Development Plan Figure 1 - August 1, 1989

and its contractors have had discussions with the City of Arvada regarding the provision of utilities to the site during clean-up and decommissioning phases of the current mission.

The main extension along State Highway 93 is anticipated as an 8 inch main to lie within the right-of-way for SH-93.

Sanitary Sewer Collection System:

Existing System

The sanitary sewer collection and treatment facilities at RFETS consist of seven lift stations, approximately 30,000 liner feet of gravity sewer mains, and a sewage treatment plant located at the eastern edge of the PA. The existing collection system is divided into two zones to serve the PA and the remaining site.

The existing system is a combination of cast iron, vitrified clay, ductile iron, and polyvinyl chloride pipe (PVC).

The resultant dried sludge from the treatment processes is currently stored on the RFETS site as low level radioactive waste. Capacity of the plant is 500,000 gallons per day, however the efficient operating levels are somewhat lower.

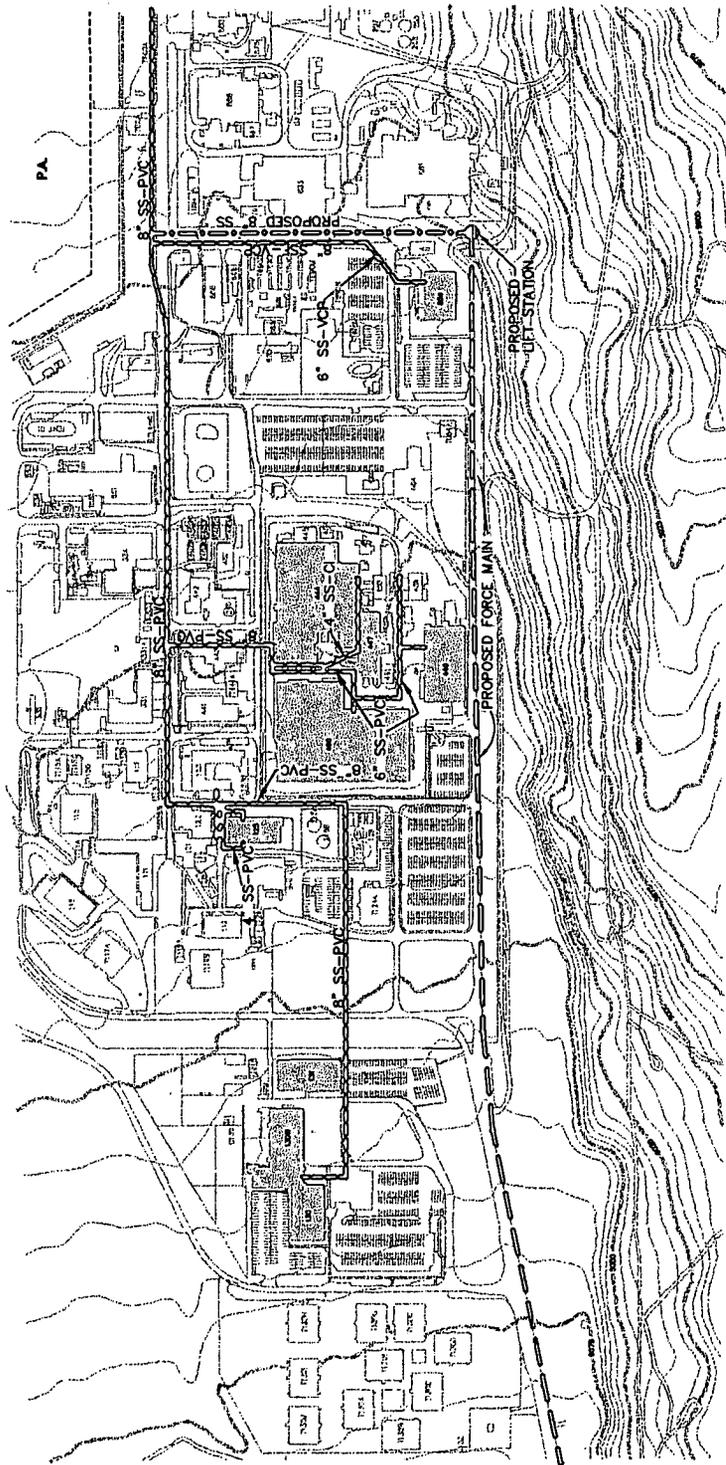
There is substantial infiltration of storm water runoff during periods of heavy rainfall. Studies have been done that indicate that the amount of infiltration is typical to systems in the area, and that it would not be cost effective to improve the system.⁴ However, this study dealt with the overall system on site, and was not confined to the portion of the system considered for reuse that is discussed in this evaluation.

Proposed On-Site Modifications

One of the base assumptions for this evaluation was that the sanitary sewer treatment plant would be decommissioned and removed during the cleanup process. Both on-site collection system zones pass through the PA as they approach the treatment plant, hence those portions of the collection system are unavailable for retention to serve the Industrial Area.

Discussions with DOE and its operating contractor the Kaiser-Hill Company indicate that the current clean-up plan calls for removal or abandonment of all sanitary sewer facilities. For purposes of this report, it is assumed that selected portions of the collection system not within the PA will be made available for retention. The portions proposed to be retained are shown on Figure 1.4.

⁴ "Interim Report, Sanitary Sewer Infiltration Inflow and Ex-filtration Study," Advanced Sciences, Inc. December 18, 1990.



PLANT SANITARY SEWER SYSTEM
MAIN LINE

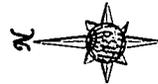


Figure 1.4 Sanitary Sewer Collection System

PREPARED FOR
BOONVILLE LOCAL GOVT. WITH THE
ADVICE OF THE BOONVILLE
PLANT SANITARY SEWER BOARD

		PLANT SANITARY SEWER SYSTEM CONSTRUCTION PLAN BOONVILLE SANITARY SEWER BOARD JEFFERSON COUNTY, COLORADO	
Job No.	Drawn by	Scale	Checked by
5822	W. J. ...	1" = 500'	...
Sheet No.	Date	Plot No.	Drawn by
1 OF 1
No.	REVISIONS	Issued	Drawn

The portions of the system proposed to be retained to serve the Industrial Area consist of primarily newer 8 inch PVC pipes. PVC piping tends to limit infiltration, so it is likely that this area does not have substantial infiltration of runoff into the collection system. The retained system should be inspected and filmed to determine the condition, and to evaluate the possible need for slip-lining or other repair or replacement options.

The retained portions of the sanitary sewer collection system generally flow with the gradient from west to east. At the eastern end of the retained systems, a new 8 inch PVC gravity main would have to be installed to take the sewage to a proposed lift station and force main. This lift station and force main would deliver the sewage to the off site system described later in this evaluation.

Proposed Off-Site Modifications

The sanitary sewer service issue is closely linked with the issues of water service to the site. The discussions to date with The City of Arvada and the Jefferson Center Metropolitan District have linked water and sanitary sewer together as one issue. The potential for service for sanitary sewer collection and treatment are similar to those discussed in the previous section dealing with the water system. The "*Clear /Upper Coal Creek Facility Plan - Recommended Plan*"⁵ describes the sanitary sewer infrastructure to be constructed in the vicinity of RFETS over the life of the recommended facility plan.

The City of Arvada is currently planning for the extension of a 15 inch sanitary sewer main from Alkire to SH-93. Preliminary design is already complete but the project has yet to be funded. The next construction phase will be from Alkire to Indiana, which will occur in 1998.

The timing of extensions beyond Indiana is subject to development demands in the area. However, the projected needs of the Jefferson Center (tied to market demand), integrated with the potential demands of RFETS would tend to indicate that extension of the portions of the sanitary sewer collection system proposed in this area is feasible.

The referenced plan calls for extension of a 15 inch gravity sewer main from the existing "North Arvada Trunk Line" to the intersection of State Highways 72 and 93. A new lift station is proposed to be located near the Northwest corner of the RFETS property, on SH-93. A 10 inch force main is proposed from that location south to the intersection of SH-93 and SH-72.

Discussions with the City of Arvada Utilities Planning staff indicate that the location of the lift station is subject to revision, and may well be best located within the RFETS area if service to that area is requested, and annexation into the appropriate District occurs. Construction of this off-site infrastructure would afford DOE the option of sanitary sewer service during the interim period of "de-construction", and as an alternative to continued on-site treatment. At some point

⁵ "Clear/Upper Coal Creek Facility Plan - Recommended Plan", Camp Dresser & McKee, Inc., Figure 9-1 Provided by the City of Arvada Utilities Department, Oct. 1997.

during the deconstruction, the sanitary sewer flows will diminish to a level too low to sustain the processes required for treatment of the influent. The availability of sanitary sewer service could be of great benefit to the cleanup process, in lieu of individual collection facilities for the remaining facilities.

Natural Gas Delivery and Distribution System:

Existing Distribution System

The existing on-site natural gas distribution system is served by the main gas feed from Western Slope Gas at the pressure reducing and metering station located on the southern limits of the Industrial Area. From there, natural gas is distributed throughout the site via above ground and buried steel pipes. The distribution pressure is maintained at 50 psig by this station.

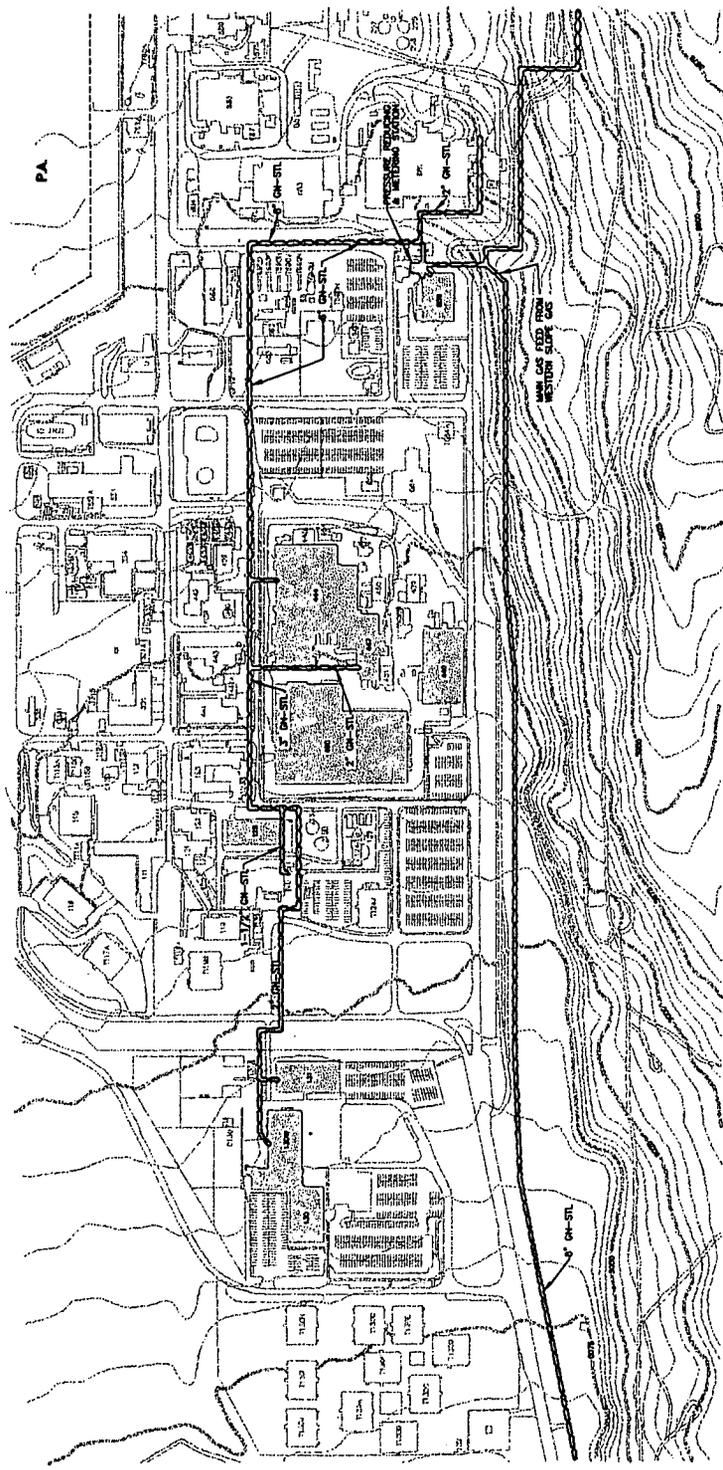
The existing distribution system can be generally classified as being in good condition, with some notable exceptions. Field surveys and discussions with utilities staff indicate that there are many older abandoned underground sections of the gas distribution system, the location of which are not precisely known. Some of these sections are still under pressure, because of inoperative or missing isolation valves.

It is assumed that the known portion of the distribution system pertinent to the planning of the retained portion of the Industrial Area will be cleared of any of the abandoned mains during the cleanup phase of the decommissioning of RFETS.

PSCo has evaluated the existing natural gas distribution system in terms of assuming the operation and maintenance of the system if redevelopment of the Industrial Area occurs. PSCo has indicated that although the existing infrastructure could be used on an interim basis, the existing system is non-standard as far as PSCo is concerned and would have to be replaced in the long term. Therefore, PSCo has determined that the existing natural gas distribution system has zero financial value to PSCo.

Existing Transmission System

Natural gas is transmitted to the site via an 8 inch steel gas main entering the Industrial Area at the south central portion of the site, immediately east of Building 850. This gas currently is supplied to the site under contractual arrangements arranged on behalf of the site by the Defense Fuel Supply Center. This gas is delivered to PSCo's transmission facilities, and transported to the site via PSCo's systems. The on-site distribution system downstream from the metering station is owned and operated by RFETS. Other contractual arrangements would need to be made with PSCo and Western Resources for continued service upon decommissioning, however it is likely that the transmission system to the site would be capped and remain in place.



PLANT NATURAL GAS
MAIN LINE

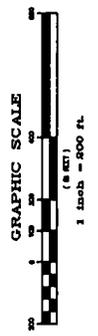
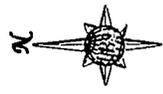


Figure 1.5. Natural Gas Delivery and Distribution System

REVISIONS FOR
ROCK FLATS LOCAL SERVICE DISTRICT
JOB NO. 0822
DATE 11/10/00
BY J. B. BROWN

PLANT NATURAL GAS ON-SITE DISTRIBUTION PLAN ROCK FLATS ENVIRONMENTAL TECH. CTR. JEFFERSON COUNTY, COLORADO		Drawn by Checked by Scale 1" = 100' Date 11/10/00	Job No. 0822	Sheet No. 1 OF 1	No. REVISIONS Date Title Appr. Date
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Proposed Modifications

The portion of the on-site natural gas distribution system proposed for retention to serve the private Industrial Area is shown in Figure 1.5. This portion of the system varies in size from 2 inch diameter to 8 inch diameter steel pipe. This retained distribution system is generally oversized, in that it has been designed to service a much larger demand than that would occur if the Industrial Area were redeveloped.

Since the central steam plant that provides steam for heating for much of the site will be demolished as a part of the clean up plan, individual buildings selected for retention will have to have some sort of individual heating systems, the most likely being decentralized individual gas fired heating systems for each building.

Some minor modifications to this portion of the system are anticipated in view of the conversion to individual heating systems, such as an extension of service lines to buildings 460 and 440. No modifications are anticipated to the off-site gas delivery systems, other than revised contractual arrangements.

Roadway Transportation System:

There has been much discussion recently regarding the overall traffic and transportation needs of the Northwest Denver Metropolitan Area, of which RFETS is a prime concern. The previously proposed "Northwest Parkway Corridor" expansion of State Highway 93, and the subsequent connection of C-470 to E-470 is a controversial issue and has been subject to both criticism and support by the area residents. Specific positions of area municipalities are documented in an "issues paper" prepared by Jefferson County.⁶ Future transportation requirements and facilities for the northwest quadrant, including the area surrounding Rocky Flats, are the focus of a planned study to be undertaken by the Denver Regional Council of Governments (DRCOG), Jefferson County and surrounding jurisdictions, scheduled to begin in the Fall of 1998.

The current and past employment at RFETS has ranged from 5,000 to 8,000 people. Traffic patterns and transportation systems currently in place have adequately provided for these demands in the past. High peak hour traffic levels occur on some adjoining streets that serve Rocky Flats, such as Indiana north and south of the east access road and 96th Avenue near the intersection with Indiana. Current expansion of regional facilities such as Interlocken Advanced Technology Center, continued development of the US-36 corridor, development south of the Jefferson County Airport and the potential development of the Jefferson Center in Arvada will strain the transportation systems in the area.

⁶ "Northwest Parkway Issues Paper", Supplement to Countywide Transportation Plan, Jefferson County, Colorado 1997

The designated route for removing radioactive waste from RFETS includes SH-93, SH-128, US-36, Interstate 25, Interstate 225, and Interstate 70. These and other factors will be taken into consideration in the planned northwest quadrant transportation study.

Existing On-Site Roadways and Parking Facilities

The area proposed to be retained is served by two major streets. Central Avenue, an extension of East Road from the east entrance to RFETS, and Cactus Avenue, and extension of West Road from the west entrance to RFETS provide access to the Industrial Area. These two major roadways are connected by a series of north-south streets from First Street through Eight Street.

Parking areas and paved industrial service areas tend to commingle somewhat throughout the Industrial Area. Paved parking areas exist in general proximity with the buildings.

The condition of the roadways, drives, and parking areas at RFETS can be divided into two sub-categories, those being "Surface Condition" and "Structural Condition".

The structural condition of the roadways and parking areas can be categorized as good. This pertains to the structure of the roadways, the base and sub-grade of the systems, and their ability to withstand major loads without deformation, shifting, and heaving. Ground conditions in the vicinity of RTETS inherently provide good structural support for roadways and building foundations. Unlike many areas within the Front Range, there is an abundance of cobble and rocks within the soil, that when properly excavated and graded, can provide excellent support for the roadways.⁷

The surface condition of the roads, drives, and parking lots is characterized as poor. There has been little on-going maintenance aimed at providing longevity to these systems, because of the policies of "operating to failure" of the systems. Many areas appear to have less than the desired thickness of surface paving. There is evidence of surface wear, cracking, and spalling of the asphalt surfaces.

In general, there appears to be adequate paved parking areas to provide for the demands of the buildings. Some of the parking layout is not the most convenient to the building locations, but can be classified as adequate for service. However, parking areas generally lack light lighting and sidewalks.

Existing Off-Site Systems

As discussed above, the existing employment base of from 5,000 to 8,000 employees have been transported to the site via the existing roadway system. The system has experienced delays in the past, but has been reasonably adequate to serve the facility.

⁷ "Soil Survey of Golden Area, Colorado" U.S. Department of Agriculture, Soil Conservation Service and Jefferson County, 1980.

Major roadways serving the site include State Highway 93, US-36, Indiana Street and McCaslin Blvd., and SH-128. There is a rail spur line from the Southern Pacific/Union Pacific Railroad serving the site. This spur enters the south boundary of the Industrial Area from the west, and turns north into the site at Building 440.

Proposed Improvements/Modifications

The proposed improvements to the street system at RFETS include the connection of Central Avenue through from its current westerly end to First Street. This is a distance of approximately 900 linear feet. This connection will facilitate emergency and fire access throughout the retained area.

A second major on-site improvement is the connection of Eighth Street south the Cactus Avenue near Building 850. This would complete the on-site looping of main roadways.

There are many parking areas and drives within the site that will require overlays of wearing course paving to bring the systems to levels required for service to the proposed retained industrial buildings. These improvements can be phased as each building is brought "on-line" after the completion of the deconstruction of the remainder of RFETS.

Improvement of the off-site transportation networks is an issue that is being addressed by the communities comprising the Northwest Metropolitan Area task forces, and as a regional issue, are not addressed in this report.

Other Infrastructure Systems

Steam

The existing central steam plant and above ground distribution system for building heating on the site are to be abandoned as the buildings are either vacated or demolished as part of the cleanup process. As necessary during the interim period, heating in individual buildings will be provided by individual boilers.

Solid Waste

Solid waste service to the site is currently provided by private contractor and sanitary waste is disposed of off-site. A similar arrangement could be established for redevelopment in the Industrial Area. One cell of a four cell phase solid waste landfill has been constructed northwest of the Industrial Area in the Buffer Zone for use by the site's contractor. However, this facility has not yet been used. Additional permits (or amendments to permits) and maintenance would be required to convert this facility to non-DOE use. Because the facility has remained unused for a period of time, the integrity of the liner system would have to be evaluated prior to initiating use.

Fire Protection

Fire protection and hazardous material response is provided by a crew and on-site fire station operated by the site's contractor. The high level of service reflects the materials and activities presently on-site. A new arrangement (possibly including the annexation of the area into an adjoining fire district or a cooperative arrangement with the DOE caretakers) would be necessary to provide future fire protection for redevelopment on the site, after cleanup.

Key components of future fire protection for future development of the Industrial Area include retention of the on-site water tower and the looping of the on-site water system and the roadway systems.

Security

Security for the site is provided by a private contractor and is related to nuclear facility requirements and the presence of plutonium on the site. These requirements will change once plutonium has been removed. Security services for the site after cleanup could be provided by private contract or by an arrangement with a neighboring jurisdiction.

Telecommunications

The existing on-site telephone system serving RFETS is outdated. It is assumed for purposes of this report, that new on-site telecommunication lines would be installed to serve the demand created by development of the Industrial Area.

Rail Service

Retention of the on-site rail lines would have the added benefit of offering the alternative of rail service to the site for future uses.

Other Services

In order to assure proper service pertaining to public right-of-way maintenance, emergency services, cable TV and other services, future development of the Industrial Area would require one of the following: (1) establishment of an independent maintenance entity(s) for the site, (2) inclusion into an existing entity (such as the City of Arvada, Jefferson Center Metropolitan District, or other appropriate jurisdictions), or (3) arrangements for out-of-district service by these or other entities.

In addition, it may be desirable and necessary to establish an on-site entity to provide maintenance of signage, landscaping, common areas and parking facilities, and administration of protective covenants, depending upon depending on the structure of ownership and management of the Industrial Area after cleanup.

Section 5: SUMMARY OF FINDINGS AND CONCLUSIONS

The evaluation of the infrastructure systems presented in this Technical Memo is of necessity, limited in scope. More detailed analysis of the existing conditions, locations, type, serviceability, and current code compliance aspects of each infrastructure system should be undertaken as part of the detailed planning for the future use of the Industrial Area.

The evaluation summarized in this report is intended to present an overall view of the extent to which the current infrastructure systems can be detached from the overall site systems, served via outside sources, and developed to serve the retained area after the clean up and "deconstruction" phases of the plant decommissioning are complete and the site is made available to the community.

It is the conclusion of this evaluation, that with relatively minor on-site improvements, the infrastructure systems proposed for selective retention in the Industrial Area can be isolated from the remainder of the site and modified to serve industrial uses during the initial phase of redevelopment of the site. These systems could serve as a "backbone" for existing buildings to be retained and for interim development. In the long term, however, major portions of the existing infrastructure systems (in particular, electrical and gas distribution) would have to be replaced and modifications would have to be made to all systems to bring them up to the applicable civilian standards.

The off-site service extensions necessary to accomplish this conversion are much more significant in scope, and will be somewhat dependant on the service demands during the deconstruction sequence itself, as well as the pace of development in the surrounding areas.

Taken together, the cost of rehabilitation of on-site infrastructure for interim development and construction of new water and sewer extensions to reach the site are in the range of \$3-\$5 million.

The most financially attractive scenario for extension of water and sewer services to the site is to develop off-site extensions of infrastructure to the site in conjunction with surrounding development, on a shared-cost basis. To accomplish this, it might be feasible that the cleanup process be coordinated with the provision of new off-site utilities in order that new utilities reach the site and facilitate future development of the Industrial Area.

The "worst case" scenario for the extension of utility services to the site would be to attribute the entire burden of cost and service demand to future users of the Industrial Area. However, even for this scenario, the cost of extension to the site would not be a prohibitive burden to future development of the Industrial Area because utilities are already relatively close to the site. This conclusion assumes that a redevelopment of the Industrial Area would be of a sufficient magnitude to justify the off-site infrastructure investment.