

Environmental Restoration

A Periodic Update on Environmental Restoration at Rocky Flats Cleanup



April/May 1993

EG&G ROCKY FLATS

Protection of Groundwater at the Rocky Flats Plant - An Ongoing Project

We often hear the term groundwater aquifer and water table and we may understand that these terms are very important without knowing exactly what they mean. Groundwater can be described simply as the subsurface water that occurs beneath the water table in soils and geologic formations that are completely saturated. The Rocky Flats Plant is located in a regional

groundwater recharge area which is an area where water from precipitation streams ditches and pond infiltrate through the near surface unsaturated zone to the saturated zone at some depth. The water table is the boundary between these two zones.

Aquifers are groundwater sources. An aquifer is an underground geological formation that is capable of yielding a significant amount of water to a well or a spring. The water table aquifer at Rocky Flats is primarily unconsolidated alluvial material which is clay silt sand gravel or similar material deposited by running water. It includes the Rocky Flats Alluvium and in the western part of the plant where the thickness of the alluvial material is the greatest the depth of the water table is 50 to 70 feet below the surface.

The protection of groundwater is important to everyone involved with the Rocky Flats Plant especially those citizens who live closest to the plant and employees who work at the plant every day.

Groundwater protection at Rocky Flats is the prevention monitoring and remediation of contaminated

groundwater near and in the vicinity of the plant. Protection is achieved through ongoing monitoring activities and if necessary appropriate treatments.

Groundwater monitoring for radionuclides and other constituents has been conducted at Rocky Flats since the first monitoring wells were installed near the Solar Evaporation Ponds in 1960. Prior to 1981 the groundwater monitoring program was voluntary and was poorly implemented. However in November 1981 the groundwater monitoring program became subject to state and federal regulations.

The new regulations required the submittal of a groundwater monitoring program plan to the Environmental Protection Agency. In 1986 a new groundwater monitoring plan was submitted and was revised again in 1988.

A new document the Groundwater Protection and

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Water quality is an important issue to those who live with Rocky Flats. This section is from which plans for the future of the plant.

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Monitoring Plan was developed in 1991 to define describe and evaluate the groundwater and monitoring program at Rocky Flats and to comply with Department of Energy Order 5400 1 the Resource Conservation & Recovery Act (RCRA) and the Colorado Hazardous Waste Act (CHWA) The document is reviewed annually and the entire program is kept current and modified a requirements and program needs change

As part of the Groundwater Protection and Monitoring Plan 371 wells and piezometer are included in the program The program has been designed to measure the concentration of hazardous constituents and assess the rate of movement of those constituents

The groundwater protection action of the program involves interpretation of quarterly

groundwater data and subsequent treatment of contaminated groundwater Any activity that could have an adverse effect on groundwater quality must be reviewed by the hydrogeology staff and assessed against National Environmental Policy Act RCRA and CHWA regulations A restoration project can only begin after it has been determined that the activity will not have a negative impact on the environment Projects that involve excavations or other intrusive work are of particular concern because these activities could damage the groundwater by introducing contamination or by inadvertently providing new routes of migration through which existing contamination might spread

Included in the monitoring program are
 a network of background wells
 a network of monitoring wells

- a monthly measurement of water elevations
- a quarterly sampling and analysis program
- an assessment program
- a program for reporting information to the appropriate regulatory agencies on a quarterly and annual basis
- a well abandonment and replacement program
- an annual evaluation program
- a protection program and
- a special projects program

To counter any accidental spills of hazardous or mixed waste Rocky Flats has a specially trained hazardous materials response team that can respond quickly to spills This capability is intended to assure that spills will not pose a threat to groundwater resources in the area

Public Invited to Use Reading Rooms

The following reading rooms contain current information technical reports and reference documents on environmental restoration at the Rocky Flats Plant

Rocky Flats Plant Reading Room
Front Range Community College Library
 3645 West 112th Avenue
 Level B Center of Building
 Westminster Colorado 80030
 (303) 469 4435

Hours
 Monday Tuesday 12 00 pm 8 00 pm
 Wednesday 11 00 am 4 00 pm
 Thursday Friday 8 00 am 4 00 pm

Colorado Council on Rocky Flats
 1536 Cole Boulevard Suite 325
 Denver West Office Park Building 4
 Golden Colorado 80401
 (303) 232 1966

Hours
 Monday Friday 8 30 5 00 p

EPA Superfund Records Center
 999 18th Street Suite 500
 Denver Colorado 80202 2405
 (303) 293 1807
Hours
 Monday Friday 8 00 am 4 30 pm

**Colorado Department of Health
 Hazardous Materials and Waste
 Management Division**
 4300 Cherry Creek Drive South
 Bldg B 2nd Floor
 Denver Colorado 80222 1530
 (303) 692 3312
Hours
 Monday Friday 8 00 am 5 00 pm

Standley Lake Library
 8485 Kipling Street
 Arvada Colorado 80001
 (303) 423 1000
Hours
 Monday Friday 10 00 am 9 00 pm
 Saturday 10 00 am 5 00 pm
 Sunday 12 00 pm 5 00 pm

**United States Department of Energy
 Freedom of Information and Privacy
 Branch Office**
 1000 Independence Avenue S W
 Washington D C 20585
 (202) 586-6025
Hours
 Monday Friday 9 00 am 4 00 pm
 (Eastern Time Zone)

*Information Repository

at the Rocky Flats Plant

Natural Drainage

Several ponds, creeks, and streams are scattered throughout the Rocky Flats buffer zone. These are considered surface water, and because of Rocky Flats's proximity to the Denver metro area and the plant's previous mission, the water is sampled and monitored every day. This surface water monitoring program was established several years ago at the Rocky Flats facility and is presently being supervised by EG&G personnel.

Three drainage basins and temporary streams cut across the plant and surface water flow generally from west to east. The Rock Creek drainage basin traverses and drains the northwestern portion of the plant's buffer zone and is entirely separate from the operational plant complex.

The Woman Creek drainage basin traverses and drains the southern portion of the site. Although this basin is located primarily in the buffer zone, it does extend into the extreme southern boundary of the plant complex. An interceptor ditch (South Interceptor Ditch) is located between and parallel to Woman Creek and the southern boundary of the plant complex. The relatively small quantity of surface runoff that flows from the southern boundary of the plant complex toward Woman Creek is intercepted by this ditch. This intercepted flow eventually ends up in detention pond C-2.

Surface runoff not captured by the South Interceptor Ditch runs into Woman Creek, which flows east to Standley Lake, a water supply for the City of Westminster and for portions of the cities of Northglenn and Thornton. Woman Creek also delivers some water offsite to Mover Reservoir.

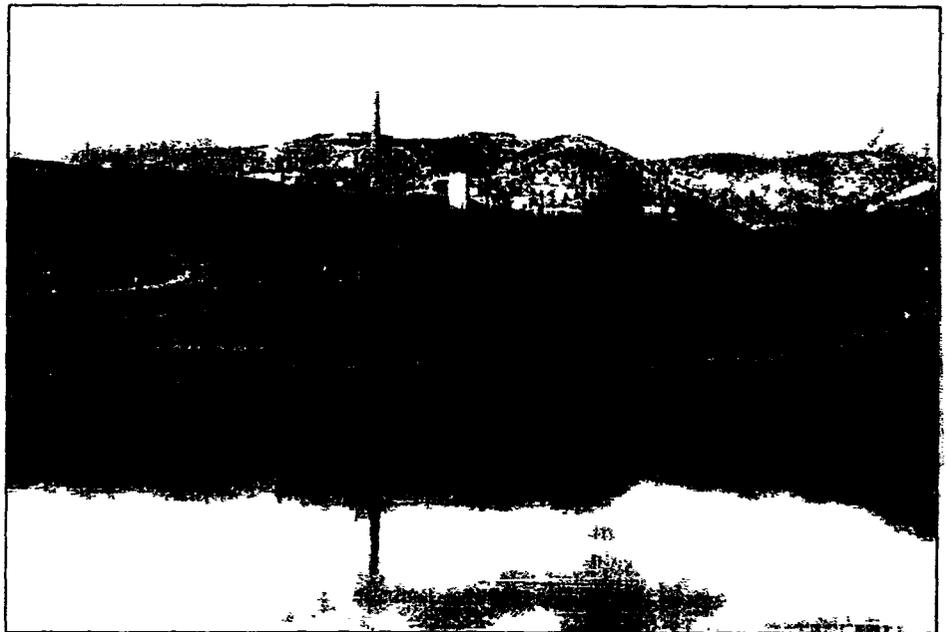
The Walnut Creek drainage basin traverses the eastern, northern, and northeastern portions of the Rocky

Flats site and receives runoff from the majority of the plant complex. Three seasonal streams are tributaries to Walnut Creek: Dry Creek, North Walnut Creek, and South Walnut Creek (which receives most of the runoff from the plant complex). These three forks of Walnut Creek join in the buffer zone and until 1989 flowed east offsite into the Great Western Reservoir, a water supply for a portion of the City of Broomfield. The City of Broomfield built the Broomfield Diversion Ditch to divert Walnut Creek around Great Western Reservoir.

constructed at Rocky Flats to control the release of plant discharges and surface runoff. The ponds located downstream of the plant along North Walnut Creek are designated A-1 through A-4. Ponds on South Walnut Creek are designated B-1 through B-5. The pond series receive runoff from the plant.

Regulatory Overview

Several federal and state regulations as well as Department of Energy Orders govern oversight and management of stormwater and wastewater discharge. These regulations and orders are often



Ponds are a major surface water located at the Rocky Flats Plant.

Ditches and Diversions

In addition to natural flows and the South Interceptor Ditch, there are seven ditches or diversion canals in the general vicinity of Rocky Flats. The Upper Church, McKay, Kinnear, and Rock Creek Ditches are the most

Detention Ponds and Drainage

Detention ponds are used for

complex and in some cases conflict with best management practice. Because of such conflicts, simultaneous adherence to regulations is a continuing challenge.

The primary water law governing the Rocky Flats water program is the Clean Water Act, which is augmented by secondary state and federal regulations. The Clean Water Act

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Wetlands Reconstructed in Operable Unit 1

Operable Unit 1 is located south of the Rocky Flats Plant on a south facing hillside that slopes down from Building 881 to Woman Creek. Topographically the highest point near Operable Unit 1 is Building 881 approximately 6 000 feet above mean sea level and the lowest point is Woman Creek about 5 830 feet above mean sea level.

The terrain at Operable Unit 1 varies from gently rolling to steep slope on the hillside. Naturally lumping and pattern construction fill placement waste storage and waste clean up activities have recontoured the Operable Unit 1. A french drain was built across a significant portion of Operable Unit 1 to collect alluvial groundwater. The french drain was completed in April 1992 but the excavation necessary to build the drain ruined a small section of wetland.

A wetland has certain characteristics that distinguish it from other natural ecosystems. Wetland soils contain little or no oxygen and are saturated for varying periods of time during the growing season. Certain plants are adapted to living in wet low oxygen conditions and thrive in wetland areas. Cattails, rushes, willows and cottonwoods are examples of wetland plants typically found in the Northern Great Plains and Rocky Mountains. The Corps of Engineers and the Environmental Protection Agency required Rocky Flats to reconstruct about 2000 square feet of the wetland. The Department of Energy decided to purchase new vegetation to lessen the chance of transferring any contamination from other sites to this site.

When construction of the wetland began the bentonite slurry did not retain water due to a nearby culvert that drained the area and because the clay was not as fine as the original soil.



A Rocky Flats Plant scientist carefully plants cattails in the newly reconstructed OUI wetland.

originally thought. In March of this year bentonite, a clay substitute, was mixed into the top four inches of the soil to retain the water. After a few trial rainfall tests, the site was visually determined adequate for a wetland site.

Several types of vegetation were ordered and planted at the end of April: 2200 Common Cattails (*Typha latifolia*), 100 Softstem Bulrushes (*Scirpus validus*), 100 Three squares (*Scirpus americanus*) and 100 Sandbar Willows (*Salix exigua*). Jeff Krause with Environmental Restoration Ecology & NEPA division designed the manmade wetland planting scheme to best copy the diversity of a natural wetland.

The Environmental Protection Agency is requiring the Department of Energy to monitor the newly constructed wetland closely and provide a report by the end of the

growing season which is at the end of August. This annual report will eventually become a five year monitoring review.

FEEDBACK

Let us know what you think about this Update.

Fax or mail your comments, questions or suggestions to:

FAX: (303) 586-6153

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EG&G Engineers Design Successful Water Monitoring System

Wes Goodwin of EG&G's Surface Water division and Darwin Baxter of EG&G's Environmental Technologies division have developed a system that will automatically monitor and control more than 26 environmental monitoring stations around the Rocky Flat Plant. The system is a radio based environmental monitoring network built with a unique blend of industrial control hardware and off the shelf components.

Currently used as a form of real time surface water monitoring, the system provides real time assessments of water quality and conditions at Rocky Flat by incorporating radio telemetry, direct hard wire connections, and infrared communication techniques.

The Rocky Flats Remote Surface Water Monitoring system is composed of three major elements: (1) field sensors including flow equipment and water quality probes; (2) remote radio telemetry hardware; and (3) a computer based real time graphical user interface program. Each of these major components was designed to work together as an automated real time monitoring

network that includes a two way communication channel that connects the field installed instruments to the centralized monitoring station.

Field sensors are located throughout the plant, primarily near discharge ponds and creeks. These field sensors measure flow and basic water quality. Since many of the field sensors do not have electrical power on them, many of the sensors were selected with low power requirements and are equipped with solar panels. Field sensors are also installed to measure real time basic water quality measurements such as temperature, dissolved oxygen saturation, percentage conductivity, pH, and oxidation reduction potential.

Other field sensors being developed include low flow metering of discharge pipes, an automated respirometer that monitors toxicity at the Rocky Flats sewage treatment facility, volatile organic compound identification, and an automated toxicity instrument for real time water sampling.

To tie the system together is a distinct low power remote radio

systems are combined to serve as the link between the field sensors and an integrated real time graphical user interface. This is accomplished by using radio telemetry and specially designed radios. The real time graphical user interface developed by EG&G is a combination of software products that offers real time and historical data, graphical and text animation, and historical reports.

The system is designed to be expanded when the need arises. Future development will include network improvement, additional sensors, and further screen development for specific applications.

The Remote Sampler Water and Instrumentation Monitoring System gives environmental managers and engineers the capability of continuously monitoring and assessing conditions around the Rocky Flats Plant. By utilizing the best available technology, EG&G has taken steps toward meeting the Department of Energy's standards and expectations while building a framework that will keep in step with tomorrow's emerging technology.

OU16 No Further Action Justification Document - Proposed Plan Draft Written

The U.S. Department has announced its preferred alternative to address the Low Priority Site of the Rocky Flat Plant site. The Department of Energy, the lead agency for the cleanup at the site,

The preferred remedy for the soils at the No Action alternative

for five of the seven individual hazardous substance sites covered in Operable Unit 16, the Low Priority Sites. This alternative is preferred because potential risks to human health and the environment have been mitigated by past response actions and/or natural attenuation processes have eliminated the source or exposure pathways. The other two individual hazardous substance sites will undergo further investigation as part of the cleanup of other operable units.

The public will have the opportunity to comment on this

document in a 60 day public comment period this summer. Dates and availability of the Proposed Plan and the No Further Action Justification Document will be advertised in major Denver newspapers. Also, the date, time, and location of the public hearing to be held within 30 days during the public comment period will be advertised.

For further information, please contact Melanie Zgabay, EG&G Community Relations at (303) 966-1001.

which applies to discharges of waters is implemented in two ways. One manner of implementation is directed by the Environmental Protection Agency via the National Pollutant Discharge Elimination System which issues permits that control and limit the discharge of any pollutant to the waters of the United States. These permits are administered for Rocky Flats by the Environmental Protection Agency's Region VIII office in Denver, Colorado.

The second manner of implementation is through the Colorado Water Quality Control Act. Although Colorado does not have the authority to directly control the contents of permits for federal facilities, it is still required to develop its own stream classifications and water quality standards for the waters of the State.

Colorado Water Quality Control Commission Stream Standards

The Colorado Water Quality Control Commission is responsible for establishing designated use classifications for waters of the State and then setting water quality standards that protect that use. New stream standards for Standley Lake, Great Western Reservoir and Big Dry Creek and its tributaries were established in 1989 and will be reviewed every three years.

Radionuclide stream standards have also been established in Colorado. In January 1990 the Colorado Water Quality Control Commission adopted newer, stricter stream standards for radionuclides for segments of Big Dry Creek Basin which comprise Walnut Creek, Woman Creek, Standley Lake and the Great Western Reservoir. In cases where comparisons are possible, current state standard for Big Dry Creek Basin are equal to or more restrictive than federal drinking water standard.

Surface Water Detention & General Considerations

Water is used at the Rocky Flats Plant for domestic purposes and process applications. Water used in process applications is not released; it is treated and reused within the process loop to largely evaporative loads. Rocky Flats does not have senior water rights. Water entering the plant and not consumed is returned to the stream following treatment to benefit downstream users. Some citizens and businesses downstream of Rocky Flats would like to prevent discharge of water from Rocky Flats into their water supplies, but the implication of total zero discharge on the water rights of downstream users have not been explored in depth.

Sampling and Analysis of Radionuclides in Water

There are two parts to determining the concentration of any contaminant in pond water: sampling and analysis. Rocky Flats analyzes literally thousands of samples annually for low level radiochemistry. Standard radiochemical analyses utilize characteristics of the radioactive decay process in identifying and quantifying radionuclides. As such, lower limits of detection for radionuclides are limited by the activity of the sample.

Sampling Methods

Sampling is conducted to achieve three basic objectives: (1) to assemble a water quality database; (2) to assess pre-discharge water quality versus set standards and determine the need for treatment; and (3) to demonstrate and document compliance of water discharges with the standards.

Sampling is conducted prior to and during discharge in order to support decisions on initiation, suspension and resumption of discharge and to monitor compliance. There are three types of samples: (1) single grab; (2) depth composited; or (3) time composited. Sampling may be done from a boat or from shore within the

treatment train by sample tap, or at discharge by direct collection or mechanically actuated time-compositing.

Improving Analytical Methods/Performance

Efforts to improve analytical performance will evaluate the following approaches: improving detection limits; improving sampling methods; increasing analytical sensitivity; improving chemical separations; increasing sampling size; or using alternative methods.

While no real time analytical methods are available to monitor radiochemistry at environmental ($\mu\text{Bq/l}$) levels in water, Rocky Flats will consider the use of indicator parameters to provide continuous control of water quality and water treatment processes. A remote surface water monitoring system based on new technologies in microelectronics and the environmental sciences has been developed by two EG&G engineers. This new system uses commercially available components and careful evaluation has resulted in the design and installation of a working system that is easily installed, cost effective and reliable. For more detailed information about this remote surface water monitoring system, please refer to article in this Update entitled "EG&G Engineers Design Successful Water Monitoring System."

For further information about the surface water program at Rocky Flats or the control of contaminants in Rocky Flats water discharge, please visit any of the reading rooms listed in this Update.

Upcoming Public Meetings

Work Force Restructuring Public Information Meeting

June 15 1993 7 00 to 9 00 p m
 Arvada Center for the Arts & Humanities
 6901 Wadsworth Blvd Arvada

Quarterly Environmental Restoration Public Information Meeting

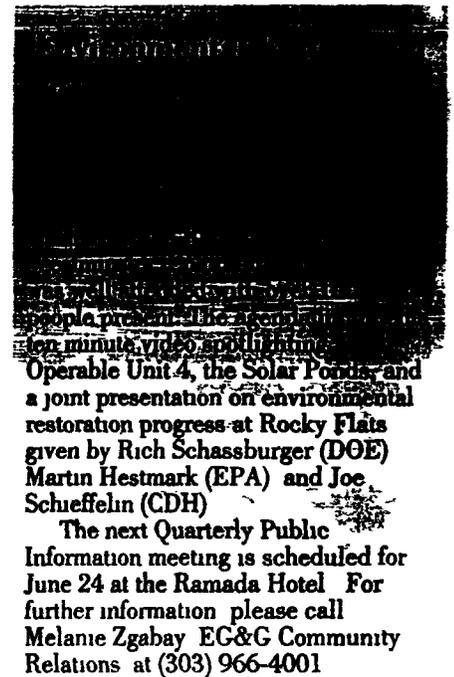
June 24 1993 7 00 to 9 00 p m
 Ramada Hotel 8773 Yates Drive Westminster

Environmental Surveillance Exchange of Information Meeting

June 29 1993 1 30 p m
 Broomfield City Council Chamber
 Number 6 Garden Office Center Broomfield

Colorado Council on Rocky Flats

June 29 1993 Time and Location to be announced
 Call Cathy Carlson at (303) 966 4261 for more information



Operable Unit 4, the Solar Pond, and a joint presentation on environmental restoration progress at Rocky Flats given by Rich Schassburger (DOE) Martin Hestmark (EPA) and Joe Schieffelin (CDH)
 The next Quarterly Public Information meeting is scheduled for June 24 at the Ramada Hotel. For further information please call Melanie Zgabay EG&G Community Relations at (303) 966-4001

Why Were Hotspots Not Discovered Sooner at 881 Hillside?

The 881 Hillside or Operable Unit 1 is an important environmental restoration site at the Rocky Flats Plant. Extensive sampling has been conducted on the Hillside and a Phase III Remedial Investigation Report has been drafted. Some people were surprised that unexpected areas of anomalous radionuclide contamination or hotspots were not discovered on the 881 Hillside until the planned investigatory fieldwork had been completed.

In any environmental remediation project it is not economically practical to sample every square inch. So to most effectively characterize the site proven methods of sampling that meet or exceed regulatory guidelines are used. The statistically based soil sampling program used at the 881 Hillside was approved by the

regulatory agency. The data to Cindy Gee the LG&G manager for Operable Unit 1 provided a 95% level of confidence of finding any contaminant present. Unfortunately the approved investigative work plan did not include a radiation survey of the site without which hotspots can easily go undetected.

However as Gee commented a needle in the haystack was discovered during a routine maintenance operation on a pump in the operable unit. The hot area (plutonium and americium in the soil) was only inches away from a previously sampled area which was not contaminated.

The hotspot was found in an area where drums had been stored and as the drums deteriorated over the years some of the contents (plutonium contaminated machining oils solvents etc) apparently leaked into the soil. After the first hotspot was discovered workers went into the area to conduct extensive surveying radiological detecting equipment and found three more areas of isolated contamination. To first check the area with point

minimum detectable level (used in the last Update) was used to scan twenty two 150 foot diameter circular area and then a hand held Fidler was used to inspect inch by inch any areas where the high purity germanium detector picked up high counts. The first hotspot was approximately 200 000 counts per minute the second was about 8 000 counts per minute and the third was 4 000 counts per minute. The fourth discovery was U238.

The new data will be incorporated in the Final Phase II Remedial Investigation report which is due November 15 1993.

One final note on the 881 Hillside Operations the 891 Water Treatment facility which handles water from the hillside french drain treated its millionth gallon of water in April.

Environmental Restoration

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