United States
Environmental Protection
Agency
Region 8

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Colorado, Montana,
North Dakota, South Dakota,
Utah, Wyoming

EPA **Fact Sheet**

January 1992

SUBJECT: THE ROCKY MOUNTAIN ARSENAL (RMA)

LOCATION: Ten miles northeast of Denver, Colorado in south Adams County

NOTE: This issue is related to the south Adams County (sAC) issue. Review of the sAC Fact Sheet is recommended.

## SUMMARY

Hazardous wastes exist on most of the Rocky Mountain Arsenal (RMA), in both a thin layer of topsoil and in deeper areas on at least 178 sites. These 178 sites total 1,750 acres, or about 10 percent of the 27 square miles occupied by the Arsenal. More than 750 different chemicals were handled or generated at the Arsenal; of these, 63 were used as target (indicator) chemicals for analyses during the remedial investigation. The contamination is dispersed in buildings, surficial soils, deeper soils, groundwater, surface water and sediments. The volume of contaminated soils is estimated at 8 to 13 million cubic yards.

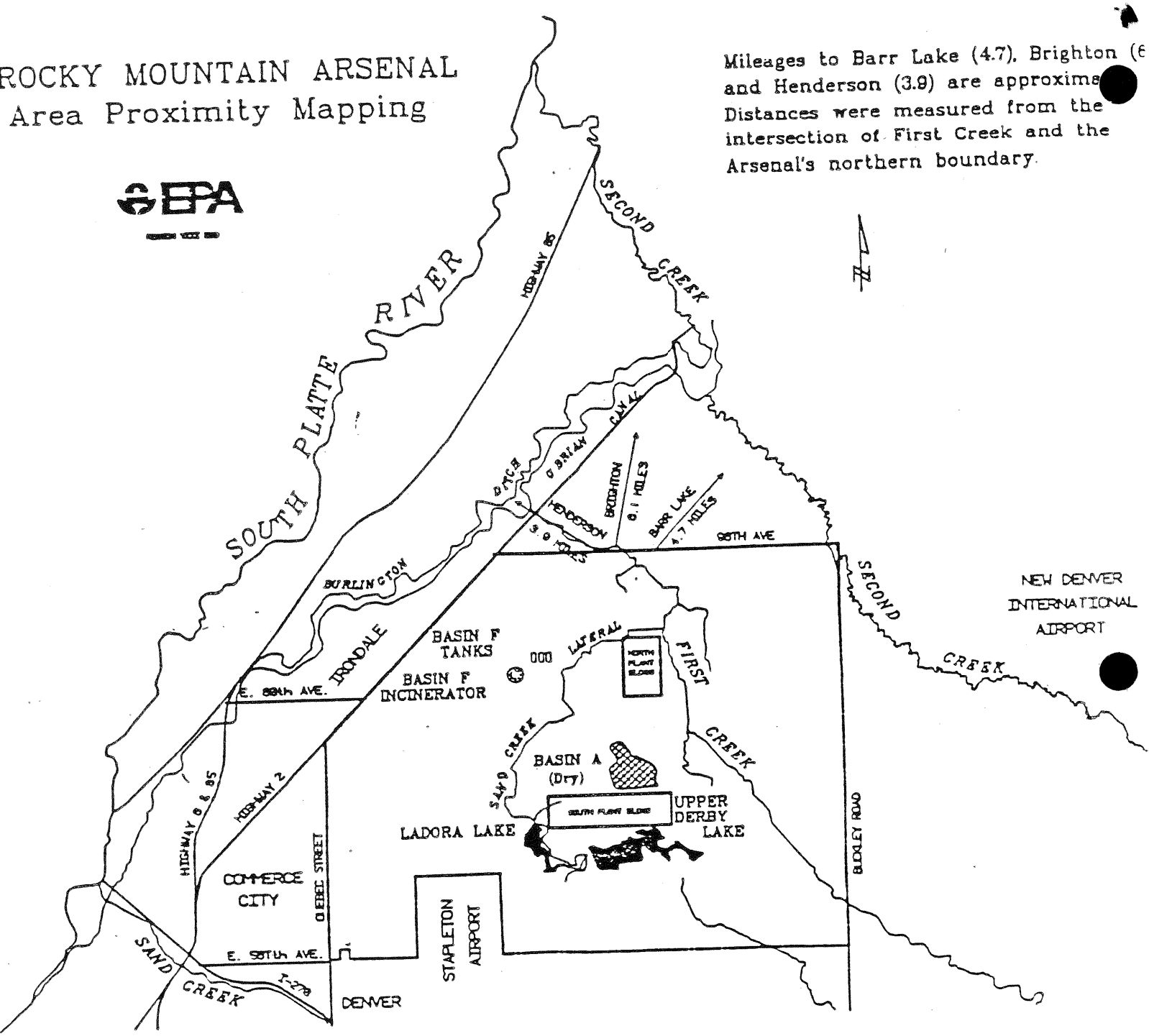
Hazardous waste effluents generated at RMA were routinely discharged to unlined evaporation basins prior to 1956. After 1956, Basin F, which had an asphalt liner, was used for disposal. Solid wastes were buried at selected locations. Spills of raw materials, intermediate and final products occurred within the manufacturing complexes at RMA. Contaminants from many of these sites have entered the groundwater, surface water, air and wildlife and have been transported or migrated off RMA. Plumes of contaminated groundwater move north and northwest from the Arsenal and eventually reach the South Platte River, albeit with levels of contamination which do not pose a health threat.

Stapleton Airport abuts the southwest corner of the site, and the new Denver International Airport, now under construction, is on the east. Residential and commercial properties of Commerce City are located to the west and southwest of the site. Rural residential and agricultural land are located to the north and east of the Arsenal. Residential and light industrial areas are located to the south. Henderson lies four miles northwest, Brighton six miles north, and Barr Lake State Park is about five miles northeast; residents in these communities are concerned about both surface and groundwater contamination from RMA.

# ROCKY MOUNTAIN ARSENAL
## Area Proximity Mapping

EPA

Mileages to Barr Lake (4.7), Brighton (6
and Henderson (3.9) are approxima
Distances were measured from the
intersection of First Creek and the
Arsenal's northern boundary.



All production operations at RMA ceased in 1982. Significant cleanup has been accomplished during the past several years, as described below.

The U.S. Army's sole mission at RMA is to remediate the contamination, as the lead agency. EPA performs both oversight of the Army efforts and a separate Remedial Investigation and Feasibility Study (RI/FS) in EPA's off-post area.

## CONTAMINANTS OF CONCERN

### In groundwater

Volatile organic chemicals found at the Arsenal include benzene, di bromochloropropane (DBCP), chloroform, toluene, and trichloroethylene (TCE).

Pesticides and other semivolatile chemicals include aldrin, atrazine, chlordane, dieldrin, diisopropylmethyl phosphonate (DIMP), endrin, and others.

Heavy metals include arsenic, cadmium, chromium, lead, mercury, and others.

### In sediments

Sediment samples from on-post lakes and drainage areas are contaminated with metals and pesticide residues.

### In soil

Some surface and near-surface soils are contaminated with heavy metals, such as arsenic, lead, and mercury; pesticides, such as dieldrin and aldrin; and other compounds identified in the groundwater (see above).

## HUMAN HEALTH and ENVIRONMENTAL THREAT

The potential exposure routes to people or animals associated with RMA include ingestion, skin absorption and/or breathing of contaminated dust that may result from windblown soils and cleanup activities, or from exposure to contaminated soils, sediments, surface water and groundwater (off-post).

In spite of contamination in the lakes and soils, the Arsenal is home to more than 130 different kinds of animals, including a wide variety of mammals, birds, fish and amphibians. The size of RMA has been of assistance in protecting wildlife habitat. The U.S. Fish and Wildlife Service actively manages the wildlife on the Arsenal.

## FUTURE LAND USES

Since EPA is not a land use agency, the decision on future land uses will be made by the landowner (the Army) and take into account the wishes of the public. However, EPA insists on clean-up goals which are protective of human health and the environment consistent with the range of ultimate uses of the RMA allowed by the Federal Facility Agreement (see below). By insisting on clean-up levels for all FFA-allowed options, including a wildlife refuge, recreational uses, and potential commercial or industrial activities, EPA will ensure that the cleanup is adequate for those uses.

## BACKGROUND

RMA was constructed in 1942. Until 1950, the Army manufactured and assembled chemical and incendiary munitions, distilled available stocks of Levinstein mustard, demilitarized several million rounds of mustard-filled shells, test-fired mortar rounds filled with smoke and high explosives, and destroyed many different types of obsolete World War II ordnances by detonation or burning.

Between 1953 and 1957, the Army produced GB nerve agent. Munition-filling operations continued until 1969. From 1970 to 1982, RMA was primarily involved with the disposal of chemical warfare material, including the incineration of TX anti-crop agent, mustard agent, explosive components, and the destruction of GB agent and related munitions casings by caustic neutralization and incineration.

In 1947, certain facilities in the "South Plants" area were leased to the Colorado Fuel and Iron Corporation for manufacture of chlorinated benzenes and dichlorodiphenyltrichloroethane (DDT). Julius Hyman and Company assumed part of the CF&I lease in 1950 and produced several pesticides. Subsequently, the company was bought by Shell Chemical Company which conducted pesticide and herbicide manufacturing operations from 1952-1982. Both Shell and the Army are responsible for cleanup at RMA.

## MEMORANDUM OF AGREEMENT (MOA)

To promote consultation and cooperation in implementing its CERCLA (Comprehensive Environmental Response, Compensation and Liability Act of 1980, also known as Superfund) responsibilities at RMA, EPA initiated and signed a Memorandum of Agreement (MOA) on December 6, 1982, with the Army, Colorado Department of Health (CDH), and Shell. Under the MOA and a national EPA-DOD Memorandum of Understanding, the Army agreed to provide an initial off-post contamination assessment report based on existing monitoring data, and later, to conduct a RI/FS for on- and off-post.

In addition, EPA agreed to perform a separate off-post RI/FS west of RMA. (See sAC Fact Sheet.) Through the MOA, the parties actively exchanged information and evaluations of issues. (See description of the Federal Facility Agreement (FFA), which replaced the MOA, below.)

## LEGAL ISSUES; FEDERAL FACILITY AGREEMENT (FFA)

In spite of numerous lawsuits and questions about federal and state jurisdiction, clean-up activities at RMA have steadily progressed.

In December 1983, the United States filed a $1.8 billion lawsuit against Shell seeking natural resource damages and response costs under CERCLA. At the same time, the State of Colorado filed suit for $50 million for each release that has occurred, against both the U.S. government and Shell. The State amended its complaint in November 1985, to seek recovery of response costs under CERCLA.

In November 1986, the State sued the Army over Basin F jurisdiction. A hearing on a preliminary injunction over Basin F was held December 11, 1987; the ruling is still pending. However, the Basin F IRA proceeded.

In talks beginning May 8, 1987, the MOA parties entered into intensive litigation negotiations on numerous issues: MOA party participation, dispute resolution, settlement of past and future cleanup costs, an expanded list of interim actions and their funding, and RCRA (Resource Conservation and Recovery Act of 1976) and CERCLA jurisdiction. The parties agreed to a revised technical plan which is described below.

The trial on cleanup and damage claims was scheduled for September 1987, but the Court granted a suspension at the request of all parties. A Shell-U.S. Consent Decree was proposed on February 1, 1988, modified on June 7, 1988, but never approved by the Court. The State's major issues were proposed land use restrictions, RCRA/CERCLA jurisdiction, the State's role, and natural resource damages. Negotiations continued, assisted by a Special Master appointed by the Court on June 30, 1988.

The Army, U.S. Department of Interior, U.S. Agency for Toxic Substances and Disease Registry, Department of Justice, EPA, and Shell signed the FFA, effective February 17, 1989, consistent with Section 120 of the Superfund Amendments and Reauthorization Act of 1986, known as "SARA." The FFA replaced the MOA and established a procedure for the signees to cooperate in the cleanup. The Settlement Agreement, executed the same date, apportioned liability for cleanup between Shell and the Army, and led to resolution of the Army-Shell litigation. The State of Colorado has not signed the FFA, though negotiations continue.

In describing the clean-up work to be done at RMA, the FFA makes a distinction between problems that require short-term solutions to mitigate the spread of contamination, and problems that are not an immediate threat and are best handled by long-term solutions. The FFA identifies "Interim Response Actions" (IRAs) as priority items expediting clean-up activities before a final remedial decision and provides for the identification and performance of approximately 20 clean-up activities to deal with sources of contamination.

The FFA also sets forth specific procedures for finding effective solutions to contamination problems and provides for addressing the comments and concerns of all the agencies and the public. EPA - in its dual role as protector of public health and the environment, and enforcer of proper clean-up activities - has the final authority for clean-up remedies at sites listed on EPA's National Priorities List (NPL).

On September 1, 1989, the United States was served with a Final Amended Compliance Order, a state administrative order issued by the Colorado Department of Health (CDH) under its delegated RCRA authority in the Colorado Hazardous Waste Management Act (CHWMA). The order sought to compel the United States to follow the procedural and substantive requirements of CHWMA, and sought civil penalties for the United States' alleged non-compliance with both the order and CHWMA.

In response, the United States filed an action seeking a court order declaring the Amended Compliance Order unlawful and also argued that it was not subject to such penalties under state law. The court has ruled in favor of the United States in this action, with regard to civil penalties. The remainder of the action is still pending.

In early 1989, a Superior Court jury in California decided that Shell's insurers were not liable for cleanup, contamination control, and natural resource damages arising out of Shell's operations at the RMA. Shell is appealing that decision.

Four private lawsuits have been filed: Land vs. U.S.; Daigle, et al., vs. Shell and U.S.; Adams County Joint Venture vs. Shell; and Maul, et al., vs. U.S. and Shell. The latter two were settled out of court in early 1991.

In July, 1990, CDH asked the federal court for a temporary restraining order to stop the Army from decontamination of nerve gas residue in the North Plants area. Judge Carrigan did not grant the order. While ruling in favor of the Army, he said that CDH was not precluded from bringing actions in the future.

On August 14, 1991, the court issued a ruling in U.S. vs. Colorado granting the U.S. motion for summary judgment. The

Court held that under CERCLA, it had no jurisdiction in the State's Final Amended Compliance Order, in effect, affirming EPA's role as the final authority in selecting the remedies for cleanup at RMA.

## TECHNICAL PLANS AND IMPLEMENTATION STATUS

EPA advised the Army of the requirements of the National Contingency Plan in the Army's development of an acceptable clean-up plan for the Arsenal. In October 1984, the resulting conceptual plan was released, outlining a $360 million cleanup over a 15-year period, with all significant contamination to be excavated and treated, when possible, and then deposited in on-post landfills meeting substantive RCRA standards. In the meantime, implementation of interim remedies would take place under RCRA, CERCLA and Underground Injection Control (UIC).

The November 1985 "Kramer Bill" required development of a plan to complete cleanup by September 1993, but none of the resulting four new clean-up plans could meet the deadline.

A mid-course technical review of the RI/FS and Endangerment Assessment (EA) resulted from the May 1987 negotiations described above. The Technical Program Plan (TPP) was issued in March 1988 and established the schedule of clean-up study activities and IRAs. The FFA includes a process for agreeing to changes.

The Army is now conducting a $115 million RI/FS to evaluate on- and off-post contamination and remedial alternatives, and select remedies. Several interim response actions have been completed, are ongoing, or are in planning. Shell is reviewing and assisting the Army efforts.

EPA also conducted its own $1.3 million RI/FS off-post study in south Adams County (see sAC Fact Sheet) and performs active oversight of the Army's studies. The combination of these studies will lead to selection of final clean-up remedies for both RMA and sAC.

## NPL STATUS AND RESPONSIBILITIES

RMA (except Basin F) was proposed for the Superfund National Priorities List (NPL) in October, 1984; it was listed in July, 1987. Basin F, built in 1956, was listed in March, 1989.

Under Section 120 of CERCLA, the Army is the lead agency responsible for determining the extent of contamination and appropriate clean-up measures necessary to protect public health and the environment from releases of hazardous substances, pollutants or contaminants. These Army actions are required to be consistent with the NCP and must be coordinated with EPA. EPA must approve the final remedial decision.

The State has a role, under Sections 120 and 121 of CERCLA, which provide for "substantial and meaningful involvement ... in initiation, development and selection of remedial actions to be undertaken in that State...."

## CURRENT STATUS

The Army's RI is complete, except for surface soil and structures data; the final report is pending. The FS and EA are proceeding; final results are expected in 1993 (off-post) and 1994 (on-post).

In 1989, the Army and EPA constructed a drinking water treatment system for south Adams County. The system began operating in November of that year (see below). EPA's RI/FS for the aquifer and other sources continues under the jurisdiction of the Chemical Sales Co.'s NPL site west of RMA.

Several FFA Interim Response Actions (IRAs) and earlier activities at RMA sites have been completed. (Please see below.)

| Costs (millions) | Project and Completion Dates |
|---|---|
| *FFA IRAs<br>** Cleanup activities dealing specifically with groundwater | |
| $4.3 | North boundary groundwater treatment system (two stages, 1979-82)** |
| 1.1 | Irondale groundwater treatment system, by Shell (1981)** |
| 5.5 | Northwest boundary groundwater treatment system (1984)** |
| 1.5 | Basin F liquid evaporation and contaminated sewer removal (1982) |
| 0.09 | Basins A and F windblown dust control |
| 0.22 | Basins A and F reapplication of windblown dust control for 142 acres (1988-89)* |
| 0.25 | Reapplication of windblown dust control (May, 1991) |
| 2.5 | Deep well (12,045 ft.) closure (1986) |
| 10.5 | Removal of 76,000 drums of waste salts (1986) |

| | |
|---|---|
| 23.1 | Treatment for TCE in the public water supply plus about 400 private well connections in south Adams County (1986). Includes $8.2M by EPA. The Klein Water Treatment Facility supplies safe drinking water to 30,000 south Adams County residents (1989)** |
| 2.75 | Improvements to North Boundary System (1990)* ** and treatment plant modifications (1991) |
| 3.7 | Closure of 353 abandoned wells on-post (1990)* ** |
| 42.0 | Removal and containment of 10.5M gallons of Basin F liquids and 564,000 cubic yards of sludges (1989)* |
| 0.7 | Basin F groundwater treatment system (1990)* ** |
| 3.1 | "A" neck groundwater containment and treatment (1990) * ** |
| 1.4 | Northwest Boundary and Water Extraction Systems Improvement (1991) |
| 3.0 | Rail Classification Yard and Motor Pool Groundwater (implementation of groundwater intercept and treatment system) (1991)** |
| 0.5 | South Tank Farm Plume (action completed; monitoring ongoing)(1991)** |
| 1.4 | Army trenches (action completed; monitoring ongoing) (1991) |
| 3.2 | Shell trenches (construction completed) (1991) |
| 0.18 | Building 1727 sump cleanup (Operations & Maintenance expected through 1993) |
| $111.0 million | Total Completed to Date (not including operation and maintenance costs) |

**FFA Interim Response Actions for Winter 1991-92 and beyond:**

| | |
|---|---|
| 11.75 | Hydrazine liquid treatment and equipment removal (liquid being transferred to Basin F incinerator, and equipment being removed) (ongoing, through 1992) |
| 8.7 | Groundwater treatment system off-post to the north (1992) (under construction) ** |
| 0.8 | Sanitary sewer closure (ongoing) (1992) |

| | |
|---|---|
| 7.09 | Asbestos removal from buildings (ongoing) (1992) |
| 14.0 | M-1 ponds (ongoing in-situ vitrification design) (1994) |
| 0.15 | Motor Pool (vapor extraction system implementation) (1992)** |
| 1.7 | Lime Settling Basins (implementation of containment system) (1992) |
| 90.0 | Treatment of 10.5 million gallons of Basin F liquids (incinerator construction ongoing) (1992-93) |
| 7.25 | CERCLA Liquid Waste Treatment (construction begun October, 1991; completion 1992; operational 1993) |
| 0.05 | Expansion of Abandoned Well Program (1993) |
| 4.5 | Chemical Process-Related (ongoing through 1993) |

Also, proposed Interim Response Actions:

| | |
|---|---|
| 0.2 | PCBs (1993) |
| 5.0 | CERCLA Waste Management (1994) |
| $151.2 million | Total (ongoing and proposed) |
| $262.2 million | TOTAL CLEANUP ACTIONS PRIOR TO THE ON-POST RECORD OF DECISION (ROD) (1994) |

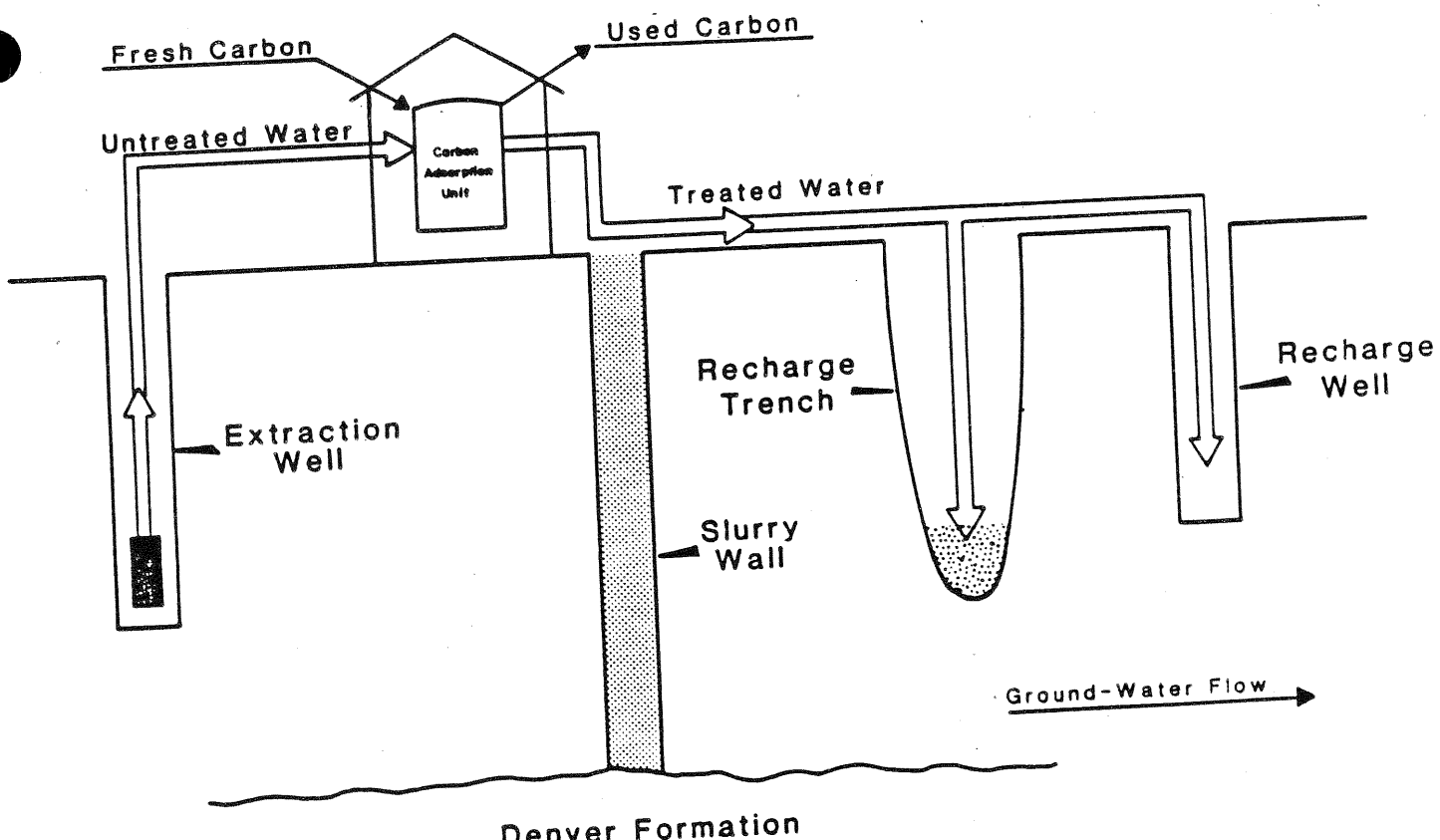
All interim response actions must be consistent with final remedies.

## GROUNDWATER INTERCEPT AND TREATMENT SYSTEMS

Groundwater intercept and treatment systems have been operating at the north boundary of RMA since 1979, at Irondale since 1981, and at the northwest boundary since 1984. Improvements are being made to these systems. Two new similar systems began operating in September 1990 on-post, and two more began operating in 1991. A new one, north of the Arsenal, should be operating in 1992.

These seven operating systems pump the contaminated water from the ground before it leaves RMA, remove contaminants, and inject the treated water on the other side to continue to flow off the Arsenal. The systems are cleaning one billion gallons a year which then flow into the areas north and northwest of RMA. In large measure, the systems are working. Contamination in the groundwater leaving the RMA has diminished.

For example, the amount of DIMP in an off-post monitoring well was 138 ppb in 1985, 105 in 1987, 14 in 1988, and 6.7 in 1989. Another monitoring well registered 640 ppb in 1987 and 55 in 1989.




**Schematic Diagram of**
**North Boundary Treatment System**

## CURRENT ISSUES AND ACTIONS

Acceptance by the State of the Federal Facility Agreement is among the highest priorities for the parties involved in the cleanup. The litigation diverts resources from the cleanup efforts and sometimes even complicates sharing of information.

EPA is continuing oversight of the interim response actions, expediting Army and Shell studies and final remedies, working to improve communication among the parties, and encouraging citizen involvement in the Superfund process. The Army's on- and off-post studies are progressing, as are EPA's sAC investigations.

Citizens Against Contamination (CAC), an environmental group composed of citizens of Commerce City, was awarded a $50,000 Technical Assistant Grant (TAG) by EPA in 1990. The funds are being used to hire independent technical advisors to review data from the ongoing studies and clean-up activities at the Arsenal.

EPA, the Army, Shell, State, and the U.S Fish and Wildlife Service actively participate in the community relations subcommittee for the purpose of involving the community in decisions about clean-up activities as early as possible and coordinating community relations efforts among the five parties.

## DOCUMENTS AVAILABLE TO THE PUBLIC

JARDF (Joint Administrative Record Document Facility)
Rm 14, Arsenal Security Building
72nd & Quebec Streets, Commerce City, CO 80022

| | |
|---|---|
| Monday, Wednesday, Friday | - 12 Noon to 4:30 p.m. |
| Tuesday and Thursday | - 5:00 p.m. to 9:00 p.m. |
| Saturday | - 10:00 a.m. to 4:00 p.m. |

For information about the JARDF, call Isabel Vargas at 289-0362.

Some documents are also available at public libraries in Commerce City, Brighton and downtown Denver, and at the EPA library, 2nd floor, 999 18th Street, Denver, CO 80202.

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