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ENVIRONMENTAL ASSESSMENT OF A PROPOSED ACTION TO PLUG AND ABANDON THE
DEEP INJECTION WELL AND ASSOCIATED SURFACE FACILITIES

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THE DEEP INJECTION WELL AND THE ASSOCIATED SURFACE SUPPORT FACILITIES ARE NO LONGER IN OPERATION, AND NO PLANS EXIST FOR OPERATION OF THE FACILITIES IN THE FUTURE. THE LIQUID TREATED AND INJECTED IN THE WELL HAS BEEN CLASSIFIED AS A HAZARDOUS WASTE BY RCRA REGULATIONS. ALTHOUGH THE FACILITIES ARE NOT SPECIFICALLY REGULATED UNDER RCRA, ALL OPERATIONS WERE TERMINATED PRIOR TO 19 NOV. 1980, THE FACILITIES COULD PRESENT A POTENTIAL HAZARD TO HUMAN HEALTH AND THE ENVIRONMENT. AS A RESULT, A CLEANUP ACTION IS REQUIRED TO REMOVE THE REMAINING CONTAMINANTS AND A CLOSING ACTION IS REQUIRED TO PLUG THE WELL. IN ACCORDANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT AND IMPLEMENTING ARMY REGULATION 200-2, IT IS DETERMINED THAT A FINDING OF NO SIGNIFICANT IMPACT IS APPROPRIATE, SINCE THIS ACTION WILL NOT SIGNIFICANTLY AFFECT THE QUALITY OF THE HUMAN ENVIRONMENT. THEREFORE, AN ENVIRONMENTAL IMPACT STATEMENT IS NOT NEEDED.

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1.0 INTRODUCTION

1.1. General Description. Rocky Mountain Arsenal (RMA) is located in Adams County, Colorado, about 10 miles northeast of the central business district of Denver. (See Figure 1.) RMA includes 17,238 acres, of which portions are occupied by inactive and active waste storage and treatment facilities. Denver's Stapleton International Airport extends into the southern border of RMA. Land use on land bordering RMA includes agricultural (north and east), light industrial manufacturing (south), and residential (west and southwest). Residential population within a radius of 15 miles from the west edge of RMA totals approximately 1,500,000. This metropolitan area consists of the following Colorado cities: Denver, Aurora, Commerce City, Thornton, Northglenn, Federal Heights, Westminster, Broomfield, Arvada, Lakewood, Littleton, Englewood, Cherry Hills Village, Greenwood Village, Glendale, and the heavily populated unincorporated areas of Arapahoe, Jefferson, Boulder, and Adams County.

1.2 Historical Perspective. The property occupied by RMA was purchased by the government in 1942. RMA was originally established as a defense installation for manufacturing chemical intermediate and toxic end-item products and assembling incendiary munitions. During the period 1945-50, the Arsenal distilled available stocks of Leinstein mustard, neutralized and destroyed several million rounds of mustard-filled shells, and test fired 4.2-inch mortar rounds filled with smoke and high explosives. Also, many different types of obsolete World War II ordnance were destroyed by detonation or burning.

In 1947, certain portions of the Arsenal were leased to private industry for manufacturing various chemicals, including pesticides and herbicides, which continued until recently. In the early 50's, RMA was selected as the site for construction of a facility to produce GB agent. This facility was completed in 1953, with manufacturing operations continuing until 1957, and the munitions filling operations continuing until late 1969. Since 1970, RMA has been involved primarily with the demilitarization of various munitions and bulk materials, including chemical agents, explosive components and biological anti-crop agents. The demilitarization operations have included neutralization and/or incineration of the materials in order to render them non-lethal.

1.3 Waste Management at RMA. Until the mid-50's, liquid wastes generated by the manufacturing activities at RMA were disposed of in a series of unlined ponds

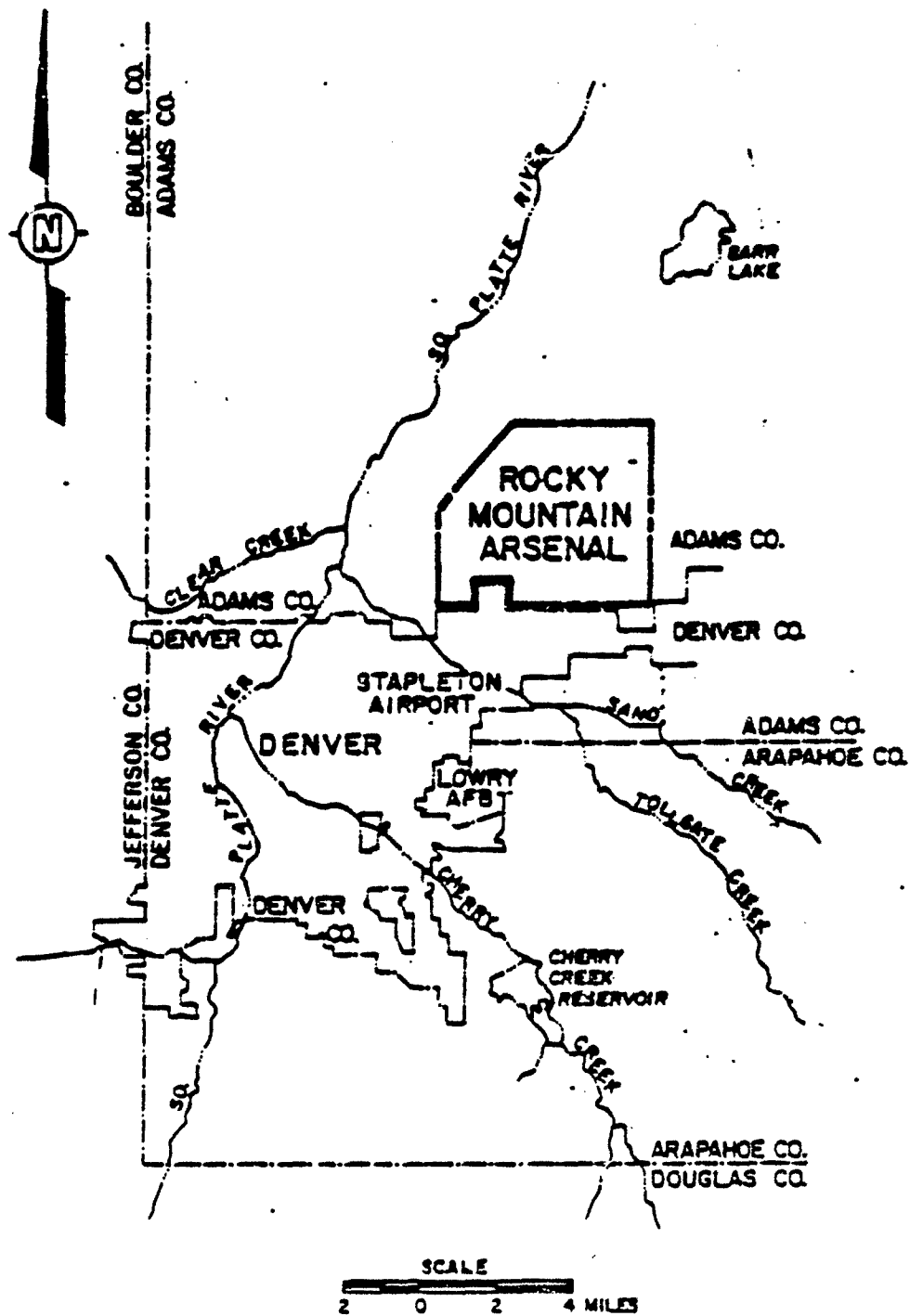


Figure 1. Location Map of Rocky Mountain Arsenal, Denver Colorado.

and basins located within the Arsenal boundaries. These basins are identified as Basins A-E on Figure 2. In 1957, Basin F was constructed with an asphalt-lined bottom. This basin encompasses approximately 93 acres with a total volume in excess of 200 million gallons. Use of Basin F for the disposal of liquid wastes continued until 1982, when the chemical sewer feeding Basin F was excavated and placed in Basin F. Through the years, various studies and activities were proposed and conducted, aimed at eliminating the discharge of industrial wastes into Basin F and accomplishing its final cleanup. One such attempt conducted in the early 60's involved construction of a deep injection well adjacent to Basin F for disposal of the liquid contained in Basin F and the liquid being generated by the ongoing activities.

1.4 Deep Injection Well. The Deep Injection Well is located in the NE 1/4, Section 25, Township 25, Range 67 West, approximately 1900 feet west of "D" Street and 600 feet south of 9th Avenue on RMA. The well was drilled to a depth of 12,045 feet into a formation of Pre-Cambrian Gneiss in 1961 with pressure testing being completed in January 1962. A cross-section of the completed well showing the well head and all casing is presented in Figure 3. The well was in operation from March 1962 until February 1966, during which time approximately 164 million gallons of liquid waste were injected. Operation of the well was terminated due to a reported link between the injection of liquid waste and an increase in the frequency and magnitude of earth tremors in the Denver area.

After operations had ceased, a research program including down-hole instrumentation of the well was initiated in an attempt to assess the link between the incidence of earthquakes in the Denver area and the operation of the well. Limited pump tests were conducted on the well in 1968 and several unsuccessful attempts were made to place an instrumentation package near the bottom of the well. During February 1969, the instrument package became lodged around the 9,000 foot level in the well. Attempts to remove the instrument package were unsuccessful and resulted in the loss of additional equipment in the well. This includes approximately 4,000 feet of copper tubing containing conductor cables, 1,950 feet of 3/4 inch sucker rod, and a "fishing" spear.

1.5 Surface Support Facilities. Surface facilities to support the operation of the Deep Injection Well were constructed immediately west of the well between Basin F and the well. (See Figure 4.) The major facilities included a pump house,

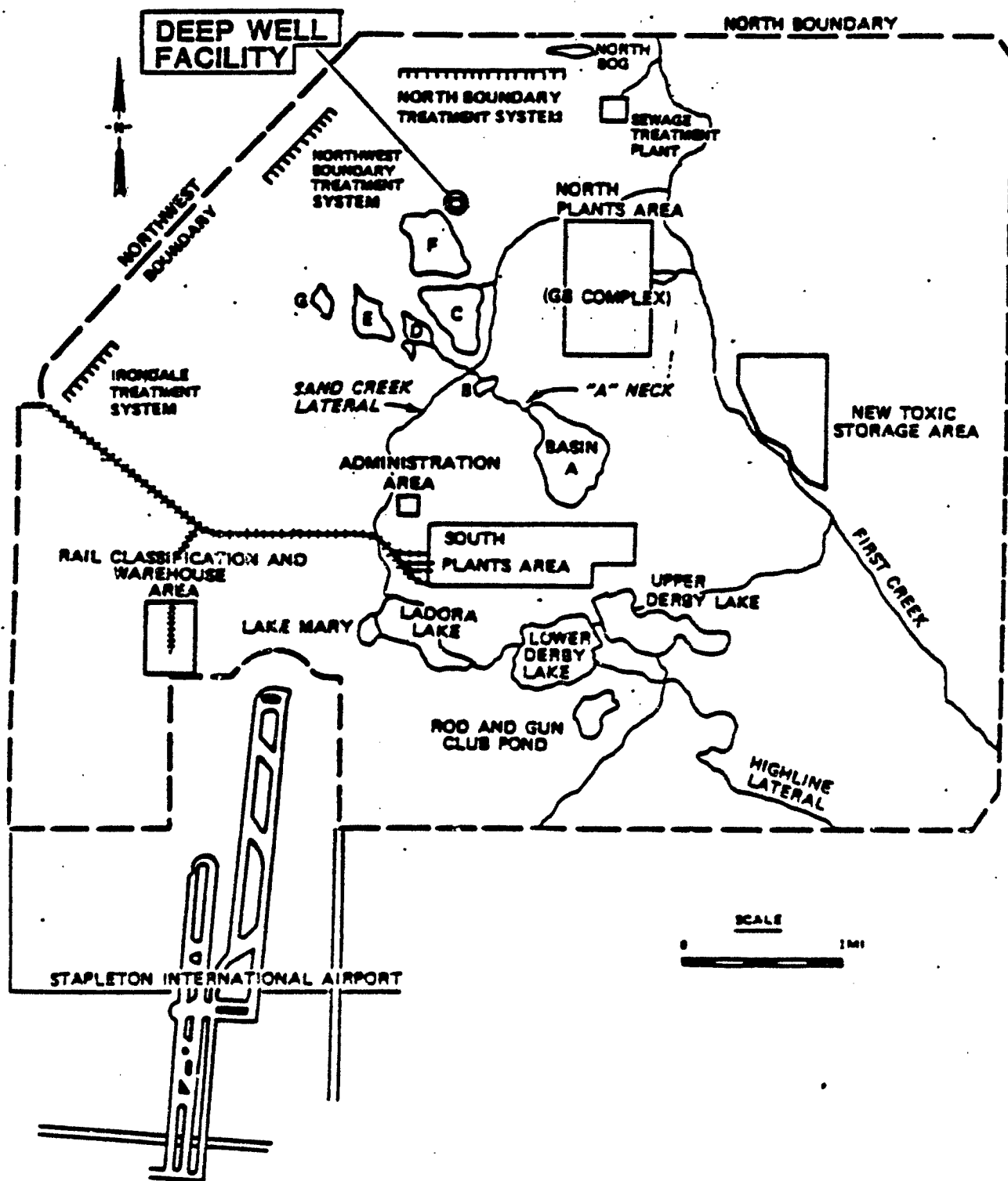
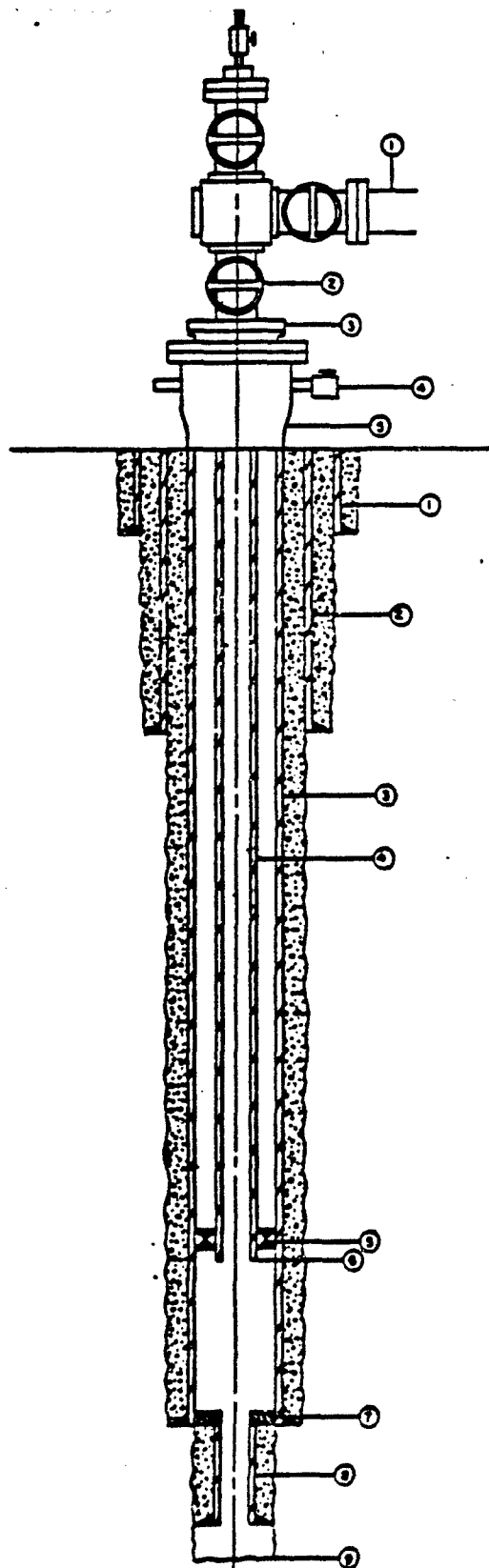


Figure 2. Location of the Deep Well Facility, Rocky Mountain Arsenal.



WEL HEAD DETAIL

1. 4" Flowline from injection pumps
2. Master Valve
3. Tubing Hanger
4. Valve, tubing-casing annulus (to pressure sensitive detector and alarm)
5. Casing Hanger

BELOW GROUND DETAIL

1. Conductor Casing - 20" set in 24" hole, cemented with regular ideal cement with 2% CaCl₂
2. Surface Casing - 13 3/8" set in 17 1/2" hole to 2000', cemented with regular ideal cement with 2% CaCl₂
3. Protection Casing - 8 5/8" set in 11" hole to 11,171', cemented in three stages as follows:
 - Stage 1: 11,007' - 8,999', cemented with 1000 sacks of 140 Pozmix A with 0.5% MR-4 and 410 sacks of gilsonite 140 Pozmix (3-centralizers).
 - Stage 2: 8,966' - 4,507', cemented with 2,350 sacks of 50-50 Pozmix with 6% bentonite and 0.4% retarder (2 centralizers).
 - Stage 3: 4,507' - surface, cemented with 2020 sacks of 50-50 pozmix and 6% bentonite
4. Injection Tubing - 5 1/2"
5. Packer, Baker Model "D" with 2.5" I.D. set with toe at 8,999'
6. Tail Joint, bottom at 9,011'
7. Liner Hanger, Seesh Ross set at 11,007'
8. Liner, 5 1/2" with 4.67" I.D. set to 11,975' in 6 3/4" hole cemented with 250 sacks of Pozmix 140 A with 0.5% MR-4 (10 centralizers)
9. Total Depth 12,045'

All measurements relative to Kelly Bushing

Figure 3. Schematic of the Injection Disposal Deep Well, Rocky Mountain Arsenal.

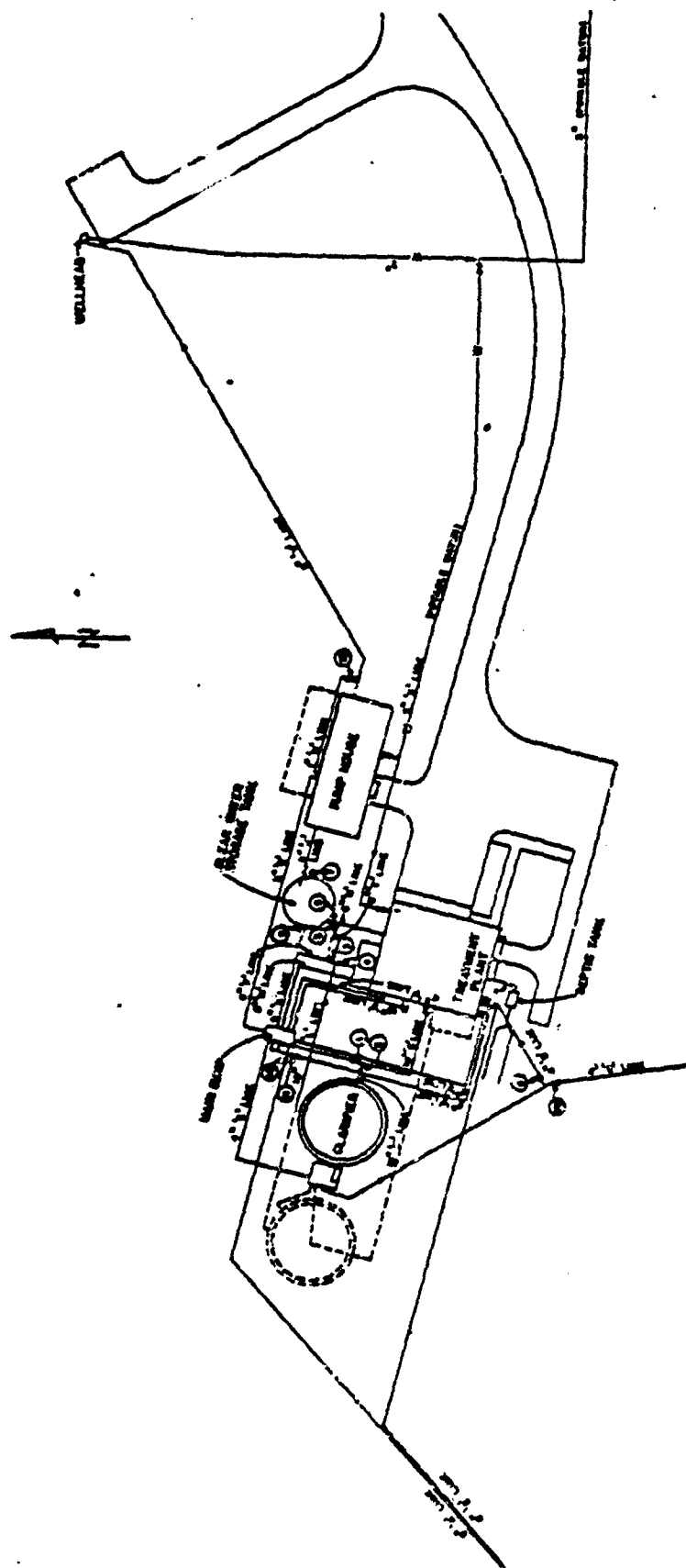


Figure 4. Schematic of Deep Well Treatment Plant and Piping, Rocky Mountain Arsenal.

treatment plant building, clarifier, several sumps, and a clear-water storage tank. The pump house (designated B-806) is a 25 foot by 70 foot concrete-block building with a slab floor containing several recessed pipe galleries. The building still contains the four triplex pumps (rated at 400 gal/min) which were used to pump the liquid down the well. The treatment plant building (designated B-802) is 50 feet by 50 feet and was constructed of concrete blocks with a slab floor. The floor contains a recessed drain. The building also contains two small sumps constructed of concrete. The treatment plant building originally contained steel tanks, mixing equipment, and several filters used for treating the liquid prior to injection. All this equipment was removed, cleaned, and scrapped after termination of the operation of the well. The clarifier is an open, circular, concrete tank approximately 35 feet in diameter and 12 feet deep. The clarifier still contains the sludge rake, surface skimmer, and associated equipment which is all constructed of steel. The main sump shown in Figure 4 is still in existence and is a buried, concrete tank approximately 5 feet, by 12 feet, by 15 feet deep. The pumps associated with this sump were removed, cleaned, and scrapped after termination of operations. The clear water storage tank, an above-ground, circular, steel tank, was removed after termination of operations.

All of the surface facilities were interconnected by various buried steel pipes ranging from 2 inches to 10 inches in diameter. The facilities received liquid from Basin F through two 8-inch steel pipelines approximately 300 feet long (shown in Figure 4) and through a 10-inch, vitrified-clay pipeline running approximately 15,000 feet from Building 802 to the southeast corner of Basin F (not shown in Figure 4). A 6-inch, high-pressure, steel pipeline approximately 250 feet long was used to transfer the liquid from the pump house to the well head. A 4-inch steel pipeline approximately 500 feet long was used to transfer the under-flow from the clarifier back to Basin F. These pipelines are all still in existence.

2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

2.1 Current Problem. The Deep Injection Well and the associated surface support facilities are no longer in operation and no plans exist for operation of the facilities in the future. The liquid treated and injected in the well has been classified as a hazardous waste in the regulations promulgated under the Resource Conservation and Recovery Act of 1976 (RCRA). Although the facilities are not

specifically regulated under RCRA, since all operations were terminated prior to November 19, 1980, the facilities could present a potential hazard to human health and the environment. This potential hazard is due in part to the residual contamination remaining in the sumps, clarifier and pipelines, which could migrate through the soil to the ground water. The open well also presents a potential hazard since it could provide a pathway for contaminant migration from the strata into which the waste liquid was injected to strata from which water supplies are obtained in the Denver area. As a result of the potential hazard, a cleanup action is required to remove the contaminants remaining in the surface facilities and a closing action is required to plug the well and eliminate it as a pathway for contaminant migration.

2.2 Authority. The authority for the proposed action is provided by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Executive Order No. 12316, which place responsibility for releases or threatened releases of hazardous substances or contaminants from Department of Defense facilities with the Secretary of Defense, in consultation with the affected state and EPA and in accordance with the National Contingency Plan (NCP). The Army has the authority and responsibility for determining and implementing appropriate response actions consistent with the NCP to protect public health, welfare, and the environment from contamination resulting from activities at RMA.

3.0 ALTERNATIVES

3.1 No Action Alternative. The no action alternative was eliminated because the facilities would continue to present an unacceptable potential hazard to human health and the environment in their present state. As the surface facilities continue to deteriorate, residual contaminants could be released and migrate into the soil and ground water. Should the casing in the well deteriorate and/or breach, the liquid wastes in the well could migrate into strata from which water supplies are obtained in the Denver area.

3.2 Cleanup and Reuse of the Facilities and the Well. This alternative involves cleanup and repair of the surface facilities and well in anticipation that the facilities would be placed in operation at some future date. This was eliminated for several reasons. Manufacturing operations at RMA by the Army and leasees have been terminated. Disposal of wastes from future production missions at RMA as part of a mobilization would be by other means. No industrial liquid waste

streams are being generated that require disposal. The liquid in Basin F is evaporating and a closure plan has been developed for the removal and disposal of all contaminated materials from Basin F. Therefore, there is no anticipated need for future use of the well in disposing of liquid wastes. In addition, the feasibility of injecting additional liquids into the well would be questionable due to the previous link between well operations and earth tremors. Due to the proximity of the facilities to Basin F and the potentially hazardous vapors emitting from Basin F as the liquid evaporates, the use of the facilities as a permanent work place for Army personnel cannot be recommended. It is also anticipated that the closure of Basin F would require several years and that during this period the facilities would not be used due to the potential hazard to the personnel from the construction activities in the Basin area.

3.3 Demolition of the Facilities and Plugging the Well. The preferred alternative is decontamination and demolition of the facilities, excessing of any usable equipment, and cleanout and plugging the well. The existing pumps and associated equipment, such as valves, would be decontaminated by steam cleaning and excessed. All sumps and the clarifier would be decontaminated by steam cleaning and demolished. Any usable equipment from the clarifiers would be excessed or returned to the Defense equipment inventory for reuse elsewhere. Unusable equipment would be scrapped. All steel pipeline would be excavated, cut up, and either decontaminated in an onsite furnace and scrapped, or transferred to a hazardous waste landfill. The vitrified clay pipe would be excavated along with any contaminated soil and delivered to a hazardous waste landfill. The buildings would be decontaminated as required, demolished, and the debris placed in a landfill. Any liquid or other waste generated from the cleanup activities would be analyzed and if contaminated, would be treated and disposed of as a hazardous waste.

. Any remaining equipment in the well would be removed. The 5.5-inch injection tubing, along with the equipment, would be removed, cut up and decontaminated in an onsite furnace and scrapped. The remaining casing would be logged to determine if any voids exist. If voids are found, they would be cemented. The injection zone at the bottom of the well would be cemented. Additional cement plugs would be placed across zones that contain ground water suitable as a water supply. A heavy bentonite mud would be used to plug the rest of the casing. The well head would be decontaminated and excessed or scrapped. A permanent concrete marker would be installed over the well location.

All holes, pits, depressions, and disturbed areas would be filled, graded, contoured and revegetated.

4.0 ENVIRONMENTAL IMPACT

4.1 Air, Water and Land. This project is a cleanup action intended to significantly reduce the potential for contaminant migration from the Deep Injection Well and associated surface facilities to the environment. All activities including a plugging of the well and demolition of the other facilities would be conducted so as to prevent the release of any contaminants. All contaminated liquids or other residues generated during the project would be treated and/or disposed of in accordance with all applicable regulations. The volumes of contaminated materials which would be generated are considered small.

Surface water runoff is not expected to be a problem since no contaminated material would be piled or exposed at the site in such a manner that it would come in contact with runoff. Contaminated water either currently existing or generated during the cleanup would not be ponded or stored at the site in such a manner that it could migrate into the soil. Such water would be transported away from the site and properly treated and disposed. Contaminated dust generation is not expected to be a problem at the site since the facilities will be decontaminated prior to demolition. Dust generation due to the movement of heavy equipment on gravel roads will be minimized by wetting as required. The on-site furnace proposed for use in decontaminating the steel pipe and other equipment is equipped with air pollution control equipment, and stack gas monitoring is routinely conducted. All contaminated solid residues generated would be transported and placed in an offsite, permitted hazardous waste landfill. Disposal of all non-contaminated debris would be effected in an onsite, existing, sanitary landfill. The volume to be disposed of is not considered significant. All decontaminated equipment and scrap would be transported to the Property Disposal Office (PDO) for final disposal or stockpiled at a suitable location on RMA for sale by PDO.

4.2 Health and Safety. RMA is a closed installation and access to the installation by the public in general is controlled by Arsenal security personnel. Access to the immediate work area during demolition operations will be controlled by the contractor and general public access will be prohibited. A Health and Safety Plan will be prepared by the demolition contractor detailing the requirements for protective clothing and personal protective equipment and work procedures to be used and

followed by all personnel. Although RMA has a Medical Clinic and Fire Department with EMT personnel on the installation, the contractor will be responsible for making his own arrangements in this area with appropriate medical facilities and doctors. RMA personnel would respond where life threatening situations might occur or where protection of property is required. Prior to beginning work on site, all contractor personnel will be briefed as to the nature of the project.

4.3 Economical and Cultural. The proposed project is relatively small activity and would require only a small number of contract personnel to perform the work. There are adequate facilities in the Denver area near to the Arsenal to provide housing, board, and other requirements for these personnel. The only known archaeological site on RMA is in the northeast corner of the Arsenal which is approximately two miles from the site of the proposed project. All of the area involved in this project has previously been disturbed or excavated and thus no new discoveries are anticipated.

4.4 Biological. Various work activities have been conducted in and around the project site on a continuous basis for a number of years. These activities have included numerous personnel and vehicular traffic similar to that involved in the proposed project. Therefore, no increase in contact with or disturbance of the local animal populations is anticipated. Upon completion of the project, the area will be regraded and revegetated with native plant species.

5.0 CONSULTATION AND COORDINATION

Section 1-202 of Executive Order 12088 requires the Department of Defense to consult with Environmental Protection Agency (EPA) concerning the best techniques and methods available for the prevention, control, and abatement of environmental pollution. A forum for discussion and consultation has been established among RMA, EPA and the State of Colorado in the form of a Memorandum of Agreement (MOA). The proposed closure of the Deep Injection Well has been discussed by the various parties at several MOA meetings. RMA requested and received recommendations from EPA Region VIII on plugging the well. These recommendations will be taken into consideration during development of the final, detailed, closure plan. This final plan will be distributed to the MOA parties for comment prior to initiation of construction. All parties will be notified of the project starting date.

6.0 CONCLUSIONS

In accordance with the National Environmental Policy Act and implementing Army Regulation 200-2, it is determined that a finding of no significant impact is appropriate, since this action will not significantly affect the quality of the human environment. Therefore, an environmental impact statement is not needed.