9.0 IDENTIFICATION OF THE SELECTED REMEDY

The selected remedy for the Offpost OU consists of implementing Alternative N-4 for remediation of groundwater in the North Plume Group, Alternative NW-2 for remediation of groundwater in the Northwest Plume Group, and continued operation of the Irondale Containment System consistent with the Irondale IRA. The selected alternatives are described in detail in Section 7 and the Declaration to the ROD.

9.1 Alternative N-4: Offpost Groundwater Intercept and Treatment System

Construction of the Offpost Groundwater Intercept and Treatment System began in November 1991 and full-scale system operation began in June 1993. Additional detail concerning design specifics is contained in the Final Implementation Document for the Groundwater Intercept and Treatment System North of RMA (HLA, 1991). The major components of this alternative are as follows:

- Operation of the Offpost Groundwater Intercept and Treatment System

  Removal of contaminated UFS groundwater north of the RMA boundary in the First Creek and northern paleochannels, using Offpost Groundwater Intercept and Treatment System groundwater extraction wells

  Treatment of the extracted groundwater, using carbon adsorption

  Recharge of treated groundwater to the UFS, using Offpost Groundwater Intercept and Treatment System recharge wells and trenches

  Natural attenuation of inorganic chloride and sulfate concentrations to meet applicable standards for groundwater in a manner consistent with the on-Post remedial action

- Continued operation of the NBCS
- Improvements to Offpost Groundwater Intercept and Treatment System and the NBCS, as necessary
- Long-term groundwater and surface-water monitoring
- Site reviews
- Exposure control/provision of alternate water supply as described in Section 7.1
- Well closure in conformance with criteria listed in Appendix C, pages C-1 and C-2

- Institutional controls for the selected remedy are reflected in Appendix B. These institutional controls are intended to prevent the future use of groundwater exceeding remediation goals.

The Offpost Groundwater Intercept and Treatment System is an array of extraction wells and recharge trenches in the northern and First Creek paleochannels. The system is configured to extract and treat UFS groundwater that exceeds containment system remediation goals and to recharge the treated groundwater. Figure 7.1 presents the placement of extraction wells and recharge wells in the northern paleochannel and the placement of extraction wells and recharge trenches in the First Creek paleochannel. The location of the treatment facility is also shown in Figure 7.1. The northern paleochannel collection system consists of 12 extraction wells spaced approximately 200 feet apart across the paleochannel, perpendicular to the direction of groundwater flow. The recharge system in the northern paleochannel consists of 24 recharge wells spaced 100 feet apart and placed parallel to and approximately 300 feet downgradient of the collection system. The First Creek paleochannel collection system consists of 5 extraction wells spaced 200 to 500 feet apart along the axis of the paleochannel. Recharge trenches are placed such that four of the six trenches are parallel to the flow axis and located on the margins of the paleochannel, with the remaining two trenches located downgradient of the extraction well system and oriented perpendicular to the flow axis.

The system is designed to extract and treat an average flow of 300 gpm from the northern paleochannel, an average flow of 180 gpm from the First Creek paleochannel, and a peak flow of 1.5 times the average flow. The treatment facility basic process flow includes influent storage, pumping, bag filtration for particulate removal, carbon adsorption, multimedia filtration, treated water storage, treated water pumping, and final bag filtration.

A total of approximately 250 million gallons per year would be treated by the Offpost Groundwater Intercept and Treatment System at the average flows. In addition, operation of the NBCS component of this alternative will treat approximately 125 million gallons per year. Thus, a total of approxi-

mately 375 million gallons of UFS groundwater will be treated annually to attain Offpost OU containment system remediation goals (Tables 7.1, 7.2, and 7.3) under this alternative.

An intensive short-term monitoring component will be included in Alternative N-4 as part of the long-term monitoring program. For costing purposes, it is assumed that this program will consist of a network of approximately 60 wells to be sampled semiannually for two to three years, beginning with the Offpost Groundwater Intercept and Treatment System start-up. The intensive monitoring program will allow the collection and subsequent interpretation of performance data for the full-scale operation of both the Offpost Groundwater Intercept and Treatment System and the NBCS. The data will also be used to assess the need for any improvements to the systems. The acquisition of such data will allow for increased accuracy in assessing the response of the UFS groundwater to the NBCS and Offpost Groundwater Intercept and Treatment System remediation systems.

In addition, the preferred alternative includes long-term monitoring of offpost groundwater and surface water to assess contaminant concentration reduction and remedy performance. Groundwater monitoring will continue utilizing both monitoring wells and private drinking water wells. Selected surface-water monitoring locations will be included to evaluate the effect of groundwater treatment on surface water quality. Monitoring will continue after system shut-off to assure continued compliance with containment system remediation goals. The Army will present the scope of these ongoing monitoring programs in an Implementation Plan to be submitted within 90 days following issuance of the ROD. A schedule for compliance with the containment system remediation goals will be included in the Implementation Plan.

9.2 Alternative NW-2: Continued Operation of the Northwest Boundary Containment System with Improvements as Necessary

This section summarizes Alternative NW-2, the continued operation of the NWBCS with improvements as necessary. For additional details of the extraction/recharge systems, the recent upgrades to the system, and the treatment facility at the NWBCS, the reader is referred to the following reports:

Final Implementation Document for NWBCS Short-term Improvements IRA (Morrison-Knudsen Environmental Services [MKES], 1990a); NWBCS Long-term Improvements IRA B(ii) Final Assessment Document (Woodward-Clyde [WWC], 1991a); Proposed Decision Document NWBCS RMA Long-term Improvements IRA (WWC, 1991b); Report of Field Investigations, Assessment, and Final Decision Document for the NWBCS Short-term Improvements IRA (MKES, 1990b); Implementation Document for the Northwest Boundary System long-term Improvements IRA Final Report (MKES, 1992); and Northwest Boundary Containment System Long-term Improvements IRA One-year Evaluation Report (MKES, 1993). The major components of this alternative are as follows:

- Continued operation of the NWBCS
- Improvements to the NWBCS as necessary
- Long-term groundwater monitoring
- Site reviews
- Exposure control/provision of alternate water supply as described in Section 7.1
- Well closure in conformance with criteria listed in Appendix C, pages C-1, and C-2
- Institutional controls as described in Appendix B

In addition, the preferred alternative includes long-term monitoring to assess contaminant concentration reduction and remedy performance. After attainment of groundwater containment system remediation goals and system shut-off, groundwater monitoring will continue to assure continued compliance with containment system remediation goals. The Army will present the scope of these monitoring programs in implementation plans to be submitted following issuance of the ROD.

The NWBCS began operation in 1984. The NWBCS collection system consists of 20 extraction wells and a soil bentonite barrier approximately 2300 feet in length. The recharge system consists of 25 downgradient recharge wells.

9.3 Additional Components of the Selected Remedy

In accordance with the NCP, the public had an opportunity to review and comment on the selected remedial alternatives presented in the Proposed Plan. In response, the Parties held additional discussions to determine how best to address these comments. These discussions resulted in clarifications and minor technical changes that do not significantly alter the overall scope, performance, or cost of the Offpost preferred alternative.

Because the main focus of the Offpost preferred alternative is unchanged, and the additional actions only clarify and enhance the preferred alternative, the changes were not considered to be significant.

The discussions also involved broader issues which were resolved in a document entitled "Agreement for a Conceptual Remedy for the Cleanup of the Rocky Mountain Arsenal," dated June 13, 1995. With regard to the Offpost area, the Parties agreed to several additional components which are an integral part of the overall remedy but are proposed for inclusion in the Onpost ROD. Many of these components are in the Onpost Proposed Plan, which is available for public comment from October 16, 1995, through January 19, 1995.

The additional components added in response to public comment and as part of the Conceptual Remedy Agreement discussions include:

- The U.S. Army and Shell Oil Company agree to continue monitoring and to complete an assessment of the NDMA plume by June 13, 1996, using a 20 ppt method detection limit.
- The U.S. Army and Shell Oil Company agree to prepare a feasibility study of potential actions, both onpost and at the boundary, or adjacent to the boundary in order to achieve NDMA remediation goals at the RMA boundary and to use 7.0 ppt PRG or a certified analytical detection level readily available at a certified commercial laboratory (currently 33 ppt).
- The U.S. Army and Shell Oil Company agree to revegetate approximately 160 acres located in the southeast portion of Section 14 and the southwest portion of Section 13 as depicted in Figure 9.1. Revegetation will involve tilling and seeding. No sampling will be conducted before or after revegetation. Existing soil risks in the area to be revegetated fall within EPA's established acceptable risk range and revegetation is not necessary. However, the U.S. Army and Shell Oil Company agree to the revegetation program as part of the Offpost settlement.

- The Army will treat any contaminated extracted groundwater prior to discharge or reinjection so that it meets the current water quality standards established in the Colorado Basic Standards for Groundwater and the Colorado Basic Standards and Methodologies for Surface Water.

- As of the date of the Onpost ROD, and based on a 0.392 parts per billion (ppb) detection limit, the U.S. Army will use the last available quarterly monitoring results to determine the DIMP plume footprint.

- The Army and Shell Oil Company will pay for the extension of, and hook-up to, the current water distribution system for all existing well owners within the DIMP plume footprint referenced above.

- Existing domestic well owners outside of the DIMP plume footprint as of the date of the Onpost ROD where it is later determined that levels of DIMP are eight ppb or greater (or other relevant CBSG at the time) will be hooked up at the U.S. Army and Shell Oil Company's expense to the SACWSD distribution system or provided a deep well or other permanent solution.

- For new domestic wells with levels of eight ppb or greater (or other relevant CBSG at the time), the Offpost ROD institutional controls will provide that the U.S. Army and Shell Oil Company will pay for hook-up to the distribution system or provided a deep well or other permanent solution.

- The parties to the Conceptual Remedy Agreement commit to good faith best efforts to establish a trust fund for the operations and maintenance of the remedy, including habitat and surficial soil. The parties recognize, however, that establishment of such a trust fund requires special legislation and there are restrictions on the actions federal agencies can take with respect to proposing legislation and supporting proposed legislation.

- As part of the Onpost remedy, the U.S. Army and Shell Oil Company will pay for and provide, or arrange for the provision, of 4000 acre-feet of water to SACWSD.

9.4 Cost of Selected Remedy

A detailed cost summary for the selected remedy is presented in Table 9.1. The total estimated cost ranges from approximately $69 to $76 million. This cost does not include implementation of the additional components discussed in Section 9.3. However, these additional components would be included in all the alternatives evaluated (except the No Action alternative); therefore, the relative relationship of the cost of the various alternatives will not change.

9.5 Limitations

It should be recognized that U.S. Environmental Protection Agency (EPA) studies (EPA, 1988b) have indicated that it may not always be possible to reach MCLs or proposed MCLs through currently available technology. If it becomes apparent during implementation or operation of the selected

remedy that contaminant levels are remaining constant for a significant amount of time at levels higher than the groundwater containment system remediation goals delineated in the ROD, the containment system remediation goals and the remedy will be reevaluated. Further, the NCP requires a formal review of the effectiveness of the selected remedy at least every five years. As needed, the operational design of the selected remedy will be reviewed to achieve the groundwater containment system remediation goals .

9.6 Criteria for Shutting Down Boundary and Offpost Containment Groundwater Systems

Existing wells within the boundary and offpost containment systems can be removed from production when concentrations of constituents detected in the well are less than applicable or relevant and appropriate requirements (ARARs) established in the ROD and/or it can be demonstrated that discontinuing operation of a well will not jeopardize the containment objective of the systems. Wells removed from production, and monitoring wells upgradient and downgradient of the boundary and offpost containment systems, will be monitored quarterly for a period of five years to determine if contaminants reappear. Wells turned off for hydraulic purposes will not be subject to the quarterly monitoring requirements. Boundary and offpost containment system extraction wells removed from production for water quality reasons will be placed back into production if contaminant concentrations exceed the ARARs established in the ROD. Wells with concentrations less than ARARs established in the ROD can remain in production if additional hydraulic control is required.