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United States Department of Energy

Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site at Riverton, Wyoming

Final

Appendix B of the Cooperative Agreement
No. DE-FC04-83AL19454

April, 1987

Uranium Mill Tailings Remedial Action Project UMTRAP

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REMEDIAL ACTION PLAN

AND

SITE DESIGN FOR STABILIZATION

OF THE

INACTIVE URANIUM MILL TAILINGS SITE

AT

RIVERTON, WYOMING

FINAL

APPENDIX B OF THE COOPERATIVE AGREEMENT

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1.0 INTRODUCTION

1.1 PURPOSE

This Remedial Action Plan (RAP) has been developed to serve a two-fold purpose. It presents the series of activities which are proposed by the U.S. Department of Energy (DOE) to affect long-term stabilization and control of radioactive materials at the inactive uranium processing site located in Riverton, Wyoming. It also serves to document the concurrence of both the State of Wyoming and the U.S. Nuclear Regulatory Commission (NRC) in the remedial action. This agreement, upon execution by DOE and the State and concurrence by NRC, becomes Appendix B of the Cooperative Agreement.

1.2 RESPONSIBILITIES

In 1978, Congress passed Public Law 95-604 (PL95-604), the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978, expressly finding that uranium mill tailings located at inactive (and active) mill sites may pose a potential health hazard to the public. Title I to the UMTRCA identified sites to be designated for remedial action. On November 9, 1979, Riverton was designated as one of 24 sites.

UMTRCA charged the U.S. Environmental Protection Agency (EPA) with the responsibility for promulgating remedial action standards for inactive mill sites. The purpose of these standards is to protect the public health and safety and the environment from radiological and non-radiological hazards associated with radioactive materials at the sites. The final standards were promulgated with an effective date of March 7, 1983.

The DOE will select and execute a plan of remedial action that will satisfy the EPA standards and other applicable Federal and state laws. Under UMTRCA, the DOE and the State of Wyoming entered into a cooperative agreement effective December 23, 1983, for remedial action at the Riverton site. The cooperative agreement will be modified to affirm the agency responsibilities and the assumptions for remedial action at the Riverton site. Those assumptions are as follows:

- DOE is responsible for excavation of the Riverton Title I tailings (unlicensed tailings defined in the UMTRCA), relocation of the tailings to a Title II (licensed) disposal site in the Gas Hills area, and restoration of the Title I Riverton processing site.

- NRC will, at the request of the Title II licensee, amend the byproduct material license to allow for comingling of the Title I and Title II tailings and the ultimate stabilization to meet EPA and other applicable standards prior to September 30, 1992.

- NRC shall obtain reclamation bonding from the Title II licensee to ensure reclamation of the Title I/Title II disposal site in the event that the licensee should default prior to completion of tailings stabilization.

- DOE shall pre-qualify Title II disposal sites to ensure that the Title II site has sufficient capacity to receive in excess of 1,500,000 cubic yards of tailings and contaminated materials that will be relocated from the Riverton site. The Title II licensee shall provide evidence of disposal site land ownership or land use authorization as well as permits and licenses required for disposal of tailings which shall remain in effect until NRC termination of the Title II license.

- The Title II licensee will be responsible for all costs of reclamation/stabilization of comingled tailings to comply with EPA and other applicable standards after the tailings are unloaded at the disposal site.

- DOE is responsible for ground-water protection or mitigative measures to meet Title I EPA standards at the Riverton processing site, pending EPA reissuance of remedial standards.

- The Title II licensee is responsible for ground-water protection or mitigative measures which may be necessary to meet the Title II EPA standards for the comingled tailings at the disposal site.

- The Title II licensee is responsible for surveillance and maintenance of the comingled tailings pile at the disposal site until such time as reclamation/remedial action is determined by NRC to be complete.

- DOE or another Federal agency designated by the President will be responsible to obtain a license for and to implement surveillance and maintenance of the stabilized tailings and obtain legal title to the disposal site.

The DOE will fund 90 percent and the state will fund 10 percent of allowable costs up to $15.0 million of the project cost. The portion of the project cost between $15.0 million and $28.0 million will be funded 75 percent by DOE and 25 percent by the state. Project costs in excess of $28.0 million will be assumed 100 percent by the state.

All remedial actions must be selected and performed with the concurrence of the NRC. In conformance with the UMTRCA, the required NRC concurrence with the selection and performance of proposed remedial actions and the licensing of long-term monitoring and maintenance of disposal sites will be for the purpose of ensuring compliance with the standards established by the EPA. Therefore, the RAP constitutes the initial document in the licensing process. A detailed listing of the responsibilities of the project participants is included in Section 6.0 of this report.

1.3 SCOPE AND CONTENT

This document has been structured to provide a comprehensive understanding of the remedial action proposed for the Riverton site. It includes specific design requirements for the detailed design and

construction of the remedial action. It is important to stress that the site design summarized in Section 4.0 establishes that the remedial action can be completed to comply with the EPA standards. The detailed design in Appendix C contains the remedial action specifications and accompanying drawings.

An extensive amount of data and supporting information have been generated for this remedial action plan which cannot all be incorporated into this single document. Pertinent information and data are included with reference given to the supporting documents.

Section 2.0 presents the EPA standards, including a discussion of their objectives. Section 3.0 traces the history of operations at the Riverton site with a description of the present site characteristics. Section 4.0 provides a summary of the proposed remedial action. Section 5.0 summarizes the plan for ensuring health and safety protection for the surrounding community and the on-site workers. Section 6.0 presents a detailed listing of the responsibilities of the project participants. Section 7.0 describes the long-term surveillance and maintenance responsibilities. Section 8.0 is a summary presentation of the UMTRA Project Quality Assurance Plan. Section 9.0 documents the on-going activities to keep the public informed and participating in the project.

Attached as part of the RAP are appendices which describe in more detail various aspects of the remedial action.

Appendix A, Regulatory Compliance, describes in detail the permits necessary for the remedial action activities.

Appendix B, Radiological Support Plan, describes the procedures used to characterize the present radiological condition of the site and the procedures to be used to control and verify the results of remedial action activities.

Appendix C, Final Plans and Specifications, contains the bid schedule, special conditions, specifications, and subcontractor drawings.

1.4 COLLATERAL DOCUMENTS

The Processing Site Characterization Report (PSCR) (DOE, 1985a) and the Environmental Assessment (EA) (DOE, 1987) describe the existing conditions at the site and the results of the remedial action. These documents include details that are not reported in the RAP.

The PSCR contains all of the geotechnical, hydrological, radiological, meteorological, and physical data necessary to describe the existing conditions at the Riverton site. The report also contains data which characterize potential remedial action construction materials.

The EA describes the proposed remedial action and alternatives and the environmental impacts of the proposed actions.

An additional supporting document is the Technical Approach Document (TAD) (DOE, 1986a). This document describes technical approaches and

procedures used in the UMTRA Project. It includes discussions of major technical areas: design considerations; surface-water hydrological erosion control; geotechnical aspects of pile design; radiological issues; and protection of ground-water resources.

Copies of all of these documents, as well as supporting data and calculations, are on file in the UMTRA Project Office in Albuquerque, New Mexico.

2.0 EPA STANDARDS

The requirements and considerations for long-term isolation and stabilization of tailings, radon control, cleanup of land and buildings, and protection of water quality have been discussed and published in the Plan for Implementing EPA Standards for UMTRA Sites (DOE, 1984). This document was used as a guide in the development of the Remedial Action Plan and is the basis for the following discussion of the EPA standards.

2.1 GENERAL

Pursuant to the requirements of the UMTRCA, EPA has promulgated health and environmental standards to govern cleanup, stabilization, and control of residual radiological materials at inactive uranium mill tailings sites. The promulgated standards establish requirements for long-term stability and radiation protection and provide procedures for ensuring the protection of ground-water quality.

In developing the standards, EPA determined "that the primary objective for control of tailings should be isolation and stabilization to prevent their misuse by man and dispersal by natural forces such as wind, rain, and flood waters" and that "a secondary objective should be to reduce radon emissions from tailings piles." A third objective should be "the elimination of significant exposure to gamma radiation from tailings piles." (Ref. preamble to Standards for Remedial Actions at Inactive Uranium Processing Sites, 40 CFR Part 192.) These conclusions were based on a determination that the most significant public health risks associated with inactive tailings were posed by exposure to people living and working in structures contaminated by tailings. The EPA further concluded that the potential for contamination of ground water and surface water should be evaluated on a site-specific basis.

The EPA standards are discussed in the following paragraphs and are summarized in Table 2.1.

2.2 LONG-TERM STABILITY

Isolation and stabilization of tailings in order to prevent misuse by man and dispersal by natural forces is the primary objective of the EPA standards. Accordingly, long-term stability was emphasized in the development and promulgation of the standards. This is consistent with the guidance provided by the legislative history of the UMTRCA which stresses the importance of avoiding remedial actions which would be effective only for a short period of time and which would require future Congressional consideration.

The EPA standard-setting process distinguished "passive controls" such as thick earthen covers, below-ground disposal, rock covers, and massive earth and rock dikes, from "active controls" such as semi-permanent covers, warning signs, and restrictions on land use. Active control covers could be expected to need frequent replacement or other

PART 192 - HEALTH AND ENVIRONMENTAL PROTECTION STANDARDS FOR URANIUM MILL TAILINGS

SUBPART A - Standards for the Control of Residual Radioactive Materials from Inactive Processing Sites

192.02 Standards

Control shall be designed to:

(a) Be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years, and,

(b) Provide reasonable assurance that releases of radon-222 from residual radioactive material to the atmosphere will not:

(1) Exceed an average release rate of 20 picocuries per square meter per second, or
(2) Increase the annual average concentration of radon-222 in air at or above any location outside the disposal site by more than one-half picocurie per liter.

SUBPART B - Standards for Cleanup of Land and Buildings Contaminated with Residual Radioactive Materials from Inactive Uranium Processing Sites

192.12 Standards

Remedial actions shall be conducted so as to provide reasonable assurance that, as a result of residual radioactive materials from any designated processing site:

(a) The concentration of radium-226 in land averaged over any area of 100 square meters shall not exceed the background level by more than -

(1) 5 pCi/g, averaged over the first 15 cm of soil below the surface, and
(2) 15 pCi/g, averaged over 15 cm thick layers of soil more than 15 cm below the surface.

(b) In any occupied or habitable building -

(1) The objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL. In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL, and
(2) The level of gamma radiation shall not exceed the background level by more than 20 microroentgens per hour.

SUBPART C - Implementation (condensed)

192.20 Guidance for Implementation

Remedial action will be performed with the "concurrence of the Nuclear Regulatory Commission and the full participation of any state that pays part of the cost" and in consultation as appropriate with other government agencies.

192.21 Criteria for Applying Supplemental Standards

The implementing agencies may apply standards in lieu of the standards of Subparts A or B if certain circumstances exist, as defined in 192.21.

192.22 Supplemental Standards

"Federal agencies implementing Subparts A and B may in lieu thereof proceed pursuant to this section with respect to generic or individual situations meeting the eligibility requirements of 192.21."

(a) ". . .the implementing agencies shall select and perform remedial actions that come as close to meeting the otherwise applicable standards as is reasonable under the circumstances."

(b) ". . .remedial actions shall, in addition to satisfying the standards of Subparts A and B, reduce other residual radioactivity to levels that are as low as is reasonably achievable."

(c) "The implementing agencies may make general determinations concerning remedial actions under this Section that will apply to all locations with specified characteristics, or they may make a determination for a specific location. When remedial actions are proposed under this Section for a specific location, the Department of Energy shall inform any private owners and occupants of the affected location and solicit their comments. The Department of Energy shall provide any such comments to the other implementing agencies [and] shall also periodically inform the Environmental Protection Agency of both general and individual determinations under the provisions of this section."

Ref: Federal Register, Volume 48, No. 3, January 5, 1983, 40 CFR Part 192.

TABLE A.1.1 EPA STANDARDS

major repairs requiring the appropriation and expenditure of public funds. In setting the standards, EPA called for designs which rely primarily on passive controls.

The standard is framed as a longevity requirement which recognizes the difficulty in predicting very long-term performance with a very high degree of confidence. In establishing the longevity requirement, EPA concluded that existing knowledge permits the design of control systems that have a good expectation of lasting at least 1000 years. Therefore, a design objective of 1000 years was established to be satisfied whenever reasonably achievable, but in any case, with a minimum performance period of 200 years.

The standard recognizes the need for institutional controls such as custodial maintenance, monitoring, and contingency response measures. In its preamble to the standards, EPA calls for such controls to be provided as an essential backup to the primary passive controls.

2.3 RADON EMISSIONS CONTROL

The EPA identified a reduction of radon emission from tailings piles as the second objective in its standards for the control of tailings. In developing the standards, the EPA considered several alternative approaches and selected an emission limitation as the primary form of the standard. In addition, a concentration limit was established by the EPA as an alternative form of the standards for use in cases where the DOE determined that the alternative was appropriate.

In establishing the emission limitation for tailings piles, the EPA sought to reduce both the maximum risk to individuals living very near to the sites and the risk to the population as a whole. With regard to individuals very near to disposal sites, the EPA estimates that exposure to radon emissions will be reduced by more than 96 percent. The radon standard will limit the increase in radon concentration attributable to a pile to a small increase above the background radon level near the disposal site. Both radon standards are design standards with compliance to be determined on the basis of predicted rather than measured emission rates and concentrations. The EPA states that "post-remediation monitoring will not be required to show compliance, but may serve a useful role in determining whether the anticipated performance of the control system is achieved."

In establishing the radon standard, the EPA determined that the emission limitation could be achieved by well-designed thick earthen covers and that such control techniques would be compatible with the requirements of the EPA longevity standard.

2.4 WATER-QUALITY PROTECTION

The EPA reviewed available water-quality data at inactive tailings sites and determined that there was little evidence of recent movement of contaminants into ground water. They also determined that any degradation

of ground-water quality should be evaluated in the context of potential beneficial uses of the ground water as determined by background water quality and the available quantity of ground water.

Rather than establish specific numerical limitations for contaminant discharges or ground-water quality, EPA determined that the most appropriate course of action would be to require site-specific analyses of potential future contaminant discharge and a case-by-case evaluation of the significance of such a discharge. The implementation guidelines for the EPA standards call for adequate hydrological and geochemical surveys at each site as a basis for determining whether specific water-protection measures should be applied.

Specific site assessments must include monitoring programs sufficient to establish background ground-water quality through one or more upgradient wells, and to identify the present movement and extent of contaminant plumes associated with the tailings piles. The site assessments further call for judgements of the need for restoration or prevention, or both, to be guided by EPA's hazardous waste management system and relevant state and Federal water-quality criteria. Decisions on specific actions to protect or restore water quality are to be guided by such factors as the technical feasibility of improving the aquifer, the cost of applicable restorative or protective programs, the present and future value of the aquifer as a water source, the availability of alternate water supplies, and the degree to which human exposure is likely to occur.

The UMTRCA requires that the standards promulgated by EPA ". . . to the maximum extent practicable, be consistent with the requirements of the Solid Waste Disposal Act, as amended." In setting the standards, EPA determined that the statutory requirement for NRC to concur with the selection and performance of remedial actions and to issue licenses encompassing "monitoring, maintenance, or emergency measures necessary to protect public health, safety, and the environment" was consistent with the EPA regulations implementing the Solid Waste Disposal Act (47 FR 32274, July 26, 1982). Accordingly, EPA established the implementation procedures requiring case-by-case evaluations of potential contamination at sites. Decisions regarding monitoring or remedial actions will be guided by relevant considerations in the hazardous waste management systems.

On September 3, 1985, the United States Tenth Circuit Court of Appeals set aside the EPA Standard applicable to the protection of waterways and ground water, 40 CFR Part 192.20(a)(2)-(3). The water protection standard was remanded to the EPA for further consideration in light of the Court's opinion that the water standard promulgated by the EPA on March 7, 1983, was site-specific rather than of general application as required by the legislation. EPA has not identified a date for re-issuance of 40 CFR Part 192.20(a)(2)-(3), but it is anticipated that such re-issuance will not occur until after remedial action has been initiated at the Riverton site. Therefore, DOE and the State of [illegible] will implement the remedial action plan, with the concurrence of NRC and after consultation with EPA. As implementing agencies with regard to the EPA Standards, DOE, the State of Wyoming, and NRC, [illegible]

Remedial Action, will make every reasonable effort to ensure that water resources are adequately protected.

Whether EPA, in re-issuing the water standard, sets forth a technical approach similar to either the current active site water standard or that proposed prior to promulgation of 40 CFR 192.20 (a)(2)-(3) for the inactive sites, DOE has thoroughly characterized conditions at the Riverton processing site and does not anticipate that any substantive changes to the remedial action will be required.

2.5 CLEANUP OF LANDS AND BUILDINGS

The EPA evaluated the risk associated with the dispersal of tailings off the sites and concluded that the principal risk to man was the exposure to radon daughter products inside buildings. The EPA therefore stated that the objective of the cleanup of tailings from around existing structures was to achieve an indoor radon daughter concentration (RDC) of less than 0.02 working level (WL). For open lands, the purpose of removing the contamination is to remove the potential for excessive indoor radon daughter concentrations that might arise from new construction on contaminated land. The 5 pCi/g and 15 pCi/g Ra-226 concentration limits for 15-cm surface and subsurface layers were considered adequate to limit indoor RDCs to below 0.02 WL. A secondary concern was to limit exposure to people from gamma radiation.

The standard requires that residual radioactive materials be removed from buildings exceeding 0.03 WL. In cases where levels are between 0.02 and 0.03 WL, the Federal Government will have the flexibility to use measures such as sealants, filtration devices, or ventilation devices to reduce concentrations to below 0.02 WL.

3.0 SITE CHARACTERIZATION

Site characterization describes the Riverton site as it exists today. Emphasis is given to the three major concerns of stability, radiation, and ground water. The data to support the characterization may be found in the Processing Site Chracterization Report (PSCR) (DOE, 1985a).

3.1 HISTORY

The mill near Riverton was constructed in 1958 and operated by Fremont Minerals, Inc., whose name was subsequently changed to Susquehanna-Western, Inc. The mill processed uranium for sale to the U.S. Atomic Energy Commission (AEC) from 1958 until 1963. The location of the abandoned mill site is shown in Figure 3.1.

A variety of uranium ores were shipped to the mill from the surrounding area by rail and truck. The mill included both acid and carbonate circuits to provide flexibility for the many types of ore received. During the five years of operation, approximately 900,000 dry tons of ore were processed. The mill also included a sulfuric acid plant (FBDU, 1981).

Fremont Minerals, Inc. acquired the property from a private owner; afterward, their name changed to Susquehanna-Western and the plant shut down in 1963. Susquehanna-Western dismantled portions of the buildings and process tanks, and covered the tailings pile with 18 inches of fill in approximately 1965.

Western Nuclear, Inc. bought the acid plant in early 1967. In 1985, Western Nuclear sold the acid plant to Chemical Marketing Services, Inc. Solution Engineering Company of Alice, Texas, acquired the remainder of the site from Western Nuclear in approximately 1976. The present owner, Lome Drilling and Well Service, acquired the designated site, except for the acid plant, and additional property to the west from Solution Engineering in 1978.

Chemical Marketing Services owns a portion of the designated processing site and some land south of the acid plant and west of the tailings pile. The designated site and land ownership are shown in Figure 3.2.

3.2 PHYSICAL DESCRIPTION

Surface features of the Riverton site

The Riverton site is located in an unincorporated rural area about 2.5 miles southwest of the center of Riverton, on the north side of State Highway 138 (formerly State Highway 789) in Fremont County, Wyoming (Figure 3.3). The total site, which covers about 173 acres, is generally bounded by BIA Route 28 (Goes In Lodge Road) on the north, a vacant field (owned by Lome Drilling and Well Service) on the west, State Highway 138 to the south, and irrigated farmland on the east. The designated site

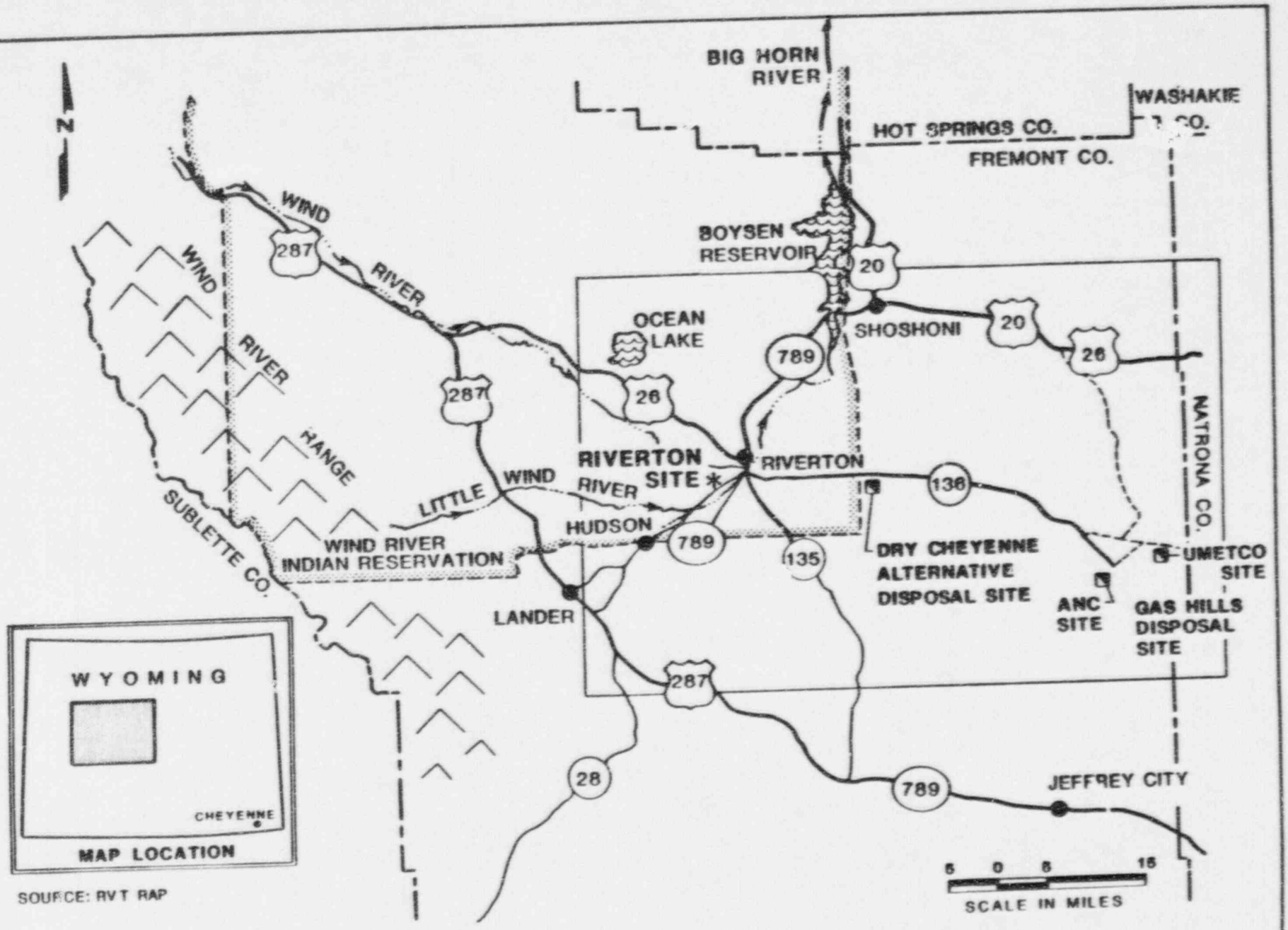


FIGURE 3.1 RIVERTON SITE LOCATION

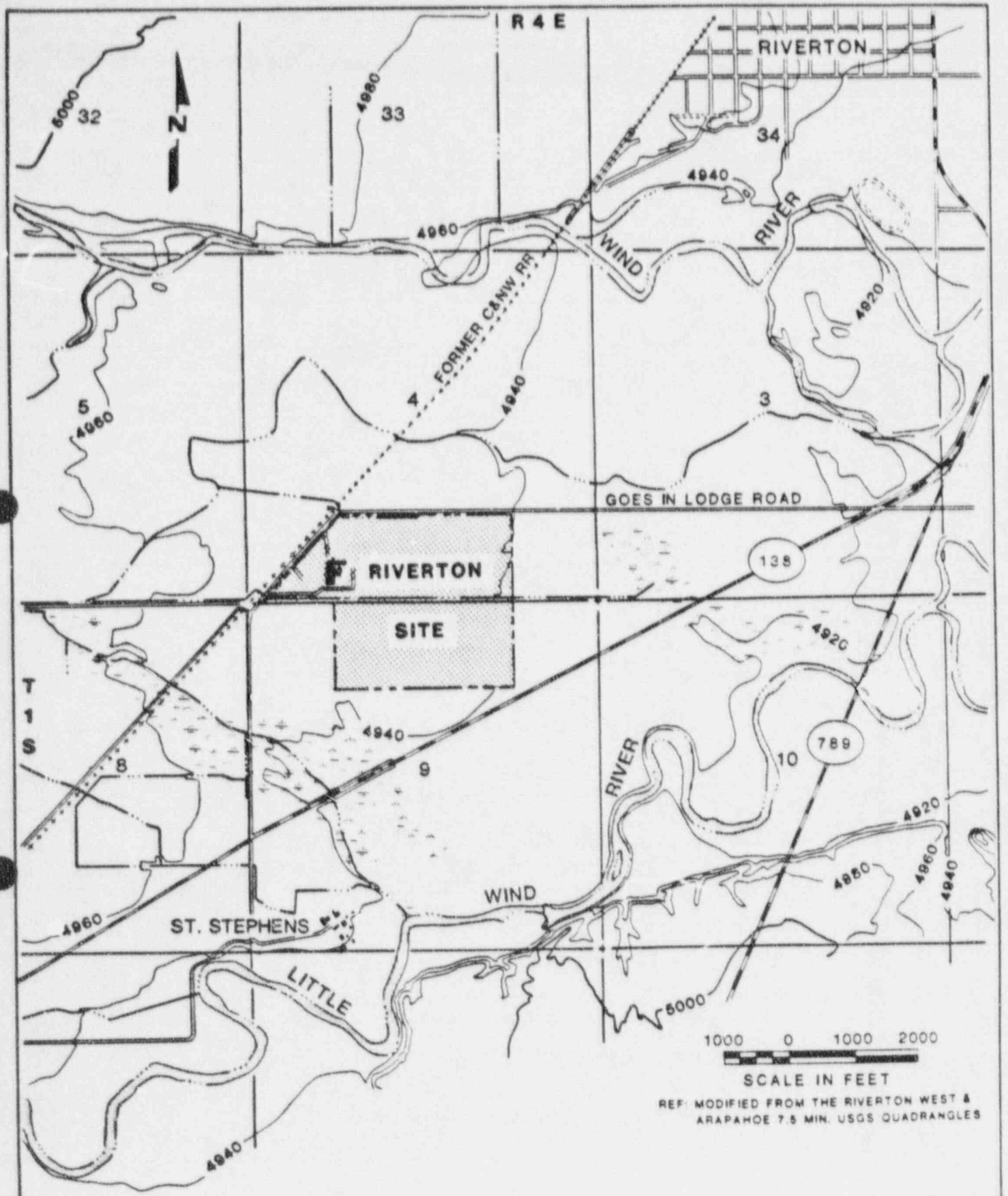


FIGURE 3.2 RIVERTON TAILINGS SITE

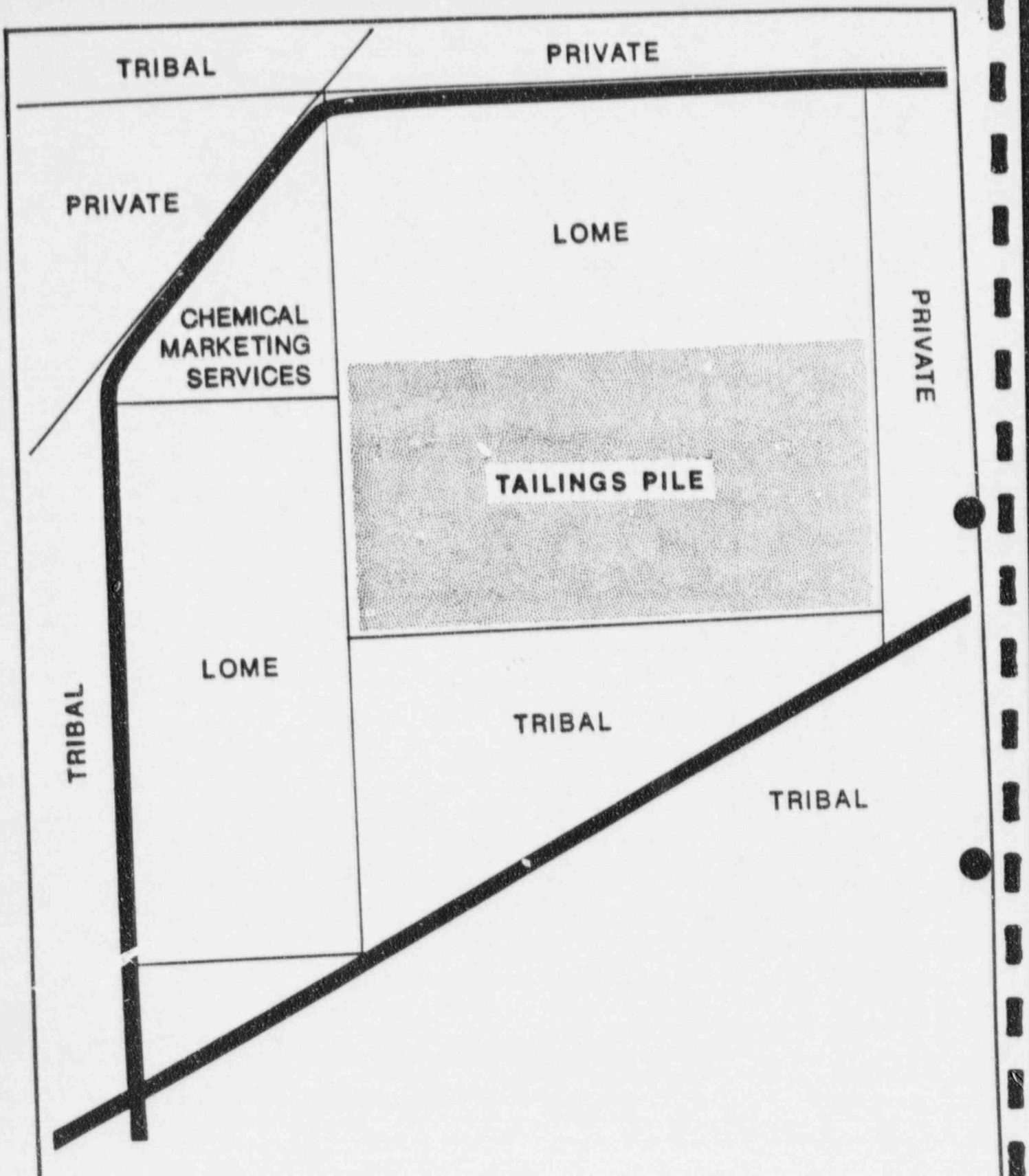


FIGURE 3.3 LAND OWNERSHIP AROUND THE RIVERTON SITE

is surrounded by the Wind River Indian Reservation. The neighboring properties are owned by members of the Arapahoe and Shoshone Indian tribes and others (see Figure 3.2).

The designated site is rectangular, with the exception of a triangular projection on the northwestern boundary where the original mill site is located. The site is partially bisected from east to west and north to south by irrigation canals. Both native grasses and those intentionally seeded grow on the open areas and the pile. Portions of the mill building were dismantled; however, the structure and foundations remain along with some steel tanks. Other associated buildings remain, including a pump house which supplies the water tower, a scale house which is used by Chemical Marketing Services, and a wash house. Several piles of rubble spot the area and some of the process tanks and debris have been buried on the site. The ore storage area previously occupied the northwest corner of the site and contaminated the upper soil layer. The rectangular tailings pile in the southern half of the designated site occupies about 70 acres; the pile is higher on the west side and slopes to the east. The pile was contoured and covered with approximately 18 inches of material from the surrounding edge of the pile. The excavation for the cover created a swale around the pile which collects runoff from the pile. The cover was seeded with crested wheatgrass which controls wind and water erosion to some degree.

Subsurface features for the Riverton site

The Riverton tailings site lies within the Wind River Basin, part of the Wyoming Basin subdivision of the Middle Rocky Mountain physiographic province. The topography of the Wind River Basin has been greatly influenced by glaciation and is characterized by glacial and post-glacial deposits, including terrace and pediment gravels and modern river alluvium.

The tailings site is situated on a floodplain terrace which is approximately five feet higher than the streambed of the Wind River. Geomorphic conditions at the site reflect the depositional history of the floodplain. The surface of the terrace on which the tailings rest is marked by older channels of the Wind River that have been filled with unstratified eolian sand (SHB, 1984). Floodplain materials beneath the tailings consist of one to three feet of fine-textured eolian sand and approximately 18 feet of coarse-grained alluvium that is classified as sandy gravel containing rounded granitic cobbles. This layer of sandy gravel acts as a perched water-table aquifer. The alluvial materials were deposited on an irregularly-eroded bedrock surface (FBD, 1983).

Bedrock under the tailings site is the Wind River Formation of Eocene age (36,000,000 to 58,000,000 years ago). Results of core drilling indicate that the bedrock materials are moderately weathered claystones to very fine-grained siltstones and sandstones (FBD, 1983). Lithologic changes tend to be gradational, with some lensing of both claystone and sandstone. Saturated strata exist in layers below 50 feet. The stratigraphic units are nearly horizontal and extend to a depth of at least 2000 feet (FBDU, 1981).

Soils present within the designated tailings site are sandy loam over gravel (Bigwin series) and sandy loam formed on alluvial fans (Apron series) (Iiams, 1984). The Bigwin series consists of somewhat poorly-drained, sandy loams that are underlain by sand and gravel to a depth of 20 to 40 inches. The Apron series consists of well-drained, sandy loams that formed on alluvial fans. Runoff is slow, and the hazard of water erosion is slight for both soils (SCS, 1974).

There are important deposits of industrial minerals, fossil fuels, and metallic ores in both the Wind River Basin and the adjacent Precambrian uplifts. Oil and gas exploration and development are ongoing in the area around Riverton. Alluvial sand and gravel deposits exist beneath and around the tailings site, and similar deposits are widespread throughout the Wind River valley. The mineral rights for the designated site are owned by Lome Drilling and Well Service; therefore, they are not subject to mining claims or mineral leasing.

Further details on the subsurface features of the tailings site may be found in the Riverton Processing Site Chracterization Report (PSCR) (DOE, 1985a).

3.3. STABILITY

No earthquakes greater than Intensity VI have been recorded in the Riverton area. One earthquake, interpreted as Intensity VII (modified Mercalli scale) occurred in 1897 near Casper, which is about 110 miles east of Riverton. Because few people lived in the Casper area in 1897, the interpretation may be inaccurate. In general, the region has a low seismic risk (ATC, 1978).

For establishing earthquake design parameters, the impact of a Maximum Credible Earthquake (MCE) is used. An MCE of magnitude 6.8 (Richter scale) was estimated for the North Granite Mountain fault system which lies approximately 40 miles south of the existing tailings site. An earthquake of this magnitude would generate an on-site horizontal ground acceleration of 0.13g. The effective duration of ground motion greater than 0.05g would range from 11 to 16 seconds in soil and three to eight seconds in rock as described in the PSCR (DOE, 1985a).

The Riverton tailings site is located on a low floodplain terrace in the Wind River Basin, about 2.5 miles upstream of the confluence of the Wind and Little Wind Rivers. The Wind River is one mile north of the site, and the Little Wind River is approximately 0.5 mile southeast of the site. The site is bordered by drainage ditches and irrigation canals.

The Wind River has a drainage basin of approximately 2300 square miles. The Little Wind River drains an area of approximately 2000 square miles. Peak monthly flows for both rivers generally occur during the month of June as a result of snowmelt runoff. A maximum flow of 13,300 cubic feet per second (cfs) was recorded in 1935 for the Wind River; a maximum of 14,700 cfs was recorded in 1963 for the Little Wind River (USGS, 1984).

A geomorphic evaluation of the tailings site (SHB, 1984) has indicated that, disregarding any engineering control features, the channels of the Wind and Little Wind Rivers could move toward the site due to aggradation or very large flood events (greater than 100-year events). Geologic evidence indicates that the hazard is primarily from the Wind River which could migrate laterally across its floodplain within a 2000-year period depending upon the frequency and severity of floods. The extent of channel migration is unknown; however, the rate of migration could exceed 0.5 mile per 1000 years.

3.4 RADIATION

Radioactive elements occur naturally throughout the earth's air, water, and soil. The concentration of these elements varies greatly throughout the United States, and the concentrations in the Riverton area are generally higher than the average for other areas because of local mineralization. Background soil radioactivity levels typical of the Riverton area and not influenced by the Riverton tailings pile have been established as 0.9 pCi/g for radium-226 (Ra-226) (ORNL, 1980).

The average background gamma radiation exposure rate from both terrestrial and cosmic sources measured at three feet above the ground is 13 microroentgens per hour (microR/hr) with a range of 12 to 13 microR/hr (ORNL, 1980). Cosmic rays (radiation from the sun and other sources external to the earth) contribute approximately 7.7 microR/hr (55 percent) to the 13 microR/hr background gamma exposure rate in the Riverton area (EG&G, 1983).

The average outdoor background radon concentration in the Riverton area is 1.1 picocuries per liter (pCi/l) based on measurements at two locations southwest and north of Riverton. The range of radon concentrations for these 24-hour samples was 0.8 to 1.3 pCi/l (FBDU, 1977).

The average Ra-226 content of the tailings pile and the existing earthen cover is 342 pCi/g (DOE, 1985a). The Ra-226 concentrations ranged from 180 to 1200 pCi/g (ORNL, 1980).

Gamma radiation exposure rates have been measured around the Riverton tailings site by many programs (PHS, 1970; EPA, 1977; ORNL, 1980; SFEC, 1983; EG&G, 1983), and all reported rates are in general agreement. Over the eastern half of the mill site, the gamma exposure ranges from 180 to 360 microR/hr. Over the western half of the pile and around the edges of the ore storage area, the exposure rates range from 90 to 180 microR/hr. Along a band about 200 feet wide ringing the entire site, the exposure rate is about 60 to 90 microR/hr. Extending about 2000 feet to the southeast of the pile, is an area of windblown contamination producing an exposure rate of 20 to 60 microR/hr. Background gamma exposure rates are reached within about 1000 feet of the pile in all other directions.

Radon flux through the cover of the existing pile ranges from 51 to 81 picocuries per square meter per second (pCi/m^2s), with an area

averaged flux of 65 pCi/m^2s (FBDU, 1977). The radon flux source term was back calculated using the RAECO model and an average Ra-226 concentration of 342 pCi/g (NRC, 1984). The calculation resulted in an annual average radon flux of 170 pCi/m^2s from the bare tailings.

The soil beneath the tailings pile exceeds the EPA standards of 15 pCi/g of Ra-226 to an average depth of about three feet. The Ra-226 concentration in this material ranges from four to 1300 pCi/g based on data from the analyses of interface samples collected by Mountain States Research and Development (MSRD, 1982).

The tailings have been dispersed by wind and water erosion and have contaminated soils adjacent to the tailings pile. Figure 3.4 shows the areal extent of the displaced tailings as well as the contaminated ore storage and mill areas.

Along the eastern half of the ore storage area, the contaminated material is less than one foot deep. Along the western half of the ore storage area, and over most of the mill area, the contaminated material ranges from two to four feet in depth. Contamination in this area is slightly elevated above the EPA standard for radium in soils with isolated spots of higher activity. Windblown contamination around the tailings pile consists of diluted tailings, and is generally slightly elevated above the EPA standard. The total number of acres of contamination off the pile is approximately 118 acres.

3.5 GROUND WATER

Ground water occurs under unconfined and confined conditions within the alluvial deposits and the sedimentary strata of the Wind River Formation in the Riverton area. An unconfined system exists in the shallow alluvial deposits and the hydrologically-connected upper sandstone unit of the Wind River Formation. The unconfined system is affected by irrigation during late spring and early summer. A confined system exists in the deeper sandstone strata of the Wind River Formation. Details on the stratigraphy of the two systems may be found in the PSCR and EA (DOE, 1985a; 1987).

The ground-water flow direction in the unconfined aquifer is predominantly to the south-southeast toward and into the Little Wind River. The hydraulic gradient is approximately 12 feet per mile. Recharge to the aquifer is from precipitation, snowmelt, and irrigation seepage. The ground water discharges into the Little Wind River approximately 2800 feet downgradient from the tailings site (LBL, 1984).

Comparisons of the water-table configuration and potentiometric surfaces for the first confined sandstone layer and sandstones deeper than 200 feet indicate that there is a greater degree of communication between the unconfined aquifer and first confined sandstone than between the first confined sandstone and deeper sandstone. Using estimates based on Darcy's Law, hydrologic calculations indicate that water would require at least 20 years to migrate from the unconfined aquifer to the first confined sandstone and an additional 1800 years to migrate from the first confined sandstone to the sandstones at depths greater than 200 feet.

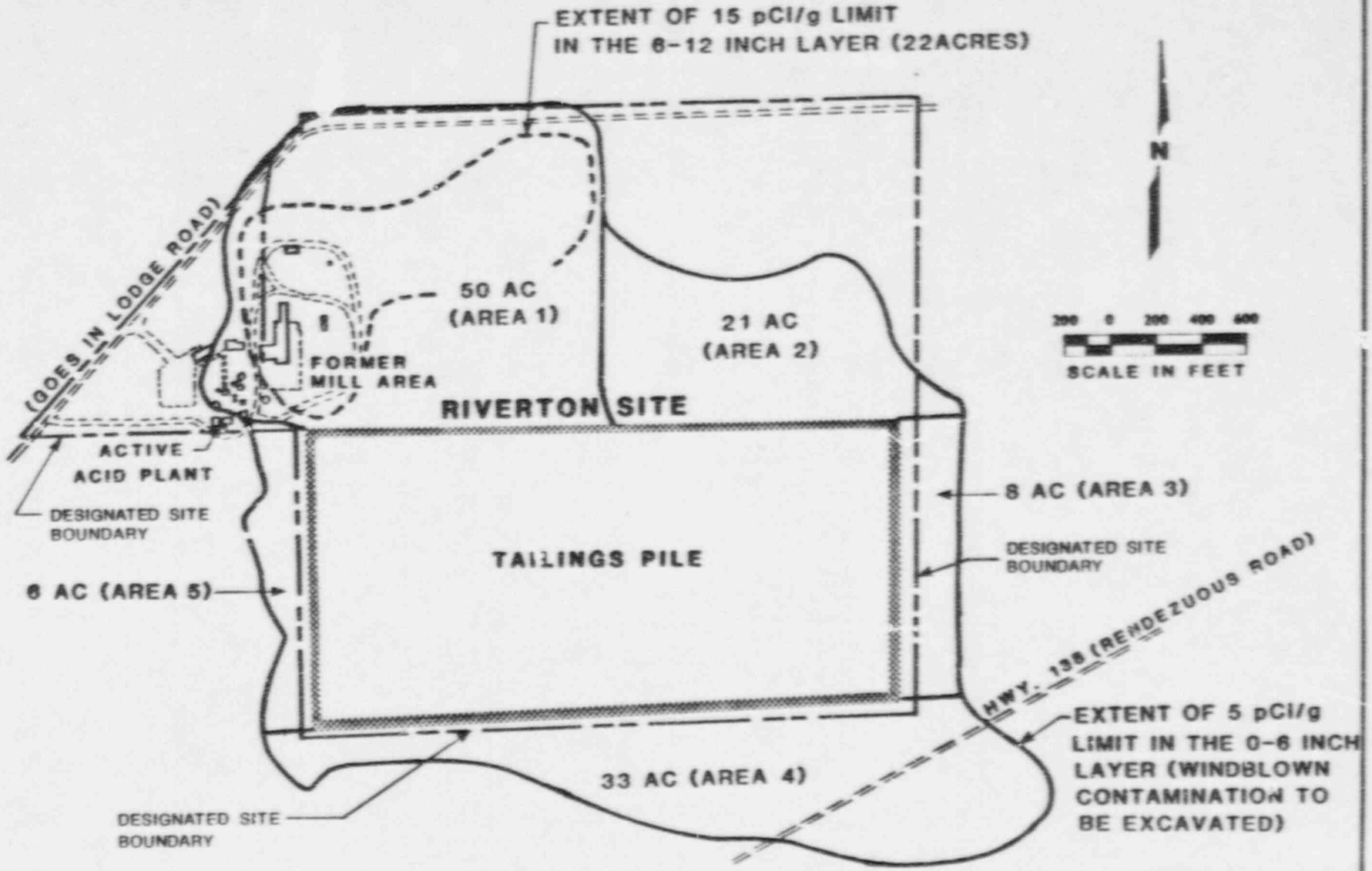


FIGURE 3.4 LIMITS OF EXCAVATION FOR THE WINDBLOWN AREA, RIVERTON SITE

The background water quality or chemistry of the two aquifer systems is different. The unconfined system has a poor quality caused by the natural dissolution and leaching of salts which are deposited in the floodplain. The confined system is used for domestic purposes by the residents around the tailings site and by the city of Riverton which has a group of 15 wells. Some residents use the unconfined water for stock watering and irrigation; however, no wells in this aquifer were identified downgradient of the tailings pile in the contaminated plume.

Although portions of the pile contain water that is highly acidic, the carbonate tailings, ambient ground water, and natural soils contain sufficient bicarbonate to neutralize this acidity. As neutralization occurs, sulfate, hydroxide, and oxide minerals precipitate in the unsaturated zone and shallow aquifer. These precipitates coprecipitate with and absorb most of the toxic elements and compounds found in the tailings pore water. These layers of precipitation also occlude the pore space in the soils and restrict the infiltration of water (DOE, 1987).

Even with the action of the precipitated minerals, some contaminant concentrations are elevated in the ground water beneath and downgradient of the pile. However, based on EPA primary drinking water standards, no appreciable health hazard is associated with the presently observed ground-water contamination resulting from the Riverton mill tailings (DOE, 1987).

4.0 SITE DESIGN

4.1 INTRODUCTION

This section describes the final remedial action to be implemented at the Riverton processing site. The purpose and objectives of this section are:

- To demonstrate that the design meets the requirements of PL95-604 and the EPA standards applicable to the UMTRA Project.
- To provide concurring parties with a description of the final remedial work at the processing site.
- To document procedures that will govern completion of the remedial work at the processing site.

This document does not cover the design or implementation of work at the Gas Hills disposal site. Only the work involved in removing the tailings and transporting them to the Gas Hills site is described. Final stabilization of the tailings will be described in documentation produced by other parties to the remedial action. Accordingly, this final design section should be read in conjunction with other such documentation related to final stabilization of the tailings.

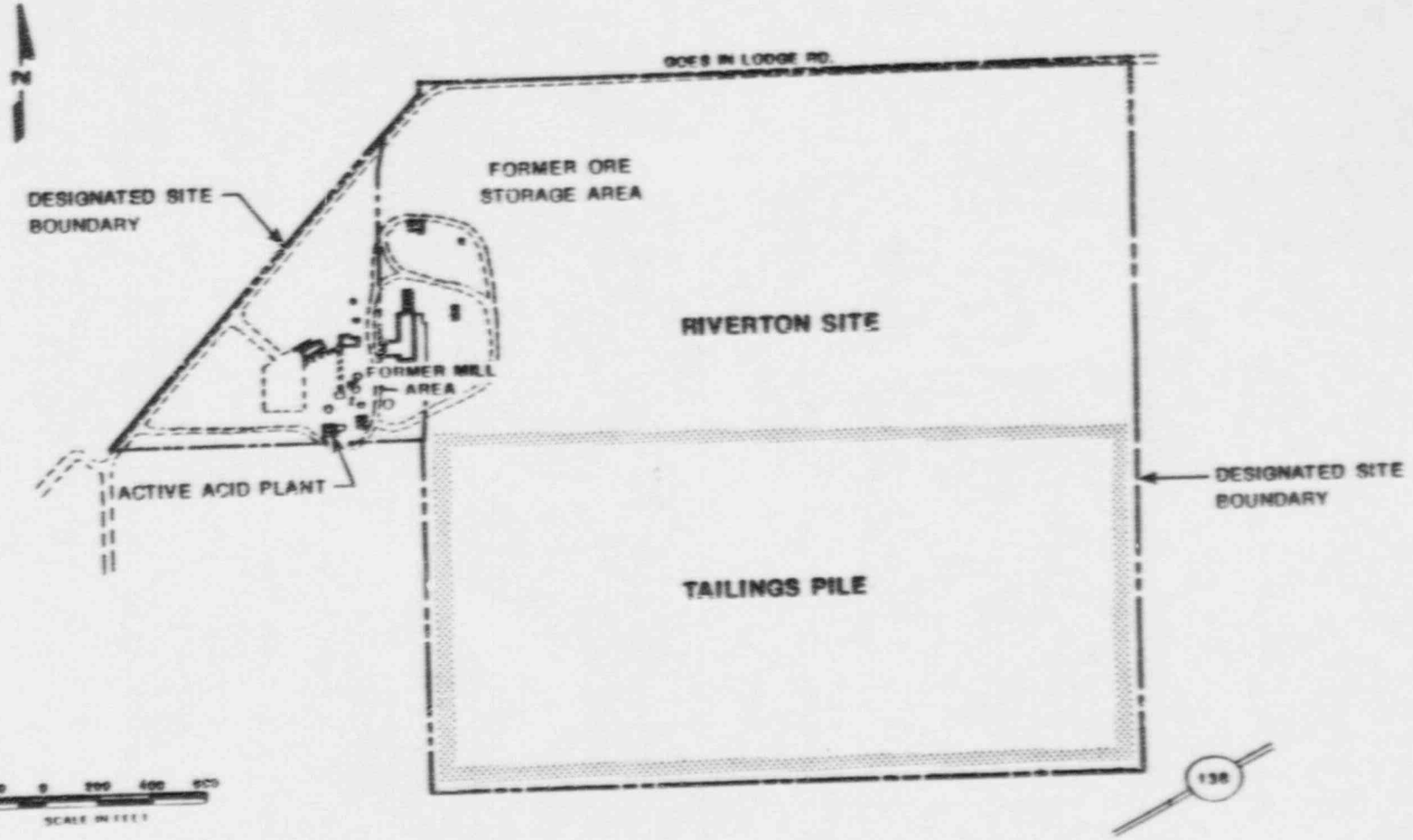
This section is divided into four subsections. The first is this introduction; the second is a brief summary of the final remedial action; the third is a more detailed description of the various significant design aspects of the remedial work; and the fourth is a description of significant aspects of the construction work involved in completing the remedial work at the processing site.

4.2 SUMMARY OF THE PROPOSED REMEDIAL ACTION

The principal feature of the final remedial action is the relocation of 1.5 million cubic yards of tailings and contaminated materials from the existing tailings pile, mill yard, windblown contaminated areas, and vicinity properties to the Gas Hills site.

Section 3.0 of this RAP describes current conditions at the processing site. Figure 4.1 shows the layout of the Riverton processing site. All contaminated materials will be excavated, loaded into trucks, and transported from the processing site to the Gas Hills disposal site via the route shown in Figure 4.2. The transportation route is approximately 45 miles, primarily along State Highway 136.

After tailings and contaminated materials have been removed from the processing site, the excavation will be backfilled with uncontaminated soil to a level compatible with the surrounding terrain, recontoured to promote surface drainage, revegetated as necessary, and released for any use consistent with existing local land use controls.



SOURCE: RVT RAP

FIGURE 4.1 RIVERTON SITE LAYOUT

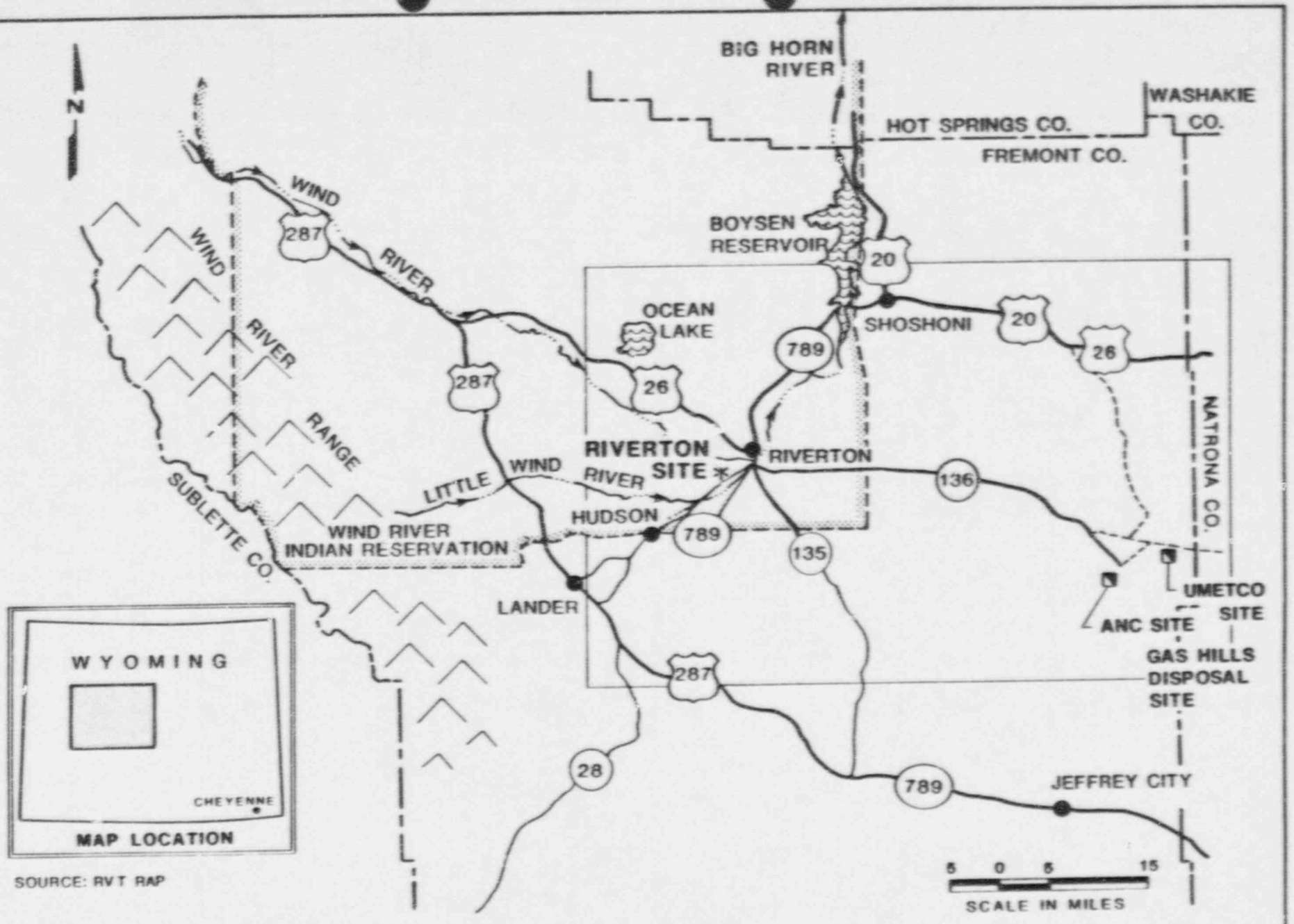


FIGURE 4.2 TRANSPORTATION ROUTE, RIVERTON TO GAS HILLS

4.3 DESIGN DETAILS

4.3.1 Introduction

This section provides details of significant aspects of the remedial action at the Riverton processing site. The site design specifications and drawings (Appendix C) contain additional quantitative information about the remedial action design.

4.3.2 Pile location

The tailings and other contaminated materials will be relocated to the Gas Hills site. Background information regarding the decision to relocate the tailings is contained in the Environmental Assessment (DOE, 1987).

4.3.3 Decontamination and restoration

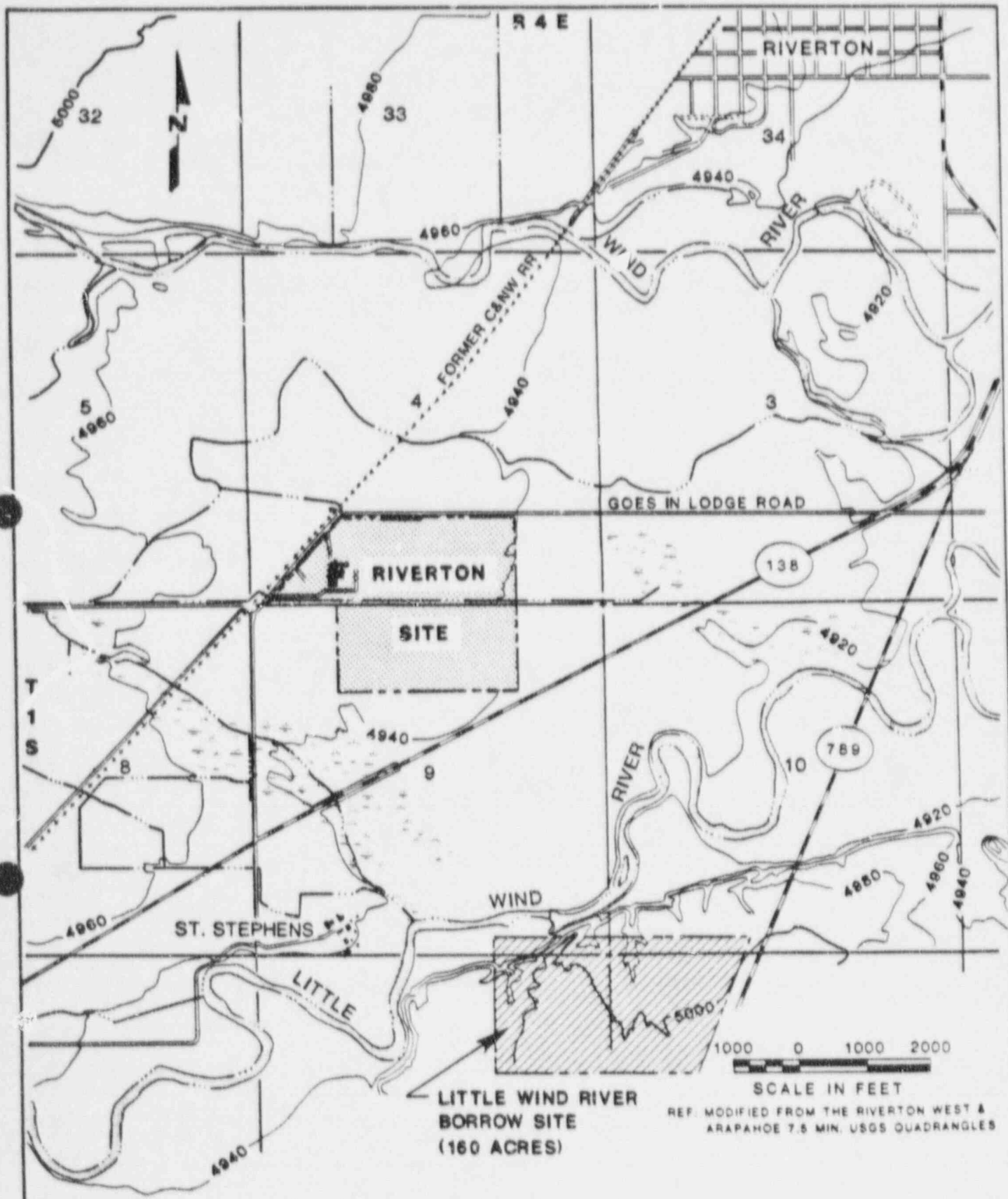
Decontamination of the 188-acre processing site will be achieved by removal of all the contaminated materials from the site. Removal of the tailings and contaminated subgrade materials may require the subsequent placement of clean backfill materials to restore natural surface drainage. Such backfill materials would be obtained from the Little Wind River borrow site (Figure 4.3). The disturbed areas of the processing site will be revegetated as necessary.

4.3.4 Hydrogeology

The two basic approaches to mitigation of ground-water contamination are ground-water protection and aquifer restoration. The former approach involves remedial action measures that will reduce the potential for future contamination. To address present ground-water contamination, active aquifer restoration and other controls are assessed.

The nature and extent of remedial actions or mitigative measures chosen to resolve ground-water concerns associated with the Riverton site are based on the following:

- The lateral extent, depth, and concentrations of presently observed contamination.
- The nature of contaminant sources.
- The rates and directions of and hydrodynamic controls on ground-water flow.
- The geochemical controls on solute transport.
- The health effects associated with presently observed and predicted future levels of contamination.



SOURCE: RVT RAP

FIGURE 4.3 BORROW SITE LOCATION

- The contaminated ground-water quality compared with background ground-water quality and applicable Federal and state standards.

- The present water use and expected water use of contaminated or potentially contaminated water.

- The availability of alternate water supplies.

Health effects associated with concentrations of various contaminants found presently in the ground water are emphasized.

Ground-water protection

Relocation of the tailings and contaminated materials to the Gas Hills disposal site will eliminate the source of future ground-water contamination at the Riverton site. Relocation activities could cause a short-term increase in ground-water contamination; however, the increase will only be in effect until all materials are removed. Existing contamination will continue to migrate downgradient and discharge into the Little Wind River until the concentrations of contaminants in the aquifer have returned to background levels.

Solute transport modeling was conducted to assess the impact of pile relocation on existing ground-water plumes (DOE, 1987). The results indicate that current sulfate contamination will be reduced to background levels through natural mechanisms in approximately 45 years. A detailed discussion of the solute-transport modeling is provided in the Riverton EA (DOE, 1987).

Two features of the remedial action plan will ensure ground-water protection at the Riverton site during and after relocation. These include construction of a three-acre evaporation pond and abandonment of existing monitoring wells.

The cleanup and excavation of the tailings and contaminated materials may require a small amount of dewatering. This water and other water from equipment washing and decontamination will be disposed of in a small evaporation pond. The pond will be constructed with a liner to ensure ground-water protection. All the water will be evaporated and the pond will be abandoned upon completion of remedial action activities to prevent any future ground-water contamination.

During or after relocation, the monitoring wells at the Riverton site will be plugged to prevent them from acting as vertical channels for potential ground-water contamination. The wells will be grouted to the land surface in accordance with State of Wyoming regulations for monitor well abandonment (Appendix A, Regulatory Compliance).

Aquifer restoration

Mitigative measures to protect or restore ground-water quality may be necessary as part of the remedial action. The requirements for possible aquifer restoration will be defined by ground-water standards to be reissued by EPA (previously remanded by the 10th Circuit Court of Appeals) and by the State of Wyoming ground-water standards. After the new standards have been promulgated by EPA, the DOE will evaluate the conditions at the Riverton site and develop a plan for compliance with the EPA and state regulations.

4.4 CONSTRUCTION FEATURES AT THE RIVERTON PROCESSING SITE

4.4.1 Overview

This section describes the significant aspects of the construction activities involved in completing the remedial action at the Riverton processing site.

Construction will take place at the processing site, the Little Wind River borrow site, along the transportation routes, and at the Gas Hills disposal site. Final design features, including exact locations and sizes of staging areas, decontamination facilities, temporary drainage ditches, waste-water retention basins, and access control will be determined by other parties to the remedial action.

During construction, temporary facilities will be provided at each site for construction workers, along with supervisory, engineering, administrative, security, and radiation monitoring personnel. The facilities will include office space, toilets, and change rooms.

An equipment decontamination pad will be constructed near the vehicle access gate. Waste water from the decontamination pad will be directed to a retention basin on the site. Construction fences will control traffic entering and leaving the site and prevent unauthorized entry to the controlled area.

4.4.2 Tailings transport

The tailings and other contaminated materials will be transported from the site in trucks. The trucks will be equipped with gate seals and tarpaulin covers to prevent leakage and dispersion of tailings enroute to the disposal site. The trucks will be washed at the decontamination pad prior to leaving the processing site. The transportation route will be along BIA and public roads as indicated in Figure 4.2.

4.4.3 Drainage, erosion control, and waste water

During construction, contaminated drainage will be contained on the processing site. Disturbed areas on the site will be graded to direct potentially contaminated runoff to a retention basin, while uncontaminated runoff will be directed off the site. Ditches will be designed to convey the runoff from the site-specific 10-year one-hour storm. The waste-water retention basin will be designed to retain the runoff from a 10-year 24-hour storm at the processing site. Waste water from the decontamination pad and effluent from any dewatering operations also will be directed to the retention basin. The retention basin will be equipped with an emergency spillway designed to discharge the runoff from the site-specific 25-year one-hour storm.

Treatment of the water retained in the basin is not anticipated. The average annual evaporation in Riverton is expected to exceed the probable waste-water volume generated during the remedial action. If it becomes necessary to discharge water (either raw or treated) from the basin, a National Pollutant Discharge Elimination System (NPDES) permit may be required.

4.4.4 Dust control

Dust generated by excavation, earth moving, vehicle use, temporary material stockpiling, and other similar activities will be controlled and minimized by the use of water, surfactants, or salt solutions (such as magnesium chloride). Dust control in uncontaminated areas will be accomplished with clean water solutions, while dust control on the tailings pile may be accomplished with waste water.

4.4.5 Utilities

Existing utilities at the Riverton processing site will be protected during construction or temporarily relocated as necessary. Potable water may be available from the site owner. Electrical power, natural gas, and telephone service are available at the processing site.

4.4.6 Dewatering

Excavation below the water table may be required at times during the remedial action. Preliminary analysis indicates that the volume of materials excavated from the saturated zone will be negligible, hence no special provisions for dewatering the excavation are anticipated. Saturated materials may be mixed with drier materials for transport and disposal at the Gas Hills site. Should it become necessary to dewater the excavation itself, temporary well points or sumps may be installed, with the discharge directed to the waste-water retention basin.

4.4.7 Demolition

Existing steel and concrete structures at the processing site, including foundations, will be demolished and transported to the Gas Hills site for disposal. Prior to demolition, structural contamination may be removed or fixed to control its spread.

4.4.8 Borrow area restoration

The Little Wind River site is proposed as the borrow source for processing site restoration materials. The proposed borrow site is approximately three road miles southeast of the processing site. The materials at the Little Wind River site have not been characterized, and it is recognized that the remedial action construction contractor may elect to choose another source for restoration materials.

4.4.9 Construction sequence

The following is the generalized construction sequence for the remedial action. The actual sequence may vary from the hypothesized scenario, given that the remedial action construction contractor will be granted some flexibility in accomplishing the contract scope of work.

Initially, the site preparation phase will include equipment mobilization, installation of a site security system, and establishment of an equipment staging area. This phase will also include construction of a decontamination pad, temporary drainage ditches, and a retention basin. Uncontaminated soils excavated during such construction may be stockpiled for use as backfill during the site restoration phase. Other drainage and erosion control features will be constructed at this time, as well as construction or upgrading of access roads at the site.

The next phase of construction will be tailings relocation. That work will include building demolition and excavation of the tailings pile (including contaminated foundation soils), windblown tailings, and contaminated mill yard soils. All such materials will be transported in trucks to the Gas Hills site for ultimate disposal.

The restoration phase will begin during the latter part of the tailings relocation phase. That work will include importation of any necessary clean backfill materials, grading to promote drainage at the restored processing site, and revegetation of all disturbed areas. The accumulated contaminated sediments and liner from the waste-water retention basin will be transported to the Gas Hills site for disposal, and the excavations for the basin and temporary drainage ditches will be backfilled with stockpiled materials, graded, and revegetated. The construction equipment will be decontaminated and inspected prior to release from the construction area.

Figure 4.4 is a proposed schedule for completion of remedial action at the Riverton processing site.

4.4.10 Cost estimate

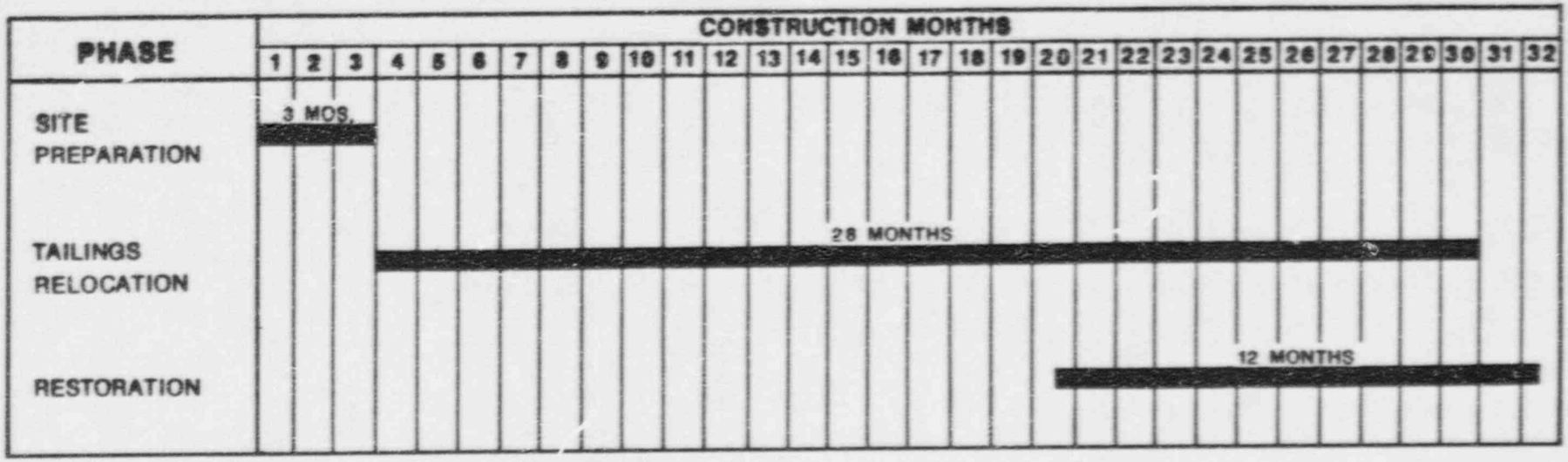
The cost estimate summary for the proposed Riverton remedial action will be provided in Table 4.1.

4.5 REPROCESSING ASSESSMENT

An aspect of the project which must be addressed in order to comply with PL95-604 is the economic and technical feasibility of reprocessing the tailings for the recovery of residual uranium and vanadium. In 1981, Mountain States Research and Development (MSRD) was contracted to perform an economic evaluation of reprocessing the Riverton tailings. MSRD conducted a drilling and sampling program to determine the amount of recoverable uranium, vanadium, and molybdenum. Laboratory leaching tests were conducted on the samples to estimate extractability and the process to be applied. The evaluation compared the recoverable values of the metals versus the capital and operating costs for processing. Site excavation, haulage, and final disposal costs were not included. The results of the study indicated that reprocessing was not economical at 1982 prices for the metals (MSRD, 1982).

4.6 SITE ACQUISITION

Legal access to the Riverton processing site will be by means of a remedial action agreement between the DOE, the State of Wyoming; and Lome Drilling and Well Service and Chemical Marketing Services, the owners of the processing site. The disposal site will remain under the ownership of the Title II site licensee during the remedial action.



NOTE: SCHEDULE DOES NOT TAKE INTO ACCOUNT WINTER SHUTDOWN.

FIGURE 4.4 CONSTRUCTION SCHEDULE

Table 4.1 Site cost estimate summary (1987 - $000)

Site acquisition	
Remedial action	
Subcontracts:	
Main site	
Bonds and insurance	
Mobilization	
Staging area	
Roads	
Dust control water	
Dewatering	
Evaporation pond	
Tailings	
Windblown	
Backfill	
Decontamination	
Vegetate	
Demolition	
Fence	
Drill holes and water wells	
Demobilization	
Subcontractor overhead[a]	
Subtotal	
Construction contingency	
Total processing site	
Vicinity properties:	
Cost to date	
Cost to completion	
Total vicinity properties	
Total remedial action	
Summary	
Engineering	
Field management	
Remedial action	
Subtotal	
Construction management @ 7.5%	
Total site cost estimate	

[a]Includes profit, supervision, miscellaneous, and vehicle expense.

5.0 ENVIRONMENTAL, HEALTH, AND SAFETY

5.1 POLICY

It is the policy of the UMTRA Project that the DOE and its contractors take all reasonable precautions in the performance of the remedial action work to protect the environment, ensure the health and safety of employees and the public, and provide protection of the U.S. Government. The DOE and its contractors will comply with all applicable Federal and state health and safety regulations and requirements including, but not limited to, those established pursuant to the Occupational Safety and Health Act (OSHA).

The site Remedial Action Contractor (RAC) will have the principal responsibility for implementing a health and safety program. The program should include an on-site professional radiation health staff responsible for implementing monitoring, sampling, training, and reporting procedures. The surrounding community and the on-site workers must be protected to prevent avoidable accidents and radiation exposure. The RAC will prepare a site-specific Environmental, Health, and Safety Plan which meets the requirements of the UMTRA Project Environmental, Health, and Safety Plan (DOE, 1985b), and its revisions. The site-specific plan will be available for NRC and state review prior to its field implementation.

5.2 SITE CONDITIONS AFFECTING HEALTH AND SAFETY PLANNING

Health and safety considerations at the Riverton site will require special attention by the RAC because of the physical, radiological, and industrial hygiene hazards that may exist there. This section of the Remedial Action Plan describes those specific conditions that represent potential hazards and are suspected or known to exist. The following text is not intended to provide a comprehensive list of potential hazards, but rather describes conditions that have been noted during prior work activities at the Riverton site. The site-specific health and safety plan, to be developed by the RAC, will address the appropriate precautions for those conditions.

Figure 5.1 shows the locations of existing utilities at the Riverton site. The Processing Site Characterization Report (DOE, 1985a), contains additional descriptions and maps of the existing utilities at the Riverton site. Buried gas, electric, water, and sewer lines, and above-ground electric lines exist on and around the processing site. Buried fuel tanks have not been reported, but could exist in the former mill areas.

Numerous buildings and structures remain standing at the Riverton site. The mill building is in poor condition and has been partially demolished. Rubble from the mill building is scattered near the remaining mill structure. Radiological contamination and exposure rates have been measured in some of the buildings, and the results are reported in the radiological characterization report (BFEC, 1983). Potential physical hazards and exposures to residual process chemicals should be addressed

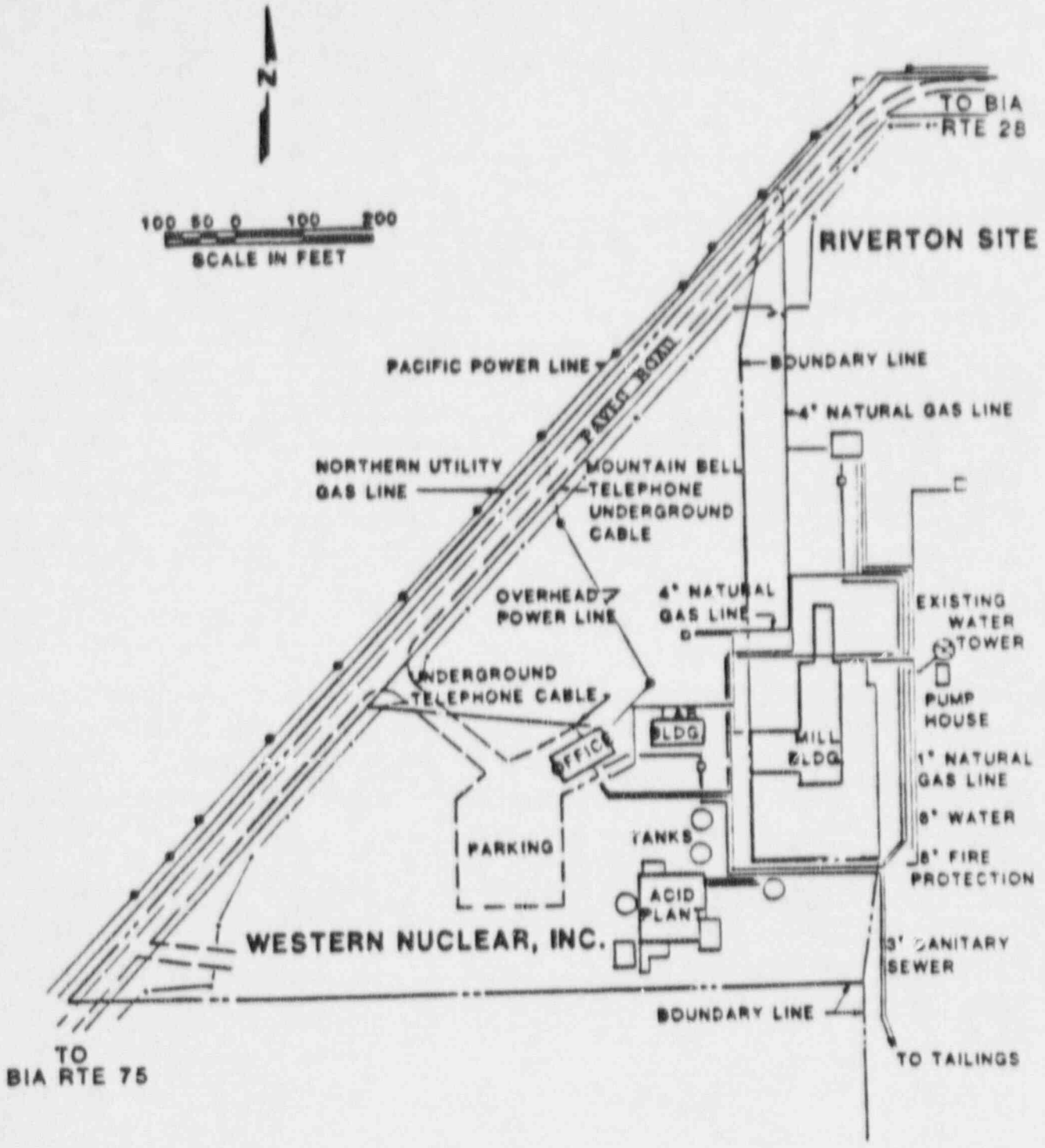


FIGURE 5.1 LOCATION OF EXISTING UTILITIES, RIVERTON SITE

before working in the abandoned buildings. The ages of the buildings indicate that asbestos-containing materials may be encountered if buildings are dismantled or demolished. Potential exposures should be evaluated and appropriate precautions taken during work activities. Guidance for handling asbestos is provided by the Occupational Health and Safety Administration (29 CFR Part 1910.1001 subheading - Asbestos and 29 CFR Part 1926.58), and the Environmental Protection Agency (40 CFR Part 61 subpart M - Natural Emission Standard for Asbestos). Recommended procedures for handling and disposing of asbestos-containing materials are provided in two EPA publications (EPA, 1985a,b).

The site is located southwest of the city of Riverton, Wyoming, adjacent to State Highway 138. The proximity of the site to the city and the highway indicates that potential vehicle hazards and traffic accidents should be considered in planning the remedial actions, and in developing employee orientation and safety training programs.

Emergency response facilities are easily accessible in the city of Riverton in case of an emergency. The location of the hospital, and phone numbers for emergency response organizations are:

Fire/Ambulance and Police (Riverton)	911
Police/Sheriff (Gas Hills)	1-332-5611
Riverton Memorial Hospital (East Park Avenue & 12th Street, Riverton)	856-4161

6.0 RESPONSIBILITIES OF PROJECT PARTICIPANTS

6.1 INTRODUCTION

The following defines the various responsibilities of the U.S. Department of Energy (DOE) UMTRA Project Office, the U.S. Nuclear Regulatory Commission (NRC), and the State of Wyoming during detailed design, remedial action, and through certification. Responsibilities are divided into major categories to be performed by the parties. Most of the state of Wyoming's responsibilities will be performed by the Department of Environmental Quality (DEQ).

Major areas of responsibilities for future actions by the DOE, the State of Wyoming, and the NRC can be summarized as follows:

- o DOE:

  Manage and coordinate project.
  Obtain permits and approvals.
  Prepare detailed designs and specifications.
  Prepare quality assurance plan.
  Prepare and implement public participation and information plan.
  Provide funds.
  Conduct remedial action.
  Audit remedial action.
  Certify remedial action.

- o State of Wyoming:

  Concur in Remedial Action Plan.
  Assist in obtaining local permits.
  Issue state permits.
  Assist in public participation and information.
  Provide funds.

- o NRC:

  Review and concur in RAP.
  Review final design.
  Concur in site certification.

6.2 DETAILED RESPONSIBILITIES

Detailed responsibilities of the project participants in the areas of permitting, land acquisition, detailed design construction, health and safety, public information, radiological support, and quality assurance.

6.2.1 Regulatory compliance

Requirements for regulatory compliance, previously identified by Federal, state, tribal, and local agencies (Agencies), will be incorporated into the final design specifications, as needed, by the DOE. Revisions to the design and specifications resulting from internal DOE reviews will be incorporated prior to the Agencies' review for permits.

During the remedial action, the DOE will audit construction activities for compliance with provisions in the permits and approvals. (Permitting agencies may independently audit relevant activities consistent with normal practice.) Summary audit reports will be prepared by the DOE and will be submitted to the appropriate Agencies as required. Depending upon agency comments, revisions to construction compliance activities will be implemented.

Upon completion of the permitted action, the DOE will conduct a final review and will prepare a close-out report for submittal to the Agencies. Permits will then be terminated.

6.2.2 Land acquisition

The DOE, the State of Wyoming, and the processing site owner will enter into a remedial action agreement allowing legal access to the processing site for the remedial action.

6.2.3 Detailed design

The DOE will prepare preliminary engineering drawings for internal review. Based upon this review, final design drawings, specifications, and bid packages will be prepared. Once finalized, the bid packages will be advertised pursuant to Federal regulations and a construction contractor will be selected.

Final design and specifications will be available to the NRC and the state upon request.

6.2.4 Construction

The DOE will prepare guideline documents to comply with health and safety, security, quality assurance, public information, and other regulatory requirements. Revisions resulting from internal DOE review will be incorporated into each document.

Site mobilization and initiation of construction activities will occur in accordance with the DOE-approved construction schedule.

Construction activity will be audited by the DOE. The state, NRC, and other regulatory agencies may also audit the remedial action. Revisions to the remedial action resulting from site audits will be incorporated into the final design and the remedial action plan, as necessary, by the DOE.

Audit reports will be available to the NRC and the state upon request. Upon completion of the remedial action, the remediated processing site will be certified by the DOE. The NRC will concur in certification.

6.2.5 Health and safety

The DOE will prepare an Environmental, Health, and Safety Plan in conformance with the UMTRA Project Health and Safety Plan. Based upon this guidance, site-specific implementation procedures will be developed by the DOE. As part of the implementation procedures, the DOE will institute radiation control and environmental monitoring, and will develop response procedures for severe weather and medical emergencies.

Construction contractors will comply with approved procedures and file reports with the DOE that record the results of monitoring, and report accidents and illnesses. Records will be maintained by the DOE following remedial action construction.

Employee and public complaints will be investigated by the DOE. The DOE will audit construction activities. Others such as the state and the NRC may perform independent audits.

6.2.6 Public information

The DOE will establish a local site manager who will provide input into the public information process.

Prior to and during construction, the DOE, with assistance from the state and local citizens, will conduct public information meetings to inform the interested public of key aspects and current progress of the remedial action.

Concurrent with the public meetings, the DOE will provide status and progress reports for the state and other agencies (e.g., NRC, EPA, Shoshone and Arapahoe Indian Tribes, and BIA).

6.2.7 Radiological support

The DOE will prepare and implement a Radiological Support Plan, and will take measures to independently assure the quality of the analyses and compliance with the procedures. Based upon review of the analyses, the construction sequencing and design may be revised by the DOE.

After remedial action, the DOE will prepare a completion report, conduct a final certification survey, and provide a recommendation for site certification. The NRC will concur in the final site certification.

6.2.8 Quality assurance

The DOE will prepare the Quality Assurance (QA) Plan in conformance with guidelines established in the UMTRA Project Quality Assurance Plan (DOE, 1986b). The DOE will audit the construction activities and will prepare audit reports as appropriate.

6.2.9 Surveillance and maintenance

The NRC will prepare the Site Surveillance and Maintenance Plan and will ensure that the plan is implemented by the Federal agency that will assume custodial responsibility of the Gas Hills disposal site.

7.0 SUPVEILLANCE AND MAINTENANCE

After the remedial action is complete and the processing site has been certified, there will be no need for long-term surveillance and maintenance at the Riverton processing site. Surveillance and maintenance of the disposal site will be the responsibility of the NRC or another designated Federal agency.

8.0 QUALITY ASSURANCE

8.1 GENERAL

The RAC shall provide and maintain an effective quality assurance (QA) program and procedural system which will assure that all work, materials, supplies, and services required under the contract conform to contract requirements, whether constructed or processed by the RAC or its subcontractors or procured by subcontractors or vendors. The RAC shall perform or have performed adequate inspections and tests as will ensure and substantiate that all work, materials, supplies, and services conform to contract requirements.

The RAC shall furnish a QA test and inspection plan which defines the health, safety, and environmental activities to be incorporated into the design and/or performed during construction to ensure contract compliance and site certification. Test and inspection requirements shall be approved by the DOE prior to the start of any physical job site construction work under this contract. If the RAC revises the plan, the RAC shall concurrently furnish a copy of the revision to the DOE for approval prior to implementing the revision on work under the contract.

8.2 QUALITY ASSURANCE PLAN

Before construction operations are started, the RAC shall meet with the authorized DOE QA representative to review and discuss the RAC's proposed project QA plan. The meeting shall develop mutual understanding relative to details of the individual site plan requirements including the formats to be used for recording and reporting tests and inspections, administration of the plan, personnel assignments, and the interrelationship between the RAC and the DOE QA representative. The RAC shall furnish a list of the procedures required to implement the project plan. This list shall include, at a minimum, procedures for data collection, analyzing samples, inspection and testing, and formats of reports to be used.

8.3 DAILY INSPECTION REPORT

The RAC shall prepare a daily report for every day worked, and a weekly summary report covering the RAC and/or subcontractor's operations in an appropriate format. These daily reports shall be maintained at the site until work is complete. These logs shall provide complete and factual evidence that continuous, effective quality control construction inspections and tests have been performed, including but not limited to: (1) the type and number of inspections and tests involved; (2) results of inspections and tests; (3) nature of deficiencies requiring corrections; and (4) corrective actions taken or to be taken.

The RAC shall maintain current records of all inspections and shall furnish, as part of the files at the end of the project, copies of the inspection reports and all other files appropriate to each individual

subcontract. The reports of inspection shall cover all work placement subsequent to the previous report and shall be verified by the RAC's designated QA representative.

8.4 MEASURING AND TEST EQUIPMENT CALIBRATION AND CONTROL

The RAC shall provide measuring and test equipment having the precision and accuracy needed to establish conformance with specified quality requirements. Calibrations shall be in accordance with nationally recognized standards. The RAC shall identify procedural systems for test equipment calibration and recall.

8.5 NONCONFORMANCES

A nonconformance and change procedural system shall be developed by the RAC and approved by the DOE.

8.6 RECORDS CONTROL

The RAC shall be responsible for generation, retention, and retrieval of legible records which provide objective evidence of conformance to the specified quality requirements. These records shall be considered valid only if they are completed and signed or otherwise authenticated and dated by authorized personnel. These records should include, but are not limited to:

- o Radionuclides in soil data.
- o Air monitoring data.
- o Design review files.
- o Water contaminant analysis.
- o Personnel radiation exposure data.
- o As-built drawings.
- o Test and inspection reports.
- o Engineering specifications.
- o Material certifications.
- o Certificates of compliance.
- o Reports and corrective action requests.
- o Operating procedures.
- o Change orders.
- o Unusual occurrence reports.

All records shall be available to the DOE for review upon request. All personnel radiation exposure records shall be turned over to DOE upon completion of the site remedial action.

8.7 CODES AND STANDARDS

The RAC shall have on the job site, no later than three weeks after site mobilization, the applicable quality assurance codes and standards available for ready reference by all personnel. The RAC shall maintain

at the job site copies of all approved-for-construction drawings, specifications, and other documents which describe the remedial action.

8.8 RECORD DRAWINGS

The RAC shall develop QA procedural systems to ensure the use of authorized (approved-for-construction) drawings and specifications and the maintenance of current record drawings. Two full-sized sets of contract drawings shall be used by the RAC for this purpose. All variations from the contract drawings shall be depicted. Generally, the drawings shall reflect only such changes and/or corrections to data and dimensions shown on contract drawings. Where the contract specifications or drawings permit optional use of more than one type of material or equipment, the type of material or equipment installed shall be shown on the drawings. The drawings shall, at all times, be maintained in a current condition, and made available for review by the DOE. Variations from the contract drawings shall be shown in the contract working drawings and shall be incorporated into the record drawings. Upon physical completion of the contract work, two reproducible copies of these drawings shall be furnished to DOE.

8.9 MATERIAL CERTIFICATION

The technical specifications may require that certain materials be certified. Two types of certifications that may be specified are:

- o Certificate of compliance.
- o Certified material test report (CMTR). When a CMTR is requested from the RAC or its subcontractors, it shall be accompanied by a certificate of compliance certifying that the tested material is actually that material incorporated in the work.

8.10 QUALITY ASSURANCE PROGRAM VERIFICATION

Verification of the QA Program implementation by DOE may be accomplished by:

- o Review of daily or weekly summary reports.
- o On-site inspections and surveillance.
- o Periodic audits.
- o Acceptance of DOE QA recommendations based on DOE QA audits of RAC activities.
- o Any combination of the above.

8.11 REMEDIAL ACTION FIELD CHANGES

During the course of remedial action, design changes are expected to occur. Some of these changes may impact compliance with EPA Standards, but most changes are expected to be unrelated to critical design elements of the stabilized tailings pile. The following sections define three classes of changes and establish guidelines to be used when implementing changes.

8.11.1 Class 1 changes

A Class 1 change is a change which may affect compliance with the EPA Standards (40 CFR Part 192). Class 1 changes will be reflected in a Modification to the Remedial Action Plan (RAP), which will ultimately result in a change to the State Cooperative Agreement. The NRC and the State of Wyoming will be required to concur on all Class 1 changes.

Class 1 changes include, but are not limited to, the following:

- Discovery of unusually high levels of residual radioactive materials which will change the radon emission concentrations post-remedial action according to the final design as presented within the final RAP.
- Disposal of hazardous/mixed wastes within the disposal cell.
- Changes in the radon barrier thickness or permanent erosion protection.

8.11.2 Class 2 changes

A Class 2 change is a change to any permanent construction feature which does not clearly affect compliance with the EPA Standards. Class 2 changes will be forwarded to the NRC and the state of Wyoming for informative purposes. At any time that the NRC and/or state feel a change has been incorrectly designated as Class 2, the change may be redesignated as Class 1 upon verification of error. By approaching Class 2 in such a manner, construction delays will be avoided, and the NRC and state will consistently be aware of all changes affecting the RAP. Class 2 changes will not require formal NRC or state concurrence, and will not require a modification to the RAP or Cooperative Agreement.

Class 2 changes include, but are not limited to, the following:

- Adjustments to specifications which will <u>not</u> affect the major aspects of design, such as permeability, infiltration, radon flux, or ground-water contamination.

- Requests for additional well sealing for newly discovered wells.

- Changes in location of permanent fencing.

8.11.3 Class 3 changes

A Class 3 change is a change to temporary features which have no impact on the design for the stabilization of the tailings pile. Class 3 changes will not require NRC or state concurrence and may be approved by a representative of the Remedial Action Contractor of appropriate supervisory position.

Class 3 changes include, but are not limited to, the following:

- Changes in location or use of construction/excavation materials.

- Change in location of temporary fencing.

- Alteration of temporary drainage facilities, roads, or site office facilities.

8.11.4 General requirements

The general requirements which are to be fully understood and commonly interpreted by all parties (DOE, NRC, state) in utilization of the above classification of changes are as follows:

- All changes will be logged on a Project Interface Document (PID), which will be initiated by the Remedial Action Contractor (RAC) and forwarded to the DOE Project Office (PO). The DOE PO will then forward copies of the PID and supporting data, if required, to the NRC and the affected state as outlined below.

- Each change will be classified promptly by the RAC and concurred upon by the DOE PO, with input from the TAC if needed, immediately following notification from the field. Contact for DOE concurrence will be documented in the space provided on the PID.

- For all Class 1 changes, the DOE will notify the NRC and state no later than one working day after notification by the RAC. The NRC and the state will then be copied on all pertinent data necessary for review and concurrence or comment within one working day after receipt of same by the DOE PO. This may be transmitted verbally or telefaxed prior to formal issuance.

- RAP Modifications may be handled as a group as opposed to separate issuance of individual modifications for each Class 1 change.

- For all Class 2 changes, appropriate justification data will be forwarded to the NRC and state as submitted to the DOE PO by the RAC. This may be transmitted following verbal or telefaxed notification as noted under the third general requirement above. Written justification will be forwarded by the PO within five working days after receipt.

- For all Class 3 changes, the PID will be forwarded to the NRC and the State of Wyoming within a reasonable time.

- The RAC shall maintain an up-to-date record of all changes for all sites. In addition, the DOE PO will maintain an up-to-date file of all PIDs.

9.0 PUBLIC INFORMATION AND PUBLIC PARTICIPATION

9.1 INTRODUCTION

Section III of the UMTRCA states,

> "In carrying out the provisions of this title, including the designation of processing sites, establishing priorities for such sites, the selection of remedial actions and the execution of cooperative agreements, the Secretary (of Energy), the Administrator (of the Environmental Protection Agency), and the (Nuclear Regulatory) Commission shall encourage public participation and, where appropriate, the Secretary shall hold public hearings relative to such matters in the state where processing sites and disposal sites are located."

It is the intent of the public information and public participation program to fully inform the interested public and use the feedback in the decision-making processes and remedial action activities relative to the UMTRCA-designated site near the city of Riverton, Fremont County, Wyoming. The following sections describe the actions the DOE and state will take to encourage the participation of an informed public in this project.

9.2 PUBLIC PARTICIPATION

The National Environmental Policy Act (NEPA) of 1969 requires an evaluation of the environmental impacts of major Federal actions that may significantly affect the environment. Before remedial action construction can begin, an Environmental Assessment (EA) will be completed for the Riverton site. Public participation is an important part of the preparation of the EA; the participation requirements are detailed in the Council on Environmental Quality (CEQ) Regulations (effective July, 1979) for implementing the provisions of NEPA, and in the DOE guidelines of 1980 for NEPA compliance.

In preparing the EA, DOE has conducted and will continue to conduct individual and group meetings with community officials and private citizens to discuss the purpose of the proposed remedial actions and ascertain the extent of pubic interest in this project. At these meetings, the public is given the opportunity to express their concerns and identify what they believe to be significant issues.

The identified issues are documented in the EA and incorporated into the decision-making process. The DOE accepts written comments for a 30-day period after publication of the draft EA. Interested parties were given the opportunity to comment on the draft EA at an official comment-taking meeting in Riverton after the draft EA was published.

In addition to meetings on the EA, the DOE has held public information meetings in Riverton to describe the remedial action plan for the project and received comments which were used in the design for the remedial action.

A Task Force comprised of local citizens, formed to serve as a major communication link in the decision-making process, has met with the DOE and state to convey community response on project activities. The Task Force should continue to meet periodically throughout the duration of remedial action construction.

Frequent meetings and briefings have been held to provide information and project status updates and solicit public participation in the project activities. DOE, state, local officials, and interested citizens will be involved in frequent discussions regarding remedial action construction schedules, radiation monitoring reports, ground-water protection plans, and other project activities. These meetings will be advertised as to time and place.

9.3 PUBLIC INFORMATION

In order for public participation to be effective, the public must be informed concerning the remedial action project in Riverton. Several methods of information dissemination will be used by the DOE. Press releases and press packets are prepared for project status updates, including report summaries, texts of presentations, and graphics.

The names and addresses of some 165 individuals, media representatives, and Federal, state, and local officials have been computerized for information dissemination purposes. Information is provided to interested persons in the Federal Government, state, Tribal, and local administrations, public interest groups, private citizens, and private businesses in Fremont County.

A public preconstruction meeting will be conducted by DOE. Principal topics of discussion will include the remedial action construction and schedules.

An on-site representative will be designated by DOE to respond to public inquiries during remedial action construction. This representative will work closely with the DOE to provide information, and will meet frequently with the public throughout the construction period.

A variety of printed materials have been prepared concerning the UMTRA Project and the Riverton site. These include project fact sheets, a site fact sheet, and the Environmental Assessment (EA) document. As they are printed, these materials and other fact sheets will be sent to interested individuals and are available in the Riverton and Cheyenne areas at the public libraries, city and county offices, and the Wyoming Department of Environmental Quality offices. The same materials are also available at DOE-designated libraries nationwide.

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GLOSSARY

absorbed dose, radiological	The energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest. The unit of absorbed dose is the rad; one rad equals 100 ergs per gram.
alluvium	Fragmental sediment deposited by the operation of modern rivers.
alpha particle	A positively-charged particle emitted from certain radionuclides. It is composed of two protons and two neutrons, and is identical to the helium nucleus.
aquifer	A saturated, permeable, geologic unit that can transmit significant quantities of water under normal hydraulic gradients.
aquitard	A water-bearing zone that transmits water at a very slow rate.
atom	A unit of matter; the smallest unit of an element consisting of a dense, central, positively-charged nucleus surrounded by a system of electrons, equal in number to the number of nuclear protons and characteristically remaining undivided in chemical reactions except for a limited removal, transfer, or exchange of certain electrons.
background radiation	Levels of radiation, or concentration of radionuclides which are typical of an undisturbed area, or area not affected by residual radioactive material.
beta particle	Charged particle emitted from the nucleus of an atom, with mass and charge equal to those of an electron.
bioassay	A method for quantitatively determining the concentration of radionuclides in a body by measuring the quantities of those radionuclides that are eliminated from the body, usually in the urine or the feces.
confined aquifer	An aquifer bounded above and below by relatively impermeable beds.
contamination	In this report, the presence of radioactive material in undesirable concentrations and in undesirable locations.
daughter product(s)	A nuclide resulting from radioactive disintegration of a radionuclide, formed either directly or as a result of successive transformations in a radioactive series; it may be either radioactive or stable.

decay, radioactive	Disintegration of the nucleus of an unstable nuclide by spontaneous emission of charged particles, photons, or both.
decontamination	The reduction of radioactive contamination from an area to a predetermined level set by a standards-setting body such as the EPA, by removing the contaminated material.
disintegrations per minute or second	The number of radioactive decay events occurring per minute or second.
DOE	U.S. Department of Energy.
dose	A general term denoting the quantity of radiation or energy absorbed, usually by a person; for special purposes, it must be qualified. If unqualified, it refers to absorbed dose.
dose, absorbed	The amount of energy imparted to matter by ionizing radiation per unit mass of irradiated material at the point of interest; given in units or rads.
dose commitment	The cumulative dose equivalent that results and will result from exposure to radioactive materials over a discrete time period; given in units of rems.
dose equivalent	The quantity that expresses all kinds of radiation on a common scale for calculating the effective absorbed dose; defined as the product of the absorbed dose in rads and modifying factors, especially the qualifying factor; given in terms of rems. Often abbreviated "dose."
dose, external	The absorbed dose that is due to a radioactive source external to the individual as opposed to radiation emitted by inhaled or ingested sources.
dose, internal	The absorbed dose or dose commitment resulting from inhaled or ingested radioactivity.
EA	Environmental Assessment.
EPA	U.S. Environmental Protection Agency.
exposure	A measure of the ionization produced in air by x or gamma radiation. It is the sum of the electrical charges on all ions of one sign produced in air when all electrons liberated by photons in a volume element of air are completely stopped in air, divided by the mass of the air in the volume element. The unit of exposure is the roentgen (R).

FONSI	Finding of No Significant Impact.
flux, radon	The emission of radon gas from the earth or other material, usually measured in units of picocuries per square meter per second.
gamma dose	Radiation dose caused by gamma radiation.
gamma logging (or logs)	A technique for determining gamma radiation levels at various depths in a borehole.
gamma ray	Short wave length electromagnetic radiation of nuclear origin with energies ranging from 10 KeV to 9 MeV.
gamma spectral analysis (gamma spectroscopy)	An analytical technique for identifying radionuclides based on their different gamma energy levels.
ground water	Subsurface water in fully saturated soils and geologic formations.
hydraulic conductivity	Ratio of flow velocity to driving force (for viscous flow of a specified liquid in a porous medium).
hydraulic gradient	Rate of change of hydraulic head per unit of distance of flow at a given point. The driving force for advective flow in a porous medium.
half-life	The time required for a radioactive substance to lose 50 percent of its activity by decay. Each radionuclide has a unique half-life.
in-situ	In the natural or original position.
isotopes	Nuclides having the same number of protons in their nuclei, but differing in the number of neutrons. The chemical properties of isotopes of a particular element are almost identical.
licensing	In this report, the process by which the NRC will, after the remedial actions are completed, approve the final disposition and controls over a disposal site.
maintenance, custodial	The repair of fencing; repair or replacement of monitoring equipment; revegetation; minor additions to soil cover; general disposal site upkeep such as mowing grass.
man-rem	Unit of population exposure obtained by summing individual dose-equivalent values for all people in the population. Thus, the number of man-rems attributed to one person exposed to 100 rems is equal to that attributed to 100 people each exposed to one rem.

micro	A prefix meaning one millionth (x 1/1,000,000 or 10^{-6}).
milli	A prefix meaning one thousandth (x 1/1000 or 10^{-3}).
Modified Mercalli (scale)	A standard scale for the evaluation of the local intensity of earthquakes based on observed phenomena such as the resulting level of damage. Not to be confused with magnitude, such as measured by the Richter scale, which is a measure of the comparative strength of earthquakes at their sources.
monitor	To observe and make measurements resulting in data for evaluation of the performance and characteristics of the disposal site.
MSRD	Mountain States Research and Development.
NEPA	National Environmental Policy Act.
NRC	U.S. Nuclear Regulatory Commission.
OSHA	Occupational Safety and Health Act.
passive institutional controls	Those controls which require action by a governmental agency to preclude human contact with the waste or require a continuing social order. Examples include Federal ownership of a disposal site, monuments on the site, records with agencies, and physical barriers (e.g., riprap covers, vegetation, waste burial).
perched ground water	Ground water that is unconfined and separated from an underlying body of ground water by an unsaturated zone.
permeability	The capacity of a rock or soil mass to transmit a fluid.
permissible dose	That dose of ionizing radiation that is considered acceptable by standards-setting bodies such as the EPA. Also, the dose of radiation that may be received by an individual within a specified period with the expectation of no substantially harmful result.
person-rem	Same as man-rem.
pico	A prefix meaning one trillionth (1 x 1/1,000,000,000,000 or 10^{-12}).
picocurie	A unit of radioactivity defined as 0.037 disintegrations per second.
potentiometric (piezometric) surface	An imaginary surface that everywhere coincides with the static hydraulic head of the water in the aquifer.

stabilization	The reduction of radioactive contamination in an area to a predetermined level by a standards-setting board such as the EPA, by encapsulating or covering the contaminated materials.
standard Proctor	A test procedure to measure moisture-density relationship (ASTM D698).
surveillance	The observation of the disposal site for purposes of visual detection of need for custodial care, evidence of intrusion, and compliance with other license and regulatory requirements.
TAC	Technical Assistance Contractor.
tailings, uranium-mill	The waste material remaining after most of the uranium has been extracted from uranium ore.
TDS	Total dissolved solids.
thorium-230, Th-230	A radioactive daughter product of uranium-238; it has a half-life of 80,000 years and is the parent of radium-226.
transmissivity, hydraulic	A measure of the ability of an aquifer to transmit water equal to the product of the hydraulic conductivity and the saturated thickness of the aquifer.
UMTRA	Uranium Mill Tailings Remedial Action.
UMTRCA	Uranium Mill Tailings Radiation Control Act.
unconfined aquifer	An aquifer that is not confined by impermeable beds. The upper water surface is called the water table.
uranium-238 U-238	A naturally-occurring radioisotope with a half-life of 4.5 billion years; it is the parent of uranium-234, thorium-230, radium-226, radon-222, and others.
vicinity property	A property in the vicinity of the Riverton site that is determined by the DOE, in consultation with the NRC, to be contaminated with residual radioactive material derived from the Riverton site, and which is determined by DOE to require remedial action.
water table	The upper surface of a zone of saturation is an unconfined aquifer.
working level (WL)	A measure of radon-daughter-product concentrations. Technically, it is any combination of short-lived radon decay products in one liter of air that will result in the ultimate emission of alpha particles with a total energy of 130,000 MeV.

promulgate	To make known by open declaration; proclaim.
proton	Elementary nuclear particle with a positive electric charge equal numerically to the charge of the electron and a mass of 1.007277 mass units. Also the nucleus of a hydrogen atom.
PSCR	Processing Site Characterization Report.
RAC	Remedial Action Contractor.
rad	A unit of measure for the absorbed dose of radiation. It is the equivalent of 100 ergs per gram of material.
radioisotope	A radioactive isotope of an element with which it shares almost identical chemical properties.
radionuclide	A radioactive nuclide.
radium-226, Ra-226	A radioactive daughter product of uranium-238. Radium is present in all uranium-bearing ores; it has a half-life of 1620 years.
radon-222, Rn-222	An inert gas continuously generated by the decay of Ra-226 in rock and soil with a half-life of 3.8 days generating a series of non-gaseous radioactive decay products.
radon-daughter product	One of several short-lived radioactive daughter products of radon-222. All are solids.
RAP	Remedial Action Plan.
RDC	Radon daughter concentration.
recharge	The process involved in the replenishment of water to the zone of saturation.
rem	A unit of dose equivalent equal to the absorbed dose in rads times quality factor times any other necessary modifying factor. It represents the quantity of radiation that is equivalent in biological damage to one rad of x-rays.
roentgen	The unit of exposure. One roentgen equals 2.58 x 10^{-4} coulombs per kilogram of air. One roentgen (R) in air is approximately equal to one rad and one rem in tissue.
soil infiltration rate	The rate at which water enters the soil surface and moves vertially downward.
soil percolation rate	The rate at which water moves through soil in all directions.

working-level month (WLM)	Exposure to a worker resulting from inhalation of air with a concentration of one WL of radon daughters for 170 working hours. Continuous exposure of a member of the general public to one WL for one year results in approximately 53 WLM.

APPENDIX A

REGULATORY COMPLIANCE DESCRIPTION

TABLE OF CONTENTS

LIST OF FIGURES

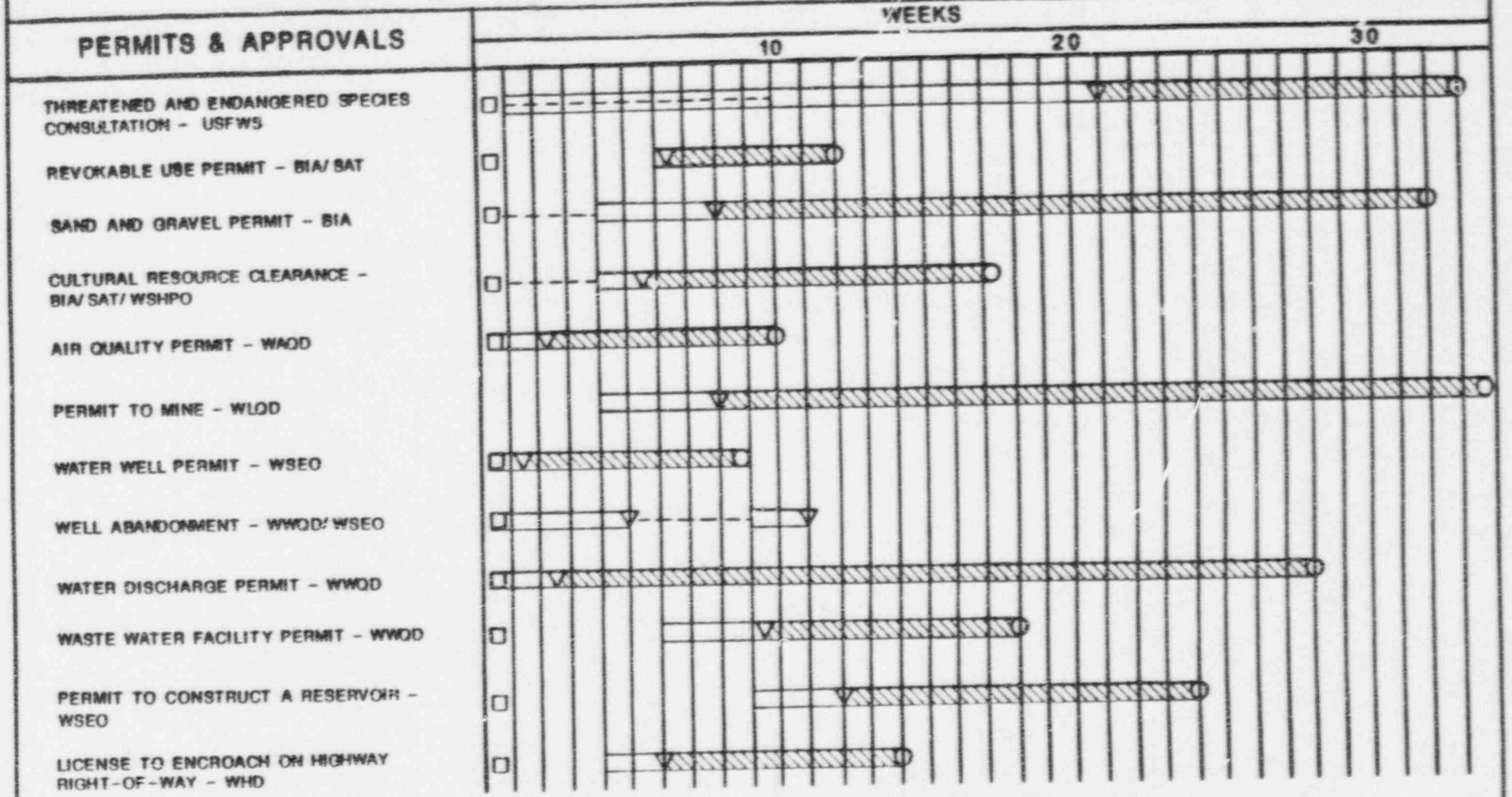
A.1 INTRODUCTION

This appendix is intended to identify and describe the permits, licenses, and approvals that are likely to be required for the proposed action (Section 4.0). Other permits, licenses, and approvals ma be required for activities beyond the scope of the Remedial Action Plan (RAP) or due to its modification.

Procedures for preparing permit, license, or approval applications and agency review processes are outlined in the following sections. The principal technical and supervisory personnel at the regulatory agencies are listed as well. This appendix should be considered as an introduction to the permitting process as details must be obtained from the regulatory agencies. Applications must be submitted to Federal, state, and local agencies depending on the type of permit, license, or approval sought.

A tentative schedule for regulatory compliance activities (Figure A.1.1) is included for initial planning purposes. Figure A.1.2 illustrates the regulatory compliance matrix. The preparation and filing of applications will be sequenced so that permits, licenses, and approvals will be received in a timely manner without causing delay to construction activities.

FIGURE A.1.1 REGULATORY COMPLIANCE SCHEDULE RIVERTON, WYOMING



BIA - BUREAU OF INDIAN AFFAIRS
SAT - SHOSHONE & ARAPAHOE TRIBES
USFWS - U.S. FISH & WILDLIFE SERVICE
WAQD - WYOMING AIR QUALITY DIVISION
WLQD - WYOMING LAND QUALITY DIVISION
WHD - WYOMING HIGHWAY DEPARTMENT
WSEO - WYOMING STATE ENGINEER'S OFFICE
WSHPO - WYOMING STATE HISTORIC PRESERVATION OFFICER
WWQD - WYOMING WATER QUALITY DIVISION

AGENCY CONSULTATION
DATA COLLECTION
PREPARE APPLICATION OR REPORT
PERMIT APPROVAL
SUBMIT APPLICATION
AGENCY REVIEW
PUBLIC HEARING

FIGURE A.1.2

REGULATORY COMPLIANCE MATRIX
RIVERTON, WYOMING UMTRA SITE

PERMIT OR APPROVAL	REGULATORY AGENCY								
	USFWS	BIA	SAT	WSHPO	WLQD	WAQD	WWQD	WSEO	WHD
THREATENED & ENDANGERED SPS. CONSULT.	L								
CULTURAL RESOURCE CLEARANCE		L	C	C	C				
SAND & GRAVEL PERMIT		L	C						
REVOKABLE USE PERMIT		L	C						
AIR QUALITY CONSTRUCTION PERMIT						L			
PERMIT TO MINE					L				
WATER WELL PERMIT								L	
MONITOR WELL ABANDONMENT							L	L	
WASTE WATER DISCHARGE PERMIT							L		
WASTE WATER TREATMENT PERMIT							L		
PERMIT TO CONSTRUCT A RESERVOIR								L	
LICENSE TO ENCROACH ON HIGHWAY R.O.W.									L

KEY

USFWS - U.S. FISH & WILDLIFE SERVICE
BIA - BUREAU OF INDIAN AFFAIRS
SAT - SHOSHONE & ARAPAHO TRIBES
WSHPO - WY STATE HISTORIC PRESERVATION OFFICER
WLQD - WY LAND QUALITY DIVISION
WAQD - WY AIR QUALITY DIVISION
WWQD - WY WATER QUALITY DIVISION
WSWP - WY SOLID WASTE PROGRAM
WSEO - WY STATE ENGINEER'S OFFICE
WHD - WY HIGHWAY DEPT.

L - LEAD AGENCY

C - COOPERATING OR CERTIFYING AGENCY

ACTIVITY: THREATENED AND ENDANGERED SPECIES CONSULTATION

LEGAL CITATION: Endangered Species Act of 1973, Section 7;
16 USC 1531, et seq.

AGENCY/CONTACT: U.S. Fish and Wildlife Service
Endangered Species Office
Federal Building, U.S. Courthouse
P.O. Box 10023
Helena, Montana 59626
ATTN: Wayne Brewster, (406) 449-5225
Field Supervisor

PROCEDURE: A Federal agency must ensure that any action authorized, funded, or implemented by the agency is not likely to jeopardize the continued existence of any threatened and endangered (T&E) species or their critical habitats. The responsible Federal agency must consult with the U.S. Fish and Wildlife Service (USFWS) to determine what effect, if any, the proposed action might have on any T&E species.

A letter is sent by the Federal agency to the USFWS outlining the proposed action. If the USFWS determines that no T&E species would be adversely affected by the action, no further consultation is necessary. If the USFWS identifies any T&E species that may be affected, the Federal agency is required to prepare a biological assessment considering the species identified by the USFWS, make a "no effect" or "may effect" determination for the species and, for a "may affect" determination, recommend appropriate mitigation measures. The USFWS will review and concur in the determination and the mitigative measures.

SPECIAL CONSIDERATIONS: No T&E species would be affected by the remedial actions at the processing site. However, use of the Little Wind borrow site or other borrow sites will require Section 7 consultation.

SCHEDULE: After obtaining the list of T&E species from the USFWS, the Federal agency has 180 days or another mutually agreeable time period to complete a biological assessment. The Federal agency requests a Section 7 consultation, and the USFWS is required to issue a biological opinion within 90 days.

ACTIVITY: REVOKABLE USE PERMIT

LEGAL CITATION: 25 CFR Part 169

AGENCY/CONTACT: Bureau of Indian Affairs (BIA)
Wind River Agency
Fort Washakie, WY 82514

ATTN:	David Allison, Superintendent	(307) 332-7810
	Dan Nueman, Realty Officer	(307) 332-4639
	Arthur Hallett, Supervisory Highway Engineer	

Bureau of Indian Affairs
Billings Area Office
316 N. 26th St.
Billings, MT 59101

ATTN:	Richard Whitesell, Area Director	(406) 657-6315
	Larry Moran, Realty Officer	(406) 657-6301

PROCEDURE: The purpose of this permit is to gain legal access to BIA roads for decontamination. An application for a revokable use permit is filed by sending a letter to the Superintendent, Wind River Agency, with the following information:

(1, Explanation of the proposed decontamination activities along Bureau of Indian Affairs (BIA) roads and on allotted lands.

(2) Legal description of lands involved.

(3) Schedule of operations.

SPECIAL CONSIDERATIONS: A copy of the application letter should be sent to the Area Director, Billings Area Office. Consent of the Arapahoe and Shoshone tribes will be required if tribal trust lands are involved or if the mineral rights are held by the tribes. Decontamination of allotted Indian lands will probably require the approval of the allottee heirs and the BIA.

SCHEDULE: Review and approval by the BIA may involve two to three months.

PERMIT: SAND AND GRAVEL PERMIT

LEGAL CITATION: 25 CFR Part 216

AGENCY/CONTACT: Bureau of Indian Affairs
Wind River Agency
Fort Washakie, WY 82514
ATTN: Dan Nueman, Realty Officer (307) 332-4639

PROCEDURE: This permit is required for the excavation of borrow materials (e.g., earth, gravel, rock) within the Wind River Reservation. Issuance of a sand and gravel permit is based upon review of a completed application form 5-154j (original and four copies) and accompanying information. The following information is required:

(1) Name, address, and telephone number of applicant.

(2) Land ownership.

(3) Location of proposed operation (map).

(4) Proposed expiration date of permit.

(5) Exact acreage of land to be covered by the permit.

(6) Metes and bounds description of the property boundary.

(7) Royalty rate or royalty waiver explanation.

(8) Description of the type of material to be mined.

(9) Performance bond to assure reclamation of the site (form 5-154b).

(10) Approval by the Joint Business Council will be required or written consent of current owners of allotted lands if tribal lands and/or minerals are involved.

Exhibit A of the application should include:

(1) Description of the project.

(2) Description of project purpose and need.

(3) Summary of existing environmental conditions, including:
- o Land use.
- o Vegetation.
- o Water.
- o Air.
- o Biology.
- o Existing facilities.

(4) Statement of influence on the environment.

(5) Summary of environmental impacts.

(6) Mining and reclamation plan, including:
- o Type of equipment to be used.
- o Topsoil to be stockpiled for later reclamation use.
- o Revegetation procedures based on recommendations of the Branch of Land Operations, BIA.

The application is evaluated by the Realty Officer to determine if a site-specific environmental assessment is needed in addition to the environmental assessment completed for the remedial action. Stipulations for impact mitigation may be attached to the permit approval.

SPECIAL CONSIDERATIONS: Concurrence must be obtained by the BIA from the Shoshone and Arapahoe Joint Business Council prior to issuance of the permit.

A production royalty is charged for the extraction of borrow materials. Cultural resource clearance and T&E species consultation for the borrow site must be obtained prior to permit approval.

SCHEDULE: The time required for review and processing of the application is typically three to six months although special handling of the application may considerably reduce the review period.

ACTIVITY: CULTURAL RESOURCE CLEARANCE
(WITHIN THE WIND RIVER RESERVATION)

LEGAL CITATION: National Historic Preservation Act of 1966, Section 106
36 CFR Part 800 and 25 CFR Part 261

AGENCY/CONTACT:

Bureau of Indian Affairs
Wind River Agency
Fort Washakie, WY 82514
ATTN: David Allison, Superintendent (307) 332-7810

Bureau of Indian Affairs
Billings Area Office
316 N. 26th St.
Billings, MT 59101
ATTN: Jim Charles, Area Archaeologist (406) 657-6145
Richard Whitesell, Area Director (406) 657-6315

State Historic Preservation Office
State Archives, Museum and Historical
Department
Barrett Building
Cheyenne, WY 82002
ATTN: Robert Bush,
State Historic Preservation Officer (307) 777-7695
Tom Marceau, Review and
Compliance Section Head

PROCEDURE: All Federal agencies are required to comply with Section 106 of the National Historic Preservation Act with regard to any action which could impact archaeological or historical resources. Prior to surface-disturbing activities on Shoshone/Arapahoe allotted or trust lands, cultural resource clearance should be obtained from the Bureau of Indian Affairs (BIA). The person or government agency proposing the activity should contract with an approved archaeologist to conduct a Class III archaeological survey of the land to be affected. If a survey has been completed previously, a new survey may not be required. Prior to commencement of the survey, the archaeologist must obtain a valid permit from the Area Office. The survey report and a copy of the Riverton UMTRA Project Environmental Assessment should be sent to the Billings Area Office with a copy to the Wind River Agency. If archaeological resources are involved, the Bureau seeks the approval of the tribes and consults with the State Historic Preservation Officer (SHPO) prior to making a final determination of mitigation measures. The Bureau can either grant clearance or, if significant archaeological or historical features are present, require avoidance or possibly excavation of features that may have been identified. Correspondence should be directed to the Area Director (ATTN: Area Archaeologist), with copies sent to the Wind River Agency Superintendent.

SPECIAL CONSIDERATIONS: A cultural resource survey conducted near the tailings site identified two lithic scatters that were not eligible for

CULTURAL RESOURCE CLEARANCE (WITHIN THE WIND RIVER RESERVATION)(Concluded)

inclusion to the National Register of Historic Places (NRHP). The survey also identified a concentration of historic homestead materials which need additional data to determine eligibility. The cultural resources report recommended archaeological monitoring during construction as some sites have been found in the area at depths of up to four feet.

An ethnographic survey identified one area of concern for the Araphoe; this is the historic site identified in the cultural resource survey. Additional research will be required to determine if the site is important to the Arapahoe.

The Little Wind borrow site or other borrow sites have not been surveyed for cultural resources. Prior to surface disturbance of undisturbed areas, a Class III survey must be conducted. In addition, an ethnographic survey may be required.

The discovery of archaeological sites during the course of Federally assisted, permitted, funded, or licensed construction or land alteration must be reported to the land management agency with jurisdiction for the area. If a previously undiscovered site is revealed during the course of construction, the official in charge should halt construction and request an on-site assessment by the Area Archaeologist.

SCHEDULE: Completion of a Class III archaeological survey usually requires two to four weeks, depending upon the size of the area and availability of archaeologists. Review by BIA and SHPO usually involves three to five weeks.

ACTIVITY: CULTURAL RESOURCE CLEARANCE
(OFF THE WIND RIVER RESERVATION)

LEGAL CITATION: Historic Preservation Act of 1966, Section 106, 16 USC 470; Executive Order 11593; and 36 CFR Part 800

AGENCY/CONTACT: State Historic Preservation Office
State Archives, Museum
and Historical Department
Barrett Building
Cheyenne, WY 82002
ATTN: Robert Bush, State Historic Preservation Officer (307) 777-7695
Tom Marceau, Review and Compliance Section Head

PROCEDURE: Federal agencies are required to conduct appropriate studies and provide information necessary for an adequate review of the effect a proposed undertaking may have on a property eligible for, or listed on, the National Register of Historic Places (NRHP). In most cases this involves field inventories of the areas subject to surface disturbance to discover and evaluate cultural resources. Resources found to be on the NRHP or eligible for nomination to the NRHP shall be afforded protection from the proposed undertaking or shall be mitigated. Effect determinations and proposed mitigative measures shall be reviewed and accepted by the BLM (if on their land), the Wyoming State Historic Preservation Officer (SHPO), and, if necessary, the Advisory Council on Historic Preservation (ACHP) prior to remedial action or use of borrow sources.

The organization sponsoring the action should contract with an archaeologist with a valid antiquities permit to conduct cultural resource inventories. If a cultural resources inventory of the undertaking area has been completed previously, a new inventory may not be required. The inventory report shall be sent to the BLM (if required), Wyoming SHPO, and the Wyoming Department of Environmental Quality (DEQ), Land Quality Division. Clearance from the Land Quality Division is usually given in the form of mine permit approval.

SPECIAL CONSIDERATIONS: The discovery of archaeological sites on public lands during the course of Federally assisted, permitted, funded, or licensed construction or land alteration must be reported to the BLM of the U.S. Department of the Interior. If previously unknown resources are revealed during the course of construction, the official in charge should halt constructon in the vicinity of the discovery and request an on-site assessment by the BLM. The BLM will respond within three working days with a professional assessment of the significance of the site. In consultation with agency officals, the BLM representative makes an on-site decision for (a) salvage, (b) burial, or (c) destruction of the site. The local area office of BLM can be contacted at (307) 332-7822.

CULTURAL RESOURCE CLEARANCE (OFF THE WIND RIVER RESERVATION) (Concluded)

SCHEDULE: The SHPO review involves approximately one month for review of archaeological reports. BLM reviews take two weeks to two months to complete.

ACTIVITY: AIR QUALITY CONSTRUCTION PERMIT

LEGAL CITATION: Wyoming Environmental Quality Act, W.S. 35-11-101 through 35-11-1207, and Wyoming Air Quality Standards and Regulations

AGENCY/CONTACT: Wyoming Department of Environmental Quality
Air Quality Division
210 Lincoln Street
Lander, WY 82520
ATTN: Dan Fauth, District Engineer (307) 332-3144

Wyoming Department of Environmental Quality
Air Quality Division
Herschler Building
Cheyenne, WY 82002
ATTN: Charles Collins, (307) 777-7391
Air Quality Administrator

PROCEDURE: A permit is required to construct or modify any facility which may cause the issuance of an air contaminant. A completed application form is submitted to the Air Quality Division (the Division) which requires the following information:

(1) Description of the proposed remedial action with:
- Quantities of materials moved.
- Number, type, and models of vehicles and equipment to be used.

(2) Description of air pollution control methods to be used.

(3) An estimate of air emissions from the proposed operation.

(4) Description of facility location.

(5) Schedule of construction activities.

(6) Evidence of compliance with local land use plans.

(7) Evidence that the applicant has legal access to or ownership of the land.

The total suspended particulate (TSP) air standards are 60 micrograms/meter^3 and 150 micrograms/meter^3 for one 24-hour period annually.

SPECIAL CONSIDERATIONS: Best Available Control Technology (BACT) is required to reduce dust emissions. This includes application of surfactants or chemical stabilizers on unpaved access roads and water spray on work areas. An emission inventory and air-quality impact computer simulation were completed as part of the environmental assessment for the remedial action. The ISCST computer model was used in the study.

AIR QUALITY CONSTRUCTION PERMIT (Concluded)

A minor source may receive an exemption from permit requirements if it is determined to be insignificant in both emission rate and ambient air quality impact. The procedure involved in obtaining an exemption is to send a letter to the Division Administrator requesting a permit determination. The letter should describe the proposed minor source(s), including an estimate of air emissions and a project schedule. The Division evaluates these requests on a case-by-case basis.

Approval by letter is commonly granted for open burning of trees and brush cleared from construction sites; however, burning of lumber from building demolition would not be approved.

SCHEDULE: Upon receipt of an application, the Division has 30 days to determine if the application is complete. An additional 60 days are allotted to review the technical aspects of the application and to determine whether to approve or deny the application. The public notice and comment period involves an additional 45 to 60 days. The review period may be extended if the Division determines that additional information is needed before the technical review can proceed.

ACTIVITY: PERMIT TO MINE

LEGAL CITATION: Wyoming Environmental Quality Act, W.S. 35-11-401 through 35-11-423

AGENCY/CONTACT: Wyoming Department of Environmental Quality
Land Quality Division
210 Lincoln Street
Lander, WY 82520
ATTN: D. Lynn Askew, (307) 332-3047
Sr. Environmental Specialist
Mark Moxley, District II Engineer

Wyoming Department of Environmental Quality
Land Quality Division
Herschler Building
Cheyenne, WY 82002
ATTN: Roger Schaffer, (307) 777-7756
Land Quality Administrator

PROCEDURE: This permit applies to borrow areas off the Wind River Indian Reservation that would affect more than 10 acres of land per year. A permit application consists of:

Part I - Adjudication File (in triplicate).

Form 1 - Permit to Mine Application.

Form 3 - License to Mine Application.

Reclamation Bond - Original copy of bond and power of attorney. Cash, Federally insured certificate of deposit, government securities, and/or self-bonding information.

Surface Owner Consent - Associated legal documents.

Appendix A

1. List of names and last known addresses of:
   a. Surface owners of record within permit area.
   b. Mineral owners of record within permit area.

2. Maps showing locations of ownerships in 1.a. and 1.b., above.

Appendix B

1. List of names and last known addresses of owners of record of surface rights of lands immediately adjacent to the proposed permit area, and for any other persons having a valid legal estate of record within 0.5 mile of the permit area.

2. Maps showing the locations of the ownerships in 1, above.

Appendix C

1. Tabulation of lands in the proposed permit area by legal subdivision, section, township, range, county, and municipal corporation, if any, and number of acres for each entry listed.

2. Separate tabulation of lands in the proposed permit area where no right to mine is claimed with the number of acres for each entry.

3. Tabulation of lands which are located within other permit areas and a copy of the agreement with the other permittee(s).

4. An original Geological Survey topographic map, clearly outlining and identifying the lands to be within the proposed permit area. Photocopies or other similar copies are not acceptable unless prior approval is obtained from the Land Quality Division (the Division).

Appendix E - A map or maps with the boundary of the proposed permit area clearly outlined and identified showing:

1. Lands to be affected by mining.

2. Drainage area within and surrounding the proposed permit area.

3. Location and names, where known, of all roads, railroads, public or private rights-of-way and easements, utility lines, buildings, lakes, streams, creeks, springs, and other surface-water courses, oil wells, gas wells, and water wells.

4. Outline of the probable limits of all areas previously disturbed or to be disturbed by underground or surface mining, whether active or inactive, on or immediately adjacent to the proposed permit area.

Proof of Publication - The Division will provide publication notice format. Publication and notification are not to begin until written consent from the Division has been received.

Proof of Filing - Letter from the appropriate county clerk verifying that a copy of the application was filed for public review in the county courthouse.

Proof of Notification - Surface and mineral owners within 0.5 mile, and adjacent to the permit area. The notice must be sent within five days after the first publication to all above owners of record.

Part II - Supporting Information (in triplicate).

Appendix D - Description of the Land (Permit to Mine Application Form 1, Section (vii)).

1. Appendix D-1, Land Use.

   a. Past use of land within permit area for last 20 years, if known.
   b. Present use of land within permit area. If there are two or more neighboring and different land uses, the location and extent of each should be shown on a pre-mining land use map.
   c. Aerial photo of proposed permit area.

2. Appendix D-2, Brief History of the Area.

3. Appendix D-3, Archaeological and Paleontological Resources.

   a. Surveys.
   b. Clearances.

4. Appendix D-4, Climatology.

   a. Meteorological data.
   b. Air-Quality Permit.
   c. Discussion.

5. Appendix D-5, Topography, Geology, and Overburden Assessment.

   a. Pre-mining topographic slope conditions (slope measurements) with map.
   b. Geologic stratigraphy and structure.
   c. Geologic cross sections for pit area(s).
   d. Qualitative and quantitative overburden analyses.
      - o Locate overburden test holes (drill or core holes from which samples are collected for laboratory analyses) on a topographic map and on the geological cross sections. The topographic map should also be utilized as a geologic cross-section key.
      - o Geologist's log for each overburden test hole.
      - o Overburden sampling and analytical methods.
      - o Analytical results.
   e. Evaluation and summary.

6. Appendix D-6, Hydrology.

   a. Ground water.
      - o Geologic setting
      - o Aquifer properties.

- o Piezometric contour maps of affected aquifer(s).
- o Ground-water quality.
- o Monitoring program with map (pre-mining, mining, post-mining).
- o Identify and locate ground-water recharge areas.

b. Surface water.
- o Drainage basin description with map.
- o Surface runoff flood estimates.
- o Surface-water quality including sediment loads.
- o Channel geometry.
- o Monitoring program with map (pre-mining, mining, post-mining).
- o Perspective of stream channels in relation to the fluvial system.

c. Water rights.
- o List and map of surface water rights inside and within 0.5 mile of the permit area boundary.
- o For any stream leaving the permit area, list and map surface-water rights for a distance of three miles downstream.
- o List and map of water wells inside and within three miles of permit area boundary.

d. Mining impact on hydrology and water resources during and after mining on and off the site; discussion of dewatering effects on and off the site.

7. Appendix D-7, Soil Assessment.

a. A soil inventory and suitability map with soil units and affected lands clearly outlined and identified.
b. Soil mapping unit and profile descriptions.
c. Qualitative soil analyses.
- o Sampling methods.
- o Analytical results.

d. Quantitative topsoil analyses.
- o Evaluation of soil resource for topsoiling purposes.
- o Quantities and characteristics of soil yielded per affected area (noncontiguous areas estimated separately).
- o Soil stripping depth map for affected lands.

e. Prime farmland (if applicable).
- o Prime farmland soil determination (local Conservation District determination in writing).
- o Historical use as cropland.

f. Summary and discussion.

8. Appendix D-8, Vegetation Inventory.

   a. Introduction.
   b. Methods.
      - o Vegetation types and mapping.
      - o Species list.
      - o Sample locations and sampling procedure.
      - o Reference or control area locations.
      - o Reference or control area sampling.
      - o Time of sampling.
      - o Plot size and shape.
      - o Measurements.
      - o Trees and shrub height.
   c. Results.
      - o Description of vegetation.
      - o Vegetation map.
      - o Vegetation type acreages.
      - o Species list.
      - o Weeds; selenium indicators; threatened or endangered species.
      - o Cover data.
      - o Productivity data.
      - o Trees and shrubs.
      - o Trees by species.
      - o Sample adequacy.
      - o Cover and productivity for entire area.
   d. Discussion.

9. Appendix D-9, Wildlife.

   a. Description of potential and actual faunal distribution on permit area with map.
   b. Habitat affinity of animals on the site.
   c. Identification of unique habitat types on the site with map.
   d. Occurrence of threatened or endangered species or eagles on or within two miles of the permit area.
   e. Changes in hunting and fishing access to public lands during the life of the mine.
   f. Wildlife impacts, short term and long term, resulting from the mining operation.
   g. Summary and discussion.

<u>Mine Plan</u>

1. General description of mining operation.

   a. Type of mine.
   b. Life of mine.

c. Equipment list (include types and numbers).
d. For minerals other than coal, nature of the deposit and estimation of reserves for life of mine.
e. Existing underground mines (locate on maps and address effects).
f. Protection of other resources (oil, gas, ground water, other minerals).

2. Mine facilities design criteria and construction methods and schedule discussed and mapped in relation to the mine plan.

a. Buildings, processing plants, and other facilities.
b. Access and haul roads.
c. Power transmission and communication lines.
d. Sedimentation and treatment ponds.
e. Hydraulic diversions and retention systems, temporary and permanent.
f. Solid waste disposal.
g. Storage and/or stockpile sites.
h. Access control features (fences, etc.).

3. Mining method and schedule.

a. Topsoil.
   - o Stripping and handling techniques (stockpiling and/or haulback).
   - o Quantity expected to be stockpiled per stockpile (topsoil stockpiles located on mine sequence map).
   - o Topsoil stockpile conservation plan.

b. Mine pit excavation, backfilling, and contouring.
   - o Methods of pit excavation and pit backfilling.
   - o Location and engineering of spoil piles to be located outside the pit boundaries; discuss longevity of piles.
   - o Disposal treatment or covering of combustible, toxic, acid-forming, or radioactive materials which may retard vegetative growth (as identified in Appendix D-5).
   - o Compaction of backfilled material or material placed in spoil piles to prevent leaching and upward movement of toxic substances; provide stability; and prevent subsidence.
   - o Tabular listing of volume of material excavated and backfilled per pit(s) or placed in spoil piles.

c. Commodity (ore or mineral).
   - o Removal process.
   - o Handling (preparation, refining, shipping).

d. Mining sequence.
   - o Mine advance, by year, for life of mine.
   - o Mine sequence map.

e. Mining hydrology.
   - o Surface drainage plan during mining (maps, design, and hydraulic properties).
   - o Water treatment plans.
   - o Quantity and quality of ground water discharged into mine pit at various stages during mining. Show methods, calculations, and numbers used to arrive at discharge estimates; describe plans for placement and use of water pumped from the mine.
   - o Statement of source, quality, and quantity of water, if any, to be used in the mining and reclamation operation.
   - o Design details for sediment ponds and treatment systems.
   - o Operational monitoring systems for surface and ground waters.
   - o Ground-water drawdown estimates placed on topographic map.
   - o Statement of areas and rates of ground-water recharge.

Reclamation Plan

1. Post-mining land use.

   a. If more than one land use is proposed, the location and extent of each land use should be shown on a post-mining land use map.

2. Contouring plan for affected lands.

   a. Surface configuration consistent with post-mining land use.
   b. Affected lands blend with adjacent topography and land uses.
   c. Erosion and sedimentation controlled.
   d. Drainages re-established.
   e. Acceptable slope conditions.
   f. Post-mining contour map to illustrate reclaimed land surface contour and configuration. Contours of the topography for a 0.5-mile periphery outside the permit area should be shown on the map. Contour intervals should be the same inside and outside the permit area.

3. Surface preparation for topsoil or subsoil replacement.

4. Topsoil and/or subsoil replacement.

   a. Methods of replacement.
   b. Schedule for replacement.
   c. Special soil reconstruction procedure, e.g., prime farmland.
   d. Minimum depth of topsoil to be replaced on all affected land.
   e. Erosion-control and water conservation practices.
   f. Soil amendments.

5. Revegetation practices.

a. Cover crops or nurse crops.
   - o Reason for use.
   - o Species to be seeded.
   - o Seeding rate.
   - o Method of seeding.
   - o Time of seeding.

b. Mulch.
   - o Reason for use.
   - o Type applied.
   - o Application rate and method.
   - o Anchoring methods.
   - o Areas of application.
   - o Time of application.

c. Species to be seeded or planted with seeding rate for each in pounds of pure live seed per acre or number of nursery stock plants per acre including seeding methods and dates.

d. Where different mixtures will be seeded, delineate areas to be seeded with each mixture. If trees and shrubs are to be planted in localized areas, these areas should also be delineated.

e. Evaluation techniques for revegetation.
   - o. Vegetation cover.
   - o Productivity.
   - o Species composition with respect to land use goal.

6. Protection of newly-seeded areas.

   a. Type of fencing to be used.
   b. Criteria to be used to determine when fences may be removed.
   c. Other means of providing protection for newly seeded areas.

7. Final hydrologic restoration.

   a. Final drainage system with maps and channel geometry.
   b. Impoundments (Land Quality Division Rules & Regulations, Chapter III, Section 6).
   c. Aquifer reconstruction/restoration and post-mining monitoring plan with map.
   d. Estimated final water quality and quantity.
   e. Final anticipated piezometric surface(s) of affected areas.
   f. Drainage system for reclaimed land surface.
   g. Post-mining recharge restoration.

8. Special reclamation standards.

   a. Facilities and utilities.
   b. Roads, railroads, and transport facilities.

9. Reclamation schedule. Annual progress of reclamation in accordance with mine sequence map.

10. Reclamation costs. Assessment of costs for reclamation of all lands to be affected during the first year as if the mining operation were to stop at the end of this period. Itemize costs on a unit-cost basis for the reclamation of the different types of disturbance, such as:

    a. Pit areas.
    b. Overburden and topsoil storage areas.
    c. Mineral stockpiles and mill tailings areas.
    d. Waste or refuse areas.
    e. Embankments and impoundment basin.
    f. Drainage conveyance and control structures.
    g. Shop and mill areas.
    h. Processing and shipping areas.
    i Access and haul roads.
    j. Any other activity or facility which will require reclamation.

    Costs for items a. through j., where applicable, should be based on replacement of overburden and topsoil materials for removal of surface facilities, grading and contouring, seedbed preparation, stabilization, and seeding in accordance with the reclamation plan. The reclamation cost estimate should be concluded with a summation of all individual costs along with an estimate of total affected areas.

Part III - Maps and Aerial Photos

Maps

1. Title block located in lower right-hand corner with, as a minimum, the following information:

    a. Applicant's name and address.
    b. Title of map.
    c. Date map was drawn.
    d. Each date map was revised.
    e. Map sheet page number and exhibit number.
    f. Scale and contour interval.

2. Section, township, and range lines and numbers.

3. North arrow.

4. Permit area clearly outlined and identified. Amendment areas should be clearly differentiated from original permit area and other amendment areas, clearly outlined, and identified. All should agree with written legal description in Appendix C of adjudication file.

5. Legend clearly describing information on map.

6. If only a portion of permit or amendment area is shown, a map location key showing area with respect to total permit or amendment area should be on map.

7. If more than one map sheet is used for a specific subject, each sheet should be numbered consecutively, 1 of 4, 2 of 4, and so on.

8. Reference on the map any enlarged view, cross sections, or more detailed information contained elsewhere.

9. Contours.

   a. No more than two contour intervals on any map; interval should normally not exceed 20 feet.
   b. Contour intervals same for pre-mining and post-mining maps.
   c. Contour lines distinct and clearly identified.

10. Size of map sheets.

    a. Not extremely large or small.
    b. Information and detail clearly shown.
    c. Use a series of sheets if necessary.

11. Scale ranges for specific maps. Variations should have prior approval.

a.	Hydrologic maps	1" = 400' to 2,000'
b.	Vegetation maps*	1" = 400' to 700'
c.	Soils maps*	1" = 400' to 700'
d.	Pre-mining contours**	1" = 400' to 1,000'
e.	Post-mining contours**	1" = 400' to 1,000'
f.	Mine sequence map	1" = 400' to 1,000'

*These maps should be the same scale.
**These maps should be the same scale.

Aerial Photos

1. Should be current and show date taken.

2. Eliminate edge distortions on mosaics.

3. If used in place of map, should contain all information required for maps, otherwise items 6 through 11 for maps. Mylar overlays are desirable for small photos.

Upon receipt of the application, the Division reviews the application to determine that it is complete. Applications deemed complete then undergo a technical review by the Division staff. The Division Administrator considers staff recommendations and notifies the applicant of his/her intent to approve or deny the application. The Division directs the applicant to publish a newspaper notice of the Administrator's intent to approve, for a period of four weeks. If no significant adverse comments are received, the application is given final approval.

SPECIAL CONSIDERATIONS: The Wyoming Environmental Quality Act, W.S. 35-11-401 e)(11), extends an exemption from permit issuance for:

> "Excavations . . . by an agency of federal, state, or local governments or its authorized contractors for . . . the purpose of providing fill, sand, gravel, and other materials for use in connection with any public project if reclamation requirements of federal, state, or local governments are consistent with all provisions of this act or regulations promulgated thereunder."

The Division Administrator should be petitioned to exercise this option.

If the borrow source mineral rights and surface ownership are privately held, a permit to mine from the state will be required. If the title to the mineral resources is held by the tribes, this permit would not be required.

SCHEDULE: Review and approval of a Permit to Mine application typically involves three to ten months. Longer review periods have occurred due to applications that were found to be incomplete and adverse public comments that resulted in public hearings. The legal limits for application processing are:

(1) Completeness review - 60 days.
(2) Technical review - 150 days.
(3) Publication of newspaper notice - four weeks.
(4) Public comment period - 30 days.

ACTIVITY: PERMIT TO APPROPRIATE GROUND WATER

LEGAL CITATION: State Engineer's Office Rules and Regulations
Parts II and III

AGENCY/CONTACT: Wyoming State Engineer's Office
Herschler Building
Cheyenne, WY 82002
ATTN: George Christopulos, State Engineer
Mike Penz, Ground Water Geologist
(307) 777-7354

PROCEDURE: Prior to drilling monitor wells or supply wells, an Application for Permit to Appropriate Ground Water should be filed with and approved by the Wyoming State Engineer's Office. Information required in Form U.W.5 is as follows:

(1) Name, address, and telephone number of applicant and agent.

(2) Proposed use for the water (monitor wells are considered a miscellaneous use).

(3) Location of the well.

(4) Proposed depth.

(5) Quantity of water to be developed and beneficially used.

(6) Land ownership.

SPECIAL CONSIDERATIONS: Temporary acquisition of an existing water right is allowed as described in the State Engineer's Regulations, Part II, Section 13.

Following completion of well construction, a Statement of Completion and Description of Well Form (U.W.6) shall be filed. If the water is to be beneficially used, Form U.W.8 (Proof of Appropriation and Beneficial Use) shall also be filed.

SCHEDULE: Review and approval of water well permits usually involves one to three months after the application is submitted to the State Engineer's Office.

ACTIVITY: MONITOR WELL ABANDONMENT

LEGAL CITATION: Wyoming Environmental Quality Act, W.S. 35-11-404; Water Quality Division Rules and Regulations, Chapter XI; and State Engineer's Office Rules and Regulations, Part III, Water Well Minimum Construction Standards

AGENCY/CONTACT: Wyoming Department of Environmental Quality
Water Quality Division
210 Lincoln Street
Lander, WY 82520
ATTN: Ed Baruth, District Supervisor (307) 332-3144

Wyoming State Engineer's Office
Herschler Building
Cheyenne, WY 82002
ATTN: Mike Penz, Ground Water Geologist (307) 777-7354

PROCEDURE: Any monitor well that is not converted into a permanent water well shall be properly plugged and sealed. Requirements of the State Engineer's Office are as follows:

When any wells, including test wells, are to be permanently removed from service, they shall be destroyed so as to prevent the wells from being channels that allow vertical movement of water or allow contamination of the ground-water supply. An uncased well shall be destroyed by filling it with grout, cement or concrete grout, drilling mud, or bentonite.

A cased well in unconsolidated formations shall be destroyed by placing a cement or concrete plug opposite all perforations or screens. The remainder of the well shall be filled with grout, cement or concrete grout, drilling mud, or bentonite.

A well in consolidated formations shall be destroyed by filling it with grout, cement or concrete grout, drilling mud, or bentonite. Any section of the well intersecting cavernous or creviced rock shall be filled with concrete or cement grout, or alternate layers of cement grout, and gravel or stone aggregate. A concrete or cement plug shall extend to at least 10 feet above the cavernous zone and 10 feet below the cavernous zone, or to the bottom of the well, whichever distance is less.

An artesian well shall be destroyed in such a manner that a cement or concrete plug completely seals the artesian aquifer and extends above the artesian zone for a minimum of 10 feet. This seal shall also extend 10 feet below the artesian zone or to the bottom of the well, whichever distance is less. If necessary to stop surface or subsurface leakage from the artesian zone, the entire zone shall be pressure grouted. The remainder of the well shall be filled with grout, cement or concrete grout, drilling mud, or bentonite.

A gravel-packed well shall be destroyed by pressure grouting the entire perforated or screened section of the casing. The remainder of the well shall be filled with grout, cement or concrete grout, drilling mud, or bentonite.

Water Quality Division Regulations, Chapter XI, governing well abandonment are as follows:

Section 70. Plugging and Abandonment

(a) All wells that are no longer useful (including test wells) must be plugged in order to assure that the ground-water supply is protected and preserved for further use and to eliminate the potential physical hazard. A well is considered "abandoned" when it has not been used for a period of one year, unless the owner demonstrates his intention to use the well again by properly maintaining the well in such a way that:

- The well has no defects which will allow the impairment of quality of water in the well or in the water-bearing formations penetrated.

- The well is covered and the cover is water-tight.

- The well is marked so that it can be clearly seen.

- The area surrounding the well is kept clear of brush or debris.

Observation or test wells used in the investigation or management of usable sources of ground water by state agencies or by engineering or research organizations are not considered "abandoned" so long as they are maintained for this purpose. These wells shall be covered with an appropriate cap and labeled for their particular use.

(b) Preliminary work. Before a well is plugged and abandoned, it shall be investiated by the permittee (owner/operator) to determine its condition, details of construction, and whether there are obstructions that will interfere with the process of filling and sealing.

(c) Filling and sealing. The following are requirements to be observed when plugging wells.

- Wells wholly situated in unconsolidated material in an unconfined ground-water zone shall have the uppermost 30 feet sealed with impervious material. The remainder of the well shall be filled with clay, sand, or other suitable inorganic matters, as described in paragraph (e).

- Wells penetrating several aquifers or formations containing usable water sources shall have the uppermost 30 feet sealed with an impervious material. All screened or perforated intervals shall be sealed to prevent vertical movement of waters from the producing or injected formation. Impervious material shall be placed opposite the confining formation above and below (and including) the screened or perforated interval for a minimum of 50 feet.

- Any uncased hole below the well shoe shall be filled with an impervious material, as described in paragraph (e), to a depth of at least 50 feet above the shoe.

- Whenever production casing has been severed or inadvertently removed, the well bore shall be filled with impervious material from a point 50 feet below to a point 50 feet above the point of severance, or to the surface limit.

- Wells penetrating crevices or fractured rock shall have the portions of the well opposite this formation sealed with neat cement, sand-cement grout, or concrete. If these formations extend to considerable depth, alternate layers of coarse stone and cement grout or concrete may be used to fill the well.

- Wells in nonfractured, consolidated formations shall have the uppermost 30 feet filled with impervious material and the noncreviced, consolidated formation portion of the well may be filled with clay or other suitable material.

(d) Placement of material. The following requirements shall be observed in placing fill or sealing a plugged or abandoned well.

- No material shall be placed in the well unless the administrator has been notified that plugging and abandonment operations are to commence. A minimum of 30 days' notice must be given.

- The well shall be filled with the appropriate material, as decribed in paragraph (e), from the bottom of the well up.

- Sealing materials shall be placed in the interval or intervals to be sealed by methods that prevent free fall, dilution, and/or separation of aggregates from cementing materials.

- When the underground pressure head producing flow is such that a counter-pressure must be applied to force a sealing material into the annular space, this counter-pressure shall be maintained for the length of time required for the cementing mixture to set as specified in Section 65, paragraph (c) (viii) of this part.

- To assure that the well is filled and there has been no bridging of the material, verification shall be provided that the volume of material placed in the well installation at least equals the volume of the empty hole.

(e) Material. Requirements for sealing and fill materials are as follows:

- Impervious sealing materials. Sealing materials shall have a permeability of 10^{-7} cm/sec or less. Impervious materials include neat cement, sand-cement grout, concrete, and bentonite clay as described in Section 66, paragraph (c). Used drilling muds are not acceptable.

- Filler material. Material such as clay, silt, sand, gravel, crushed stone, native soil, and mixtures of these materials, as well as those described in the preceding paragraph, may be used as filler material. Material containing organic matter or used drilling muds shall not be used.

(f) Markings. The top of the plug of any plugged and abandoned well shall show clearly, by permanent markings, whether inscribed in the cement or on a steel plate embedded in the cement, the permit number, well identification number, and date of plugging.

(g) Reports. Within 15 days after a well has been plugged and abandoned, the owner shall file a plugging record with the Water Quality Division (the Division).

SPECIAL CONSIDERATIONS: None.

SCHEDULE: Notification to the Division is required 30 days prior to sealing wells. A report of the results of well sealing and abandonment shall be sent to the Division within 15 days of sealing and abandonment.

ACTIVITY: WASTE-WATER DISCHARGE PERMIT

LEGAL CITATION: Wyoming Environmental Quality Act W.S. 35-11-301
Wyoming Water Quality Rules and Regulations, Chapter II

AGENCY/CONTACT: Wyoming Department of Environmental Quality
Water Quality Division
Herschler Building
Cheyenne, WY 82002
ATTN: John Wagner, (307) 777-7082
Technical Support Supervisor

PROCEDURE: The permit applies to all operations discharging to waters of the state from a point source. Application is made by filing completed U.S. Environmental Protection Agency (EPA) Forms 1 and 2C under the EPA Consolidated Permits Program. Information required on Form 1 includes:

(1) Name, mailing address, and location of the facility.

(2) Facility contact.

(3) Standard industrial classification code for the facility.

(4) Name of facility operator and status (i.e., Federal, state).

(5) Existing Federal, state, or local permits.

(6) A map covering an area extending at least one mile beyond the facility property boundaries. The map should be based on a 7.5-minute U.S. Geological Survey (USGS) Quadrangle map.

(7) A description of the nature of the business.

Form 2C requires the following information:

(1) Location, by Latitude and Longitude, and number designation of each effluent outfall.

(2) Name of receiving water for each outfall.

(3) A schematic flow diagram indicating sources of water, operations contributing waste water for the effluent water balance, and treatment processes for each waste stream.

(4) A list of each operation, average flow, and treatment related to each outfall.

(5) Description of the variation and frequency of water flow.

(6) Explanation of any Federal, state, or local implementation schedule for construction or improvement of waste-water treatment, or other environmental programs.

(7) Influent and effluent characteristics:

- Pollutants present.
- Source of pollutants.
- Concentration of pollutants.
- Temperature of effluent.
- Flow of effluent.
- pH of effluent.

SPECIAL CONSIDERATIONS: This permit is equivalent to an NPDES Permit. EPA has approved the Wyoming State Implementation Plan for administering the NPDES Program. Discharge limitations will be based on the EPA Uranium Ore Mining and Dressing Standards, and the quality of the receiving water body.

Form C may be used as an alternative to Form 2C in the application. The conceptual design specifies that a zero discharge evaporation pond will be used to receive contaminated water. For this type of facility, the main purpose in obtaining an NPDES permit is to limit the liability of the operator for discharges that may result from a very large precipitation event or other unanticipated situations. DEQ officials encourage operators to obtain a permit for a no-discharge facility. Prohibitions of a discharge permit include, but are not limited to, the following:

(1) No discharge is allowed that will violate state, regional, or local land use plans unless all requirements and conditions of applicable Federal and state statutes and regulations are met or will be met according to a schedule of compliance. Similarly, no discharge is permitted that, by itself or in combination with other pollutants, will result in pollution of the receiving waters in excess of standards, unless the permit contains effluent limitations and a schedule of compliance with water-quality requirements.

(2) No discharge of any radiological, chemical, or biological warfare agent or high-level radioactive waste is permitted. Limits of radiological wastes that may be discharged are determined by state water-quality standards.

(3) No discharge from a point source that is in conflict with an established water-quality management plan promulgated under Sections 201, 208, 209, and 303(e) of the Federal Water Pollution Control Act of 1972 and the Clean Water Act of 1977 is permitted unless the waste discharge permit contains limitations and a schedule of compliance approved by the DEQ.

SCHEDULE: An applicant is to apply for a permit at least 180 days in advance of the date the discharge is to begin.

ACTIVITY: PERMIT TO CONSTRUCT A WASTE-WATER TREATMENT FACILITY

LEGAL CITATION: Wyoming Environmental Quality Act, W.S. 35-11-101 through 35-11-1207 and Wyoming Department of Environmental Quality, Water Quality Rules and Regulations, Chapter III, 1983

AGENCY/CONTACT: Wyoming Department of Environmental Quality
Water Quality Division
201 Lincoln Street
Lander, WY 82520
ATTN: Ed Baruth, District Supervisor (307) 332-3144

Wyoming Department of Environmental Quality
Water Quality Division
Herschler Building
Cheyenne, WY 82002
ATTN: William Garland, (307) 777-7781
Water Quality Administrator
Jake Strohman,
Technical Services Supervisor

PROCEDURE: This permit is required in order to construct a sewage system, treatment works, or disposal system including non-discharging facilities such as retention ponds. Application is made by submitting completed application forms, facility design drawings, plan layout drawings, specifications, materials list, dewatering provisions, and design calculations to the Water Quality Division (the Division) in triplicate.

Three types of waste waters from the remedial action will be subject to Chapter III permitting:

(1) Gray-water (shower, wash basin, and laundry water) disposal during remedial action.

(2) Surface runoff treatment and disposal during the remedial action.

(3) Land application of waste water for applications exceeding a one-year period.

Waste water from showers and wash basins can be commingled with surface runoff water and contained in a single retention pond. Use of a separate holding tank for sewage is acceptable, with the following stipulations:

(1) A letter from the sewage hauling contractor stating the schedule of pumping and hauling and the location of the receiving facility must be approved by the Division.

(2) A letter from the Riverton Municipal Sewage Treatment Facility stating that the facility will accept the sewage must be approved by the Division.

Waste-water treatment ponds are subject to the "Guidelines for Waste Water Pond Construction Permit Applications," April 1, 1981. The guidelines direct that the application include the following information:

(1) Waste-water characterization.

(2) Justification of all estimates used to size the facility, ditches, piping, and the like.

(3) Design of a leak detection system with a minimum of four monitoring wells.

(4) Description of soils (e.g., results of permeability and percolation tests and soil classification).

(5) Description of surficial geology and stratigraphy.

(6) Potentiometric surface map.

(7) Description of upper unconfined aquifers.

(8) Listing and location of wells within one mile of the pond and description of water quality, uses, and well completion.

(9) Liner specifications (e.g., type of liner, installation procedures, pond compaction, and underdrain system).

(10) Monitoring program description including schedule and reporting procedures.

Section 31. Sedimentation Control Facilities. This section includes the standards for sedimentation control facilities.

(a) Location. Sedimentation control facilities shall be as near to the affected lands as possible to keep construction and containment volumes to a minimum. Sedimentation control facilities shall be located off-channel, when possible. Runoff from unaffected lands should be bypassed around the containment area. All affected lands must drain to a sedimentation control facility.

(b) Basis of design. Sedimentation control facilities shall control all runoff from areas which drain into the facility from a 10-year 24-hour precipitation event. In addition, the estimated sediment storage volume for one year shall always be available. The pond shall be drained down to the permanent pool level as soon as the effluent meets the discharge parameters. The application shall demonstrate that equipment or outlet structures are available for draining the pond.

(c) Layout.

(i) Inlet ditches or structures shall not erode or disturb the pond bottom.

(ii) Outlet structures, if used, shall have an overflow device, prevent short-circuiting, prevent floating debris from discharging, and shall not erode or disturb the dike. All pipe protruding through a dike shall have adequate seepage control. The point of discharge into a channel shall be protected against erosion and erosion-control devices shall be designed based on flow velocities.

(iii) Spillways. Sedimentation control facilities that individually contain more than two acre-feet of runoff, or that individually have more than two acres of surface area or that are located on-channel, shall have a spillway to bypass precipitation events in excess of the design event. Spillways shall safely pass the 25-year flood event, except when the impoundment height is greater than 20 feet or capacity exceeds 20 acre-feet, in which case the spillway shall safely pass the 100-year flood event.

(iv) Bypass ditches. If bypass ditches are provided to transport runoff from unaffected lands, they shall be designed to pass the runoff from a 25-year precipitation event.

(v) Freeboard. Freeboard shall be provided to protect embankments and dikes from overtopping from wave action and shall be a minimum of one foot above the high-water level. For ponds less than two acres, 0.5 foot of freeboard may be acceptable.

(d) Construction.

(i) Soils used in constructing the pond bottom and dike cores shall be relatively incompressible, have a low permeability, and be free from organic material or trash. The soil shall be compacted at a water content that will ensure structural stability, minimize hydraulic seepage, and minimize settling.

Rocks larger than six inches in length shall not be placed within five feet of the interior slope surface of any pond embankment. Material containing, by volume, less than 25 percent of rock larger than six inches and less than 12 inches in length dimension may be placed in the remainder of the embankment.

(ii) Outer dike slopes shall not be steeper than one vertical to two horizontal. Flatter slopes may be required to maintain slope stability. Inner dike slopes shall be sloped between one vertical to four horizontal and one vertical to three horizontal.

(iii) The minimum top dike width shall be sufficient to provide structural stability.

(iv) Riprap or other acceptable erosion control shall be installed on the inner dike slopes at all anticipated levels of water. Dikes cut into existing ground shall be exempted from riprap requirements. Ponds that have less than two acres of surface area shall also be exempt.

The applicant should be the sponsoring organization (not the contractor) and the application should be signed by a Professional Engineer registered in Wyoming.

As-built drawings and specifications shall be submitted to the Division within 30 days after completion of construction.

SPECIAL CONSIDERATIONS: None.

SCHEDULE: Applications are usually processed and approved by the Division within 60 days.

ACTIVITY: PERMIT TO CONSTRUCT A RESERVOIR

LEGAL CITATION: Wyoming Statutes 41-26 to 41-46
State Engineer's Office Regulations and Instructions
Part 1, Surface Water

AGENCY/CONTACT: Wyoming State Engineer's Office
Herschler Building
Cheyenne, WY 82002
ATTN: Paul Thompson, Senior Analyst (307) 777-7354

PROCEDURE: A permit to construct a reservoir is required for sedimentation and evaporation ponds. Application is made by filing completed Forms SW3, SW3-A, and an accompanying map. The following information is required:

(1) Name of the facility.

(2) Name and address of the applicant/agent.

(3) Description of the intended use of the water (i.e., pollution control).

(4) Capacities of the reservoir, active and inactive.

(5) Surface area of the high-water line in acres.

(6) Total available capacity.

(7) Source of the water.

(8) Location of outlet as described by bearing and distance to a section corner or quarter corner.

(9) Listing and legal description of lands at the reservoir site that are owned by the Federal or state government.

(10) Name of ditch and ditch capacity that will be used to fill the reservoir.

(11) Volume and type of materials to be used for dam construction.

(12) Type of protection or armoring of the dam face.

(13) The estimated time for commencement and completion of construction.

(14) Specifications of dam design (e.g., cross section of dam, profile of dam site, cross section of spillway).

PERMIT TO CONSTRUCT A RESERVOIR (Concluded)

SPECIAL CONSIDERATIONS: Reservoirs for pollution control or flood-water detention are subject to Chapter VI, Part 7, Special Applications of the State Engineer's Office Rules and Regulations. Plans for water collection channels and modification of existing irrigation or drainage ditches should be sent to the State Engineer to be recorded and made a matter of public record. Use of water from the pond for dust control or soil compaction would necessitate filing an application for beneficial use of water.

SCHEDULE: Applications are usually reviewed and approved in approximately three months.

ACTIVITY: LICENSE TO ENCROACH ON HIGHWAY RIGHT-OF-WAY

LEGAL CITATION: Wyoming Statutes 24-64

AGENCY/CONTACT: Wyoming Highway Department
P.O. Box 351
Basin, Wyoming 82410
ATTN: George A. (Pat) Brown, District Engineer (307) 568-3321

PROCEDURE: This license is required for removal of contaminated soils along Highway 138 and for access roads to state highways. Four copies of completed Highway Department Form E-54 must be submitted to the District Engineer. Required information includes:

(1) Name of licensee/applicant.

(2) Description of installation or activity.

(3) Location description (i.e., section; township and range; route number; county; maintenance section and mile post).

(4) A drawing showing the alignment, grade, clearance, materials, pressures, land ties, and mile post ties to be labeled as Appendix A.

SPECIAL CONSIDERATIONS: The Wyoming Highway Department (the Department) requires that the licensee be the sponsoring organization (i.e., DOE) rather than the contractor executing the plan. The licensee must comply with standards in the Department Roadway Work Operations Manual or alternate traffic control standards approved prior to the construction work.

The Department requires that clean soil be brought in to fill areas where contaminated soil has been removed. Areas on the highway rights-of-way that are affected by the cleanup should be revegetated according to specifications of the Department.

Weight limitations on heavy equipment and haul trucks may be imposed by the Department after review of project plans and consideration of highway strength and deterioration.

SCHEDULE: The normal time involved in processing an application by the Department is one to two months.

A.2 CONCLUDING REMARKS

This section provides brief discussions of issues that do not, at this time, require permits or that might require permits if the Remedial Action Plan (RAP) is significantly modified.

It should be noted that the issue of who has permit authority for the Little Wind borrow site has not been resolved. If the mineral and surface rights are privately held, the State of Wyoming will have permit authority.

SPILL PREVENTION CONTROL AND COUNTERMEASURES PLAN (SPCC)

If on-site fuel and oil storage facilities exceed a total of 1320 gallons or any single on-site fuel or oil tank exceeds a 660-gallon capacity, the EPA requires the operator to prepare an SPCC plan meeting the specifications cited in 40 CFR Part 112 and certified by a professional engineer. No permit is required, but a copy of the plan must be kept at the storage facilities and be available for review by the EPA in the event of a spill or general inspection.

APPROVAL OF BORROW SITE EXPLORATION PERMITS

A letter of notification of test pit work on private lands within the reservation should be sent to the Land Quality Division of the Department of Environmental Quality in Lander, Wyoming. There is no approval involved.

WILDLIFE CONSULTATION

The Wyoming Game and Fish Department acts in an advisory capacity. A copy of the Riverton UMTRA Project Environmental Assessment should be sent to their Lander office for review.

APPENDIX B

RADIOLOGICAL SUPPORT PLAN

TABLE OF CONTENTS

B.1 INTRODUCTION

The Uranium Mill Tailings Radiation Control Act of 1978 (PL95-604) gave the responsibility of developing standards for remedial actions to the U.S. Environmental Protection Agency (EPA). Section 108 of PL95-604 states that the DOE shall "select and perform remedial actions at designated processing sites and disposal sites in accordance with the general standards" prescribed by the EPA. The EPA standards state:

> "Section 108 of the Act requires the Secretary of Energy to select and perform remedial actions with the concurrence of the Nuclear Regulatory Commission and the full participation of any State that pays part of the cost, and in consultation, as appropriate, with affected Indian Tribes and the Secretary of the Interior. These parties, in their respective roles under Section 108, are referred to hereafter as 'the implementing agencies.'
>
> The implementing agencies shall establish methods and procedures to provide 'reasonable assurance' that the provisions of Subparts A and B are satisfied. This should be done primarily through use of analytical models, in the case of Subpart A, and for Subpart B through measurements performed within the accuracy of currently available types of field and sampling procedures. These methods and procedures may be varied to suit conditions at specific sites."

Subpart B consists of standards for cleanup of land and buildings. The standards applicable to the project are:

> "Remedial actions shall be conducted so as to provide reasonable assurance that, as a result of residual radioactive materials from any designated processing site:
>
> A. the concentration of Radium-226 in land averaged over any area of 100 square meters shall not exceed the background level by more than --
>
> (1) 5 pCi/g, averaged over the first 15 cm of soil below the surface, and
>
> (2) 15 pCi/g, averaged over 15-cm-thick layers of soil more than 15 cm below the surface.
>
> B. in any occupied or habitable building --
>
> (1) the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL. In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL, and
>
> (2) the level of gamma radiation shall not exceed the background level by more than 20 microR/h."

In addition to the EPA standards for buildings, removable surface alpha contamination shall not exceed 1000 dpm/100 cm^2, and total non-removable

alpha contamination shall not exceed 5000 dpm/100 cm^2. This limit will ensure that potential airborne radionuclide concentrations will not exceed 10 CFR 20 Appendix B standards and that physical contact with the surfaces by occupants of the structures will not result in a measurable radiation exposure.

As indicated earlier, the standards suggest that the implementing agencies determine what methods and procedures will be used to provide "reasonable assurance" that the standards are met. Reasonable assurance implies that a site-specific analysis is appropriate where the cost of demonstrating compliance with the standards is to be weighed against the health risks or other impacts associated with leaving areas which slightly exceed the standards.

The sections which follow provide the procedures proposed for use at the Riverton site. Consideration was given to the time required to collect samples and perform the analyses.

B.2 BASIS FOR RADIOLOGICAL SURVEY STRATEGY

The Riverton site consists of a tailings pile, mill area, ore storage area, and windblown areas. Removal of the contaminated material from the mill and ore storage areas adjacent to the tailings pile will require excavation of from one to two feet below grade, followed by restoration to normal grade using clean fill. This clean fill will minimize the potential health effects due to residual contamination.

The windblown areas will be decontaminated by removing a thin layer of tailings from the surface. Clean fill will not be required in some of these areas, and residual contamination may remain exposed at the surface. In those areas where backfill after excavation is not required, it is highly desirable that the residual contamination not exceed the five pCi/g limit when averaged over an area equivalent to the size of a house. One hundred square meters, or approximately 1100 square feet, will be used.

Any occupied or habitable building will be decontaminated as needed, and surveys will be conducted to reasonably ensure that the standard is met. For the Riverton site, all buildings except the pump house will be demolished and buried on the site or decontaminated for other uses.

B.3 REMEDIAL ACTION RADIOLOGICAL SURVEY PLAN

Radiological surveys are performed for three purposes: site characterization, excavation control, and final radiological verification. Site characterization surveys or pre-remedial action surveys are performed to identify volumes of material which exceed the standard. The results are used for planning and engineering design. Excavation control monitoring is performed as the work is being done to guide and control the amount of contaminated material removed. Finally, when excavation control monitoring results indicate that there is a high probability that the area meets the standards, a final radiological survey is carefully performed and the results documented.

B.3.1 SITE CHARACTERIZATION SURVEYS

Radiological surveys have been performed by Mountain States Research Development (MSRD) and by Bendix Field Engineering Corporation (BFEC) to identify the subsurface boundary of the tailings pile to be excavated as well as the depth and area of windblown tailings on adjacent land. Subsurface evaluations were performed using gamma well logging techniques and by analyzing cores from boreholes. In general, these measurements were made on a 200-foot grid. Additional measurements were performed in areas of radiological interest. The grid points have been identified by a land survey tied to a U.S. Geological Survey (USGS) survey point and all recordable data located by these coordinates.

Radiological surveys were performed by BFEC inside the buildings to determine gamma exposure rates and the levels and extent of surface contamination.

B.3.2 EXCAVATION CONTROL MONITORING

The purpose of excavation control monitoring is to guide excavation through the use of real-time radiological measurements. It is designed to ensure that the five pCi/g (surface) and 15 pCi/g (subsurface) standards are met. In addition, it minimizes the possibility that material meeting the standards is also excavated. Properly performed excavation control monitoring simultaneously ensures that neither underexcavation nor over-excavation occurs.

Excavation will be monitored by qualified technicians relying principally on gamma field measurements employing hand-held instruments such as gamma-scintillation detectors. This technique will only be used where measurements are not seriously impaired by interference from nearby tailings deposits. In areas where significant interference exists, alternate monitoring techniques will be used. These techniques may include use of a shielded probe gamma-scintillation instrument (operated in a gross count mode or in a delta mode) or the immediate counting of soil samples. In all cases, these techniques will be routinely calibrated by comparison of the field measurements to soil samples analyzed in the laboratory and reported on a fully equilibrated

dry-weight basis. Because the standards are based upon average areas of 100 m^2, the excavation control monitoring will be performed on areas of this characteristic size as well.

Elevated gamma-ray radiation fields will preclude exclusive use of in-situ monitoring devices to estimate the surface radionuclide concentrations in soil on or immediately adjacent to the Riverton pile. When in-situ measurements cannot be performed, the suggested method for analysis is to take individual or composite samples of soil, seal by canning, and immediately count the sample by gamma-ray spectrometry. Errors associated with this approach will be reduced by taking several samples 30 days prior to starting work to determine calibration factors. These samples will be counted, dried, pulverized, and screened with recanning for subsequent analysis. They will be counted later after the Ra-226 daughters reach equilibrium. Analyses of these prepared samples can then be compared to standards. Several samples will be collected weekly during the remedial action and analyzed to provide a measure of the variation of the calibration factor.

B.3.3 FINAL RADIOLOGICAL VERIFICATION SURVEY FOR LAND

The final radiological survey will be based on 100-m^2 areas, with a composite sample used to obtain a measure of the average Ra-226 concentration in an area. The Ra-226 measurement will be reported on a dry-weight basis. For measurements based on gamma spectrometry of Ra-226 daughters, full equilibrium will be assured. It is expected that at least preliminary measurement results will be obtained prior to backfilling. The error limits for Ra-226 verification measurement techniques must be better than plus or minus 30 percent, at the 95 percent confidence level.

The average Ra-226 concentration on each 100-m^2 area which is surveyed will be determined by a composite sample composed of a number of 15-cm-deep samples of approximately equal mass taken on a uniform spacing over the survey area. Nineteen to 24 samples is an appropriate number for forming the composite, but fewer may be used if shown to be sufficient to characterize the mean concentration and if approved in advance by the UMTRA Project Office. The sampling error associated with composite sampling should be routinely estimated by collection of duplicate samples (two to five percent pair-wise basis) with the same number of samples forming each composite.

B.4 DATA AND SAMPLE MANAGEMENT

During the cleanup operations, the Remedial Action Contractor will collect data to support excavation control. Data used in declaring an area adequately decontaminated will be documented in a format approved by the UMTRA Project Office.

Site characterization survey data, excavation control data, and the final radiological survey data will be collected using procedures and analytical methods meeting the requirements of the UMTRA Project Management and Overview Quality Assurance Program Plan (UMTRA DOE/AL-400325). All data used in describing the final radiological conditions of the site as well as other data as specified by the UMTRA Project Office will be provided in a convenient format for input into the UMTRA Project Data Management System. Data generated in the remedial action will be presented in a report documenting the final radiological condition of the property. Verification samples will be archived pending orders for transfer or disposal from the UMTRA Project Office.

B.5 CERTIFICATION

Certification is a professional judgement by an independent party that the remedial action has been completed according to the site-specific Remedial Action Plan and meets the applicable standards.

During the remedial action operations, the Remedial Action Contractor will make available to appropriate state agencies, Federal agencies, or UMTRA Project designated contractors data related to the cleanup. In addition, samples collected during the cleanup operations may be split for analyses by these agencies to allow comparison of analytical results. These data, along with any additional data collected at the discretion of the certifying agent, will be used in the final certification report.

APPENDIX C

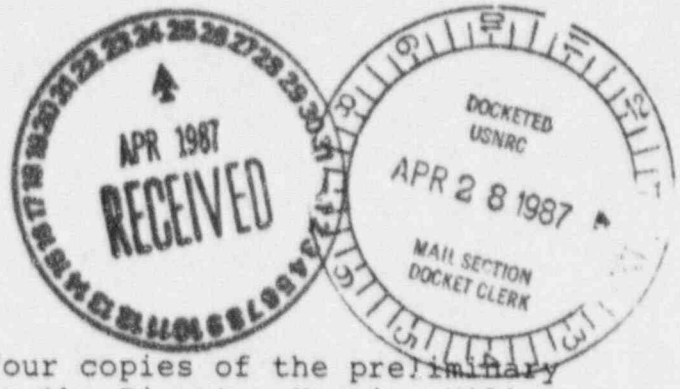
FINAL PLANS AND SPECIFICATIONS

(To be completed and incorporated into the final RAP prior t NRC and state concurrence)

WM-60

Department of Energy
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87115

APR 24 1987



Malcolm Knapp
Nuclear Regulatory Commission,
Mail Stop 623-SS
7915 Eastern Avenue
Silver Springs, MD 20910

Dear Mr. Knapp:

Enclosed for your concurrence are four copies of the preliminary final Remedial Action Plan (RAP) for the Riverton Uranium Mill Tailings Site in Wyoming. Several revisions are already anticipated for Chapter 1, Introduction. Others are expected. Please note that this document is considered part of the deliberative process by DOE and is not for release to the general public at this time. Please provide comments and/or concurrence to this office by May 25, 1987.

Once concurrence is reached and all comments have been incorporated into the document, a signature page for concurrence will be forwarded to you for execution. Following execution of the signature page by all parties, the final RAP/final design will be published and will be incorporated as Appendix B of Cooperative Agreement No. FC04-83AL19454 between DOE and the State of Wyoming.

Should you have any questions regarding this matter, please contact Milt Scoutaris of my staff at (505) 846-1200.

Sincerely,

John R. D'Antonio

John R. D'Antonio, Operations Group Leader
Uranium Mill Tailings Project Office

Enclosure (4)

cc w/o enclosure:
D. Gillen, NRC, HQ
R. Peel, JEG

cc w/enclosure:
Dale Smith, NRC, CO. (2)
G. Gnugnoli (1)

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