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# LONG-TERM SURVEILLANCE PLAN FOR THE MEXICAN HAT DISPOSAL SITE MEXICAN HAT, UTAH

February 1996

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**LONG-TERM SURVEILLANCE PLAN FOR THE  
MEXICAN HAT DISPOSAL SITE  
MEXICAN HAT, UTAH**

**February 1996**

**Prepared for  
U.S. Department of Energy  
UMTRA Project Team  
Environmental Restoration Division  
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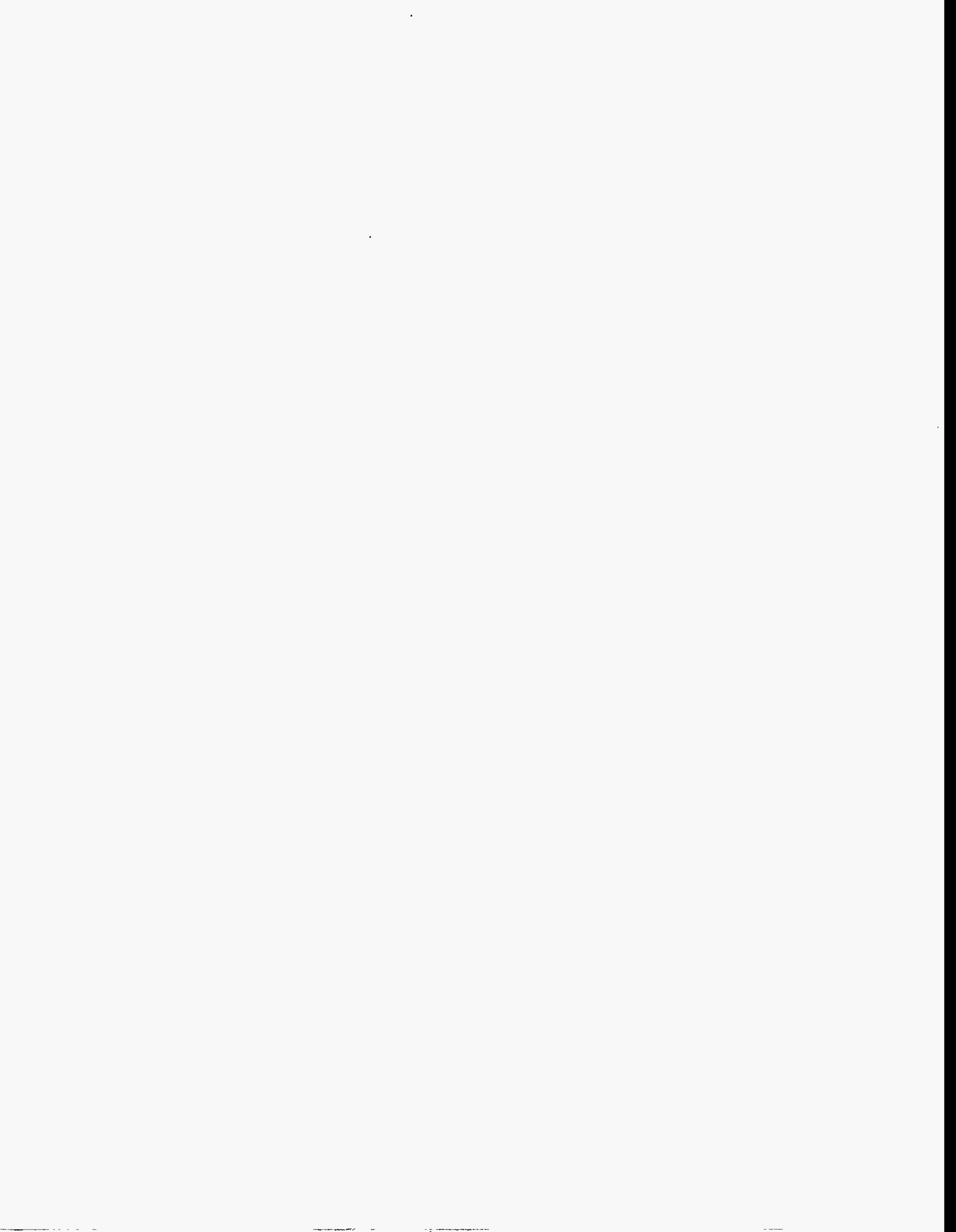




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## LIST OF ACRONYMS

<u>Acronym</u>	<u>Definition</u>
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
GJPO	Grand Junction Projects Office
LTSP	long-term surveillance plan
NGVD	National Geodetic Vertical Datum
NRC	U.S. Nuclear Regulatory Commission
QA	quality assurance
RAC	Remedial Action Contractor
RAP	remedial action plan
RRM	residual radioactive material
SOW	statement of work
TDS	total dissolved solids
UMTRA	Uranium Mill Tailings Remedial Action
UMTRCA	Uranium Mill Tailings Radiation Control Act
UPDCC	UMTRA Project Document Control Center
USGS	U.S. Geological Survey

## 1.0 INTRODUCTION

This plan describes the long-term surveillance activities for the Uranium Mill Tailings Remedial Action (UMTRA) Project disposal site at Mexican Hat, Utah. The U.S. Department of Energy (DOE) will carry out these activities to ensure that the disposal site continues to function as designed. This long-term surveillance plan (LTSP) was prepared as a requirement for acceptance under the U.S. Nuclear Regulatory Commission (NRC) general license for custody and long-term care of residual radioactive material (RRM). This LTSP (based on the DOE's *Guidance for Implementing the UMTRA Project Long-term Surveillance Program* [DOE, 1992]) documents the land ownership interests and details how the long-term care of the disposal site will be accomplished.

### 1.1 BACKGROUND

Title I of the *Uranium Mill Tailings Radiation Control Act* (UMTRCA) of 1978 (42 USC §7901 *et seq.*) authorized the DOE to perform remedial action at 24 inactive uranium mill tailings sites to reduce the potential effects on public health from the unstabilized RRM in and around the sites. RRM's are any wastes determined by the DOE to be radioactive, either in the form of tailings resulting from the processing of ore for the extraction of uranium and other valuable constituents of the ores, or in other forms that relate to such processing, such as sludge and captured contaminated water from these sites (60 FR 2854). The Mexican Hat, Utah, uranium mill tailings site in San Juan County was one of the 24 sites identified for remediation in the UMTRCA.

The UMTRCA required the U.S. Environmental Protection Agency (EPA) to promulgate standards for protecting public health and the environment from hazardous constituents associated with the processing of uranium and the resulting RRM. In 1983 the EPA published standards for the cleanup and disposal of RRM in Title 40, Code of Federal Regulations, Part 192 (40 CFR Part 192). In 1985 the U.S. Tenth Circuit Court of Appeals remanded the ground water protection standards (40 CFR §192.2(a)(2)-(3)) to the EPA for further consideration. The EPA published final ground water standards in 1995 (60 FR 2854).

The Mexican Hat UMTRA Project site and adjacent lands are part of the Navajo Indian Reservation. The DOE and the Navajo Nation entered into a cooperative agreement under the UMTRCA (DOE, 1983) establishing the terms and conditions of the remedial action. The DOE proposed a surface remedial action that satisfied UMTRCA requirements and complied with the EPA standards for inactive uranium processing sites in 40 CFR Part 192, Subparts A-C, and the final standards in 60 FR 2854.

The proposed remedial action for the Mexican Hat site was to stabilize the RRM and the RRM from the Monument Valley, Arizona, UMTRA Project site at the Mexican Hat site. The Monument Valley site is within the Navajo Indian Reservation in Arizona approximately 17 road miles (mi) (27 kilometers [km])



south of the Mexican Hat site. The remedial action for stabilizing the RRM at the Mexican Hat site was described and evaluated in a remedial action plan (RAP) (DOE, 1993a), and the environmental impacts of the remedial action were evaluated in environmental assessments for both the Mexican Hat and Monument Valley sites (DOE, 1987; 1989). The NRC and the Navajo Nation concurred with the RAP, and the surface remedial action was completed in early 1995. When it is available, concurrence from the NRC on the completion of the remedial action at the Mexican Hat site and NRC licensing documentation will be included in Attachment 1. Ground water compliance activities at the Mexican Hat site will be implemented at a later date as part of the UMTRA Ground Water Project.

## 1.2 LICENSING PROCESS

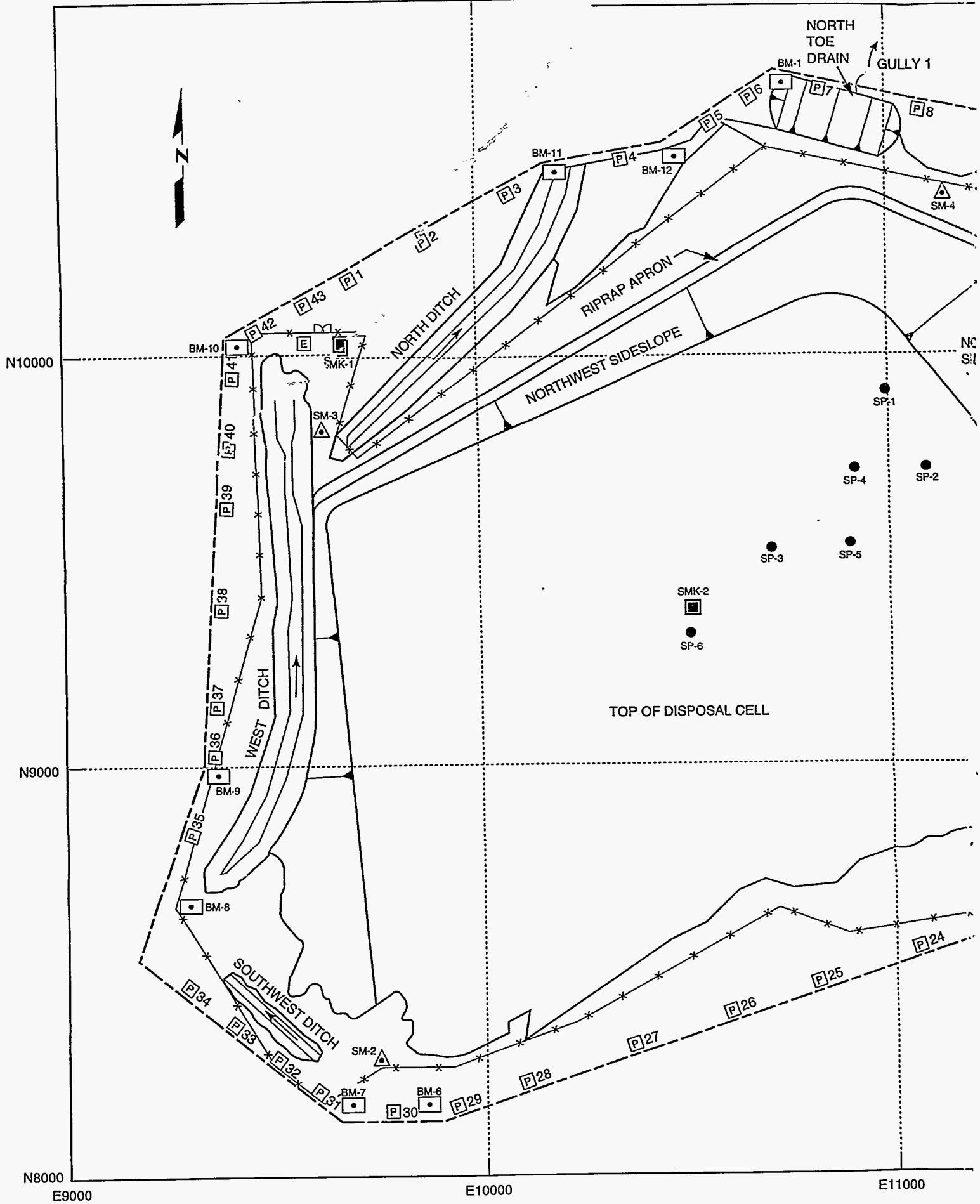
The NRC has developed regulations in 10 CFR §40.27 for issuing a general license for the long-term care of UMTRA Project (Title 1) disposal sites, including the Mexican Hat disposal site (Attachment 1). The license is available only to the DOE (or any successor federal agency designated by the President of the United States) and has no termination date. The purpose of this general license is to ensure that the UMTRA Project disposal sites will be cared for in a manner that protects the public health and safety and the environment after the NRC concurs (i.e., accepts the site-specific completion report and certification summary) that the remedial action is complete at that site and formally accept the site-specific LTSP that meets the requirements of 10 CFR §40.27. The site-specific completion report documents the disposal site as-built conditions. The DOE prepares a certification summary certifying satisfaction of approved RAP provisions and compliance with EPA standards. The DOE compiles the final completion report, final audit report, and certification summary into the certification report and submits it to the NRC for concurrence (DOE, 1993b).

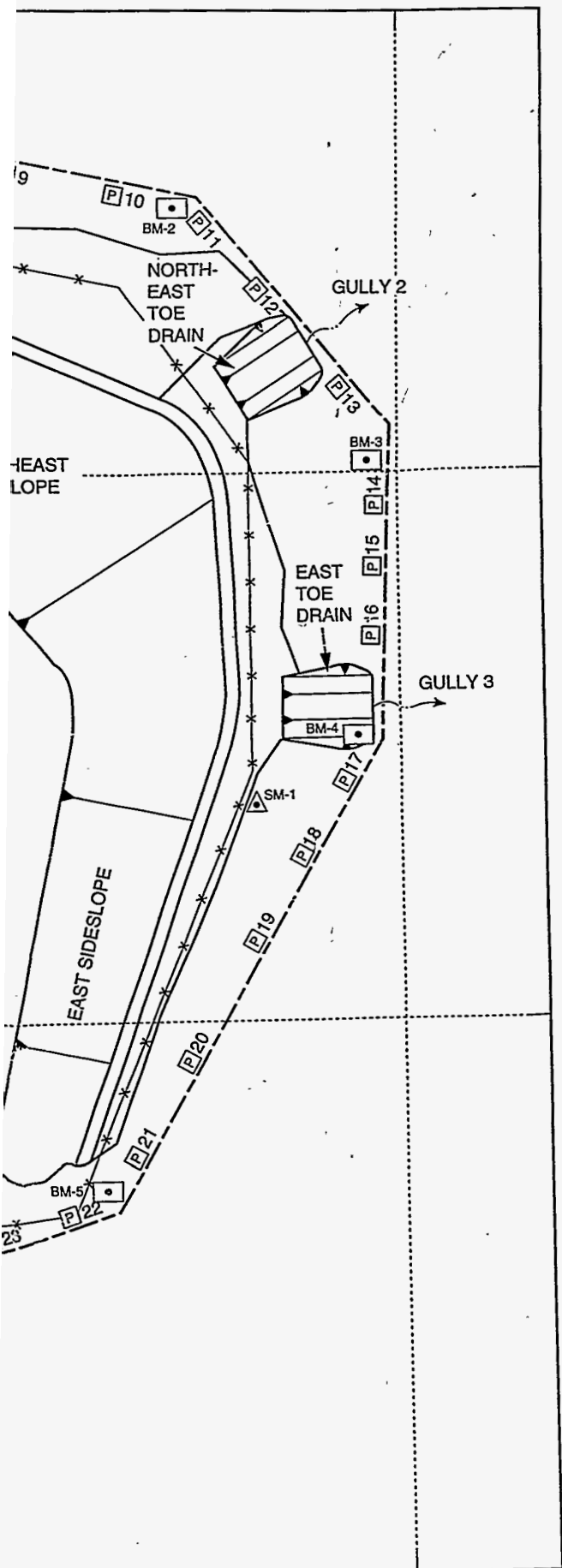
When the general license becomes effective after approval of the LTSP (Attachment 1), responsibility for the long-term surveillance program will be transferred to the DOE Grand Junction Projects Office (GJPO), Grand Junction, Colorado. The programmatic transfer will occur within 30 days of NRC notification that the license is in effect. The DOE remains the responsible federal agency unless a successor agency is designated by the President of the United States.

### 1.2.1 Acquisition











No requirement exists in 10 CFR Part 40 to provide a custodial care agreement. However, the DOE will provide evidence of permanent access to the disposal site for long-term care activities. The access agreement, legal description, and documentation of site custody for the Mexican Hat disposal site are provided in Attachment 2. A map of the disposal site is provided in Figure 1.1.







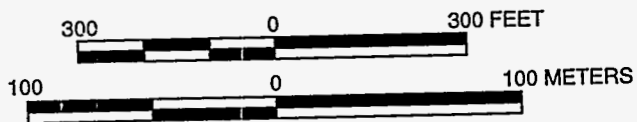
**LEGEND**

-  PERMANENT SURVEY MONUMENT
-  PERMANENT BOUNDARY MONUMENT,
-  GRANITE SITE MARKER
-  SETTLEMENT PLATE
-  PERIMETER SIGN AND REFERENCE NUMBER
-  ENTRANCE SIGN
-  CHAIN LINK FENCE AND 20 FT WIDE DOUBLE LEAF SWING GATE
-  BARBED WIRE FENCE
-  EMBANKMENT SHOWING DIRECTION OF SLOPE
-  SITE BOUNDARY

REFERENCE DRAWINGS FROM MORRISON-KNUDSEN ENGINEERS, INC.

H/M-DS-10-0212 TAILINGS EMBANKMENT PLAN (1992)

H/M-DS-10-0240 LOCATION OF MONUMENTS, MARKERS AND SIGNS (1994)



**FIGURE 1.1  
DISPOSAL SITE MAP  
MEXICAN HAT, UTAH**

### 1.3 LONG-TERM SURVEILLANCE PLAN

This LTSP describes the long-term surveillance program to be implemented at the Mexican Hat disposal site to ensure that the disposal site performs as designed. The plan is based on the DOE's *Guidance for Implementing the UMTRA Project Long-Term Surveillance Program* (DOE, 1992). The LTSP meets the requirements of 10 CFR §40.27 by addressing the following:

- Site description and ownership.
- Description of final site conditions.
- Site inspection procedures and personnel.
- Custodial maintenance and corrective action programs.
- Record keeping and reporting requirements.
- Emergency notification and reporting.
- Quality assurance (QA).



## 2.0 FINAL SITE CONDITIONS

### 2.1 SITE HISTORY

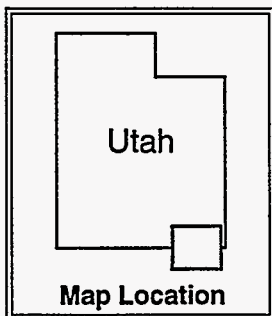
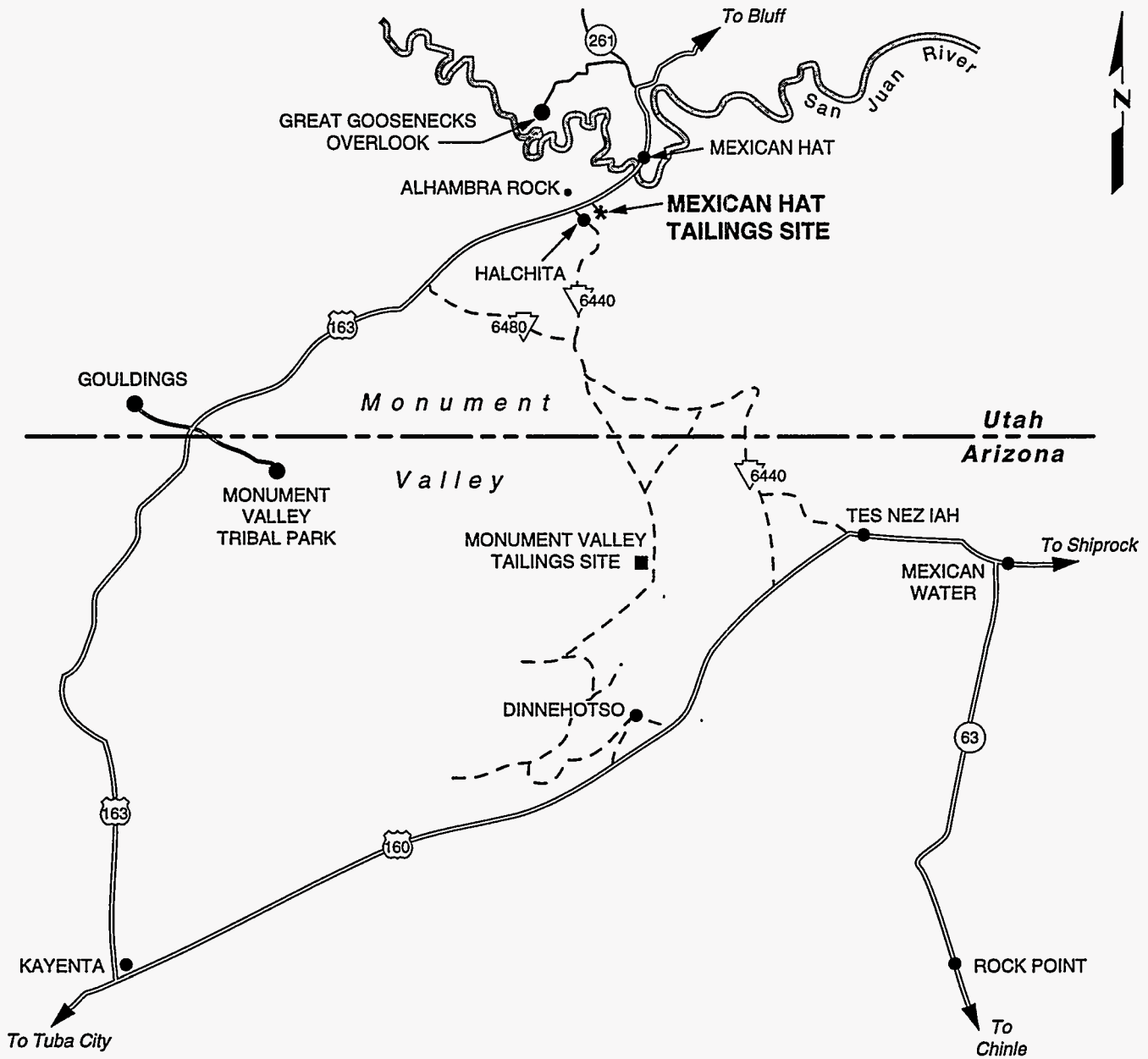
The mill at the Mexican Hat site was constructed and operated from 1957 to 1963 by Texas-Zinc Minerals Corporation. Atlas Corporation purchased the mill in 1963, and operated it until it was closed in 1965. The mill was built on land leased from the Navajo Nation; control of the site reverted to the Navajo Nation after the Atlas Corporation lease expired in 1970 (FBDU, 1981). The designated Mexican Hat UMTRA Project site covered 235 acres (ac) (95 hectares [ha]).

Much of the ore processed at the Mexican Hat site came from the White Canyon area of Utah and contained a considerable amount of copper sulfide and other sulfide minerals. The ground ore was treated by froth flotation. The flotation concentrates and tailings were acid leached separately to recover both copper and uranium products. During its operation, the mill processed 2.2 million tons (2.0 million metric tons) of ore and produced 5700 tons (5200 metric tons) of uranium concentrate. In addition to the milling operation, a sulfuric acid manufacturing plant was operated at the site until 1970 (FBDU, 1981).

The waste solids or tailings from the milling of the ore were transferred to two tailings piles. The upper tailings pile covered approximately 24 ac (10 ha) and had an average thickness of 20 feet (ft) (6 meters [m]). The lower pile covered approximately 45 ac (18 ha) and had an average thickness of 21 ft (6 m). Dispersion of the tailings by wind and water erosion contaminated 162 ac (66 ha) of land adjacent to the tailings piles and outside the designated site boundary. Another 19 ac (8 ha) within the designated site were contaminated by activities around the mill buildings and in the former ore storage area. The total volume of RRM, including the tailings and soils beneath and around the tailings, was estimated to be 2,654,000 cubic yards (yd<sup>3</sup>) (2,029,000 cubic meters [m<sup>3</sup>]) (DOE, 1987).

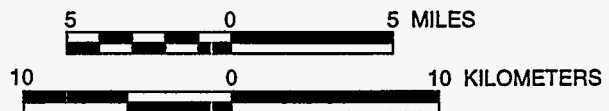
At the time of the remedial action, the concrete pad for the mill building and several associated buildings and structures (e.g., scale house, office building, and tanks) remained. One or two of the smaller buildings appeared to be used for storage, and the Navajo Tribal Utility Authority operated a small electrical substation and sewage system (three lagoons) at the site. Access to the site was not restricted; however, the Navajo Environmental Protection Administration had discouraged any activity at the site since 1978 (FBDU, 1981).

The Monument Valley site is in Apache County, Arizona, and is within the Navajo Indian Reservation approximately 17 road mi (27 km) south of the Mexican Hat site. At the time of remedial action, the 98-ac (40-ha) Monument Valley designated site contained two tailings piles covering approximately 28 ac



**LEGEND**

- U.S. HIGHWAY
- STATE HIGHWAY
- INDIAN SERVICE ROUTE



**FIGURE 2.2  
DISPOSAL SITE LOCATION**

bridge over the San Juan River (Figure 2.1). Turn left (southeast) onto a gravel road which will immediately pass under power transmission lines. Take the left fork at the "Y" intersection at the top of the hill, and stay to the left to descend to the level parking area at the northwest corner of the disposal site. The distance from U.S. Highway 163 to the parking lot is approximately 0.2 mi (0.3 km). The entrance gate is located near the northwest corner of the disposal cell.

The Mexican Hat disposal site is completely enclosed with a barbed wire fence. Access to the disposal site is provided by a locked, double-leaf swing gate at the northwest corner of the disposal site (Figure 1.1). The DOE will replace the temporary lock with a permanent lock and distribute keys to the DOE UMTRA Project Manager; GJPO Supervisory General Engineer; and Navajo Nation UMTRA Program Director (Table 2.1).

**Table 2.1 Mexican Hat disposal site key holders as of 1996**

Title and current contact	Telephone	Address
DOE UMTRA Project Manager	505-845-5667	U.S. Department of Energy Environmental Restoration Division Acting Deputy Director 2155 Louisiana NE, Suite 4000 Albuquerque, New Mexico 87110
GJPO Supervisory General Engineer	970-248-6006	U.S. Department of Energy Grand Junction Projects Office 2597 B 3/4 Road Grand Junction, Colorado 81503
Navajo Nation UMTRA Program Director	520-871-6982	Division of Resources P.O. Box 1875 Window Rock, Arizona 86515

One entrance sign and 43 perimeter signs are at the Mexican Hat disposal site (Figure 1.1). These signs provide information about the purpose of the site (Section 4.4). Two granite site markers at the disposal site also provide information about the site (Section 4.3): one marker is at the disposal site entrance, and the other marker is on the crest of the disposal cell (Figure 1.1).

Scheduled site inspections (Section 6.0) will monitor the effectiveness of the security measures at the Mexican Hat disposal site. The DOE and Navajo Nation 24-hour emergency telephone numbers on the entrance sign (Section 4.4) and agreements with local agencies to notify the DOE in the event of an emergency or breach of site integrity (Section 11.0) will provide additional security measures. Because of the remote location of the disposal site, deliberate intrusion is unlikely. However, if intrusion, vandalism, or grazing is identified during site inspections, site security will be reevaluated.

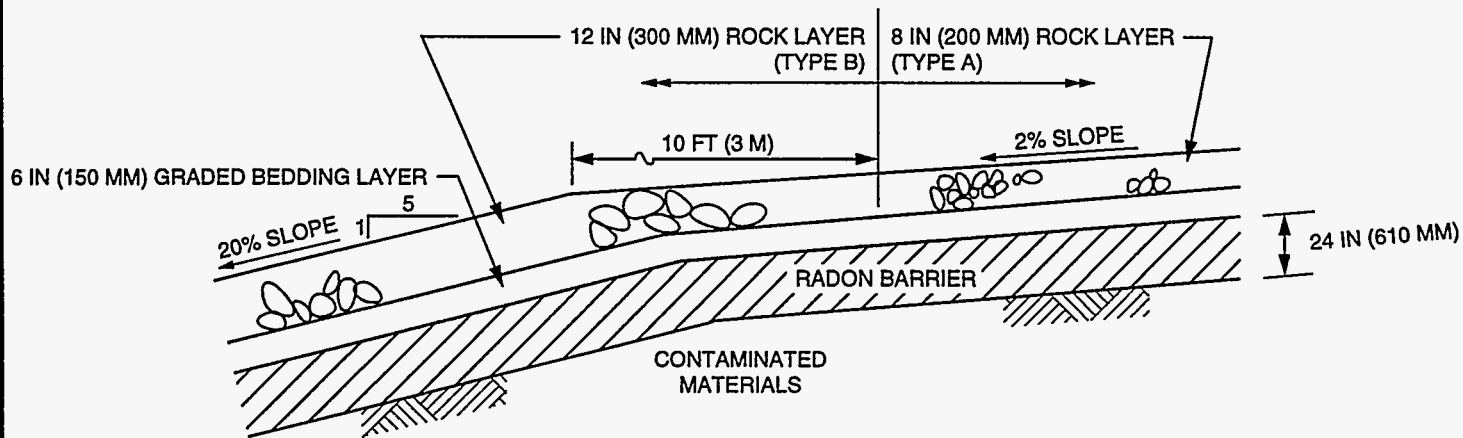
### 2.2.3 Disposal cell design

The final conditions at the Mexican Hat disposal site are shown on Figure 1.1. The aboveground disposal cell covers approximately 68 ac (28 ha) and contains approximately 4.4 million tons (4.0 million metric tons) of RRM including uranium mill tailings, contaminated soils, and mill site debris (e.g., demolished building materials). The disposal cell abuts a steep ridge to the south and rises to a height of approximately 50 ft (15 m) above the surrounding terrain to the north, east, and west.

The Mexican Hat and Monument Valley RRMs were consolidated, compacted, and stabilized at the location of the lower tailings pile at the Mexican Hat site. The sideslopes of the disposal cell were limited to a 20 percent grade to create a stable slope, and the top of the disposal cell has a 2 percent grade to promote drainage. The cover placed over the disposal cell has three components as shown in Figure 2.3. The RRM was encapsulated with a radon barrier composed of fine-grained material, the purpose of which is to control radon emanation and water infiltration. The radon barrier consists of 24 inches (610 mm) of compacted silty sand amended with 10 percent bentonite clay. The radon barrier is covered with a 6-inch (150-mm) thick graded bedding layer of coarse sand and gravel. The graded bedding layer protects the fine-grained radon barrier during placement of the rock layers and functions as a drain that sheds water laterally off of the disposal cell while protecting the radon barrier from erosion due to interstitial flow. The graded bedding layer was covered with a layer of coarser-grained material to prevent erosion due to wind or rain. The erosion protection layer consists of an 8-inch (200-mm) thick layer of 1.7-inch (43-mm) or larger mean diameter rock (riprap) on the top of the disposal cell and a 12-inch (300-mm) thick layer of 4.4-inch (110-mm) or larger mean diameter rock on the sideslopes and aprons of the disposal cell.

The Mexican Hat disposal cell and a portion of the surrounding area were graded and permanent drainage features were constructed to minimize erosion (Figure 1.1). Runoff from the western watershed at the site and the western sideslope of the disposal cell will be intercepted by the west ditch and channeled into the north arroyo. The southwest ditch will direct runoff from the watershed southwest of the disposal cell into the west ditch. Runoff from the eastern sideslopes of the disposal cell will flow eastward and northeastward as sheet flow and be released across the rock-covered aprons at the base of the cell. Runoff from the top of the disposal cell will flow to the north, and northeast as sheet flow and then down the northern sideslope across the rock-covered apron into the north ditch and into the north arroyo. The west, north, and diversion ditches are sized to carry the runoff from 1-hour rainfall intensity of a probable maximum precipitation event and are excavated into an erosion-resistant layer of sandstone and lined with engineered rockfill (riprap). The north ditch also has an excavated keyway with riprap at its outfall into the north arroyo to prevent headcutting, and three gullies on the northern and eastern sides of the disposal cell are armored with riprap (i.e., north, northeast, and east toe drains) to prevent advancement toward the cell. There is also a drainage channel





SCHEMATIC - NOT TO SCALE

FROM MK-F, 1995.

**FIGURE 2.3  
CROSS SECTION OF DISPOSAL CELL COVER  
MEXICAN HAT, UTAH, SITE**

approximately 150 ft (46 m) long at the southeast corner of the base of the disposal cell. This drainage channel is lined with riprap and drains into the south arroyo.

The surface conditions of the Mexican Hat disposal site will be monitored during the annual or scheduled inspections to determine whether the disposal cell and associated erosion protection measures are performing as intended. The general guidelines to be followed during these site inspections are presented in Section 6.0.

#### **2.2.4 Design features to be monitored**

The surface conditions at the Mexican Hat disposal site will be monitored during the scheduled inspections to determine whether the disposal cell and erosion protection measures are performing as designed. Guidelines for inspecting the disposal cell to determine the need for corrective actions or repairs are as follows:

- Disposal cell crest—Observations will be made in all directions for any features that are anomalous or unexpected and may require a closer inspection. Inspectors will walk around the edge and along diagonal transects of the crest at approximately 50-yard (yd) (46-m) intervals. The inspectors will search for evidence of any differential settling, or cracks. The rock cover will be examined for evidence of deterioration. Selected individual rocks will be examined for excessive fracturing, oxidation, or other signs of deterioration. Areas of sand accumulation and volunteer plant growth will be noted.
- Disposal cell slopes—Careful examination of the toes of the sideslopes and the rock-covered aprons will be a key part of the inspections. Settlement or sliding will be apparent by the presence of bulges, depressions, cracks, or scarps. Any localized change in vegetation will be described and examined. During the inspections, the sideslopes will be examined for evidence of animal intrusion or burrowing, changes in vegetation, and human activity.
- Drainage ditches and channel—Inspectors will walk along the entire length of each drainage ditch and channel to identify evidence of erosion, sedimentation, slides, debris, or growing vegetation. The disposal cell sideslopes will also be examined for evidence of piping or burrowing by animals, which could lead to sloughing of material into the drainage ditches and channel.
- Gullies—Inspectors will observe the armored gullies (toe drains) to determine whether the riprap has been functioning, and should continue to function, as designed. The armored portions of the gullies will be inspected for erosion, sedimentation, slides, debris, growing vegetation, or gully advancement toward the disposal cell.

### 3.0 SITE DRAWINGS AND PHOTOGRAPHS

At the completion of remedial action, the Mexican Hat disposal site as-built conditions were documented with as-built drawings, baseline photographs, and aerial photographs (MK-F, 1995). This information illustrates baseline conditions against which future conditions at the disposal site can be compared.

A map was prepared for the Mexican Hat site and is part of the permanent Mexican Hat site file. This map will be updated, as necessary, after each site inspection. All drawings, maps, and photographs will be archived by the UMTRA Project Document Control Center (UPDCC). These maps, drawings, and photographs may be further modified by the GJPO, as necessary, and the GJPO will be responsible for maintaining and archiving these maps, drawings, and photographs after the permanent Mexican Hat site file is transferred to the GJPO.

#### 3.1 DISPOSAL SITE MAP

Figure 1.1 shows disposal site features after completion of remedial action including:

- Disposal site boundary, fences, gates, and access road.
- Outline of the base and crest of the disposal cell.
- Permanent site surveillance features (i.e., survey and boundary monuments, site markers, entrance and perimeter signs and settlement plates).
- Site coordinate system.

The Mexican Hat disposal site map (Figure 1.1) will serve as the base map for site inspections (Section 6.7). A new inspection map will be prepared after each inspection. Each site inspection map will indicate the year of the inspection and the type of inspection. All base maps and inspection maps will become part of the permanent Mexican Hat site file.

#### 3.2 DISPOSAL SITE AS-BUILT DRAWINGS

Upon completion of remedial action, as-built conditions were documented in final as-built drawings. The as-built drawings are included in the Mexican Hat completion report (MK-F, 1995) and are in the permanent Mexican Hat site file. The as-built drawings may be used to detect changes in site conditions or the disposal cell over time.

Upon licensing of the Mexican Hat disposal site, the Remedial Action Contractor will transfer one original set of as-built drawings to the GJPO. These drawings will be maintained in the permanent Mexican Hat site file at the GJPO.

### 3.3 DISPOSAL SITE BASELINE PHOTOGRAPHS

A photographic record of final site conditions is in the Mexican Hat completion report (MK-F, 1995). This record consists of a series of ground and aerial photographs that provide a baseline visual record of site construction activities and site conditions to complement the as-built drawings. The post-construction photographs provide an orientation tool for disposal site inspections and a baseline record of surveillance features. The photographic record of final site conditions is maintained in the permanent Mexican Hat site file.

### 3.4 DISPOSAL SITE AERIAL PHOTOGRAPHS

Aerial photographs of the Mexican Hat disposal site were taken after surface remedial action was completed. These aerial photographs provide a permanent record of site conditions at the time of completion of the disposal cell. The photographs will be used to monitor changes in site conditions (e.g., erosion patterns, vegetation, and land use) over time and to provide a useful orientation tool for disposal site inspections. The aerial photographs are contained in the permanent Mexican Hat site file. The need for new aerial photographs will be evaluated at 5-year intervals, beginning with the year the license becomes effective for the disposal site. The specifications for aerial photographs at the disposal site are summarized in Table 3.1. More detailed guidance is provided in Attachment 3 of the *Guidance for Implementing the UMTRA Project Long-term Surveillance Program* (DOE, 1992).

### 3.5 DISPOSAL SITE INSPECTION PHOTOGRAPHS

Photographs will be taken during disposal site inspections to document conditions at the disposal site. These photographs will provide a record for monitoring changing conditions over time. The photographs can be compared with the baseline photographs to monitor disposal site integrity. Each photograph will be recorded individually on the photo log (Attachment 3). An appropriate description of the feature photographed (including the azimuth, if necessary) will be entered into the log. Copies of the disposal site inspection photographs and the photo log will be included in the disposal site inspection reports. If possible, each photograph will include a reference point such as a survey monument, boundary monument, site marker, or monitor well. For large-scale features such as drainage ditches or disposal cell slopes, a north arrow and scale will be included for reference.

For specific areas where a photograph is used to monitor change over time, the distance from the feature and the azimuth should be recorded, and all subsequent photographs should be taken from the same orientation to provide a more accurate picture of changing conditions. The magnetic declination of the compass should be corrected for true north. This information will also be provided on the site inspection checklist and photo log.

**Table 3.1 Aerial photography specifications for the Mexican Hat, Utah, disposal site**

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<b>Area to be photographed</b>	Final disposal site plus a minimum of 0.25 mi (0.40 km) beyond site boundaries unless site conditions require otherwise.
<b>Products to be delivered</b>	One set of vertical, color, infrared stereo, contact prints 9- x 9-inch (230- x 230-mm); scale 1 inch = 300 ft (1 mm = 360 m) (representation fraction 1:2400); double weight, glossy, not trimmed. One index map, scale 1 inch = 300 ft (1 mm = 360 m); flight lines and frame numbers will be provided. One set of 2 each of low and high oblique photographs (and negatives) in natural color; 8- x 10-inch (200- x 250-mm) or 9- x 9-inch (230- x 230-mm) contact prints.
<b>Flight date of photograph</b>	To be imprinted as part of the photograph.
<b>Camera</b>	Precision, 9- x 9-inch (230- x 230-mm) format for vertical photos; 35-mm (single lens reflex) or larger format camera for oblique photos is acceptable.
<b>Film</b>	Eastman-Kodak Aerochrome Infrared 2443, or its equivalent, for vertical photos. Eastman-Kodak Ektacolor, or its equivalent, for oblique photos.
<b>Filter</b>	Wratten Nos. 12 or 15 for infrared photos; skylight filter for color photos.
<b>Flight line coverage</b>	60 percent end overlap; 30 percent average side overlap.
<b>Ground control</b>	Control stations will be second order, Class 1, for horizontal control and third order for vertical control (standard U.S. Geological Survey [USGS] map accuracy specifications).

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All site inspection photographs, as well as all corresponding photo log forms, will be maintained in the permanent Mexican Hat site file.

**Features to be photographed**

The following site features should be documented by photographs during every scheduled inspection at the Mexican Hat disposal site:

- Survey and boundary monuments, site markers, and entrance and perimeter signs.
- Fences, gates, and access roads.
- The disposal cell (crest, sideslopes, aprons, and surrounding area). Panoramic sequences of photographs from selected vantage points may be used for this purpose.
- Disposal cell sideslopes and changes along the grade between the topslopes and sideslopes.
- Drainage and diversion ditches and armored gullies.
- Off-site features that the inspector deems significant and that may affect the disposal site in the future.
- Volunteer vegetation on the disposal cell and any other vegetation that may affect the integrity of the disposal site.
- Eolian deposition or erosion.
- Any other evidence of erosion the inspector deems significant (e.g., gullies or rills).
- Erosion protection material (riprap).

Any Mexican Hat disposal site feature or condition that requires the inspectors to make a written comment, explanation, or description will be photographed. These photographs will provide a record of developing trends in site conditions. These records will be used to make decisions concerning additional inspections, custodial maintenance or repairs, or corrective actions. Inspectors will determine the number of photographs, the view angles, and choice of lenses based on site conditions, lighting conditions, and the goal of having sufficient photographs for agency review.

## 4.0 PERMANENT SITE SURVEILLANCE FEATURES

The permanent surveillance features at the Mexican Hat disposal site include survey and boundary monuments, site markers, entrance and perimeter signs, and settlement plates (Figure 1.1). The construction and emplacement of these permanent site surveillance features are described below and meet the specifications set forth in the *Guidance for Implementing the UMTRA Project Long-term Surveillance Program* (DOE, 1992).

### 4.1 SURVEY MONUMENTS

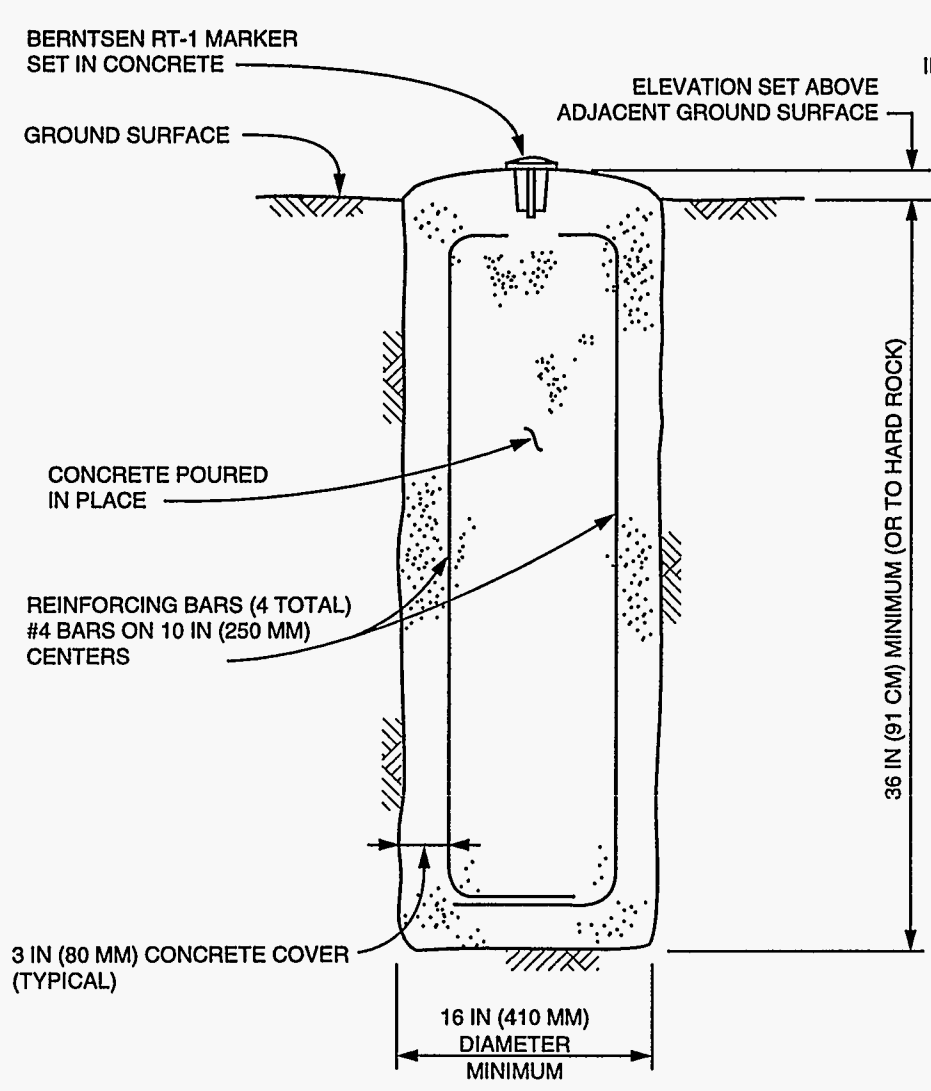
Four survey monuments (SM-1 through SM-4) were placed around the Mexican Hat disposal site to establish a permanent horizontal control based on the disposal site grid system. Each survey monument is a Berntsen RT-1 marker set into the top of a reinforced and poured-in-place concrete cylinder (Figure 4.1). The bottom of the concrete cylinder is a minimum of 3 ft (1 m) below the land surface or to hard rock. The steel reinforcing rods and the magnet in the Berntsen RT-1 marker will allow location of the survey monuments with a metal detector if the monuments become covered over time. The survey monuments were surveyed to second-order survey standards in accordance with the DOE's LTSP guidance document (DOE, 1992). The coordinates and elevations of the survey monuments are presented in Table 4.1.

### 4.2 BOUNDARY MONUMENTS

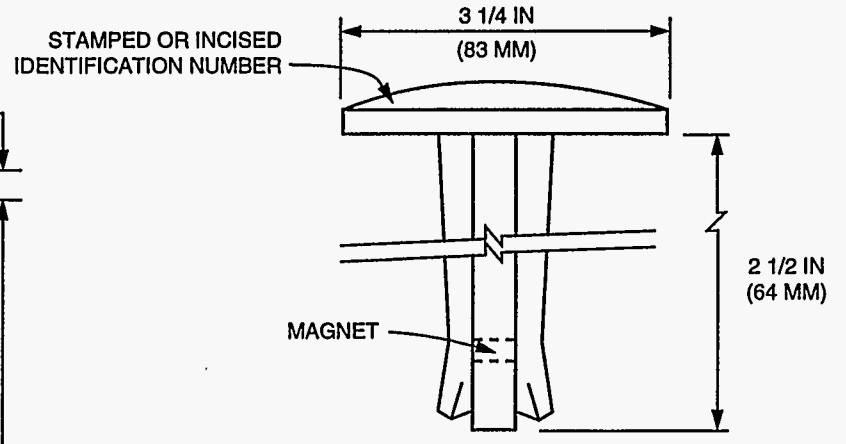
Twelve boundary monuments (BM-1 through BM-12) were placed around the Mexican Hat disposal site. Each boundary monument is a Berntsen federal aluminum survey monument, Model A-1, set in a poured-in-place concrete cylinder as shown by Figure 4.2. The base of each boundary monument is a minimum of 3 ft (1 m) below the land surface or a minimum of 6 inches (150 mm) below hard rock. The top of each monument is a variable height above the land surface depending on the location of the monument. Ceramic magnets are epoxied in the cap and base of each monument and are vertically oriented so that they can be easily detected if they become covered. The survey coordinates and elevations of the boundary monuments are presented in Table 4.1.

### 4.3 SITE MARKERS

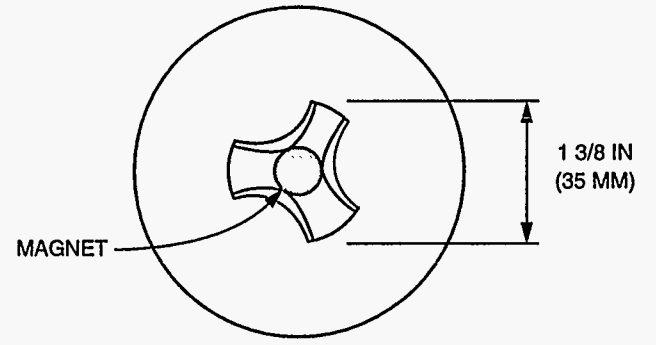
Two unpolished granite site markers were installed at the Mexican Hat disposal site. Site marker SMK-1 is at the entrance to the disposal site and is set in a bed of reinforced concrete that extends a minimum of 3 ft (1 m) below the land surface (Figure 4.3). Site marker SMK-2 was placed on the crest of the disposal cell and set in a bed of reinforced concrete that extends to the top of the radon barrier (Figure 4.4). The inscriptions on the site markers (Figure 4.5) identify the general location of the Mexican Hat disposal cell, the closure date for the disposal cell (20 July 1994), the dry tonnage of tailings (4,400,000 short tons [4,000,000 metric tons]) in the disposal cell, and the curies of radioactivity



SCHEMATIC - NOT TO SCALE



SIDE VIEW



BOTTOM VIEW

DETAIL  
BERNTSEN RT-1  
MARKER

SCHEMATIC - NOT TO SCALE

**FIGURE 4.1**  
**TYPICAL SURVEY MONUMENT**  
**MEXICAN HAT, UTAH, DISPOSAL SITE**

FROM MK, 1994.



**Table 4.1 Survey coordinates and elevations for survey and boundary monuments at the Mexican Hat, Utah, disposal site**

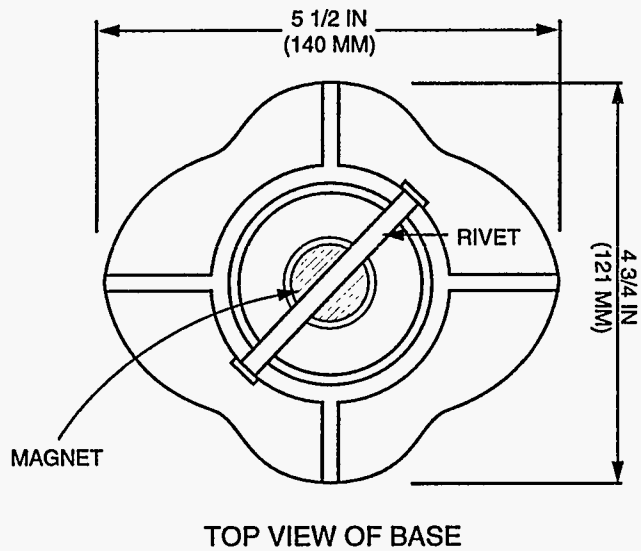
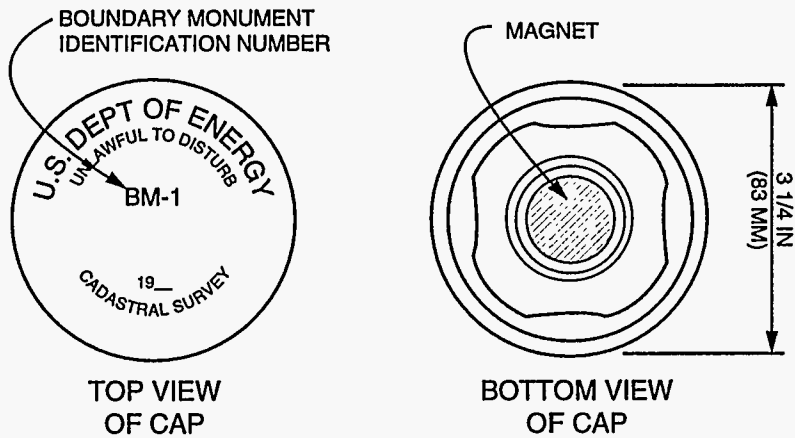
Features <sup>a</sup>	UMTRA site grid coordinates		Elevation (ft) <sup>b</sup>
	North (ft)	East (ft)	
<b>Survey monuments</b>			
SM-1	9664.5	11,862.4	4274.57
SM-2	8275.0	9749.4	4363.84
SM-3	10,072.5	9717.4	4299.68
SM-4	10,435.1	11,313.0	4269.03
<b>Boundary monuments</b>			
BM-1	10,672.0	10,737.2	4238.86
BM-2	10,490.1	11,606.0	4240.18
BM-3	10,025.1	11,972.0	4252.01
BM-4	9501.0	11,938.1	4254.65
BM-5	8668.1	11,459.1	4301.40
BM-6	8131.2	9879.2	4437.75
BM-7	8188.1	9646.0	4366.98
BM-8	8534.2	9174.1	4315.51
BM-9	8971.4	9332.4	4303.84
BM-10	10,035.1	9356.0	4309.36
BM-11	10,451.0	10,170.0	4270.26
BM-12	10,496.1	10,455.0	4275.18

<sup>a</sup>See Figure 1.1 for the locations of these features.

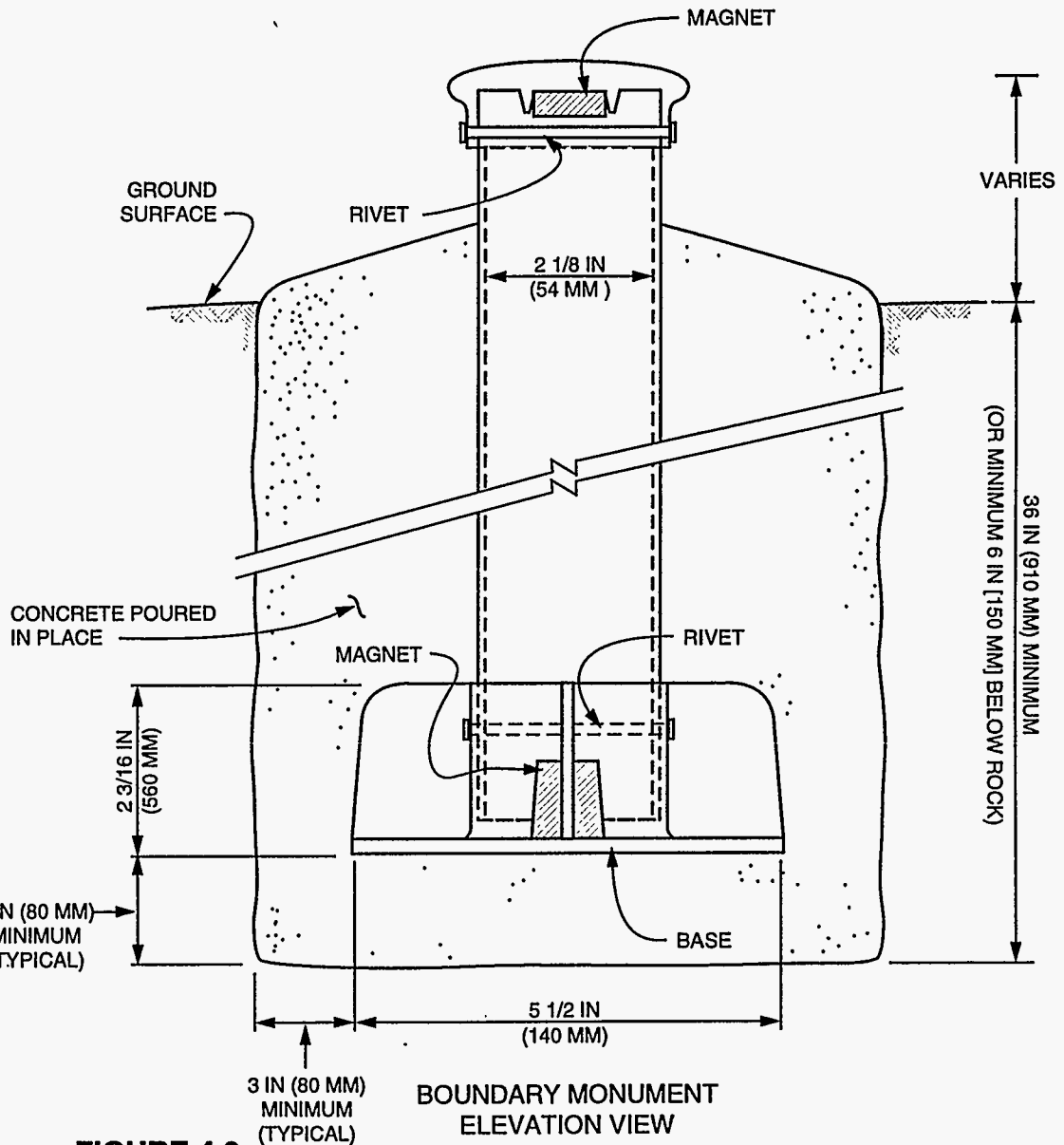
<sup>b</sup>Above NGVD, 1929.

From MK-F, 1995.

**BERNTSEN FEDERAL ALUMINUM BOUNDARY MONUMENT, MODEL A-1, STANDARD LOGO CAP**



SCHMATIC - NOT TO SCALE

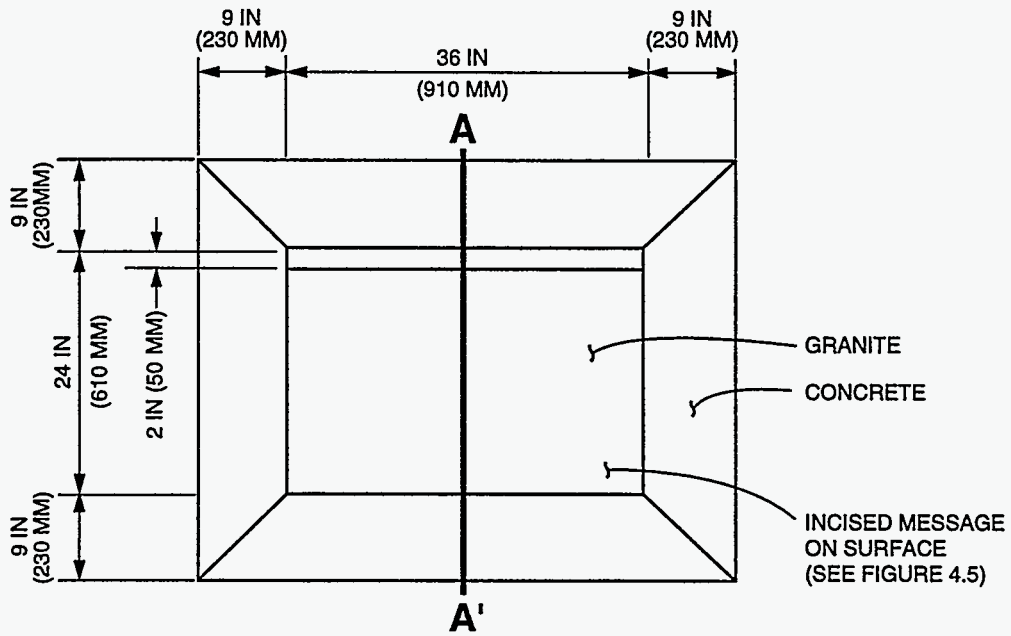


SCHMATIC - NOT TO SCALE

**FIGURE 4.2  
TYPICAL BOUNDARY MONUMENT  
MEXICAN HAT, UTAH, DISPOSAL SITE**

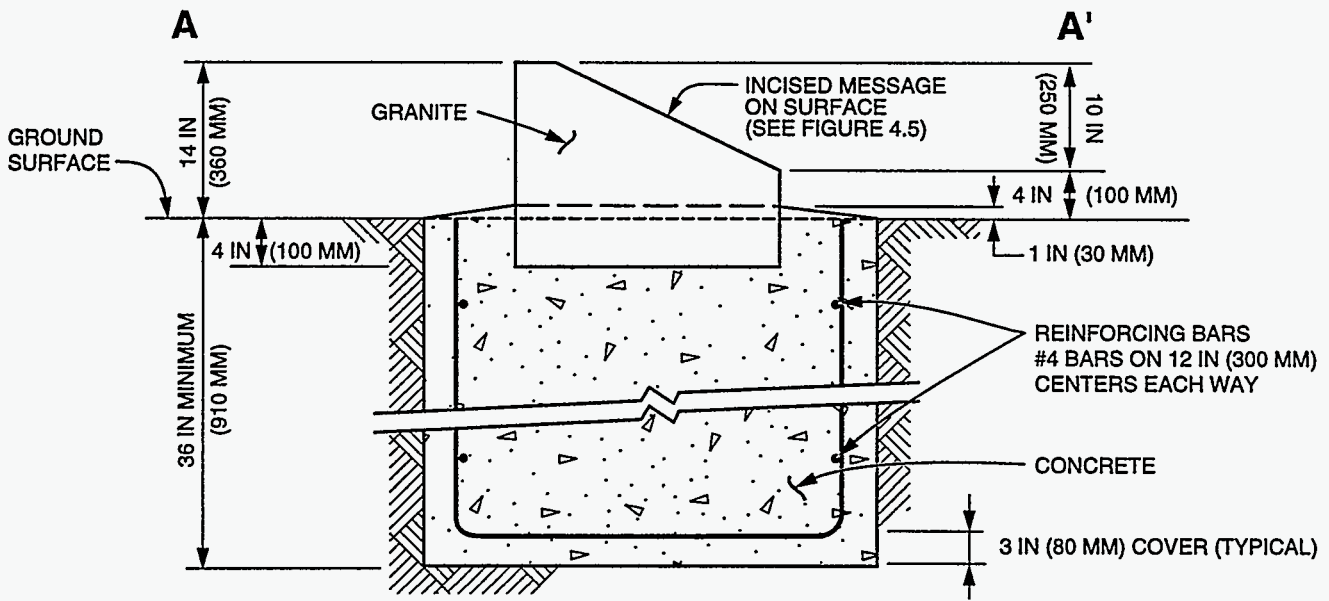
FROM MK, 1994.

4-4



PLAN VIEW

SCHEMATIC - NOT TO SCALE

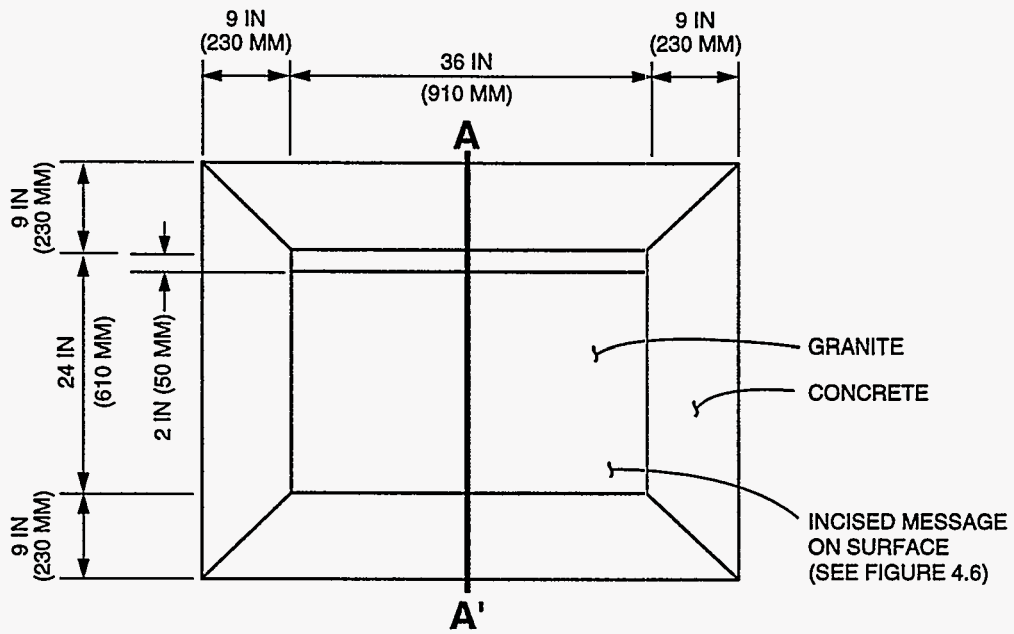


SECTION A-A'

SCHEMATIC - NOT TO SCALE

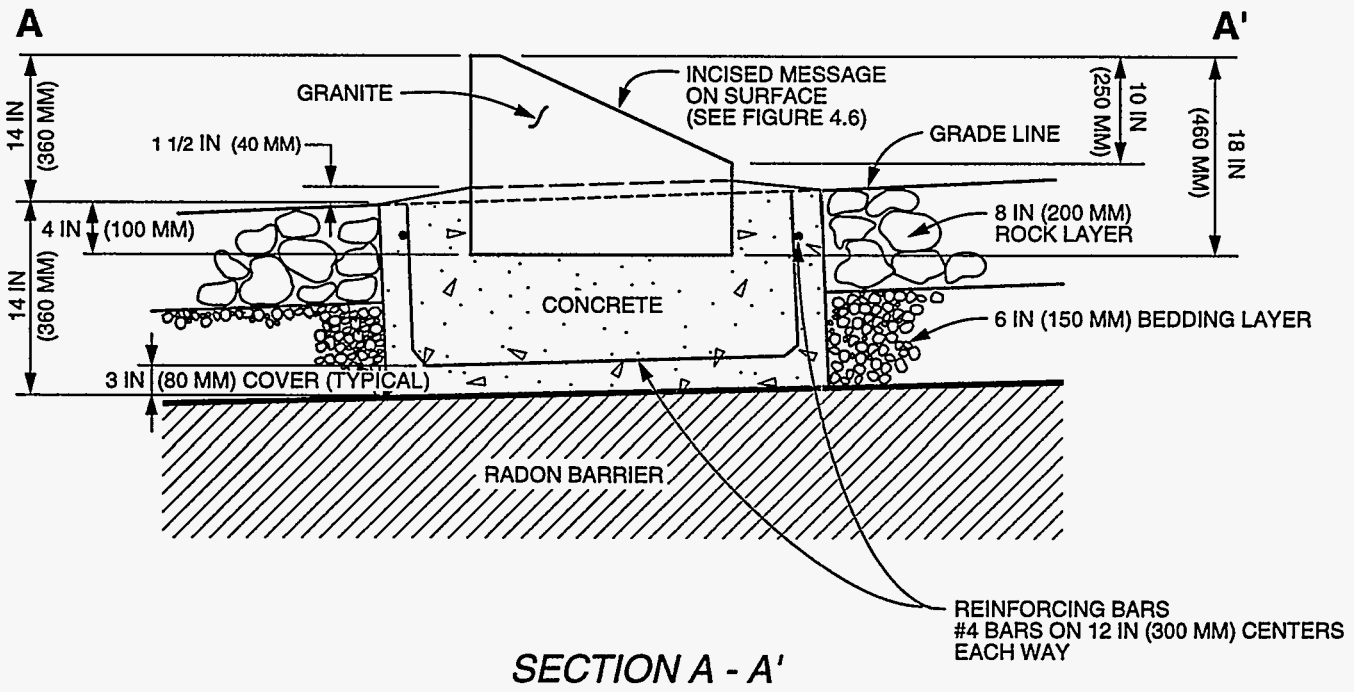
FROM MK, 1994.

**FIGURE 4.3**  
**SITE MARKER AT DISPOSAL SITE ENTRANCE**  
**MEXICAN HAT, UTAH**



PLAN VIEW

SCHEMATIC - NOT TO SCALE



SECTION A - A'

SCHEMATIC - NOT TO SCALE

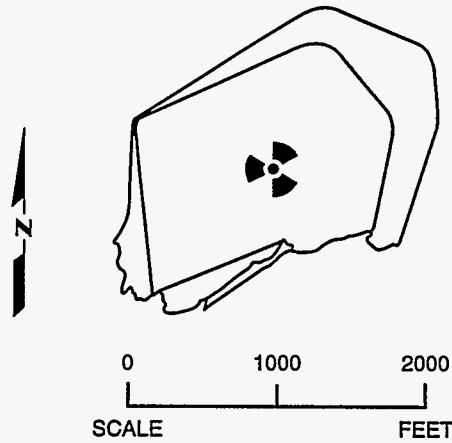
FROM MK, 1994.

**FIGURE 4.4**  
**SITE MARKER AT DISPOSAL CELL CREST**  
**MEXICAN HAT, UTAH**

+ BM

## MEXICAN HAT, UTAH

DATE OF CLOSURE: JULY 24, 1994  
DRY TONS OF TAILINGS: 4,400,000  
RADIOACTIVITY: 1800 CURIES, RA-226



NOTE: MINIMUM DEPTH OF INCISING IS 1/4 IN (6 MM).

### *INCISED MESSAGE*

FROM DOE, 1995a; MK, 1994.

**FIGURE 4.5**  
**ENTRANCE AND DISPOSAL CELL SITE MARKER MESSAGE**  
**MEXICAN HAT, UTAH, DISPOSAL SITE**

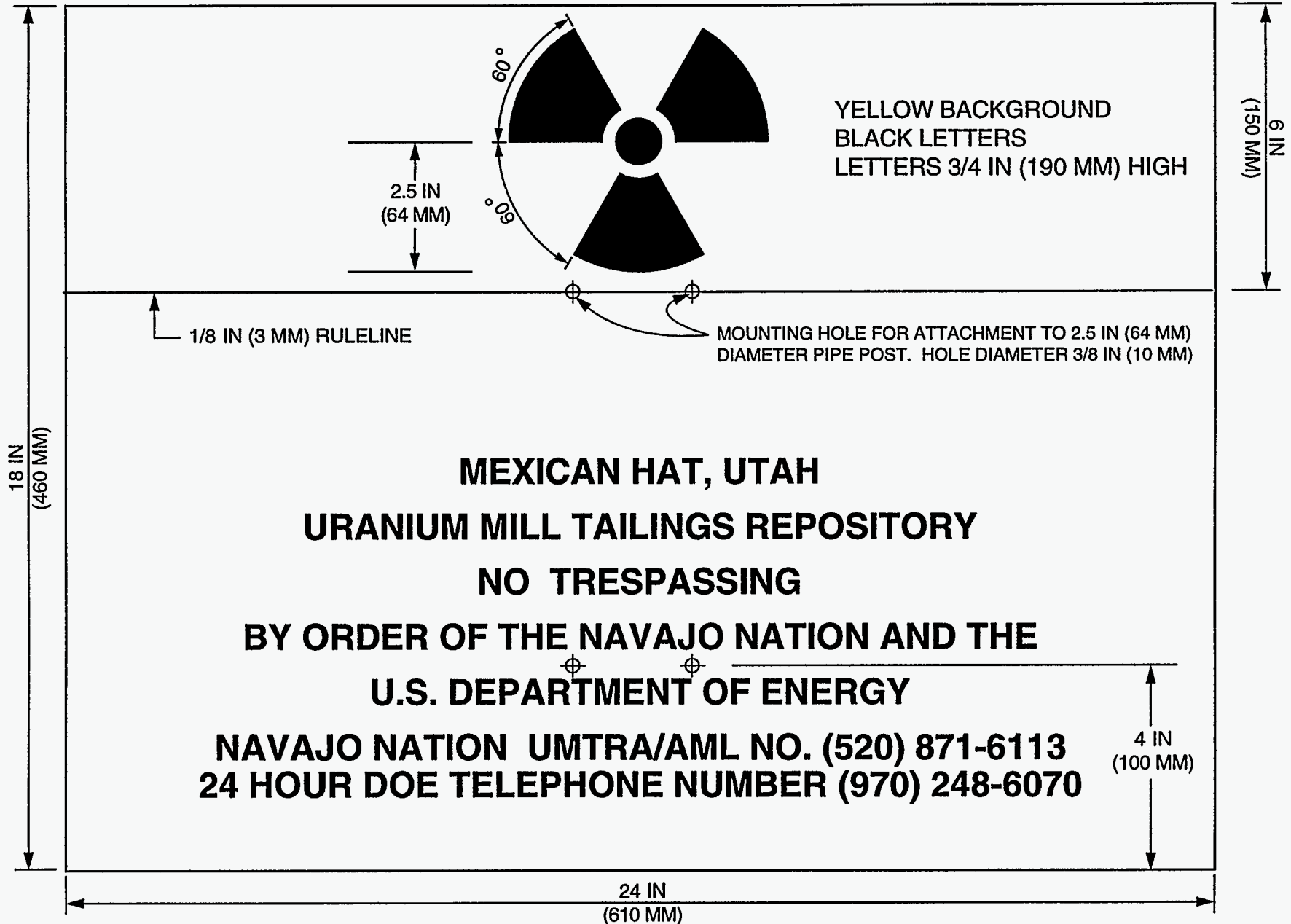
(1800 curies of radium-226) in the disposal cell. The international radiation symbol is also inscribed on each marker.

#### 4.4 ENTRANCE AND PERIMETER SIGNS

A warning sign is posted at the entrance to the Mexican Hat disposal site (Figure 4.6). Another 43 warning signs (P1 through P43) are posted at approximately equal intervals around the perimeter of the disposal site (Figure 4.7). The signs display the international radiation symbol and state that the site contains uranium mill tailings and that trespassing is forbidden. The warning sign at the entrance also provides the DOE and the Navajo Nation emergency notification telephone numbers for the disposal site (Figure 4.6).

#### 4.5 SETTLEMENT PLATES

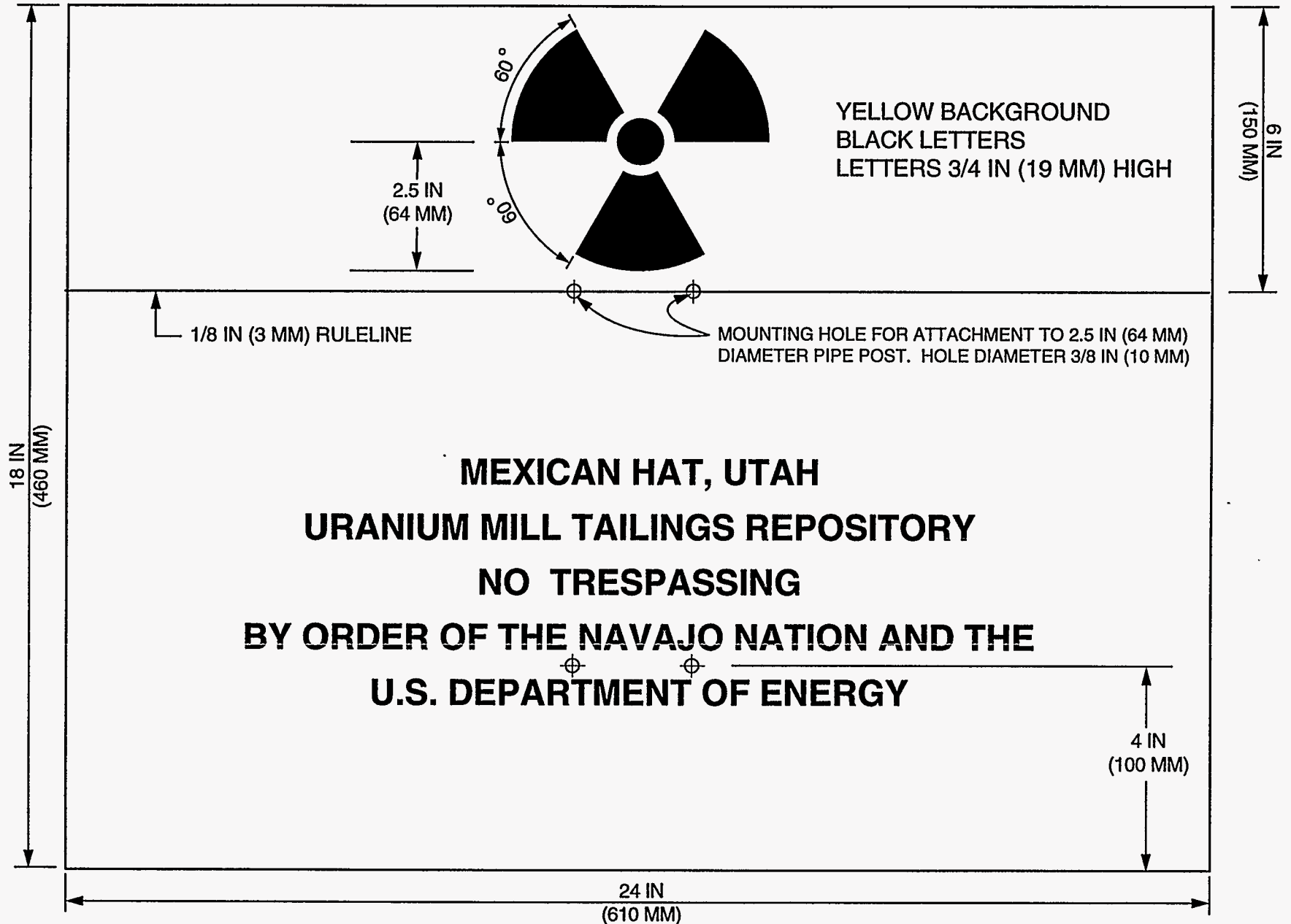
Two types of settlement plates were installed in the northeast portion of the Mexican Hat disposal cell during construction (Figure 1.1). Settlement plates SP-1, SP-2, and SP-3 were installed during phase II construction activities and prior to the temporary shutdown in 1990 (Figure 4.8). Settlement plates SP-4, SP-5, and SP-6 were installed after construction activities began again in 1992 (Figure 4.9). These settlement plates are not intended to be used as permanent surveillance features and there are no plans to monitor them routinely. However, if future disposal site inspections detect settling problems in the northeastern portion of the disposal cell, these plates could be surveyed. The coordinates and elevations of the settlement plates at the completion of remedial action are presented in Table 4.2. These elevations are the baseline against which any future measurements would be compared.



**FIGURE 4.6**  
**ENTRANCE SIGN**  
**MEXICAN HAT, UTAH, DISPOSAL SITE**

SCHMATIC - NOT TO SCALE

FROM MK, 1994.

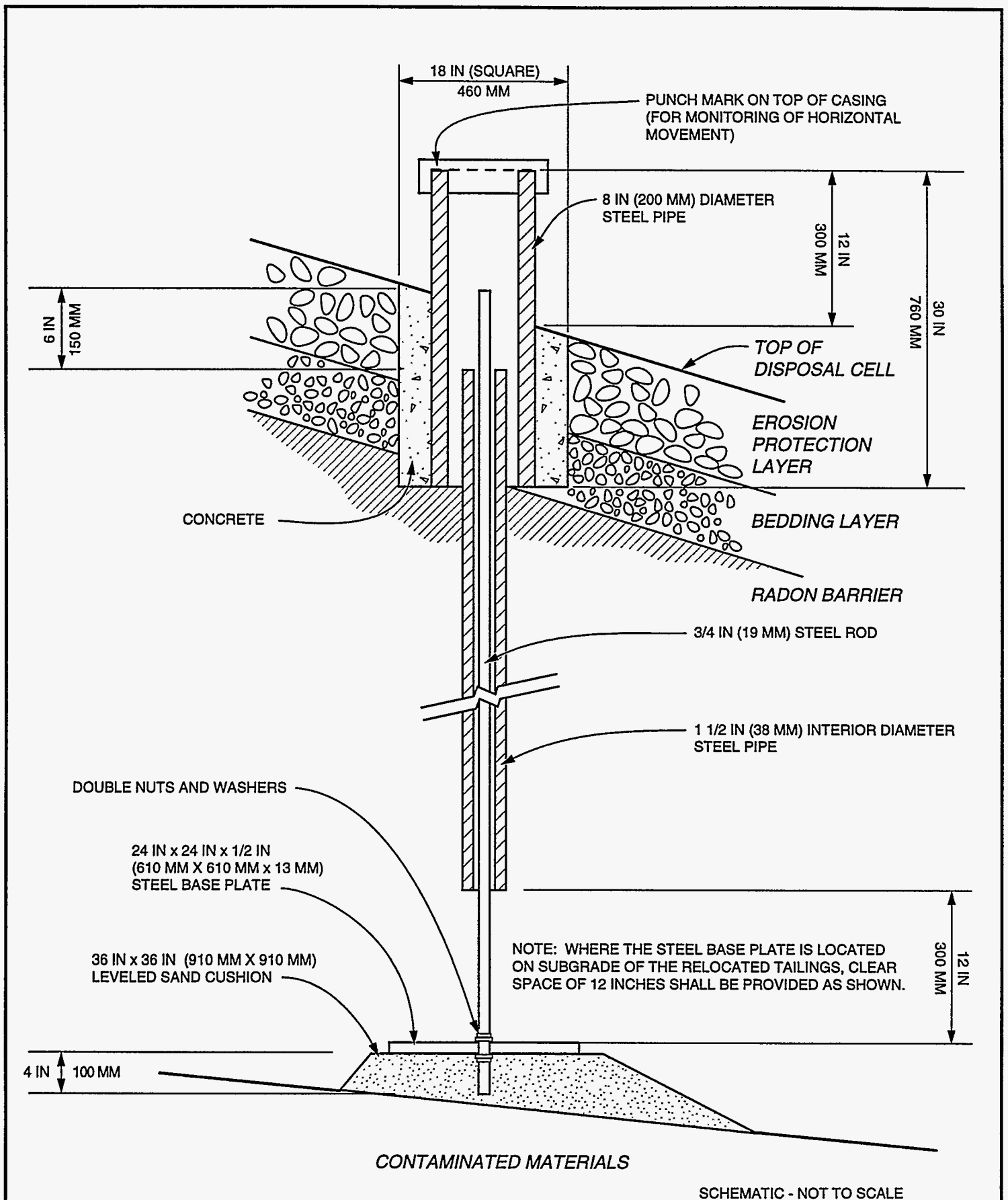


**FIGURE 4.7**  
**PERIMETER SIGN**  
**MEXICAN HAT, UTAH, DISPOSAL SITE**

SCHMATIC - NOT TO SCALE

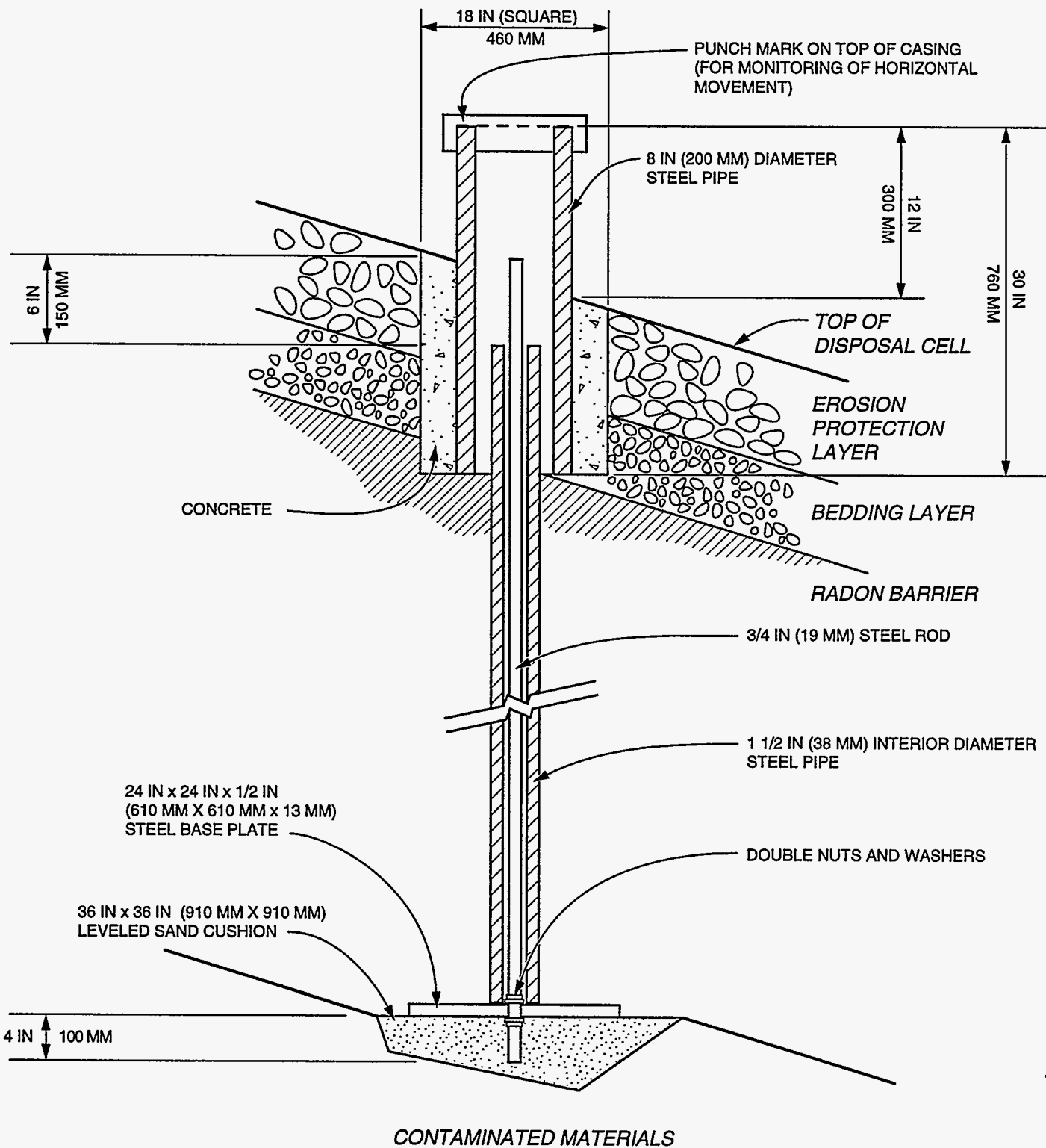
FROM MK, 1994.





**FIGURE 4.8**  
**SP-1, SP-2, AND SP-3 SETTLEMENT PLATES**  
**MEXICAN HAT, UTAH, DISPOSAL SITE**

FROM MK-F, 1995.



SCHEMATIC - NOT TO SCALE

**FIGURE 4.9**  
**SP-4, SP-5, AND SP-6 SETTLEMENT PLATES**  
**MEXICAN HAT, UTAH, DISPOSAL SITE**

FROM MK-F, 1995.

**Table 4.2 Survey coordinates and elevations for settlement plates at the Mexican Hat, Utah, disposal site**

Features <sup>a</sup>	UMTRA site grid coordinates		Elevation (ft) <sup>b</sup>
	North (ft)	East (ft)	
SP-1 <sup>c</sup>	9874.55	10,990.12	4292.00
SP-2 <sup>c</sup>	9700.03	11,090.08	4292.00
SP-3 <sup>c</sup>	9509.82	10,691.41	4288.00
SP-4 <sup>d</sup>	9689.87	10,900.01	4315.29
SP-5 <sup>d</sup>	9529.72	10,870.28	4318.04
SP-6 <sup>d</sup>	9329.86	10,525.13	4318.97

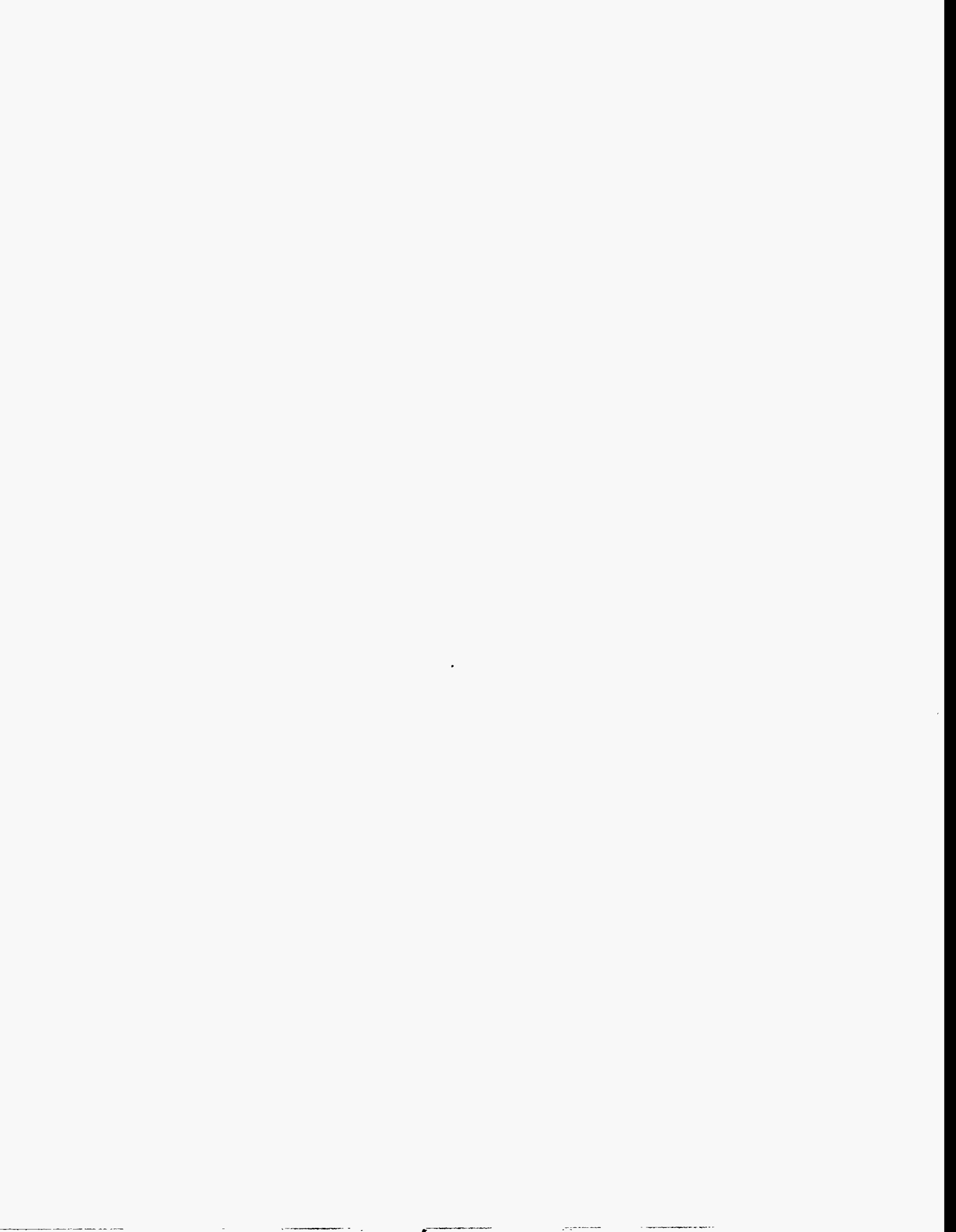
<sup>a</sup>See Figure 1.1 for the locations of these features.

<sup>b</sup>Above NGVD, 1929.

<sup>c</sup>Survey elevation taken from top of base plate, 13 March 1989.

<sup>d</sup>Survey elevation taken from top of rod, 16 July 1994.

From MK-F, 1995.



## 5.0 GROUND WATER

### 5.1 GROUND WATER CHARACTERIZATION

The DOE characterized the ground water conditions at the Mexican Hat disposal site, and the NRC concurred that the ground water conditions at the disposal site have been adequately characterized for the UMTRA Surface Project (NRC, 1992). Hydrogeologic conditions at the disposal site are summarized below and are described in detail in the RAP (DOE, 1993a), site observational work plan (DOE, 1995b), and in the NRC's technical evaluation report (NRC, 1992).

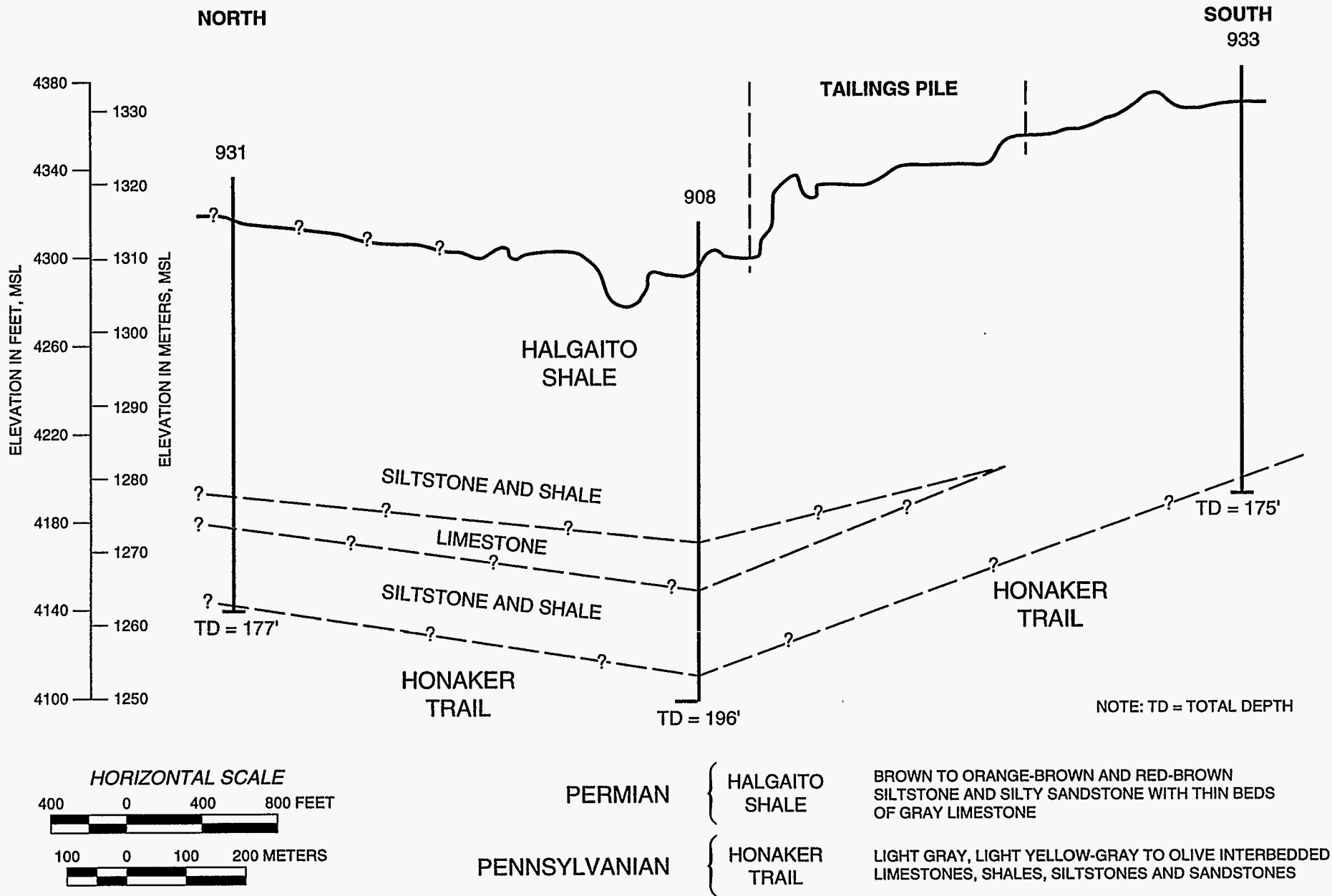
#### 5.1.1 Hydrostratigraphy

The Mexican Hat disposal site is approximately 1 mi (1.6 km) south of the San Juan River on a relatively flat mesa at an elevation of approximately 4300 ft (1300 m) above mean sea level. Surface drainage from the site and surrounding area is to the San Juan River. Bounding the relatively flat mesa to the north and east are the ephemeral drainages North Arroyo and Gypsum Creek. These drainages are relatively narrow and deeply incised. The terrain west of the site is similar to that to the north and east (DOE, 1995b; 1993a). A ridge that extends approximately 100 ft (30 m) above the site bounds the site on the south.

The Halgaito Shale, the lowermost unit of the Permian Cutler Group, is exposed at the ground surface of the site (Figure 5.1). This shale consists primarily of interbedded silty sandstone, siltstone, and shale. Calcareous, well cemented beds alternate with less cemented beds, and there are some thin lenticular beds of limestone and conglomerate (siltstone and limestone pebbles in a silty matrix). The unit is 80 to 215 ft (24 to 66 m) thick in the vicinity of the site. Two sets of nearly vertical fractures trending east-northeast and northeast-southwest and fractures along bedding planes that dip toward the east are present in the upper portion of the Halgaito Shale at the site. The presence and size of the fractures decreases significantly with depth (DOE, 1995b; 1993a).

The Honaker Trail Formation is the uppermost unit of the Hermosa Group and lies beneath the Halgaito Shale (Figure 5.1). The Honaker Trail Formation consists of interbedded siltstone, limestone, shale, and sandstone. Chert and limestone nodules are found throughout the siltstone beds, and the limestone units are predominantly fine to very fine grained. The formation is more than 300 ft (90 m) thick (DOE, 1995b; 1993a).

The Halgaito Shale was unsaturated before the uranium processing activities at the Mexican Hat site. Nearly all of the ground water presently contained in the Halgaito Shale is a result of the former uranium processing operations (the discharge of process water and water used to place the tailings) and, to a lesser degree, transient drainage from the disposal cell. The ground water in the shale is contained primarily in fractures and is perched on underlying zones having a



**FIGURE 5.1**  
**TYPICAL GEOLOGIC CROSS SECTION**  
**MEXICAN HAT, UTAH, DISPOSAL SITE**

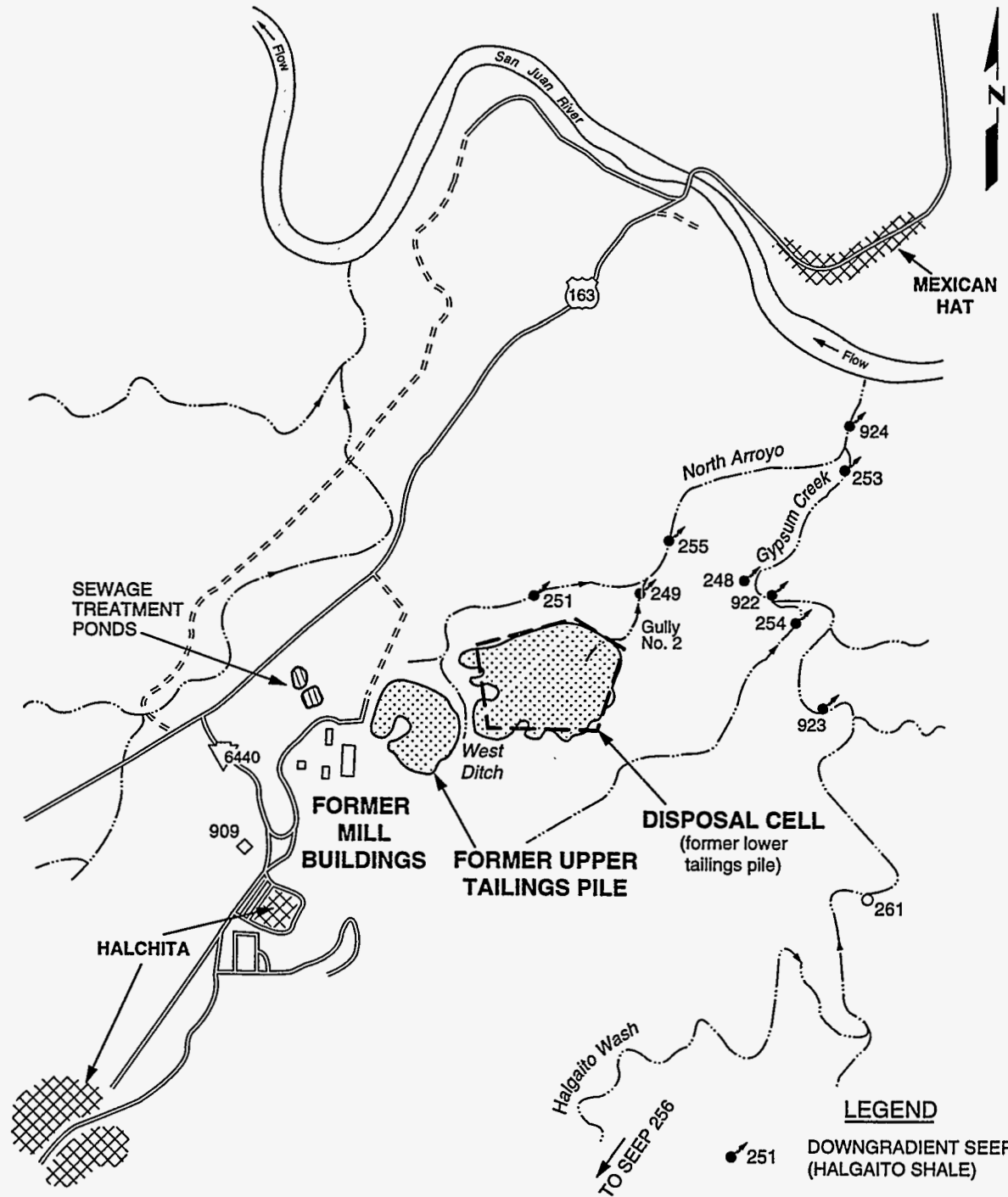
FROM DOE, 1993a.

lower hydraulic conductivity. The unit exhibits very little primary hydraulic conductivity due to the fine-grained nature of the sediments and intergranular cements. The hydraulic conductivity of the unit decreases with depth because of the decrease in the number and size of the fractures, and the lower portion of the unit is a very effective confining layer that significantly limits the vertical exchange of ground water between the Halgaito Shale and the underlying Honaker Trail Formation (DOE, 1995b; 1993a).

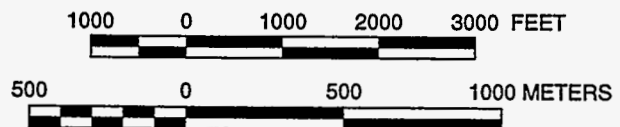
Recharge to the Halgaito Shale is limited by low annual precipitation (6 inches [150 mm] per year) and high evaporation. Discharge is through the fractures and on low permeability beds as the ground water travels toward seeps in the north arroyo and Gypsum Creek. Some recharge does occur as evidenced by an uncontaminated seep from the shale in Gypsum Creek. The ground water in the Halgaito Shale that is affected by the disposal site is limited in areal extent and yield and has no potential use as a water resource (DOE, 1995b; 1993a).

The Honaker Trail Formation contains an aquifer below the Halgaito Shale. The aquifer is isolated from ground water in the Halgaito Shale because the lower portion of the Halgaito Shale is a very effective confining layer and there is an upward hydraulic gradient in the Honaker Trail Formation that prevents ground water in the Halgaito Shale from entering the Honaker Trail Formation (DOE, 1995b). Water levels in the confined Honaker Trail aquifer are above the perched water levels in the Halgaito Shale and above the ground surface in some locations, including at the disposal site. Ground water in the Honaker Trail aquifer flows northeast toward the San Juan River, which is the discharge area for the aquifer. Recharge to the aquifer is limited and may occur as precipitation in areas to the southwest where the formation is closer to or exposed at the ground surface. Recharge may also occur as upward flow from deeper units. The ground water in the Honaker Trail Formation is not contaminated from the uranium processing activities, but its natural quality in the vicinity of the Mexican Hat disposal site is likely unsuitable for consumption. Monitor wells at the disposal site showed the presence of hydrogen sulfide gas and naturally occurring petroleum. A limited amount of oil is produced from the Halgaito Shale and Honaker Trail Formation in the nearby oil field in the town of Mexican Hat (DOE, 1995b; 1993a).

Three seeps (251, 249, and 255) have been identified in the north arroyo in the vicinity of the Mexican Hat disposal site (Figure 5.2). Seep 251 was first noticed in December 1989 during the relocation of the upper tailings pile to the lower tailings pile; however, dense green vegetation in aerial photographs taken as early as 1974 provide evidence of the earlier occurrence of near surface water at this location. The flow rate at seep 251 was measured in February 1990 at 4 gallons (gal) (15 liters [L]) per hour, but the flow decreased until it stopped in May 1990. The seep was observed to be flowing again during remedial action in May 1994. It is not possible to predict when the intermitting flow from seep 251 will stop (DOE, 1995b; 1993a).



NOTE: WELL AND SEEP LOCATIONS ARE APPROXIMATE.



- LEGEND**
- 251 DOWNGRADIENT SEEP (HALGAITO SHALE)
  - 261 UPGRADIENT SEEP (HALGAITO SHALE)
  - ◇ 909 MONITOR WELL (HONAKER TRAIL FORMATION WELL)
  - (163) U.S. HIGHWAY
  - 6440 INDIAN SERVICE ROUTE
  - IMPROVED ROAD
  - ==== DIRT ROAD
  - EPHEMERAL DRAINAGE

**FIGURE 5.2**  
**SEEP LOCATIONS AT THE MEXICAN HAT, UTAH, DISPOSAL SITE**



Flow rates at seep 249 (Figure 5.2) were 0.5 gal (1.9 L) per hour in March 1990 and 0.35 gal (1.3 L) per hour in July 1990 (DOE, 1995b; 1993a). A spring in this area was documented in 1968 (Snelling, 1971), and there is no record that the seep has ever stopped flowing since the relocation of the upper tailings pile to the lower tailings pile. The seep was observed to be flowing during remedial action in May 1994. Insufficient information is available to make an accurate prediction of the continuation of seepage at this location (DOE, 1995b; 1993a).

Flowing water has been observed at seep 255 as far back as March 1976 (DOE, 1990), and the seep was observed from 1988 through 1990 by UMTRA Project personnel. The seep was observed to be flowing during remedial action in May 1994. No flow rates have been measured at seep 255, and it is not possible to predict when the seep will stop flowing (DOE, 1995b; 1993a).

Seven seeps (261, 923, 254, 922, 248, 253, and 924) have been identified in Gypsum Creek in the vicinity of the Mexican Hat disposal site (Figure 5.2). Flow rates from these seeps have not been determined, however, the seeps do not have continuous flows of water (DOE, 1995b; 1994; 1993a).

#### 5.1.2 Background ground water quality

Background ground water quality was determined for the Halgaito Shale and underlying Honaker Trail Formation at the Mexican Hat disposal site. The Halgaito Shale contains only minor amounts of naturally occurring water, and upgradient monitor wells in the shale were dry. Therefore, background ground water quality for the Halgaito Shale was determined using seep 256 in Halgaito Wash and seep 261 in Gypsum Creek upgradient of the disposal site (Figure 5.2). The water quality of both seeps is very similar, and both seeps appear to be isolated from ground water contamination related to the disposal site. Background ground water quality for the Honaker Trail Formation was determined using monitor well 909 upgradient of the disposal site (Figure 5.2) (DOE, 1995b; 1993a).

The background ground water quality of both the Halgaito Shale and Honaker Trail Formation is generally similar because both units are lithologically similar (Table 5.1). Both of the units contain the same calcium sulfate as the mineral gypsum which has been positively identified in outcrops of the Halgaito Shale. This is reflected in the background ground water quality. Ground waters from both units contain relatively high concentrations of sulfate as the dominant anion (2000 to 3300 milligrams per liter [mg/L]) balanced by nearly equal equivalents of sodium, calcium, and magnesium. The pH of the ground waters is slightly alkaline, and the ground waters in both units are oxidizing. Total dissolved solids (TDS) in the ground waters range from 3200 to 5300 mg/L (DOE, 1995b; 1993a).

Several constituents commonly found in the solutions produced by the uranium processing at the Mexican Hat site are also present naturally in ground water from the seeps upgradient of the site. However, the concentrations of these

**Table 5.1 Background ground water quality for the Halgaito Shale and Honaker Trail Formation**

Constituent	Halgaito Shale <sup>a</sup>	Honaker Trail Formation <sup>b</sup>
Alkalinity	189 - 289	133 - 159
Aluminum	<0.05	<0.1 - 0.3
Ammonium	<0.01 - 0.5	<0.1 - 0.4
Antimony	<0.02	<0.003 - 0.006
Arsenic	<0.01	<0.01 - 0.02
Barium	<0.002 - 0.02	<0.01 - 0.1
Beryllium	<0.005	
Boron	0.3 - 0.4	0.1 - 1.0
Bromide	0.5 - 0.9	
Cadmium	<0.001	<0.001 - 0.005
Calcium	410 - 555	330 - 445
Chloride	109 - 181	93 - 110
Chromium	<0.01	<0.01 - 0.09
Cobalt	<0.03	<0.05
Copper	<0.01	<0.01 - 0.04
Fluoride	0.4 - 2.2	1.3 - 1.5
Iron	<0.03 - 0.2	<0.03 - 0.13
Lead	<0.005	<0.01
Lead-210 (pCi/L)	0.0 - 1.0	
Magnesium	44 - 265	141 - 190
Manganese	<0.01 - 0.66	0.01 - 0.02
Mercury	<0.0002	<0.0002
Molybdenum	<0.01 - 0.02	<0.01 - 0.20
Nickel	<0.04	<0.04 - 0.11
Nitrate	<1.0 - 8.9	0.8 - 11.1
pH	7.1 - 8.0	7.1 - 7.4
Phosphate	<0.01 - 0.01	<0.1 - 0.1
Polonium-210 (pCi/L)	0.5 - 0.7	0.0
Potassium	6 - 15	5.4 - 8.5
Radium-226 (pCi/L)	0.0 - 1.5	0.0 - 0.3
Radium-228 (pCi/L)	0.0 - 6.0	0.0 - 8.5
Selenium	<0.03	<0.005 - 0.04
Strontium	10 - 13	<0.1 - 9.2

**Table 5.1 Background ground water quality for the Halgaito Shale and Honaker Trail Formation (Concluded)**

Constituent	Halgaito Shale <sup>a</sup>	Honaker Trail Formation <sup>b</sup>
Silver	<0.01	<0.01
Silica - SiO <sub>2</sub>	16 - 25	14 - 16
Sodium	270 - 740	397 - 470
Sulfate	2200 - 3300	1980 - 2380
Sulfide	<0.1 - 4.4	<0.1 - 64.4
Thallium	<0.03	
Thorium-230 (pCi/L)	0 - 1.7	0.0 - 0.30
Tin	<0.05	<0.005
Total dissolved solids	3700 - 5300	3170 - 3730
Total organic carbon		<1 - 31
Uranium	0.01 - 0.05	0.04 - 0.06
Vanadium	<0.01 - 0.02	<0.01 - 0.49
Zinc	<0.005 - 0.01	<0.01 - 0.03

<sup>a</sup>Data are from seeps 256 (Halgaito Wash) and 261 (Gypsum Creek) (Figure 5.2) from 1990 to 1994.

<sup>b</sup>Data were collected from monitor well 909 (Figure 5.2) from 1985 to 1993.

Note: All data are in milligrams per liter (mg/L) unless noted as picocuries per liter (pCi/L). Values given as less than (<) are below the minimum detection limit for the analysis.

constituents in the ground water are below those in the tailings piles. Constituents that occur naturally in ground water from the upgradient seeps include ammonium, boron, magnesium, manganese, molybdenum, nitrate, silica, sulfate, and uranium (DOE, 1995b; 1993a).

## **5.2 GROUND WATER MONITORING**

The ground water in the Halgaito Shale is limited in areal extent, and the low hydraulic conductivity of the shale results in low water yield to wells. Therefore, the ground water's potential as a water resource is very limited. Because the ground water in the underlying Honaker Trail Formation is isolated from ground water in the Halgaito Shale, no contamination related to the Mexican Hat site has been detected in the Honaker Trail Formation. It is unlikely that the ground water in the Honaker Trail Formation is a viable water resource in the area due to its naturally poor quality (DOE, 1995b; 1993a). Therefore, ground water monitoring to demonstrate cell performance standards will not be conducted.

In keeping with the best management practices and a request from the Navajo Nation, selected seeps will be monitored periodically to observe changes in flow rates and water quality. The seeps downgradient of the Mexican Hat disposal cell in North Arroyo and Gypsum Creek are representative of ground water in the Halgaito Shale. Information obtained from observations of the seeps will be used in the UMTRA Ground Water Project.

## **5.3 CORRECTIVE ACTION**

The EPA standards (40 CFR §192.04(c)) require that a corrective action be implemented within 18 months after verification of an exceedance of an established concentration limit for one or more of the monitored constituents. Because there will be no ground water monitoring, corrective action due to an exceedance of constituents concentrations limits is not applicable.

## 6.0 DISPOSAL SITE INSPECTIONS

Inspections of the Mexican Hat disposal site are conducted to ensure that it continues to function as designed. The primary objective of a site inspection is to identify potential problems before extensive maintenance, repairs, or corrective action are needed. The inspection team will be knowledgeable in the processes that could adversely affect the site. A fundamental part of the inspection will be the detection and documentation of progressive changes caused by slowly acting natural processes. The findings from these inspections will be compared to the initial baseline conditions to provide a basis for future inspections. The three types of site inspections are as follows:

- Annual or scheduled site inspections.
- Follow-up inspections.
- Contingency inspections.

Each site inspection will be documented by a report that identifies the findings of the inspection. Copies of the report will be submitted to the NRC and the Navajo Nation and will be placed in the permanent Mexican Hat site file. Annual or scheduled site inspection reports will be completed and submitted to the NRC within 90 days of the last UMTRA Project site inspection of that calendar year. Follow-up or contingency inspection reports must be submitted to the NRC within 60 days of the initial report and within 60 days after any other type of inspection.

### 6.1 INSPECTION FREQUENCY

The Mexican Hat disposal site will be inspected annually for the first 5 years after licensing. At the end of the 5-year period, the GJPO will evaluate the need to continue annual inspections, basing its recommendation on an evaluation of the annual inspections and any reports that have been filed for maintenance repair, or corrective action or for unforeseen events. If the evaluation supports less frequent inspections without significant impact to performance, the GJPO will modify the LTSP and submit it to the NRC for approval. The Navajo Nation will also receive a copy for review. Once approved, any modifications to the LTSP will be implemented.

Site inspections at the Mexican Hat disposal site preferably should take place in the summer during the growing season of volunteer plants. This will allow the inspectors to assess the impact of plants on the integrity of the disposal cell and if any maintenance repairs, or corrective action are necessary.

### 6.2 INSPECTION TEAM

The inspection team will consist of a chief inspector and one or more assistants. The chief inspector will be a geotechnical engineer, a civil engineer, or an engineering geologist knowledgeable in the processes that could adversely affect the site (e.g., geomorphic processes). Because the Mexican Hat disposal

cell has a rock cover, a plant specialist may be required to analyze volunteer plant growth on the cover. Additionally, because of the potential for shifting sands and sand accumulation on the cover, a geologist may be required to document the changes and the potential long-term effects. The need for specific specialists will be determined by the GJPO based on the results of previous inspections. When the inspection team is needed for follow-up or contingency inspections, they may include additional technical experts appropriate to the problems under investigation.

### **6.3 PREPARATION FOR INSPECTIONS**

Before each inspection, inspectors will complete the following tasks:

- Review the final LTSP, the permanent Mexican Hat site file, previous site inspection report(s) and map(s), and all maintenance repair, or corrective action reports.
- Prepare the site inspection checklist (Attachment 4) based on previous inspections and maintenance, repairs, or corrective action and incorporating any needed modifications into the checklist.
- Verify and update the names and telephone numbers of all parties with whom access or notification agreements have been executed.
- Verify the DOE and Navajo Nation emergency notification telephone numbers and contacts. Arrange to change all disposal site signs, as needed.
- Schedule the site inspection.
- Notify the NRC and Navajo Nation representatives so that they may attend the inspection if they so choose.
- Assemble the equipment needed for the inspection.
- Adjust the magnetic declination of the Brunton compass or equivalent for the Mexican Hat area.

### **6.4 SITE INSPECTION AND INSPECTION CHECKLIST**

The site inspection will include the disposal cell and site area, and the immediate off-site areas. All site inspection activities and observations will be recorded and described using the as-built drawings, site inspection checklist (Attachment 4), site inspection map, field notebook, photographs, and site inspection photolog. Observations and photographic stations should be recorded on the field maps. After the inspection is complete, significant observations will be

included in a revision of the site map and retained in the permanent Mexican Hat site file.

The initial site inspection checklist (Attachment 4) is a guideline for the inspectors. After each inspection is complete, the checklist will be revised to include new information or to delete items that are no longer pertinent. Revisions to the checklist will be documented in the inspection report.

A photographic record of each site inspection will be obtained. Disposal site conditions will be documented by ground photographs to record developing trends and to enable the DOE to evaluate the need for and extent of future activities. Any site feature or condition that the inspectors deem worthy of a written comment, explanation, or description will be photographed, if possible. Photographs will be recorded on the site inspection photo log (Attachment 3). All features will be photographed and recorded as specified in Section 3.5. The inspectors may determine the number of photographs, the view angles, and the choice of lenses to ensure that sufficient photographs are taken.

#### **6.4.1 Off-site areas**

The area within a maximum of 0.25 mi (0.4 km) of the center of the disposal site will be examined for evidence of land-use changes that indicate increased human activity (i.e., greater probability of intrusion onto the site).

#### **6.4.2 On-site areas**

The integrity of the disposal site will be evaluated by a series of transects around the perimeter of the disposal site; along the base, crest, sideslopes, and aprons of the disposal cell; in and around the drainage ditches and channel; and in and around the armored gullies (toe drains). Sufficient transects must be walked so that the disposal site area is thoroughly covered and inspected. Diagonal transects of the disposal cell crest will be made, and the edge of the disposal cell crest will be walked. Additional transects, at approximately 50-yd (46-m) intervals, will be walked along the disposal cell sideslopes. Transects along the entire length of each drainage ditch and channel will be made to determine whether the ditches and channel have been functioning, and can be expected to continue to function, as designed.

At a minimum, the disposal site perimeter and disposal site area transects will be checked for damage or disturbance to the following features:

- Site access roads.
- Site fencing, entrance gate, and entrance and perimeter signs.
- Permanent site surveillance features (wells).
- Drainage ditches and channel.
- Rock-covered aprons and armored gullies (toe drains).

Transects along the engineered components of the disposal site (i.e., disposal cell sideslopes, crest, and aprons; drainage ditches and channel; and armored gullies) will be walked along their complete length and examined for evidence of the following:

- Structural instability due to differential settlement, subsidence, cracking, sliding, or creep.
- Erosion as evidenced by the development of rills or gullies.
- Sedimentation or debris.
- Rapid deterioration of the rock erosion protection caused by weathering or erosion.
- Removal of rock or other disposal cell material.
- Seepage.
- Intrusion (inadvertent or deliberate) by humans or animals.
- Animal burrowing.
- Vandalism.
- Development of trails from human or animal activity.
- Volunteer plant growth.

All permanent site surveillance features (Section 4.0) will be examined for evidence of disturbance. Naturally occurring changes in site features will be noted and assessed to determine the need for maintenance, repairs, or corrective action. If disturbance or damage to permanent site surveillance features is evident, recommendation for maintenance or repair will be made.

#### **6.4.3 Modifying processes**

At the Mexican Hat disposal site, processes of concern include settling, subsidence, slumping, plant and animal intrusion, rill and gully formation, and eolian sedimentation. If any modifying features are observed during the inspection, the following data should be recorded on the inspection checklist:

- Evidence of settlement or sliding, including the presence of bulges, depressions, cracks, or scarps.



- Extent and stability of the area affected and nature of movement.
- Number, spacing, length, depth, and width of modifying features.
- Related erosional features.
- Patterns of occurrence.
- Plant or animal species found at the site.
- Location, size, and density of volunteer plant growth.

Inadvertent or casual intrusion by humans or animals is not cause for great concern, but evidence of cover removal, extensive vandalism to site surveillance features, or the presence of well-established trails will be described in detail. Continued vandalism may require more active measures to control site access.

If new conditions requiring continuing observation, monitoring, or immediate action are discovered during the inspection, the inspector should quantify the observed conditions and identify the appropriate level of action for subsequent inspections.

#### **6.4.4 Volunteer plant growth**

Volunteer plant growth includes plants growing on the topslope, sideslopes, and in rock-lined drainage ditches.

A follow-up inspection by a plant specialist may be required if an inspection team reports volunteer plant species such as big sagebrush growing on the disposal cell. These plants may be eliminated from the cover by selective spraying or mechanical removal.

Based on the results of the UMTRA Project biointrusion study (DOE, 1995c), a volunteer plant root-to-shoot ratio of 1.0 to 1 should be used unless site-specific plant data indicate otherwise. Based on a root-to-shoot ratio of 1.0 to 1, an unwanted plant species must be removed when its shoot height equals or exceeds 3.5 ft (1.1 m) from the base of the plant.

### **6.5 SITE INSPECTION MAP**

A new Mexican Hat disposal site inspection map will be prepared after each scheduled inspection using the Mexican Hat disposal site map (Figure 1.1) as a base. This map must include the following:

- Inspection transects.
- Photographic locations.

- Locations and descriptions of any new, anomalous, or unexpected conditions or features.
- Features identified during previous inspections for observation or monitoring.
- Inspection date.

## 6.6 REPORTING REQUIREMENTS

Upon completion of the field inspection, Section D of the site inspection checklist (Attachment 4) will be completed and the certification statement must be signed. Overlays for the as-built drawings or revised drawings will be developed, noting any potential problems or other site conditions that may require attention. The revised drawings will be labeled with the type of site inspection and the date the site inspection was performed.

All photographs will be logged on a site inspection photo log (Attachment 3). A separate photo log will be completed for each roll of film exposed, with an entry for each photograph. The completed photo logs should be attached to the inspection checklist.

Documented evidence of new, anomalous, or unexpected conditions or features must be included to record developing trends and to enable the responsible agency to make reasonable decisions concerning follow-up inspections, custodial maintenance, repair, and corrective action. Photographs may be considered documentation.

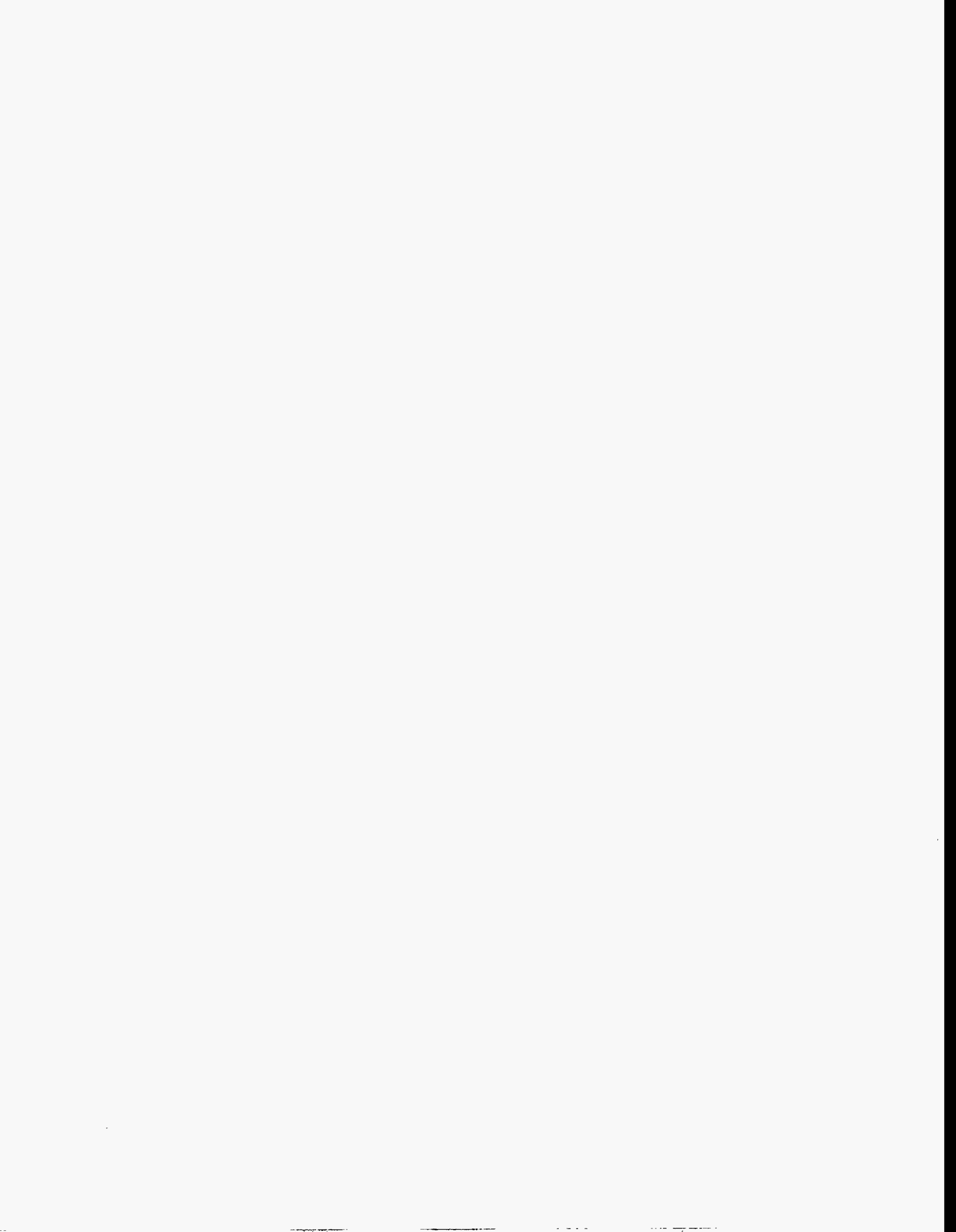
A site inspection report will be prepared describing surveillance activities at the disposal site. The inspection report will include the information identified in the LTSP guidance document (DOE, 1992). At a minimum, the report will include the following information:

- Narrative of inspection, results, conclusions, and recommendations.
- Site inspection checklists and all relevant supporting documentation.
- Site inspection map and other drawings, maps, or figures, as required.
- Inspection photographs and photo logs.
- Field notes.
- Recommendations for additional follow-up inspections, custodial maintenance, or repair, if required.
- Follow-up or contingency inspection reports, if required.

- Custodial maintenance or repair report and certification, if required.
- Inspector qualifications.
- Inspection certification.

All problems, active or potential, will be identified and described in the report, along with recommendations for follow-up inspections, custodial maintenance, repair, or corrective action, if required.

Appendix A, Criterion 12 of 10 CFR Part 40 requires that the DOE submit the results of all routine site inspections to the NRC within 90 days of the last UMTRA Project site inspection for that calendar year. Copies will also be provided to the Navajo Nation. A copy of all site inspection reports will be maintained in the permanent Mexican Hat site file.



## 7.0 UNSCHEDULED INSPECTIONS

An unscheduled inspection may be performed to investigate reports or information indicating that disposal site integrity has been or may be compromised. An unscheduled inspection may be a follow-up to a previous action of a scheduled site inspection or to investigate a report of an incident at the site.

### 7.1 FOLLOW-UP INSPECTIONS

Follow-up inspections are used to investigate and quantify specific problems detected during a scheduled site inspection, ground water sampling event, special study, or other DOE activity. They are needed to determine if processes currently active on or near the site threaten site security or stability and to evaluate the need for immediate custodial maintenance, repair, or corrective action. Follow-up inspections should be made by technical specialists in a discipline appropriate to the problem (e.g., a soils scientist or geomorphologist to evaluate erosion processes).

The first step of the follow-up inspection is an on-site visit to determine the need for definitive tests or studies. Additional visits may be scheduled if more data are needed to draw conclusions and make recommendations. If maintenance, repair, or corrective action is warranted, the DOE will notify the NRC and the Navajo Nation as specified in Section 9.0.

### 7.2 CONTINGENCY INSPECTIONS

Contingency inspections are unscheduled inspections ordered by the DOE when it receives information indicating that disposal site integrity has been or may be compromised. Examples of events that could trigger contingency inspections include reports of severe vandalism, intrusion by humans or animals, severe rainstorms, or unusual events such as tornados or earthquakes. An assessment of each event must be submitted to the NRC within 60 days of the initial report that damage or disruption has occurred at the Mexican Hat disposal site (10 CFR Part 40). The Navajo Nation will receive a copy of this report. At a minimum, this report must include the following:

- A description of the reported condition or event.
- A preliminary assessment of the maintenance, repair, or corrective action required.
- Conclusions and recommendations.
- Assessment data, including field and inspection data and photographs.
- Names and qualifications of the field inspectors.

A copy of the report and all other data and documentation will be maintained in the permanent Mexican Hat site file. The annual report to the NRC will include the results of these contingency inspection reports. If appropriate, the annual (or scheduled) Mexican Hat disposal site inspection report will also contain the results of these inspections. After reviewing the preliminary inspection/assessment report, the DOE must submit a corrective action plan to the NRC for approval and to the Navajo Nation within the 60-day period required by 10 CFR Part 40. Based on the findings of these reports, the GJPO will complete corrective action following the guidance for implementing corrective action described in Section 9.0.

## 8.0 CUSTODIAL MAINTENANCE AND REPAIR

Custodial maintenance or repair will be performed as needed at the Mexican Hat disposal site. In general, the decision to conduct maintenance or repair will be based on the results of scheduled site inspections, follow-up inspections, or contingency inspections.

### 8.1 PLANNED MAINTENANCE

Planned maintenance at the Mexican Hat disposal site will be limited to a spraying program to control unwanted vegetation growth on the disposal cell. Due to the arid conditions at the site and the sporadic frequency and amount of rainfall, this spraying will occur as needed. Vegetation growth will be monitored during regular scheduled inspections conducted during the growing season. If significant vegetation is found, a maintenance visit to apply herbicidal spray will be scheduled.

### 8.2 UNSCHEDULED MAINTENANCE OR REPAIR

Unscheduled custodial maintenance or repair activities that may be required at the Mexican Hat disposal site include the following:

- Repair of entrance gate and fencing.
- Replacement of entrance and perimeter signs.
- Reestablishment of survey and boundary monuments, site markers, and settlement plates.
- Eradication of deep-rooted trees and shrubs.
- Removal of tumbleweeds or other debris from the drainage and diversion ditches and armored gullies or from around the disposal site fence.
- Control of burrowing animals.
- Placement of fill in gullies or rills.
- Replacement of rock erosion protection materials.

For these types of custodial actions, the GJPO will prepare a purchase order and statement of work (SOW) (including subcontractor qualifications) authorizing the repair. If problems are identified that may affect the integrity of the disposal cell or compliance with the EPA standards, the NRC must approve the recommended action in advance, and the action will be treated as corrective action.

### 8.3 CERTIFICATION AND REPORTING REQUIREMENTS

The following information on unscheduled maintenance or repair must be provided in the Mexican Hat site inspection report and included in the annual report to the NRC:

- Summary of work required.
- Purchase order and SOW.
- Contractor qualifications, if applicable.
- Contractor documentation of completion of work.
- *DOE certification of completion of work.*

After the work is completed, the contractor must submit verification of the completed work and/or a written report if the action is considered significant. The DOE will inspect the site, as necessary, and review the report before certifying that all work was completed in accordance with all required specifications. Copies of all records, documentation, and certifications must be included in the permanent Mexican Hat site file. Copies of all relevant documentation will be transmitted to the NRC and the Navajo Nation.



## 9.0 CORRECTIVE ACTION

If natural or unforeseen events threaten the stability of the disposal site, corrective action could include temporary emergency measures. In addition, the DOE would evaluate the factors that caused the problem to ensure that recurrence is minimized or avoided. The following events and conditions could require corrective action:

- Surface rupture of the disposal cell possibly indicating differential settlement or severe shrinkage of the cover materials.
- Subsidence, sliding, or slope instability of the disposal cell caused by mass wasting, liquefaction, differential settlement, or other events.
- Development of rills or gullies on the disposal cell.
- Deterioration of the rock erosion protection on the disposal cell or aprons or in the drainage and diversion ditches or armored gullies.
- Seepage originating from the disposal cell or the toe of the cell.
- Gully development on or immediately adjacent to the disposal site possibly affecting the integrity of the disposal cell.
- Rapid headward cutting of a gully, arroyo, or ravine threatening the stability of the disposal cell.
- Damage to the disposal cell or disposal site from extreme seismic events, other catastrophic events, or vandalism.
- Verification of an excursion during the ground water monitoring program.

When a potential problem is identified, the DOE will notify the NRC and Navajo Nation and submit an inspection and preliminary assessment report for the NRC and Navajo Nation to review no more than 60 days after the problem is identified. The inspection and preliminary assessment report will evaluate the problem and recommend the next step (e.g., immediate action or continued evaluation). After the NRC and Navajo Nation review the report and recommendations, the DOE will develop a corrective action plan for NRC approval. Once the NRC approves the corrective action plan, the DOE will implement the plan. Figure 9.1 identifies the general sequence of events and the key elements in the corrective action process.

NRC regulations do not stipulate a time period for implementing a corrective action. However, the EPA regulations in 40 CFR Part 192 require that a corrective action begin within 18 months after the verification of an exceedance of an established concentration limit at a disposal site. Assessing the extent of a problem and developing a corrective action plan will not be considered initiation of the corrective action. Section 9.0 of the

### **NEED FOR CORRECTIVE ACTION IDENTIFIED**

- DOCUMENT AND REPORT PROBLEM TO NRC AND STATE
- EVALUATE PROBLEM AND PROPOSE A SOLUTION
- DEVELOP CORRECTIVE ACTION PLAN AND NOTIFY NRC AND STATE
- SELECT CONTRACTOR TO PERFORM CORRECTIVE ACTION
- ESTABLISH CONTRACTUAL CONDITIONS FOR PERFORMING CORRECTIVE ACTION AND GUARANTEE CORRECTIVE ACTION WILL BE PERFORMED IN ACCORDANCE WITH CONTRACTUAL AGREEMENTS AND DESIGN SPECIFICATIONS

### **CORRECTIVE ACTION IMPLEMENTATION**

- MONITOR PROGRESS OF CORRECTIVE ACTION
- VERIFY COMPLETION OF CORRECTIVE ACTION

### **CORRECTIVE ACTION CERTIFICATION**

- VERIFY CORRECTIVE ACTION AS DESIGNED CORRECTS THE PROBLEM
- ENSURE RECURRENCE OF PROBLEM IS MINIMIZED OR AVOIDED
- CERTIFY COMPLETION OF CORRECTIVE ACTION IN ACCORDANCE WITH EPA STANDARDS
- SUBMIT CERTIFICATION REPORT TO NRC

FROM DOE, 1992.

**FIGURE 9.1**  
**KEY ELEMENTS IN THE CORRECTIVE ACTION PROCESS**

UMTRA Project LTSP guidance document (DOE, 1992) contains details on corrective action.

### **9.1 PROBLEM IDENTIFICATION**

Site inspections by qualified inspectors and routine custodial maintenance are designed to identify problems at the developmental stage and eliminate the need for corrective action. However, extreme natural events, vandalism, and unanticipated events may create the need for additional data or evaluative monitoring to assess whether uncorrected problems would threaten site integrity. An on-site inspection and preliminary assessment would include, but not be limited to, the following:

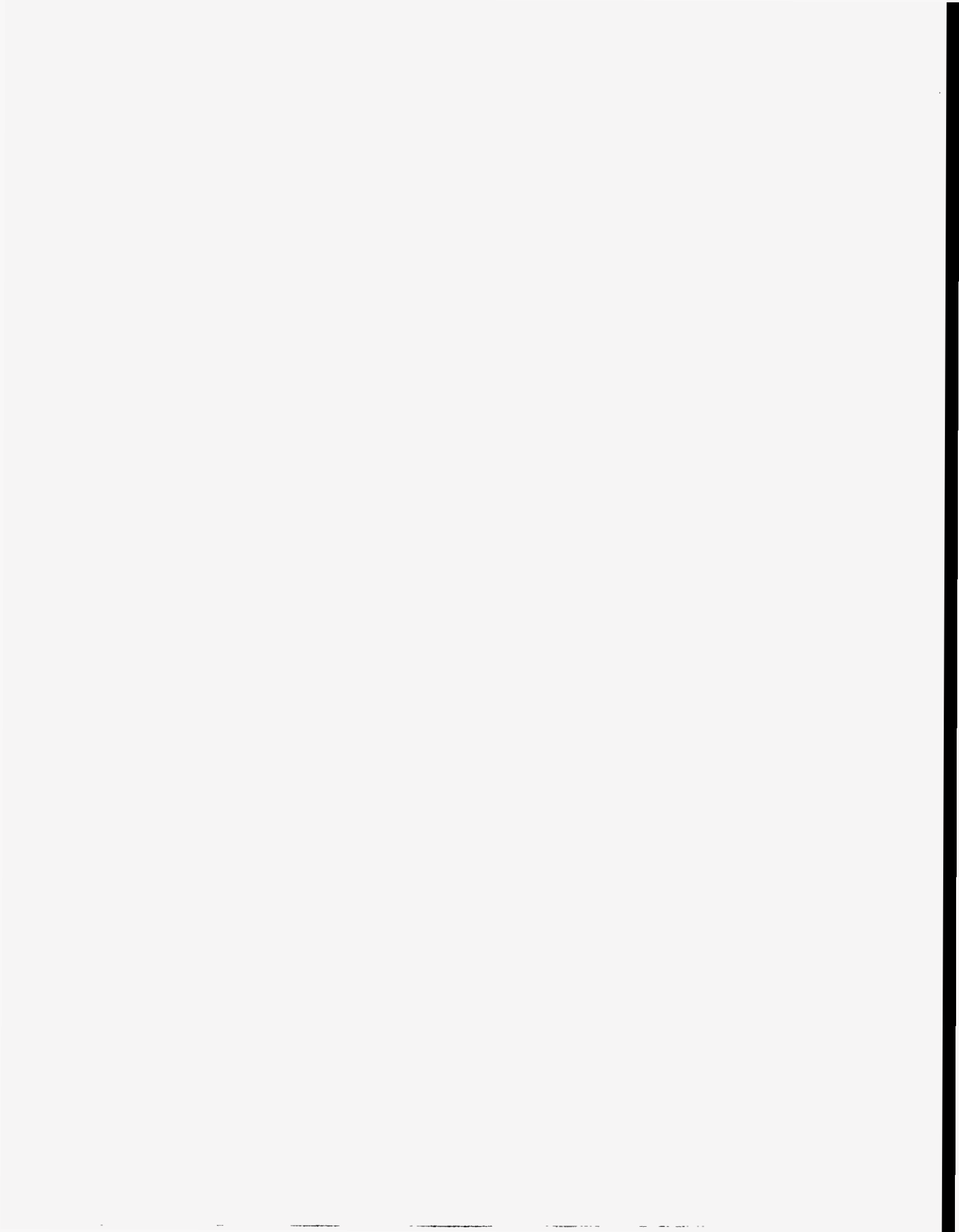
- Identifying the nature and extent of the problem.
- Evaluating the engineering design features associated with the problem.
- Establishing a data collection and/or evaluative monitoring program to quantify the magnitude of the problem.
- Resurveying the cell settlement plate elevations compared to prior elevations if subsidence is suspected.

### **9.2 IMPLEMENTATION OF CORRECTIVE ACTION**

The DOE will define detailed procedures for implementing the corrective action when a corrective action becomes necessary. Implementing a corrective action program could be carried out in two or more steps. If a preliminary assessment recommends a phased response to the problem, a program of additional characterization with additional data collection and/or evaluative monitoring would be implemented to draw conclusions and recommend the appropriate corrective action.

### **9.3 CERTIFICATION AND REPORTING REQUIREMENTS**

The DOE will prepare progress reports on each corrective action while it is under way or under evaluation. The NRC will receive a copy of each report, or the reports will be attached to the annual report. The NRC will be informed of all potential problems and solutions. Copies of all reports will also be provided to the Navajo Nation. After corrective action is complete, all work will be certified in accordance with the EPA standards. A copy of the accepted certification statement will become part of the permanent Mexican Hat site file, as will all reports, data, and documentation generated during the corrective action.



## 10.0 RECORD KEEPING AND REPORTING REQUIREMENTS

The DOE will maintain the permanent Mexican Hat site file containing all information needed to prepare for and conduct site surveillance. Compiled, complete, and accurate reports of site surveillance activities will be maintained in accordance with archival procedures set forth in 41 CFR Part 101 and 36 CFR Parts 1220-1238.

As required by 10 CFR Part 40, the DOE will provide an annual report to the NRC documenting the results of the long-term surveillance program. Copies of the annual report will be provided to the Navajo Nation and will be added to the permanent Mexican Hat site file. The annual reports and supporting documentation in the permanent site file will accomplish the following:

- Document the history of disposal site performance.
- Demonstrate to the NRC that licensing provisions are met.
- Provide the DOE and the NRC with the information needed to forecast future disposal site surveillance and monitoring needs.
- Provide the public with information that disposal site integrity has been maintained.

### 10.1 RECORDS

The GJPO will maintain the permanent Mexican Hat site file in Grand Junction, Colorado. All original deeds, custody agreements, and other property documents will be kept at the DOE Facilities and Property Management Division in Albuquerque, New Mexico. Copies of the property documentation will also be maintained in the permanent Mexican Hat site file. Surveillance and maintenance documentation maintained at the GJPO will exist as a record collection separate from the UPDCC. As such, the records will be handled in accordance with DOE Order 1324.2A to ensure proper handling, maintenance, and disposition of the documents.

All information in the Mexican Hat permanent site file will be available for NRC and public review. The permanent site file will include the following:

- Licensing documentation.
- Site-specific LTSP.
- Disposal site legal description, title, custody documentation, and cooperative agreements.
- Interagency agreements, authorizations, and access agreements.

- Documentation of rights of entry.
- Environmental assessments and findings of no significant impact for both the Mexican Hat and Monument Valley UMTRA Project sites.
- Disposal site characterization report.
- Final RAP and final design for construction.
- Pertinent design and construction documents and drawings.
- Site certification report (certification summary, completion, and final audit reports).
- As-built drawings.
- Disposal site map and inspection maps.
- Baseline and aerial photographs.
- Ground water monitoring reports and records.
- Additional monitoring reports and records.
- Monitor well permits and abandonment records.
- Annual reports to the NRC.
- Annual inspection reports and records.
- Follow-up or contingency inspection preliminary assessments, reports, and records.
- Custodial maintenance or repair reports and records.
- Corrective action plans, reports, and records.
- Quality assurance program plan.

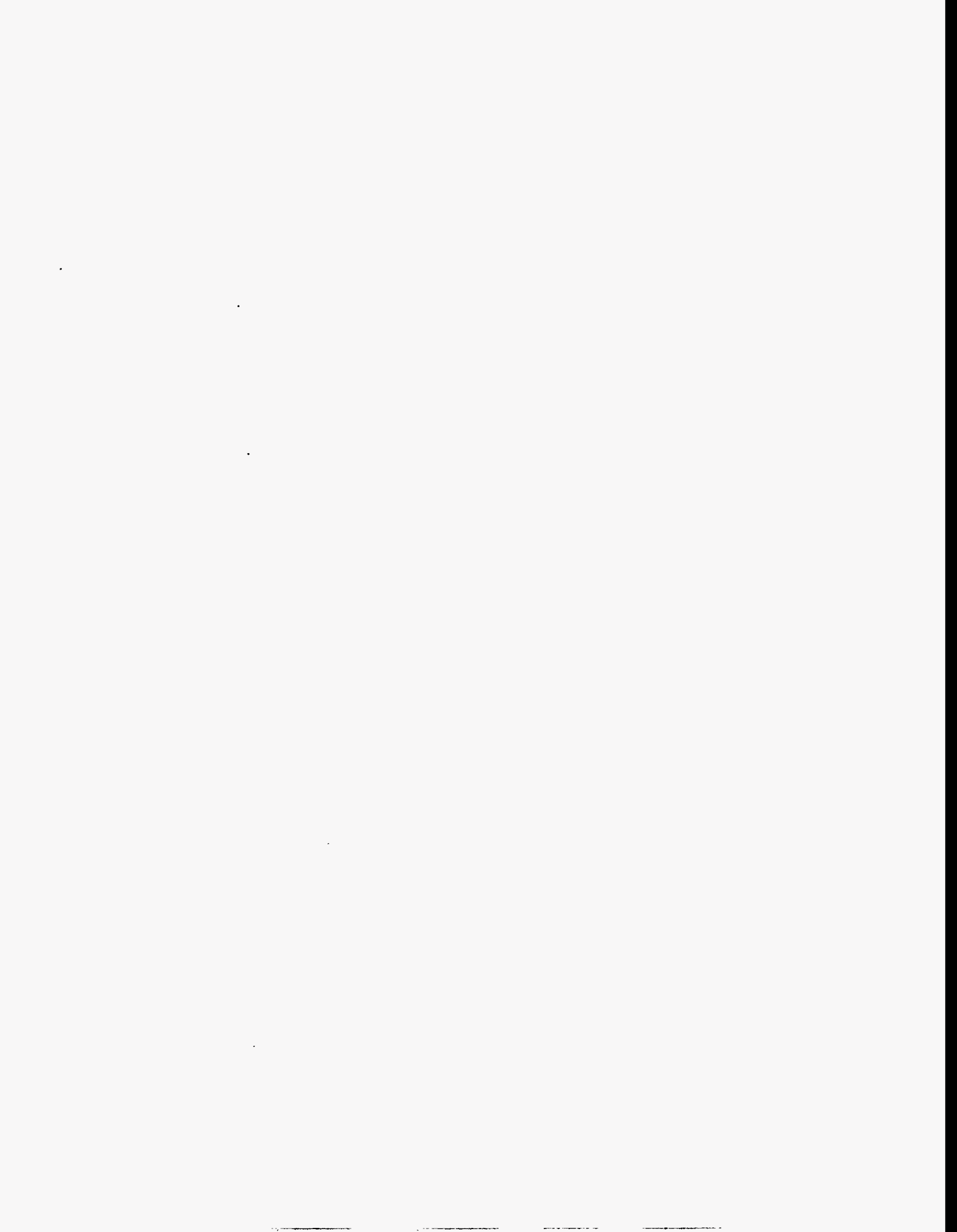
The GJPO will update the permanent Mexican Hat site file as necessary after annual disposal site inspections are complete. Original UMTRA Project records and files will be archived in UPDCC at the DOE UMTRA Project Office, Albuquerque, New Mexico. Copies of the documentation and annual updates and additions will be kept in the permanent site file held by the GJPO.

## 10.2 REPORTS

The GJPO will provide an annual report to the NRC, documenting the results of the annual site inspections and any other activities conducted in conjunction with the long-term surveillance program. The annual report must be submitted no more than 90 days after the date of the last UMTRA Project site inspection for that calendar year (Criterion 12, Appendix A, in 10 CFR Part 40).

The GJPO will also submit reports to the NRC and Navajo Nation documenting follow-up or contingency inspections and any corrective action plans. If any unusual damage or disruption is discovered, all preliminary inspection reports must be submitted within 60 days of the discovery (Criterion 12, Appendix A, in 10 CFR Part 40).

The results of the ground water monitoring program (Section 5.0) will be contained in separate reports not related to the long-term surveillance program.





## 11.0 EMERGENCY NOTIFICATION AND REPORTING

The Mexican Hat disposal site was designed to comply with 40 CFR Part 192 with minimum maintenance and oversight for a period of 1000 years, or at least 200 years. However, unforeseen events could create problems that may affect the disposal site's ability to remain in compliance with 40 CFR Part 192. Therefore, the DOE has requested notification from the Navajo Nation and other agencies of any purposeful intrusion or damage at the Mexican Hat disposal site as well as the occurrence of earthquakes, tornados, or floods in the Mexican Hat area.

### 11.1 AGENCY AGREEMENTS

The DOE has negotiated formal agreements with the Navajo Police, San Juan County Sheriff, USGS National Earthquake Information Center, and the Utah State Office of the National Weather Service. Copies of the agreements are presented in Attachment 5. In accordance with the agreements, the designated facility contact for emergency notification is the GJPO's 24-hour telephone number (970-248-6070). This telephone number is posted on the Mexican Hat disposal site entrance sign so that the public can notify the DOE if problems are discovered. The Navajo Nation's emergency notification telephone number (602-871-6113) is also posted on the disposal site entrance sign (Section 4.4).

Response letters from all of the agencies will be kept in the permanent Mexican Hat site file. Contact lists and telephone numbers for all agencies and parties with whom the DOE has entered into agreements will be updated annually, in conjunction with the scheduled site inspection, for inclusion in the disposal site inspection report.

### 11.2 UNUSUAL OCCURRENCES

The DOE has requested that the GJPO be notified of any unusual occurrences in the Mexican Hat area that may affect the surface or subsurface stability of the disposal site. If an unusual occurrence (e.g., human intrusion or vandalism) is observed by or reported to Navajo Police or San Juan County Sheriff personnel, these agencies have agreed to notify the GJPO.

### 11.3 EARTHQUAKES

The DOE subscribes to the USGS Early Warning Service for notification of the occurrence of an earthquake of sufficient magnitude to threaten a disposal site. This service provides data on the magnitude of the earthquake and location of the epicenter. The USGS National Earthquake Information Center agreed to notify the GJPO of an earthquake that satisfies any of the following criteria:

- Any earthquake of magnitude 3.0 or greater (Richter scale) within 0.3 degree [approximately 20 mi (30 km) at 37°8" latitude] of the Mexican Hat disposal site.
- Any earthquake of magnitude 5.0 or greater (Richter scale) within 1.0 degree [approximately 70 mi (110 km) at 37° 8" latitude] of the Mexican Hat disposal site.

#### 11.4 METEOROLOGICAL EVENTS

Presently, San Juan County has adequate radar coverage. In May 1995, the National Radar Service implemented the new NEXRAD, WSR-88D doppler system which covers San Juan County. Severe weather information is available from the National Weather Service via the doppler system. An agreement letter has been sent to the National Weather Service.

## 12.0 QUALITY ASSURANCE

The GJPO is responsible for developing QA procedures specific to the UMTRA Project long-term surveillance program. The GJPO *Long-Term Surveillance and Maintenance Program Quality Assurance Program Plan* (Chem Nuclear, 1992) specifies requirements for the following:

- Program planning.
- Program activities, including inspections, site maintenance, corrective action, and emergency responses.
- Monitoring, if required.
- Personnel qualifications and training.
- Program surveillance and audits.
- Analytical QA.
- Analytical data validation.

All site inspections, monitoring data, records, photographs, maps, and other information related to the long-term surveillance program for the Mexican Hat disposal site are subject to formal and unannounced audits by the DOE UMTRA Project Office or the NRC. Specific QA criteria have already been developed for aerial photographs (DOE, 1992).



### 13.0 PERSONNEL HEALTH AND SAFETY

DOE Order 5480.1B, *Environment, Safety and Health Program for DOE Operations*, establishes personnel health and safety procedures for all DOE operations. After the Mexican Hat disposal site is licensed and transferred to the GJPO, health and safety procedures for GJPO personnel and GJPO subcontractors will be the responsibility of the GJPO. The GJPO will determine health and safety requirements for its personnel and subcontractors in accordance with applicable orders and federal regulations. The disposal cell was constructed to control Ra-226 and Rn-222 releases from the RRM to the regulatory standards in 40 CFR §192.02(a); therefore, radiation exposure tracking and dosimetry badges are not needed.

#### 13.1 HEALTH AND SAFETY

The inspector's health and safety training and certifications, the locations and telephone numbers for emergency medical and law enforcement facilities, and the designated facility contact's 24-hour telephone number will be verified by DOE before each site inspection.

Specific safety concerns at the Mexican Hat disposal site include steep slopes and cliffs; slip, trip, and fall hazards; animal, snake, and insect bites; hantavirus; heat and cold stress; fire hazards; skin punctures and cuts; overhead electrical power lines and buried utilities; driving hazards; severe weather and unusual events (e.g., tornado or earthquake). Safety equipment and a first aid kit will be taken to the site to reduce exposures to identified hazards and to provide first aid as needed.

##### Emergency medical and law enforcement facilities

Local emergency medical and law enforcement agencies have been briefed on the scope of work at the Mexican Hat disposal site during the long-term surveillance program. The 24-hour emergency telephone numbers for these agencies are as follows:

- Fire: Bluff Fire Department in Bluff, Utah, 801-587-2237.
- Hospital: Monument Valley Seventh Day Adventist Hospital in Gouldings, Utah, 801-727-3241.
- Ambulance: Monument Valley Seventh Day Adventist Hospital in Gouldings, Utah, 801-727-3241; Bluff Fire Department in Bluff, Utah, 801-587-2237; or St. Mary's Air Life in Grand Junction, Colorado, 800-525-4224.
- Law Enforcement: San Juan County Sheriff in Monticello, Utah, 801-587-2237, Navajo Police Department in Kayenta, Arizona, 520-697-3578; or Utah State Police in Price, Utah, 801-637-0893.

All of these agencies can also be contacted by dialing 911 or the San Juan County Sheriff in Monticello, Utah at 801-587-2237. The nearest telephone is at the San Juan Inn in Mexican Hat, Utah.

The nearest hospital with an emergency room is the Monument Valley Seventh Day Adventist Hospital in Gouldings, Utah (Figure 2.1). This hospital can be reached by traveling south from the Mexican Hat disposal site on U.S. Highway 163 to the Utah-Arizona border where there is a high school on the right. Turn right at the high school, and proceed 1 mile to the hospital. Personnel inspecting the disposal site should ensure that at least one if not all personnel have taken first aid and cardiopulmonary resuscitation training. The Technical Assistance Contractor's health and safety supplement for the Mexican Hat disposal site will be included in the permanent Mexican Hat site file.

### 13.2 REPORTABLE INCIDENTS

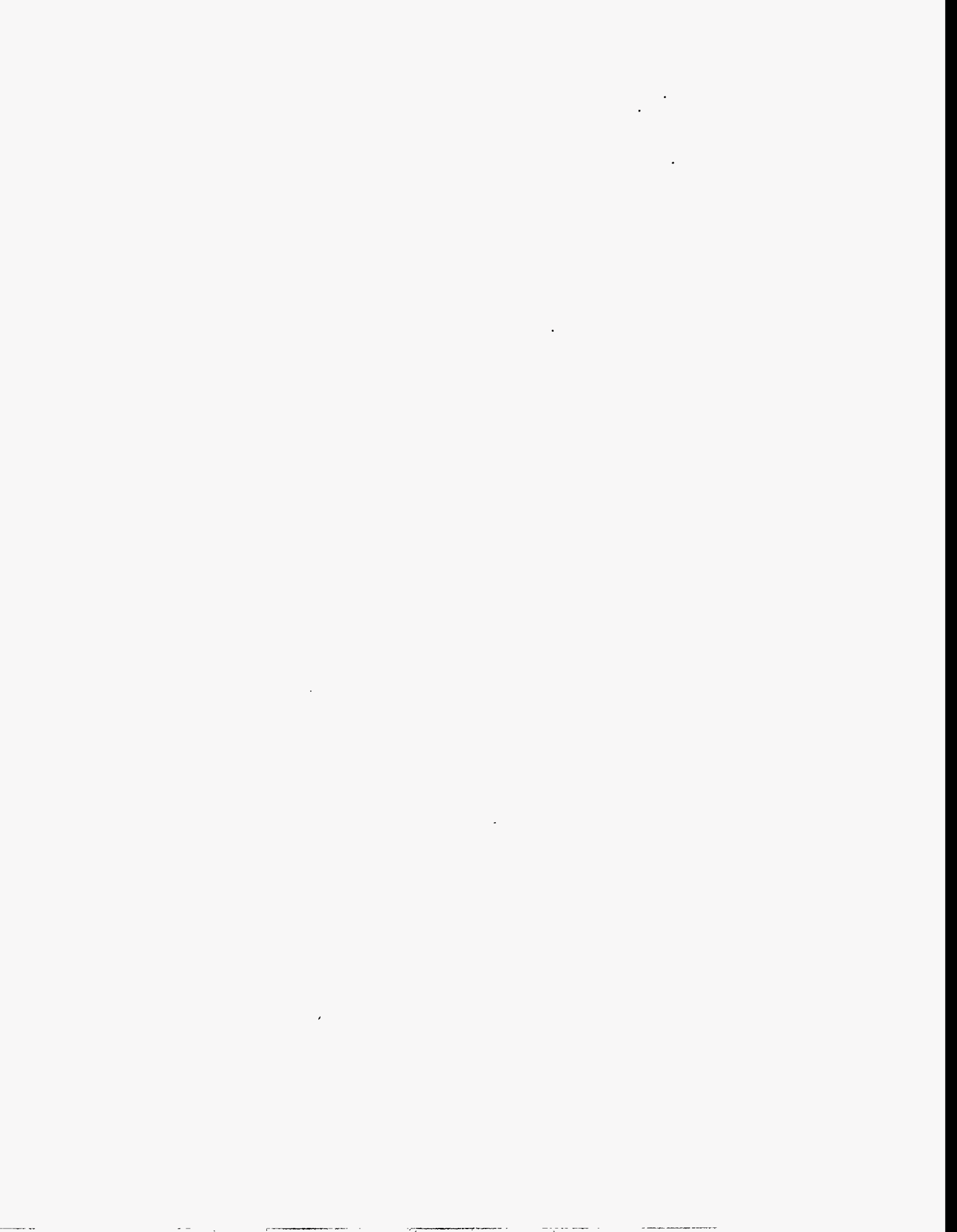
The inspection team should be briefed by the GJPO Health and Safety Manager on potential site hazards and other requirements before site inspections or visits. The GJPO Health and Safety Manager's telephone number is 970-296-6730.

In accordance with DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, any accident, injury, or unusual event (e.g., tornado or earthquake) occurring during a site inspection is a reportable incident. The incident will be reported to the GJPO facility manager or designated contact within 8 hours of the incident. The GJPO facility manager's 24-hour telephone number for reporting an incident is 970-248-6070 and is posted on the Mexican Hat disposal site entrance sign.

## 14.0 LIST OF CONTRIBUTORS

The following individuals contributed to the preparation of this report.

Name	Contribution
M. Bradshaw/D. Jones	Document coordinator
D. Jones	Primary author
J. McBee	Site manager, document owner
A. Holm, R. Neri Zagal, J. McBee, J. Ritchey, J. Crain, M. Gawthrop, A. Miller	Document review
T. Jackson	Geochemistry
J. Crain	Engineering design
A. Miller	Hydrology, hydrogeology
P. Martinez	Real estate
L. Sanchez, Word Center Inc.	Text processing
E. Bond	Graphic design
D. Kahl, K. Walston	Technical editing





## 15.0 REFERENCES

- Chem Nuclear (Chem Nuclear Geotech, Inc.), 1992. *Long-Term Surveillance and Maintenance Program Quality Assurance Program Plan*, P-GJPO-152, prepared by Chem Nuclear Geotech, Inc., for the U.S. Department of Energy, Grand Junction Projects Office, Grand Junction, Colorado.
- DOE (U.S. Department of Energy), 1995a. "1995 Annual Prelicensing Inspection of the Mexican Hat, Utah, UMTRA Project Disposal Site," Draft, DOE/ID/12584-222, prepared by Rust Geotech for the U.S. Department of Energy, Albuquerque Operations Office, Grand Junction Projects Office, Grand Junction, Colorado.
- DOE (U.S. Department of Energy), 1995b. *UMTRA Project Site Observational Work Plan, Mexican Hat, Utah*, DOE/AL/62350-153, Rev. 0, DOE UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico.
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- DOE (U.S. Department of Energy), 1993b. *Licensing Plan for UMTRA Project Disposal Sites*, DOE/AL/62350-9F, DOE UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico.
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- FBDU (Ford, Bacon and Davis Utah, Inc.), 1981. *Engineering Assessment of Inactive Uranium Mill Tailings, Mexican Hat Site, Mexican Hat, Utah*, DOE/UMT-0109, FBDU 360-03, UC 70, prepared by Ford, Bacon and Davis Utah, Inc., for the U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico.
- MK (Morrison Knudsen Corporation), 1994. *Uranium Mill Tailings Remedial Action Project (UMTRAP), Mexican Hat, Utah, Monument Valley, Arizona, Long Term Surveillance Plan-Part I, Subcontract Documents H/M-LTSP-I, Final Design for Construction*, prepared by Morrison Knudsen Corporation for the U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, New Mexico.
- MK-F (MK-Ferguson Company), 1995. "Mexican Hat, Utah, Monument Valley Arizona, Draft Completion Report," prepared by MK-Ferguson Company for the U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico.
- NRC (U.S. Nuclear Regulatory Commission), 1992. "Draft Technical Evaluation Report for the Proposed Remedial Action of the Monument Valley, Arizona, and Mexican Hat Tailings Site, Mexican Hat, Utah, Uranium Mill Tailings Sites," Division of Low-Level Waste Management and Decommissioning, Office of Nuclear Material Safety and Safeguards, Washington, D.C.
- Snelling, R. N., 1971. "Environmental Survey of the Uranium Mill Tailings Pile, Mexican Hat, Utah," *Radiological Health Data Reports*, Vol. 12, Southwestern Radiological Health Laboratory, Bureau of Radiological Health, Las Vegas, Nevada.

### CODE OF FEDERAL REGULATIONS

- 10 CFR Part 40, *Domestic Licensing of Source Material*, U.S. Nuclear Regulatory Commission.
- 36 CFR Parts 1220-1238, *National Archives and Records*, Subchapter B - Records Management, National Archives and Records Administration.
- 40 CFR Part 192, *Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings*, U.S. Environmental Protection Agency.

41 CFR Part 101, *Federal Property Management Regulations*, General Services Administration.

#### DOE ORDERS

Order 1324.2A, *Records Disposition*, 13 September 1988, Office of Information Resource Management, U.S. Department of Energy, Washington, D.C.

Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, draft, 24 September 1991, U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico.

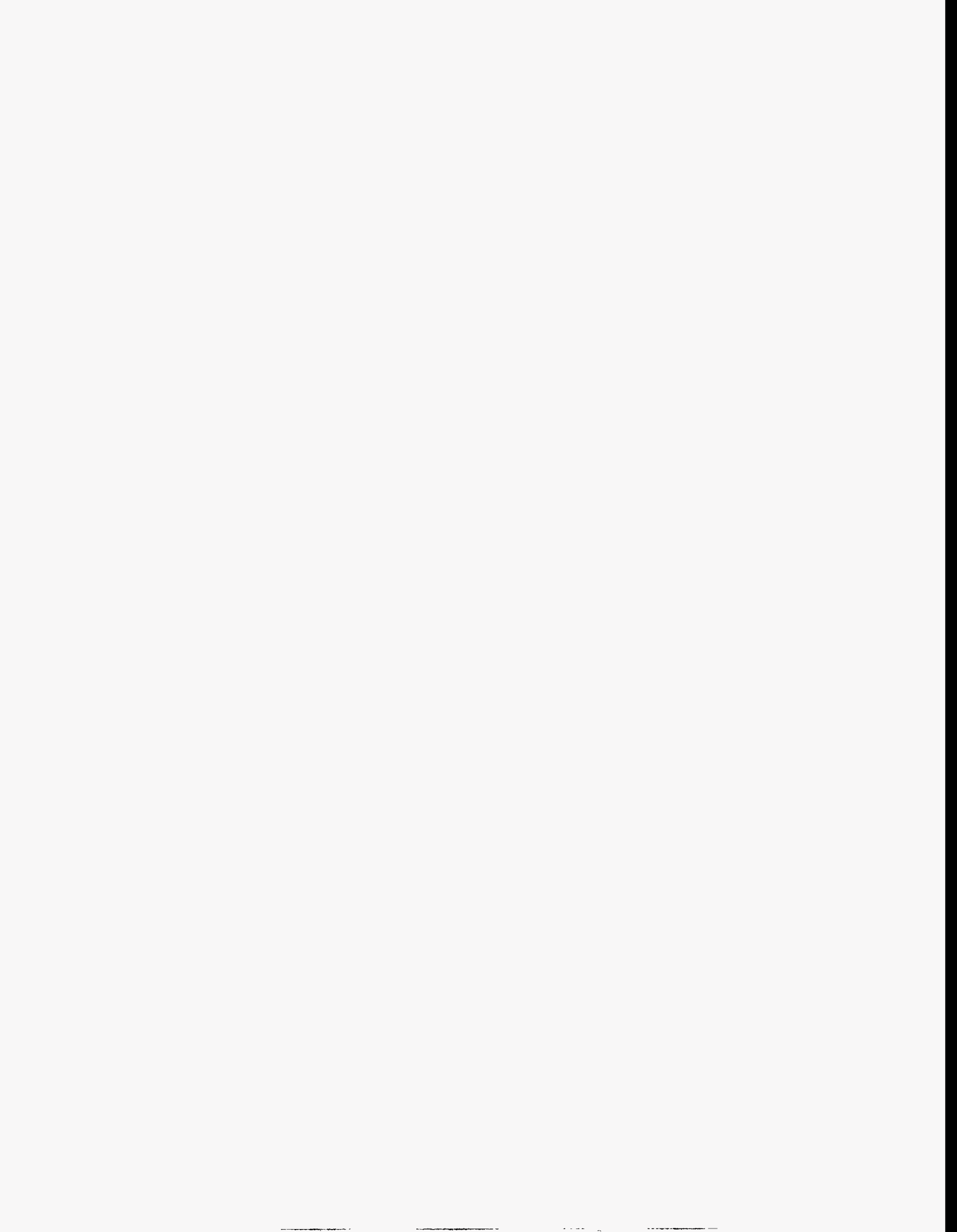
Order 5480.1B, *Environment, Safety and Health Program for DOE Operations*, September 1986, U.S. Department of Energy, Safety Programs Division, Washington, D.C.

#### FEDERAL REGISTER

60 FR 2854, *Groundwater Standards for Remedial Actions at Inactive Uranium Processing Sites*, 11 January 1995, U.S. Environmental Protection Agency.

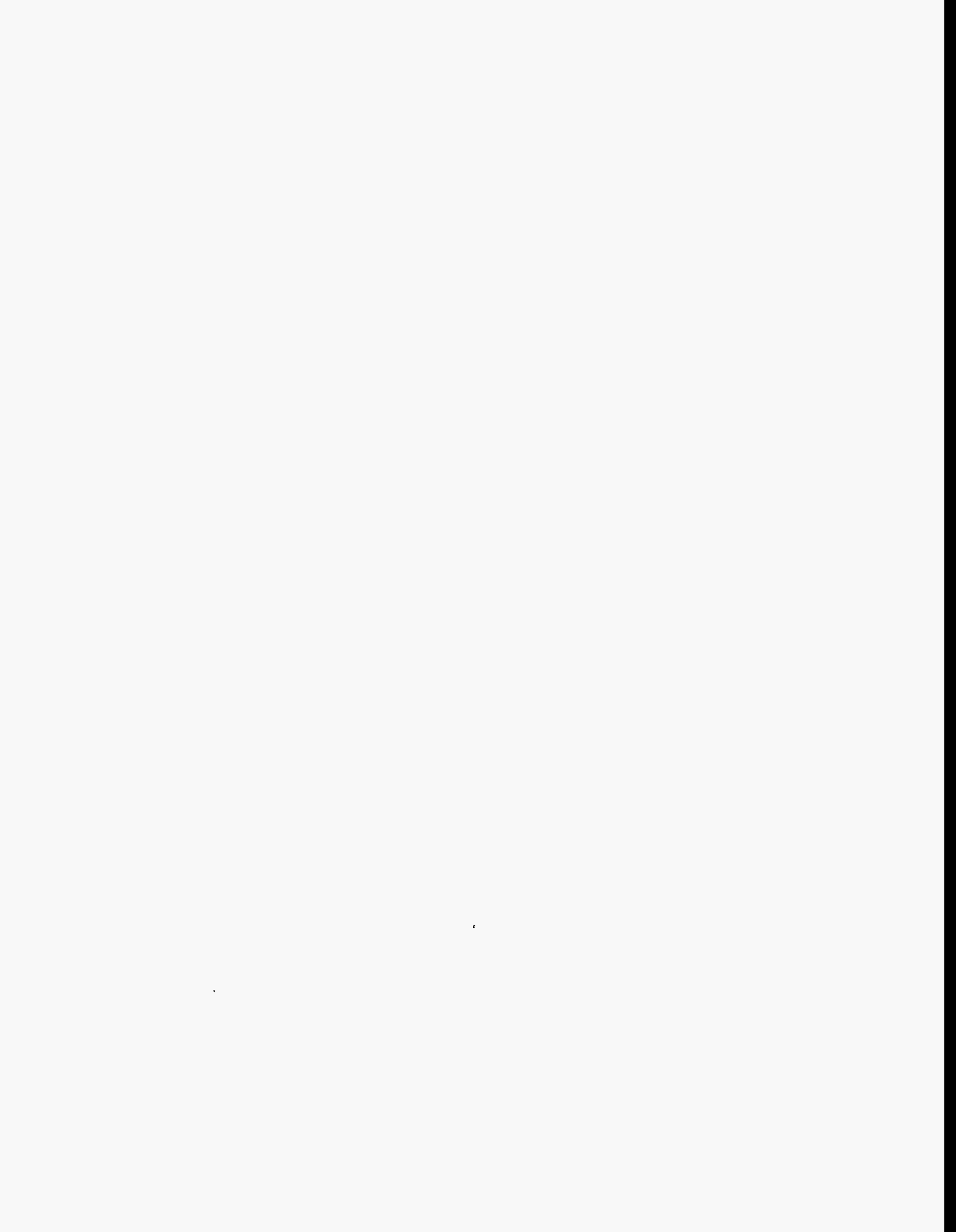
#### UNITED STATES CODE

42 USC §7901 *et seq.*, *Uranium Mill Tailings Radiation Control Act of 1978*, 8 November 1978, Washington, D.C.

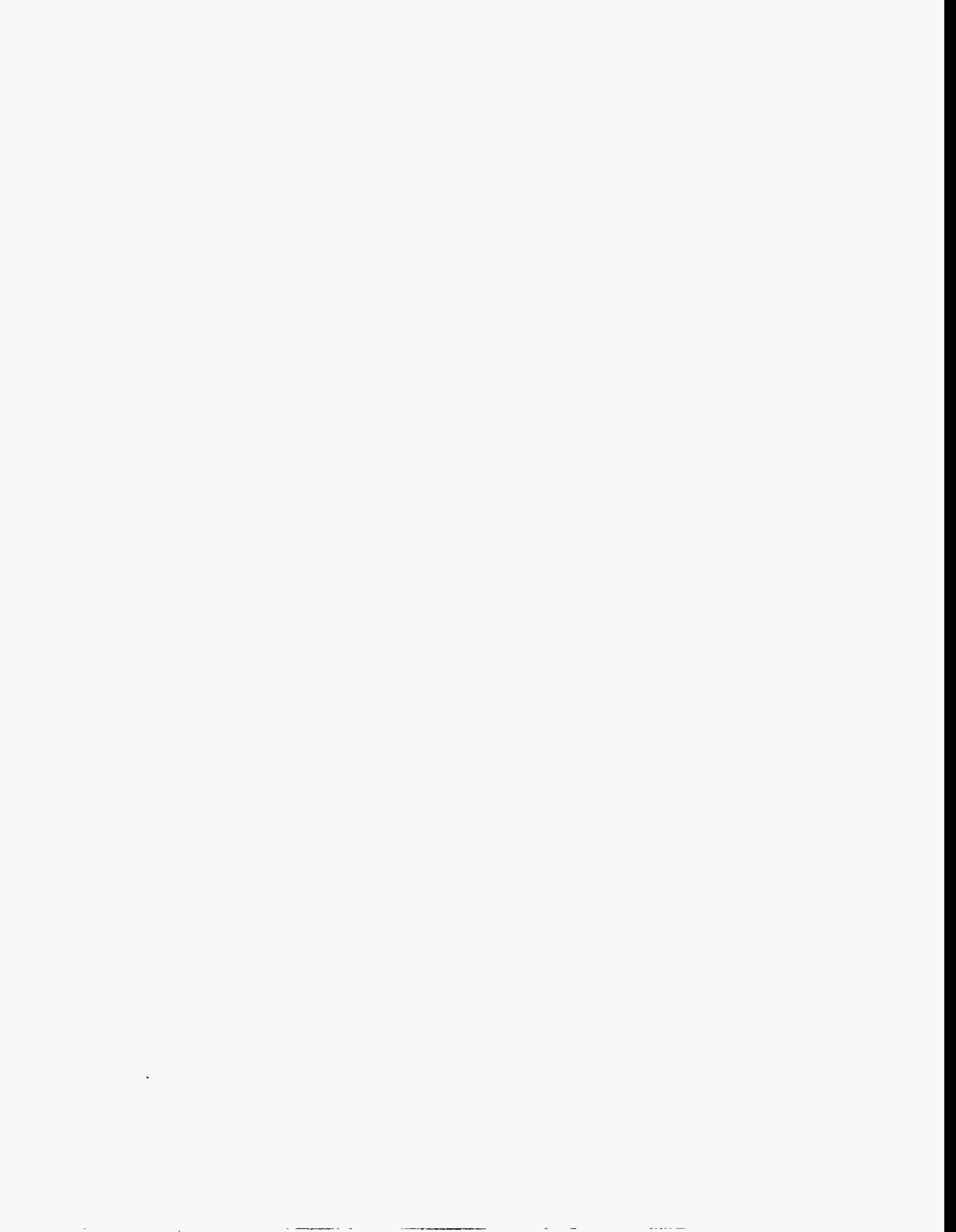


**ATTACHMENT 1**

**NRC CONCURRENCE AND  
LICENSING DOCUMENTATION**

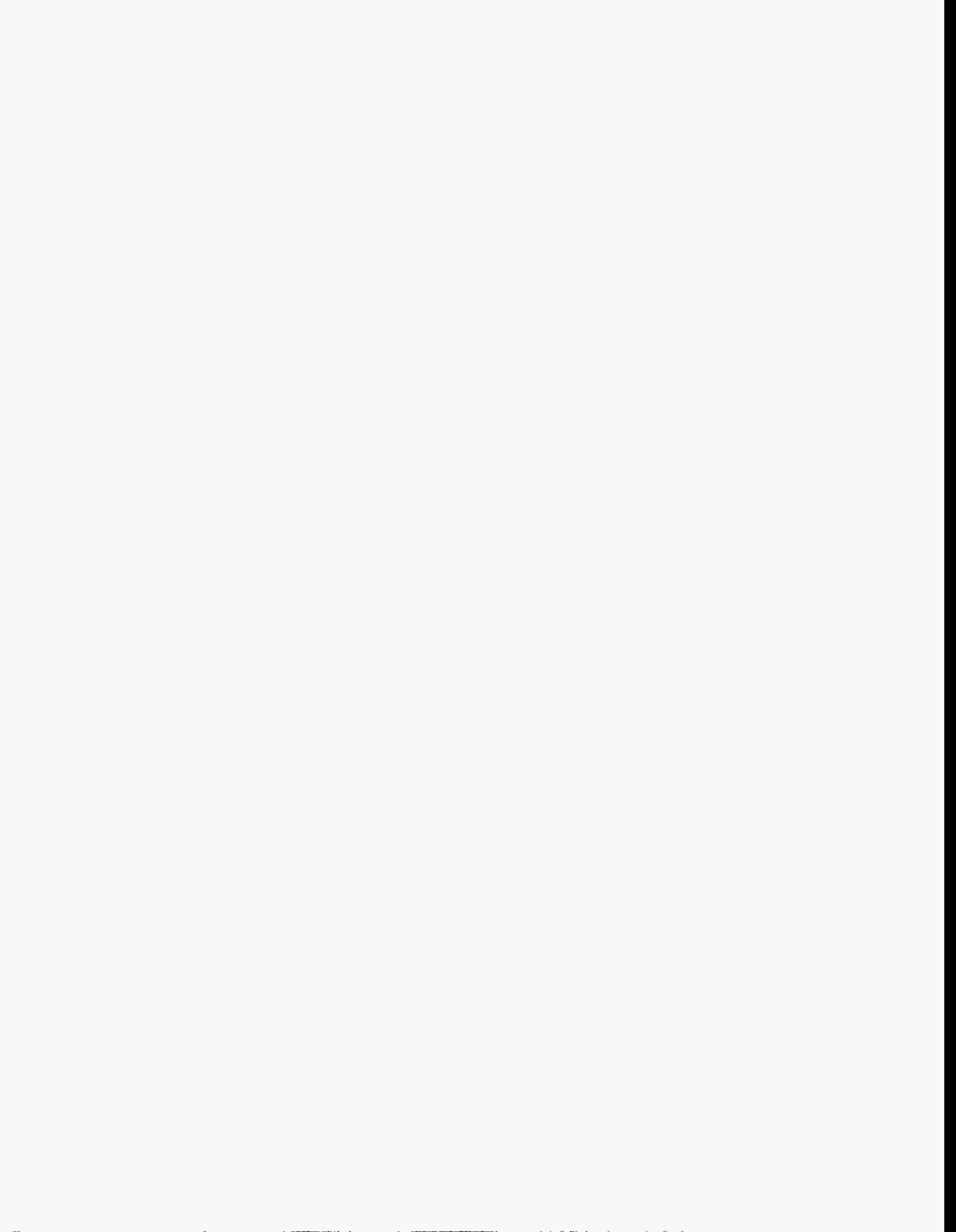


NRC concurrence and licensing documentation  
will be included when the site is licensed.





**ATTACHMENT 2**  
**SITE OWNERSHIP/CUSTODY DOCUMENTATION**



## ATTACHMENT 2

### SITE OWNERSHIP/CUSTODY DOCUMENTATION

Remedial action at the Mexican Hat UMTRA Project site consisted of consolidation and stabilization of the contaminated materials on-site. Remedial action also included the relocation of contaminated materials at the Monument Valley, Arizona, site to the Mexican Hat site. Under the requirements of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978, as amended, and under the terms of the Cooperative Agreement between the Navajo Nation and the federal government, the Navajo Tribe and the U.S. Department of Energy (DOE) participated in the selection and performance of remedial action at the two designated sites through completion.

The Mexican Hat designated processing site consisted of approximately 235 acres. The final disposal site acreage consists of approximately 119 acres.

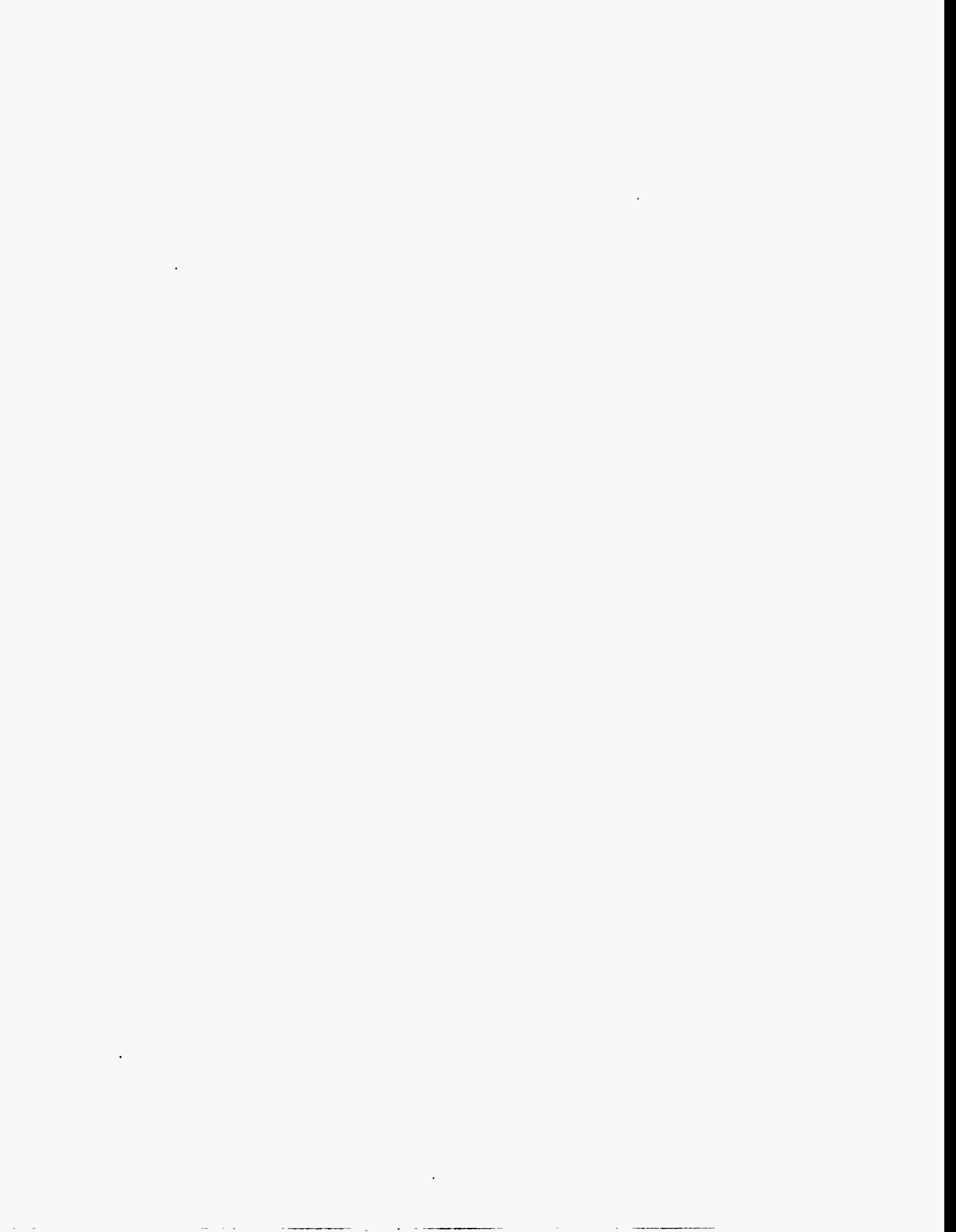
#### Transfer of Custody and Right of Access to the Final Disposal Site

A custodial access agreement between the DOE and the Navajo Nation will give access and custody of the residual radioactive materials, disposal cover components, and any engineering features associated with the disposal cell to the DOE. When it is finalized, a copy of the agreement will be included in this attachment.

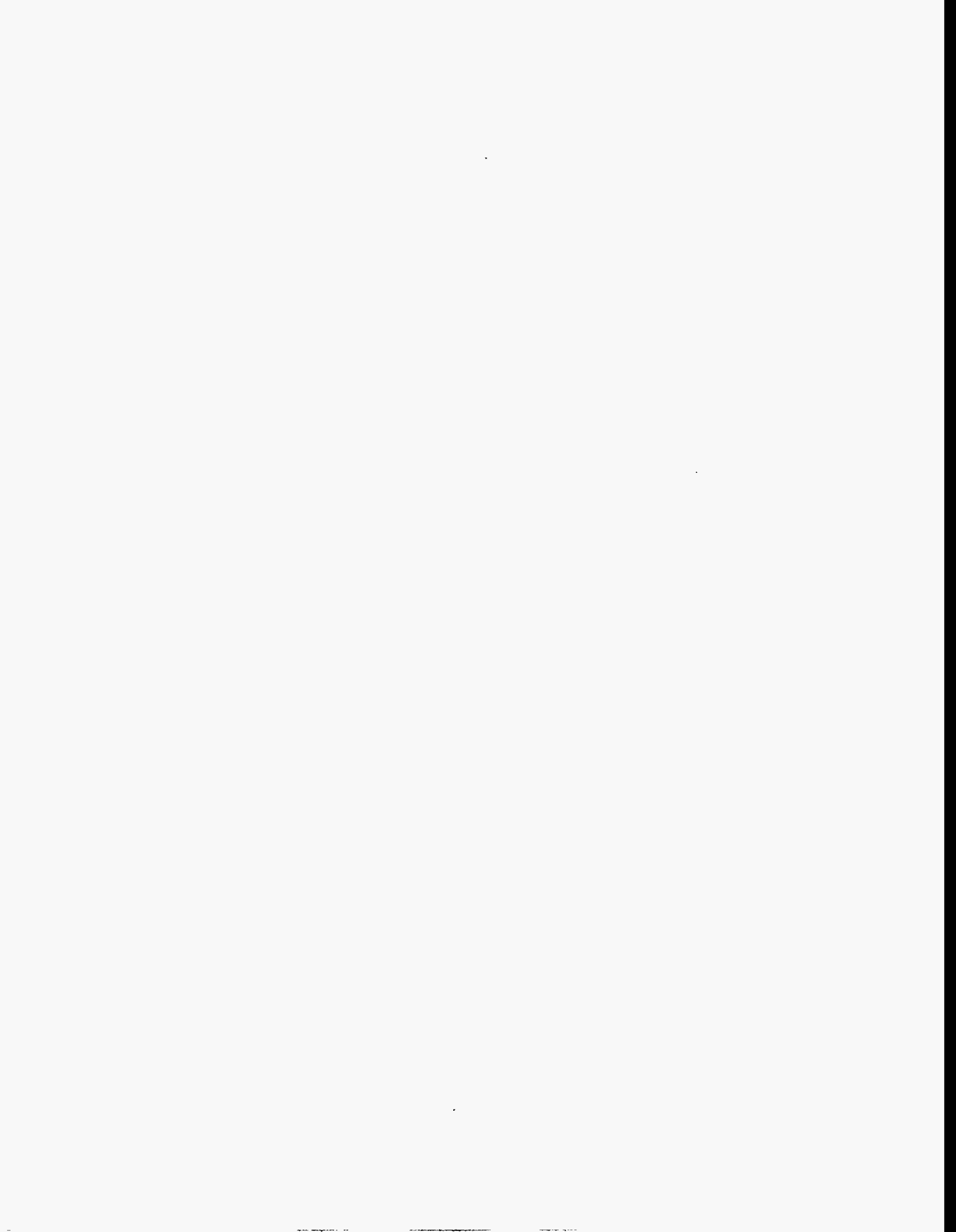
#### Legal Description

A tract or parcel of land located in the Navajo Reservation described as follows:  
Beginning point is reached by moving South 6817.30 feet and West 4247.41 feet from the NE corner of Section 7, Township 42 South, Range 19 East, Salt Lake Base and Meridian to Station 1 and thence S28° 44' 53"W 798.41 feet to the point of beginning. From the point of beginning move:

S 38° 12' 22" E	591.76 feet, thence
S 03° 34' 35" W	545.06 feet, thence
S 29° 54' 00" W	960.90 feet, thence
S 71° 26' 45" W	1671.90 feet, thence
N 87° 06' 49" W	238.30 feet, thence
N 51° 18' 40" W	617.51 feet, thence
N 19° 04' 19" E	483.54 feet, thence
N 01° 17' 32" E	1064.27 feet, thence
N 62° 55' 49" E	914.14 feet, thence
N 81° 01' 39" E	288.53 feet, thence
N 58° 01' 52" E	332.42 feet, thence
S 78° 25' 48" E	907.44 feet, to the point of beginning containing 118.798 acres.



**ATTACHMENT 3**  
**SITE INSPECTION PHOTO LOG**



### SITE INSPECTION PHOTO LOG

Site: \_\_\_\_\_ Site Activity: \_\_\_\_\_

Date: \_\_\_\_\_ Time of Day: From \_\_\_\_\_ to \_\_\_\_\_

Weather Conditions: \_\_\_\_\_

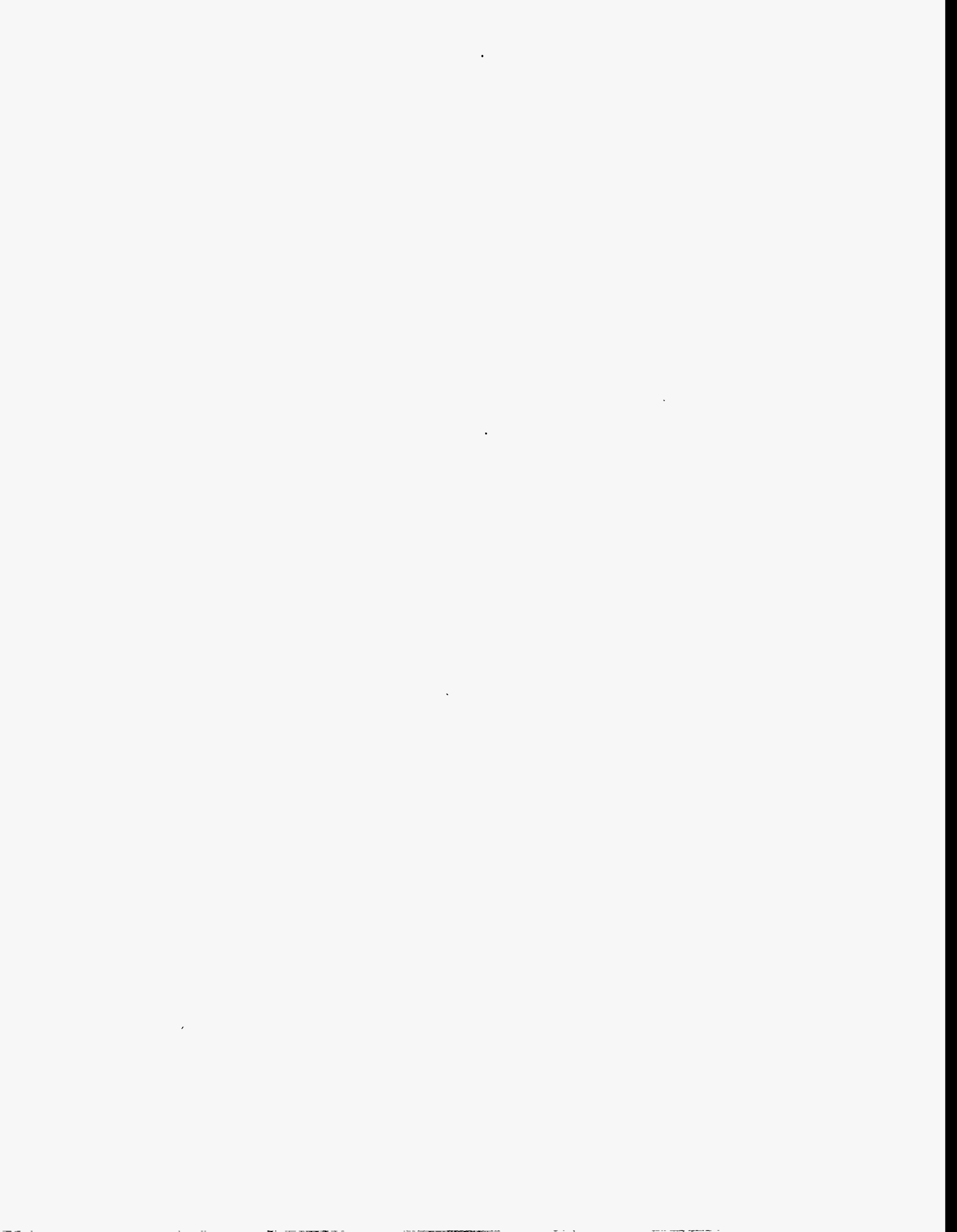
Roll Number: \_\_\_\_\_ Film Type: \_\_\_\_\_ Number of Exposures \_\_\_\_\_

Photo Number	Location	Description
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
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**ATTACHMENT 4**  
**INITIAL SITE INSPECTION CHECKLIST**



**SITE INSPECTION CHECKLIST FOR THE MEXICAN HAT, UTAH  
URANIUM MILL TAILINGS DISPOSAL SITE**

Date of Last Inspection:

Reason for Last Inspection:

Responsible Agency<sup>1</sup>: DOE Grand Junction Projects Office

Address: P.O. Box 2567, Grand Junction, Colorado 81502-2567

Responsible Agency Official:

Inspection Start Date and Time:

Weather Conditions at Site:

Inspection Completion Date and Time:

Chief Inspector: \_\_\_\_\_

Name	Title	Organization
------	-------	--------------

Assistant Inspectors: \_\_\_\_\_

Name	Title	Organization
------	-------	--------------

Name	Title	Organization
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**A. GENERAL INSTRUCTIONS**

1. All checklist items must be completed and detailed comments made to document the results of the site inspection. The completed checklist is part of the field record of the inspection. Additional pages should be used, as necessary, to ensure that a complete record is made. Attach the additional pages and number all pages upon completion of the inspection.
2. Inspectors are to provide an up-to-date résumé or vitae for inclusion in the inspection report.
3. Any checklist line item that is checked by an inspector must be fully explained or an appropriate reference to previous reports provided. The purpose of this requirement is to provide a written explanation of the inspector's observations and rationale for conclusions and recommendations. Explanations are to be placed on additional attachments and cross-referenced appropriately. Explanations, in addition to narrative, will take the form of sketches, measurements, and annotated site atlas overlays.

<sup>1</sup>Responsibility for site inspections assigned by DOE UMTRA Project Office, Albuquerque, to DOE Grand Junction Projects Office, November 6, 1990.

4. The site inspection is a walking inspection of the entire site, including the perimeter and sufficient transects as specified in **Section 6.4.2**, to be able to inspect the entire surface and all features specifically described in this checklist. Every monument, site marker, sign, and erosion control marker will be inspected.
5. A set of color print 35-mm photographs is required. Sufficient photographs will be taken to compare to baseline photographs and determine if there are any significant differences in site appearance. In addition, all anomalous features or new features (such as changes in adjacent area land use) are to be photographed. A photo log entry will be made for each photograph taken.
6. Field notes taken to assist in completion of this checklist will become part of the inspection record. No form is specified; the field notes must be legible and in sufficient detail to enable review by succeeding inspectors and the responsible agency.

**B. PREPARATION (to be completed prior to site visit)**

Yes    No

1. Review licenses (including *Long-Term Surveillance and Maintenance Plan*).
2. Obtain site as-built plans with the following information:
  - a. Adjacent off-site features and land use; fences, gates, and signs; access roads and paths.
  - b. Survey monuments, boundary markers, site markers, aerial photo ground controls, ground photo locations.
  - c. Site drainage and diversion channels.
  - d. Planned inspection transects and vegetation cover.
  - e. Others.
3. Review previous inspection reports.
  - a. Were anomalies or trends in modifying processes detected on previous inspections?
  - b. Was a follow-up or contingency inspection conducted?
  - c. Was custodial maintenance performed?
  - d. Was contingency repair work done as a result of the Phase II inspection?

Yes    No

4. Review site custodial maintenance and contingency repair records.
  - a. Has site contingency repair resulted in a change from as-built conditions?
  - b. Are revised as-builts available that reflect contingency repair changes?
5. When necessary, obtain entry approval to adjacent property (attach signed access agreement).
6. Review aerial photos if taken since last inspection. For each set, enter date taken, scale, and if interpreted.

<u>Set</u>	<u>Date</u>	<u>Scale</u>	<u>Interpreted</u>	
			<u>Y</u>	<u>N</u>
1.	_____	_____	___	___
2.	_____	_____	___	___
3.	_____	_____	___	___

7. Were any of the following suggested by examination of aerial photographs? (If yes, give photo set date and indicate if item noted by interpreter or inspector):
  - a. Intrusion by man?
  - b. Intrusion by animals?
  - c. Channelized erosion on slopes?
  - d. Change in area drainage?
  - e. Landslides?
  - f. Creep on slopes?
  - g. Obstruction of diversion channels?
  - h. Bank erosion of diversion channels?
  - i. Seepage?
  - j. Cracking?
  - k. Change in vegetative cover?

Yes    No

- l. Displacement of fences, site markers, boundary markers, or monuments?
  - m. Change in adjacent land use?
  - n. Evidence of tailings exposure or transport?
8. From as-builts, or subsequent inspection reports, note distance and azimuth from designated site location, such as a monument, to adjacent off-site features that could eventually affect integrity of site.

<u>Off-site feature</u>	<u>Site monument no.</u>	<u>Distance</u>	<u>Azimuth</u>
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____

9. Assemble and check out the following equipment, as needed, to conduct inspections:
- a. Cameras, film, and miscellaneous support equipment.
  - b. Binoculars.
  - c. Tape measure (100 ft)
  - d. Optical ranging device.
  - e. Brunton compass or equivalent.
  - f. Photo scale stick.
  - g. Erasable board.
  - h. Plant press, plastic bags for vegetation.
  - i. Keys to locks.
  - j. Bolt cutters.
  - k. Hand lens.
  - l. Clipboard.
  - m. Mexican Hat LTSP topographical maps.
  - n. Others.

**C. SITE INSPECTION**

- 1. Adjacent off-site features (within 0.25 mile [0.4 km] of site boundary).
  - a. Have there been any changes in use of adjacent areas (grazing, construction, agriculture)?

Yes    No

- b. Are there any new roads or trails?
  - c. Has there been a change in the position of nearby stream channels?
  - d. Has there been headward erosion of nearby gullies?
  - e. Are there new diversion channels?
  - f. Others?
2. Access roads and paths, fences, gates, and signs.
- a. Is there a break in the fence?
  - b. Have any posts been damaged or their anchoring weakened?
  - c. Is there evidence of erosion or digging beneath the fence?
  - d. Do any of the gates show evidence of tampering or damage?
  - e. Is there any evidence of human intrusion?
  - f. Is there any evidence of large animal intrusion?
  - g. Have any signs been damaged or removed?  
(Number of signs replaced: \_\_\_\_)
  - h. Are access roads and paths passable?
  - i. Others?
3. Monuments and other permanent features.
- a. Have the survey or boundary monuments been defaced or disturbed?
  - b. Have the site markers been disturbed by man or natural processes?
  - c. Do natural processes threaten the integrity of any monument or site marker?
  - d. Others?

Yes    No

4. Crest.

- a. Is there evidence of uneven settling (e.g., depressions or scarps)?
- b. Is there cracking?
- c. Has the outer cover layer been breached?
- d. Is there evidence of erosion?
  - 1) By water (e.g., rills or rivulets)?
  - 2) By wind (e.g., pedestal rocks or ripple marks)?
- e. Is there evidence of animal burrowing?
- f. Others?

5. Slopes.

- a. Is there evidence of gradual downslope movement or creep (e.g., terraces or deflection of plants)?
- b. Is there cracking?
- c. Can depressions or bulges on the slope be seen?
- d. Has the outer cover layer been breached?
- e. Is there evidence of erosion:
  - 1) By water?
  - 2) By wind?
- f. Has water runoff become channelized (e.g., rivulets or gullies)?
- g. Is there evidence of seepage (e.g., moisture, color, or vegetation)?
- h. Is there evidence of animal burrowing?
- i. Is there evidence of deterioration of riprap or gravel cover?



Yes    No

j. Others?

6. Periphery (within site boundaries).

- a. Is there evidence of seepage such as wet areas or localized change of vegetation?
- b. Is there evidence of sediment transport from the tailings pile by water or wind?
- c. Is the drainage as described in the as-builts?
- d. Others (e.g., burrowing animals or erosion)?

7. Diversion channels.

- a. Is there evidence of bank erosion?
- b. Has the integrity of riprap structures been disturbed by people or natural processes?
- c. Is there evidence of channel erosion?
- d. Is there evidence of sedimentation in the channel?
- e. Is the channel obstructed in any way?
- f. Is there any evidence that the diversion channels are not performing their function?
- g. Others?

8. Photography.

- a. Have all required photos been taken?
- b. Has a photo log sheet been prepared for each roll of film exposed?
- c. Number of rolls of film exposed: \_\_\_\_\_
- d. Number of frames per roll: \_\_\_\_\_
- e. Others?

Yes    No

**D. FIELD CONCLUSIONS**

1. Is there an imminent hazard to the integrity of the tailings pile? (Immediate report required)  
Person \_\_\_\_\_  
Agency to whom report made: \_\_\_\_\_
2. Are more frequent inspections required?
3. Are existing contingency repair actions satisfactory?
4. Are follow-up inspections required?
5. Is a contingency report or custodial maintenance required?
6. Rationale for field conclusions are documented as the text of this report.

**E. CERTIFICATION**

I have conducted a prelicensing inspection of the Mexican Hat uranium mill tailings site in accordance with the procedures of the license (includes the site surveillance plan) as recorded on this checklist, attached sheets, field notes, photo log sheets, and photos.

\_\_\_\_\_  
Chief Inspector's Signature

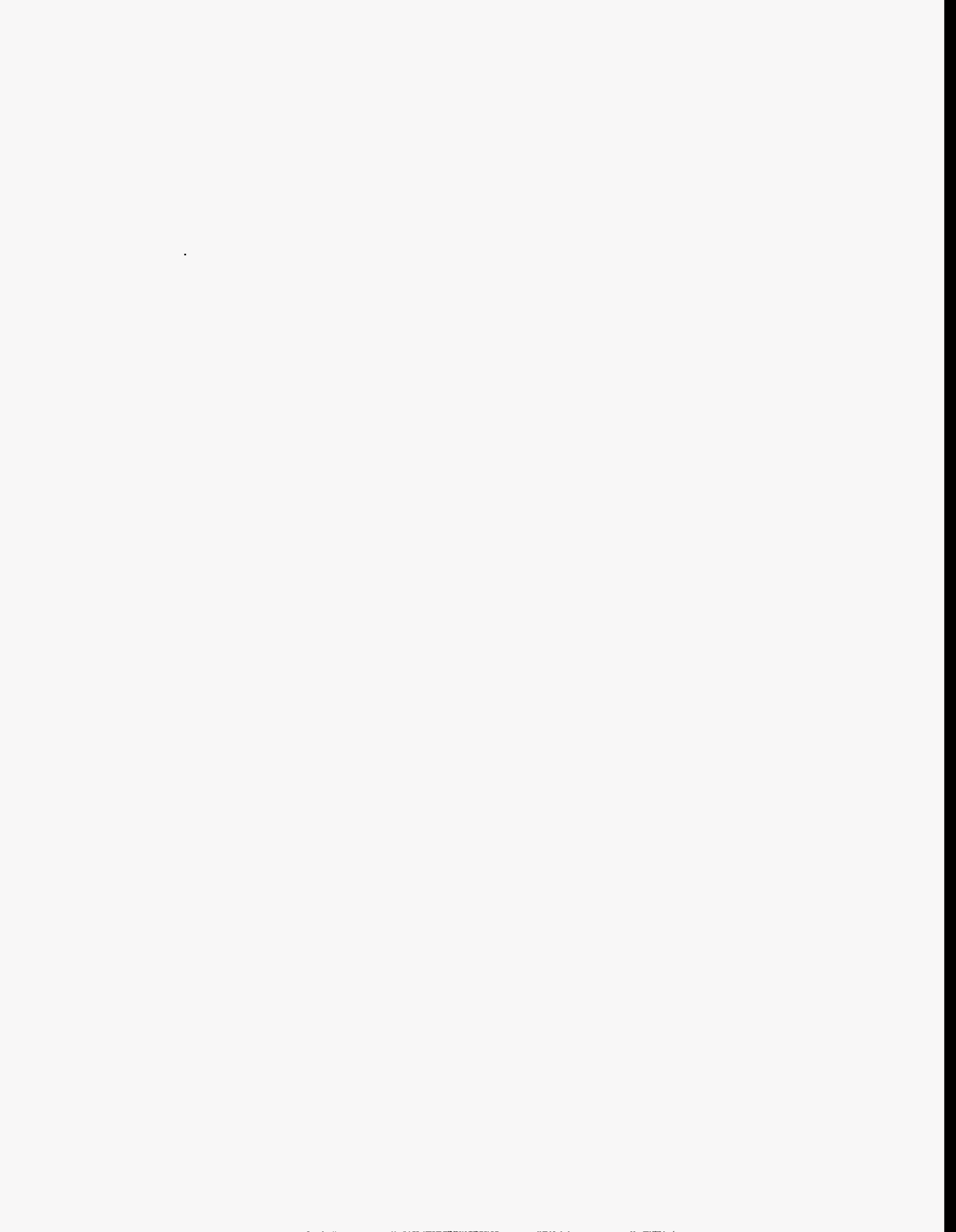
\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

(Stamp or Seal)

**ATTACHMENT 5**  
**AGENCY NOTIFICATION AGREEMENTS**



**DRAFT**

Mike Lacy  
San Juan County Sheriff's Dept.  
P.O. Box 788  
Monticello, UT 84535

Dear Mr. Lacy:

The U.S. Department of Energy (DOE) Uranium Mill Tailings Remedial Action Project Office is requesting notification in the event of any unusual activities or events in San Juan County, Utah, or around the Mexican Hat disposal site.

The purpose of the notification request is to assist the DOE in surveying and maintaining the integrity of its disposal site and to ensure public safety.

If during the course of routine activities, anything out of the ordinary is observed by your staff or reported to your office, we would appreciate notification to the DOE Grand Junction Projects Office 24-hour phone at 970-248-6070. If the notification request discussed above is agreeable to you, please sign and return the attached reply letter for our records as soon as possible.

Should you have any questions, please contact me at 505-845-6130. Thank you for your attention in this matter.

Russel Edge  
DOE Project Site Manager  
Environmental Restoration Division  
U.S. Department of Energy

Enclosure

cc: w/o enclosure  
J. McBee, TAC  
C. Jones, GJPO  
M. Hansen, TAC  
M. Bradshaw, TAC  
J. Virgona, GJPO

**DRAFT**

Mr. Russel Edge  
DOE Project Site Manager  
Environmental Restoration Division  
U.S. Department of Energy  
2155 Louisiana Blvd., NE, Ste. 4000  
Albuquerque, NM 87110

Dear Mr. Edge:

This letter is to concur with the U.S. Department of Energy (DOE) request for notification as set forth in the DOE's letter. As requested in your letter, this office will contact the DOE Grand Junction Projects Office 24-hour phone at 970-248-6070 if any unusual event or anomaly is observed or reported at the Mexican Hat disposal site, Mexican Hat, Utah.

Sincerely,

Mike Lacy  
County Sheriff

cc: J. McBee, TAC  
M. Hansen, TAC  
M. Bradshaw, TAC  
C. Jones, GJPO  
J. Virgona, GJPO

**DRAFT**

Philip Clah  
Navajo Police Dept.  
P.O. Box Drawer 22  
Kayenta, AZ 86033

Dear Mr. Clah:

The U.S. Department of Energy (DOE) Uranium Mill Tailings Remedial Action Project Office is requesting notification in the event of any unusual activities or events in San Juan County, Utah, or around the Mexican Hat disposal site.

The purpose of the notification request is to assist the DOE in surveying and maintaining the integrity of its disposal site and to ensure public safety.

If during the course of routine activities, anything out of the ordinary is observed by your staff or reported to your office, we would appreciate notification to the DOE Grand Junction Projects Office 24-hour phone at 970-248-6070. If the notification request discussed above is agreeable to you, please sign and return the attached reply letter for our records as soon as possible.

Should you have any questions, please contact me at 505-845-6130. Thank you for your attention in this matter.

Russel Edge  
DOE Project Site Manager  
Environmental Restoration Division  
U.S. Department of Energy

Enclosure

cc: w/o attachment  
J. McBee, TAC  
M. Hansen, TAC  
M. Bradshaw, TAC  
C. Jones, GJPO  
J. Virgona, GJPO

**DRAFT**

Mr. Russel Edge  
DOE Project Site Manager  
Environmental Restoration Division  
U.S. Department of Energy  
2155 Louisiana Blvd., NE, Ste. 4000  
Albuquerque, NM 87110

Dear Mr. Edge:

This letter is to concur with the U.S. Department of Energy (DOE) request for notification as set forth in the DOE's letter. As requested in your letter, this office will contact the DOE Grand Junction Projects Office 24-hour phone at 970-248-6070 if any unusual event or anomaly is observed or reported at the Mexican Hat disposal site, Mexican Hat, Utah.

Sincerely,

Philip Clah  
Navajo Police

cc: J. McBee, TAC  
M. Hansen, TAC  
M. Bradshaw, TAC  
C. Jones, GJPO  
J. Virgona, GJPO



**DRAFT**

Dave Toronto  
National Weather Service  
Warning Coordinator Meteorologist  
2242 West North Temple St.  
Salt Lake City, UT 84116

Dear Mr. Toronto:

The U.S. Department of Energy (DOE) Uranium Mill Tailings Remedial Action Project is requesting notification in the event of issuance of flash flood or tornado warnings in San Juan County. We would appreciate notification to the DOE Grand Junction Projects Office 24-hour phone at 970-248-6070 within 8 hours of issuance of a warning or episode of warnings.

The purpose of this warning is to assist the DOE in surveying and maintaining the integrity of its disposal site located approximately 2 road miles (3 km) southwest of the town of Mexican Hat, Utah.

If the notification request discussed above is agreeable to you, please sign and return the enclosed reply letter for our records as soon as possible.

Should you have any questions, please contact me at 505-845-6130.

Sincerely,

Russel Edge  
DOE Project Site Manager  
Environmental Restoration Division  
U.S. Department of Energy

Enclosure

cc: w/o enclosure  
J. McBee, TAC  
M. Hansen, TAC  
M. Bradshaw, TAC  
C. Jones, GJPO  
J. Virgona, GJPO

**DRAFT**

Russel Edge  
DOE Project Site Manager  
Environmental Restoration Division  
U.S. Department of Energy  
2155 Louisiana Blvd., NE, Ste. 4000  
Albuquerque, NM 87110

Dear Mr. Edge:

This letter is to concur with the U.S. Department of Energy (DOE) request for notification as set forth in the DOE's letter. As requested in your letter, this office will contact the DOE Grand Junction Projects Office 24-hour phone at 970-248-6070 in the event of issuance of a flash flood or tornado warning in San Juan County.

Sincerely,

Dave Toronto  
National Weather Service  
Warning Coordinator Meteorologist

cc: J. McBee, TAC  
M. Hansen, TAC  
M. Bradshaw, TAC  
C. Jones, GJPO  
J. Virgona, GJPO



UMT 59954

IN UPDC

0.13.4.6



# National Earthquake Information Center

## World Data Center A for Seismology

Director  
(303) 236-1510

Research  
(303) 236-1506

U.S. Geological Survey  
Box 25046, DFC, MS-967  
Denver, Colorado 80225 USA  
Telex: (WUTCO) 5106014123ESL UD

Operations  
(303) 236-1500  
QED  
(800) 358-2663

Clinton C. Smythe  
Engineering and Construction Group Leader  
Uranium Mill Tailings Remedial Action  
Project Office  
2155 Louisiana NE, Suite 4,000  
Albuquerque, NM 87110

Dear Mr. Smythe:

This letter is to confirm that the DOE Grand Junction Projects Office (24-hour phone line, (303) 248-6070 has been added to our notification list for the occurrence of earthquakes near the following locations:

Disposal Site	Latitude	Longitude
<b>COLORADO</b>		
Durango (Bodo Canyon)	N37.15	W107.90
Grand Junction	N38.91	W108.32
Gunnison (Landfill)	N38.51	W106.85
Maybell	N40.55	W107.99
Naturita (Dry Flats)	N38.21	W108.60
Rifle (Estes Gulch)	N39.60	W107.82
Slick Rock (Burro Canyon)	N38.05	W108.87
<b>IDAHO</b>		
Lowman	N44.16	W115.61
<b>NEW MEXICO</b>		
Ambrosia Lake	N35.41	W107.80
<b>NORTH DAKOTA</b>		
Bowman	N46.23	W103.55
<b>OREGON</b>		
Lakeview (Collins Ranch)	N42.2	W120.3
<b>PENNSYLVANIA</b>		
Canonsburg	N40.26	W80.25
Burrell VP	N40.62	W79.65
<b>TEXAS</b>		
Falls City	N28.91	W98.13
<b>UTAH</b>		
Mexican Hat	N37.10	W109.85
Salt Lake City (Clive)	N40.69	W113.11





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## World Data Center A for Seismology



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(303) 236-1510  
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(303) 236-1506

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Denver, Colorado 80225 USA  
Telex: (WUTCO) 5106014123ESL UD

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(303) 236-1500  
QED  
(800) 358-2663

Clinton C. Smythe

-2-

We have entered the following selection criteria into our notification program:

1. Any earthquake of magnitude 3.0 or greater, within 0.3 degrees (about 20 miles) of any site shown above, or
2. Any earthquake of magnitude 5.0 or greater, within 1.0 degrees (about 70 miles) of any site shown above.

Sincerely,

*Bruce W. Presgrave*

Bruce Presgrave  
U.S. Geological Survey  
National Earthquake Information Center  
P.O. Box 25046  
Mail Stop 967  
Denver Federal Center  
Denver, Colorado 80225

*Please address future correspondence to Stuart Koyanagi at the above address. I have moved to a different project.*

*Thank you + best regards,*

*Bruce Presgrave*