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REV. 1

LONG-TERM SURVEILLANCE PLAN FOR THE UPPER BURBANK DISPOSAL CELL URAVAN, COLORADO

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Location of monuments, markers and signs.

LIST OF ACRONYMS

Acronym	Definition
BLM	U.S. Bureau of Land Management
BMP	best management practice
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
LTSP	long-term surveillance plan
MCL	maximum concentration limit
NGVD	National Geodetic Vertical Datum
NRC	U.S. Nuclear Regulatory Commission
POC	point of compliance
QA	quality assurance
RAP	remedial action plan
SOP	standard operating procedure
TAC	technical assistance contractor
UMTRA	Uranium Mill Tailings Remedial Action
UMTRCA	Uranium Mill Tailings Radiation Control Act
RRM	residual radioactive material

CHANGE HISTORY

Document version	Date	Pages/comments
Rev 0 Ver 0	9/14/98	
Rev 1 Ver 0	7/13/99	Incorporates NRC, GJO and CDPHE comments

1.0 PURPOSE AND SCOPE

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Upper Burbank disposal cell near Uravan, Colorado. This disposal cell contains materials from the Naturita, Colorado processing site.

The U.S. Nuclear Regulatory Commission (NRC) developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites are cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Upper Burbank disposal cell. The general license becomes effective when the NRC concurs with the DOE determination that remedial action is complete at the Upper Burbank disposal cell and the NRC formally accepts this LTSP. Attachment 1 contains the concurrence letters from NRC.

This LTSP describes the long-term surveillance program the DOE will implement to ensure that the Upper Burbank disposal cell performs as designed. The program is based on site inspections to identify threats to disposal cell integrity. Ground water monitoring will be conducted. The LTSP is based on the UMTRA Project long-term surveillance program guidance (DOE, 1996a) and meets the requirements of 10 CFR §40.27(b) and 40 CFR §192.03.

2.0 FINAL SITE CONDITIONS

Remedial action at the former uranium processing site located near Naturita, Colorado consisted of demolishing existing facilities, excavating subpile and windblown material from the site and adjacent properties, and relocating the residual radioactive materials to the Upper Burbank disposal cell at Uravan, Colorado. The DOE constructed a disposal cell to control this residual radioactive material in accordance with 40 CFR Part 192. The Upper Burbank disposal site is barbwire fenced, and its perimeter is marked with warning signs. The site completion report contains a detailed description of the final site conditions (MK-F, 1998).

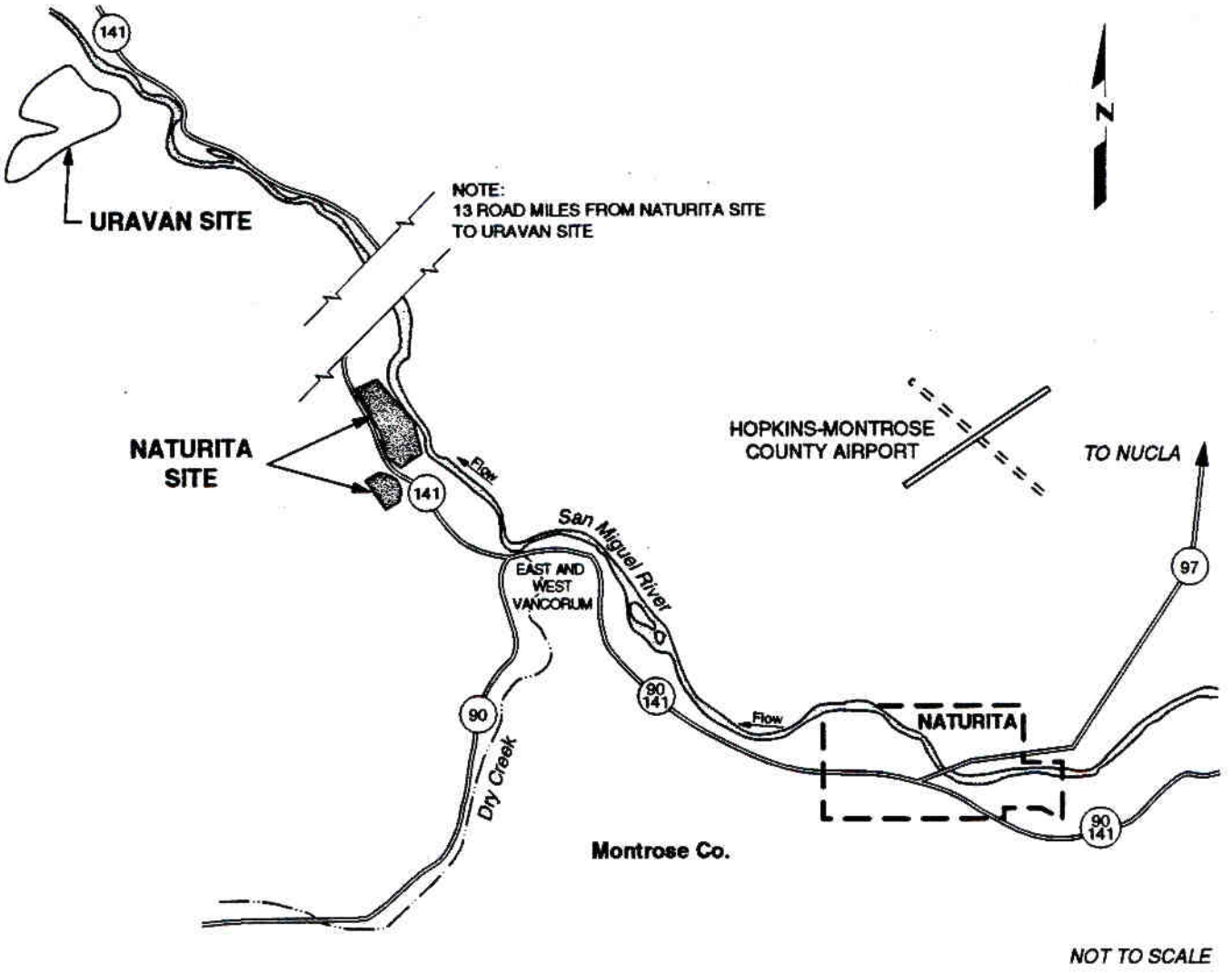
2.1 DISPOSAL SITE HISTORY

The Upper Burbank disposal cell is located approximately 13 road miles (21 kilometers) northwest of the Naturita processing site (Figure 2.1). The Upper Burbank site is located on property formerly owned by the Umetco Minerals Corporation. During remediation of uranium mill tailings at the Uravan site, Umetco decided to develop the Burbank Pit as a borrow source for sandstone rock for use as erosion protection on the slopes of Uravan Disposal Cells 1, 2, and 3. The Burbank Pit is located near the south end of the Club Mesa adjacent to Hieroglyphic Canyon, and was excavated from the south end at the canyon rim northward toward the center of the mesa. After excavation of the required sandstone material from the Burbank Pit, a "U" shaped hole was formed (Figure 2.2). Umetco used the lower (southern end) of the Burbank Pit for disposal of raffinate crystals from the upper part of Club Mesa, leaving the upper (northern) end of the pit available for construction of the Title I UMTRA Project disposal cell. Hence, the site for materials from the Naturita processing site was called the Upper Burbank disposal cell.

The Upper Burbank disposal cell is unique in that little or no tailings materials are contained in the disposal cell. This is because the original tailings stored at the Naturita processing site were purchased and removed for processing at the nearby Durita Site by Ranchers Exploration and Development. The remaining subpile material, consisting of soils in the mill yard, ore storage area, tailings pile areas, windblown tailings adjacent to the site, building debris from demolition of the mill buildings, and mill equipment stored on site make up the contaminated material hauled to the Upper Burbank disposal cell.

Surface remedial action at the Naturita processing site began in June 1996 and ended in November 1997. Final site grading and seeding of the disposal site was completed in the summer and fall 1998. Disposal cell construction was essentially completed in July 1998 with placement of final lifts of frost protection material on the south end of the cell. Approximately 800,000 yd^3 (610,000 m^3) of material were placed in the disposal cell and compacted to a volume of approximately 680,000 yd^3 (520,000 m^3).

The Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 gave the DOE authority to perform remedial action at the Naturita processing site (42 USC 7901 *et seq.*). The DOE evaluated the environmental impacts associated with the remedial action in an environmental assessment (DOE, 1994). The NRC and the state of Colorado concurred with the DOE remedial action plan (RAP) (DOE, 1998) to comply with the requirements of 40 CFR Part 192, Subparts A through C.



MODIFIED FROM DOE, 1994.

FIGURE 2.1
REGIONAL MAP SHOWING LOCATION OF THE BURBANK DISPOSAL CELL

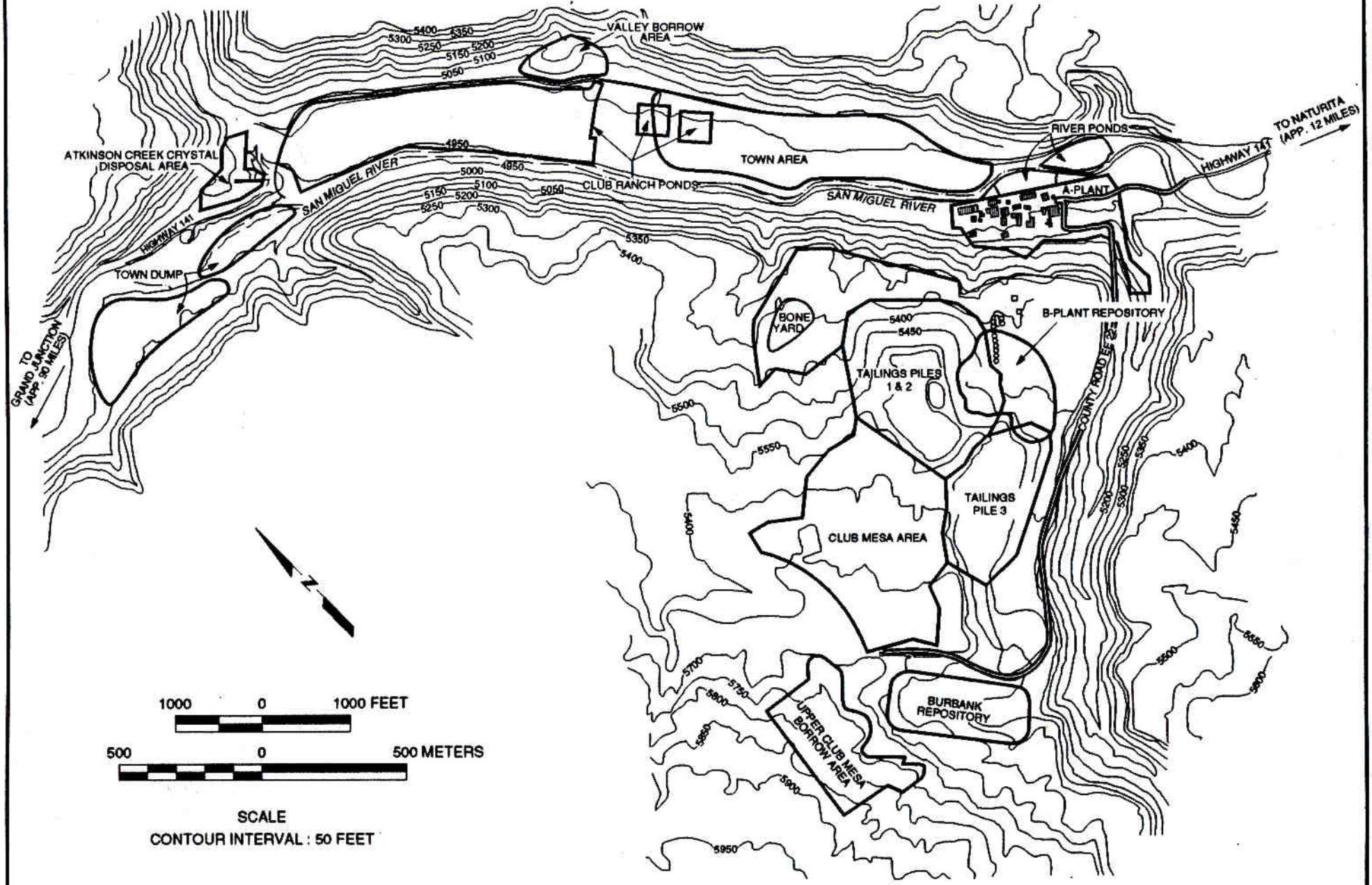


FIGURE 2.2
LOCATION OF THE UPPER BURBANK DISPOSAL SITE
URAVAN, COLORADO

The DOE prepared a completion report documenting compliance with the remedial action plan and the site as-built conditions (MK-F, 1998). The DOE also prepared a final audit report and certification summary and submitted it and the completion report to the NRC for concurrence. NRC concurrence on the certification report is included in the permanent site file. (Attachment 1)

2.2 GENERAL DESCRIPTION OF THE SITE VICINITY

The Naturita processing and disposal sites are located in Montrose County, which is a predominately rural county in western Colorado with a population of 24,423 (United States Census, 1990). The Uravan area is sparsely populated, with no permanent residences within 5 miles (8 km) of the disposal site. Much of the land is held by the BLM and is leased to ranchers for grazing. The dominant land uses are livestock grazing and a minor amount of mining. Historically, mining was active in the area and numerous abandoned mines and mining roads are located near the site.

2.3 DISPOSAL SITE DESCRIPTION

The Upper Burbank disposal site is located in the northerly end of a rock quarry developed by Umetco to produce erosion protection rip rap for their Title II disposal cells. Being a quarry pit, the site is basically a large hole excavated into solid bedrock along the southern rim of Club Mesa with rock slopes on three sides and an open end that borders Umetco's crystal storage cells (Figure 2.2).

2.3.1 Site ownership and legal description

A legal description of the DOE property that contains the Upper Burbank disposal site shown in Attachment 2. The plan view of the property is shown on Plate 1.

2.3.2 Directions to the disposal site

The Upper Burbank disposal site can be reached by automobile via paved roads by following these directions:

1. Take Colorado State Route 141 northwest out of the town of Naturita approximately 15 miles (24 km) to Uravan.

2. Turn left (west-southwest) toward the old Uravan site on County Road EE22. Almost immediately after leaving highway 141, there is a metal bridge crossing. Bear to the right and go up EE22 along a narrow road that hugs the rim of Hieroglyphic Canyon approximately 1.6 miles (2.6 km).

3. Near the top of the canyon, EE22 makes a sharp turn to the right (northwest) and goes out of the canyon toward the top of the mesa. The Burbank disposal site is located a few hundred feet after the turn, just to the left of EE22.

2.3.3 Description of surface conditions

Prior to start of construction of the Upper Burbank disposal cell, the bottom of the Burbank pit was covered with a clay liner (previously installed by Umetco). To prevent ponding on this clay layer and allow free drainage (see groundwater protection strategy in section 2.6.1), the clay liner was removed (by Umetco), and the bottom of the excavation was scraped into the top of intact sandstone bedrock. At the start of construction, slopes along the north, east, and west sides of the site were either intact sandstone bedrock or soil and rock rubble cover over intact sandstone. To help limit the amount of silt and rock debris that could be washed on the disposal site by the Maximum Probable Flood, these slopes were cleaned of loose material to the bedrock surface or cut to a stable slope angle.

Stoops and adits from the nearby Cotter mine workings can be seen along the western side of the site. An airshaft from the Cotter mine located above the western corner of the site, caused the western end of the interceptor ditch to be redesigned during construction.

2.3.4 Permanent site-surveillance features

Survey and boundary monuments, site markers, and warning signs are the permanent long-term surveillance features of the Upper Burbank disposal site. In addition, the disposal site also has background ground water monitor wells. Plate 1 shows the locations of these features and Table 2.1 provides their survey grid coordinates. Typical construction and installation specifications for these features are shown in the long-term surveillance guidance (DOE, 1996a) and subcontract documents (MK-ECE, 1998).

Three survey monuments establish permanent horizontal control based on the Union Carbide North Uravan District Coordinate System, established by others. The three permanent survey monuments (SM-3, SM-4, and SM-11) are Berntsen RT-1 markers set in concrete with the monument approximately 4 inches (in) (10.2 centimeters [cm]) above the ground level. Magnets in the markers will permit easier detection if they become buried over time. The survey monument identification number is stamped on the top of the metal cap.

Fourteen boundary monuments lie along the final site boundary. These monuments are Berntsen Model A-1 survey monuments set in concrete with the monument approximately 1 inch (2.5 cm) above ground level. Magnets in the A-1 monuments will allow easier detection if they become buried. The boundary monument identification number is stamped on the top of the metal cap. Boundary monuments are offset five-feet inside the site boundary.

Two unpolished granite markers with an incised message identify the Upper Burbank disposal cell. The message includes a drawing showing the general location of the stabilized disposal cell within the site boundaries, the date of closure, the weight of tailings (971,762 dry tons [881,405 metric tons]), and the amount of radioactivity (79 curies of radium-226). Site marker SMK-1, near the north end of

Table 2.1 Location of permanent surveillance features, Upper Burbank Disposal Cell, Uravan, Colorado

Feature	Location coordinate (ft)
Granite Site Markers	
SMK-1	N 172,736.71; E 79,009.12
SMK-2	N 171,876.47; E 79,254.98
Permanent Survey Monuments	
SM-3	N 172,425.70; E 79,385.67
SM-4	N 172,827.26; E 78,926.11
SM-11	N 171,601.74; E 78,853.34
Boundary Monuments	
BM-1	N 171,877.61; E 79,797.58
BM-2	N 172,136.01; E 79,630.44
BM-5	N 172,892.93; E 78,800.65
BM-6	N 172,701.82; E 78,709.62
BM-7	N 172,523.94; E 78,611.97
BM-8	N 172,070.21; E 78,376.68
BM-9	N 172,032.35; E 78,715.31
BM-10	N 171,797.31; E 78,718.77
BM-12	N 171,337.18; E 79,082.85
BM-13	N 171,238.55; E 79,197.12
BM-14	N 171,217.24; E 79,323.54
BM-15	N 171,417.82; E 79,190.82
BM-16	N 171,793.94; E 79,671.80
BM-17	N 171,686.73; E 79,932.65
Monitor Wells	
CM93-1	N 171,474.89; E 79,045.25
CM93-2	N 171,621.10; E 78,880.10
BR95-1	N 172,128.51; E 79,581.96
BR95-2	N 171,417.14; E 79,053.12
BR95-3	N 171,828.55; E 78,819.71

the diversion channel, is set in reinforced concrete that extends 3 ft (0.9 m) below the ground surface. site marker SMK-2, at the crest of the disposal cell, is set in reinforced concrete that extends to the top of the frost-protection barrier.

The DOE-posted warning signs (18 x 24 inches [61 x 46 cm]) indicate property use around the disposal site perimeter. The site entrance sign displaying the DOE 24-hour telephone number is at the east access gate near survey monument SM-4. In addition to the entrance sign, 23 perimeter warning signs are located approximately 5 ft (1.5 m) inside the site fence at approximately 200-ft (60-m) intervals. The warning signs are mounted on steel posts with the tops of the signs approximately 6 ft (2.0 m) above the ground surface. The sign posts are embedded in concrete to a depth of approximately 3 ft (1.0 m) below ground surface.

The Upper Burbank disposal cell has one point of compliance monitor well (CM93-2), one background well (CM93-1), and three ground water-level monitor wells (BR95-1, BR95-2, and BR95-3). Umetco Minerals company installed and developed the five monitor wells. Figure 2.3 shows approximate location of monitor wells in the Club Mesa area.

2.4 DISPOSAL CELL DESIGN

The approximately 10-acre (4-ha) disposal cell is located near the southern rim of Club Mesa in the upper end of the Burbank pit. Upland drainage has been directed away from the disposal cell by grading of the borrow areas and construction of an interceptor channel. For details of upland drainage, refer to the Completion Report (MKF, 1998). The disposal cell was designed with erosion protection features to resist the probable maximum precipitation (PMP) event. Sandstone rock was used above the interceptor ditch, in construction of a sediment trap dam to the southwest of the cell, in an energy dissipation pad to the west side of the cell, and in a narrow band around the disposal cell. This sandstone rock was not considered to be erosion protection riprap, rather its purpose was for flow velocity reduction, energy dissipation, and sediment reduction before the PMP runoff flow reached the erosion protection rock. The erosion protection rock, designated as types A, B, and B_1 on the plans, was tested and meets NRC rock suitability scoring requirements. The sandstone rocks do not; and they do not need to meet these requirements because they are not designed to function as erosion protection rock.

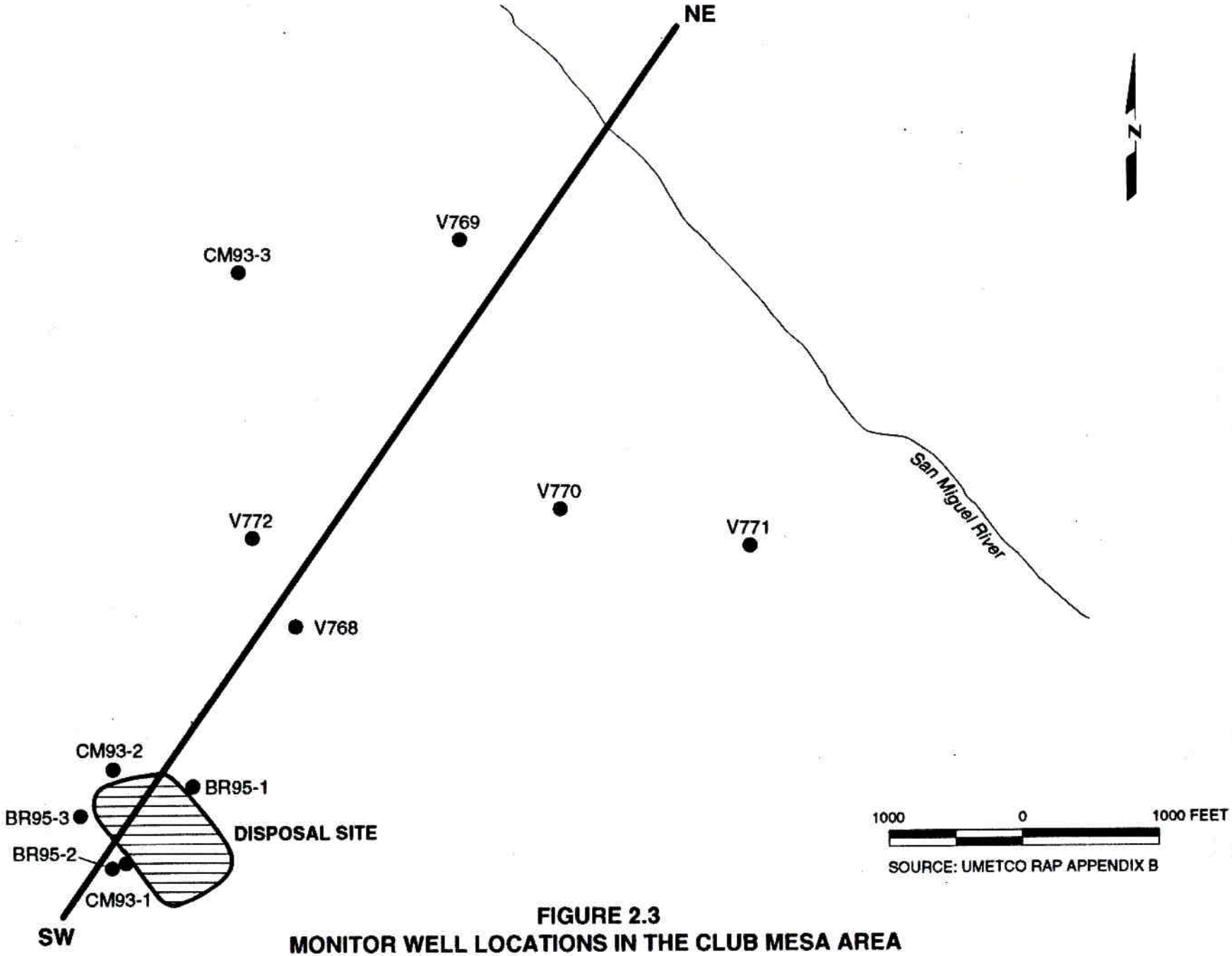


FIGURE 2.3
MONITOR WELL LOCATIONS IN THE CLUB MESA AREA
URAVAN, COLORADO

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MAC: SITE/NAT/EA/MONITORWELLS

RRM placed in this disposal cell are subpile soils and wind blow contamination consisting primarily of granular material such as silty sand, sand, sand and gravel, and cobble sized rocks. Some clayey silt soil was placed in the cell, but this material was from the fine-grained flood plain deposits existing at the processing site. No actual tailings were placed in the Upper Burbank disposal cell and no compressible, wet slimes or fine silty materials are present to cause problems with excessive settlement, cover cracking or seismic liquefaction.

The disposal cell was designed to resist seismic forces. The on-site peak horizontal acceleration used in cell design was 0.28g.

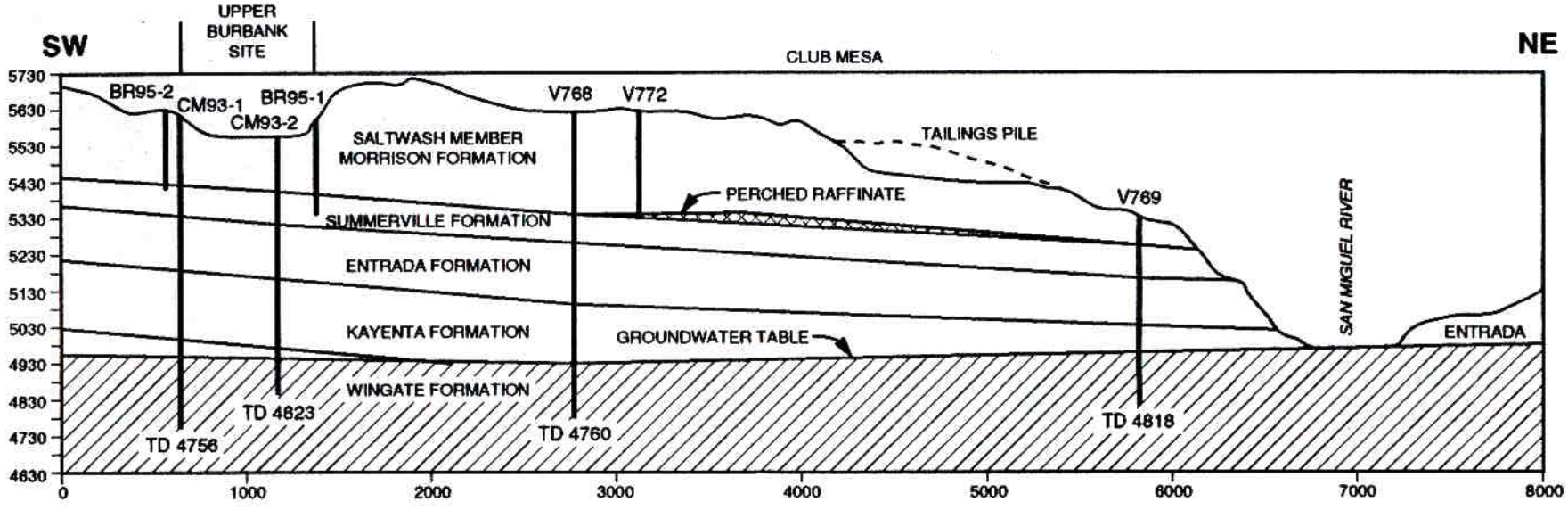
Because of the relatively high plasticity index (PI = 40+) of much of the radon barrier soils, there was some concern for radon barrier cracking due to drying of the radon barrier layer with time. The erosion protection layer on top of the disposal cell acts like a rock mulch, and tends to retard surface evaporation which could dry out the cover layers of the disposal cell. Placement of a 5.5-foot (1.7 m) thick freeze-thaw barrier over the radon barrier protects it from seasonal moisture fluctuations. Placement of the clayey radon barrier layer over coarser RRM layers forms a capillary break that tends to maintain moisture in the radon barrier layer. So long as the moisture content of the radon barrier layer remains relatively constant, and it doesn't dry out to below the clayey's Shrinkage Limit, cover cracking of the radon barrier layer due to drying will not occur.

2.5 GROUND WATER CHARACTERIZATION

Umetco Minerals Corporation has characterized the hydrogeology, aquifer properties, geochemical conditions, water quality, and water resources at the Upper Burbank disposal site at Uravan, Colorado. This information is summarized below, with details provided in Appendices B and C of the RAP (DOE, 1998).

2.5.1 Hydrogeologic setting

The uppermost aquifer beneath the Upper Burbank disposal site is the sandstone of the Triassic Wingate Formation (Figures 2.3 and 2.4). Ground water occurs in the uppermost aquifer under unconfined conditions. Depth to ground water in the uppermost aquifer beneath the disposal site is approximately 600 ft (180 m). The hydraulic conductivity of the Wingate aquifer is 0.12 ft/day (4.2×10^{-5} cm/sec). Ground water flows in a northerly direction beneath the site with an average gradient of 0.018 at an average linear velocity of 8 ft/yr (2.4 m/yr) (assuming an effective porosity of 0.10) toward the San Miguel River. At this rate, ground water currently beneath the disposal site will not discharge into the San Miguel River for over 1000 years. The combination of low annual precipitation, high evaporation potential, and the moisture deficiency (unsaturated conditions) in rock units in the area indicates that significant ground water recharge does not occur in the vicinity of the disposal site. Another indication of the absence of long-term effects of infiltration into the Wingate aquifer is the lack of any indication of ground water contamination resulting from the extensive mining of radium, uranium, and vanadium, along with related mineral processing activities in the Club Mesa area.



2X VERTICAL EXAGGERATION
SOURCE: UMETCO RAP APPENDIX B

FIGURE 2.4
HYDROGEOLOGIC CROSS SECTION AT THE UPPER BURBANK SITE
URAVAN, COLORADO

Residual radioactive material in the disposal cell lie on interbedded sandstone, siltstone, and mudstone strata of the Salt Wash Member of the Jurassic Morrison Formation. The Salt Wash is underlain by the Jurassic Summerville Formation, an aquitard consisting of approximately 90 ft (27 m) of massive clayey mudstones, silty shales, clayey siltstones, and minor interbedded sandstones. Field tests indicate a low hydraulic conductivity of 0.01 ft/yr (1.0×10^{-8} cm/sec) for the Summerville. The top of the Summerville is approximately 100-ft (30 m) beneath the surface. The Salt Wash and the Summerville are exposed in the hillside forming Club Mesa. Some water exists in the sandstone units of the Salt Wash and at the contact of the Salt Wash and the Summerville, but is relatively transient in nature. The Jurassic Entrada Formation lies between the Summerville and the Kayenta, and is unsaturated.

Any water infiltrating into the Salt Wash as recharge, from direct precipitation, surface runoff, or seepage from the tailings or other remediated materials, tends to migrate downward through the Salt Wash to the contact with the Summerville aquitard, then laterally to discharge as seepage along the hillside. This seepage is currently collected in drainage ditches along the hillside and transported to evaporation ponds in the river valley. The Summerville acts as an aquitard, providing hydrogeologic isolation, and minimizing migration of contaminants downward into the uppermost aquifer beneath Club Mesa. Geochemical conditions beneath the site are conducive to effective attenuation of contaminants in the seepage liquids.

Ground water from beneath the disposal site is not a current or potential source of drinking water because of the relatively high total dissolved solids (ranging from 3400 to 4860 mg/L) and the depth to ground water (approximately 600 ft [180 m]). Also the relatively low hydraulic conductivity of the aquifer of 0.12 ft/day (4.2×10^{-5} cm/sec) would restrict development of ground water resources beneath the site. There are no domestic or stock wells in the saturated zone of the Wingate aquifer within a 2-mi (3.2-km) radius of the site. Four industrial wells owned by Umetco are present in the area, but will eventually be plugged and not available for future use. The Uravan site is located in a remote area approximately 12 mi (19 km) from the nearest towns, Naturita and Nucla. The nearest residence to the site is approximately 5 mi (8 km) to the east-southeast (upstream and upgradient). Because of the nature of the terrain and the demise of the uranium industry, there is no reason to believe that there will be any significant population increases with 10 mi (16 km) of the site in the foreseeable future.

2.5.2 Background ground water quality

Background ground water quality in the uppermost aquifer (Wingate) has been determined from monitor wells in the vicinity of the Upper Burbank disposal site (CM93-1 and CM93-2) and downgradient from the disposal site (V768 and V769). Water quality data are available from September 1993 through December 1995 for monitor wells CM93-1 and CM93-2, and from April 1991 through December 1995 for monitor wells V768 and V769 (Appendix C, NAT-GW-002). Results of laboratory analyses indicate that concentrations of constituents of potential concern are below the MCLs. Background levels have been determined for those constituents without

MCLs (Table 2.2). Thus, there does not appear to be contamination in ground water in the uppermost aquifer beneath the disposal site on Club Mesa related to the uranium processing and remediation activities.

The geochemical properties of soils and lithologic materials beneath the Upper Burbank disposal site will control the solubility and adsorption of contaminants that could leach from the residual radioactive materials. Geochemical attenuation of the leachate would occur as liquid percolates through the bedrock formations by unsaturated flow. Calcium carbonate cement in the Salt Wash sandstones would buffer any solutions exiting the disposal cell. In summary, the Wingate aquifer would be protected from migration of any potential contamination from the disposal cell by the hydrogeologic isolation provided by the low-permeability shale and siltstone of the Summerville aquitard and geochemical attenuation of hazardous constituents in initial minor transient drainage and in design of the disposal cell.

2.6 GROUND WATER PROTECTION

2.6.1 Water resources protection strategy

The water resources protection strategy for the Upper Burbank disposal site is to meet MCLs or background levels at a point of compliance (POC) in ground water in the uppermost aquifer (Wingate Formation) hydraulically downgradient from the disposal cell. Ground water in the uppermost aquifer is approximately 600 ft (180 km) beneath the base of the disposal cell. The uppermost aquifer is hydrogeologically isolated from recharge by surface water or potential transient drainage from the disposal cell by unsaturated sandstone and confining shale layers.

In accordance with 40 CFR §192.03, the DOE will implement a ground water monitoring plan, to be carried out over a period of time commencing upon completion of remedial actions taken to comply with the standards in 40 CFR §192.02, and of a duration which is adequate to demonstrate that future performance of the system of disposal can reasonably be expected to be in accordance with the design requirements.

Compliance with the ground water protection standards requires determination of potentially hazardous constituents in the disposal cell, proposal of a concentration limit for each hazardous constituent and specification of a POC in the uppermost aquifer hydraulically downgradient of the disposal area.

The DOE has determined those constituents listed in Table 1 to Subpart A and Appendix I to Part 192 (40 CFR §192.02(c)(3)) that are present in or reasonably derived from residual radioactive materials, and has determined background levels of each such constituent in ground water beneath the disposal site. The list of hazardous constituents proposed for the POC at the Upper Burbank disposal cell is shown in Table 2.2.

Table 2.2 Hazardous Constituents and Concentration Limits for the POC at the Upper Burbank disposal cell, Uravan, Colorado

Constituent	Concentration Limit[a]
Aluminum	0.1 (background)
Antimony	0.1 (background)
Arsenic[d]	0.05 (MCL)
Barium	1.0 (MCL)
Beryllium	0.05 (background)
Cadmium	0.01 (MCL)
Copper	0.01 (background)
Cyanide	0.01 (background)
Fluoride	5.9 (background) [c]
Gross alpha[b]	44.7 pCi/L (background)[c]
Lead	0.05 (MCL)
Mercury	0.002 (MCL)
Molybdenum[d]	0.1 (MCL)
Nickel	0.05 (background)
Nitrate (as N)	10 (MCL)
Radium-226 and 228	5.0 pCi/L (MCL)
Selenium	0.01 (MCL)
Silver	0.05 (MCL)
Strontium	0.1 (background)
Thallium	0.01 (background)
Tin	0.005 (background)
Uranium[d]	0.004 (MCL)
Vanadium	0.05 (background)
Zinc	15.5 (background)[c]

a) In milligrams per liter, unless otherwise designated; pCi/L=picocuries per liter. Background is statistical maximum at 97.5 percent confidence or the laboratory detection limit. Background concentrations derived from Wingate wells CM93-1 and CM93-2.
b) Excludes radon and uranium.
c) Exceeds MCL naturally.
d) Indicator constituents to be sampled from shallow wells at the contact of the Salt Wash Member of the Morrison Formation and the Summerville Formation.

The proposed concentration limit for each constituent shown in Table 2.2 is either the MCL from Table 1 to Subpart A, or the background level. Background is the statistical maximum at 97.5 percent confidence or the laboratory detection limit. Background concentrations were derived from monitor wells CM93-1 and CM93-2 completed in the Wingate. DOE will establish concentration limits for strontium and tin by routine sampling of CM 93-1 CM 93-2 during long-term surveillance activities.

- The designated POC in the uppermost aquifer hydraulically downgradient from the Upper Burbank disposal cell is monitor well CM93-2 (Figure 2.3).

It is unlikely that any disposal cell contamination would reach ground water in the uppermost aquifer because of the hydrogeologic isolation caused by the Summerville (aquitard), the vertical distance to ground water, and the estimated travel time for any contaminants to get from the surface to ground water in the uppermost aquifer. Calculation NAT-GW-004 estimates the travel time from the base of the disposal cell to the uppermost aquifer to be in excess of 1000 years (Appendix B of the RAP, DOE, 1998).

2.6.2 Ground water monitoring plan

The DOE will monitor for potential seepage from the disposal cell by periodically evaluating water levels in the three monitor wells completed at the contact of the Salt Wash and the Summerville (BR95-1, BR95-2, and BR95-3) (Figure 2.3). Monitoring will be performed the first, third and fifth years after licensing. The need to continue monitoring will be evaluated after the fifth year. If enough water is available, samples will be taken and analyzed for the indicator constituents. This monitoring will be considered as a best management practice to provide early warning of possible migration of contaminants through the unsaturated zone and into the basal portion of the Salt Wash at the contact with the Summerville.

If it is determined that contamination detected in the shallow monitor wells could be related to the disposal cell, follow-up ground water monitoring will be performed in the designated POC monitor well (CM93-2) in the Wingate (Figure 2.3). Monitoring of ground water will also be performed in the other monitor well (CM93-1) adjacent to the disposal cell in the Wingate (Figure 2.3). Constituents to be analyzed are listed in Table 2.2. The frequency of monitoring ground water in the uppermost aquifer for compliance purposes will be determined if this sampling is implemented, and will be coordinated with any corrective action activities. Umetco will also be sampling these monitor wells on a quarterly basis as part of their Title II compliance monitoring, and the DOE will have access to these data as required.

The UMTRA Project has established standard operating procedures (SOP) for ground water sampling, sample preservation and transport, field procedures, chain of custody samples for laboratory analysis, and validating and managing analytical data. All aspects of ground water monitoring will be conducted in accordance with these procedures, which are updated regularly to reflect changes in industry standards, best management practices, and DOE and EPA guidance. The quality assurance (QA) procedures used are consistent with the long-term surveillance and

maintenance program QA plan (DOE, 1996b). The Umetco procedures for water quality sampling are compatible with DOE requirements.

The DOE maintains and updates specific records and reports required to document long-term surveillance program activities at the Upper Burbank disposal site. The DOE will submit an annual report to the NRC documenting the results of the LTSP, as required by 10 CFR §40.27, Appendix A, Criterion 12. The DOE will keep all relevant and required records at an appropriate location. These documents will be available for review by the NRC and the public.

2.6.3 Standpipe

The Upper Burbank disposal cell was constructed on a clean sandstone foundation. All clayey soil material was reported removed by Umetco from the cell bottom prior to start of construction. The cell was constructed with 6-ft (2-m) thick compacted clay sidewalls (constructed of radon barrier clay material) on three sides to prevent seepage of water laterally into exposed bedrock sidewalls of the Burbank pit. On the fourth side, adjacent to the Umetco raffinate crystal (UMTRA Title II) disposal cell, the Upper Burbank disposal cell has a 100-ft (30-m) wide compacted clay dam to prevent lateral seepage. As a result, seepage from this cell is designed to go down and out of the bottom of the cell into the permeable bedrock (Salt Wash Member of the Morrison Formation), which field performance verifies.

A standpipe was placed in the Upper Burbank disposal cell to allow measurement and evaluation of potential fluid accumulation in the cell during construction. The standpipe has been in place since March 1997 and is located in the north corner of the disposal cell (Burbank pit's lowest point) (MK Drawing No. NAT-DS-10-1786). The standpipe is 1.5-ft (0.5 m) in diameter and has a total depth of approximately 74-ft (23 m) (bottom and top elevations of 5542 and 5616 ft [1689 and 1712 m]).

Measurement of water levels in the standpipe in the disposal cell was not part of the regulatory compliance strategy. However, measurements of water levels through July 1997 indicated several inches of water in the bottom of the standpipe. On 24 June 1998, there were 25.7 inches (65.9 centimeters) of water observed in the bottom of the standpipe. The water was removed on 25 June 1998 to a depth of 6.8 inches (17.4 centimeters). On 1 July 1998, the water had recharged to a depth of 8.5 inches (21.8 centimeters) and on 28 July 1998, the water was at a depth of 11.4 inches (29.2 centimeters). The water level was 12.4 inches (31.8 centimeters) on 20 August 1998 and 12.0 inches (30.8 centimeters) on 24 June 1999.

Water level measurements will continue to be performed in the first, third, and fifth years after licensing. The need to continue monitoring will be evaluated after each new measurement is collected. At any time during this monitoring period, if the water level in the standpipe were to remain essentially static (at approximately 12 inches (31 centimeters)) or decline, the decision will be made by the Department of Energy to discontinue monitoring and decommission the standpipe.

3.0 SITE INSPECTIONS

The DOE will inspect the Upper Burbank disposal site to detect progressive change caused by slow-acting natural processes and to identify potential problems before the need for extensive maintenance, repairs, or corrective action. Inspections may also be conducted to follow up on events or conditions that have affected or potentially could affect the disposal site. The DOE will compare the findings from these inspections to initial baseline conditions to identify changes over time and to provide a basis for future inspections, repairs, and corrective actions. This process is shown in Figure 3.1. Custodial maintenance and repair are described in Section 4.0. Corrective action is detailed in Section 5.0.

3.1 INSPECTION FREQUENCY

The DOE will inspect the Upper Burbank disposal cell annually. The DOE may schedule more frequent inspections if necessary. The DOE will notify the NRC of the inspection schedule.

3.2 INSPECTION TEAM

The inspection team will consist of a minimum of two inspectors qualified to inspect disposal cell integrity and make preliminary assessments of modifying processes that could adversely affect the disposal cell.

If problems are observed that require more investigation, follow-up inspections will be performed and teams will include one or more technical specialists in appropriate disciplines to assess the problems under investigation. For example, a follow-up inspection by a plant specialist may be required to evaluate reports of significant plant growth on the rock cover, or a soils scientist or geomorphologist may be needed to evaluate erosion processes.

3.3 SITE INSPECTION PROCEDURES

Before inspections, inspectors will conduct a preinspection briefing. The long-term surveillance program guidance (DOE, 1996a) contains information useful in preparing for inspections.

Site inspections will cover the disposal cell, the surrounding disposal site area, and the immediate offsite areas. Site inspections must be thorough enough to identify any significant changes or active modifying processes that potentially could adversely impact the disposal cell. Surveillance will be performed to identify the unanticipated effects of modifying processes such as gully formation, slope erosion, changes to the rock cover, ephemeral drainage channel changes, and significant modifications by humans, animals, or plants.

Inspectors will evaluate the integrity of the disposal cell by walking a series of transects around the perimeter and over the rock cover. Sufficient transects, at approximately 150-ft (46-m) intervals, will be walked to ensure that the disposal cell is thoroughly covered and inspected. Diagonal transects of the topslopes will be made and the crest line will be walked. Additional transects will be walked along the sideslopes and rock apron. Transects along the entire length of the drainage ditch

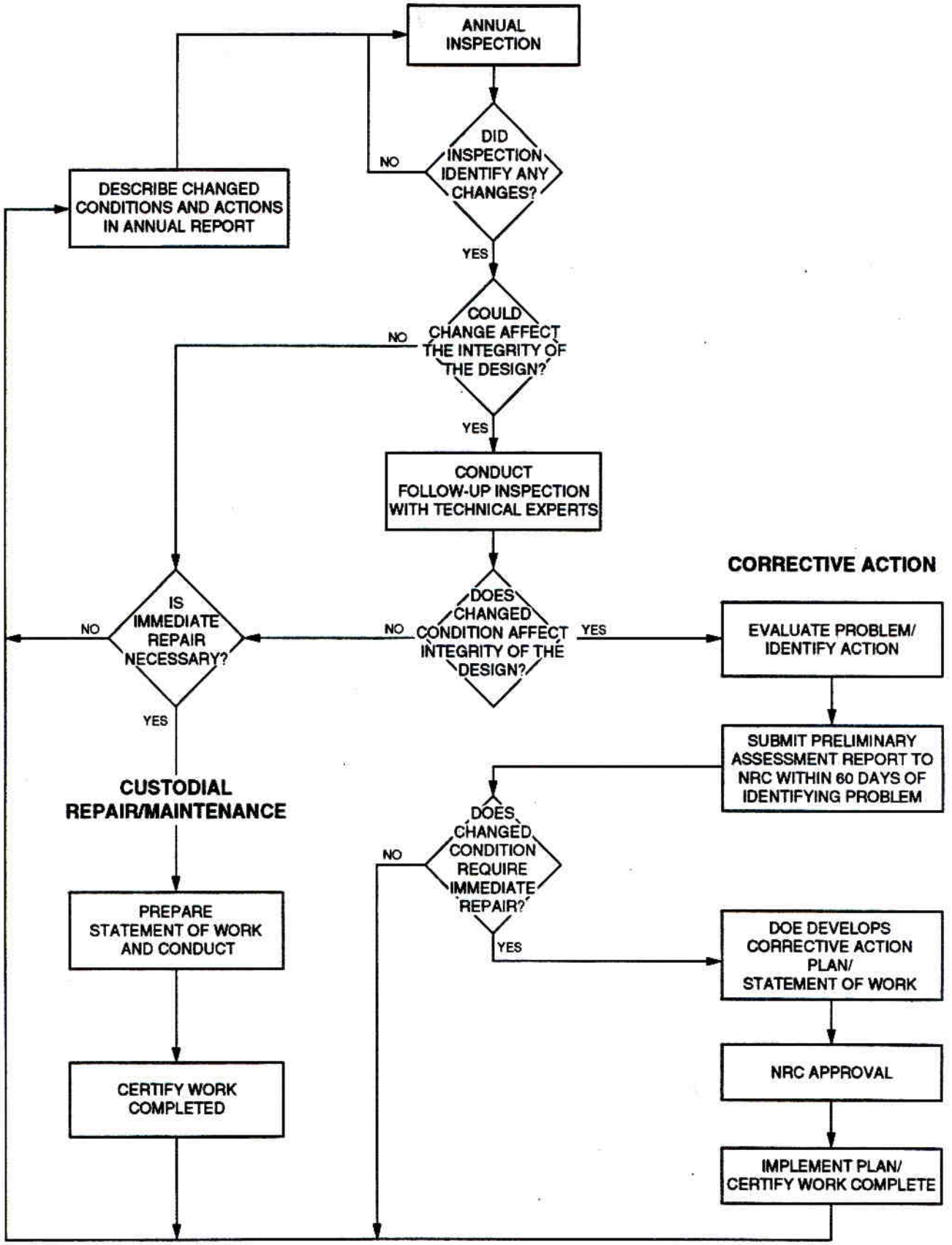


FIGURE 3.1
STEPS FOR FOLLOW-UP INSPECTIONS, CUSTODIAL MAINTENANCE, AND CORRECTIVE ACTION UPPER BURBANK DISPOSAL SITE NEAR URAVAN, COLORADO

will be made to determine if it is functioning as designed and can be expected to continue to function properly. Inspectors will make efforts to vary the transect paths from one inspection to the next to ensure small anomalies are not overlooked. The sample inspection checklist in the LTSP guidance document lists items that should be examined during inspections (DOE, 1996a).

The disposal cell has a rock cover and there is no planned vegetation on the disposal cell. However, remedial action of the areas surrounding the disposal cell included revegetation with grasses. The area surrounding the disposal cell will be monitored to determine the success of the revegetation efforts. Inspectors also will inspect this area for evidence of erosion caused by wind, sheetwash, or changes in drainage patterns.

Site inspections also will monitor damage to or disturbance of permanent site-surveillance features, fencing, gate, and locks.

From inside the disposal site, inspectors will visually survey the area approximately 0.25 mi (0.40 km) outside the disposal site boundary for evidence of land-use changes that indicate increased human activity such as new roads and paths. Inspectors will note the condition of and changes to site access roads, surrounding vegetation, and relevant geomorphic features like gullies or ephemeral drainage channels. Potential impacts to the site will be noted.

3.4 FOLLOW-UP INSPECTIONS

In addition to annual inspections, the DOE may conduct follow-up inspections due to unusual or annual inspection findings or observations. DOE may also conduct follow-up inspections to investigate and quantify specific problems found during a previous inspection, other DOE-initiated activity, or confirmed reports of vandalism (intrusion, damage), unusual occurrences, or other significant threat to the disposal site. The DOE will monitor the disposal cell area for the occurrence of extreme natural events (e.g., earthquakes, tornadoes, floods) and vandalism to ensure such events are investigated in a timely manner to assess their effects on the disposal cell. To facilitate this, the DOE has requested notification from federal, state, and local agencies of discoveries or reports of any purposeful intrusion or damage at the disposal site as well as in the disposal site area. Notification agreements with the Montrose County Sheriff's Office and the U.S. Geological Survey National Earthquake Information Center are included in Attachment 3. The DOE will also monitor the weather for the occurrence of severe storms in the disposal cell vicinity. In addition, the DOE 24-hour telephone number is posted on the site entrance sign so the public can notify the DOE if problems are discovered. If an extreme natural event or vandalism has occurred, the DOE will inspect the cell to assess the damage. The notification, response, and follow-up activities will be documented. This documentation will be included in the annual site report to the NRC and become part of the permanent site file.

The nature of the occurrence and the amount of firsthand knowledge available will determine the DOE response. If a situation poses a threat to the public, the DOE will notify individuals who may be affected and appropriate federal, state, and local

agencies, including the NRC. If necessary, the DOE will schedule a follow-up inspection to assess any potential effects from the unusual occurrence, and will take necessary response action. Follow-up inspections will be conducted to determine whether processes currently active at or near the site threaten site security or stability and to evaluate the need for custodial maintenance, repair, or other corrective action. The scope of these follow-up inspections may be broad and similar in nature to routine site inspections or focused on specific areas of concern.

3.5 QUALITY ASSURANCE

The DOE has developed and implemented a quality assurance (QA) plan (DOE, 1996a) for the site inspection program that meets the requirements of DOE Order 5700.6C. Site inspections will be conducted in accordance with this QA plan.

4.0 CUSTODIAL MAINTENANCE AND REPAIR

The DOE does not plan to conduct routine maintenance at the Upper Burbank disposal site. However, the DOE will perform needed custodial maintenance or repair as determined from site inspections.

Unscheduled custodial maintenance or repair at the Upper Burbank disposal site may include the following:

- Repairing or replacing deteriorated or vandalized warning signs, fencing, gate, locks, and monitor well caps.
- Removing deep-rooted plants determined to be a threat to the integrity of the cover.
- Reseeding areas surrounding the disposal cell.

After the work is completed and before the contractors are released, the DOE will verify that work was performed according to specification. The annual report to the NRC will document repairs that are performed. Copies of records, reports, and certifications will be included in the permanent site file.

5.0 CORRECTIVE ACTION

Corrective action is defined as repairs that are needed to address problems that affect the integrity of the disposal cell or compliance with 40 CFR Part 192. The NRC must approve the recommended action in advance. Site inspections are designed to identify problems at the developmental stage. Examples of conditions that might trigger corrective action are as follows:

- Surface rupture or subsidence of the disposal cell.
- Development of rills, gullies, or slope instability on the disposal cell.
- Deterioration of the erosion-protection rock on the disposal cell.
- Tailings fluids originating from the disposal cell.
- Gully development on or immediately adjacent to disposal site property that could affect the integrity of the disposal cell.
- Damage to the cell cover or disposal site property from natural catastrophic events or vandalism.
- Damage to the disposal cell cover from deep-rooted plant growth.

The DOE will evaluate the factors that caused the problem and identify actions to mitigate the impact and prevent recurrence. An onsite inspection or preliminary assessment will include, but is not limited to:

- Identifying the nature and extent of the problem.
- Reevaluating germane engineering design parameters.

For conditions that warrant a follow-up inspection, the DOE will submit a preliminary assessment or status report to NRC within 60 days of the inspection. The preliminary assessment report will evaluate the problem and recommend the next step (e.g., immediate action or continued evaluation). If the problem requires immediate repair, the DOE will develop a corrective action plan for NRC approval. Once the NRC approves the corrective action, the DOE will implement the plan. In some cases, corrective action could include temporary emergency measures instituted prior to completion of the normal approval process. If the problem does not require immediate repair, the problem will be documented in the annual report and assessed at the next annual inspection.

NRC regulations do not stipulate a time frame for implementing corrective action (except the finding of an exceedance in established ground water concentration limits). The DOE does not consider assessing the extent of a problem and developing a corrective action plan to be initiation of the corrective action program.

In addition to the preliminary assessment report, the DOE may (as appropriate) prepare a progress report on each corrective action while it is under way or under evaluation.

After corrective action is complete, DOE will certify work and submit a certification statement and supporting documentation to the NRC for review and concurrence. A copy of the certification statement will become part of the permanent site file, as will reports, data, and documentation generated during the corrective action.

6.0 RECORD KEEPING AND REPORTING

6.1 PERMANENT SITE FILE

The DOE will maintain a permanent site file containing site inspection reports and other supporting documentation of long-term surveillance program activities. The information placed in the site file will include:

- Documentation of disposal site performance.
- Demonstration that licensing provisions were met.
- Information needed to forecast future site-surveillance and monitoring needs.
- Reports to stakeholders regarding disposal cell integrity.

After the site is brought under the general license, the DOE will compile copies of site documentation required by the long-term surveillance program guidance for the Upper Burbank disposal site permanent site file (DOE, 1996a). Copies of deeds, custody agreements, and other property documents will be kept in the site file.

The DOE will maintain the surveillance and maintenance documentation identified in other sections of this LTSP, and it will become part of the permanent site file. The DOE will update the site file as necessary after disposal site inspections, maintenance activities, or corrective actions are complete. These records will be handled in accordance with DOE directives to ensure their proper handling, maintenance, and disposition. The archival procedures set forth in 41 CFR Part 101 and 36 CFR Parts 1220-1238 (Subchapter B) will be followed. The permanent site file information will be available for NRC and public review.

6.2 INSPECTION REPORTS/ANNUAL REPORTS

During site inspections, activities and observations will be recorded and described using site inspection checklists, maps, photographs and photo logs, and field notes. Documentary evidence of anomalous, new, or unexpected conditions or situations must describe developing trends and enable the DOE to make decisions concerning follow-up inspections, custodial maintenance, and corrective action. This information will be contained in the permanent site file at the DOE office. The DOE will prepare a site inspection report documenting the findings and recommendations from field inspections.

Site inspection reports will be submitted to the NRC within 90 days of the annual site inspection. Inspection reports will summarize the results of follow-up inspections and maintenance completed since the previous annual inspection.

If unusual damage or disruption is discovered at the disposal site during an inspection, a preliminary report assessing the impact must be submitted to the NRC within 60 days. If maintenance, repair, or corrective action is warranted, the DOE will notify the NRC. The NRC will receive a copy of corrective action plans and of

each corrective action progress report or the reports will be attached to the annual report.

The DOE also will provide copies of inspection reports and other reports generated under the long-term surveillance program to the state of Colorado as required in the cooperative agreement.

7.0 REFERENCES

DOE (U.S. Department of Energy), 1996a. *Guidance for Implementing the Long-Term Surveillance Program for UMTRA Project Title I Disposal Sites*, DOE/AL-62350-189, Rev. 0, U.S. Department of Energy, Environmental Restoration Division, UMTRA Project Team, Albuquerque, New Mexico.

DOE (U.S. Department of Energy), 1996b. *Long-Term Surveillance and Maintenance Program, Quality Assurance Program Plan*, MAC-2152, Rev. 0, prepared by MACTEC Environmental Restoration Services, for the U.S. Department of Energy, Grand Junction Office, Grand Junction, Colorado.

DOE (U.S. Department of Energy), 1995, 1996, and 1998. *RAP in various configurations . . ..*

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 5700.6C, *Quality Assurance*, 21 August 1991, U.S. Department of Energy, Washington, D.C.

UNITED STATES CODE

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

ATTACHMENT 1

NRC CONCURRENCE DOCUMENTATION

(TO BE PROVIDED WHEN RECEIVED)

ATTACHMENT 2

SITE REAL ESTATE INFORMATION

REAL ESTATE DOCUMENTATION

INTRODUCTION

The Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978, as amended, requires the Secretary of Energy to permanently acquire lands needed to carry out the purposes of the UMTRCA. The area the U.S. Department of Energy (DOE) selected for the Naturita disposal site was located on private land owned by Umetco Minerals Corporation, a Delaware corporation (Umetco).

ADMINISTRATION OF THE DISPOSAL SITE

The disposal site is located on land formerly owned by Umetco. Under the requirements of the UMTRCA, as amended, the DOE acquired the disposal site land via valuable consideration. The sale consists of 26.65 acres in accordance with the terms of the UMTRCA. As a result of the sale, the land is no longer subject to the operation of the general land laws, including the mining and mineral leasing laws. This sale to the DOE vested in the DOE the full management, jurisdiction, responsibility, and liability for the land and all activities conducted thereon.

LEGAL DESCRIPTION

Recorded deed recordation is filed at the county seat of Montrose County, Colorado filed: Date 6/16/1997, at Entry No. 629173, Deed Book No. B945, p8, WD 1 of 1 R 6.00 D 0.00 N 0.00 CLK&REC Montrose County. Beginning at a point which lies south 85°48'49" west, 3372.34 feet from the northeast corner of Section 4, Township 47 North, Range 17 West, New Mexico Principal Meridian and considering the north line of said Section 4 to bear north 85°47'29" west and all bearings contained herein relative thereto, thence south 36°18'12" east, 255.08 feet, more or less, to the north line of mill site claim Uravan No. 63 as recorded in the office of the Recorder of Montrose County, Colorado; thence north 82°16'49" west along said north line 361.72 feet, thence south 52°52'53" west, 503.91 feet, thence south 33°25'51" east, 245.53 feet, more or less, to the north line of mill site claims Uravan No. 66 and 67 as recorded in the office of the Recorder of Montrose County, Colorado; thence north 81°36'52" west along said north line, 134.18 feet; thence north 49°16'53" west, 152.74 feet; thence north 40°56'08" west, 351.13 feet; thence north 34°29'19" west, 238.62 feet: thence north 00°29'49" west, 233.37 feet; thence north 83°28'44" west, 342.58 feet; thence north 27°13'04" east, 515.21 feet; thence north 28°47'51" east, 202.47 feet; thence north 24°51'27" east, 220.23 feet; thence south 61°15'07" east, 150.16 feet, thence south 48°51'01" east, 611.42 feet; thence south 37°27'22" east, 378.02 feet; thence south 36°18'12" east, 308.00 feet to the point of beginning, containing 26.65 acres.

REPOSITORY

Real estate correspondence and related documents are maintained and filed by the Property Management Branch, Property and Administrative Services Division, U. S. Department of Energy Albuquerque Operations Office, P.O. Box 5400, Albuquerque, NM 87115, 505-845-5598.

References

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

ATTACHMENT 3

AGENCY NOTIFICATION AGREEMENTS

IN UPDC

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) 8108014122ESL 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
COLORADO		
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
IDAHO		
Lowman	N44.16	W115.61
NEW MEXICO		
Ambrosia Lake	N35.41	W107.80
NORTH DAKOTA		
Bowman	N46.23	W103.55
OREGON		
Lakeview (Collins Ranch)	N42.2	W120.3
PENNSYLVANIA		
Canonsburg	N40.26	W80.25
Burrell VP	N40.62	W79.65
TEXAS		
Falls City	N28.91	W98.13
UTAH		
Mexican Hat	N37.10	W109.85
Salt Lake City (Clive)	N40.69	W113.11

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 -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

PLATE 1

LOCATION OF MONUMENTS, MARKERS AND SIGNS

PLATE 1 will be provided upon request.

Contact Wendee Ryan to request plate.