

AUG 31 1988

MEMORANDUM FOR: Malcolm Knapp, Director
Division of Low-Level Waste Management and
Decommissioning, NMSS

FROM: Donald A. Nussbaumer, Assistant Director Original signed by:
for State Agreements Program D. Nussbaumer
State, Local and Indian Tribe Programs

SUBJECT: UMETCO'S RADIUM DISPOSAL APPLICATION AS SUBMITTED
TO COLORADO

Enclosed for your information is a copy of the Umetco Minerals Corporation license application to the State of Colorado for disposal of radium contaminated waste. We wrote to the State on July 12, 1988 noting that Umetco included in the application package a conceptual proposal for disposing of low-level radioactive waste in mined cavities. According to the application, the low-level waste facility will be the subject of additional review and future amendments, should the initial application for NORM disposal be granted. We informed Colorado that there is no basis in the current application on which to provide detailed comments on the feasibility of mined cavity disposal of low-level waste in the area conceptualized by Umetco and transmitted NRC's staff position on mined cavity disposal. We will keep you informed as we receive additional information. If you have any questions, please contact Kathleen Schneider at 492-0320.

Enclosure:
As stated

Distribution:
SA R/F
Dir R/f
KNSchneider
CO file (fc)
RDoda, RIV

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| NAME: KNSchneider/bh DANussbaumer | : | : | : | : | : | : |
| DATE: 8/30/88 | : 8/30/88 | : | : | : | : | : |

e/10

Colorado ①

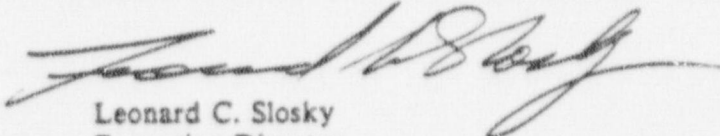
NOTICE OF HEARING

To the States of Colorado, Nevada, New Mexico, and Wyoming; Umetco Minerals Corporation; US Ecology, Inc. and all interested persons:

Please take note that on September 9, 1988, at the hour of 9:00 a.m. in the meeting room of Trumbo's Red Arrow Conference Center, 1706 East Main Street, Montrose, Colorado, pursuant to Article 4B of the Rocky Mountain Low Level Radioactive Waste Compact, the Rocky Mountain Low-Level Radioactive Waste Board will hold a hearing to consider whether to approve Colorado's application to designate the proposed low-level radioactive waste disposal site at Uravan, Colorado as a regional facility. A copy of Colorado's application is attached to this notice. At this hearing all persons seeking to address the board on the application may do so.

DATED this 8th day of August, 1988.

Rocky Mountain Low-Level Radioactive Waste Board


Leonard C. Slosky
Executive Director

Paul -
Let's discuss.
Mal

c/9

ROCKY MOUNTAIN LOW-LEVEL RADIOACTIVE WASTE BOARD

1675 Broadway, Suite 1900
Denver, CO 80202. (303)825-1912

TENTATIVE AGENDA

REGULAR MEETING

Trumbo's Red Arrow Conference Center
Meeting Room
Montrose, Colorado
September 9, 1988

8:30 a.m. Executive Session

9:00 a.m. Public Session Begins

Approval of Minutes of June 10, 1988 Annual and Regular Meetings

Hearing on the State of Colorado's Application for Designation of
a Regional Low-Level Radioactive Waste Disposal Facility at
Uravan, Colorado

Executive Director's Report

Status of Waste Receipts at Beatty

Continued Failure of US Ecology to Provide Accurate
Information on Waste Receipts at Beatty

Other Issues/Public Comments

Lunch Break

Executive Session

Status Report on the Possible Unauthorized Management of
Radium Waste at the Beatty Regional Facility

Approaches to Rate Regulation

The order of matters on this agenda is subject to change without notice.

MEMBER STATES: COLORADO, NEVADA, NEW MEXICO, WYOMING
EXECUTIVE DIRECTOR: LEONARD C. SLOSKY

APPLICATION FOR BOARD APPROVAL
OF THE
REGIONAL LOW-LEVEL RADIOACTIVE WASTE DISPOSAL FACILITY
URAVAN, COLORADO

Submitted to:
ROCKY MOUNTAIN LOW-LEVEL RADIOACTIVE WASTE BOARD

Submitted by:
STATE OF COLORADO
COLORADO DEPARTMENT OF HEALTH

August 7, 1988

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SECTION A: OPERATOR NAME, ADDRESS, AND PHONE NUMBER

The operator of the Regional Low-Level Radioactive Waste Facility is Umetco Minerals Corporation. The company headquarter's mailing address is P.O. Box 1029, Grand Junction, Colorado 81502 and street address is 1600 Ute Avenue, Grand Junction, Colorado 81501. Umetco's phone number is 303/245-3700.

The department of Umetco that will receive and place radioactive waste material in the disposal facility is identified as follows:

Umetco Minerals Corporation
Regional Low-Level Radioactive Waste Facility
P.O. Box 860
Nucila, Colorado 81424

The street address is:

No. 1 Mill Street
Uravan, Colorado 81436

The phone number is 303/862-7301.

SECTION B: FACILITY LOCATION

The Regional Low-Level Radioactive Waste Disposal Facility is located in western Colorado adjacent to the Uravan uranium and vanadium mill facilities (Figures 1 and 2). The Disposal Facility is in Sections 34 and 35, Township 48 North, Range 17 West, New Mexico Principal Meridian. The tract, shown in Figure 2, is approximately 300 feet above the San Miguel River Valley and is approximately 1/2 mile east of the Uravan Mill facilities.

SECTION C: TYPE OF FACILITY

The Disposal Facility is for Low-Level Radioactive Waste (LLW), as defined in Rules of the Rocky Mountain Low-Level Radioactive Waste Board and authorized by the Colorado Department of Health. Naturally-occurring radioactive material (NORM), e.g. the Denver Radium Waste, will be isolated in a repository cell at the East Bench Site (Figure 3). The NORM repository includes a compacted clayey liner, a multi-layered cap, and surface water control features.

Non-NORM LLW will be placed in deep underground burial chambers at the Rim Site (Figure 4) beneath the caprock of a mesa by constructing a portal on the mesa side slopes and driving an adit (tunnel) into the Burro Canyon sandstone. Disposal chambers will be excavated off of the main adit into the Brushy Basin shale approximately 150 feet below the ground surface as needed to provide LLW disposal capacity.

SECTION D: TYPES OF WASTE

The Disposal Facility is being developed to accept LLW as defined in the Rules of the Rocky Mountain Low-Level Radioactive Waste Board and authorized by the Colorado Department of Health. The East Bench Site is specifically designed for NORM LLW, such as the Denver Radium Waste with an average radium content of 100-200 picroCuries per gram, and will not be licensed for, nor accept, hazardous wastes as defined by the Resource Conservation and Recovery Act (RCRA).

Non-NORM LLW to be disposed of at the Regional Low-Level Radioactive Waste Disposal Facility will include Class A, B, and C wastes as defined in Colorado's Rules and Regulations Pertaining to Radiation Control (6 CCR 1007-1-4, which is equivalent to the federal 10 CFR 61). Nationally, Class A waste comprises over 96% of LLW, Class B is about 3%, and Class C waste is less than 1%. Similar percentages are anticipated within the Rocky Mountain Compact.

The Disposal Facility design does not provide for mixed LLW and RCRA hazardous wastes. The State and Compact have the responsibility to evaluate and achieve disposition for such mixed LLW.

SECTION E: CAPACITY

The total capacity of the East Bench Site is approximately 500,000 cubic yards. Disposal of up to 200,000 cubic yards of NORM waste during the first three years will require approximately nine acres. The remaining volume for NORM waste disposal, 300,000 cubic yards, is available for additional wastes generated in the Compact region and would, for example, allow for disposal of 20,000 cubic yards per year for 15 years.

The total capacity of the Rim Site is estimated at 5 million cubic feet, assuming chambers on 50-foot centers and a void ratio of 50%. This would, for example, provide the capability of disposing 20,000 cubic feet per year of waste material over 250 years.

SECTION F: PROPOSED SCHEDULE

The public hearing on Umetco's application for a State of Colorado Specific Radioactive Materials License for NORM wastes at the East Bench Site is scheduled for September 20, 1988. If the Disposal Facility is approved, Umetco is prepared to mobilize for construction in October 1988 and begin construction and receive NORM waste in November 1988.

Umetco is also prepared to submit a license amendment application by February 1989 for the Rim Site and to start construction three months after a license amendment is approved.

SECTION G: OPERABLE LIFE

The Regional Low-Level Radioactive Waste Disposal Facility is designed for an operational life of 20 years, with a design capacity for over 100 years. This operational life can accommodate 500,000 cubic yards of NORM waste at the East Bench Site and 300,000 cubic feet of non-NORM LLW at the Rim Site. The operational life may be extended to utilize unused capacity.

Umetco is prepared to start up and operate the Disposal Facility at least until remedial action is complete at the Uravan site, about 2003. At the end of this period, operation of the Disposal Facility would be transferred to a qualified firm or Umetco may elect to continue operation. Transfer would be subject to agreement with the State of Colorado and the Rocky Mountain Low-Level Radioactive Waste Board.

SECTION H: CHARGES

Rates for the disposal of NORM wastes will be provided to the Rocky Mountain Low-Level Radioactive Waste Board at the time this application for approval is considered by the Board.

Rates for the disposal of non-NORM LLW will be provided for Board approval at the time Umetco applies for license amendment to dispose such LLW.

SECTION I: STATEMENT OF NEED

The State of Colorado by entering into the Rocky Mountain Low-Level Radioactive Waste Compact agreed to assess and evaluate potential areas for a disposal facility and to ensure that a suitable regional low-level radioactive waste facility is established in Colorado. The existing facility at Beatty, Nevada is scheduled to close December 31, 1992 and a new regional facility is required by that time. Under the Compact, a State which generates 20% of the region's LLW is obligated to develop the next facility. Colorado generates over 90% of the Compact's LLW.

In addition, no facility now exists in the Rocky Mountain Compact to accept NORM LLW such as the Denver Radium Waste.

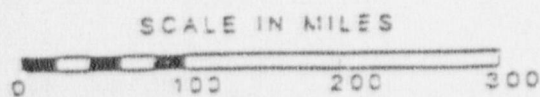
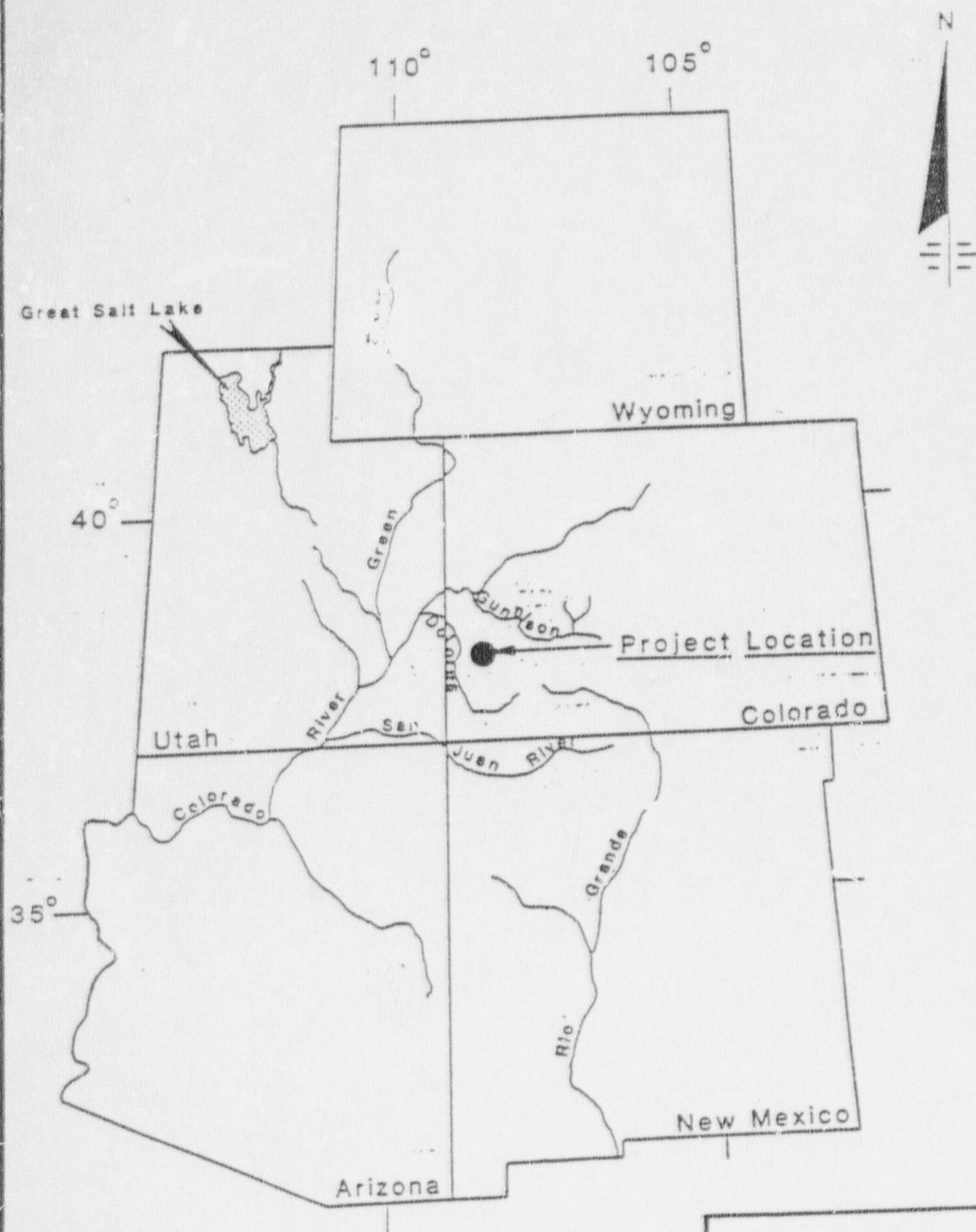
The proposed Disposal Facility meets Colorado's Compact obligations by providing the means for a cooperative effort of the Compact states in managing low-level radioactive waste and by ensuring the long-term availability and economic viability of a disposal site.

SECTION J: ECONOMIC CONSEQUENCES

Over 95% of the LLW to be disposed at this facility is NORM waste which the currently active site in Nevada does not accept. The economic consequences to the currently active site in Nevada are negligible.

SECTION K: ARTICLE 3, SECTION D(4)

Article 3, Section D (4) of the Low-Level Radioactive Waste Act (24-60-22, CRS 1973) requires that comments be solicited from other Compact members regarding the siting, design, development, licensure or other regulation, operation, closure, decommissioning, and long-term care of the regional disposal facility. The State of Colorado has complied with this requirement by presenting a description of the disposal facility to the Compact states on June 13, 1988 and by formally requesting comments in the Colorado Department of Health letter dated August 7, 1988.



LOCATION MAP
REGIONAL RADIOACTIVE WASTE
DISPOSAL FACILITY
MONTROSE COUNTY, COLORADO
JUNE, 1988

LEGEND

- Existing monitoring well
- Proposed monitoring well
- Existing air monitoring station
- Proposed air monitoring station
- Proposed meteorological station
- Proposed erosion monument

GEOLOGIC CROSS-SECTION (FIGURE 2.2-4)

W-615

H-31

SPRING CREEK

MESA

LIMIT

DISPOSAL FACILITY

RIM SITE

BENCH SITE

EAST END

H-33

H-36

E-3

E-2

H-34

E-1

F-BLOCK

URAVAN MILL

A PLANT

B PLANT

LOCATION FIGURE 2.2-5

SCALE IN FEET

0 500 1000 2000

W-615

H-31

SPRING CREEK

MESA

LIMIT

DISPOSAL FACILITY

RIM SITE

BENCH SITE

EAST END

H-33

H-36

E-3

E-2

H-34

E-1

F-BLOCK

URAVAN MILL

A PLANT

B PLANT

LOCATION FIGURE 2.2-5

SCALE IN FEET

0 500 1000 2000

W-615

H-31

SPRING CREEK

MESA

LIMIT

DISPOSAL FACILITY

RIM SITE

BENCH SITE

EAST END

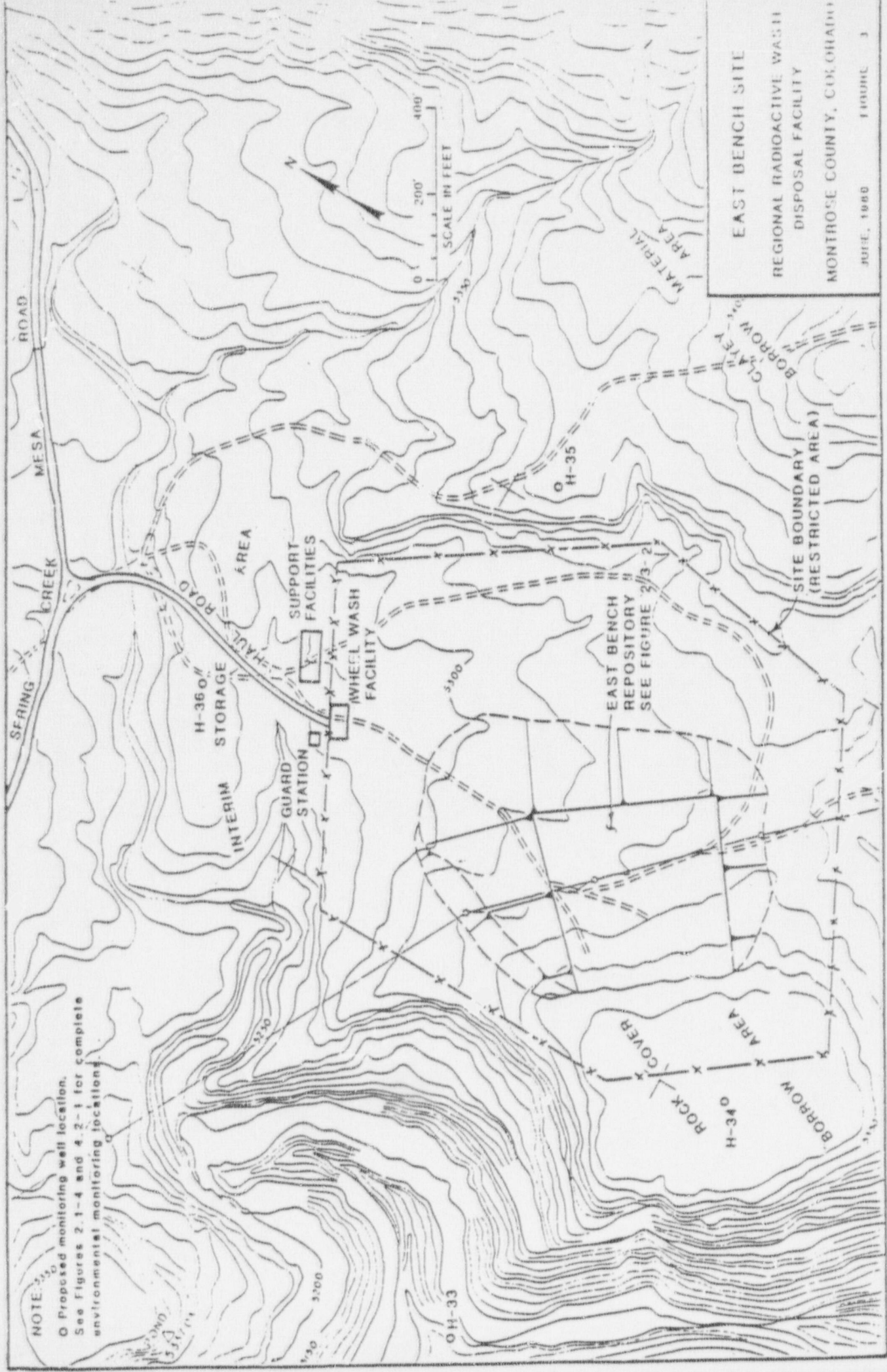
PROJECT VICINITY MAP

REGIONAL RADIOACTIVE WASTE
DISPOSAL FACILITY

MONTROSE COUNTY, COLORADO

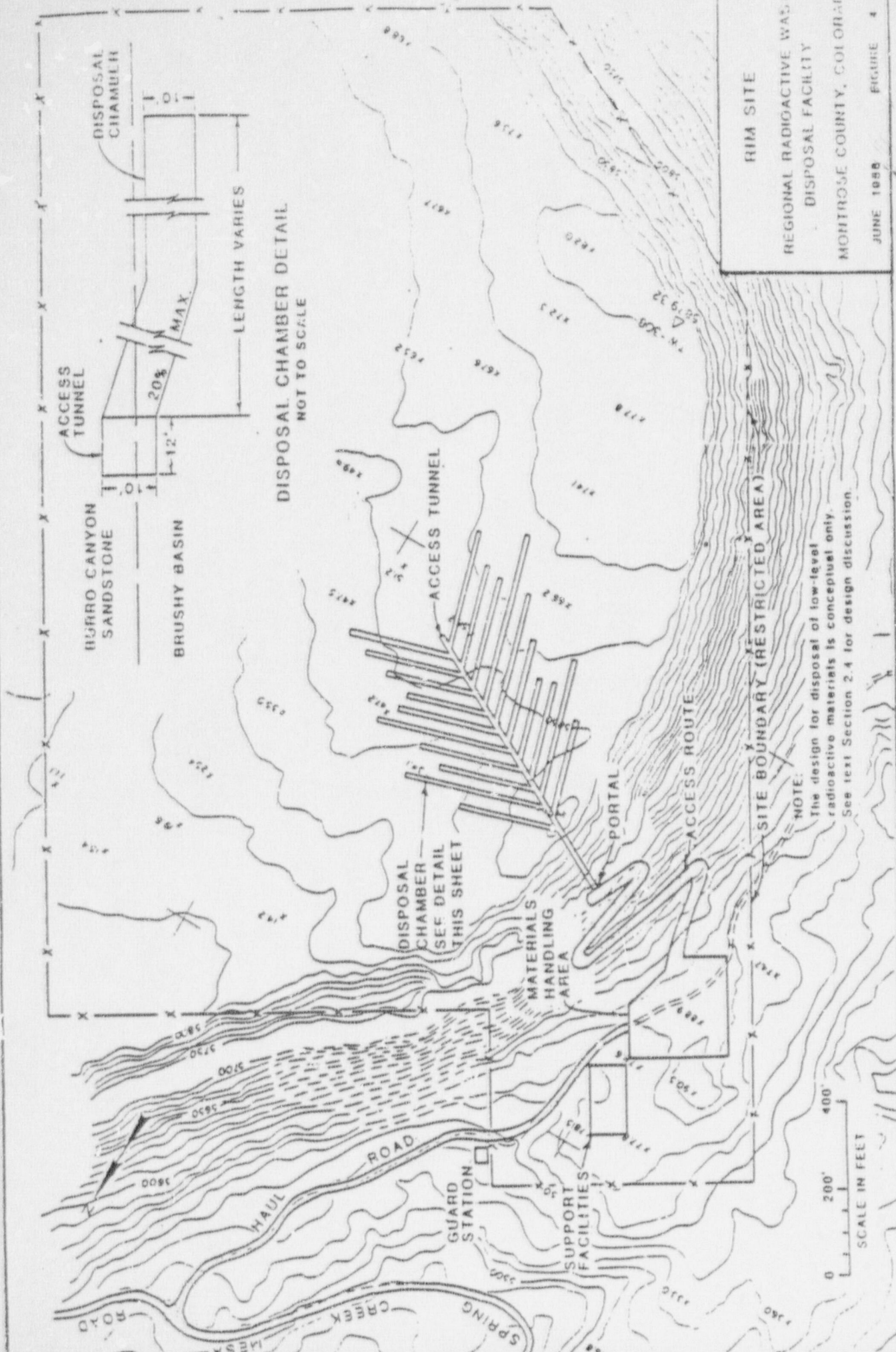
JUNE, 1988

FIGURE 2



NOTE:
O Proposed monitoring well location.
See Figures 2.1-4 and 4.2-1 for complete environmental monitoring locations.

EAST BENCH SITE
REGIONAL RADIOACTIVE WASTE
DISPOSAL FACILITY
MONTROSE COUNTY, COLORADO
JUNE, 1980 1100HC 3



RIM SITE

REGIONAL RADIOACTIVE WASTE
DISPOSAL FACILITY
MONTROSE COUNTY, COLORADO

JUNE 1988

FIGURE 4

NOTE:
The design for disposal of low-level
radioactive materials is conceptual only.
See text Section 2.4 for design discussion.

0 200' 400'
SCALE IN FEET



NEWS

CONTACT: Ann J. Lockhart

331-4639

(For immediate release)

Feb. 10, 1989

DENVER--The Colorado Department of Health today issued a radioactive materials license to Umetco Minerals Corp. to dispose of Denver radium wastes in Uravan, in the event that the Grand Junction-based company wins a bid from the Environmental Protection Agency to handle the waste under the federal Superfund program.

Before the company can proceed, it must also get designation as a disposal site from the Rocky Mountain Low Level Radioactive Waste Compact Board and secure transfer of land for the facility from the federal Bureau of Land Management.

The five-year radioactive materials license outlines 33 conditions the company must meet to operate the disposal facility to protect public health and the environment and the health and safety of the workers, according to Al Hazle, director of the Health Department's Radiation Control Division.

The company is authorized to dispose of a maximum of 200,000 cubic yards of the naturally-occurring radioactive wastes found in the Denver area in early 1979, which contain radium-226, natural uranium, thorium and radioactive decay products. The wastes were left from radium product companies and laboratories established in the early 1900s when radium was believed to have medicinal value. No other radioactive wastes are authorized for disposal at the site.

Gary Broetzman, hearing officer appointed by the Health Department to preside over a public hearing on the facility in Nucla in mid-November, ruled Jan. 3 that the facility's license could be issued with a number of specific conditions. They included changes in the design, operation and post-closure surveillance of the facility and a defined plan for transporting the wastes to the site, to be developed and coordinated with local governments, with state approval.

"The license we issued today includes the changes recommended by Broetzman which were concerns raised during the hearing. Transportation and ground water protection were two of the major concerns expressed at the hearing," Hazle said. "We specifically addressed all the environmental protection issues regarding radiation over which we have legal jurisdiction."

c/11

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH

4210 East 11th Avenue
Denver, Colorado 80220
Phone (303) 320-8333

Rec'd 2-27-89



Roy Romer
Governor

Thomas M. Vernon, M.D.
Executive Director

February 10, 1989

J.F. Frost
Director of Reclamation
Umetco Minerals Corporation
P.O. Box 1029
Grand Junction, Colorado 81502

RE: Colorado Radioactive Materials License 660-06

Dear Mr. Frost:

In response to your application dated May 31, 1988, in accordance with the findings of fact, conclusions of law, and resulting order, dated January 3, 1989, by Gary G. Broetzman, hearing officer, and pursuant to the Colorado Radiation Control Act and regulations thereunder, Radioactive Materials License No. 660-06 is hereby issued to Umetco Minerals Corporation. License 660-06 shall be effective February 10, 1989 and constitutes final agency action by the Colorado Department of Health.

Sincerely,

Albert J. Hazle, Director
Radiation Control Division

AJH/msm

Enclosure

cc: J. Goad
H. Ipsen

License No. 660-06
Amendment 00
February 10, 1989
Page 1 of 38

UMETCO MINERALS CORPORATION
1600 UTE AVENUE
GRAND JUNCTION, COLORADO

Pursuant to the Radiation Control Act, Title 25, Article 11, C.R.S. 1973 as amended, and the State of Colorado "Rules and Regulations Pertaining to Radiation Control", Part III, and in reliance on statements and representations heretofore made by the licensee designated below,

COLORADO RADIOACTIVE MATERIALS LICENSE NO. 660-06 IS HEREBY ISSUED,

authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect of the Colorado Department of Health (the "Department") and to any conditions specified below.

1.0 LICENSEE NAME

Umetco Minerals Corporation

2.0 LICENSEE ADDRESS

Headquarters Address

1600 Ute Avenue
P.O. Box 1029
Grand Junction, CO 81502

Department to Use Radioactive Material

Regional Low-Level Radioactive Waste Disposal Facility
P.O. Box 860
Nucla, CO 81424

Disposal Facility Street Address

No. 1 Mill Street
Uravan, Colorado 81436

3.0 LICENSE NUMBER 660-06 AMENDMENT NUMBER 00

4.0 EXPIRATION DATE December 31, 1993

5.0 REFERENCE NUMBER None

A U T H O R I Z A T I O N S

6.0 RADIOACTIVE MATERIALS

Naturally-occurring radionuclides, in particular radium-226 and natural uranium, thorium, and their radioactive decay products from the Denver Radium Superfund locations.

7.0 CHEMICAL AND/OR PHYSICAL FORM

Dry soil, building debris, and miscellaneous material.

8.0 MAXIMUM QUANTITY LICENSEE MAY POSSESS AT ANY ONE TIME

200,000 cubic yards or 320,000 dry tons (290,000 metric tonnes).

9.0 AUTHORIZED USES

The licensee is authorized to receive and store/dispose radium-226 contaminated waste.

The licensee is not authorized to receive, store or dispose low-level radioactive waste other than as described above.

10.0 AUTHORIZED PLACE OF USE

The licensee's waste disposal facilities at Uravan in Montrose County, Colorado, located as follows:

portions of Township 48 North, Range 17 West, New Mexico Principal Meridian, Section 34, as specified in Annex A.

11.0 LICENSEE PROPOSALS AND COMMITMENTS ("REFERENCED DOCUMENTS")

Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive materials described in Items 6, 7, and 8 and 9 of this license in accordance with statements, representations, and procedures contained in the licensee's:

- 11.1 Radioactive Material License Application, Regional Low-Level Radioactive Waste Disposal Facility, dated June 1988.
- 11.2 Site Procedures Manual, submitted in accordance with LC 20.0 and as revised pursuant to LC 20.2.
- 11.3 Final Plans and Specifications, submitted in accordance with LC 17.3.
- 11.4 Quality Control/Quality Assurance, Monitoring and Performance Evaluation Plan ("Quality Plan"), submitted in accordance with LC 17.4.
- 11.5 Financial assurance arrangements for closure, as specified in LC 11.1 and revised pursuant to LC 32.
- 11.6 Long term monitoring and custodial care arrangement, as specified in LC 11.1 and revised pursuant to LC 33.
- 11.7 Letter dated June 15, 1988 from J.F. Frost to K. Weaver.
- 11.8 Ground Water Investigation Report, September 1988.
- 11.9 Geotechnical Study, September 1988.
- 11.10 Hydrology Study, September 1988.
- 11.11 Letter dated September 1, 1988, from R.K. Jones to K. Weaver.

How are these documents connected to the license actions? Strange!

12.0 GENERAL CONDITIONS

12.1 DEFINITION OF TERMS

Unless otherwise provided in this license, terms used herein are as defined in the State of Colorado "Rules and Regulations Pertaining to Radiation Control" (6 C.C.R. 1007-1-1 et seq., hereafter the "Radiation Rules").

12.2 REQUIRED PERMITS

Prior to beginning any new construction or new operations, the licensee shall obtain all applicable permits and other authorizations of local, state and federal agencies having authority over health, safety, and environmental protection aspects of the activities authorized by Items 6, 7, 8, and 9 of this license. The licensee shall maintain in force such applicable permits from beginning to end of the project.

The licensee shall provide a copy to the Radiation Control Division of the Department (hereinafter referred to as "the Division") thirty (30) days prior to, or as soon thereafter as it is available but in no event later than the date of filing of, any application to permitting agencies for modification or renewal of such permits or other authorization.

12.3 COMPLY WITH PERMITS

Within the scope of applicable statutes and lawful regulations thereunder, the licensee shall operate in full compliance with the requirements of each other division of the Department.

Violation of such other requirements shall not by itself constitute violation of this license, unless the Department makes an independent finding of violation of the Radiation Rules or a condition of this license other than this LC 12.3.

12.4 STATUS OF REFERENCED DOCUMENTS

Proposals and commitments in referenced documents are in effect license conditions.

Where the word "will" or "should" is used in the documents referenced in LC 11 above, it shall denote a requirement.

12.5 SEVERABILITY

If any part of the Radiation Rules, Department or Division policy, or this license is held invalid, the remainder shall not be affected.

12.6 WRITTEN APPROVAL

- 12.6.1 Required Department "approval", "authorization", or "concurrence" shall be obtained in writing from the Division, unless otherwise provided in the Radiation Rules or Department policy.
- 12.6.2 When the Department reasonably and routinely consults with another party, including, but not limited to, the State Archaeologist, State Engineer and Colorado Geological Survey, the licensee shall:
- 12.6.2.1 Permit such party to inspect designated documents, facilities, or sites;
- 12.6.2.2 Submit designated documents to the party for review; and
- 12.6.2.3 Conform applications and supporting documents to the written guidelines to or of such party as determined by the Division to be applicable to the project.

12.7 LICENSE CONDITIONS MODIFY REFERENCED DOCUMENTS

The following license conditions modify and add to commitments in the documents in LC 11.

13.0 OWNERSHIP AND CONTROL

13.1 NOTIFICATION OF INTENT

The licensee shall provide the Department with ninety (90) days advance notification of any proposed change in control.

13.2 PROPERTY ACQUISITION

The licensee shall cooperate fully with the Colorado Board of Land Commissioners in achieving acquisition of the property delineated in LC 10.0, including all surface and subsurface rights necessary for control and all lease, monetary or other arrangements required by the Board to assure state ownership.

13.3 OWNERSHIP BY THE STATE OF COLORADO

Ownership of the waste disposal area shall be in accordance with the provisions of applicable Colorado statute(s) and rule(s).

14.0 USERS

14.1 AUTHORIZATION

The licensee shall submit resumes and documentation of users' training and experience to the Department and obtain written authorization from the Department for each user. Radioactive materials shall be used by, or under the supervision of, an authorized user for activities pursuant to LC 9. The following are herewith designated as authorized users: J.F. Frost, H.A. Stephens, G.L. Swanson, C.G. Fabrizius, and R.K. Jones. H.A. Stephens is herewith designated as Radiation Protection Officer (RPO).

14.2 LIST

The licensee shall maintain throughout use of radioactive materials authorized by this license at least two (2) trained, qualified, and authorized users, to include the Radiation Protection Officer (RPO).

14.3 AVAILABILITY

An authorized user shall be on hand at the facility or immediately available at all times during facility operation.

14.4 NON-SAFETY ASSIGNMENTS

The licensee's radiation safety and environmental control staff shall fulfill requirements of this license prior to being given assignments not related to health, safety and environmental protection, unless otherwise authorized by the Department.

14.5 MINIMUM TECHNICAL QUALIFICATIONS FOR RADIATION PROTECTION OFFICER

The RPO for activities pursuant to LC 9 shall have at least a B.S. degree in environmental or radiological sciences, or a related field, from an accredited college. The RPO shall have intensive formal training of at least one year duration with a minimum of one week of the course specifically applied to health physics problems at waste disposal facilities. The RPO shall have at least one year of "hands on" experience in radiation safety and occupational health in an operating mill or related facility, at least six months of this experience at the supervisory level. Refresher training in health physics (a minimum of 40 hours) is required at least every two years. With Department approval, experience may be substituted for training requirements.

14.6 DESIGNATED ASSISTANTS TO THE RADIATION PROTECTION OFFICER

The RPO may delegate to trained assistants functions required by this license, including quality assurance/quality control measures, for which a written procedure approved by the Department is included in LCs 11.1 through 11.4, so long as quality is maintained and documented and minimum qualifications for health physics technicians and other members of the radiation safety staff are specified in LC 11.2.

15.0 EMERGENCY ACTIONS

15.1 REPORT OF ACCIDENTS

The licensee shall, immediately upon discovery, notify the Director, Radiation Control Division, Colorado Department of Health, 4210 East 11th Avenue, Denver, Colorado, by telephone (303-331-8480, or 370-9395 after office hours) and in writing, of any failure or imminent threat of failure in any process, diversion, or retention system which results or may result in a release of radioactive material into uncontrolled areas. This requirement is in addition to the requirements of 6 CCR 1007-1-4.29 and -4.31.

15.2 EMERGENCY RESPONSE CAPABILITY

The following shall be approved by the Department:

15.2.1 Warning System

The licensee shall develop, and submit for approval by the Department and such other agencies as the Department designates, warning plans and systems to prevent accidents that could result in harm to workers or release to surface waters, groundwater, or uncontrolled areas of collected liquids or radioactive material involved with site operations.

15.2.2 Response Plans

The licensee shall use emergency response plans, submitted to the Department not later than thirty (30) days prior to commencement of construction, approved by the Department in conjunction with such agencies as the Division of Disaster Emergency Services, and specified in LC 11.2, to respond to accidents and fires at the Disposal Facility and in transportation of radioactive material. These plans shall include:

15.2.2.1 Provisions to ensure that all shippers of material to the facility conduct full cleanup of any spillage in the event of an accident en route to the Disposal Facility; and

15.2.2.2 Provisions for prompt retrieval of any radioactive material released to uncontrolled areas by rupture of any transport, storage, or disposal operation or area.

15.2.3 Transportation Plan

The radioactive material Transportation Plan shall include, but not be limited to:

- 15.2.3.1 The selected route and means of transport from Denver to the site;
 - 15.2.3.2 Maximum daily number of vehicles along each of the selected routes;
 - 15.2.3.3 Limitations of weekly, seasonal, or annual numbers of vehicles;
 - 15.2.3.4 Means of containment of materials within the vehicles enroute to the disposal site;
 - 15.2.3.5 Safety precautions to be taken to reduce accidents and impacts;
 - 15.2.3.6 Training of licensee employees and other response personnel en route needed to cope with possible accidents;
 - 15.2.3.7 An evaluation of the potential impact on water quality associated with a possible transportation incident whereby wastes would enter the Colorado or Dolores River;
 - 15.2.3.8 Definition of whatever preventative measures would be necessary to reasonably assure that such impacts would avoid potential risks to downstream water users.
- 15.2.4 The licensee shall present the Transportation Plan to local governments along the transport route, shall make a reasonable effort to address all issues raised, and shall work with local emergency response agencies to enhance their emergency response capabilities and training.
- 15.2.5 The licensee shall not commence construction until the Transportation Plan is entirely developed and accepted by the Department, in consultation with the Division of Disaster Emergency Services, Colorado Department of Highways, local governments, and such other agencies as the Department designates.

15.2.6 Equipment

The licensee shall have available, every calendar day all year, sufficient personnel, equipment and supplies to respond to accidents, fires, and other emergencies in accord with the plans specified in LC 11.2, as approved by the Department.

15.2.7 Training

The licensee shall maintain a documented emergency response training program to insure that sufficient trained persons are always available.

16.0 FACILITY OR PROCESS ADDITIONS OR CHANGES

- 16.1 The licensee shall provide the Department thirty (30) days advance notification of any proposed addition or change to a facility or process which potentially has a significant health, safety or environmental protection aspect. Potential public health or environmental impacts not previously assessed, or greater than previously assessed, require notification.
- 16.2 If the Department makes a preliminary finding of significant health, safety, or environmental impact, the licensee shall provide the Department with a written assessment of impacts resulting from the facility or process addition or change.
- 16.3 If the Department, upon review of the licensee's written assessment, determines that written approval or a license amendment is required, the licensee shall apply for and obtain the prescribed authorization prior to modifying the facility or process or operating procedure or equipment.
- 16.4 The licensee shall provide to the Department an acceptable plan of action to eliminate or effectively control any unexpected harmful effects or irreversible damage detected during operation and not otherwise identified in references or license conditions.

17.0 GENERAL REQUIREMENTS FOR DESIGN, CONSTRUCTION, AND CLOSURE

17.1 GENERAL REQUIREMENTS

All construction related to Items 6, 7, 8, and 9 of this license shall be in accord with detailed plans, approved prior to commencement of construction by the Department and such other agencies as the Department designates, as specified in LC 11 and as provided in LCs 17.2 through 17.5 below.

17.2 SUPERVISION

The licensee shall supervise all licensed construction activities in accordance with the regulations which govern the activities of the State Engineer and such additional requirements as are determined to be necessary pursuant to all applicable State rules and regulations.

17.3 FINAL PLANS AND SPECIFICATIONS

The licensee shall submit to the Department, no later than May 1, 1989 or thirty (30) days prior to commencement of construction, whichever is earlier, fifteen (15) copies of the detailed Final Plans and Specifications ("FPS") for all work, in accord with and pursuant to LC 11.1 and LC 11.2. The FPS, incorporated in this License as LC 11.3, shall include all modifications specified in Annex E of this License.

17.4 QUALITY PLAN

The licensee shall submit to the Department, no later than June 30, 1989 or thirty (30) days prior to commencement of construction, whichever is earlier, fifteen (15) copies of the detailed Quality Control, Quality Assurance, Monitoring and Performance Assessment Plan ("Quality Plan") for all work, in accord with and pursuant to LC 11.1 and LC 11.2. The Quality Plan, incorporated in this license as LC 11.4, shall conform to "Geotechnical Quality Control: Low-Level Radioactive Waste and Uranium Mill Tailings Disposal Facilities", NUREG/CR-3356, and to "Quality Assurance Guidance for Low-Level Radioactive Waste Facility", NUREG-1293. The specific plan of action and documentation procedures, including a description of organizational structure, methods and tests for evaluating performance, and notification steps for changes or corrective actions and including reporting, record-keeping, and storage, shall be revised as appropriate whenever regulatory guidance requiring such revisions is provided to the licensee by the Department.

17.5 CLOSURE REPORT

The licensee shall submit to the Department fifteen (15) copies of the detailed Closure Report, no later than sixty (60) days following completion of reclamation and closure activities, to demonstrate closure in accord with LC 11.1, Section 2.3.3, pages 2-75 through 2-86 and in accord with LCs 11.3 and 11.4.

18.0 GENERAL REQUIREMENTS FOR OPERATIONS

18.1 FACILITY STATUS

The facility shall operate as specified in LC 11.1 and LC 11.3 in accord with procedures specified in LC 11.2 and LC 11.4.

18.2 DISPOSAL OPERATIONS

18.2.1 The licensee shall require, and submit to the Department immediately upon receipt by the licensee, written certification from generator/shipper that bulk waste for disposal contains only naturally-occurring radionuclides from the Denver Radium Superfund locations, in which the radioactivity is by and large uniformly distributed, and does not exceed 2000 picoCuries of radium-226 per gram.

18.2.2 The licensee shall require written certification from generator/shipper that the following requirements are met:

18.2.2.1 The waste shall not contain free standing liquid. Free standing liquid is defined to be as little liquid as possible and in no case more than 0.5 percent, by volume, of liquid per container. Free standing liquid shall not refer to retained moisture.

18.2.2.2 The waste does not exhibit the characteristics of hazardous material as defined in "Subpart C - Characteristics of Hazardous Wastes" in Colorado's Hazardous Waste Regulations, Part 261.20 et seq. and shall not have as a constituent a listed hazardous waste as defined in "Subpart D - Lists of Hazardous Wastes" in Colorado's Hazardous Waste Regulations, Part 261.30 et seq. The licensee may receive waste that has been made nonhazardous by acceptable methods and is therefore not subject to Colorado's Hazardous Waste Regulations.

18.2.3 The licensee shall submit to the Department, immediately upon receipt by the licensee, all test results from U.S. Government, U.S. Government contractor, and licensee sampling of the waste materials for the presence of any toxic materials in unacceptable quantities in order to assure that such materials will not be deposited at the Disposal Facility.

18.3 GENERAL MAINTENANCE

All disposal, storage, processing, transport, impoundment, containment, monitoring, and safety systems which shall be operated pursuant to this License shall be maintained in good working order. The licensee shall document a system of routine preventive maintenance so that safety-related equipment is checked for proper working order according to a regular schedule.

18.4 ALARA (AS LOW AS REASONABLY ACHIEVABLE)

The licensee shall keep exposures as low as reasonably achievable (ALARA) as provided in LCs 11.1 through 11.4 and in conformance to U.S. Nuclear Regulatory Commission Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Exposure as Low as Reasonably Achievable", except as otherwise authorized by the Department.

The ALARA program performance shall be reviewed monthly by the Radiation Protection Officer (RPO) in a monthly written report to the manager.

18.5 MANAGEMENT

The licensee shall provide to the Department, by March 31st of each calendar year, updated details of the authority and responsibility of each level of management, noting any changes.

18.6 OFF-SITE DOSE LIMITS

18.6.1 Limits

The licensee shall conduct activities in such a manner as to provide reasonable assurance of compliance with 6 CCR 1007-1-14.19.

18.6.2 Performance

Determination of performance in relation to LC 18.6.1 shall be based upon the annual reports required by LC 30.

18.7 BASELINE INFORMATION

For the purpose of reviewing site cleanup and closure, LC 11.1 shall be considered as the baseline references.

18.8 INDEPENDENT OVERSIGHT

The licensee shall provide full support for one (1) State oversight coordinator ("SOC") throughout construction and operations. The SOC shall report directly to the Department in order to confirm that construction proceeds according to the plans and specifications required in LC 11.3 pursuant to LC 17.3 and to confirm that quality control and quality assurance are as required in LC 11.4 pursuant to LC 17.4.

The SOC shall be the Department's representative with respect to all concurrences and approvals and shall retain full discretion to consult as necessary with staff and/or designated representatives of the Department prior to such approvals.

The SOC shall certify for the Department: that the licensee has been placed and compacted the liner in accord with LC 11.3; that the waste materials have been placed in accord with LC 11.3; that the cover has been constructed in accord with LC 11.3; and that the site has been reclaimed in accord with LC 11.3, as presented in the licensee's Closure Report required by LC 17.5.

18.9 PROJECT ADVISORY COMMITTEE

The licensee shall work on a continuous basis with a project advisory committee selected by the Department and comprised of local interests from the Montrose-San Miguel County area, and others as appropriate to meet periodically during the project development period with licensee and Department representatives to review project progress, discuss any issues that might arise, and to offer constructive recommendations.

19.0 SITE CONTROL AND PERSONNEL SAFETY

19.1 RESPONSIBILITY

- 19.1.1 The Site Manager shall be accountable for safety, security, fencing, posting, and area control.
- 19.1.2 The RPO or RPO's designee shall have authority to remove employees from a work environment or suspend the operation in a particular area if (s)he has determined that a condition exists that would likely result in any individual being exposed to radiation that may present an imminent health hazard.
- 19.1.3 The Site Manager shall act promptly on the recommendations of the RPO or RPO's designee pertaining to radiation safety and security.

19.2 TRAINING

- 19.2.1 New employees shall not commence work assignments in controlled areas until they have been adequately trained in their assignment and in radiation safety, in accordance with a program approved by the Department and specified in LC 11.2. Such training shall be documented by dates, nature of training, tests and scores, and written acknowledgment of receipt by employee.
- 19.2.2 The RPO shall document employee review of (1) procedures applicable to each employee's assignment and (2) provisions of 6 CCR 1007-1-10.
- 19.2.3 The licensee shall accumulate at least ninety (90) minutes of training meeting time per year, or alternative amount approved by the Department and specified in LC 11.2, for each radiation worker to review radiation protection topics, documenting employee attendance, and retrain radiation workers annually on current developments in radiation safety.

19.3 PROTECTIVE CLOTHING

Properly-fitted respirators, gloves, boots, coveralls, helmets, goggles and other protective items shall be used at all times in areas or activities where designated by the RPO.

19.4 RADIATION WORK PERMITS

The licensee's RPO or RPO's designee shall prepare a special work permit, describing specific radiological controls, prior to start of any work or maintenance, at any location of the licensed facility or site, having radiation safety implications and for which no written procedure exists. The licensee's Radiation Work Permit program shall be included in LC 11.2, as approved by the Department. A copy of all permits shall be retained for no less than five (5) years for inspection by the Department.

19.5 HYGIENE

All workers shall monitor and document absence of contamination exceeding 1000 dpm/100 cm², in areas or activities where designated by the RPO.

19.6 CONTROLLED AREA RESTRICTIONS

The licensee shall not allow eating and smoking in controlled areas, except in control rooms, offices, and lunchrooms, or other areas designated by the RPO.

19.7 SECURITY

The licensee shall fence and post the controlled area boundary as approved by the Department and as specified in LC 11.2 and in accordance with 6 CCR 1007-1-4.14.

19.8 POSTING EXEMPTION

The licensee is hereby exempted from the requirements of 6 CCR 1007-1-4.11 for areas within the exclusion area boundary, provided all entrances to the property are conspicuously posted with the sign:

"Any Area or Container on this Property
May Contain Radioactive Materials."

20.0 HEALTH, SAFETY AND ENVIRONMENTAL PROCEDURES MANUAL

20.1 PROVISIONS

The licensee shall operate according to and maintain a comprehensive written health, safety and environmental procedures manual, approved by the Department, governing licensed activities, to wit: LC 11.2, the Site Procedures Manual. The procedures manual shall contain safety, monitoring, decontamination, and emergency procedures, including:

- 20.1.1 Administrative and operating procedures relating to radiological health and safety;
- 20.1.2 Instructions and precautions to keep exposures ALARA;
- 20.1.3 Specific information on analytical equipment, laboratories, and procedures for each aspect of the monitoring program.

20.2 REVISIONS

- 20.2.1 No reduction in monitoring provisions shall be made without Department approval.
- 20.2.2 All procedures manual revisions shall be submitted to the Department for prior approval.
- 20.2.3 The licensee shall consider proposed procedures manual revisions whenever new or revised regulatory guidance requiring such revisions is provided to the licensee by the Department.

21.0 POINT SOURCE AIR EMISSIONS CONTROLS

Emissions from all activities shall be controlled in accordance with LC 11.2 and applicable permits.

22.0 AREA SOURCE AIR EMISSIONS CONTROLS

22.1 WORK AREAS

The licensee shall obtain Department approval for a program--specified in LC 11.2, LC 11.3 and air emissions permits by written operating procedures for all conditions--to minimize, to the maximum extent reasonably achievable, dispersion of airborne particulates from the disposal area.

22.2 ROADS

The licensee shall control dusting from controlled area roads by sprinkling, or chemical crusting agents, and shall limit vehicle speeds to twenty (20) miles per hour.

23.0 SOLIDS MANAGEMENT

23.1 SUPERVISION

The disposal system shall be monitored by persons trained and under the supervision of a professional engineer, or other engineer, scientist, or person qualified by virtue of training and experience approved by the State.

23.2 QUALITY CONTROL

The licensee shall strictly adhere to LC 11.4 at all times, particularly with respect to placement and compaction of liner, waste, and cover layers.

23.3 MAINTENANCE

Culverts and roads shall be maintained at all times. All required maintenance, repair and erosion control shall be undertaken as expeditiously as possible.

23.4 DRAIN SYSTEMS

The drainage systems shall be inspected quarterly and maintained functional at all times. Required maintenance, repair and erosion control shall be as expeditious as possible.

23.5 MINOR NONRADIOLOGICAL CONSTITUENTS

The licensee is authorized to dispose incidental amounts of nonradiological constituents essentially uniformly mixed with the bulk waste if such amounts would be acceptable for receipt and disposal at an approved solid waste landfill.

24.0 LIQUIDS WASTE MANAGEMENT

The licensee shall meet the following requirements:

- 24.1 The licensee shall not discharge radioactive materials or toxic pollutants to SURFACE WATERS.
- 24.2 The licensee shall not allow significant pollution to migrate to GROUND WATERS beyond the limited area specified in LC 11.3 and approved by the Department.
- 24.3 The licensee shall control, by diversion or catchment, all SURFACE RUNOFF due to a 100-year, 24-hour precipitation event to or from all facilities or areas and obtain a permit for any discharge or prospective discharge to waters of the State.

The licensee shall construct a runoff detention pond away from the disposal embankment sufficient to fully retain the runoff from a 100-year frequency, 24-hour precipitation event. The water retained shall be removed from the holding area within 72 hours after the precipitation event. The detention pond shall be capable of passing a larger precipitation event, a 1000-year frequency event or greater, without causing a failure of the ring dike.

25.0 TRANSFER OF CONTAMINATED MATERIALS

The licensee shall release contaminated equipment, packages or materials from controlled areas for sale, repair, reuse, resale or disposal only after documented radioactive decontamination meeting the requirements of the Department, as detailed in Annex C to this license or required pursuant to 6 CCR 1007-1-3.24.

26.0 GENERAL SPECIFICATIONS FOR INSPECTION AND MONITORING

26.1 RECORDS

26.1.1 The results of sampling, analyses, surveys, instrument calibrations, inspections and audits, employee training, as well as any related reviews, investigations, and corrective actions shall be documented.

26.1.2 All such documentation shall be retained and archived until other disposition is authorized by the Department. Personnel exposure records shall be preserved indefinitely.

26.2 LOWER LIMITS OF DETECTION

26.2.1 The licensee shall adhere to the lower limits of detection (LLDs) contained in Annex D for the analysis of samples collected pursuant to LCs 27 and 28. If the licensee is using other LLDs, such LLDs shall be submitted to the Department for review and approval and specified in LC 11.2.

26.2.2 If actual concentrations being measured are sufficiently higher than the lower limits of detection specified in LC 26.2.1, the sampling and analysis procedures need only be adequate to measure the actual concentrations. In such cases, the standard deviation estimated for variability due to random error of the analysis shall be no greater than ten percent (10%) of the measured value.

26.3 QUALITY ASSURANCE/QUALITY CONTROL

26.3.1 The licensee shall maintain a quality assurance/quality control program approved by the Department and specified in LC 11.2.

26.3.2 NRC Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment", as revised, may be followed by the licensee; or the licensee's specifications may provide for an equivalent quality assurance program.

26.4 EQUIPMENT AVAILABLE

The inventory of monitoring equipment shall be such that operable and calibrated units are always on hand.

26.5 CALIBRATION OF EQUIPMENT

The licensee shall calibrate all radiation monitoring and sampling equipment after repair and, unless otherwise authorized by the Department, at least as frequently as the manufacturer's suggested interval, or semiannually if no interval is specified. Also, a check source shall be used to assure that radiation detection instruments are operating properly before each use.

27.0 PERSONNEL AND FACILITY MONITORING

27.1 Consistent with LC 11.1, the licensee's personnel and facility monitoring program shall be sufficient to enable the Department to estimate maximum potential occupational dose commitment and to demonstrate compliance with 6 CCR 1007-1-4, and shall be:

27.1.1 As in the approved procedures manual (LC 11.2) required by LC 20, as modified by this LC 27;

27.1.2 Revised as necessary in accordance with LC 20.2.

27.2 The RESULTS of personnel and facility monitoring required by LC 27 shall be included in the report required in LC 30.

27.3 PERSONNEL MONITORING control badges shall be kept in a background location.

27.4 BIOASSAY

The licensee shall comply with the program in LC 11.2, as approved by the Department.

27.4.1 The licensee shall implement a documented quality control program for urine specimens that includes background samples, blanks, and spikes and also criteria for requiring repeat collection and analysis.

27.4.2 A baseline urine sample shall be obtained from any new worker who will be subject to urinalysis, prior to start of work.

27.5 AIR SAMPLING

The licensee shall conduct an air sampling program to assess airborne radioactivity concentrations to which employees may be exposed, as follows:

27.5.1 Worker breathing zone sampling shall be conducted at least quarterly. If these values exceed 25 percent of the applicable standards, the frequency of sampling shall be increased to weekly.

27.5.2 Along with results, the licensee shall keep a record of the activity underway during sampling.

27.5.3 The licensee shall maintain records of any respirator maintenance, fit and training program.

27.6 ALPHA CONTAMINATION SAMPLING

27.6.1 The licensee shall perform documented spot surveys for alpha contamination at least quarterly on ten (10) per cent of the workers leaving the site. Alpha contamination on skin or clothes exceeding 1000 dpm/100 cm² shall require decontamination and an investigation by the RPO as to the cause.

27.6.2 The licensee shall conduct alpha contamination surveys of the lunch rooms and offices at least monthly. If the surveys reveal contamination levels that exceed Department guidelines, (1) the area shall be decontaminated immediately, (2) an investigation shall be made by the RPO to determine the cause and corrective measures required to prevent recurrence, and (3) the location shall be surveyed weekly until consecutive weekly surveys are below guidelines, at which time the survey frequency shall revert to monthly.

27.7 ACTION LEVELS

The licensee shall specify in LC 11.2 action levels for all work area monitoring and effluent discharge monitoring which requires administrative action if MPC-based or ALARA-based concentration values are exceeded.

28.0 ENVIRONMENTAL MONITORING AND ANALYSIS PROGRAM

28.1 Consistent with LC 11.1, the licensee's environmental monitoring and analysis program shall be sufficient to enable the Department to estimate, with reasonable assurance, maximum potential radiation dose commitment to individuals and populations off-site and to demonstrate compliance with LC 18.6.1, and shall be as in the procedures manual (LC 11.2) required by LC 20, as modified by this LC 28, and revised as necessary in accordance with LC 20.2.

28.2 The RESULTS of monitoring required by LC 28 shall be included in the report required by LC 30.

28.3 WASTE DISPOSAL INTEGRITY monitoring shall include the monitoring program set forth in LC 11.3 and 11.4 and the long-term monitoring and maintenance program pursuant to LC 33.

- 28.4 AIR PARTICULATES shall be:
- 28.4.1 Monitored at the locations specified in LC 11.2, as approved by the Department, including at least three (3) additional locations: one directly east of the site, one nearest feasible residence, and a control location;
- 28.4.2 Collected with weekly filter changes, or more frequently as required by dust loading;
- 28.4.3 Composited monthly by location;
- 28.4.4 Analyzed for natural uranium, thorium-230, radium-226, and lead-210.
- 28.5 AMBIENT RADON shall be monitored, at the locations specified in LC 11.2 and LC 28.4.1 continuously, or at least once per month, representing approximately the same period each month.
- 28.6 GROUND WATER shall be monitored quarterly as approved by the Department and specified in LC 11.2.
- 28.7 SURFACE WATER shall be monitored as approved by the Department and specified in LC 11.2.
- 28.8 SURFACE AND SUBSURFACE SOILS shall be collected at locations approved by the Department as specified in LC 11.2 and analyzed for Ra-226, Th-230, natural uranium and Pb-210.
- 28.9 A BETA/GAMMA CONTAMINATION SURVEY shall be conducted for areas approved by the Department and specified in LC 11.2.
- 28.10 VEGETATION, FORAGE AND FOOD CROPS shall be sampled as specified in LC 11.2 during each growing season at three or more locations which have the highest expected contaminant levels. Three samples of any form of livestock grazing within three (3) km of the mill site shall be taken annually at time of slaughter and analyzed for Ra-226 and Pb-210.
- 28.11 FAUNA shall be sampled as appropriate only in accordance with any necessary permit issued by the Colorado Division of Wildlife.

29.0 SAFETY INSPECTIONS AND AUDITS

The licensee shall perform the following safety inspections and audits:

29.1 DAILY INSPECTIONS

The integrity of the waste confinement system and the effectiveness of the methods used to control dusting (LC 22.3), shall be verified at least daily by trained personnel during documented inspections in accord with written procedures approved by the Department and specified LC 11.2.

29.2 WEEKLY INSPECTIONS

Weekly documented inspections of all active work areas and storage areas shall be conducted by the RPO to ensure that the radiation safety program is as required. Any deviation from operating procedures, license requirements, or safety practices, including housekeeping practices, affecting radiological safety shall be reviewed with management or the employees and corrected.

29.3 RSO'S AUDIT

The RPO shall audit the inspection logs and reports and audit all monitoring data as approved by the Department and provided in LC 11.2. The RPO shall summarize this information and submit a written report to the Site Manager recommending any necessary corrective actions and including an evaluation of the adequacy of the implementation of license requirements.

29.4 ANNUAL ALARA INDEPENDENT AUDIT

The licensee shall obtain and submit to the Department a performance audit of the health, safety, and environmental radiation protection programs required by this license.

30.0 REPORTS TO THE DEPARTMENT

The licensee shall, for the previous calendar year ending December 31st, provide to the Department by March 31st of each year:

- 30.1 An ALARA REPORT on the program (in LC 18.4) for maintaining uranium and decay product exposures and releases ALARA, (including as attachments the RPO's monthly reports to the Site Manager, the auditor's report required by LC 29.4, and any revisions to the procedures manual required by LC 20.2).

The report shall include conclusions and recommendations of inspections required by LC 29 and shall evaluate employee exposures including bioassay data, and environmental data to determine (1) if there are any upward trends developing in personnel exposures for identifiable categories of workers or types of operations, (2) if exposures might be lowered under the concept of maintaining exposures as low as reasonably achievable, and (3) if equipment for exposure control is being properly used and maintained.

- 30.2 An OFF-SITE RADIATION DOSE REPORT which evaluates, using site specific input parameters and methods approved by the Department, doses to off-site individuals and populations and, as necessary, indicates if standards in 6 CCR 1007-1-14.19 are exceeded.

- 30.2.1 The licensee's assessment shall refer to details of regional natural radiation background and operations which have contributed or could contribute to radiation doses above those from natural radiation background.

- 30.2.2 The licensee's assessment shall include an up-to-date inventory of sources other than authorized by this license and which could reasonably be expected to affect compliance with 6 CCR 1007-1-14.19 and shall include a detailed topographic map locating all sources, with their area, height above ground surface, and average grade, within 5 miles (8 km) of the controlled area boundary, to the extent the information is available.

- 30.3 The results of an annual LAND USE SURVEY of land and water use in an area within 5 miles (8 km) of any portion of the restricted area boundary, including:
- 30.3.1 A detailed topographic map(s) showing all environmental sample collection locations and all of the following features within 5 miles (8 km) of any portion of the restricted area boundary: private residences, grazing areas, private and public potable water and agricultural wells, milk cattle, nonresidential structures and uses, and mining areas.
- 30.3.2 Indication of any differences in land use from that described in the licensee's previous report.
- 30.4 Monitoring data, in particular all data obtained pursuant to LC 27 and LC 28, shall be presented in tables and graphs which identify trends, including:
- 30.4.1 Tables containing sampling date, type, and location for each analytical result, including the magnitude of the random error.
- 30.4.2 Graphs or charts which are summaries.
- 30.5 Data, analyses, and results of surface and groundwater monitoring required by LC 28.6 and 28.7. In general, reporting shall include an assessment of surface and groundwater conditions and the status of licensed activities and the quality control program related thereto.
- 30.6 All data, analysis and results of measurements set forth in LC 28.3.

31.0 FINANCIAL ASSURANCES

The licensee shall maintain in force a financial assurance agreement and instruments for the decommissioning, decontamination, reclamation, restoration of the all areas, and long term monitoring and custodial care until final action on release is taken by the Department.

31.1 AMOUNT OF FINANCIAL ASSURANCE

The decommissioning and closure financial assurance instruments shall be maintained in an amount sufficient to comply with LC 11.5. The licensee shall not commence construction prior to all financial assurance agreements and instruments required by law and rule being approved and signed by the Department.

31.2 ANNUAL REVIEW OF FINANCIAL ASSURANCE ARRANGEMENTS

The financial assurance agreement and instruments required by this license shall be subject to annual review for adequacy by the Department, and such other agencies as the Department designates. Cost estimates may be adjusted upward or downward as current circumstances, including, but not limited to, inflation, regulations, and technology, require. The licensee shall submit proposed changes by June 30th each year.

31.3 REPORTING

The licensee shall provide all reports required by LC 11.5 and Department policy as soon as the reports are generally available but not later than June 30th of each year.

31.4 RELEASE OF FINANCIAL ASSURANCES

31.4.1 Upon determination by the Department that performance required by this license has been complete and adequate, the licensee shall be released from the financial assurance requirement of the Radiation Rules. In the event of partial or complete default on the part of the licensee in the performance of the work, the State may draw upon the financial assurance instruments as necessary to complete the reclamation, in accordance with LC 11.5.

31.4.2 The licensee shall notify the Department of the intent to request release of other applicable financial assurance arrangements with other agencies having jurisdiction over any aspect of the Uravan facility.

32.0 DECOMMISSIONING, DECONTAMINATION AND RECLAMATION

32.1 Any portion of the decommissioned areas which are to be returned to unrestricted use shall be decontaminated toward the goal of background radiation and toxic contaminant ranges acceptable to the Department based on statistically defensible tests of soil contamination with depth.

32.2 The licensee shall minimize wind and water erosion of contaminated materials during reclamation using written procedures approved by the Department.

32.3 The licensee shall reclaim all disposal areas in accordance with the framework, schedule and details presented in LC 11.3.

32.4 The licensee shall submit to the Department, within twenty (20) days of issuance of this license, detailed draft estimated costs for the project and for decommissioning, decontamination, reclamation and closure.

32.5 The licensee shall submit to the Department no later than May 1, 1989 or thirty (30) days prior to commencement of construction, whichever is earlier, final detailed plans, costs, and arrangements for full financial assurance for all decommissioning, decontamination, reclamation and closure.

33.0 LONG TERM MONITORING AND CARE

33.1 Prior to license termination, the licensee shall provide a cash fund whose projected growth and income will fully provide for long-term monitoring and care as approved by the Department.

33.2 The long-term care agreement and fund required by this license shall be in accord with 6 CCR 1007-1-3.9.5.4.2.

33.3 The licensee shall submit to the Department, within thirty (30) days of issuance of this License, information supplemental to the long term care plan in Section 2.3.3.2 of LC 11.1, pages 2-85 and 2-86, in a revised conceptual environmental post-operation monitoring and response plan which conforms to Annex F of this License.

33.4 The licensee shall submit to the Department, not later than June 30, 1989 or thirty (30) days prior to commencement of construction, whichever is earlier, a detailed, defined environmental post-operation monitoring program and response plan. This Long Term Care Plan shall include ground water surveillance which would detect possible early warning releases of waste and ground water from the disposal site and shall delineate a range of reasonably possible releases together with the types of corrective measures that would likely be taken for curtailing those releases.

Dated

Feb 10, 1989

Albert H. Hays
For the Colorado Department of Health

Annex A

LEGAL DESCRIPTION OF DISPOSAL FACILITY

Montrose County, Colorado

New Mexico Principal Meridian

Twp. 48N, Rge. 17W

| | |
|----------------|-------------|
| Sec, 34, Lot 8 | 39.49 acres |
| Lot 9 | 39.49 acres |
| Lot 10 | 39.49 acres |
| Lot 25 | 33.09 acres |
| Lot 26 | 38.84 acres |
| Lot 27 | 7.63 acres |
| Lot 33 | 7.38 acres |
| Lot 34 | 26.80 acres |
| Lot 35 | 38.59 acres |
| Lot 38 | 13.71 acres |
| Lot 41 | 3.31 acres |
| Lot 42 | 7.84 acres |
| Lot 44 | 8.32 acres |
| Lot 45 | 2.39 acres |
| Tract 39B | 2.39 acres |

| | |
|-------|--------------|
| TOTAL | 308.76 acres |
|-------|--------------|

Annex B

FORMAT FOR REPORTING MONITORING DATA

0. Headnotes

- a. This table is not a complete list of data to be reported.
- b. Error estimate should be calculated at 95% confidence level, based on counting error and other sources of random error. Significant systematic error should be reported separately.
- c. All calculations of lower limits of detection (LLD) and percentages of maximum permissible concentration (MPC) should be included as supplemental information.

1. AIR SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection

| <u>Radionuclide</u> | <u>Concen- tration (uCi/ml)</u> | <u>Error Estimate (uCi/ml)</u> | <u>LLD (uCi/ml)</u> | <u>Concen- tration % MPC</u> |
|---------------------|---|--|-------------------------|--------------------------------------|
| U-nat | | | | |
| Th-230 | | | | |
| Ra-226 | | | | |
| Pb-210 | | | | |
| Rn-222 | | | | |

FORMAT FOR REPORTING MONITORING DATA

2. LIQUID SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection
- c. Type of sample (for example: surface, ground, drinking, stock, or irrigation)

| <u>Radionuclide</u> | <u>Concen- tration (uCi/ml)</u> | <u>Error Estimate (uCi/ml)</u> | <u>LLD (uCi/ml)</u> |
|---------------------|---|--|-------------------------|
| U-nat | | | |
| (dissolved) | | | |
| (suspended)* | | | |
| Th-230 | | | |
| (dissolved) | | | |
| (suspended)* | | | |
| Ra-226 | | | |
| (dissolved) | | | |
| (suspended)* | | | |
| Pb-210 | | | |
| (dissolved) | | | |
| (suspended)* | | | |
| Po-210 | | | |
| (dissolved) | | | |
| (suspended)* | | | |

* Not all samples must be analyzed for suspended radionuclides.

3. VEGETATION AND FOOD SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection
- c. Type of sample and portion analyzed

| <u>Radionuclide</u> | <u>Concen- tration (uCi/kg wet)</u> | <u>Error Estimate (uCi/kg)</u> | <u>LLD (uCi/kg)</u> |
|---------------------|---|--|-------------------------|
| U-nat | | | |
| Th-230 | | | |
| Ra-226 | | | |
| Pb-210 | | | |
| Po-210 | | | |

FORMAT FOR REPORTING MONITORING DATA

4. SOIL AND SEDIMENT SAMPLES

For each sample analyzed, report the following information:

- a. Date sample was collected
- b. Location of sample collection
- c. Type of sample and portion analyzed

| <u>Radionuclide</u> | <u>Concen- tration (uCi/g)</u> | <u>Error Estimate (uCi/g)</u> | <u>LLD (uCi/g)</u> |
|---------------------|--|---------------------------------------|------------------------|
| U-nat | | | |
| Th-230 | | | |
| Ra-226 | | | |
| Pb-210 | | | |
| Po-210 | | | |

5. DIRECT RADIATION MEASUREMENTS

For each measurement, report the dates covered by the measurement and the following information:

| <u>Location</u> | <u>Exposure Rate (mR/qtr)</u> | <u>Error Estimate (mR/qtr)</u> |
|-----------------|---------------------------------------|--|
|-----------------|---------------------------------------|--|

6. RADON MEASUREMENTS

Without in any way modifying or altering the monitoring requirements under the license, the following format is provided for use in reporting any information required by the license. For each measurement, report the dates covered by the measurement and the following information:

| <u>Location</u> | <u>Flux Rate (pCi/m²-sec)</u> | <u>Error</u> | <u>Progeny WL</u> | <u>Error</u> | <u>Gas pCi/L</u> | <u>Error</u> |
|-----------------|--|--------------|-----------------------|--------------|----------------------|--------------|
|-----------------|--|--------------|-----------------------|--------------|----------------------|--------------|

7. Non-Radiological Measurement

All routine and/or required non-radiological measurements (e.g., for liquid samples: pH, electrical conductivity, total dissolved solids, total suspended solids, Cl⁻, SO₄⁼, etc.) are also to be reported in an appropriate format.

Annex C

DECONTAMINATION OF FACILITIES AND EQUIPMENT
PRIOR TO RELEASE FOR UNRESTRICTED USE
OR TERMINATION OF LICENSES FOR RADIOACTIVE MATERIAL

These instructions in conjunction with Table I specify the radioactivity and radiation exposure rate limits which are to be used in accomplishing the decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table I do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control will be considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.
2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table I prior to applying the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.
3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.
4. Upon request, the Department may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:
 - a. Provide detailed, specific information describing the premises, equipment, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.

- b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table I. A copy of the survey report shall be filed with the Radiation Control Division, Colorado Department of Health. The survey report shall:

- a. Identify the premises.
- b. Show that reasonable effort has been made to eliminate residual contamination.
- c. Describe the scope of the survey and general procedures followed.
- d. State the finding of the survey in units specified in the instruction.

Following review of the report, the Department will visit the facilities to confirm the survey.

TABLE I: ACCEPTABLE SURFACE CONTAMINATION LEVELS

| NUCLIDES ^a | AVERAGE ^{b c f} | MAXIMUM ^{b d f} | REMOVABLE ^{b e f} |
|--|---|--|---|
| Alpha emissions from U-nat, U-235, U-238, and associated decay products | 5,000 dpm per 100 cm ² | 15,000 dpm per 100 cm ² | 1,000 dpm per 100 cm ² |
| Alpha emissions from Ra-226, Ra-228 Th-230, Th-228, Ac-227 | 100 dpm per 100 cm ² | 300 dpm per 100 cm ² | 20 dpm per 100 cm ² |
| Alpha emissions from Th-nat, Th-232, Ra-223, Ra-224, U-232 | 1,000 dpm per 100 cm ² | 3,000 dpm per 100 cm ² | 200 dpm per 100 cm ² |
| Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except others noted above. | 5,000 dpm per 100 cm ² | 15,000 dpm per 100 cm ² | 1,000 dpm per 100 cm ² |

- ^a Where surface contamination by both alpha and beta/gamma-emitting nuclides exists, the limits established for alpha and beta/gamma-emitting nuclides should apply independently.
- ^b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
- ^c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.
- ^d The maximum contamination level applies to an area of not more than 100 cm².
- ^e The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.
- ^f The average and maximum radiation levels associated with surface contamination resulting from beta/gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

Annex D

Lower Limits of Detection (LLD) for Sample Analysis

| | |
|---|----------------------------|
| U-natural, Th-230, Ra-226 in air | 1×10^{-16} uCi/ml |
| Pb-210 in air | 2×10^{-15} uCi/ml |
| Rn-222 | 2×10^{-10} uCi/ml |
| U-natural, Th-230, Ra-226 in water | 2×10^{-10} uCi/ml |
| Po-210 in water | 1×10^{-9} uCi/ml |
| Pb-210 in water | 1×10^{-9} uCi/ml |
| U-natural, Th-230, Ra-226, Pb-210 in soil and sediment (dry) | 2×10^{-7} uCi/g |
| U-natural, Th-230 in vegetation, food, and fish (wet) | 2×10^{-7} uCi/kg |
| Ra-226 in vegetation, food, and fish (wet) | 5×10^{-8} uCi/kg |
| Po-210, Pb-210 in vegetation, food, and fish (wet) | 1×10^{-6} uCi/kg |
| Gross alpha in air | 1×10^{-16} uCi/ml |
| Gross beta in air | 2×10^{-15} uCi/ml |
| Exposure rate | 2 uR/hr |

ANNEX E

- E.0 The licensee shall modify the design, closure, and monitoring program in LC 11.3 and LC 11.4 to include the following:
- E.1.1 An additional one (1) foot of clayey material shall be added to the clayey liner described on Page 2-40 of LC 11.1, thereby increasing the clayey liner to a thickness of three (3) feet.
- E.1.2 Construction of the clayey liner shall be phased. One (1) foot of clayey material shall be placed over the entire bottom surface initially. The remaining two (2) feet of material shall be placed just prior to placement of the waste. The bottom one (1) foot shall be reworked prior to the placement of the additional two (2) feet.
- E.2 The clayey liner shall be extended up the inside of the Zone A ring dike shown in Figure 2.3-3 of LC 11.1.
- E.3 The interim or intermediate cover and the waste material shall be compacted to ninety-five (95) per cent Standard Proctor Density (D-698) within plus or minus two (2) per cent of optimum moisture content.
- E.4 Non-clayey material greater than three (3) inches in diameter shall not exceed five (5) percent by volume of the clayey material utilized for the liner and cover.
- E.5 Specifications regarding upper limits for the Plasticity Index (PI) and moisture content for the clayey base shall be required in Table 2.3-1 of LC 11.1 in order to ensure proper workability of the clayey materials for compaction and to achieve sufficiently low field permeabilities (1×10^{-7} cm/sec or lower) in the clayey liner and cover layers. Suction lysimeters for leak detection shall be emplaced. Double ring infiltrometer tests of the compacted clayey liner and cover shall be conducted.
- E.6.1 Lift thickness shall be no more than twelve (12) inches for the ring dike Zone A material and the interim or intermediate cover.
- E.6.2 The upper five (5) feet of the waste material top slope shall be composed entirely of soil materials in order to reduce irregularities in the final surface that could lead to differential settlements.
- E.6.3 The need for settlement plates to be placed on the interim or intermediate cover shall be evaluated. This information shall be used to determine the proper timing for placement of the final cover.
- E.6.4 The waste material shall be covered as rapidly as possible.

- E.6.5 Slopes of the waste material shall not exceed 5h:1v.
- E.6.6 LC 11.3 and/or LC 11.4 shall include procedures that will be used for field-verifying compacted permeabilities in the constructed cover layer (radon barrier) materials.
- E.6.7 The hydraulic conductivity of the completed cover shall be demonstrated to be less than that of the clayey liner, so as to prevent infiltrating water from accumulating within the reclaimed cell.
- E.7.1 Placement of the top soil over the rip rap layer shall be evaluated to reasonably assure that the soil layer is continuous (does not settle into the rock over time) so that vegetation will continue to flourish for the long term.
- E.7.2 Instead of top soil on the side slopes of the disposal cell, an additional six (6) inches of clayey material shall be added.
- E.7.3 For the vegetative cover, the seed mixture, soil amendments, application rate and application method shall be included in LC 11.3 and shall be based on current and specific evaluations by the Soil Conservation Service or other qualified soils and vegetation expert. The location and preservation details of the top soil stockpiles shall be specified. All disturbed areas shall be reclaimed, with the exception of the access road if so approved by the Mined Land Reclamation Division and Department.
- E.8.1 The clayey borrow material shall be analyzed for geochemical characteristics, including but not limited to, soluble iron and magnesium oxides, per cent calcium carbonate, clay material mineral types, soil pH, and exchangeable cations, in order to confirm the assumptions made about attenuation of any ions passing through the clayey material.
- E.8.2 Confirmatory investigations for geotechnical factors shall be conducted on the specific borrow areas for the clayey material, random fill and rip rap material, sufficient to determine that the materials will meet specifications in LC 11.3 as approved by the Department.
- E.8.3 Confirmatory investigations for parameters of borrow materials which factor into radon diffusion calculations shall be conducted and submitted to the Department, along with the assumptions used for model inputs, sufficient to change and adjust design specifications for the cap design as prescribed in LC E.14.

- E.8.4 The laboratory permeability values set forth in LC 11.8 shall be confirmed by construction of a test fill at the site using the actual borrow materials. The results of this field analysis shall be used to demonstrate that water within the disposal cell will be able to pass through the liner without resulting in a net gain of water within the cell.
- E.8.5 The reclamation plan for the borrow areas shall be specified in LC 11.3 and approved by the Mined Land Reclamation Division.
- E.9 Wells shall be required to intercept the most likely pathways of contaminant migration from the disposal cell. The well locations shall be determined by the location and trend of joints and fractures in the site area.
- E.10 An additional erosion monument shall be erected to the northwest of the disposal site.
- E.11 Well completion shall be documented to the Department for all wells drilled.
- E.12 Grouting or sealing of closely spaced, open joints and fractures found during cell base preparation shall be properly and effectively conducted in order to prevent migration of clayey material into the joints or fractures and to reduce the potential pathway for percolation from the site.
- If grout is used, it shall have a compressive strength of at least 2250 pounds per square inch.
- E.13 The durability of the rip rap shall be evaluated using tests of specific gravity and rip rap size shall be adjusted if necessary, in particular if the test results show specific gravity results below 2.6. The rip rap size for the topslope of the cell shall be checked using the Safety Factors Method.
- E.14. The cap shall be redesigned based upon an average Ra-226 composition of the disposed material of at least 175 pCi/g (or a higher level if more recent information on the Denver radium wastes indicates that the average concentration is likely to be higher than 175 pCi/g) and a standard for radon exhalation of 20 pCi/m²-sec. Radon flux calculations shall be provided along with the assumptions used for model input; justification must be provided for use of any other figure than 175 pCi/g in design and modelling activities.
- E.15 All calculations, supporting data, and analysis shall be provided to the Department for: rip rap size, diversion channel size, stability analysis of the cell, long-term infiltration rates, the existence of unsaturated flow through the cover and waste material, and radon flux estimation.

ANNEX F

ELEMENTS OF LONG-TERM CARE AGREEMENT

1. Visual inspection of the area at least twice per year and according to written criteria.

2. Annual gamma measurements, one per hectare

Annual monitoring is considered a minimum requirement. This frequency is based on the fact that gamma radiation is attenuated as a function of the square of the distance and that any disruption, short of a catastrophic event which increase the gamma radiation above the cover, will be detected prior to the occurrence of elevated gamma exposure.

3. Annual atmospheric radon, at least every ten hectares or four locations.

Atmospheric radon measurements (combined with annual radon emanation surveys) provide data necessary to assess the general condition of the pile. The minimum number of property boundary sampling sites, four (4), is the same as specified for pre-operational radiological monitoring.

4. Annual radon emanation (flux) measurements at four locations

Radon emanation is affected by a number of parameters such as: particle compaction, moisture content, root penetration, burrowing animals, alternate freezing and thawing, and alternate wetting and drying, as well as other factors. An annual radon emanation survey, at four (4) locations, is considered a minimum requirement.

5. Annual vegetation analysis, at least every ten hectares or four locations.

Plant uptake parameters for certain radionuclides are high enough that these plants could accumulate significant amounts of activity. The radionuclides to be measured, a minimum of four (4) sites, are as specified for pre-operation monitoring: U-natural, Ra-226, Th-230, Po-210, and Pb-210. The sampling location(s) shall be the radon flux sampling sites or at random locations chosen each year.

6. Annual water sampling

Annual monitoring is required. These samples are to be analyzed for the following: U-natural, Ra-226, Th-230, gross alpha and beta, and electrical conductivity. The time of sampling shall reflect seasonal highs.

7. Annual fence maintenance

Annual maintenance including sign maintenance is considered a minimum requirement.

8. Access road maintenance

Required unless the road is abandoned pursuant to LC E.7.3.

9. Biennial rodent and deep-rooted vegetation control

Controlled application every two years, unless authorized otherwise by the Department.

These minimum requirements may be adjusted only with written approval of the Department.