EVEREST MINERALS CORPORATION
POST OFFICE BOX 1339
CORPUS CHRISTI, TEXAS 78403

AREA CODE 512
883-2831


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Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Docketing and Service Branch

DOCKET NUMBER
PROPOSED RULE PR misc noti
Reg Guide

Gentlemen:

Rather than submit voluminous comments on the NRC draft regulatory guide entitled: "Standard Format and Content of License Applications, Including Environmental Reports, For In Situ Uranium Solution Extraction," Everest Minerals Corporation submits a more realistic regulatory guide with the same title.

This guide was developed by the Texas In Situ Uranium Mining Environmental Association, Inc., and has been accepted for use in Texas as a guide for license applications and environmental reports. It is apparent from reviewing the NRC draft regulatory guide that the environmental effects of an in situ leach facility are not well understood by the NRC. Please review our submitted guide and feel free to discuss the document with us at any time.

Very truly yours,

Paul E. Corpstein
Environmental Coordinator

PEC:md

Acknowledged by card. 10/6/80

# 1. PROPOSED ACTIVITIES

This chapter should discuss the proposed project and the activities to be conducted as a result of the project. For example, such matters as location of general activities, mining methods, general process description, plans for waste disposal, expected life of the project, and a description of the proposed reclamation, restoration, anticipated annual production, point storage, shipping arrangements, decommissioning plans, and surety arrangements should be addressed in general terms.

## 2.1 SITE LOCATION AND LAYOUT

Provide the following information on maps of appropriate scale:

a. Site location with the county or political subdivision; also, indicate major drainageways, transportation links, and towns within a 16 km (10 mi.) radius of the permit boundary.

b. A topographic map indicating the area to be permitted indicating such items as farms, settlements, drainageways, plant site, etc., to a 3.2 km (2 mi.) radius from permit boundary should be provided. The acreage to be permitted should be indicated on the map.

c. Total arrangement of the site, showing well fields and central facilities, should be provided on a map.

## 2.2 USES OF ADJACENT LANDS AND WATERS

Indicate the nature and extent of present and projected land use (e.g., agriculture, livestock raising, dairies, pasturelands, residences, wildlife preserves, sanctuaries, hunting areas, industries, recreation, transportation on lands within a 3.2 km (2 mi.) radius of the proposed permit boundary). Indicate distance to nearest residence( from emission source(s). List nuclear fuel cycle facilities within 80 km of permit boundary.

## 2.3 POPULATION DISTRIBUTION

Estimate total population grouped by cities within a 16 km (10 mi.) radius.

## 2.4 REGIONAL HISTORIC, ARCHEOLOGICAL, ARCHITECTURAL, SCENIC, CULTURAL, AND NATURAL LANDMARKS

Areas valued for their historic, archeological, architectural, scenic, cultural, or natural significance within the permit area may be affected. The environmental report should include a brief discussion of the historic, scenic, archeological, architectural, cultural, and natural significance, if any, of the processing facility site and nearby well fields with specific attention to the sites and areas listed in the National Registry of Natural Landmarks and properties included in or eligible for inclusion in the National Register of Historic Places.

## 2.5 GEOLOGY

Describe the major geological aspects of the permit area. The discussion should include the stratigraphy and structure of the permit area. Comment on the relationship of local with regional stratigraphy and structure. Include an inventory of economically important minerals and energy-related deposits if impacted by the leach operation.

Maps and cross-sections showing geologic units, lithology, structural features and other pertinent information may be included to the extent that this information is reasonably available.

Available data on any fault, fracture or joint pattern which may affect constructed features should be included. Provide risk map or statement addressing seismic activity if potential is greater than zero.

## 2.6.1 GROUND WATER

Describe the injection zone aquifer, overlying aquifer, and (if present or not separated by aquiclude) within 3.2 km radius of the proposed boundary. Include major industrial users and completion information on industrial wells to extent available. Applicant should provide information on domestic (private) water wells within a 3.2 km (2 mi.) radius of proposed permit boundary. Information to include casing depth, completion interval, use quantity, and quality to extent available.

## 2.6.2 SURFACE WATER

Describe the location, physical description, and other hydrologic characteristics of perennial water bodies with 3.2 km ( 2 mi.) of the permit area. Include a description of upstream and downstream river control structures and provide a topographic map showing the major hydrologic featur

## 2.7 METEOROLOGY

Describe the climatological and meteorological characteristics of the site and surrounding area. The description should use available on-site meteorological data or the nearest representative National Weather Service Station data (or data of equivalent) for at least one annual cycle.

Discussion of local meteorological conditions that are representative of the site hsould include diurnal and monthly averages and extremes of temperature; monthly and annual windspeed, wind direction, and precipitation.

## 2.8 ECOLOGY

Describe the important plant and animal species in the vicinity of the site. Where available in the literature, preferred habitats and relative abundances for each species should be provided.

A more detailed discussion of species environment relationships may be provided for each endangered species. Any pre-mining environmental stresses, either natural or man-induced, which may affect food chain relationships should be mentioned.

## 2.9 BACKGROUND RADIOLOGICAL CHARACTERISTICS

Radiological data, should be summarized, including natural background radiation levels. This summary is based upon data collected in 6.4 or obtained from other sources.

## 2.10 BACKGROUND NONRADIOLOGICAL CHARACTERISTICS

Potential nonradiological pollutants that could be reasonably expected to be associated with this uranium mining region should be reported in a summary table.

## 3.1 THE CENTRAL PROCESSING FACILITY

A map of the central processing area should be included and should clearly show the following:

a. A map with smaller scale showing the central processing facility boundary.

b. The location of principal structures within the site area (with true north). Each principal structure should be identified as to function (e.g., waste ponds, administration building, lab, process facilities).

c. The boundary lines of any restricted areas, access to which are to be controlled by fences or other means.

## 3.2 PROCESS CIRCUIT

The entire process should be described sufficiently to permit evaluation of the quantities and constituents of all liquid and solid wastes and effluents generated in the process. A flow diagram with constituent ranges, should be included. This data may be designated as proprietary for the applicant.

Clearly identify the source location for all known radioactive and nonradioactive gaseous, solid, and liquid wastes other than those listed in Section 3.3. An attempt should be made to characterize the materials in terms of quantities and concentrations. The emission or effluent releases should be compared to existing regulations in a tabular form. The disposal and handling method of liquid wastes should be indicated. This data may also be designated confidential.

## 3.3 CONTROLS OF PROCESSING WASTES AND EFFLUENTS

Provide a description of effluent control systems and equipment for minimizing the radioactive and nonradioactive materials released into the environment.

Provide drawings for the waste retention systems and solid waste storage site. If a waste disposal well is planned, provide completion methods of the well, surface facilities, and completion interval geologic information.

## 3.4 MINING ACTIVITIES

This portion of the report should contain a thorough description of the interrelated mining activities including a topographical map showing locations of areas to be mined, sequence plan, and mine well arrangement.

# 4.0 SITE PREPARATION, PROCESSING FACILITY CONSTRUCTION, AND WELL FIELD OPENING

The applicant should organize the discussion in terms of the beneficial or adverse effects of site preparation, (processing facility construction) and well field opening on both land use and water use.

## 4.1 RESOURCES COMMITTED

Discuss any irreversible and irretrievable commitments of resource (loss of land, destruction of biota, etc.) that may be expected. Such losses should be evaluated in terms of their relative andlong-term net impacts, as well as their absolute impacts.

# 5. ENVIRONMENTAL EFFECTS OF MILL AND MINE OPERATION

This chapter describes the interaction of the mill and mine and the environment. To the extent possible, material presented in Chapters 2 and 3 does not need to be repeated. Measures planned to reduce any undesirable effects of the total project on the environment should be described in detail.

In the discussion of environmental effects, as in Chapter 4, effects that are considered unavoidable but either inherently temporary or subject to later amelioration should be clearly distinguished from those regarded as unavoidable and irreversible. Those effects that represent an irretrievable commitment of resources should receive detailed consideration in Section 5.6.

The impacts of operation of the proposed activity should be, to the fullest extent practicable, quantified and systematically presented. In the discussion of each impact, the applicant should make clear whether the supporting evidence is based on theoretical, laboratory, onsite, or field studies undertaken on this or on previous occasions. The source of each impact and the population or resource affected should be made clear in each case. The impacts should be distinguished in terms of their effects on surface water bodies, ground water, air, land, land use, ecological systems, and important plants and animals.

Finally, the applicant should discuss the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. As used in this guide, "short term" refers to the operating life of the proposed facility and "long term" refers to time periods extending beyond this life. The applicant should assess the action for cumulative and projected long-term effects from the point of view that each generation is trustee of the environment for each succeeding generation.

## 5.1 RADIOLOGICAL IMPACT ON BIOTA OTHER THAN MAN

In this section the applicant should consider the impact on biota other than man attributable to the release of radioactive materials from the facility.

The biota to be considered are those species of local flora dn local and migratory fauna defined as "important". Since the region may contain many important species, the applicant should concentrate any efforts on those important species whose terrestrial and aquatic habitats provide the highest potential for radioation exposure.

### 5.1.1 EXPOSURE PATHWAYS

The various possible pathways for radiation exposure of the important local flora and local and migratory fauna should be identified and described in textual and flow-chart format. The parthways should include the imprtant routes of radionuclide translocation to organisms or sites.

### 5.1.2 RADIOACTIVITY IN THE ENVIRONMENT

The applicant should consider how the radionuclide and chemical concentrations in the liquid and gaseous effluents discharged from the site are quantitatively distributed in the environment. Specifically, estimates should be provided for the radionuclide concentration (a) in any water sources, (b) on land areas, and (c) on vegetation in the environs.

If there are other components of the physical environment that may become contaminated and thus result in the exposure of living organisms to radiation, they should be identified and their radioactivity burden estimated. In addition, information concerning any cumulative buildup of radionuclides in the environment should be presented and discussed. A summary of data, assumptions, and models used in determining radioactivity concentrations and burdens should be provided.

From considerations of the exposure pathways and the distribution of

maximum radionuclide concentrations that may be present in important local flora and local and migratory fauna. Values of bioaccumulation factors used in preparing the estimates should be based on site-specific data if available; otherwise, values form the literature may be used. The applicant should tabulate and reference the values of bioaccumulation factors used in the calculations.

## 5.2 RADIOLOGICAL IMPACT ON MAN

In this section the applicant should consider the radiological effects of operations and transportation of radioactive materials on man. Estimates of the radiological impact on man via various exposure pathways should be provided.

### 5.2.1 EXPOSURE PATHWAYS

The various possible pathways for radiation exposure of man should be identified and described in textual and flow chart format.

Discuss any exposure pathways, if they exist, involving radionuclide accumulation inspecific components of the environment.

### 5.2.2 LIQUID EFFLUENTS

Estimate the expected annual average concentrations of radioactive nuclides in receiving water at locations where water is consumed or otherwise used by human beings or where it is inhabited by biota of significance to human food chains. Specify the dilution factors used in preparing the estimates

should be given to the absence of mixing and dilution because of factors such as channeling.

Determine the expected radionuclide concentrations in aquatic and terrestrial organisms significant to human food chains.

Using the above information and any other necessary supporting data, calculate the total annual body and significant organ doses (millirems) to individuals in the population from all receiving-water-related exposure pathways, i.e., all sources of internal and external exposure.

5.2.3 AIRBORNE EFFLUENTS

From release rates of airborne radioactivity and meteorological data, estimate total annual body and significant organ doses (millirems) to individuals exposed at the point of maximum ground-level concentrations off site, individuals exposed at the site boundary in the direction of the prevailing wind, individuals exposed at the nearest residence in the direction of prevailing wind. Assume annual average meteorological conditions. Identify locations of points of relase used in calculations.

Estimate deposition of radioactive materials on food crops and pasture grass. Estimate total annual body doses (millirems) and significant annual doses received by other organs via such potential pathways.

5.2.4 DIRECT RADIATION

The applicant should provide an estimate of the maximum annual external dose (millirems) that would be received by an individual at the nearest site boundary from direct radiation. Provide assumptions and calculations used

### 5.2.5 SUMMARY OF ANNUAL RADIATION DOSES

The applicant should provide estimates of the maximum annual doses (millirems) to an individual at the site boundary and the nearest residence that could be received via all pathways.

The applicant should also present a table that summarizes the estimated radiation dose to the regional population (within 10 miles) from operating and mine-related sources using values calculated in previous sections. The tabulation should include (a) the total annual doses to the population from all receiving-water-related pathways and (b) the total annual doses to the population attributable to airborn effluents.

## 5.3 EFFECTS OF CHEMICAL DISCHARGES

In this section, the specific concentrations of nonradioactive wastes in effluents at the points of discharge should be compared with natural ambient concentrations without the discharge and also compared with applicable standards. The projected effects of the effluents for both acute and chronic exposure of the biota should be identified and discussed. Dilution and mixing of discharges into the receiving environs should be discussed in detail, and estimates of concentrations at various distances from the point of discharge should be provided. The effects on terrestrial and aquatic environments from chemical wastes that contaminate ground water should be included.

## 5.4 OTHER EFFECTS

The applicant should discuss any other effects of operation if applicable. These may include changes in land and water use at the project site, interaction of the facility with other existing or projected neighboring facilities, effect of ground-water withdrawal on ground-water resources in the vicinity of the well field and plant and disposal of solid and liquid wastes other than those already discussed.

## 5.5 RESOURCES COMMITTED

Provide a brief summary of any irreversible and irretrievable commitments of resources due to in situ leach mining if applicable.

# 6.0 EFFLUENT AND ENVIRONMENTAL MONITORING

## 6.1 PREOPERATIONAL RADIOLOGICAL PROGRAM

Applicant should describe preoperational radiological program (Appendix I).

## 6.2 OPERATIONAL RADIOLOGICAL PROGRAM

Applicant should describe operational radiological program (Appendix II).

## 6.3 NONRADIOLOGICAL PROGRAMS

Applicant should describe preoperational and operational nonradiological programs. List all licenses, permits, and other approvals of construction and operations required by Federal, State, local, and regional authorities for the protection of the environment.* List those Federal and State approvals that have already been received and indicate the status of matters regarding approvals yet to be obtained. For general background, submit -similar information regarding approvals, licenses, and contacts with local authorities.

In view of the effects of the plant on the economic development of the region in which it is located, the applicant should also note the State, local, and regional planning authorities contacted or consulted. Office of Management and Budget Circular A-95** identified the State, metropolitan, and regional clearinghouse that should be contacted, as appropriate.

Cite meetings held with environmental and other citizen groups with reference given to specific instances of the applicant's compliance with citizen group recommendations.

## 7.1 PROCESSING FACILITY ACCIDENTS

The applicant should provide an analysis of an accident that might be expected to occur at the processing facility and the well fields. The applicant should indicate the proposed methodology to clean up any environmental contamination.

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* This list should be updated bimonthly until final action is taken by the NRC.

** Inquiries concerning this circular may be addressed to the Office of Management and Budget, Washington, D.C. 20503

## 7.2 TRANSPORTATION ACCIDENTS

The potential environmental effects from transportation accidents involving radioactive materials should be evaluated.

# 8.0 BENEFITS

The applicant may discuss significant benefits that may be realized from the construction and operation of the facility.

## 8.1 COSTS

The application may discuss significant costs to state and local governments which may result from the proposed facility.

# 9. DECOMMISSIONING, RECLAMATION AND RESTORATION

Describe plans for decommissioning of plant facilities, reclamation of affected surface areas and aquifer restoration. Attention should be given to the following:

a. Aquifer restoration program.

b. Well field reclamation including well plugging procedures.

c. Disposal of wastes, radioactive and non-radioactive.

d. Relation of a, b, and c to Uranium Mill Tailings Radiation Control Act.

e. Surety arrangements for a, b, and c.

## 10. ALTERNATIVES TO THE PROPOSED ACTION

In this chapter of theenvironmental report, the applicant's choice should be supported through a comparative evaluation of alternative.

## 11. OTHER LICENSES AND PERMITS REQUIRED

The applicant may here discuss state permits and licenses required by other agencies of the state government.

## 12. REFERENCES

The applicant should provide a bibliography of all sources used in preparation of the environmental report. References cited should be keyed to the specific sections and page numbers to which they apply.

APPENDIX I

PREOPERATIONAL MONITORING OF IN SITU LEACH FACILITIES

| Type of Sample | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| Air Particulate* | One | At proposed plant site | Continuous | Weekly filter change or more frequently as required by dust loading | Quarterly composite of weekly samples | Natural Uranium Ra-226, Th-230 Pb-210, Gross $\alpha$, Gross $\beta$ |
| | One | At or near nearest residence or occupied structure within 10 km. | Continuous | Weekly filter change or more frequently as required by dust loading | Quarterly composite of weekly samples | Natural Uranium Ra-226, Th-230 Pb-210, Gross $\alpha$, Gross $\beta$ |
| Radon Gas | One or more | Same as Air Particulate or proposed emission source | One 48-hour period or at least one week per month, representing the same period each month. | One 48-hour period or one week per month. | Each sample | Radon-222 |
| Radon Flux | One | Plant site | Continuous | One week per month | Each sample | Radon-222 Flux |

* For sites with dryers only

## PREOPERATIONAL MONITORING OF IN SITU LEACH FACILITIES

| Type of Sample | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| WATER | | | | | | |
| Ground Water | One from each TDWR* baseline well | Within one km of permit boundary | Grab | Once | Once | Natural Uranium, Ra-226, Gross $\alpha$, Gross $\beta$ |
| Surface Water | One from each body of water | Permanent on-site or adjacent impoundments and surface waters passing through permit area | Grab | Once | Once | Same as Ground Water |
| SOILS | | | | | | |
| Surface | One per acre | Process Facility | Grab | Once | Once | Natural Uranium, Ra-226, Th-230, Pb-210 |
| | One per acre | Delineated well field | Grab | Once | Once | Natural Uranium, Ra-226, Th-230, Pb-210 |

* As required by TDWR

PREOPERATIONAL MONITORING OF IN SITU LEACH FACILITIES

| Type of Sample | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| SOILS | | | | | | |
| Surface (cont'd) | One per 100 acre | Permit Area | Grab | Once | Once | All for Ra-226 10% for Natural Uranium, Th-230, Pb-210 |
| Subsurface | 10% of above | Evenly distributed | One foot composites to a depth of three feet | Once | Once | Ra-226, 1 set for Natural Uranium, Th-230 Pb-210 |
| VEGETATION, FOOD AND FISH | | | | | | |
| Vegetation | One per type | Within permit area<br>1 dominant grass/forbs<br>1 dominant shrub/brush<br>1 major food/feed crop | Grab | Once | Once | Natural Uranium Ra-226, Th-230 Pb-210 |
| Food | One | Herbivore within permit area | Grab | Once | Once | Natural Uranium Ra-226, Th-230, Pb-210 |

PREOPERATIONAL MONITORING OF IN SITU LEACH CILITIES

| Type of Sample | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| Fish | Each body of water sampled as surface water | SAme as Surface | Grab | Once | Once | Natural Uranium Ra-226, Th-230, Pb-210 |
| Sediment | One from each impoundment | Same as Surface Water | Grab | Once | Once | Natural Uranium Ra-226, Th-230, Pb-210 |
| | Two from each stream | One at upstream boundary, one at downstream boundary | Grab | Once | Once | Natural Uranium Ra-226, Th-230 Pb-210 |
| Direct Radiation | Minimum twenty-five | At surface and subsurface soil sampling location and at evenly spaced locations across permit area, to include permit boundary, taken at ground level and one meter | | Once | Once | Gamma exposure rate using TLD, pressurized ionization chamber or portable survey meter |

APPENDIX II

## OPERATIONAL MONITORING OF IN SITU LEACH FACILITIES*

| Type of Sample | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| STACKS | One for each stack | Dryer off gasses | Isokinetic | Quarterly | Each Sample | Natural Uranium (TH-230, Ra-226 and Pb-210 if not available from other sources) |
| AIR | | | | | | |
| Particulates** | 2 | Same locations as preoperational monitoring sites | Grab | Continuous At least one week per month | Quarterly Composite by location of monthly samples | Natural Uranium Ra-226, Th-230, Pb-210 (or Gross $\alpha$, Gross $\beta$ (if you have established baseline for others) |
| Radon | 2 | Same locations as preoperational monitoring sites | Grab | 144 hours per month | Monthly | Rn-222 |
| WATER | | | | | | |
| Groundwater | One from each well | Human consumption, livestock or irrigation wells within the permit area | Crab | Quarterly | Quarterly | Gross Alpha, Gross Beta (Radium 226 if over 3 pCi/1 Alpha, Lead 210 if over 50 pCi/1 Beta) |
| Surface Water | One from each body of water | Permanent onsite or adjacent impoundments and surface waters passing through the permit area. | Grab | Quarterly | Quarterly | Same as above |

* Also to be used for renewals except for some specific isotopes not previously analyzed for.
** Dryer only

## OPERATIONAL MONITORING OF IN SITU LEACH FACILITIES

| Type of Sample | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| SEDIMENT | One | Downstream at permit boundary | Grab | Annual | Annual | Natural Uranium, Ra-226 |
| VEGETATION* | Two | Near air particulate sample stations | Grab | Semiannual | Semiannual | Ra-226, Pb-210 |
| SOIL* | Two | Near air particulate sample stations | Grab | Annual | Annual | Natural Uranium, Th-230, Ra-226, and Pb-210 |

* Dryer only