

MOBIL CROWNPOINT

SECTION 9 - IN-SITU FACILITY

LICENSE NUMBER SUA-1479

REFERENCE NUMBER 40-8911

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INTRODUCTION

Mobil has completed the groundwater stability monitoring program and proposes the following well field abandonment and facilities decontamination and decommissioning plan for review and approval. The purpose of this plan is to describe steps Mobil will follow to meet the NRC criteria for unrestricted use following decontamination, decommissioning and surface reclamation of the test site.

As required by Condition No. 18 of Source Material License SUA-1479, Mobil submits this decommissioning plan for your review concurrent with the review of the stability monitoring data.

DECOMMISSIONING AND DECONTAMINATION

Certain areas and equipment at the Section 9 site are expected to show evidence of residual contamination. Prior to beginning decontamination, radiological surveys will be conducted to define areas, equipment and structures requiring remedial action and to identify areas with a potential of causing exposure to personnel during decommissioning and decontamination.

In order to release the Section 9 site for unrestricted use, the following standards will be achieved.

1. Gamma radiation exposure rates will not exceed the background level by more than 20 microR/hour in any building.
2. Concentrations of Ra-226 averaged over any area of 100 square meters will not exceed the background level by more than 5 pCi/g, averaged over the first 15 cm of soil below the surface and 15 pCi/g, averaged over 15 cm thick layers of soil more than 15 cm below the surface.
3. Surface contamination levels will not exceed those stipulated for U-Nat, U-235, U-238, and associated decay products in Table 1 of NRC Guide, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials" (Attachment 1).

BACKGROUND LEVELS

Soil

Analysis by Camp Dresser S. McKee, Inc. (CDM) (Attachment 2) contracted by Mobil prior to mining activity at the site found Ra-226 levels to be 0.87 pCi/g (n=20, sample sd = 0.43 pCi/g). Analysis of these same samples indicated uranium concentrations averaging 4×10^{-4} percent U_3O_8 . Converting the uranium numbers to pCi/g, one obtains a value of 2.3 pCi/g with a sample standard deviation of 1.2 pCi/g (n=20). Although the uncertainties in measurement preclude calculating an accurate estimate of the U-nat/Ra-226 ratio, the measurements indicate that in all probability this ratio is less than 10 for uncontaminated soils. Since these values indicate that Ra-226 is probably no less than .5 pCi/g and U-nat is no more than 5 pCi/g, the measurements indicate that the ratio of U-nat to Ra-226 is less than 10 for background soils.

Gamma Exposure Rates

Baseline exposure rate measurements performed by CDM employed relatively insensitive instrumentation calibrated at exposure rates well above background and are not sufficiently accurate to use as background for purposes of demonstrating measurement in the 20 microR above background range.

Determination of background for the purpose of demonstrating compliance with the gamma exposure rate standard will be made by averaging a number of readings taken off-site in an upwind and updrainage location with a calibrated exposure rate meter as well as a gross scintillation detector. Readings will be taken at waist level, and these same instruments will be used to make exposure rate determinations inside buildings to demonstrate compliance with release standards.

The gross scintillation detector readings will be recorded as cpm, and will serve to corroborate the values of the less sensitive but accurately calibrated exposure rate measurements.

SOIL CONTAMINATION SURVEYS

Identification of areas requiring sampling and/or soil excavation will be determined using a gross gamma scintillation detector with a Ludlum model 44-2. Prior to site survey, the decision levels for this instrument will be determined by performing approximately 20 background readings at appropriate areas upwind and updrainage of the site. Readings will be taken at 5 cm and 1 m above the ground, and the means and sample standard deviations of these readings will be calculated. The location of each background reading will be recorded.

Decision levels for readings at both 5 cm and 1 m heights will be calculated using the formula:

$$\text{Decision Level} = \text{Mean background cpm} + 3 \times \text{background sample standard deviation cpm}$$

After determining these decision levels, areas to be surveyed for soil sampling will be marked in a 10 m by 10 m grid pattern, and a measurement will be recorded at each crosspoint of the grid (one measurement per 100 m²).

Any measurement above either decision level (1 m or 5 cm levels) will be followed by finding, marking, and recording the results for the point of highest reading in the vicinity of the original measurement.

SOIL CONTAMINATION ACTION LEVELS

Although it is known that in-situ measurements are not accurate estimates of Ra-226 concentrations in soil, being affected by depth of contamination, soil moisture, other gamma emitters, and other factors, other sites (reference Rocky Mountain Energy) have found them adequate for defining action levels for the purposes of site decommissioning. Studies have demonstrated that at low levels, such methods have reasonable accuracy and show a tendency towards overestimating the Ra-226 concentrations.

It is, therefore, proposed that action levels for soil sampling and analysis or excavation be developed that specify gross gamma scintillation readings below which there is no reason to suspect contamination in excess of release limits.

These action limits will be based on factors that will be determined in a preliminary gross gamma survey using procedures discussed in soil contamination surveys, concentrating only on 2 or 3 areas in one well field that now appear to produce the maximum scintillation readings found on-site. In addition, a point of highest reading will be searched for within the area of pond #1. Samples will be taken from:

1. The points directly below areas of local maximum readings.
2. Points down drainage from local maximums that are directly beneath readings that correspond to decision levels.

A regression equation will be developed which will convert scintillation readings (in excess of background) to Ra-226 concentration. Action levels for cleanup or sampling will be equal to the gross scintillation readings in excess of background that correspond to the levels of 5 pCi/g and 15 pCi/g.

SAMPLING PROCEDURE

Areas selected for soil sampling and analysis will be sectioned into a 10 meter by 10 meter grid around the points of highest measured gamma exposure rate. Ten equidistant samples will be collected within a 100 square meter area. All ten samples will be placed inside of one bag.

Current standards applicable to cleanup of sites to be released for unrestricted use require cleanup of soil with Ra-226 concentrations greater than 5 pCi/g above background in the first 15 cm of soil below the surface and 15 pCi/g averaged over 15 cm thick layers of soil below the surface. If the level of contamination appears to be less than 15 pCi/g, deeper samples will not be taken. The contaminated soil will be excavated and hauled to Conoco's Conquista Project in Fall City, Texas. Alternating the contaminated material will be taken to an approved and licensed site in New Mexico. A final gamma survey and/or sampling and analysis will be done to insure the area meets unrestricted area use standards.

SAMPLE ANALYSIS

Soil samples analysis will be contracted to a reputable analytical laboratory (Eberline or Acculabs). Closed can methods after suitable ingrowth will be used to determine Ra-226 and U-238 by gamma spectrometry.

SOIL SAMPLE DOCUMENTATION

The soil sample documentation will include the Section 9 site docket number, sample number project name, date and time of collection, depth of sample and sample description.

A sample number will be assigned to each sample. The sample numbers will be printed on sample forms and labels prior to sampling. These records will be maintained on file at Mobil for a period of five years following decommissioning.

REMOVABLE ALPHA CONTAMINATION

Surveys for fixed and removable alpha contamination will be performed according to methods described in Regulatory Guide 1.86. Fixed contamination levels will be determined using a Ludlum alpha scintillation probe and Ludlum Model 2 rate meters. Alpha detection efficiency will be determined by measurement of a Th-230 calibration source before and after each days' use of the instrument.

Trailers and buildings will be surveyed with the alpha probe paying particular attention to areas which may have become contaminated by contact with mine solutions, samples, or waste. Any area that is noticeably (or 100 cpm) above background level will be wipe tested for alpha contamination.

Removable contamination levels will be determined by wiping at least 100 cm² area with a dry filter or soft absorbent paper while applying modest pressure. The level of radioactive material on the paper will be counted on a Eberline Model SPA 1 alpha scintillation detector with an Eberline PRS-1 scalar/rate meter. Alpha detection efficiency will be determined by measurement of a Th-230 calibration source before and after each days' use of the instrument.

Records of these counts will indicate gross CPM, net CPM, and net DPM/100 cm². The records of efficiency determinations will include date, calibration source serial number, gross cpm, background and efficiency.

All equipment and structures identified as requiring remedial action will be taken to Conoco's Conquista Project. Alternatively, Mobil will dispose of contaminated material at an approved disposal site in New Mexico.

POND ABANDONMENT

Pond sludge and liners have been removed from two of the three ponds and transported by Energy Fuels Nuclear, Inc. for disposal.

Once the NRC approves Mobil groundwater stability analysis, the third pond will be decontaminated. The contaminated material from the third pond will be removed and transported by Conoco to the Conquista Project in Texas, or an alternative site in New Mexico.

A gamma survey will be performed on the areas inside each pond as described for Ra-226 soil surveys. If soil sample analyses indicate Ra-226 levels greater than 5 pCi/g above background, soil will be removed until gamma survey results reach acceptable unrestricted use standards. Contaminated soils will be identified according to the criteria described in the previous section "Sampling Procedure".

Once all contaminated material has been removed, the ponds will be backfilled and reclaimed.

WELL ABANDONMENT

All injection, production and monitor wells within the Section 9 Pilot test site will be sealed in accordance with the New Mexico State engineer requirements. The wells within the test site will be cemented from bottom to top. The cementing will be completed in three stages from the depth of the well to within three feet of the surface. Each stage will consist of 15.6 pounds per gallon class A neat cement. After cementing all well casings will be cut off three feet below ground surface. All underground piping between the wellheads and head-house will be filled with cement. Any underground piping within three feet of the surface will be excavated and removed for release survey or disposal.

Fiberglass pipe used in the well field will be surveyed for gamma and removable alpha. The surveys will be performed in accordance with Attachment 1, "Guidelines For Decontamination And Equipment, Prior To Release For Unrestricted Use Or Termination Of Licenses For By Product Or Source Materials." The fiberglass pipe will be wipe tested through the 30 feet length of the pipe with a dry swab. The level of radioactive material on the swab will be counted on a Eberline Model SPA 1 Alpha Scintillation detector with an Eberline PRS-1 scaler base meter. All pipe identified as requiring remedial action will be taken to Conquista for disposal, or taken to an alternative disposal site in New Mexico.

SURFACE RECLAMATION

All areas of significant disturbance including unreclaimed well field areas, evaporation ponds, access road and building or trailer sites will be reclaimed according to New Mexico EID and surface owner requirements.

After all surveys are complete and the land meets unrestricted use standards, the areas of disturbance will be broadcast-seeded followed by harrowing or similar treatment to ensure seed coverage.

Species mixtures adapted to the climate and soil conditions existing on the sites with forage characteristics of palatability, tolerance to grazing and availability for year around use have been established. The seed mixture will be applied at the rate of 35 lbs. of seed per acre, followed by harrowing to insure seed coverage. Mobil will establish the success of the revegetation within 36 months after the initial application of the seed mixture.

SCHEDULE-DECONTAMINATION AND DECOMMISSIONING PLAN

Mobil plans to begin decontamination and decommissioning at Crownpoint in October 1987. Once the decommission plan is approved by the NRC, Mobil will begin the gamma survey to identify areas where soil samples will be collected. After the contaminated areas are identified, Mobil will remove the contaminated soil and dispose of at Conquista, or an alternative disposal site in New Mexico. This process will be completed within approximately 3 months after plan approval.

Surveys for fixed and removable alpha will be performed within 3 to 6 months after plan approval. Contaminated equipment and facilities will be removed within the 6 month time frame.

The final gamma survey well abandonment and final reclamation will be completed by the date of NRC license expiration, July 1989.

TECHNICAL QUALIFICATIONS OF HEALTH PHYSICS STAFF

Primary - Radiation Safety Officer (RSO) - Pat Moore

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Education

B.S. Biology 1971, University of New Mexico

Registered by National Registry of Radiation Protection Technologies

Experience

- o 1983 - Present; Health Physics Consultant, Assaigai Laboratories
- o 1984 - 1985; Hazardous Waste Manager, Department of Occupational Safety;
University of New Mexico
- o 1978 - 1984; Radiological Safety Technologist; Department of Radiological
Safety; University of New Mexico

TECHNICAL QUALIFICATIONS OF HEALTH PHYSICS STAFF (CONTINUED)

Secondary Radiation Safety Officer (RSO) - J.E. Sciba

Education

High School Graduate

Training received at Mobil Oil Corporation, Nell In-situ Mining Project,
Pawnee, Texas

Experience

5 1/2 years experience at Nell Project

3 years experience at Crownpoint

Specialized Training

One week entitled "Radiation Protection and Environmental Surveillance for
Uranium Resource Organization - September 1984.

Six weeks on site instruction from R.D. Pierce, Radiation Protection Officer
at Crownpoint from 1980-1983, on environmental sampling and operational
monitoring, radiation detection instrumentation, laboratory analysis, quality
control, occupational radiological protection and state and federal regulation
as applicable to Mobil's Crownpoint Section 9 Pilot Leach Operations.

Mr. Sciba has worked in the in-situ uranium mining industry for over 8 years with Mobil Oil Corporation. His experience has been in operations and maintenance of both pilot test and commercial in-situ uranium leach and extraction facilities, holding the position of Well Field Operator and Plant Maintenance Foreman. As part of this training program, Mr. Sciba completed the "Radiation Protection and Environmental Surveillance for Uranium Resource Organizations" course conducted by Eberline Services Division in September, 1984. In addition, Mr. Sciba received six weeks on-site training in Environmental sampling, operational monitoring, radiation detection, instrumentation, laboratory analysis, quality control and occupational radiological protection in August, 1984.

RADIATION SAFETY

Attachment 3 contains Mobil's "Personnel Health and Safety Program".

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT
PRIOR TO RELEASE FOR UNRESTRICTED USE
OR TERMINATION OF LICENSES FOR
BYPRODUCT OR SOURCE MATERIALS

U.S. Nuclear Regulatory Commission
Uranium Recovery Field Office
Region IV
Denver, CO 80225

SEPTEMBER 1984

The instructions in this guide in conjunction with Table I specify the radioactivity and radiation exposure rate limits which should be used in accomplishing the decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use.

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 Commission 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 or scrap, 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 Uranium Recovery Field Office, Region IV, P.O. Box 25325, Denver, CO 80225. 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 findings of the survey in units specified in the instruction.

Following review of the report, the NRC will consider visiting the facilities to confirm the survey. The licensee shall not release the premises for unrestricted use without the written approval of the USNRC staff.

TABLE I

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES ^a	AVERAGE ^{b c f}	MAXIMUM ^{b d f}	REMOVABLE ^{b e f}
U-nat, U-235, U-238, and associated decay products	5,000 dpm /100 cm ²	15,000 dpm /100 cm ²	1,000 dpm /100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-118, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm ²	3,000 dpm/100 cm ²	200 dpm/100 cm ²
beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above.	5,000 dpm /100 cm ²	15,000 dpm /100 cm ²	1,000 dpm /100 cm ²

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^bAs 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.

^cMeasurements 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.

^dThe maximum contamination level applies to an area of not more than 100 cm².

TABLE 1

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^eThe 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.

^fThe 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.

ATTACHMENT 2

ENVIRONMENTAL RADIOMETRIC SURVEYS

MOBIL OIL CORPORATION

IN-SITU URANIUM PROJECT

MCKINLEY COUNTY, NEW MEXICO