



UNITED STATES
NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D.C. 20555-0001

April 3, 1998

Mr. Jeff Lux
 Kerr-McGee Corporation
 Kerr-McGee Center
 P.O. Box 25861
 Oklahoma City, OK 73125

SUBJECT: RADIOACTIVE MATERIAL STORAGE AREA LIQUID EFFLUENT MONITORING PROGRAM

Dear Mr. Lux:

The U.S. Nuclear Regulatory Commission, by letter dated December 10, 1997, approved construction of the Cushing Radioactive Material Storage Area (RMSA). As noted in our discussions with you prior to this approval, we had concerns with the design based on the need to release liquid effluents to the environment. However, based on our discussions, NRC did approve the design and construction of the RMSA based on the understanding that Kerr-McGee would develop an acceptable liquid effluent monitoring program. This understanding is reflected in License Condition 11.B.1, which was revised to as follows:

Construction of the Radioactive Materials Storage Area (RMSA) in accordance with the licensee's letter dated September 2, 1997, is authorized, however NRC approval of the RMSA liquid effluent monitoring program must be obtained prior to transferring any contaminated material into the RMSA.

Kerr-McGee, by letter dated February 10, 1998, rather than submitting the expected RMSA liquid monitoring program, submitted a request to amend the Cushing license to allow placing of contaminated material into RMSA without a liquid effluent monitoring program based on the results of an analysis. Kerr-McGee's contractor, Radiation Safety & Control Services, Inc., developed an analysis to demonstrate under "conservative assumptions" liquid released from the RMSA would be in compliance with the requirements of 10 Code of Federal Regulations (CFR) Part 20, Appendix B, thus negating the need for a RMSA liquid effluent monitoring program.

NRC has reviewed the supporting analysis for this license amendment request and found it unacceptable. The basis for this finding is enclosed. Kerr-McGee is requested to submit the following: (1) the requested RMSA liquid effluent monitoring program that will demonstrate the ability to comply with 10 CFR Part 20; (2) a detailed discussion of the environmental impacts of this new effluent discharge; and (3) an ALARA program for effluents in accordance with the guidance provided in NRC Regulatory Guide 8.37.

Finally, in your application you are proposing to release liquid effluents under 10 CFR Part 20, Appendix B. To accommodate this, you need to identify the release drainage pathway and point of release to a surface water body. We assume this will be Skull Creek. If you intend to directly release liquid to the land surrounding the RMSA, you will need to apply for approval

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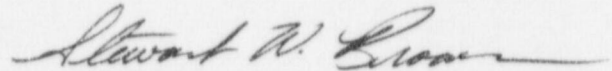
J. Lux

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under 10 CFR 20.2002, since this type of release is not a liquid effluent release as envisioned in 10 CFR Part 20 Appendix B.

If you wish to discuss this matter further or have any questions, please contact me, at (301) 415-6605.

Sincerely,

A handwritten signature in cursive script, reading "Stewart W. Brown".

Stewart W. Brown, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 70-3073
License No. SNM-1999

Enclosure: As stated

NRC Comments on Kerr-McGee's January 1998 Report on Calculated Effluents from the
Proposed Radioactive Material Storage Area (RMSA) at Cushing

BACKGROUND

The purpose of the RMSA is to store contaminated soil within a diked area, which will collect both surface water and rain water during its operation. The licensee proposes to release the collected water to an unrestricted area owned by the licensee. In support of a license amendment to construct the RMSA, the licensee submitted a report that evaluated the release of liquid effluents discharged from the RMSA. Releases of liquid effluent into an unrestricted area must comply with the requirements of 10 CFR Part 20. The licensee, rather than measuring the isotopic content of the liquid effluent to demonstrate compliance with the regulation, proposed to demonstrate compliance analytically.

The licensee's evaluation calculated the concentration of radioactive material at the discharge point of the RMSA assuming certain radionuclide concentrations in the soil, radionuclide solubility, rainfall rate, soil pile geometry, soil erosion depth, and suspended fraction of radioactivity in the effluent. The concentration of liquid effluents released from the RMSA was then compared to the effluent concentration values specified in Table 2 of appendix B of 10 CFR 20. The report concluded that the annual average concentration at the effluent point would be less than the prescribed values.

NRC COMMENTS

1. Liquid Effluent Release to Land Surface

The application proposes to release liquid effluents under 10 CFR Part 20, Appendix B. To accommodate this, it will be necessary to identify the release drainage pathway and point of release to a surface water body. It is assumed that the drainage pathway will be Skull Creek. If it is intended that liquid effluents are to be directly released to the land surrounding the RMSA, it will be necessary to apply for approval under 10 CFR 20.2002, since this type of release is not a liquid effluent release as envisioned in 10 CFR Part 20, Appendix B.

2. Source Term

The report states that the evaluation provides a "very conservative estimate of the concentration of radioactive material in the discharge point in the event that the diked area is filled with water and is discharged to unrestricted areas." However, the source term that was used in the effluent concentration calculations contains assumptions about the source term that are not adequately supported. Specific comments on the source term estimates are provided below:

- a. Table 1, "Estimated Total Radioactivity Contained in the Proposed RMSA at Maximum Capacity," provides estimates of the total radioactivity contained in the RMSA at maximum capacity. Assuming the licensee's estimates of volume and activity in each radioactive

ENCLOSURE

materials area (RMA), NRC calculations were between 3 and 4 percent higher than the reported values. Although this is good agreement, the licensee states in paragraph 3 of page 3 that "the effluent concentration would be less than 0.96 of the 10 CFR 20 values." Thus, a 3 to 4 percent increase in calculated effluent concentration could bring the licensee's estimates to about 100 percent of the appendix B limits, which is not conservative with respect to demonstrating compliance with 10 CFR 20.1302. Also, this value is not considered ALARA - see the comments below on ALARA for more information.

- b. Section 2.1 of the report states that Table 1 provides a summary of the activity for "each of the four major isotopes" (U-234, U-235, U-238 and Th-232), but there is no consideration of the daughters of those radionuclides in the effluent concentration calculations. Although the original source of those radionuclides was processed fuel, it is expected that several of the daughters would be present in the contaminated soil due to ingrowth and, therefore, should be accounted for in the effluent concentration calculations. It is expected that inclusion of the daughters would result in the calculated effluent concentration exceeding the appendix B limits by about 15 to 20 percent. Such estimates of the source term are not considered conservative or ALARA - see the comments below on ALARA for more information.
- c. The total radioactivity estimates provided in Table 1 were used to calculate the concentration of radioactive material in effluents discharged from the RMSA. Although the appendix B limits are based on annual average concentrations, a slight increase in the concentration of radioactive material (especially thorium due to its relatively low Appendix B limit) could result in the calculated effluent concentration exceeding the Appendix B limits (the calculated effluent concentrations is at 96 percent of the appendix B limit).
- d. Table 1 contains estimates of soil volume in the proposed RMSA based on information contained in a March 1995 ALARA analysis by Chase Environmental Group. The RMAs analyzed in Table 1 are numbers 2, 3 and 5. However, the March 1995 ALARA analysis states that the largest areas and the largest potential soil volumes are contained in RMA numbers 2, 3, 4, 5, 6 and 11 (see section 4.1 of the ALARA analysis). Also, the soil volumes were estimated assuming a contamination depth of 1 foot, but the ALARA analysis also contains higher estimates of contamination at depths greater than 1 foot.

It is not clear from the report why RMA numbers 4, 6, and 11 were not included in the licensee's analysis and why the higher estimates of soil contamination at depth were not analyzed in the report.

- e. The first paragraph on page 3 states that "the uranium and thorium species contained within the contaminated soil is insoluble," but the report does not provide a basis for this assumption.
- f. The report did not contain information on the method used to estimate the total amount of eroded soil, but assumed that the soil pile was in the shape of a hemisphere and comprised 304,000 cubic feet. This geometry provides an estimated pile diameter (base) of 105 feet and a soil surface area of about 17,300 square feet. Assuming a soil erosion depth of 2 inches, about 2,880 cubic feet of eroded soil is discharged as effluent from the RMSA - this

value compares favorably with the Kerr-McGee estimate. However, the report did not include the bases to support the assumptions that the rainfall rate, soil pile geometry, soil erosion depth, and suspended fraction of radioactivity in the effluent are conservative.

3. ALARA

10 CFR 20.1101(b) requires that licensees use, to the extent practicable, procedures and engineering controls based on sound radiation protection principles to achieve doses to members of the public that are ALARA. Guidance on designing an acceptable program for establishing and maintaining ALARA levels for liquid effluents at materials facilities is contained in Regulatory Guide 8.37, "Effluents from Materials Facilities." The ALARA goal cited in the NRC Regulatory Guide 8.37 is 10 to 20 percent of Appendix B values or less. NRC Regulatory Guide 8.37 also states that licensees should consider available engineering options to control the release of effluents to the environment. Effluent minimization techniques for diffuse sources, such as contaminated soils or surfaces, include covers, the application of stabilizers, and recycling of process fluids.

Contrary to the above, the report does not cite or contain a program for establishing and maintaining ALARA levels for liquid effluents. Also, according to paragraph 3 on page 3 of the report, the calculated effluent concentrations for the RMSA are about 96 percent of the appendix B limits, which is unacceptably high compared to the recommended ALARA goal of 10 to 20 percent or less of the Appendix B limits. Also, the licensee did not consider engineering options to control the release of effluents to the environment.

4. Effluent Monitoring

- a. The last sentence on page 4 states that "it appears reasonable that the storage of contaminated soil within the proposed RMSA will not cause liquid effluent to exceed the values specified in 10 CFR 20 provided that appropriate monitoring and controls are applied to the management of the area." However, the report did not contain information on surveys and effluent monitoring to demonstrate compliance with the requirements of 10 CFR 20.1302.

10 CFR 20.1302 requires licensees to make surveys in unrestricted areas and radioactive materials in effluents released to unrestricted areas to demonstrate compliance with the dose limits specified in 10 CFR 20.1301. The surveys should include liquid effluent monitoring and surveys of dose rates in unrestricted areas. This includes the monitoring and surveys that may be necessary to determine whether radiation levels and effluents meet ALARA goals.

- b. In section 3.4.10.4 of a letter from Kerr-McGee dated September 2, 1997, the licensee proposed to use gross alpha and gross beta analyses "to compare against the public limits in 10 CFR 20," but the report does not mention this proposal. In the event that the licensee proposes to use this technique in the future, it should be noted that, in general, radionuclide specific analyses are performed on representative effluent samples unless (1) the gross alpha and gross beta activities are so low that individual radionuclides could not be present in concentrations greater than 10 percent of the concentrations specified in Appendix B or

(2) the radionuclide composition of the sample is known through operational data. Regarding the latter item, it is noted that operational data may not be adequate for the determination of radionuclide concentration at Cushing because uranium of varying enrichments and thorium was processed.

Radionuclide analyses are performed more frequently than usual at sites that possess special nuclear material under the following circumstances: (1) at the beginning of the monitoring program until a predictable radionuclide composition in effluents is established; (2) whenever there is a significant unexplained increase in gross radioactivity; or (3) whenever a process change of other circumstance might cause a significant variation in the radionuclide composition.

5. Waste Minimization

The licensee's proposal is to discharge untreated effluent directly to an unrestricted area. This practice will, in turn, contaminate the unrestricted area with elevated levels of uranium and thorium series radionuclides. The licensee's estimate is that about 0.2 curies of U-238, U-235, and U-234 (combined) and 0.15 curies of Th-232 will be released to the unrestricted area. This estimate is based on the assumptions described previously in these comments.

The NRC has stated for more than a decade that licensees should design features and procedures that facilitate decommissioning the site, reduce the amount of radioactive waste, and minimize the overall public risk associated with decommissioning. For example, the 1985 proposed decommissioning rule states that "facilitation of decommissioning in the design of facilities can be considered under the general standard for issuance of licenses that equipment and facilities be adequate to protect the health and safety of the environment contained in ...10 CFR 70.23(a)."¹ Although not codified in the final 1988 decommissioning rule, the associated Federal Register notice² states that "to the extent that design features or operational techniques are of known value in facilitating decommissioning, the Commission may consider these factors in reviewing applications for construction permits or operating licenses under the more general criteria contained in the regulation."

In the supporting Generic Environmental Impact Statement (NUREG-1496) to the 1997 decommissioning rule, the staff stated that waste minimization requirements are "necessary to focus attention on facility design and good housekeeping practices needed to minimize problems, like those addressed in the Commission's Site Decommissioning Management Plan." Although not applicable to the Cushing decommissioning, 10 CFR 20.1406 requires that applicants for licenses describe how facility design and procedures for operation will minimize contamination of the facility and the environment, facilitate eventual decommissioning, and minimize the generation of waste.

¹50 Federal Register 5605

²53 Federal Register 24026

It is recommended that the licensee evaluate the impact of the proposed effluent discharge in view of facilitating the decommissioning of the Cushing site.

6. Environmental Assessment

The proposed action is for the licensee to discharge effluents from the RMSA, which is a new activity proposed under the license, and therefore requires a license amendment. 10 CFR 51.60 requires that an application for a license amendment shall submit an "Applicant's Environmental Report" that contains the information required in 10 CFR 51.45. One of the actions covered by 10 CFR 51.60(b)(2) is the issuance of an amendment that would authorize or result in a significant change in the types or amounts of effluents.

10 CFR 51.22 contains categorical exclusions for preparing an environmental assessment or environmental impact statement that are associated with licensing and regulatory actions. 10 CFR 51.22(c)(11) provides a categorical exclusion for amendments to materials licenses, except for actions which result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

The report does not provide sufficient information for the staff to determine whether it is necessary to perform an environmental assessment or whether the categorical exclusion applies. Accordingly, the report should be supplemented with information on the reasonably expected environmental impacts of the release of the effluents. In the absence of such information supporting a categorical exclusion and because the RMSA is a new structure, it must be assumed that the effluent release is a significant change in the types and amounts of effluents.

J. Lux

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If you wish to discuss this matter further or have any questions, please contact me, at
(301) 415-6605.

Sincerely,

Stewart W. Brown, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 70-3073
License No. SNM-1999
Enclosure: As stated

TICKET NO. LLDP-8026

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From: Charles Cain
To: TWD2.TWP7(SWB1)
Date: 3/23/98 8:29am
Subject: Cushing - RMSA effluent monitoring -Reply

I concur.

>>> Stewart Brown 03/20/98 12:01pm >>>

Attached please find NRC's response to Kerr-McGee's February 10, 1998, license amendment request. RIV's concurrence is requested. Thank you.

<WP Attachment Enclosed>

J. Lux

- 2 -

under 10 CFR 20.2002, since this type of release is not a liquid effluent release as envisioned in 10 CFR Part 20 Appendix B.

If you wish to discuss this matter further or have any questions, please contact me, at (301) 415-6605.

Sincerely,

[ORIGINAL SIGNED BY:]

Stewart W. Brown, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
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