MARK COLEMAN
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

FRANK KEATING
Governor

March 2, 1999

Mr. Stewart Brown
Low-Level Waste & Decommissioning Projects Branch
Division of Waste Management
Office of Nuclear Materials Safety & Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Kerr McGee Cushing
Release of Unaffected Areas

Dear Mr. Brown:

My staff has reviewed your letter received February 8, 1999. We have no comments or suggestions on this assessment or the proposed action for release of the unaffected areas and the haul road corridor from the license. If you have any questions regarding this matter please contact Earlon R. Shirley of my staff at (405)702-5163.

Sincerely yours,

H. A. Caves, Director
Waste Management Division

HAC\ers

NL16'0

707 NORTH ROBINSON, P.O. BOX 1677, OKLAHOMA CITY, OKLAHOMA 73101-1677

Delete: ACNW

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

APR 06 1993

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

Mr. John C. Stauter
Kerr-McGee Corporation
Technology and Engineering Division
P.O. Box 25861
Oklahoma City, OK 73125

SUBJECT: ISSUANCE OF SPECIAL NUCLEAR MATERIALS LICENSE NO. SNM-1999 TO KERR-MCGEE CORPORATION TO POSSESS CONTAMINATED MATERIAL AT THE CUSHING SITE

Dear Mr. Stauter:

In accordance with the statements, representations, and conditions specified in your application letter dated October 17, 1991, as revised on September 25, 1992 (application), and supplemented on December 18, 1992, January 14, 1993, and February 23, 1993, and pursuant to Title 10, Code of Federal Regulations, Part 70, the Nuclear Regulatory Commission hereby issues Special Nuclear Material (SNM) License No. SNM-1999 (Enclosure 1). SNM-1999 authorizes the possession of contaminated soil, sludge, sediment, trash, building rubble, and any other contaminated material, at Kerr-McGee's Cushing site. The material is to be used during preliminary remediation activities.

SNM-1999 contains 11 conditions. On March 31, 1993, Kerr-McGee verbally agreed to the 11 license conditions as stated in Enclosure 1. Take special note of License Condition 11.B, which prohibits Kerr-McGee from conducting several of the remediation activities proposed in the application until NRC approves the methods to be used. Kerr-McGee must submit the descriptions of the methods to be used in the license amendment requests.

NRC staff's review of the application is documented in a Safety Evaluation Report (Enclosure 2). In addition to the health and safety issues addressed in the Safety Evaluation Report, the staff evaluated the decommissioning funding plan and financial assurance mechanism submitted with the application, as supplemented, and determined that they are in compliance with 10 CFR 70.25, "Financial Assurance and Recordkeeping for Decommissioning."

NL160

9304090219 4pp Delete: ACNW

Please be advised that you must conduct the remediation activities at the Cushing site in accordance with the conditions of your license, representations made in the application, and NRC regulations.

Sincerely,

John H. Austin

John H. Austin, Chief
Decommissioning and Regulatory
Issues Branch
Division of Low-Level Waste Management
and Decommissioning
Office of Nuclear Material Safety
and Safeguards

Enclosures:
1. License SNM-1999
2. Safety Evaluation Report

cc: w/enclosures
H. A. Caves, Oklahoma DoH
L. Kirk, Oklahoma DoH

Enclosure 1

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee		
1. Kerr-McGee Corporation	3. License number	SNM-1999
2. Kerr-McGee Center Oklahoma City, OK 73125	4. Expiration date	Jaunary 1, 1997
	5. Docket or Reference No	70-3073

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Uranium Enriched in U-235	A. Contaminated soil, sludge, sediment, trash, building rubble, structures, and any other contaminated material.	A. All residual contamination which currently exists at the former Cushing Refinery Site.
B. Thorium	B. Contaminated soil, sludge, sediment, trash, building rubble, structures, and any other contaminated material.	B. All residual contamination which currently exists at the former Cushing Refinery Site.
C. Natural Uranium and Depleted Uranium	C. Contaminated soil, sludge, sediment, trash, building rubble, structures, and any other contaminated material.	C. All residual contamination which currently exists at the former Cushing Refinery Site.

9. Authorized Use: Licensed material shall be possessed and used in remediation activities leading to the decommissioning of the Cushing Site.

10. Authorized Place of Use: The existing facilities of Kerr-McGee Corporation, Environmental Operations, Technology and Engineering Division, P.O. Box 89, Cushing, OK 74023. Location: Two miles North - State Highway 18, 1/2 mile East - Deep Rock Road.

11. Conditions:

A. Kerr-McGee shall submit by license amendment request, before February 1, 1994, a Proposed Decommissioning Plan for the Cushing Site meeting the requirements of 10 CFR 70.38(c)(2)(iii).

B. Kerr-McGee shall submit, by separate license amendment requests, or as a part of the Proposed Decommissioning Plan, detailed descriptions of the methods for performing the following activities, prior to beginning the activities:

1. Prior to transferring contaminated material to any of the three temporary storage areas provide an analysis of the ability of the three temporary storage areas to effectively resist erosion by wind and water, and describe the measurement procedures to be used to control the sorting of the contaminated material to be transferred to the temporary storage areas,

2. Prior to neutralizing the acidic contaminated sludge in Pit 4, describe the methods to be used,

3. Prior to demolishing potentially contaminated structures, provide a description of the methods to be used.

C. Both the 8 hour and 2 to 3 hour Health and Safety indoctrinations described in Item 8 of the application shall include all of the topics described in 10 CFR 19.12.

D. Kerr-McGee shall submit, by license amendment request, before June 1, 1993, the proposed boundaries of all radioactive materials areas designated in accordance with 10 CFR 20.203(e)(2), restricted areas as defined in 10 CFR 20.3, and areas outside of restricted areas, where licensed materials exist which must be secured from unauthorized removal per 10 CFR 20.207.

E. Notwithstanding statements in the application, the limits listed in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," Policy and Guidance Directive 83-23, August 1987, shall be used as the criteria for the unrestricted release of equipment, material, and personnel.

F. All radiation protection program procedures shall, at a minimum, be approved by the Radiation Safety Officer and either the Vice President, Environmental Operations, or the Vice President, Environmental & Health Management.

G. All work in radioactive materials areas or restricted areas, or work with licensed material not located in radioactive materials or restricted areas, shall be in accordance with an approved radiation safety procedure.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: SNM-1999

Docket or Reference number: 70-3073

H. Wastes disposed offsite shall be classified and meet waste form requirements of 10 CFR Part 61, meet applicable disposal site license conditions, and meet Department of Transportation and 10 CFR Part 71 transportation requirements.

I. The Radiation Safety Officer for this license is Will Rogers.

J. Licensee is exempt from the physical protection requirements of 10 CFR 73 and the criticality accident requirements of 10 CFR 70.24.

K. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with statements, representations, and conditions contained in letter dated September 25, 1992, as supplemented on December 18, 1992, January 14, 1993, and February 23, 1993.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date: April 6, 1993

By: John H. Austin

John H. Austin, Chief
Decommissioning and Regulatory
Issues Branch
Division of Low-Level Waste Management
and Decommissioning
Office of Nuclear Material Safety
and Safeguards

Enclosure 2

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

APR 06 1993

DOCKET NO: 70-3073

LICENSE NO: SNM-1999

LICENSEE: KERR-McGEE CORPORATION

SUBJECT: SAFETY EVALUATION REPORT, LICENSE APPLICATION DATED OCTOBER 17, 1991, AS REVISED ON SEPTEMBER 25, 1992, AND SUPPLEMENTED ON DECEMBER 18,1992, JANUARY 14, 1993, AND FEBRUARY 23, 1993

RE: POSSESSION OF URANIUM AND THORIUM AT THE CUSHING REFINERY SITE

1. INTRODUCTION

Kerr-McGee Corporation (Kerr-McGee) submitted a special nuclear materials (SNM) license application, on October 17, 1991; a revised application (application) on September 25, 1992; and supplements on December 18, 1992, January 14, 1993, and February 23, 1993, to possess the uranium and thorium at the former Cushing Refinery Site (Cushing Site). Uranium and thorium currently exist at the Cushing Site in the form of contaminated soil, sludge, sediment, trash, building rubble, and on building surfaces. Kerr-McGee proposes to possess the licensed material during preliminary remediation and disposal activities.

While Kerr-McGee has not formally organized the schedule for the Cushing Site decommissioning into phases, the Nuclear Regulatory Commission staff (staff) views the decommissioning as proceeding in two phases. The preliminary activities proposed in the application are considered by the staff to be Phase 1 of the decommissioning. The goal of the preliminary activities is to identify and consolidate the contaminated material on the site, not to remediate to contamination levels allowing for the unrestricted release of the site. The plan for the second and final phase of decommissioning will be submitted in a Proposed Decommissioning Plan, to be submitted by Kerr-McGee at a later date. The Proposed Decommissioning Plan will describe the Phase 2 decommissioning activities, leading to the unrestricted release of the Cushing Site and the termination of License No. SNM-1999, and will include the information required by 10 CFR 70.38(c)(2)(iii)(c).

The Cushing Site is located halfway between Oklahoma City and Tulsa, two miles north of State Highway 18 and a half mile east of Deep Rock Road (Figure 1). Under Atomic Energy Commission (AEC) licenses SNM-695 and SMB-664, Kerr-McGee chemically processed enriched, normal, and depleted uranium and natural thorium at the Cushing Site from 1962 through 1966. The licensed activities were

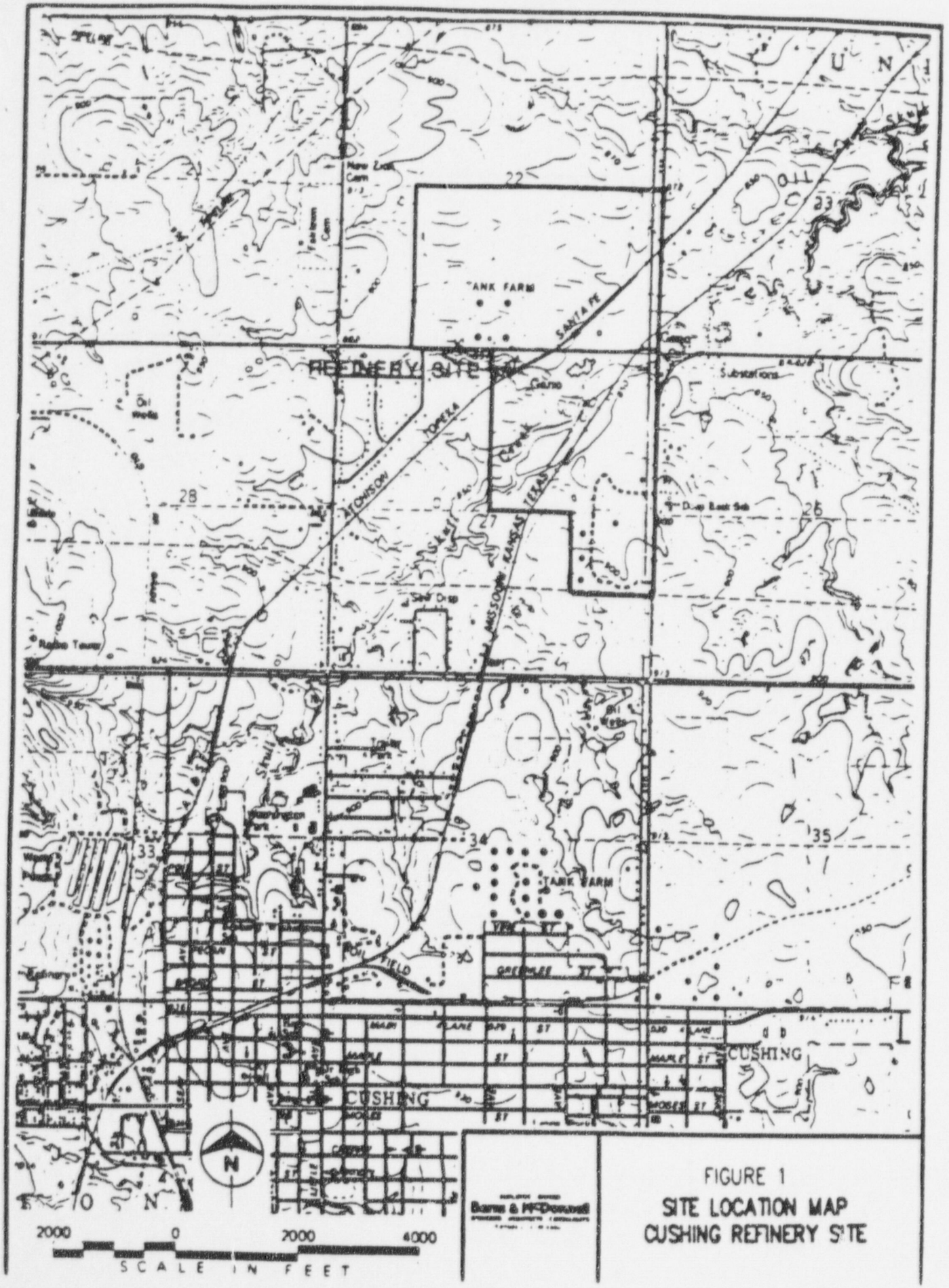

FIGURE 1

SITE LOCATION MAP

CUSHING REFINERY SITE

conducted on a Kerr-McGee owned site, approximately 400 acres in size, that was also the location of a Kerr-McGee oil refinery operation. Materials were received in the form of UF_6, mill concentrates, unirradiated scrap fuel elements, and various other chemical compounds. The licensee converted uranium to other compounds suitable for use in the nuclear fuel cycle and produced metal alloys of uranium and thorium.

In 1966, the site was decommissioned, in accordance with practices at the time, and the license was terminated. Between 1972 and 1982, Kerr-McGee further decontaminated the site by shipping the more highly radioactive materials off site, and disposing of unknown quantities of contaminated soils and trash in an existing refinery sludge pit (Pit 4), in trenches located in the northeast corner of the site, and in inactive tank berms in the northwest portion of the site. This contaminated soil and trash currently remains at the original disposal locations in concentrations exceeding Option 1 of the Branch Technical Position (BTP) on "Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations" (46 FR 52061). There are also areas of contamination, exceeding BTP Option 1 limits, around and under the former uranium processing building on the Cushing Site and in the soils and sediments of Skull Creek, which was a discharge point for effluent from the uranium processing facility (see Figure 2).

The staff reviewed the proposed remediation and disposal activities. The staff also reviewed the organization responsible for radiation safety at the Cushing Site, the qualifications of individuals assigned to key positions in the organization, the training program, the radiation safety program, the waste management program, and the SNM safeguards procedures.

2. PROPOSED DECONTAMINATION AND DISPOSAL ACTIVITIES

The primary purpose for this license is to authorize the possession of the uranium and thorium on the Cushing Site. The license covers all uranium and thorium present as contamination in concentrations or surface contamination levels exceeding natural background. Kerr-McGee also seeks approval to conduct a number of preliminary remediation activities, which are listed below:

1. excavation of contaminated soil, sediment, and trash;

2. sorting the excavated material by concentration level and oil content;

3. disposal of excavated material with concentrations of uranium and thorium in excess of BTP Option 2 limits, and oil and grease content less than 3 percent, at a licensed low-level waste facility;

4. consolidation of the remaining excavated material at approved temporary storage areas on the Cushing Site;

5. decontamination of the former uranium processing building;

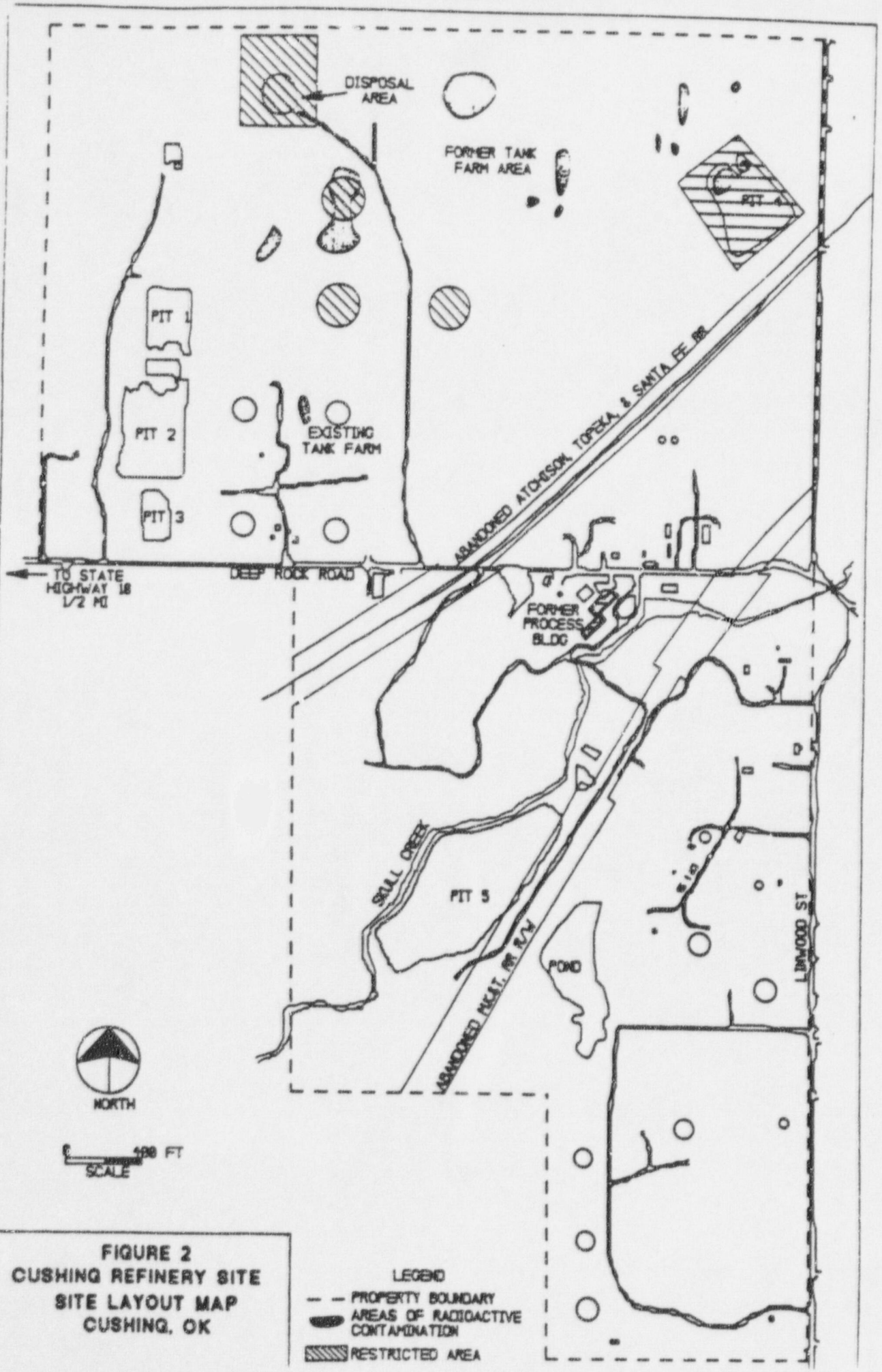

FIGURE 2
CUSHING REFINERY SITE
SITE LAYOUT MAP
CUSHING, OK

6. demolition of structures when contamination cannot be removed from structures in place or is shown to be in soils under structures; and

7. neutralization of the acidic contaminated sludge in Pit 4.

The purpose of the proposed preliminary remediation activities is to: 1) identify all areas on the Cushing Site that contain uranium and thorium in concentration levels above natural background; 2) excavate from the identified areas those materials that contain radioactivity in excess of NRC unrestricted release limits; and 3) consolidate the excavated material at designated temporary onsite storage areas or ship the material to a licensed low-level waste disposal facility. The final disposition of the uranium and thorium to be consolidated in the temporary storage areas will be proposed in a decommissioning plan, which Kerr-McGee has committed to submit at later date. The decommissioning plan will describe the procedures for completing the decommissioning and releasing the Cushing Site for unrestricted use. To ensure the timely completion of Cushing Site decommissioning, the staff recommends the following license condition:

CONDITION 1 Kerr-McGee shall submit, by license amendment request, before February 1, 1993, a decommissioning plan for the Cushing Site, meeting the requirements of 10 CFR 70.38(c)(2)(iii).

Excavation of contaminated soil, sludge, sediment, trash, and building rubble will be accomplished using typical earth-moving equipment. Excavation equipment will be selected based on the size and relative dimensions of the contaminated area. The generation of airborne radioactivity will be minimized and controlled, during excavation and movement of contaminated soil, through the use of water sprays, foams, wetting agents, and dust suppressors, as required.

Kerr-McGee proposes to sort the excavated contaminated material according to the concentration of uranium, thorium, and oil in the material, and either ship the material to an approved low-level waste disposal facility or transfer the material to one of three temporary storage areas. However, the sorting procedure outlined in the application is not described in sufficient detail for the staff to evaluate if the procedure is as low as is reasonably achievable (ALARA), i.e., that during excavation and placement in the storage areas significant volumes of material containing greater than BTP Option 2 concentrations of uranium and thorium are not mixed with material containing less than BTP Option 2 concentrations of uranium and thorium. Therefore, the staff recommends the following license condition:

CONDITION 2 Prior to transferring contaminated material to the temporary storage areas, Kerr-McGee shall submit, by license amendment request, a detailed description of the measurement procedures to be used to control the sorting and transfer of the contaminated material.

Three former petroleum storage tank pads, located north of Deep Rock Road on the Cushing Site, will be used to temporarily stockpile the excavated contaminated material not shipped to a disposal facility. The tank pads will be upgraded by constructing a three-foot-high berm around each pad. Also, a fence will be

constructed around each storage area to restrict access. During sorting and stockpiling operations, wind dispersal of the contaminated soils placed in the storage areas will be controlled by either wetting or plastic sheeting. After sorting and stockpiling has been completed, vegetative covers will be established over the temporary storage areas to control wind dispersion until the final disposition of the material is decided.

The application does not include a description of the potential for flooding of and erosion from the temporary storage areas, which could lead to the release of contaminated water, and the methods to be employed to minimize flooding and erosion. Therefore, the staff recommend the following license condition:

CONDITION 3 Prior to transferring contaminated material to any of the three temporary storage areas, Kerr-McGee shall submit, by license amendment request, an analysis of the ability of the three temporary storage areas to effectively resist erosion by wind and water.

After excavation is completed in a given contaminated area, Kerr-McGee proposes to grid the area, perform exposure rate measurements, and collect soil samples to ensure that the area has been remediated to BTP Option 1 concentrations. The survey plan described is adequate for a "remediation" survey, which is a field survey method to determine if additional excavation is necessary before beginning a final termination survey of the area. The described survey plan is not acceptable as a final termination survey plan. The termination survey plan will be submitted with the decommissioning plan, in accordance with 10 CFR 70.38(c)(2)(iii)(c) or, if necessary, in a separate submittal for NRC approval.

The decontamination of the former uranium process building primarily involves scabling contaminated concrete using a steel-shot blasting machine. The machine is equipped with filters that essentially eliminate the release of airborne radioactivity. The remediation of the building also entails limited excavation of contaminated soil from underneath the building.

Kerr-McGee proposed two additional remediation activities: 1) demolition of structures when contamination cannot be removed from structures in place or is shown to be in soils under structures; and 2) neutralization of the acidic contaminated sludge in Pit 4. These two activities were not described in sufficient detail for the staff to complete a safety review. Therefore, the staff recommend the following license condition:

CONDITION 4 Prior to neutralizing the acidic contaminated sludge in Pit 4 or demolishing potentially contaminated structures Kerr-McGee shall submit, by license amendment request, a detailed description of the methods to be used.

In summary, the staff reviewed Kerr-McGee's proposed methods for completing the preliminary decommissioning activities to ensure that they can be carried out in accordance with NRC regulations and the ALARA principle. The proposed methods for remediating the process building, excavating contaminated soil, and transporting contaminated soil are adequately described in the application. The simple earth-moving techniques and equipment described have been successfully

applied during the remediation of other contaminated sites and are acceptable to NRC. However, as recommended in License Conditions 2, 3, and 4, additional submittals to NRC are required before Kerr-McGee may begin the excavation and transfer of contaminated materials to the temporary storage areas, the neutralization of acidic contaminated sludge, or the demolition of potentially contaminated structures.

3. ORGANIZATION AND QUALIFICATIONS

Figure 3 shows the proposed organization responsible for radiation safety at the Cushing Site. The Cushing Site organization includes several Kerr-McGee employees who are also employed by Cimarron Corporation, a Kerr-McGee subsidiary. The Cimarron Corporation is responsible for the remediation of the Cimarron facility, which entails similar actions as those proposed in the application. Figure 3 includes both the Cimarron and Cushing Site organizations to show which employees work in both organizations. The dotted line on the bottom of the chart shows that the proposed radiation safety officer (RSO) for the Cushing Site is also the RSO for the Cimarron facility.

The left-hand side of Figure 3 shows the Cushing Site management structure. The Project Manager for Cushing Site operations reports to the Vice President, Technology & Engineering Division, Operations Division. The Project Manager is responsible for overall project direction. The Site Coordinator, who reports to the Project Manager, is responsible for daily operations, including supervision of the RSO. The RSO is responsible for the conduct of the health physics and industrial safety programs, to include directing health physics technicians, conducting specified radiation surveillance, and training. The RSO reviews procedures to ensure that exposure limits will not be exceeded and monitors activities to ensure that exposures are maintained ALARA.

The RSO designated for the Cushing Site has over 23 years experience in nuclear operations and cleanup and has completed a radiation protection technology course. In addition to being RSO for the Cushing Site, he is also the Supervisor of Health Physics and Industrial Safety and RSO at the Cimarron facility. The activities carried out at the Cimarron facility are similar to those proposed in this application, and have been conducted under an NRC license. The Project Manager and Site Coordinator have no previous experience in radiation protection. However, both have completed a course in the principles of radiation safety. The Vice President, Technology & Engineering Division, Operations Division, has experience in uranium mining operations and the remediation of other radiologically contaminated sites.

In summary, the staff reviewed the proposed organization and concludes that the RSO is qualified to oversee radiation protection activities at the Cushing Site and that the organization is adequate to ensure, per 10 CFR 70.23, that licensed material will be used in accordance with NRC regulations.

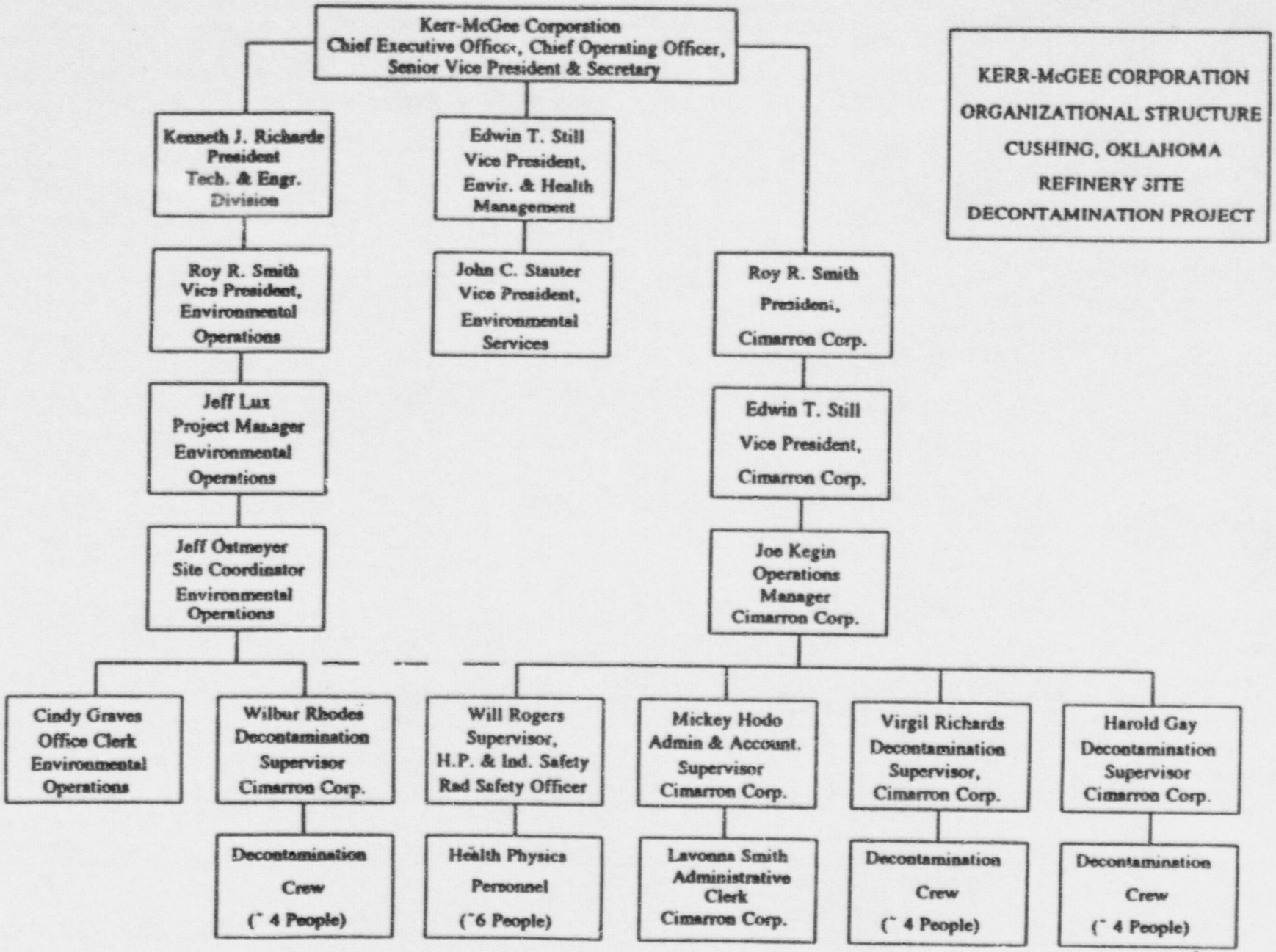
Kerr-McGee Corporation
Chief Executive Officer, Chief Operating Officer, Senior Vice President & Secretary
KERR-McGEE CORPORATION
ORGANIZATIONAL STRUCTURE
CUSHING, OKLAHOMA
REFINERY SITE
DECONTAMINATION PROJECT
Kenneth J. Richards
President
Tech. & Engr.
Division
Edwin T. Still
Vice President,
Envir. & Health
Management
Roy R. Smith
Vice President,
Environmental
Operations
John C. Stauter
Vice President,
Environmental
Services
Roy R. Smith
President,
Cimarron Corp.
Jeff Lux
Project Manager
Environmental
Operations
Edwin T. Still
Vice President,
Cimarron Corp.
Jeff Ostmeyer
Site Coordinator
Environmental
Operations
Joe Kegin
Operations
Manager
Cimarron Corp.
Cindy Graves
Office Clerk
Environmental
Operations
Wilbur Rhodes
Decontamination
Supervisor
Cimarron Corp.
Will Rogers
Supervisor,
H.P. & Ind. Safety
Rad Safety Officer
Mickey Hodo
Admin & Account.
Supervisor
Cimarron Corp.
Virgil Richards
Decontamination
Supervisor,
Cimarron Corp.
Harold Gay
Decontamination
Supervisor
Cimarron Corp.
Decontamination
Crew
(~ 4 People)
Health Physics
Personnel
(~6 People)
Lavonna Smith
Administrative
Clerk
Cimarron Corp.
Decontamination
Crew
(~ 4 People)
Decontamination
Crew
(~ 4 People)

FIGURE 3

3. RADIATION SAFETY TRAINING

Kerr-McGee proposes to require radiation safety training for workers and visitors who enter designated radioactive materials areas. Individuals who work independently with radioactive material are required to undergo an eight-hour Health and Safety indoctrination. These individuals are considered radiation workers. A brief two- to three-hour indoctrination will be given to new employees and contractors whose site activities are related to radioactive material and who will be under the supervision of an experienced radiation worker. Training will be conducted by the RSO or his designated representative.

The application lists the topics to be covered during the eight-hour Health and Safety indoctrination. The topics to be covered during the two- to three-hour indoctrination are not described in the application. The eight-hour indoctrination does not include all the topics listed in 10 CFR 19.12, "Instructions to Workers." The excluded topics are: 1) the precautions or procedures to minimize exposures; 2) the worker's responsibility to report promptly to the licensee any condition which may lead to or cause a violation of Commission regulations and licenses or unnecessary exposure to radiation or to radioactive material; and 3) the radiation exposure reports which workers may request pursuant to 10 CFR 19.12. Since 10 CFR 19.12 is not specifically called out in the application and the listed training topics do not include all of those required by 10 CFR 19.12, the staff recommends the following license condition to ensure that Kerr-McGee recognizes the requirements of 10 CFR 19.12:

CONDITION 5 Both the eight-hour and two- to three-hour health and safety indoctrinations described in Item 8 of the application shall include all of the topics described in 10 CFR 19.12.

After the initial eight-hour indoctrination, Kerr-McGee proposes to conduct annual training once per year. The annual training is more comprehensive than the eight-hour Health and Safety indoctrination and requires approximately 16 to 24 hours.

In summary, the staff reviewed the proposed radiation safety training program and found that the program, as described, does not comply with 10 CFR 19.12, "Instructions to Workers." Therefore, to ensure compliance, the staff recommends that License Condition No. 5 be incorporated into the license.

4. RADIATION SAFETY PROGRAM

a. Radioactive Material Areas

Kerr-McGee designates six areas on the Cushing Site as radioactive materials areas, in accordance with 10 CFR 20.203(e):

1. the former process building;

2. Pit 4;

3. the disposal area; and

4. the three temporary materials storage areas.

These areas are shown on Figure 2 as "radiation areas."

These areas require designation as radioactive materials areas since they contain, or will contain, at some time in the future, thorium in quantities exceeding 10,000 uCi or uranium-234 (U-234)/uranium-235 (U-235) (enriched uranium [EU]) in quantities exceeding 0.1 uCi. The staff assumes that the thorium at the Cushing Site is in secular equilibrium and classify it as "natural thorium" when determining compliance with NRC regulations. The uranium identified on the Cushing Site is assumed to be EU.

The staff's calculations indicate that several areas on the Cushing Site, other than the six identified above, contain uranium and thorium in quantities sufficient to require posting as radioactive materials areas. In addition, 10 CFR 20.207, "Storage and control of licensed materials in unrestricted areas," requires all licensed materials stored in an unrestricted area to be secured from unauthorized removal or be tended under constant surveillance. As stated above, all uranium and thorium present in concentrations or contamination levels in excess of natural background are considered licensed materials. The application does not describe how licensed materials that exist outside of the designated radioactive materials areas will be controlled.

To clarify the posting and control procedures for areas containing licensed material, the staff recommend the following license condition:

CONDITION 6 — Kerr-McGee shall submit, by license amendment request, before May 1, 1993, the proposed boundaries of all radioactive materials areas designated in accordance with 10 CFR 20.203(e)(2), restricted areas as defined in 10 CFR 20.3, and areas outside of restricted areas, where licensed materials exist which must be secured from unauthorized removal per 10 CFR 20.207.

b. Personnel Monitoring Devices

External occupational exposure is expected to be relatively low at the Cushing Site because of the low concentrations of the thorium and uranium present. Although exposure rates above 500 uR/hr, on contact, have been measured in limited areas of the trash disposal area, the average exposure rate, at one meter, in the contaminated areas is significantly less than 500 uR/hr. However, conservatively assuming that an individual works 2000 hours per year in contaminated areas with the maximum exposure rate of 500 uR/hr, the annual external exposure would be 1 rem/year, which is below the 5 rem whole body occupational exposure limit of 10 CFR 20.101.

Film badges will be used to monitor external occupational exposure. Radiation workers are required to wear film badges at all times while on the Cushing Site. Also, all individuals entering a radioactive materials area are required to wear film badges. The radiation worker's film badges are exchanged on a monthly basis. Film badges for visitors will be exchanged on a quarterly basis. All film badges will be processed by a contractor accredited under the National Voluntary Laboratory Accreditation Program, as required by 10 CFR 20.202(c)(1). Records of exposure will be kept on file.

c. Bioassays

Inhalation of resuspended airborne radioactivity is the primary pathway for internal occupational exposure during remediation and disposal activities at the Cushing Site. The licensee proposes to monitor and control the inhalation of airborne material primarily through air sampling. However, a bioassay program will be used to supplement the air sampling program.

The proposed bioassay program consists of urine sample collection and analysis, on a bi-monthly frequency, from workers who frequently work with radioactive materials. Fecal analysis will be conducted for thorium if air sample results indicate greater than 520 MPC-hrs in a quarter.

d. Surveys and Monitoring

Kerr-McGee proposes to survey personnel, material, and equipment for contamination before exiting radioactive materials areas and to monitor for airborne radioactivity.

Equipment used to excavate and move radioactive material will be stored in the confines of the radioactive materials area in which it is used, until it becomes necessary to remove the equipment for use in other areas. Kerr-McGee referenced the contamination limits listed in Appendix I to NUREG/CR-2082, "Monitoring for Compliance with Decommissioning Termination Survey Criteria," June 1981, as those to be used at the Cushing Site for unrestricted release of equipment and material. Appendix I to NUREG/CR-2082 presents an outdated version of the surface contamination limits listed in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," Policy and Guidance Directive 83-23, August 1987. To ensure that the most recent version of this document is used, the staff recommend the following license condition:

CONDITION 7 Notwithstanding statements in the application, the limits listed in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," Policy and Guidance Directive 83-23, August 1987, shall be used as the criteria for the unrestricted release of equipment, material, and personnel.

In the application, Kerr-McGee states that airborne radioactivity will be sampled to ensure that inhalation of airborne radioactivity remains below the limits in 10 CFR 20.103. At least 50 percent of the workers will be equipped with lapel

air samplers whenever contaminated soils are being excavated or handled. In addition, area air samples will be located near excavation, packaging, or materials handling areas where the potential for airborne resuspension exists. Lapel and air samples will be counted on a daily basis. Air sample results in excess of 50 percent of the maximum permissible concentration (MPC) listed in Appendix B, Table 1, will be evaluated to determine the conditions which caused the airborne radioactivity and what additional measures should be implemented to reduce the airborne concentration. If an air sample result exceeds 1.0 MPC work will not continue until corrective actions are taken.

The MPC for the most limiting material present (i.e., natural thorium) will be used to conservatively evaluate air sample results. If an elevated airborne concentration is measured, the isotopic content of the air sample may be determined to more accurately assess compliance with 10 CFR 20.103. For the purpose of demonstrating compliance with 10 CFR 20.103, Kerr-McGee assumed that the contamination at the Cushing Site is insoluble. The assumption of insolubility is acceptable for this purpose since it leads to the most conservative, i.e., lowest, MPC value. However, additional evaluation may be required to determine the solubility classification of the contamination for the purpose of compliance with other NRC requirements, such as the BTP.

e. Radiation Detection Instruments

Portable alpha and gamma radiation monitoring will be used to determine site activity and radiation levels. Table 5 of the application lists the instruments to be used for surveys and monitoring. The instruments are appropriate for the radiation types to be encountered at the Cushing Site and have minimum detectable activities well below the limits in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," Policy and Guidance Directive 83-23, August 1987.

The instruments are to be calibrated at the Kerr-McGee Corporation's Cimarron Facility on a quarterly basis. Instrument checks will be performed daily. If the instrument response varies by more than +/- 10 percent, it will be checked for electronic and radiological calibration. Logs for each instrument will be kept on file.

f. Radiation Safety Procedures

Kerr-McGee proposes to use a Special Work Permit (SWP) program to control remediation activities at the Cushing Site since the range of activities proposed, and the variety of radiological conditions expected to be encountered, vary between locations on the site. The SWPs will control the majority of excavation and handling of radioactive material at the Cushing Site by specifying the methods to be used in completing the activity, as well as the controls required to complete the task safely and maintain exposures ALARA. An SWP is required and must be completed before beginning work whenever a safety hazard is suspected to exist or could be created. Supervisory staff will generate the SWP and health physics personnel will review it. All workers assigned to an SWP activity are required to read and sign the SWP.

The application generally describes the SWP program. However, the application does not discuss the overall program for developing and maintaining radiation safety procedures. A procedure control program is necessary to ensure that the SWP program, as well as the procedures controlling activities such as waste management, respiratory protection, and radioanalysis, receives the proper level of Kerr-McGee management review. Therefore, the staff recommends the following license condition.

CONDITION 8 — All radiation protection program procedures shall, at a minimum, be approved by the RSO and either the Vice President, Environmental Operations, or the Vice President, Environmental & Health Management.

In addition, to ensure that all activities involving licensed material are controlled by a properly approved procedure, the staff recommends the following condition:

CONDITION 9 — All work in radioactive materials areas or restricted areas, or work with licensed material not located in radioactive materials or restricted areas, shall be in accordance with an approved radiation safety procedure.

h. Radioactivity in Effluent to Unrestricted Areas

Airborne radioactivity is the primary potential effluent from the proposed remediation activities. Small volumes of liquid effluent could possibly result from surface drainage of precipitation that becomes contaminated through contact with storage piles or other areas where surface contamination is present.

Although the probability of licensed material being released from the Cushing Site via runoff is currently low, the probability should become smaller as the proposed remediation activities proceed. The material that currently exists at several surface locations will be stockpiled in three temporary storage areas, which will be designed to contain runoff in dikes surrounding them. The staff will fully review the ability of the temporary storage areas to resist the effects of flooding and erosion when Kerr-McGee submits its analysis of these issues, as recommended by the staff in License Condition No. 3. As stated in License Condition No. 3, no licensed material will be transferred to the temporary storage area until the staff approves Kerr-McGee's submittal. Samples of water accumulated in the dikes surrounding the temporary storage areas will be analyzed before the water will be released to the environment. No discharges of water containing concentrations of radioactive material in excess of those allowed in 10 CFR 20.106 will be allowed. Until the contaminated material is stockpiled in the three storage areas, all areas containing surface contamination will be monitored and significant accumulated water sampled.

Airborne radioactivity may be generated during excavation of contaminated soil, the transfer of the soil to storage or packaging areas, and packaging of the soil. Smaller amounts of airborne radioactivity may also be generated during removal of contaminated concrete from building surfaces. Three high volume

environmental air samplers, permanently located downwind from radioactive materials areas, will monitor the release of airborne contaminants in unrestricted areas.

i. ALARA

In the application, Kerr-McGee commits corporate and operations management to maintaining radiation exposures ALARA. Health Physics staff will review SWPs to ensure that the methods employed are ALARA. The Kerr-McGee management commitment to ALARA is sufficient to meet the intent of 10 CFR 20.1(c), to make every reasonable effort to maintain exposures ALARA.

j. Summary

The staff reviewed the proposed radiation safety program including radioactive materials areas posting, personnel monitoring devices, bioassays, surveys and monitoring, radiation detection instruments, radiation safety procedures, effluent to unrestricted areas, and commitments to maintain exposures ALARA.

The staff's review found four deficiencies in Kerr-McGee's proposed radiation safety program and recommended License Condition Nos. 6 to 9 to correct the deficiencies. With these conditions, the staff concludes that, in accordance with 10 CFR 70.23, Kerr-McGee's proposed equipment and instrumentation and proposed radiation safety procedures are adequate to protect the health and safety of workers and the public.

5. WASTE MANAGEMENT

Contaminated soil that exceeds the BTP Option 2 limit for thorium or uranium, and other material contaminated in excess of NRC limits will be shipped to an approved offsite disposal site in accordance with 10 CFR Part 71. Department of Transportation Regulations are not referenced in the application. The waste will be collected and packaged in 55-gallon drums for disposal. Full drums will be temporarily stored in the former uranium process building, or in the transport trailer, until a full shipment is accumulated. The quantity of EU in each container destined for disposal will be determined. Records of the transfer of such material will be maintained in accordance with 10 CFR 70.51(b)(1)-(b)(6), regardless of EU content.

To ensure that all classification, transportation, and disposal requirements are met, the staff recommends the following license condition:

CONDITION 10 Wastes shall be classified and meet waste form requirements of 10 CFR Part 61, meet applicable disposal site license conditions, and meet Department of Transportation and 10 CFR Part 71 transportation requirements.

6. SNM SAFEGUARDS

The activities performed at the Cushing Site under the previous licenses involved uranium with various weight percentages of U-235. The application states that, based on analyses conducted to date by Kerr-McGee, the U-235 weight percentages in the uranium contamination currently at the Cushing Site range from 0.18 percent to 22 percent. However, independent samples collected and analyzed by an NRC contractor (Oak Ridge Associated Universities, January 24, 1991 letter to Tony Huffert, NRC) revealed enrichments of up to 43 percent in the trash disposal area in the northwest corner of the site.

Approximately 35,000 cubic feet of uranium contaminated soil and trash are located in the trash disposal area. Using the NRC contractor value, the uranium in this area is assumed to be enriched to 43 percent by weight. The former process building is estimated to contain 17,000 cubic feet of contaminated concrete, soils, and construction material, with up to 22 percent U-235 enrichment. The balance of the uranium on the site is in the form of contaminated soil and sediment. The uranium in this material is enriched in U-235 from 0.18 percent to approximately seven percent by weight.

The application proposes no physical protection procedures, as set forth in 10 CFR Part 73, for the EU at the Cushing Site. The EU is contained in matrices (soil, sediment, trash, and concrete) that preclude the recovery or separation of the EU. This has been demonstrated by Kerr-McGee in previous attempts to remove the EU, as well as the other source material present, from the matrices for the purpose of reducing waste volume required for disposal. The approaches attempted, including soil washing and chemical extraction, have not resulted in significant separation of the material from the matrices. In addition to not being suitable for recovery, the uranium contaminated wastes are acceptable for land disposal under 10 CFR Parts 20 and 61. Therefore, consistent with previous NRC positions, the staff agrees that the EU at the Cushing Site need not be afforded physical protection as set forth in 10 CFR Part 73.

Records of the transfer of SNM will be maintained in accordance with 10 CFR 70.51(b)(1) -(b)(6), regardless of EU content. Also, any theft, or attempted theft, of SNM that requires reporting under 10 CFR 70.52 (a), (b), and (c) will be made via commercial telephone system to the NRC Operations Center.

Kerr-McGee requested an exemption from the criticality accident requirements of 10 CFR 70.24 (a) and (b) as provided for in 10 CFR 70.24(d). The criticality analysis in the application concludes that the necessary factors for quantity, enrichment, geometry, moderation, reflection, and concentration leading to criticality cannot be met for the EU present at the Cushing Site. The staff agrees that the uranium concentrations in the soil do not appear to present potential criticality hazards and agree that an exemption from the requirements of 10 CFR 70.24 is appropriate.

The staff recommends the following license condition regarding SNM safeguards requirements:

CONDITION 11 Kerr-McGee is exempt from the physical protection requirements of 10 CFR 73 and the criticality accident requirements of 10 CFR 70.24.

In summary, the staff reviewed the proposed SNM safeguards procedures. Kerr-McGee requested exemption from the physical protection procedures, set forth in 10 CFR Part 73, for the EU at the Cushing Site. The EU is not suitable for recovery and the uranium contaminated wastes are acceptable for land disposal under 10 CFR Parts 20 and 61. Therefore, consistent with previous NRC positions, the staff agrees that the EU at the Cushing Site need not be afforded physical protection as set forth in 10 CFR Part 73. Kerr-McGee also requested an exemption from the criticality accident requirements of 10 CFR 70.24 (a) and (b) as provided for in 10 CFR 70.24(d). The staff agrees that the SNM concentrations at the Cushing Site do not appear to present potential criticality hazards and that an exemption from 10 CFR 70.24 is appropriate.

7. CONCLUSION

The staff reviewed the proposed decontamination and disposal activities. The staff also reviewed the organization responsible for radiation safety at the Cushing Site, the qualifications of individuals assigned to key positions in the organization, the training program, the radiation safety program, the waste management program, and the SNM safeguards procedures.

During the review of the application, the staff identified several deficiencies. To correct the deficiencies and ensure compliance with NRC regulations, the staff recommends that the 11 conditions described above be included in the license. With the 11 license conditions, the staff concludes that the SNM license to possess the uranium and thorium on the Cushing Site, and to perform limited preliminary remediation activities can be issued without undue risk to workers, the public, or the environment, and that the application meets the requirements for approval described in 10 CFR 70.23.

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