



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

July 5, 1972

James C. Malaro, Chief  
Materials Branch  
Directorate of Licensing

REVIEW OF GEOLOGIC PARAMETERS AND THEIR EVALUATION AT  
KERR MCGEE CORPORATION NO. 1 SEQUOYAH INJECTION WELL

I have reviewed the Kerr McGee application for approval to operate a deep disposal well at their Sequoyah, Oklahoma, facility and have the following comments:

The determination by field mapping, photograph interpretation, and drilling of the geological (stratigraphic, structural, lithologic, and hydrological) features of the area influenced by the proposed operation appears adequate for evaluation of the environmental impact.

The measurement of apparent density, porosity, and permeability by logging techniques, pressure injection tests, and core studies is considered reasonably accurate for the amount of physical investigation undertaken.

The statistical analysis by computer of assumed reservoir dimensions and characteristics appears adequate and to have considered all reasonably probable eventualities by assuming factors of change much larger than the observed ranges of variation.

The Arbuckle dolomite is concluded to contain reasonably safe ample permeable reservoirs isolated within a matrix effectively impermeable to normal ground waters or brines.

Exhibit A by Gruy and Associates evaluates the five reservoirs only for 5 years of operation. A migration maximum of 900 feet and pressure increase maximum of 161 psi are predicted for that period. However, 5 years is a very short time geologically to evaluate fluid movement even after injection ceases. Two boundaries were not identified.

Dolomite is chemically reactive, although less so than calcitic limestone. Exhibit G states that some waste raffinate will be neutralized before injection, but also states that acid raffinate will be added. No statements were noted regarding possible

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July 5, 1972

reactions between dolomite and acid raffinite. The Arbuckle formation waters were analyzed and described, but these are not expected to be chemically comparable to acid raffinite.

We concur that the earthquake hazard is relatively low.

The report could be supplemented by more data from injection tests on outlying wells to expand knowledge of the five reservoirs. However, the cost of obtaining this data may well be unreasonably high compared to the amount of change it would produce in the present understanding and evaluation of the reservoirs. The statistical assumptions are believed to have covered the extent of change that would probably result.

*John W. Gabelman*  
John W. Gabelman  
Staff Geologist  
Division of Production and  
Materials Management

PMG:JWG

Kerr-McGee - Sequoyah Facility

Docket No. 40-8027

File No. 1

September 23, 1969 - July 31, 1972

*Specie folder made up  
for all inspections*

## FINDINGS AND LICENSEE ACKNOWLEDGMENT

## 1. LICENSEE

Kerr-McGee Corporation  
Kerr-McGee Building  
Oklahoma City, Oklahoma 73102

## 2. REGIONAL OFFICE

U. S. ATOMIC ENERGY COMMISSION  
REGION IV, DIVISION OF COMPLIANCE  
10395 W. COLFAX, ROOM 200  
DENVER, COLORADO 80215

## 3. DOCKET NUMBER(S)

40-8027

## 4. LICENSE NUMBER(S)

SUB-1010

## 5. DATE OF INSPECTION

September 20, 21, &amp; 22, 1971

## 6. INSPECTION FINDINGS

The inspection was an examination of the activities conducted under your license as they relate to radiation safety and to compliance with the Commission's rules and regulations and the conditions of your license. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. The findings as a result of this inspection are as follows:

☒ No items of noncompliance or unsafe conditions were found.

The following items of noncompliance related to records, signs, and labels were found:

- ☐ A. Rooms or areas were not properly posted to indicate the presence of a RADIATION AREA. 10 CFR 20.203(b) or 34.42
- ☐ B. Rooms or areas were not properly posted to indicate the presence of a HIGH RADIATION AREA.  
10 CFR 20.203(c) (1) or 34.42
- ☐ C. Rooms or areas were not properly posted to indicate the presence of an AIRBORNE RADIOACTIVITY AREA.  
10 CFR 20.203(d)
- ☐ D. Rooms or areas were not properly posted to indicate the presence of RADIOACTIVE MATERIAL. 10 CFR 20.203(e)
- ☐ E. Containers were not properly labeled to indicate the presence of RADIOACTIVE MATERIAL.  
10 CFR 20.203(f) (1) or (f) (2)
- ☐ F. A current copy of 10 CFR 20, a copy of the license, or a copy of the operating procedures was not properly posted or made available. 10 CFR 20.206(b)
- ☐ G. Form AEC-3 was not properly posted. 10 CFR 20.206(c)
- ☐ H. Records of the radiation exposure of individuals were not properly maintained. 10 CFR 20.401(a) or 34.33(b)
- ☐ I. Records of surveys or disposals were not properly maintained. 10 CFR 20.401(b) or 34.43(d)
- ☐ J. Records of receipt, transfer, disposal, export or inventory of licensed material were not properly maintained.  
10 CFR 30.51, 40.61 or 70.51
- ☐ K. Records of leak tests were not maintained as prescribed in your license, or 10 CFR 34.25(c)
- ☐ L. Records of inventories were not maintained. 10 CFR 34.26
- ☐ M. Utilization logs were not maintained. 10 CFR 34.27
- ☐ N. Records of radiation survey instrument calibration were not maintained. 10 CFR 34.24
- ☐ O. Records of teletherapy electrical interlock tests were not maintained as prescribed in your license.
- ☐ P. Other \_\_\_\_\_

*James E. Hyder*  
(AEC Compliance Inspector)

7. The AEC Compliance Inspector has explained and understand the items of noncompliance listed above. The items of noncompliance will be corrected within the next 30 days.

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(Date)

(Licensee Representative - Title or Position)

ORIGINAL TO LICENSEE

*Docket File*

FEB 22 1971

40-8027

Kerr-McGee Corporation  
ATTN: Mr. Allen Valentine  
Coordinator, Radiation  
Health and Safety  
Kerr-McGee Building  
Oklahoma City, Oklahoma 73102

Gentlemen:

This will acknowledge receipt of your letter dated January 28, 1971, reporting the exposure of an individual to radioactive material at your Sequoyah plant. This matter will be examined during the next inspection of your facilities.

Very truly yours,

Lawrence D. Low, Director  
Division of Compliance

8507310363

*Docket File*

40-8027

FEB 17 1971

Kerr-McGee Corporation  
ATTN: Dr. Frank E. Pittman, Director  
Technical Services  
Nuclear Division  
Kerr-McGee Building  
Oklahoma City, Oklahoma 73102

Gentlemen:

Thank you for your letter dated February 5, 1971, in reply to our notice of January 11, 1971. The corrective actions taken by you regarding the items described in our January 11 notice will be examined during the next inspection.

Your cooperation with us is appreciated.

Very truly yours,

Lawrence D. Low, Director  
Division of Compliance

cc: Mr. Parker S. Dunn  
Vice President  
Nuclear Engineering

8507310358

40-8027

FEB 17 1971

Kerr-McGee Corporation  
ATTN: Dr. Frank E. Pittman, Director  
Technical Services  
Nuclear Division  
Kerr-McGee Building  
Oklahoma City, Oklahoma 73102

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Division of Compliance

cc: Mr. Parker S. Dunn  
Vice President  
Nuclear Engineering

bcc: PDR )  
NSIC )  
Docket Fidds) w/cpy ltr 2-5-71  
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**KERR-McGEE CORPORATION**

KERR-McGEE BUILDING • OKLAHOMA CITY, OKLAHOMA 73102

February 5, 1971

Mr. Lawrence D. Low  
Director, Division of Compliance  
United States Atomic Energy Commission  
Washington, D. C. 20545

Dear Mr. Low:

This is in reply to your letter of January 11, which referred to the compliance inspection conducted at the Sequoyah Facility on October 21, 22 and 23, 1970 of activities authorized under AEC Source Material License No. SUB-1010.

Corrective actions and the results achieved are reported on the items in your letter. Full compliance is achieved for all of the licensed activities.

- Item 1. Samples have been taken since plant startup of the hydrofluoric acid leaving the facility by truck to commercial firms. These samples have been analyzed and found to contain less than the concentration of radioactivity for U-natural as specified in the AEC Standards for Radiation Protection of Title 10, Part 20, Appendix B, Table II. A procedure change now requires the samples of these shipments to be analyzed prior to shipment.
- Item 2. Diffusion calculations have been made according to the methods described in the U. S. Public Health Service publication No. 999-AP-26, entitled, "Workbook of Atmospheric Dispersion Estimates". The results of these calculations are to be routinely used in determining sampling locations for the environmental surveys. An initial fixed air sampling station, located approximately 500 yards north of the facility, was placed into service on January 19 as part of the continuing environmental surveillance program.

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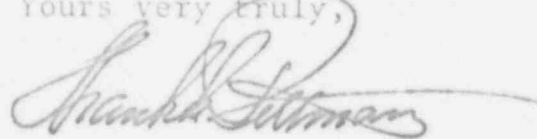


Mr. Lawrence D. Low  
February 5, 1971  
Page Two

- Item A. Analyses of the environmental water samples collected from May through October, 1970 have been completed since December 17, 1970. This program has now been improved and implemented to assure timely analysis and evaluation of results on a routine basis.
- Item B. As you suggested, we have re-evaluated our contamination control practices, and certain measures have been incorporated into the program to assure a more effective contamination control in the processing areas. Specifically, the control program has been strengthened by improved routine surveys of uranium spills and follow-up with more timely clean-up actions; requiring detailed reports by operations supervision on contamination incidents; more selectively periodic sampling in potential incident areas of the plant; and modification of the Hazardous Work Permit system to assure health physics coverage for maintenance activities.

Please let me hear if you have any further questions on the above matters.

Yours very truly,



Frank K. Pittman  
Director, Technical Services  
Nuclear Division

FKP:rc

*Docket Files*

40-8027

JAN 11 1971

Kerr-McGee Corporation  
ATTN: Mr. Parker S. Dunn  
Vice President  
Nuclear Engineering  
Kerr-McGee Building  
Oklahoma City, Oklahoma 73102

Gentlemen:

This refers to the inspection conducted at your Sequoyah facility on October 21, 22, and 23, 1970, of your activities authorized under AEC Source Material License No. SUB-1010. In addition, we wish to acknowledge receipt of a letter dated November 13, 1970, from Mr. A. M. Valentine reporting the exposure of personnel to radiation.

It appears that certain of your activities were not conducted in full compliance with a condition of your license and the requirements of the AEC's "Standards for Protection Against Radiation," Part 20, Title 10, Code of Federal Regulations, in that:

1. Contrary to 10 CFR 20.201(b), "Surveys," no surveys were made to evaluate the quantities of radioactive material contained in the hydrofluoric acid, which had been recovered from hydrofluorination beds, prior to releasing the acid to commercial firms during the period July 24, 1970 to October 19, 1970.
2. Contrary to License Condition No. 8 which incorporates the representations, specifications, and procedures contained in Appendix A of the September 23, 1969 application, diffusion calculations were not performed, as specified on Page A-11 of the Appendix, to determine the areas of maximum ground level concentrations where quarterly air samples at upwind and downwind locations from the plant should be taken. It was found that no such calculations had been made since the plant started operations in early 1970.

This notice is sent to you pursuant to the provisions of Section 2.201 of the AEC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations. Section 2.201 requires you to submit to this office within

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JAN 11 1971

twenty (20) days of your receipt of this notice, a written statement or explanation in reply including: (1) corrective steps which have been taken by you, and the results achieved; (2) corrective steps which will be taken; and (3) the date when full compliance will be achieved.

In addition to the items of noncompliance described above, we wish to point out other matters which we believe warrant your consideration:

- A. It was observed that Kerr-McGee did not promptly evaluate the environmental monitoring samples to determine whether the areas surrounding the plant were being contaminated by plant operations. The AEC inspector reported that while the company takes samples at various locations around and about the plant on a monthly and quarterly basis, the samples had not been analyzed since May 1970.
- B. During the inspection, the AEC inspector observed visible layers of uranium compounds on floors and equipment in the various processing areas. While steps had been initiated by Kerr-McGee to rectify the problem, it appears that the actions taken have not been adequate. In view of the foregoing, we believe that the company should re-evaluate its contamination control practices to improve their effectiveness in minimizing contamination in the processing areas.

Please provide us with your comments concerning the matters discussed above and the corrective steps taken or planned.

Kerr-McGee failed to make a timely report, pursuant to 10 CFR 20.405(a), with respect to the exposures of personnel to average weekly airborne concentrations of uranium in excess of AEC limits during July, August, and September 1970. In this regard, Mr. Valentine's written report of the exposures was not filed with the Commission until November 13, 1970. We understand that the company failed to make a prompt evaluation to determine whether these employees had, in fact, been exposed to airborne concentrations of radioactive material in excess of AEC limits during the months in question. It is necessary that Kerr-McGee take corrective steps to assure that such evaluations will, hereafter, be made promptly and that a timely report be sent to the Commission if the results of these evaluations indicate that an overexposure may have occurred.

Kerr-McGee Corporation

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JAN 11 1971

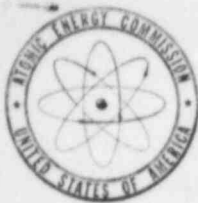
The AEC inspector reported that the organizational and functional responsibilities specified on Pages A-2 and A-3 of Appendix A to the application dated September 23, 1969 were revised on July 2, 1970. For purposes of keeping your licensing record accurate, you should send the revised pages to the Division of Materials Licensing.

Very truly yours,

Lawrence D. Low, Director  
Division of Compliance

cc: Dr. Frank Pittman  
Licensing and Regulation Officer

Mr. H. C. Eberline, Director  
Physical Science and Measurement Dept.



UNITED STATES  
ATOMIC ENERGY COMMISSION  
DIVISION OF COMPLIANCE, REGION IV  
10395 WEST COLFAX, ROOM 200  
DENVER, COLORADO 80215

10/12/6

December 1, 1970

Gen W. Roy, Chief  
Materials Inspection & Enforcement Branch  
Division of Compliance, HQ

KERR-McGEE CORPORATION, OKLAHOMA CITY, OKLAHOMA  
LICENSE NO. SUB-1010 (Docket No. 40-8027)  
INSPECTION CONDUCTED OCTOBER 21, 22, and 23, 1970

Transmitted herewith for enforcement action is the subject inspection report.

The major item of safety, which was noted and that requires more attention by management, is the failure to promptly clean up contamination after process difficulties have occurred and are corrected. It was apparent from the audits conducted by the Health and Safety Officer, Mr. A. M. Valentine, that he felt production was being maintained at the expense of health and safety. As noted in the report, the visible compounds of uranium in the process areas, on floors, pipes, and sides of vessels no doubt contributes to the chronic above-MPC air concentrations in the process areas. Management indicated that they were concerned about the problems that have occurred in plant equipment, and are currently trying to solve the problems such that the material will be retained within process vessels, and that, in the interim, additional effort will be made to decontaminate the aforementioned areas.

The citation for failure to follow the organizational structure, as required by the documents incorporated in License Condition No. 8, is a technical citation and the current change appears to have strengthened the health and safety aspects of the licensee's operations, since this function has been removed from a line-type organization. The licensee has upgraded the health physics program at the facility by replacing Mr. F. J. Edwards, and bringing in Mr. Douglas Sly, along with obtaining other qualified and experienced persons to provide health physics coverage on a full-shift basis.

As noted in the attached report, corrective action has been taken on the items noted during the previous inspection. Conditions resulting in evaluated overexposures to 11 employees in excess of the limits (up to 3 times MPC), if continued, presents a significant problem. However, the trend of airborne

(continued)

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December 1, 1970

concentrations in the restricted areas has shown a downward trend during the last 30 days of operation, and the licensee is devoting effort to improving the situation. No citation against failure of the licensee to submit reports of the exposures pursuant to 10 CFR 20.405 was made since the evaluations had been completed within the prior 30-day period. (The reports were submitted by letter dated November 13, 1970.)

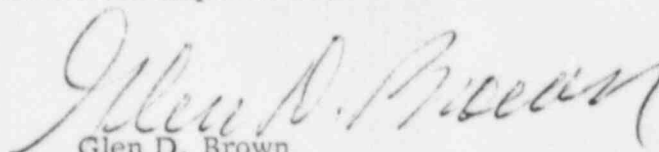
A citation was made against the use of unauthorized liquid waste retention systems, in view of the telegraphic exchange between the licensee and the DML, on July 7, and 9, respectively. However, the licensee's application, as originally submitted and approved, allows for the licensee to build an earthen dike retention system in accordance with AEC licensing criteria.

Failure to obtain timely analyses on environmental liquid samples defeats the purpose of taking the samples since it is possible that contamination of ground water could occur over a significant period of time and not be noticed.

Failure to determine the uranium content of the recovered HF acid that was shipped to customers for use in consumer products (aluminum wrapping foil) presented a potential hazard. Analytical results performed on the HF acid, subsequent to the inspection, showed a maximum concentration of  $2.6 \times 10^{-6} \text{Ci/ml}$  of uranium in the acid that had been shipped.

Although a citation for failure to take environmental air samples based on diffusion calculations, as required by Appendix A which is incorporated by License Condition No. 8, has been made, a diffusion calculation for the effluent, which is primarily particulate in nature, has little merit. However, the environmental sampling should be expanded to additional locations since the current two sampling locations may not necessarily represent the maximum concentration present in the unrestricted area.

In addition to addressing the enforcement letter to Mr. P. S. Dunn, Vice President, Nuclear Engineering, it is suggested that carbon copies be sent to Mr. Frank Pittman, Licensing and Regulation Officer, and Mr. H. C. Eberline, Director, Physical Science and Measurement Department.

  
Glen D. Brown  
Senior Radiation Specialist

Attachment:  
Form AEC-417 Inspection Report

cc: A. Giambusso, CO, w/attach.  
L. Kornblith, CO, w/attach.  
R. H. Engelken, CO, w/attach.