.ORADO
STATE environmental resources center
ERSITY
RT COLLINS
COLORADO
80521

September 29, 1972

Evaluation of Environmental Impact Analysis

Kerr-McGee Corporation Sequoyah Uranium Hexafluoride Plant

Part I Observations and Recommendations

OBSERVATION 1:

The material in Section I, pages 31-39, of the supplement indicates a good deal of knowledge about the geology in the vicinity of the plant. Geologic cross-sections through the plant area, and especially through the retention ponds, would be very useful, however, for the evaluation of whether or not monitor wells and observation holes are appropriately located. Cross sections would also assist in ascertaining the continuity of the clay and shale strata which are, apparently, being relied upon to cause any seepage to form a perched water table that can be detected (Sect. IV. C, p. 85 of Supplement).

RECOMMENDATION 1:

Construct cross-sections and contour maps which are adequate for ascertaining strata continuity and direction of any seepage.

OBSERVATION 2:

A description of the completion practices used for the monitoring

Part II

Supplementary Comments

From the standpoint of geology, hydrology, and erosion, the report is quite adequate except as noted in the foregoing observations. The general comments presented here are not directed toward Kerr-McGee in particular, but are meant to raise some general questions concerning the surveillance of tailing ponds, effluent-retention basins, etc.

It is realized that every effort is made to construct these ponds so that seepage does not occur. In the event seepage does occur, however, by what methods can it be detected is the central question. It is an important question because the liquids in the ponds often contain harmful and dangerous chemicals. The most common method of monitoring the ponds for seepage is by wells.

Seepage monitoring wells may not be effective for a variety of reasons. Among them are:

1. Improper location.
2. Results are masked by water from irrelevant sources.
3. Chemicals for which tests are made may not be mo'ile in a porous medium and, therefore, not indicative of seepage.
4. Seepage occurs at pressures less than atmospheric and, therefore, does not enter the monitoring wells.

Most of the above deficiencies, if recognized in advance, can be circumvented by carefully selecting the well locations (both vertical and horizontal location) and analyzing for the proper chemicals. Locating the wells so as to insure the detection of seepage requires a detailed knowledge of the horizontal and vertical distribution of both permeable and impermeable strata beneath and around the ponds. This can be determined only by drilling appropriate test holes on a closely spaced pattern.

Under certain geological conditions, monitoring wells will not detect seepage at all. This situation will occur if there is no impermeable layer upon which a perched water table can form or an already existing water table relatively near the surface.

Another item which would significantly improve the possibility of seepage detection in many cases is a monitor well sampling program designed to provide initial benchmark data against which changes can be measured once the ponds are in operation.

Radioactive Releases

A discrepancy in terminology on Page 80 of the Supplemental Report could lead to some confusion. The maximum downwind, or ground level, concentration occurs when XU/Q is maximum, implying minimum dispersion. In line 6 (p. 80), the word "minimum" should be replaced by "maximum." Also, all of the column headings for Table XXIII should say "maximum" rather than "minimum."

The rather lengthy discussion of natural radiation sources (pp. 98-101) is of questionable accuracy and undocumented. However, it is of little significance to the total report and, therefore, could just as well be omitted.

The following notes relate to estimates of release:

Table XII (p. 65): the design criteria were for no discharge of radionuclides.

Tables XIX (p. 75) and XXI (p. 77): these tables give air sampling data indicating the release of some uranium by gross alpha analyses. The highest twelve-month average was 5×10^{-14} µCi/ml at 1000 ft. to the north.

Table XXII (pp. 78-78a): shows vegetation sampling data which seems to confirm the atmospheric release of some uranium, particularly to the south.

Table XXVII (p. 96): presents calculated maximum annual individual doses from inhaled, soluble uranium. The figures were taken directly from the Dames and Moore report (App. IV). The calculated values predict the maximum dose to occur between 0 and 1 mile in the southwest sector.

The methods used by Dames and Moore for making the dose calculations are generally accepted and appear to be completely valid. The only way to determine whether or not all of their data and results are correct would be to repeat the calculations; however, this has not been done since the results appear reasonable and are completely consistent within the report and the appendix.

Health and Social

As complete as the Sequoyah Reports were, two considerations curiously escaped mention. One concerns the availability in the general area of medical facilities and personnel trained for emergency treatment of human radiation contamination. Given the proximity of the facility to several metropolitan areas and medical schools, one would assume that such presents no special problem. The other curious ommission was no reference to the concentration of Indians in the immediate area. Presumably, the operation will disturb no site of archaeological significance. Since no mention of the composition of the labor force was made, we should assume that a reasonable proportion of the work force at the Sequoyah plant is Native American, and that their cultural integrity is respected. In the event that either is not the case, the company should realize that it is in both governmental and public relations jeopardy.

COLORADO
STATE UNIVERSITY environmental resources center
FORT COLLINS
COLORADO
80521

September 29, 1972

Evaluation of Environmental Impact Analysis

Kerr-McGee Corporation Sequoyah Uranium Hexafluoride Plant

Part I
Observations and Recommendations

OBSERVATION 1:

The material in Section I, pages 31-39, of the supplement indicates a good deal of knowledge about the geology in the vicinity of the plant. Geologic cross-sections through the plant area, and especially through the retention ponds, would be very useful, however, for the evaluation of whether or not monitor wells and observation holes are appropriately located. Cross sections would also assist in ascertaining the continuity of the clay and shale strata which are, apparently, being relied upon to cause any seepage to form a perched water table that can be detected (Sect. IV. C, p. 85 of Supplement).

RECOMMENDATION 1:

Construct cross-sections and contour maps which are adequate for ascertaining strata continuity and direction of any seepage.

OBSERVATION 2:

A description of the completion practices used for the monitoring wells (Sect. V, p. 32, Rev. Rep. and Sect. IV. B, p. 67, Supplement) is lacking. It is not apparent how deep the wells were drilled, which strata they penetrate, from which geologic zones water can enter the well, etc. This kind of data is required if one is to evaluate whether or not seepage or water from some other source is being monitored.

RECOMMENDATION 2:

Provide detailed data on the characteristics of the monitor wells and a statement as to their effectiveness as seepage monitors.

OBSERVATION 3:

It was noted that the report lacked any specific data about the water table (or piezometric surface) in the Atoka formation and in the alluvial sediments that could be correlated with geologic strata elevations and/or land surface. This information would be very helpful in assessing the effectiveness of the monitor wells and the sources of contamination, should contamination occur in the future.

RECOMMENDATION 3:

Prepare water table (or piezometric surface) contour maps and establish the direction of water movement (if any) in the vicinity of the plant. Available test holes and monitor wells will likely provide sufficient data.

Part II
Supplementary Comments

From the standpoint of geology, hydrology, and erosion, the report is quite adequate except as noted in the foregoing observations. The general comments presented here are not directed toward Kerr-McGee in particular, but are meant to raise some general questions concerning the surveillance of tailing ponds, effluent-retention basins, etc.

It is realized that every effort is made to construct these ponds so that seepage does not occur. In the event seepage does occur, however, by what methods can it be detected is the central question. It is an important question because the liquids in the ponds often contain harmful and dangerous chemicals. The most common method of monitoring the ponds for seepage is by wells.

Seepage monitoring wells may not be effective for a variety of reasons. Among them are:

1. improper location.
2. Results are masked by water from irrelevant sources.
3. Chemicals for which tests are made may not be mobile in a porous medium and, therefore, not indicative of seepage.
4. Seepage occurs at pressures less than atmospheric and, therefore, does not enter the monitoring wells.

Most of the above deficiencies, if recognized in advance, can be circumvented by carefully selecting the well locations (both vertical and horizontal location) and analyzing for the proper chemicals. Locating the wells so as to insure the detection of seepage requires a detailed knowledge of the horizontal and vertical distribution of both permeable and impermeable strata beneath and around the ponds. This can be determined only by drilling appropriate test holes on a closely spaced pattern.

Under certain geological conditions, monitoring wells will not detect seepage at all. This situation will occur if there is no impermeable layer upon which a perched water table can form or an already existing water table relatively near the surface.

Another item which would significantly improve the possibility of seepage detection in many cases is a monitor well sampling program designed to provide initial benchmark data against which changes can be measured once the ponds are in operation.

Radioactive Releases

A discrepancy in terminology on Page 80 of the Supplemental Report could lead to some confusion. The maximum downwind, or ground level concentration occurs when XU/Q is maximum, implying minimum dispersion. In line 6 (p. 80), the word "minimum" should be replaced by "maximum." Also, all of the column headings for Table XXIII should say "maximum" rather than "minimum."

The rather lengthy discussion of natural radiation sources (pp. 98-101) is of questionable accuracy and undocumented. However, it is of little significance to the total report and, therefore, could just as well be omitted.

The following notes relate to estimates of release:

Table XII (p. 65): the design criteria were for no discharge of radionuclides.

Tables XIX (p. 75) and XXI (p. 77): these tables give air sampling data indicating the release of some uranium by gross alpha analyses. The highest twelve-month average was 5 x 10-14 µCi/ml at 1000 ft. to the north.

Table XXII (pp. 78-78a): shows vegetation sampling data which seems to confirm the atmospheric release of some uranium, particularly to the south.

Table XXVII (p. 96): presents calculated maximum annual individual doses from inhaled, soluble uranium. The figures were taken directly from the Dames and Moore report (App. IV). The calculated values predict the maximum dose to occur between 0 and 1 mile in the southwest sector.

The methods used by Dames and Moore for making the dose calculations are generally accepted and appear to be completely valid. The only way to determine whether or not all of their data and results are correct would be to repeat the calculations; however, this has not been done since the results appear reasonable and are completely consistent within the report and the appendix.

Health and Social

As complete as the Sequoyah Reports were, two considerations curiously escaped mention. One concerns the availability in the general area of medical facilities and personnel trained for emergency treatment of human radiation contamination. Given the proximity of the facility to several metropolitan areas and medical schools, one would assume that such presents no special problem. The other curious ommission was no reference to the concentration of Indians in the immediate area. Presumably, the operation will disturb no site of archaeological significance. Since no mention of the composition of the labor force was made, we should assume that a reasonable proportion of the work force at the Sequoyah plant is Native American, and that their cultural integrity is respected. In the event that either is not the case, the company should realize that it is in both governmental and public relations jeopardy.

FROM: U.S. Department of Commerce Silver Spring, Md. Mr. I. Van der Hoven	DATE OF DOCUMENT: Sept. 25, 1972	DATE RECEIVED: Sept. 27, 1972	NO.: 5315
	LTR. x MEMO:	REPORT:	OTHER:
TO: J.E. Rothfleish, DL	ORIG.: 1 CC:	OTHER:	
	ACTION NECESSARY ☐ NO ACTION NECESSARY ☐	CONCURRENCE ☐ COMMENT ☐	DATE ANSWERED: BY:
CLASSIF: U POST OFFICE REG. NO:	FILE CODE: Docket No. 70-8027		

DESCRIPTION: (Must Be Unclassified)	REFERRED TO	DATE	RECEIVED BY	DATE
Ltr. responds to req. of 8-24-72 for comments on the Kerr-McGee Corporation "Applicant's Environment Report"..........	Buchanan: w/2 cys--FOR ACTION	9-27		
ENCLOSURES: ACKNOWLEDGED DO NOT REMOVE	Distribution 1-Environmental File 1-AEC PDR 1-Local Library 2-RO 4-L. Rouse, L:TS 1-J. Shafer; L:TS 1-R. Cunningham, DL 1-S. Smiley, DL			
REMARKS:			5315	df

U.S. ATOMIC ENERGY COMMISSION MAIL CONTROL FORM FORM AEC-326S (8-60)

☆ U.S. GOVERNMENT PRINTING OFFICE : 1971-424-062

U.S. DEPARTMENT OF COMMERCE Environmental File
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES
Silver Spring, Maryland 20910

September 25, 1972

R323

DOCKET NO. 40-8027

Mr. J. E. Rothfleish
Materials Branch, Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Rothfleish:

In reply to your request of August 24, 1972, the following are comments on the Kerr-McGee Corporation "Applicant's Environmental Report", November 1971 (Revised) and June 1972 (Supplemental).

It is our understanding that any effluents released to the free atmosphere will be through either a 150-ft stack or through roof-top vents. The former we would consider an elevated release taking into account the effective stack height as a result of plume rise and the latter a ground source taking into account the additional dilution because of the building wake effect.

The environmental surveillance program, and in particular, the four air samplers located at a radius of 1000 feet, appears to be wholly inadequate for the job intended; that is, effluent control to acceptable levels. For elevated releases, the maximum concentration, except in the case of very unstable vertical temperature profiles, will be well beyond 1000 feet downwind and thus not detectable by the air samplers. For ground sources, a large portion of the time the plume would go undetected because of a trajectory between samplers.

The applicant, in the gas dispersion calculations in table XXIII (page 80) and in the Appendix IV (Sequoyah Stack Diffusion Calculations - pages 1-7), has a completely erroneous analysis of what is meant to be an annual average dispersion estimate. The criterion taken from the proposed AEC "License Requirements for Measuring and Reporting of Effluents" applies to an annual or long-term average and, as such, should be used in the long-term modification of the gaussian diffusion equation as correctly stated in equation 6, page 5 of the Dames and Moore report in Appendix IV. The applicant used the short-term (about 1 hr average) equation as is obvious from the 3.55×10^{-5} value in table XXIII and as is shown on page 1 of the Sequoyah Stack Diffusion Calculations (first part of Appendix IV). It would seem that the applicant is not aware that what he calculated incorrectly was correctly done in the Dames and Moore Report.

8510010309 2pp

5315

The labeling of table XXIII is very much in error. All "minimum" labels should read "maximum"; the maximum χ/Q value for Condition A should be at a distance of 1000 feet, not 1800 feet; Conditions A through F should be labeled short-term concentrations; and the last line (1/3C, 1/3D and 1/3F) should be labeled long-term concentration. All values apply to the elevated release.

We are in agreement with the Dames and Moore analysis in Appendix IV. The Fort Smith wind data show a prevailing wind from the east as do the site data and therefore the diffusion analysis of the former is appropriately applied to the site. In comparison, the maximum concentration for an elevated release computed by Dames and Moore is 5×10^{-7} sec m^{-3} towards the WSW at a distance of 805 m, while the applicant lists 3.55×10^{-5} on page 80 and 3.35×10^{-5} sec m^{-3} on page 6, Appendix IV. This is a factor of 100 higher (more conservative) than the Dames and Moore values.

We do not understand what the applicant means on page 29 of the November 1971 report in the discussion on maximum exposure to airborne concentrations, assuming 100 percent deposition. If the latter is true, the airborne cloud would be completely depleted; that is, the material would be on the ground rather than in the air.

Si cerely yours,

I. Van der Hoven

I. Van der Hoven, Chief
Air Resources Environmental Lab.
Air Resources Laboratories