KERR-McGEE OIL INDUSTRIES, INC.

Kerr-McGee Building • Oklahoma City 2, Oklahoma

January 4, 1965

Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Re: DML:DFH 40-7236
File Copy

Dear Sir:

In further support of our application number DML:DFH: 40-7236, dated October 28, 1964 concerning our lignite operations in North Dakota, we submit the following answers to your itemed questions in your letter of November 27, 1964:

Item 1 - A MORE DETAILED DESCRIPTION OF YOUR ORE SAMPLING PROCEDURES.

The ore is sampled directly from the ore trucks as they set on the scale at the plant after being weighed. The sampling procedure consists of auger sampling the ore in the truck from the top to the bottom at numerous points throughout the load. The sample is collected in a special pan designed with a center hole for passage of the auger and immediately transferred into a covered container for transport into the sample preparation area.

These phases of taking the ore sample are done outdoors in the open. Subsequent sample preparation takes place indoors under a hood. No sample tower is involved. All samples are taken by hand.

Item 2 - A MORE DETAILED JUSTIFICATION FOR NOT CONDUCTING ENVIRONMENTAL AIRBORNE RADIOACTIVITY SAMPLES WITH EMPHASIS ON YOUR PROCEDURES FOR DETERMINING THE LOCATION OF MAXIMUM OFF-SITE CONCENTRATIONS.

Stack concentrations at the Bowman Plant have varied from 25 to 100 times the M.P.C. The variables controlling the amount of radioactivity in the stack effluent are ore feed grade, concentration of dust, and volume of flue gas. The effect of variations in grade of the feed is expected to result in a maximum increase of not more than 30 per cent. The effect of variations in the concentration of dust in the off gas during normal operation is expected to be nil because of the nature of the ore feed and the efficiency of the dust collectors. The effect of variation in volume of flue gas is expected to result

in a maximum increase of no more than 200 per cent. Thus, concentrations in the flue gas are not expected to exceed an average of 210 times the limit.

Using the Bosanquet and Pearson equation for determining concentrations resulting from an elevated source to calculate a theoretical concentration in the stack effluent necessary to result in a maximum concentration at ground level of one M. P. C. yields a number 525 times the limit.

During six years of sampling at the Grants, New Mexico uranium plant, the concentration of radioactivity in stack effluent has varied from 200 to 760 times the M. P. C. and the concentration at ground level down wind from the stack has never exceeded the M. P. C. This includes results from down wind environmental air samples that have been taken at horizontal distances ranging from 100 feet to 1.5 miles from the base of the stack and at times when wind velocities have been as low as 5 miles per hour and as high as 25 miles per hour.

In summary, years of sampling at the Grants facility where the concentration in the stack effluent is over 7 times greater than at Bowman, point out that there will be no concentrations in environmental air in excess of the limit.

The location of the maximum concentration has been determined by three methods:

1. Moving away from the stack crosswind and observing the point or points where the plume touches the ground.

2. Sampling the environmental air down wind from the stacks at various horizontal distances from the base of the stack and evaluating the assay results.

3. Calculating the horizontal distance from the base of the stack to the point of maximum concentration using the equation based upon Bosanquet and Pearson's theory for elevated sources.

The three methods agree quite well.

The lignite ore and lignite calcine at the Bowman, North Dakota, plant are not in secular equilibrium, but rather contain significantly less activity from radium 226 and thorium 230 than from natural uranium. This condition of non-secular equilibrium with low activity from radium and thorium permits a higher concentration of uranium while still remaining within the 10CFR 20 limits.

Relative to the conducting of environmental airborne radioactivity samples, we here propose to collect environmental air samples semi-annually.

Item 3 - A MORE DETAILED JUSTIFICATION FOR CONDUCTING YOUR AIRBORNE RADIOACTIVITY SURVEY PROGRAM ON A SEMI-ANNUAL BASIS.

These 157 samples were collected over a period of two weeks, one week in July and one week in October. Variations in ore grade occurring during these periods resulted in fluctuation in the grade of the lignite calcine product from below the average of 0.66% U_3O_8 to 0.88% U_3O_8. Only two lots have assayed higher than 0.88% U_3O_8. The highest assaying 0.92%. Thus, the sampling has been conducted in such a manner that the samples do reflect the effect of variations in the uranium content of the ore.

Relative to the frequency of in-plant airborne radioactivity surveys, we here propose to conduct such sampling on a quarterly basis.

Very truly yours,

M. F. Bolton
Vice President