DOCKET NO. 40-8027

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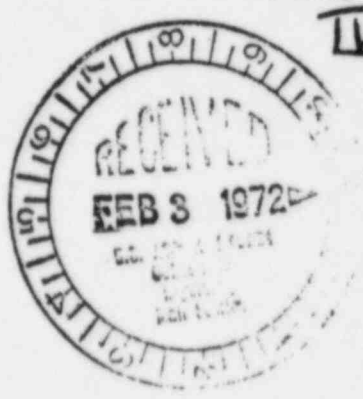
Ecc Div of Compliance

IV

January 31, 1972



Mr. C. R. Buchanan
Division of Material Licensing
U.S. Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Buchanan:

This information supplements data previously submitted in my letter dated January 21, 1972, and is in regard to the "Show Cause" statement for our Sequoyah Plant.

1. As you requested on January 14, vegetation samples were collected at 1000 foot intervals from the plant in the same direction and starting at the air sampling stations located 1000 feet from the plant fence. Duplicate samples collected at these locations, along with two (2) single samples at the plant security fence line, were analyzed for fluoride by two independent commercial laboratories designated as Lab A and Lab B, hereafter. Results reported on January 21 were from Lab A. Results from Lab B were reported by telephone on January 24 and all results received to date are reported below:

		Lab A	Lab B
West	No. 1	14.3 ppm	19.8 ppm
	No. 2	4.0 ppm	10.5 ppm
North	No. 1	5.4 ppm	<1.0 ppm
	No. 2	8.3 ppm	8.1 ppm
South	No. 1	5.5 ppm	4.2 ppm
	No. 2	4.4 ppm	6.6 ppm
	No. 3	8.7 ppm	12.9 ppm
East	No. 1	8.8 ppm	11.1 ppm
	No. 2	10.3 ppm	9.0 ppm
	No. 3	83.7 ppm	<1.0 ppm
	No. 4	18.9 ppm	14.4 ppm
Fence Line			
	North		6.4 ppm
	South		3.6 ppm

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All results are on the basis of micrograms of fluoride per gram of dried sample. We have concluded that sample No. 3 East analyzed by Lab A was contaminated and, therefore, should not cause undue concern. To confirm this, additional vegetation samples have been collected at the location and in the immediate vicinity. They are being analyzed for fluoride content by Lab B and will be reported when received.

Livestock are grazed adjacent to the Sequoyah Plant on an intermittent basis. Based upon comparison of the level of fluoride shown in the data listed above and recent references, it is concluded that no threat to grazing cattle results from measured fluoride levels surrounding the Sequoyah Plant. Safe fluoride levels for forage for the State of Washington have been established by the Department of Ecology, Chapter 18-48 WAC, "Fluoride Standards", effective February 4, 1971, and discussed in "AIR POLLUTION, Second Edition, Arthur C. Stern, Academic Press, New York, 1968," pages 528-530. These references state that 40 ppm fluoride ion is acceptable for total ration of all types of foraging livestock.

2. NO_2 effluent, reported as being measured at 24.1 lbs/hour in my letter of January 21, is calculated to be 170 ppm at the stack discharge, 150 feet above ground level. Based upon a volume of 25,000 cfm, the current engineering estimate of stack discharge with two boilers operating, estimates of ground level concentration have been made and are attached as Appendix A. We have used this calculation of volume rather than those included in our license application which were made from design calculations prior to installation. When a sampling system for the stack has been designed and installed, we will determine this exact number.

   As shown on Table 1 of Appendix A, calculated NO_2 concentrations range from 0.009 to 0.041 ppm with varying distances and conditions from the stack. In seeking recognized reference data to which this evaluation can be compared, we find nothing reported at levels this low. Study of the "Air Quality Criteria for Nitrogen Oxides", published by the Environmental Protection Agency, January, 1971, revealed that the average levels of NO_2 over the entire continent may be .004 ppm (4 ppb). Peak urban concentrations vary with

presence of carbon and photosynthesis but generally measure less than .5 ppm. Initial effects on vegetation are not measured until .25 ppm. No irreversible symptom of poisoning has resulted in animals or man from exposures up to .5 ppm. Stern (see reference above) reports visibility at .25 ppm in a horizontal layer above geographical areas and California has adopted this level as an air quality standard. Further, Stern reports odor detection at .5-3 ppm and detectable symptoms at 20 ppm with no plant damage below .25 ppm.

From comparisons of the calculated data to these references, we conclude that the NO_2 levels resulting from operation of the Sequoyah Plant do not pose an environmental hazard.

We believe that we have complied with your request. However, if you have additional questions, please call.

Very truly yours,

W. J. Shelley
Director, Regulation and Control
Nuclear Operations Division

WJS:srj
Attachment

APPENDIX A

ESTIMATES OF NO_2 STACK CONCENTRATIONS AND MAXIMUM DOWNWIND NO_2 CONCENTRATIONS

1. Stack Concentration: The NO_2 concentration in ppm was determined by calculating the fraction of NO_2 in the total stack gas stream:

$$C_s = \frac{Q}{V} \qquad \text{Given: } \begin{matrix} Q = 24.1 \text{ lbs/hr} \\ V = 2.5\times10^4 \text{ cfm} \end{matrix}$$

a. To get R in units of M^3/sec:

$$Q = \frac{24.1\left(\frac{\text{lbs}}{\text{hr}}\right) \times 453\left(\frac{\text{gm-mole}}{\text{lb-mole}}\right) \times 2.24\times10^{-2}\left(\frac{M^3}{\text{gm-mole}}\right)}{3.6\times10^3\left(\frac{\text{sec}}{\text{hr}}\right) \times 46\left(\frac{\text{lbs}}{\text{lb-mole}}\right)} = 1.4\times10^{-3}\ \frac{M^3_{NO_2}}{\text{sec}}$$

b. To get V in units of M^3/sec:

$$V = 2.5\times10^4\left(\frac{ft^3}{\text{min}}\right) \times 2\times10^{-2}\left(\frac{M^3}{ft^3}\right) \times \frac{1}{60}\left(\frac{\text{min}}{\text{sec}}\right) = .83 \times 10 = 8.3\ M^3/\text{sec}$$

c. NO_2 concentration at point of discharge

$$C_s = \frac{R}{U} = \frac{1.4\times10^{-3}\left(\frac{M^3_{NO_2}}{\text{sec}}\right)}{8.3\left(\frac{M^3_T}{\text{sec}}\right)} \times 17\times10^{-3} = 1.7\times10^{-4}\ \frac{M^3_{NO_2}}{M^3_T}$$

$$\text{or } C_s = 1.7\times10^{-4} \times 10^6 = 170 \text{ ppm}$$

2. Maximum Downwind Concentration: Using dispersion estimates suggested by Pasquill (1961) and modified by Gifford (1961) and data presented in a U.S. Public Health Service Publication No. 999-AP-26, dated 1969 and titled, "Workbook of Atmospheric Dispersion Estimates," maximum downwind concentrations are estimated for six (6) different stability conditions and nominal wind speeds.

Given: Effective Stack Height (H) = 150 ft (no plume rise)

NO_2 Emission Rate (Q) = $24.1\ \frac{\text{lbs}}{\text{hr}} = 1.4\times10^{-3}\ \frac{M^3_{NO_2}}{\text{sec}}$

$$X(x,y,0;H) = \frac{Q}{\pi\sigma_y\sigma_z} \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_y}\right)^2\right] \exp\left[-\frac{1}{2}\left(\frac{H}{\sigma_z}\right)^2\right]$$

where X = concentration $\left(g/M^3 \text{ or } M^3_{NO_2}/M^3_T\right)$

Q = emission rate $(M^3_{NO_2}/\text{sec})$

H = discharge height (M)

y = distance downwind (M)

$\sigma_y\sigma_z$ = dispersion coefficients

Using these data and Figures 3-5 (A-F) of the referenced document, maximum downwind concentration locations were determined along with dispersion values. These are listed in the righthand column of Table 1.

TABLE 1

MAXIMUM CONCENTRATION DATA

Condition	Distance to Max. Conc. (KM)	Dispersion Factor $X\mu/Q$ (M^{-2})	Nominal Windspeed M (M/sec)	Calculated Max. NO_2 Conc. (ppm)
A	.25	5.8×10^{-5}	2	.041
B	.38	5.4×10^{-5}	3	.025
C	.60	4.5×10^{-5}	5	.013
D	1.10	4.4×10^{-5}	6	.010
E	2.00	3.2×10^{-5}	5	.009
F	3.50	2.6×10^{-5}	3	.012