Docket 40-4492

PDR

RETURN TO D. CRAMER 396 55

FEDERAL-AMERICAN PARTNERS

Telephone 856-9263
Box Nine Star Route
RIVERTON, WYOMING 82501

June 23, 1981

Mr. Dan Gillen
Uranium Mill Licensing Section
Division of Fuel Cycle and Material Safety
7915 Eastern Avenue
Silver Springs, MD 20906

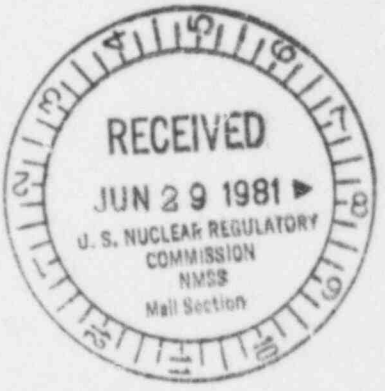
Dear Dan:

Enclosed for your consideration is the additional information prepared by Dames and Moore in response to questions raised in our meeting of May 20, 1981, in your offices.

If there are any additional requirements which we have overlooked, please advise, and if you have further questions, feel free to contact Ken Watts or myself here at Federal-American Partners, or Mr. Highland and Mr. Murdock at Dames and Moore.

Sincerely,

N. J. Andrus
Acting General Manager



NJA/smh
Encl.
cc: D. E. Q. - M. Hulburt
R. J. Mullins

FEE EXEMPT

10185
Add'l Info

Dames & Moore

250 East Broadway, Suite 200
Salt Lake City, Utah 84111
(801) 521-9255
TWX: 910-925-5692 Cable address: DAMEMORE

June 11, 1981

Federal American Partners
Star Route
Riverton, Wyoming 82501

Attention: Mr. Niles Andrus,
General Manager

Gentlemen:

ADDITIONAL INFORMATION
FOR PROPOSED MILL WASTE
MANAGEMENT PLAN
SOURCE MATERIALS LICENSE SUA-667
DOCKET NO. 40 4492

As a result of our meeting of May 20, 1981 addressing license renewal for the Federal American Partners West Gas Hills, Wyoming site, staff members of the U. S. Nuclear Regulatory Commission (NRC) requested the following additional information regarding the mill waste disposal plan:

Subgrade Disposal Area - A map displaying concentrations of sulfate, chloride, nitrate and uranium predicted 5 years after beginning of disposal operations (at cessation of operations) in relation to plant facilities and mined areas. The maps are to display the above mentioned concentrations as presented in the Dames & Moore report and assuming seepage velocity is 10 times higher than that utilized in the Dames & Moore report.

Evaporation Pond Area and Cross Section - A map displaying an outline of the perched aquifer discharge area in relation to the evaporation pond and monitoring wells.

RESPONSE:

Subgrade Disposal Area

Attached are Plate 1 and Table 1 with the requested information. Plate 1 displays the .1 normalized concentration front in relation to the subgrade disposal area as presented in the report "Detailed Seepage Investigation of Mill Waste Disposal Alternatives" (Dames & Moore, 1981) and assuming a velocity 10 times greater than that used in the report. It should be noted that nitrate concentration in the tailings liquor is below the primary drinking water standard of 10 mg/l. Also, note that background aquifer concentrations of sulfate, uranium, radium, manganese and pH make the ground water unsuitable as a drinking water source; background concentrations of radium and uranium make it unsuitable for stock watering purposes. Any possible level of contamination from the proposed disposal system will not alter the existing possible uses of the unconfined aquifer.

A summary of water quality standards, background unconfined aquifer water quality and comparisons with selected calculated concentrations is presented on Table 1. As can be observed, the values for .1 normalized concentration of chloride, sulfate and nitrate added to background concentrations results in water quality meeting stock water standards.

It should be emphasized that the continuous envelope depicting the .1 normalized concentration isocon assuming seepage velocity is 10 times that assumed in the Dames & Moore report is highly improbable. Since the volume occupied by the seepage is roughly proportional to the square of the radial distance from the pit, a seepage travel distance 10 times greater requires approximately a one hundred fold increase in seepage volume and, therefore, seepage volumetric rate. Our calculations indicate maximum seepage rates of approximately 10 gallons per minute to the unconfined aquifer (p. 46 Dames & Moore report). Assuming a seepage velocity 10 times higher. therefore, will

require a seepage rate of approximately 1,000 gpm which is approximately twice the total amount of tailings liquor available in the entire mill circuit. Therefore, the envelope displayed may be thought of as the maximum probable excursion distance in isolated high permeability lenses rather than a continuous zone occupied by seepage. On the basis of data collected during our field investigation, there is little evidence to suggest continuous high permeability lenses exist in the unconfined aquifer.

In conclusion, on the basis of our analysis, it appears that changes to pre-disposal aquifer water quality will be limited to short distances from the disposal area and will largely be contained within areas previously disturbed by mining. Disposal operations will not affect existing or potential uses of the unconfined aquifer.

Evaporation Pond Area

Please reference our initial response to NRC's request for evaluation of water quality in the evaporation pond area which was transmitted by Federal American Partners to Mr. Dan Gillen of NRC on August 29, 1980. Subsequent to that submittal, information available from air photo and topographic interpretation indicates that the perched aquifer emerges at land surface approximately 2,000 - 2,500 feet north of the evaporation pond. Heavy salt encrustations on the ground surface were noted in separate site visits by hydrogeologists from Dames & Moore and USNRC during late summer, 1980. Inspection of air photos taken in 1960 and 1979 indicate that a whitish coloring is observed in the areas where the salt crust is present.

Plate 2 presents the discharge area in relation to the evaporation pond and monitoring wells. The discharge area was interpreted from a combination of the whitish area on the air photos and topographic changes noted at the contact between sandstone and claystone beds of the Wind River Formation. As can be observed, Fox Wells 1 through 6 are present in the discharge zone where elevated salt levels are expected due to evaporation of discharging ground water.

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We trust that this information clarifies the results presented in the Dames & Moore report to your satisfaction. If you have any further questions, please contact us.

Yours very truly,

DAMES & MOORE

Larry T. Murdock
Partner

W. R. Highland
Project Manager

LTM/WRH:fl

Attachments:

References
Plates 1, 2
Table 1

REFERENCES

Dames & Moore, "Detailed Seepage Investigation of Mill Waste Disposal Alternatives, West Gas Hills, Wyoming for Federal American Partners (2 volumes), January 16, 1981.

Federal American Partners "Responses to Questions, July 3, 1980 and July 17, 1980." August 29, 1980.

F. M. Fox & Associates, Inc., "Baseline Geotechnical Investigation for the Subsurface Disposal of Mill Waste," January 30, 1979.

Freeze and Cherry, Ground Water p. 388, Prentice-Hall, Englwood Cliffs, N. J., 1979.

Wyoming Department of Environmental Quality, "Water Quality Rules & Regulations, Chapter VIII," 1980.

TABLE I

COMPARISON OF CALCULATED CONCENTRATIONS WITH WATER QUALITY STANDARDS

Parameter	Average Unconfined Aquifer[1] Concentration (mg/l)	Concentration in Tailings Solution (mg/l)	Primary[2] Drinking Water Standards (mg/l)	Livestock[2] Drinking Water Standards (mg/l)	Approximate Concentration[3] at .1 Normalized Isocon (mg/l)
Sulfate	1080 ± 499 (27)	10,060 ± 2760 (12)	250	3,000	2,140
Chloride	36.9 ± 48.5 (28)	494 ± 478 (12)	250	2,000	90
Nitrate (as N)	.65 ± .82(28)	4.85 ± 6.48(12)	10	None	1.1
Uranium	5.1 ± 6.6 (29)	16.8 ± 4.2 (11)	5	5	6.8[4]

Key: Average ± Standard Deviation (No. of Samples)

1) Based on average concentrations in wells STF-1, STF-4, STF-7, STF-9, STF-10, STF-12, STF-13, STF-14, STF-15, BUL F-1, BUL F-2, BUL F-3, BUL F-4, BUL F-5, BUL F-6, from measurements made on February 28, 1979 and March 13, 1979. Well locations presented on Plate 1 in "Baseline Geotechnical Investigation for the Subsurface Disposal of Mill Waste" (F.M. Fox, Inc., 1979). Individual results of chemical analyses presented in Appendix E of "Detailed Seepage Investigation of Mill Waste Disposal Alternatives" (Dames & Moore, 1981).

2) U. S. Environmental Protection Agency or Wyoming Department of Environmental Quality water quality standards.

3) Concentrations listed are 10% of tailings solution concentration added to average background concentration in the unconfined aquifer. All normalized concentrations were calculated assuming Kd=0. Modeling results for normalized concentrations are shown on Plates 18, 19 and 20 in "Detailed Seepage Investigation of Mill Waste Disposal Alternatives" Dames & Moore, 1981).

4) Uranium concentration shown assumes no pH - controlled precipitation reactions, which would result in lower concentration than indicated.