COGEMA

Mining, Inc.

40-8502

Via Fax and Federal Express

July 31, 2001

U.S. Nuclear Regulatory Commission
ATTN: Mel Leach, Chief
Fuel Cycle Licensing Branch
Mail Stop T-8A33
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738

RE: COGEMA Mining Inc.'s Options for Compliance – Surface Discharge of Restoration Fluid, Source Material License SUA-1341

Dear Mr. Leach:

By letter dated March 7, 2001, NRC required COGEMA Mining, Inc. (COGEMA) to demonstrate that our restoration discharge effluent complies with the public dose limit in 10 CFR 20.1301. The methods suggested by NRC to demonstrate compliance ranged from meeting the conservative values in Table 2 of Part 20 Appendix B, using flow weighted averages of the two effluent discharge points, to the use of dose assessment modeling. COGEMA has chosen to use components of both methods to show that the restoration effluent complies with the public dose limit in 10 CFR 20.1301, as demonstrated below.

Introduction:

COGEMA is in the aquifer restoration phase of decommissioning at two in situ leach facilities in Wyoming, the Irigaray and Christensen Ranch projects. As part of the restoration, an over-production (bleed) from the wellfields is generated that requires disposal. COGEMA treats this groundwater and discharges it to Willow Creek at two points, one located at Irigaray and one at Christensen Ranch. The effluent is permitted by the U.S. Environmental Protection Agency (EPA) under NPDES permits issued by the State of Wyoming, and more recently, NRC. A July, 2000 decision by the NRC Commission now requires that the effluent also meet the public dose standards in 10 CFR 20.1301. Due to this decision, NRC has required COGEMA to demonstrate that the restoration effluent meets the public dose limit.

Calculation of Internal Dose:

In order to calculate the dose to the general public from the restoration effluent, we first calculated the annual dose to a member of the public who was continuously exposed (100%) to the effluent in terms of internal and external exposure. Table 1, attached, calculates the internal dose for a person who consumes 2 liters of the effluent every day of the year. All radionuclides routinely analyzed in the effluent on a quarterly basis during the year 2000 were used to calculate the overall dose. And, as suggested by NRC, the annual flow weighted average concentration for the two discharge points was used for comparison to the Appendix B Table 2 limits.

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As shown in the attached Table 1, if 2 liters of the effluent had been consumed by an individual over the one year period (2000), the internal dose limit of 50 mrem/year would have been exceeded. This is overwhelmingly due to the Pb-210 concentrations in the effluent from the last two quarters of year 2000, which contributed to 82% of the annual dose. An internal investigation has pointed to two possibilities for the lead values in exceedance of the annual limit: 1) abnormally high radon-222 gas levels in the effluent that quickly decay to lead-210; and 2) problems with the analytical method for lead-210. The first possibility for radon-222 to be higher than normal is possible as the feed water to the reverse osmosis treatment unit is high in radon and radon gas passes through the treatment unit with little reduction. The treated water was being directly discharged to Willow Creek, rather than being stored in a pond prior to discharge. In November, 2000, the process was changed to store the treated reverse osmosis permeate in a pond prior to discharge, primarily to allow carbon dioxide to gas off. Radon gas will also be released to the atmosphere in the pond prior to discharge, thus reducing the lead-210 levels at the discharge point. This, in fact, has been seen during the year 2001, where only the first quarter results for lead-210 very slightly exceeded the limit, and all subsequent samples were below the limit.

The second possibility for abnormal lead-210 concentrations is laboratory error. The laboratory used by COGEMA for radionuclide analysis has stated that the analysis for lead-210 is very difficult, being based on precipitation and alpha counting. Self adsorption is a problem when too much precipitate is present, and poor accuracy also occurs when not enough volume of precipitate is available for counting. Due to our concerns and the concerns of other clients, the laboratory is now considering a new technique for lead-210 analysis, which relies on direct readings (liquid scintillation).

In summary, the lead-210 analysis during the year 2000 appears abnormal, contributing to over 82% of the internal dose estimate. Previous year's lead-210 analyses are normal, and subsequent analyses in year 2001 are back to normal. We believe that the internal dose should rely primarily on the remaining radionuclides in Table 1, which provides an annual internal dose of only 23.6 mrem/year.

Calculation of External Dose:

External dose was calculated for the effluent by surveying gamma dose from the discharge that was collected in a one gallon plastic container and applying that dose to an individual continuously in the presence of this container for the one year period (8760 hours). Table 2 provides the calculation for external dose, which amounts to 43.8 mrem/year.

Estimate of Annual Dose (Internal plus External):

Several options for the final estimate of dose to an individual are provided in Table 3. The first estimate is for the maximum continuous exposure to the effluent in terms of consumption and external radiation. We know that this approach is overly conservative and the scenario will never occur. Therefore, a straight comparison to the 10 CFR 20, Appendix B, Table 2 values is not thought to be the most appropriate, and due to the lead-210 values during year 2000, compliance cannot be demonstrated (176.9 mrem/yr. with a limit of 100 mrem/yr.).

Using the same continuous exposure method, but eliminating the lead-210 data based on abnormal data, compliance with the 100 mrem/yr. limit can be demonstrated. However, we do not believe that this is the most appropriate comparison as no one is or will be drinking the water.

The next comparison is termed a conservative dose, and assumes that the effluent is collected and consumed, but for only 25% of the year. The 25% consumption is based on similar occupancy and exposure factors used in RESRAD. This provides an annual dose of 44.2 mrem/yr., which meets the annual limit of 100 mrem/yr. However, it is still extremely unlikely that anyone would ever collect and consume the effluent water.

The last comparison is the most obvious and realistic, but the least conservative. This provides zero dose from the effluent to the general public. The effluent is released from the end of the pipeline in the bed of Willow Creek and is quickly absorbed into the ground and typically does not travel for any long lengths down the creek. The only usage of the water would be if wildlife or livestock were present and drank the water. The nearest residents live approximately 5 miles from the discharge sites and do not use Willow Creek water for drinking water (the creek is ephemeral, running only in response to runoff events). The chances of the water ever being used for human consumption on any continuous or short-term basis are simply zero, especially when considering the short term nature of the projected discharge (through year 2004).

Summary:

In summary, COGEMA contends that the restoration effluent discharged at Irigaray and Christensen will not cause an exceedance of the public dose limit in 10 CFR 20.1301, when realistic scenarios are considered. Even when unrealistic scenarios are used, such as continuous annual exposure, year 2001 data indicates that the effluent will meet the dose limits in Part 20 Appendix B, Table 2, due to the more normal values for lead-210.

If you should have any questions regarding this demonstration of compliance, please contact me.

Sincerely,

Donna L. Wichers
General Manager

Attachments: Tables 1, 2 and 3

TABLE 1
Estimate of Annual Internal Dose (Continuous Exposure) Using Year 2000 Data

INTERNAL DOSE		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Average	10 CFR 20 Appendix B Table 2, Col. 2 Value	Ratio: Annual Ave/Col. 2 Value	Annual Average mrem Equivalent
Unat	**Irigaray**								
	Annual Flow (MGD)	0.038	0.042	0.022	0.029				
	Unat (uCi/ml)	3.59 E-08	7.58 E-08	1.56 E-07	8.28 E-07				
	Annual Flow Weighted Ave.					2.44 E-07			
	Christensen								
	Annual Flow (MGD)	0	0	0.025	0.114				
	Unat (uCi/ml)	ND	ND	3.69 E-09	3.59 E-09				
	Annual Flow Weighted Ave.					3.61 E-09			
		Overall Annual Flow Weighted Average Unat (uCi/ml) - Irigaray/Christensen Combined				**1.20 E-07**	**3.0 E-07**	**0.4**	**20**
		1st Quarter	**2nd Quarter**	**3rd Quarter**	**4th Quarter**				
Ra-226	**Irigaray**								
	Ra-226 (uCi/ml)	<2.0 E-10	<2.0 E-10	9.0 E-10	5.0 E-10				
	Flow Weighted Ave.					3.80 E-10			
	Christensen								
	Ra-226 (uCi/ml)	ND	ND	4.5 E-09	1.9 E-09				
	Flow Weighted Ave.					2.37 E-09			
		Overall Annual Flow Weighted Average Ra-226 (uCi/ml) - Irigaray/Christensen Combined				**1.41 E-09**	**6.0 E-08**	**0.02**	**1**
		1st Quarter	**2nd Quarter**	**3rd Quarter**	**4th Quarter**				
Th-230	**Irigaray**								
	Th-230 (uCi/ml)	<2.0 E-10	<2.0 E-10	2.0 E-10	<2.0 E-10				
	Flow Weighted Ave.					2.0 E-10			
	Christensen								
	Th-230 (uCi/ml)	ND	ND	<2.0 E-10	<2.0 E-10				
	Flow Weighted Ave.					<2.0 E-10			
		Overall Annual Flow Weighted Average Th-230 (uCi/ml) - Irigaray/Christensen Combined				**2.0 E-10**	**1.0 E-07**	**0.002**	**0.1**
		1st Quarter	**2nd Quarter**	**3rd Quarter**	**4th Quarter**				
Pb-210	**Irigaray**								
	Pb-210 (uCi/ml)	<1.0 E-09	<1.0 E-09	<1.0 E-09	1.09 E-08				
	Flow Weighted Ave.					3.19 E-09			
	Christensen								
	Pb-210 (uCi/ml)	ND	ND	4.89 E-08	3.74 E-08				
	Flow Weighted Ave.					3.95 E-08			
		Overall Annual Flow Weighted Average Pb-210 (uCi/ml) - Irigaray/Christensen Combined				**2.19 E-08**	**1.0 E-08**	**2.19**	**109.5**
		1st Quarter	**2nd Quarter**	**3rd Quarter**	**4th Quarter**				
Po-210	**Irigaray**								
	Po-210	<1.0 E-09	<1.0 E-09	<1.0 E-09	<1.0 E-09				
	Flow Weighted Ave.					<1.0 E-09			
	Christensen								
	Po-210	ND	ND	<1.0 E-09	3.0 E-09				
	Flow Weighted Ave.					2.64 E-09			
		Overall Annual Flow Weighted Average Po-210 (uCi/ml) - Irigaray/Christensen Combined				**1.84 E-09**	**4.0 E-08**	**0.05**	**2.5**
	Total Internal Dose assuming 7.3 E5 ml annual water intake for the "Reference Man (2 liters per day, 365 days per year). Dose in mrem/year:								**133.1**

TABLE 2
Estimate of Annual External Dose (Continuous Exposure)

Discharge water collected at Christensen SD002 point
Date of sample collection and gamma exposure rate survey: 07-17-01

Survey Location	Survey Result mR/hr	Background mR/hr
One gallon plastic container, empty - inside		0.01
One gallon plastic container, empty - outside		0.01
Container - filled with Christensen discharge water (top open) - 30 cm above opening	0.02	
Container - filled with Christensen discharge water 30 cm from sides of container	0.01	
Container - filled with Christensen discharge water probe directly against open top	0.01	
Container - filled with Christensen discharge water probe directly against sides of container	0.02	
Average	0.015	0.01
Average Survey Result minus Background	**0.005 mR/hr**	

Annual External Dose assuming 100%, continuous exposure = 8760 hrs/yr * .005 mR/hr = 43.8 mrem/year

TABLE 3

Total Annual Dose Estimates (Internal plus External)

	mrem/year
Estimate of Annual Internal Dose (Continuous Exposure) from Table 1	133.1
Estimate of Annual External Dose (Continuous Exposure) from Table 2	43.8
Total Effective Dose (Continuous Exposure)	**176.9**
Annual Dose Without Lead-210 Data (Continuous Exposure) (Internal dose of 23.6 plus external dose of 43.8)	**67.4**
Conservative Annual Dose from Surface Discharge: (Assumes that the discharge is available for collection and 25% of a person's drinking water is collected from the surface discharge point and is consumed. This estimate also includes 25% of the external exposure received from the container while collecting, storing and consuming the water.)	**44.2**
Realistic Annual Dose from Surface Discharge: (The nearest residents are 5 miles from each discharge point, and will have no external exposure from the discharge. Also, the water from the discharge is not used by anyone for drinking water. The drinking water source for nearby residents -5 miles away- is groundwater pumped from wells located adjacent to their homes. The discharge typically soaks into the ground shortly after reaching the streambed, and is not available for use by livestock or for human consumption.)	**0**