PDR 40-8064

EXXON MINERALS COMPANY, U.S.A.
POST OFFICE BOX 2180 · HOUSTON, TEXAS 77001

December 28, 1979

Re: Uranium Solution Mining R&D Pilot
Converse County, Wyoming
NRC Docket No. 40-8064
License No. SUA-1064
Wyoming Mining Permit No. 218-C

U.S. Nuclear Regulatory Commission
Uranium Recovery Licensing Branch
Division of Waste Management
Washington, D.C. 20555

Gentlemen:

Since October 1979, as a part of the Highland solution mine pilot program, Exxon Minerals Company, U.S.A. has been developing procedures for testing the integrity of casing in wells used in solution mining. During a recent casing integrity test conducted on an injection well in the pilot project, a minor casing leak was detected. Injection into the leaking well was stopped and a restoration program was immediately implemented. Water sample analyses show that significant progress had been made toward restoration of water quality in the affected aquifer by the time the 96-hour confirming laboratory data were received.

The soundness of the casing in the other three injection wells in the pilot has been demonstrated by tests similar to those conducted in well I-3. Six of the ten producing wells have also been tested, and the casing has been found to be sound. The remaining four producing wells will be tested as part of our continuing program. It should be noted that a leak in the casing of a producing well would probably result in fluid movement into the casing rather than out into an aquifer, since the fluid level in a producing well is normally kept pumped down to near the bottom of the well.

Details of the discovery of the leak in the casing of well I-3 and the subsequent actions and events are discussed below.

On the afternoon of December 12, 1979, injection well I-3 (refer to Figure 1) was tested by inflating a packer in the 6-inch PVC casing, filling the annulus between the casing and tubing with water, and observing the water level to detect any change. The water level was observed to fall at a rate corresponding to leakage of approximately 0.12 gallons per minute over a 73 minute period. The leak was determined to be located some 250-275 feet below ground surface.

Injection into well I-3 was stopped on the morning of December 13, 1979, and the well was tested again to confirm the original test results.

The confirmed leak was adjacent to an aquifer (referred to by Exxon as the Upper Highland Sand) that lies above the upper monitor zone (the Middle Highland Sand) for the pilot project. The lithological sequence and well completion intervals are shown schematically on Figure 2.

On December 14, 1979, drilling was started on a special observation well, designated well M-3, located about 10 feet from well I-3. Well M-3 was completed on December 18, 1979, a pump was installed, the well cleaned up, and the first water sample taken on December 19 and analyzed. Results from the first sample were compared to "baseline" samples taken from Water Source Well No. 3, located about 1500 feet to west-southwest of injection well I-3, and it was concluded that leach solution had escaped into the Upper Highland Sand . On December 20, 1979, a temporary pipeline was installed to enable disposal of water from M-3 to the mill tailings pond and the well was put on production at a rate of about 10 gallons per minute. Subsequent water samples were taken daily and the results available to date are listed on Table I. As shown by Table I, by the time the 96-hour confirming sample was taken, a significant decline had occurred in the conductivity and in the concentration of those excursion parameters which were present at elevated levels in the first sample. Note that additional results will be available and reported after January 2, 1980. The samples show that none of the more toxic elements (uranium, arsenic, selenium) have elevated concentrations and that chloride has been restored to a level have elevated concentrations and that chloride has been restored to a level below EPA drinking water standards. It should be noted that the leach solution being injected contains elevated concentrations of bicarbonate and chloride. Sulfate is also present in concentrations approximating baseline concentrations in the Highland sands.

Sulfates are not believed to be an accurate indicator of the presence of leach solution since the concentration varies widely over small areas of the aquifer and since the analytical procedure for determining the concentration is subject to greater error than is the case for the other chemicals. Exxon plans to continue producing well M-3, obtaining weekly samples, and reporting the results as specified by permit and licence conditions.

Two additional observation wells were drilled to examine the other two aquifers penetrated by I-3. On December 18, 1979, drilling began on well M-4, and on December 22, 1979, this well was completed in the Middle Highland Sand. Analyses of samples taken from M-4 are shown on Table II compared to samples taken from M-1, the existing upper zone monitor well located about 150 feet from well I-3. As shown by Table II, the samples from M-4, though incomplete at this time, indicate that no leach solution entered the Middle Highland Sand since concentrations are in the expected baseline range.

On December 20, 1979, drilling started on observation well M-5. This well was abandoned due to mechanical problems and on December 24, 1979, well M-5-2 was completed in the Tailings Dam Sand which overlies the Upper Highland Sand. Samples from this well were taken beginning December 24, 1979, and the results are shown on Table II. The only "baseline" data available for this sand comes from the Tailings Dam Monitor Well No. 10, located about a mile east-southeast of I-3. The samples available to date from M-5-2 suggest water quality similar to that from Monitor Well No. 10; this comparison, combined with the low concentrations of bicarbonate, carbonate and chloride, and the high pH, lead us to conclude that no leach solution has entered this aquifer.

In addition to reporting the data not yet available for Tables I and II and continuing to pump well M-3 and monitor the water quality, Exxon plans to run a downhole TV survey of well I-3 to determine what can be learned about the nature of the casing failure before recompleting the well by cementing a 4-inch string of fiberglass reinforced polymer casing from the bottom of the well to surface inside the 6-inch PVC and resuming injection into the well. Injection wells I-4 and I-2, which have PVC casing, will also be redrilled or recompleted with fiberglass (reinforced polymer casing), thus providing greater resistance to casing damage.

We believe that the remedial action now underway demonstrates that the leak caused no serious environmental damage and that restoration can be achieved shortly with no additional measures required. The small size of the leak in well I-3, combined with the rapid rate of cleanup, shows that it was limited to the immediate area of the injection well. Since Exxon controls extensive surface area surrounding this pilot project, there is no possibility that groundwater from this mildly contaminated area will be used by others for any purpose prior to complete restoration.

This letter is intended to confirm and expand upon the verbal notification given to you by telephone on December 28, 1979. Additional water sample analyses will be sent to you when available. If you have any questions regarding this report or need additional information, please call me at 713-656-1504.

Yours very truly,

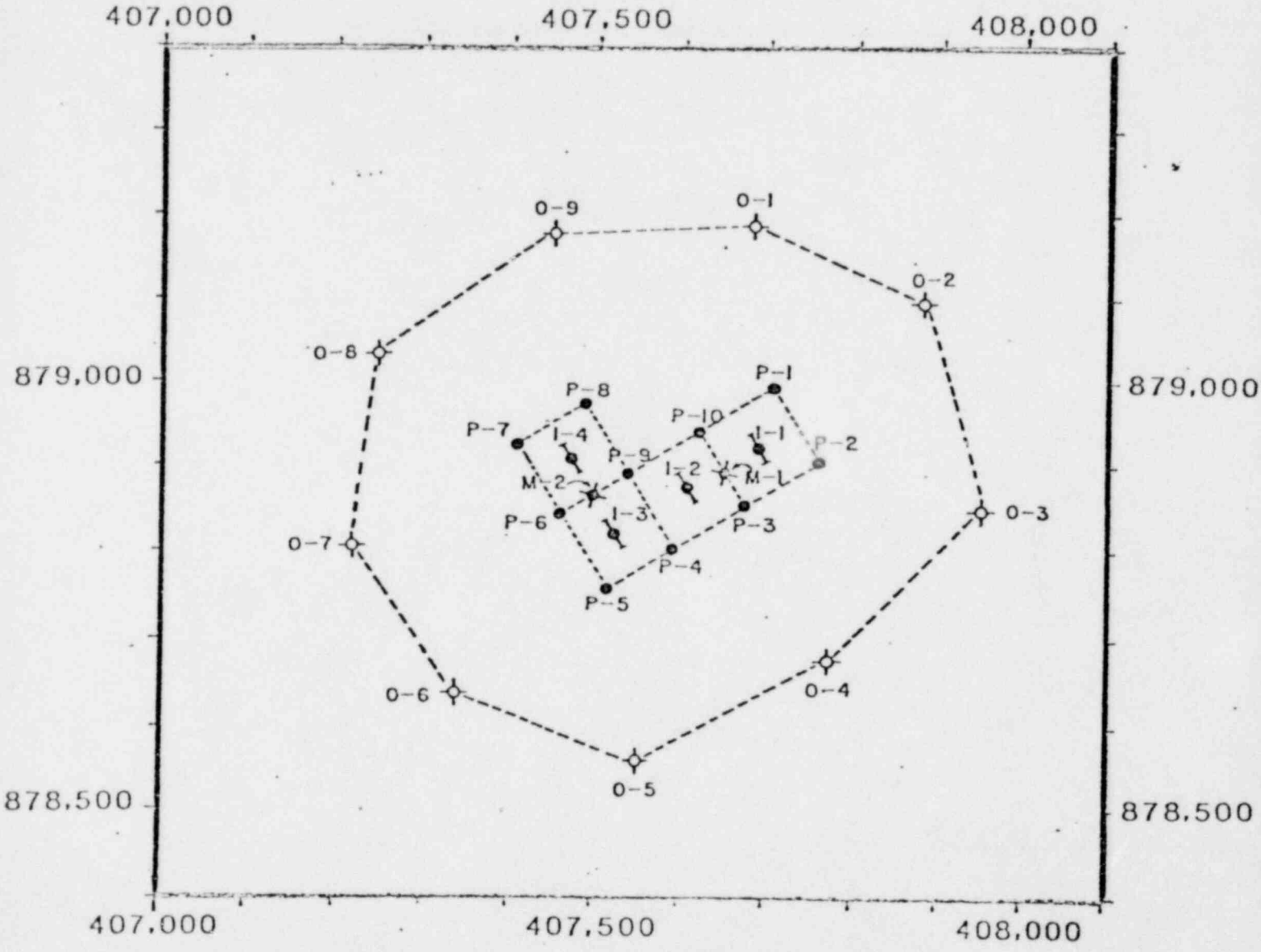
H. H. Trussell, Jr.

HHT:tsa
Attachment

c: Mr. G. D. Ortloff
Mr. J. B. Shannon, Highland Uranium Operations

FIGURE 1

SOLUTION MINE WELL PATTERN
HIGHLAND R&D PROGRAM
CONVERSE COUNTY, WYOMING



LEGEND

Approximate scale 1"=185'

PRODUCTION WELL

INJECTION WELL

MONITOR WELL

FIGURE 2

HIGHLAND R & D PROGRAM

CONVERSE COUNTY, WYOMING

GENERAL LITHOLOGICAL SCHEMATIC

(No horizontal scale)

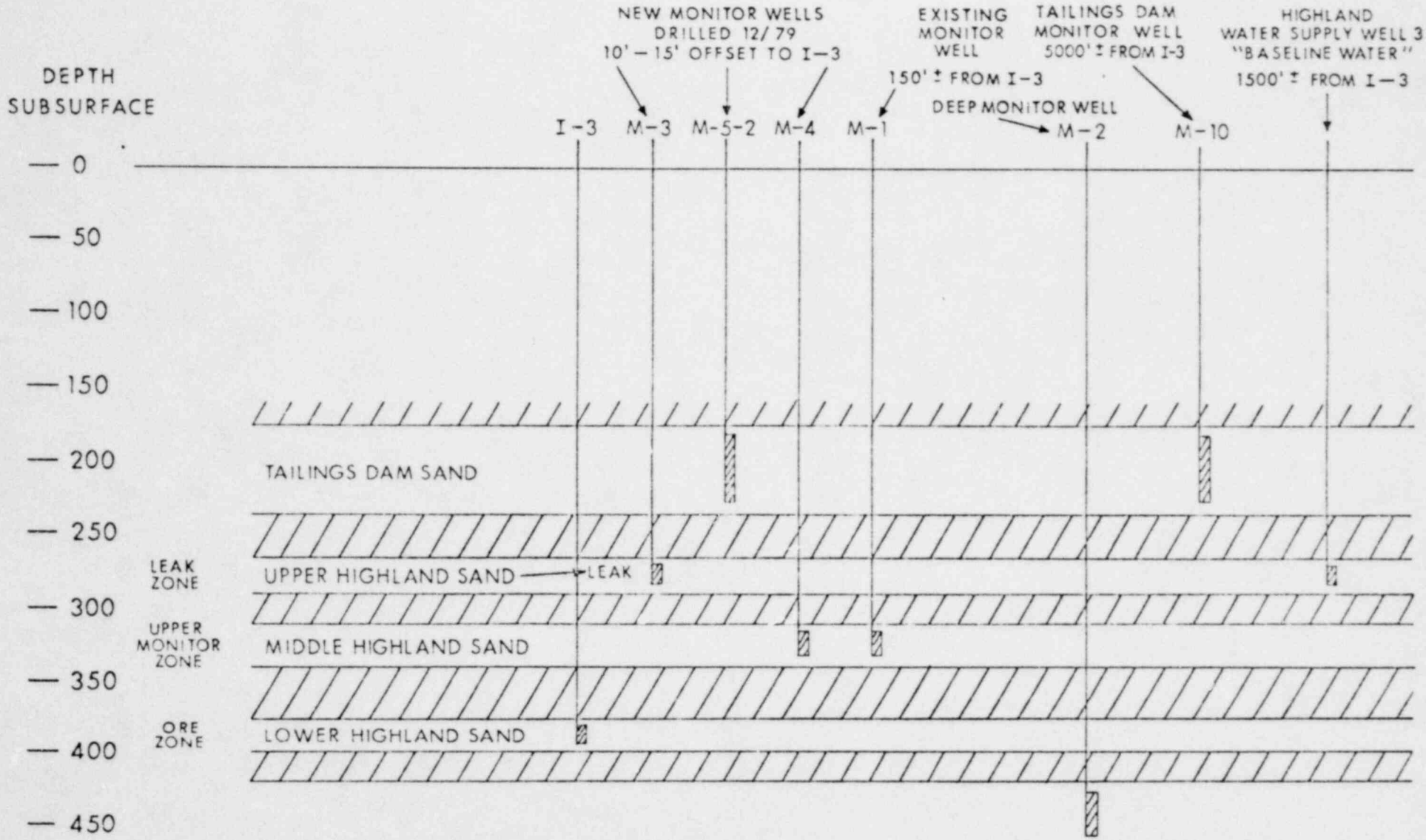


TABLE I

HIGHLAND R&D PROGRAM
SOLUTION MINE PILOT
CONVERSE COUNTY, WYOMING

WATER SAMPLE ANALYSES FOR INJECTION WELL I-3 CASING LEAK

	Upper Highland Sand "Baseline" Data Water Supply Well No.3		EPA Drinking Water Standard	Samples From Well M-3: Upper Highland Sand						
	9/78 (2)	12/13/79 (1)		12/19/79 (2)	12/20/79 (1)	12/21/79 (2) (48 hr test)	12/22/79 (1)	12/23/79 (2) (96 hr test)	12/24/79 (1)	12/25/79 (1)
Carbonate-mg/l	0	0	NA	0	0	0	0	0	0	0
Bicarbonate-mg/l	159	146	NA	571	540	586	552	469	405	380
Chloride-mg/l	10	12	250	224	222	240	174	150	121	107
Sulfate-mg/l	190	188	250	360	459	376	163	320	298	348
Uranium-mg/l	<1	<.001	5 (3)	<1	<1	<1	<1	<1	<1	<1
Sodium-mg/l	94	92	NA	264	NA	269	NA	200	NA	NA
Arsenic-mg/l	NA	<.01	.05	<.01	NA	<.01	NA	<.01	NA	NA
Selenium-mg/l	NA	<.01	.01	<.01	NA	<.01	NA	<.01	NA	NA
Radium-pCi/l	0.5	NA	5	NA*	NA	NA*	NA	NA*	NA	NA
pH	8.1	7.1	6.5-8.5	6.9	7.95	6.7	7.98	6.8	7.23	7.08
Conductivity-mmho	NA	645	NA	2000	2000	1825	1600	1450	1100	1000

(1) Analysis by Exxon's Metallurgical Lab: No capability for items marked NA
(2) Analysis by Chemical and Geological Laboratories; Radium by Hazen Research, Inc.
(3) EPA has not established a uranium concentration standard; the 5 mg/l value is the standard proposed by the Wyoming Department of Environmental Quality
NA Not available or not applicable
NA* Will be available and reported after January 2, 1980

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12/28/79

TABLE II

HIGHLAND R&D PROGRAM
SOLUTION MINE PILOT
CONVERSE COUNTY, WYOMING

WATER SAMPLE ANALYSES FOR INJECTION WELL I-3 CASING LEAK

	Middle Highland "Baseline" Data Well M-1 12/16/79(2)	Samples from M-4: Middle Highland Sand				Tailings Dam Sand "Baseline" Data Monitor Well 10 9/17/79(2)	Samples from M-5-2: Tailings Dam Sand		
		12/23/79(2)	12/24/79(1)	12/25/79(2)	12/26/79(1)		12/24/79(2)	12/25/79(1)	12/26/79(2)
Carbonate-mg/l	<1	0	0	0	12	30	0	36	58
Bicarbonate-mg/l	178	220	209	205	172	79	139	43	12
Chloride-mg/l	7	20	10	10	4	10	10	13	12
Sulfate-mg/l	220	145	124	128	185	148	228	311	230
Uranium-mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sodium-mg/l	NA	64	NA	63	NA	101	106	NA	126
Arsenic-mg/l	NA*	<.01	NA	<.01	NA	<.01	<.01	NA	<.01
Selenium-mg/l	NA*	<.01	NA	<.01	NA	<.01	<.01	NA	<.01
Radium-pCi/l	NA	NA*	NA	NA*	NA	0.5	NA*	NA	NA*
pH	7.1	7.1	7.74	7.0	8.7	9.9	7.2	9.79	9.8
Conductivity-mmho	450	555	500	560	420	NA	625	475	635

(1) Analysis by Exxon's Metallurgical Lab: No capability for items marked NA
(2) Analysis by Chemical and Geological Laboratories; Radium by Hazen Research, Inc.
NA Not available or not applicable
NA* Will be available and reported after January 2, 1980.

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