



UNITED STATES

NUCLEAR REGULATORY COMMISSION

REGION IV

URANIUM RECOVERY FIELD OFFICE
BOX 25325
DENVER, COLORADO 80225

JUL 17 1992

URFO:CDMC
Docket No. 40-6659
04006659940E

MEMORANDUM FOR: Docket File No. 40-6659

FROM: Cynthia D. Miller-Corbett, Project Manager

SUBJECT: GROUND-WATER CORRECTIVE ACTION PROGRAM REVIEW FOR THE
PETROTOMICS COMPANY, SHIRLEY BASIN MILL, DOUGLAS COUNTY,
WYOMING

By cover letter dated June 11, 1992, Petrotomics Company submitted the ground-water corrective action program (CAP) for the Shirley Basin Mill. This submittal is in accordance with License Condition No. 47(D) of Source Material License SUA-551.

BACKGROUND

The original CAP for the Shirley Basin Mill was authorized in June 1989. This program comprised pumping fluid from the tailings seepage collection drain, three recovery wells, and tailings dewatering wells. The collected fluid was discharged to the Stage I pond. This pond was fitted with 99 spray nozzles to enhance fluid evaporation. Modifications to the initial CAP are outlined in subsequent submittals. Currently, the CAP includes ground-water recovery from nine wells constructed in the uppermost aquifer, the upper Wind River sand, and tailings dewatering wells. Discharge of collected fluids is to Stage I and Stage II evaporation ponds that are constructed within the tailings impoundment. Evaporation of fluids discharged to the Stage I pond is enhanced by 79 spray nozzles.

Results of 1991 Corrective Action Program

In 1991, a total of 7,109,524 million gallons of fluid was recovered and disposed in the evaporation ponds. The total volume of fluid collected since implementation of the CAP in 1987, is approximately 58,000,000 gallons. This volume includes fluid recovered from wells constructed in the upper Wind River sand and in the tailings.

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Ground-water quality data were reported for 30 monitor wells. Based on the average concentration of detected hazardous constituents, the volume of these constituents that was collected in 1991 is as follows:

<u>Constituent</u>	<u>Volume (kilograms unless noted)</u>
Arsenic	0.08
Barium	1.35
Cadmium	2.57
Chromium	15.80
Lead	7.49
Nickel	106.94
Selenium	0.42
Uranium	102.82
Radium-226	132.77 uCi
Radium-228	1,366.55 uCi
Thorium-230	33,373.16 uCi

DISCUSSION

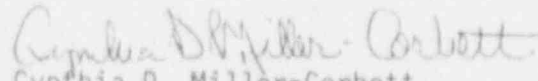
The ground-water quality data presented in the 1991 CAP reveal water quality has not significantly improved since implementation of the CAP. For the majority of monitor wells, one or more hazardous constituents that were present at below ground-water protection standards at the beginning of the CAP, are now present at concentrations that exceed the site standards. In the upgradient, south to southwest direction, ground-water quality has most notably degraded with respect to radium-228 and nickel. Prior to implementation of the CAP in 1987, these constituents commonly occurred at concentrations below the respective ground-water protection standard. The licensee states the increase in the concentrations of these particular elements is a natural phenomena, but this has not been verified. Towards the east, as well as in the downgradient direction to the north, the concentrations of hazardous constituents including chromium, selenium, nickel, uranium, radium-226 + 228, and thorium-230 have also increased over time.

The pH of seepage-bearing ground water at the Shirley Basin Mill is commonly acidic, measuring at approximately 4.0 standard units. This acidic condition is probably responsible for the continued mobility of hazardous constituents and therefore degradation of ground water.

The trends in ground-water degradation imply that contaminant-bearing plumes are not adequately being recovered. The NRC is presently reviewing a proposal to modify the Shirley Basin Mill CAP. This proposal was submitted by letter dated January 1992, and is a consequence of our determination that the current CAP is not effectively improving ground-water quality that was degraded by previous milling activity. NRC approval of the modified CAP will authorize the licensee to implement a fresh water injection/recovery system. The licensee anticipates this will allow increased collection of hazardous constituents.

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Furthermore, injection of fresh water will neutralize the existing acidic ground water. This should result in immobilization of hazardous constituents and more effective cleanup of the contaminated ground water.


Cynthia D. Miller-Corbett
Project Manager

Case Closed: 04006659940E

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