



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064**

April 19, 2000

Mr. Michael L. Griffin
Manager of Environmental and Regulatory Affairs
Crow Butte Resources, Inc.
86 Crow Butte Road
Post Office Box 169
Crawford, NE 69339-0169

SUBJECT: NRC INSPECTION REPORT 040-08943/00-01

Dear Mr. Griffin:

This refers to the routine inspection conducted on March 20-22, 2000, at your in-situ uranium processing facility near Crawford, Nebraska. This inspection consisted of a review of site status, site operations, radiation protection, and environmental monitoring. Overall, the inspection determined that you have operated the uranium production facility in a safe and effective manner. The inspection findings were presented to you and other members of your staff at the conclusion of the onsite inspection. The enclosed report presents the results of that inspection.

No violations were identified during the inspection; therefore, no response to this letter is required.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room (PDR).

Should you have any questions concerning this inspection, please contact Mr. Robert Evans at (817) 860-8234 or the undersigned at (817) 860-8191.

Sincerely,

/RA/

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle & Decommissioning Branch

Docket No.: 040-08943
License No.: SUA-1534

Enclosure:
NRC Inspection Report 040-08943/00-01

NMED 980375
NMED 990415
NMED 000168

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U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No. 040-08943

License No. SUA-1534

Report No. 040-08943/00-01

Licensee: Crow Butte Resources, Inc.

Facility: Crow Butte Project

Location: Crawford, Dawes County, Nebraska

Dates: March 20-22, 2000

Inspectors: Robert J. Evans, PE, CHP, Health Physicist
Nuclear Materials Inspection Branch
Division of Nuclear Materials Safety

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Office of Nuclear Materials Safety and Safeguards

Approved By: D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Attachment: Supplemental Information

EXECUTIVE SUMMARY

Crow Butte Project NRC Inspection Report 040-08943/00-01

This inspection included a review of site status, operations, radiation protection, and environmental monitoring. Also, several recent events involving the groundwater corrective action program were reviewed, including four excursions and one mechanical integrity test failure. Overall, the licensee was operating the facility in a safe and effective manner.

Operations Review

- Site activities were conducted in accordance with applicable license and regulatory requirements. Site operating parameters were within the respective license limits, and no health or safety hazard was identified (Section 2).
- A review of the licensee's spill management program was performed. The NRC previously identified an Unresolved Item in this program area. The Unresolved Item was left open because this issue was still under NRC review (Sections 2.5 and 5.1).
- The inspectors reviewed the licensee's investigation of several yellowcake drum seal failures, and the inspectors concluded that the licensee was implementing appropriate corrective actions to resolve the problem (Section 2.6).

Radiation Protection

- The licensee had implemented a radiation protection program that met the requirements established in 10 CFR Part 20 and the license. Occupational exposures were below the applicable NRC limits. Contamination control efforts were generally effective with several minor exceptions. One bioassay sample result exceeded the action level, but the licensee concluded that this sample result was not valid (Section 3).

Environmental Monitoring

- The licensee collected and reported all environmental and effluent monitoring samples as stipulated in the license. No sample result exceeded the applicable NRC regulatory limits (Section 4).
- The licensee conducted operations in such a manner that the doses to the nearest resident were below the NRC's annual limit (Section 4).

Report Details

1 Site Status

Crow Butte Resources' in-situ uranium mine was in operation during the inspection with Mine Units 4-7 in service and Mine Units 2-3 in restoration. Since the last inspection, the licensee suspended cleanup of Mine Unit 1 and submitted a request to the NRC to release the mine unit. At the end of the onsite inspection, the NRC had not formally responded to the licensee's request.

Mine Unit 7 was placed into service during July 1999, while Mine Unit 3 was removed from service at the same time. Portions of Mine Units 6-7 were still under construction, and development drilling was in progress in Mine Unit 8 during the inspection. The licensee recently placed Wellfield Houses 28 and 30 into service in Mine Unit 7. Wellfield Houses 25 and 26 were still under construction in Mine Unit 6.

The licensee continues to produce yellowcake material in the Central Processing Facility. Uranium-bearing leach solution was pumped from the wellfields to the process facility at a nominal flow rate of 4400 gallons per minute. Ion exchange columns were used to recover uranium from the leach solution. The end product was dried in a negative pressure dryer and packaged in 55-gallon drums for shipment offsite.

The licensee had 41 onsite employees at the time of this inspection, excluding contractors. Contractors were used as needed for specialized activities such as well drilling. The licensee's onsite organization was consistent with the one in place during the previous inspection, and an appropriate level of oversight had been provided for the current mode of plant operations.

2 Operations Review (88020)

2.1 Inspection Scope

The objective of this portion of the inspection was to verify that site activities were being conducted in accordance with applicable regulations and the conditions of the license, and to ensure that operational controls were adequate to protect the health and safety of workers and members of the public.

2.2 Performance-Based License Review

License Condition 9.4 states that the licensee may, under certain conditions and without prior NRC approval, make changes in the facility or processes, make changes to procedures, or conduct tests and experiments not presented in the license application. The licensee's implementation of the performance-based license provisions was reviewed to ensure any changes made by the licensee did not negatively impact the licensing basis of the site. In particular, the inspectors reviewed one Safety and Environmental Review Panel (SERP) meeting summary in detail.

The SERP's approval of Mine Unit 7 was reviewed, including the pre-mining groundwater quality baseline values, upper control limit (UCL) determination, and restoration goals. The SERP approved Mine Unit 7 operation in its July 8, 1999, meeting (SERP 99-02). Mine Unit 7 was the most recent mine unit approved by the SERP and two wellfields in this mine unit were in operation (Wellfields 28 and 30) at the time of the inspection.

As part of the performance-based license evaluation, the inspectors reviewed site Procedures P-23, "Mechanical Integrity Test," E-1, "Stabilization for Baseline Sampling," E-2, "Groundwater Baseline Water Quality Sampling," and E-5, "Routine Monitor Well Sampling." A detailed review was conducted on Wellfield 28 in Mine Unit 7, and drilling operations were observed. The inspectors concluded that SERP approval of Mine Unit 7 was technically adequate and in compliance with the license and internal operating procedures.

2.3 Site Tour

Site tours were performed to verify that activities were being conducted in accordance with applicable regulations and the conditions of the license. During the site tour, buildings, equipment, fences, and gates were observed. Site fences were in good condition and were properly posted in accordance with License Condition 9.11. The mill and related components appeared in good condition and properly operated. No equipment misalignments were identified, and no process flow, level, or pressure parameters were found outside of their required ranges. Housekeeping was adequate with no loose trash or debris identified on the floor. No health or safety hazard was identified during the site tours.

The inspectors performed independent radiological surveys using an NRC-issued Ludlum Model 19 microRoentgen meter (Serial Number 33541, calibration due date of October 12, 2000) that was calibrated to radium-226. Areas surveyed included the Central Processing Facility, the Reverse Osmosis Building, and Well House 28. No area was identified as a radiation area (exposure rate of greater than or equal to 5 millirems per hour) that was not already identified and labeled as a radiation area by the licensee.

2.4 Evaporation Ponds

License Condition 10.6 states that the Research & Development ponds shall have at least 0.9 meters (3 feet) of freeboard and the commercial evaporation ponds shall have at least 1.5 meters (5 feet) of freeboard. License Condition 10.6 also requires the licensee to keep a sufficient reserve capacity to enable the transfer of contents from one pond to the other ponds. An inspection of the ponds was conducted. The inspectors noted that the freeboard limits and reserve capacity were in compliance with the license requirements. The inspectors noted that the licensee was relying less on the ponds and more on the Deep Disposal Well to handle liquid waste disposals; therefore, the licensee did not routinely maintained the ponds at full capacity.

License Condition 11.4 requires the licensee to perform and document pond inspections. An observation of the licensee's routine pond inspection was made and

operating Procedure C-1, "Waste Pond Inspection," was reviewed. Procedure C-1 outlined a step by step process for determination of a potential liner leak by first measuring the amount of water in a leak detection standpipe (the pipe running in between the liners beneath the pond). Then, if more than 6 inches of fluid was observed, a measurement of specific conductance was made. If the conductivity reading was higher than 50 percent of the conductivity of the pond water, then the standpipe water was to be sampled for excursion parameters.

The inspectors noted that the procedure was unclear as to when a liner leak was determined; after the licensee determined that the conductivity was at least 50 percent of the pond water or after the excursion parameters were determined. This discrepancy was reported to the licensee during the exit meeting, and the licensee stated it would review and modify the procedure to clearly delineate when a pond leak was occurring.

An inspector toured the ponds and noted rills, animal burrowing, and minor erosion on the western slopes of the commercial evaporation ponds. These erosional features did not appear to pose an immediate threat to pond failure or human health and safety. This observation was mentioned to the licensee in the exit meeting. The licensee stated that they periodically repair these types of problems each summer and the current problems will be repaired, weather permitting, in the near future.

After observing the licensee's staff inspect the ponds and after a review of site records, the inspectors concluded that the licensee's inspections followed the license conditions and internal procedures, and the inspections were technically adequate.

2.5 Management of Spills

License Condition 12.4 states that until license termination, the licensee shall maintain documentation on all spills of source or 11e.(2) byproduct materials. Also, the licensee is required to notify the NRC of any spill that may have a radiological impact on the environment. The maintenance of the spill records is required, in part, by the decommissioning record-keeping requirements of 10 CFR 40.36(f). Records of the 1999-2000 spills were reviewed to ascertain whether the licensee reported any significant spills to the NRC.

The licensee maintained extensive spill records for all solution releases. Records indicated that the licensee experienced 46 spills during 1999 and 4 spills during 2000. Most spills were caused by piping component wear or failure, stuck or leaking pressure relief valves, human error, and open or leaking bleed valves. The licensee's SERP reviewed the 1999 spills as part of the performance-based licensing process to ascertain whether any trends existed.

During the previous inspection, the inspectors considered 2 of the 46 spills as potentially reportable to the NRC. The licensee did not report these two spills, and the licensee disagreed with the inspectors' interpretation of what was reportable. This issue was considered an NRC Unresolved Item during the previous inspection. At the conclusion of this inspection, the NRC still had not finished its review of the spill reporting requirements applicable to all in-situ leach facilities. Therefore, this subject area will be reviewed by the NRC at a later date.

2.6 Failure of Yellowcake Drum Lid Seals

During 1999, the licensee experienced several events where the lids on sealed drums of yellowcake material came loose because the associated seal ring bolt assembly had failed. In each instance, individuals were subjected to bioassay sampling to ensure that they had not ingested licensed material. 49 CFR 173.427 stipulates that yellowcake material be shipped in a strong, tight package that prevents leakage of the radioactive contents under normal conditions of transport. The licensee stated that no drum seal had failed during transport, and the seal failures most often occurred during the initial sealing (tightening) of the drum seal.

The seals that had failed were used (second-hand) seals that came with empty drums. These empty drums were subsequently refilled with yellowcake material. The licensee had new, stronger seal rings available onsite, but the licensee did not use these new seals unless the old seals were damaged or otherwise unusable.

This issue was still under review by the licensee at the end of the onsite inspection. One potential corrective action being contemplated was to use new seals on all drums. A second potential corrective action was to establish torque specifications for the older ring bolts to avoid over-tightening the bolts. The inspectors noted that the licensee had performed an adequate investigation of the problem, and the proposed corrective actions should help eliminate the problem.

2.7 Conclusions

The licensee had correctly implemented the requirements of the performance-based license. Plant process parameters were within the licensed limits, site fences were in good condition, and perimeter postings were appropriate. Radiation areas were properly posted. The inspectors reviewed the licensee's investigation of several yellowcake drum seal failures, and the inspectors concluded that the licensee was implementing appropriate corrective actions. In conclusion, site activities were conducted in accordance with applicable license and regulatory requirements.

3 Radiation Protection (83822)

3.1 Inspection Scope

The scope of this portion of the inspection was to determine if the licensee's radiation protection program was in compliance with the license and 10 CFR Part 20 regulations.

3.2 Occupational Exposure Monitoring

The licensee's exposure monitoring program was reviewed to ensure that no worker exceeded the occupational dose limits specified in 10 CFR 20.1201. The program consisted of issuance of thermoluminescent dosimeters (TLDs) to site workers and collection of air particulate samples for natural uranium and radon daughters. The inspectors reviewed the licensee's records for calendar year 1999 and concluded that no individual exceeded the NRC's annual dose limits.

The licensee monitored 21 individuals during 1999, primarily workers in the Central Processing Facility. TLDs were issued to these site workers for monitoring of external exposures. The licensee's records indicate that the highest external exposure for 1999 was 114 millirems.

The licensee performed air sampling for uranium on a monthly basis. No sample result in the general plant area exceeded the action level, and the average sample result for 1999 was less than 1 percent of the derived air concentration value listed in 10 CFR Part 20, Appendix B, Table 1, "Occupational Values." Air samples were also obtained during yellowcake packaging operations. These sample results occasionally exceeded the action level; however, respirators were required during these operations. The respirator protection factors were used in the licensee's calculation of internal occupational exposures.

Radon daughter sampling was conducted monthly unless the action level was exceeded, then the required sampling frequency was weekly. The average concentration over the review period was 0.041 Working Levels, or 12 percent of the derived air concentration value. On multiple occasions, the lowest action level (0.08 Working Levels) was exceeded. Corrective actions were taken in each instance.

Only one radon daughter sample result exceeded the derived air concentration level of 0.33 working levels. On July 15, 1999, the licensee measured 0.475 working levels between the precipitation and eluent tanks. A plugged ventilation duct was subsequently found and repaired. The licensee resampled the area later that day and the sample result was below the lowest action level.

In early 2000, the licensee calculated the total effective dose equivalent (TEDE) values for each monitored worker. The licensee used the TLD results for determination of external exposures and the radon daughter and natural uranium results from air sampling for determination of internal exposures. The licensee conservatively calculated the TEDE values assuming a 100 percent occupancy factor for the workers. The highest TEDE was determined to be 0.818 rems, while the second highest TEDE was 0.788 rems. The occupational TEDEs were primarily the result of exposure to radon daughters. Regardless, the 1999 occupational exposure results were well below the NRC's annual TEDE dose limit of 5 rems listed in 10 CFR 20.1201.

One female worker declared her pregnancy during 1999. The licensee issued this employee a TLD and collected special work area air samples to monitor the dose to the worker. The worker's TEDE during the gestation period was 69 millirems with an NRC limit of 500 millirems per 10 CFR 20.1208.

3.3 Contamination Control Program Review

The contamination control program requirements are provided in Table 5.7-18, "Radiological Monitoring Program Summary," of the NRC-approved license renewal application as well as License Conditions 9.3, 9.8, 10.11, and 10.12. The contamination control program consisted of surface contamination surveys, skin and personnel clothing surveys, equipment release surveys, and bioassay sampling.

Table 5.7-18 specifies that eating rooms, change rooms, control rooms, and office areas shall be surveyed for alpha contamination on a weekly basis. The licensee surveyed the restricted and unrestricted areas using hand-held instruments for detection of total alpha contamination (fixed and removable). In addition, smear tests for removable alpha contamination were performed monthly in the unrestricted areas. All 1999 sample results were below the respective license and action level limits. In summary, the licensee appeared to have maintained control over surface contamination in all areas of the facility.

License Condition 10.11 states that employees shall monitor themselves with an alpha survey instrument prior to exiting the restricted area. Should the results of monitoring exceed the action level, employees shall decontaminate themselves to less than the action level. Also, Table 5.7-18 states that the licensee shall perform and document unannounced quarterly spot checks of the skin and personal clothing of employees exiting the controlled areas. The licensee maintained an extensive number of log entries in this program area. A random check of the licensee's records suggested that site employees were monitoring themselves with an alpha survey meter prior to exiting the restricted area. However, during 1999-2000 two individuals failed the spot checks. One individual failed the spot check on two separate occasions. In all three cases, contamination was removed from the individuals prior to the individuals exiting the controlled area. These three incidents indicated a potential need for reinforcement instruction on frisking requirements and techniques.

In accordance with License Condition 9.8, the release of equipment or packages from the restricted area shall be in accordance with the NRC guidance document entitled, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials." The licensee's equipment release records for 1999 were reviewed during the inspection. The licensee maintained extensive, detailed records of equipment released from the site. The licensee's records indicated that no items had been released with contamination in excess of the fixed surface and removable contamination limits that are specified in the NRC guidance document.

The bioassay program requirements are listed in License Conditions 9.3 and 10.12. The licensee collected about 150 samples from site workers during 1999. The sample frequency varied depending on work assignment. Workers who had the potential for exposure to dried yellowcake material were sampled monthly, including operators who packaged the yellowcake. Others were sampled at least annually.

During July 1999, one individual submitted a diagnostic sample following an incident involving a loose lid ring on a drum of yellowcake material. The first sample result taken about 1-hour after the incident revealed 81 micrograms of uranium per liter of urine. The two subsequent samples, obtained the second and third days after the incident, were both below the detection level of 5 micrograms per liter. The radiation safety officer concluded that the initial sample result was most likely not valid and was the result of sample contamination by the worker. The radiation safety officer made this conclusion based on the time of the sample collection (within 1-hour of the incident) and because the subsequent two sample results did not contain measurable amounts of uranium in the samples. The inspectors noted that even if the initial sample result had

been valid, it would not be indicative of exceeding the uranium uptake limit of 10 milligrams in a week specified in 10 CFR 20.1201.

3.4 Ambient Gamma and Beta Radiation Surveys

Table 5.7-18 of the license application requires the licensee to conduct surveys for external gamma and beta radiation. Gamma surveys were required to be conducted semi-annually in the mill and quarterly in radiation areas. The licensee conducted the gamma surveys on a monthly basis during 1999. The inspectors reviewed the 1999 records. The two areas that routinely had the highest gamma exposure rates were the reverse osmosis membrane tubes (up to 14 millirems per hour) and injection filters (up to 14 millirems per hour). The waste demister box, located in the Central Processing Facility, initially had a surface measurement of 20 millirems per hour. The licensee installed lead shielding and a boundary around the box during March 1999 to reduce the ambient exposure rates to about 2 millirems per hour.

External beta radiation is required to be measured annually. In practice, the licensee calculated the beta radiation in accordance with the guidance provided in NRC Regulatory Guide 8.30. The last assessment, performed during 1987, conservatively concluded that the projected dose to the extremities (hands) was about 2 rems per year. The current regulatory limit for extremities is 50 rems per year as listed in 10 CFR 20.1201. Regulatory Guide 8.30 further states that beta surveys need to be done only once for an operation but should be repeated at any time the equipment or operating procedure is modified in a way that may have changed the beta dose that would be received by the worker.

The inspectors noted that the licensee, as a minimum, increased the plant throughput since the original beta assessment was performed in 1987. The radiation safety officer stated that the beta dose calculation would be reconfirmed using current plant information. The inspectors concluded that the licensee's failure to update the beta dose calculation on an annual basis was not safety significant because of the conservatism that was included in the original calculation.

3.5 Radiation Work Permits

Radiation work permit requirements are provided in License Condition 10.9. The licensee issued 20 radiation work permits during 1999 and 3 thus far during 2000. Selected radiation work permits were reviewed and the documents were determined to meet the intent of the license.

3.6 Annual Program Review

License Condition 12.6 specifies that an annual As Low As Reasonably Achievable (ALARA) audit of the radiation safety program shall be performed in accordance with Regulatory Guide 8.31 and Section 5.3 of the license application. The most recent ALARA audit was conducted during February 2000. The audit identified and documented three potentially adverse conditions or situations.

First, the audit identified a potentially negative trend involving occupational exposures. The licensee observed that employee exposures increased during 1999 from the previous year. The increase was the result of an increase in radon progeny concentrations in the facility. The cause of the increase in radon progeny may be attributed to ventilation system problems such as plugged lines, cracks, and leaks. Corrective actions taken included repair of the ventilation system problems as they were identified.

The audit also identified a situation where maintenance was performed on the yellowcake belt filter without a radiation work permit. Further, the work was performed without the assistance or oversight of the radiation safety officer. Corrective actions taken included revision of the applicable procedure and discussion of the incident with plant operators.

A third situation involved the movement of a radiation area boundary without radiation safety officer approval. A plant operator moved a radiation area boundary resulting in a radiation area outside of the required boundary line. This situation was discovered by the radiation safety officer during a routine inspection of the restricted area several days later. Corrective actions taken included discussions with operators to reinforce the importance of radiation area boundaries.

The inspectors concluded that the licensee's annual program review, when combined with the routine plant inspections, were effective mechanisms for identifying and correcting situations that are potentially detrimental to worker health and safety.

3.7 Conclusions

The licensee had implemented a radiation protection program that met the requirements established in 10 CFR Part 20 and the license. Occupational exposures were below the applicable NRC limits. Contamination control efforts were generally effective with several minor exceptions. One bioassay sample result exceeded the action level, but the licensee concluded that this sample result was not valid.

4 Environmental Monitoring (88045)

4.1 Inspection Scope

The environmental monitoring and groundwater corrective action programs were reviewed to assess the effectiveness of the licensee's programs and to evaluate the impact, if any, of site activities on the local environment.

4.2 Environmental Monitoring

License Condition 11.3 states that the licensee shall establish and conduct an effluent and environmental monitoring program in accordance with the program submitted by letter dated March 18, 1999. Also, License Condition 12.1 states, in part, that the effluent and environmental monitoring program results shall be reported to the NRC in accordance with 10 CFR 40.65. The inspectors reviewed the licensee's semi-annual

effluent and environmental monitoring reports for 1999, and the inspectors reviewed the original laboratory data used in the development of these reports. The inspectors noted that the semi-annual reports were submitted to the NRC in a timely manner and provided all the relevant data.

The licensee performed air particulate, radon, surface water, sediment, water supply well, and ambient gamma radiation monitoring. The licensee utilized seven sample stations including one background (control) and three nearest resident stations. Air particulate sampling was performed at each station for a minimum of two weeks per month when the dryer was in use. The filters were composited on a quarterly basis and analyzed for natural uranium, radium-226, and lead-210 concentrations. All air particulate sample results were less than 4 percent of the applicable limits specified in 10 CFR Part 20, Appendix B, Table 2, "Effluent Concentrations."

Radon-222 was monitored at the seven sample stations. The track etch canisters were exchanged on a semi-annual basis. The highest sample result (0.8 picocuries per liter) was obtained at the fence line monitoring station No. 5 during the second half of 1999. This sample result was 8 percent of the applicable effluent concentration limit (with daughters removed).

As noted in the licensee's most recent annual ALARA report, radon-222 appears to be trending upward at all stations with the exception of the background station, although the sample results continue to remain below the 10 CFR Part 20, Appendix B, effluent concentration limit. This upward trend corresponds to the increased radon release rate from the facility because of the recent increase in plant flow rate from 3500 to about 4400 gallons per minute. The license specifies a maximum operational flowrate of 5000 gallons per minute.

Environmental thermoluminescent dosimeters (TLDs) were located at the sample stations to monitor the ambient gamma exposures. The TLDs were exchanged on a quarterly basis. The highest annual exposure was measured at fence line monitoring Station 5. This exposure was 20.6 millirems, with background subtracted.

Surface water samples were collected quarterly from each water impoundment in the wellfield area and each stream passing through the wellfield area. The grab samples were analyzed for natural uranium and radium-226 concentrations. All sample results were 12 percent or less of the applicable effluent concentration limit specified in 10 CFR Part 20, Appendix B, Table 2.

Sediment samples were required to be collected annually from two local streams (Squaw and English Creeks). The samples were collected twice during 1999 and analyzed for natural uranium, radium-226, and lead-210 concentrations. The samples obtained from the English Creek downstream location were noted to be slightly elevated when compared to the upstream location but comparable to the sample results for 1998. The inspectors noted that the difference was not significant, and the licensee's most recent annual ALARA report referred to the sample results as "anomalous natural background concentrations."

Water supply wells within 1-kilometer of the wellfields were grab sampled quarterly for natural uranium and radium-226 concentrations. Fifteen wells were sampled during 1999. The sample results were at or under 7 percent of the applicable effluent concentration limit listed in 10 CFR Part 20, Appendix B, Table 2.

4.3 Public Dose Assessment

The inspectors evaluated the public dose to ensure that site operations did not result in a total effective dose equivalent to individual members of the public in excess of 100 millirems per year, the annual limit specified in 10 CFR 20.1301. The evaluation included environmental monitoring data for 1999 and data at the background station and three nearest resident stations. Based on the highest dose measured for 1999, the dose to the public was well below the NRC's annual limit.

4.4 Groundwater Monitoring Program

License Condition 11.2 requires the licensee to sample all perimeter and upper aquifer monitor wells on a frequency of no more than 14 days apart (postponement requires documentation), specifies excursion criteria, and references corrective action procedures for excursions. License Condition 12.2 requires the licensee to notify the NRC in the event of an excursion. Procedure E-5, "Routine Monitor Well Sampling," and C-20, "Excursion Monitoring," were reviewed. Following the review of the sampling records and after observing licensee staff implement the sampling procedures, the inspectors concluded that the groundwater sampling program was technically adequate and in compliance with the license condition and the licensee's procedures.

4.5 Conclusions

The licensee collected and reported all environmental and effluent monitoring samples that was required by the license. No sample result exceeded the applicable NRC regulatory limits. Radon-222 was observed to be trending upward, but this upward trend was the result of a recent increase in the plant's uranium production throughput. A review of the environmental and effluent monitoring programs confirmed that the licensee conducted operations in such a manner that the doses to the nearest resident were below the NRC's annual limit. In conclusion, the licensee effectively implemented the environmental and effluent monitoring programs, and the site did not have an adverse impact on the local environment.

5 Followup (92701)

5.1 (Open) Unresolved Item 040-08943/9902-02: NRC Review of Criteria For Reporting Significant Spills.

During the September 1999 inspection, the NRC performed a review of the licensee's spill records for 1999. The inspectors identified two spills that may have met the criteria for reportability although the licensee did not report these two incidents, in part, based on the licensee's interpretation of what constitutes a reportable spill. At the conclusion

of the March 2000 inspection, the subject of reportability was still under review by the NRC; therefore, this Unresolved Item remains open.

5.2 (Closed) Licensee Event Report (NMED Event No. 980375): Well SM6-26 Excursion.

On March 19, 1998, during routine bi-weekly water sampling of SM6-26, the multiple UCL for sulfate and the single UCL for chloride were exceeded. NRC was notified on March 21, 1998. After sampling the well for a period of time, the licensee concluded that these increases were a result of natural fluctuations in groundwater and not due to mining operations. The concentrations subsequently decreased to below the UCL for three consecutive weekly sampling periods thereby ending the excursion status. This excursion was closed by NRC letter dated August 6, 1998.

5.3 (Open) Licensee Event Report: Well I-196-5 Excursion.

On March 29, 1999, Well I-196-5 failed a mechanical integrity test. Subsequent testing identified a leak in the well casing at a coupling 40 feet below ground level. The licensee has delineated the excursion and conducted remedial actions in the form of groundwater pumping. This excursion is still considered an open issue because final restoration goals have not been established. The excursion is considered controlled based on the cause for the excursion being repaired (casing coupling failure) and the licensee's groundwater pumping efforts minimizing further migration of constituents through groundwater.

5.4 (Closed) Licensee Event Report (NRC Event No. 35888, NMED Event No. 990415): Well CM6-6 Excursion.

On July 1, 1999, during routine bi-weekly water sampling of perimeter Well CM6-6, the multiple parameter UCL was exceeded for sodium, sulfate, chloride, conductivity and alkalinity. This was reported to the NRC on July 2, 1999, as required under License Conditions 9.2 and 12.2. The licensee overproduced the area by 12 gallons per minute to ensure that mining solutions in the vicinity of CM6-6 were recovered, and the licensee revised their production/injection balance to remedy the problem. Subsequent concentrations of the indicator parameters decreased below the concentration levels for three consecutive weekly sampling events, and the NRC closed this excursion event by letter dated October 14, 1999.

5.5 (Closed) Licensee Event Report: Mechanical Integrity Test Failure of Well I-567.

On September 20, 1999, injection Well I-567 failed the 5-year mechanical integrity test. Well I-567 is located in Wellfield 13 in Mine Unit 4. The licensee installed monitoring points adjacent to I-567 and sampled groundwater for the five excursion parameters (chloride, alkalinity, sulfate, specific conductance, and sodium) to determine if groundwater adjacent to the failure was impacted. This is summarized in the licensee's submittal dated October 12, 1999, and concludes that groundwater impact has not occurred as a result of this integrity failure. Based on the review of this submittal during the inspection and by NRC headquarters staff, it was concluded that the licensee took appropriate actions. The NRC considers this issue closed.

5.6 (Open) Licensee Event Report (NRC Event No. 36770, NMED No. 000168):
Well SM6-18 Excursion.

One potential excursion occurred in Well SM6-18, 2 weeks prior to the inspection. Chloride concentrations were one to two parts per million over the single UCL. The licensee properly reported this excursion to the NRC on March 8, 2000, and followed the increased sampling protocol as required by License Condition 11.2. Chloride was the only parameter that showed an increasing trend. A 60 day excursion report is required as stipulated in License Condition 12.2.

The licensee stated that the increase of chloride was due to natural fluctuations and was not impacted by mining operations. The licensee supported this determination by noting that the other parameters (alkalinity, sulfate, specific conductance, and sodium) did not show an increasing trend, this situation has occurred in the past in Well SM6-26, and the UCLs are too low for Mine Unit 6. The licensee indicated that it will continue to sample this well on a weekly basis until three consecutive samples are below the exceeded UCL. The inspectors concluded that the licensee was following the license and internal procedures in monitoring this potential excursion.

6 Exit Meeting Summary

The inspectors presented the inspection results to the representatives of the licensee at the conclusion of the inspection on March 22, 2000. Licensee representatives acknowledged the findings as presented. The licensee did not identify anything reviewed by the inspector as proprietary.

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Griffin, Manager of Environmental/Regulatory Affairs
R. Grantham, Radiation Safety Officer
C. Miller, Plant Superintendent

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None.

Closed

None.

Discussed

040-08943/9901-02 URI NRC Review of Criteria For Reporting Significant Spills.

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
NMED	Nuclear Materials Event Database
PDR	Public Document Room
RWP	radiation work permits
SERP	Safety and Environmental Review Panel
TEDE	total effective dose equivalent
TLD	thermoluminescent dosimeter
UCL	upper control limit