May 13, 2014

Mr. Steve Tarlton, Program Manager
Radiation Control Program
Hazardous Materials & Waste Division
Colorado Department of Public Health
& Environment
HMWMD-RAD-B2
4300 Cherry Creek Drive South
Denver, CO 80246

Dear Mr. Tarlton:

On October 1, 2004, the Colorado Department of Public Health & Environment (CDPHE) submitted a draft Completion Review Report (CRR) to the U.S. Nuclear Regulatory Commission (NRC) regarding the proposed termination of the Hecla Mining Company's (Hecla) license for the Durita site, located in Montrose County, Colorado (Colorado Radioactive Material License No. 317-02) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML042870433). The draft CRR stated CDPHE's position that all applicable standards and requirements had been met at the Durita site to allow the Hecla Mining Company license to be terminated.

The October 2004 draft CRR was reviewed by the NRC staff in accordance with the process outlined in the Office of Federal and State Materials and Environmental Management Programs (FSME) Procedure SA-900, "Termination of Uranium Mill Licenses in Agreement States." This review was necessary in order for the NRC to make a determination that all applicable standards and requirements pertaining to the uranium mill site and 11e.(2) byproduct material were met. Inherent to this determination is an NRC finding that it concurs with CDPHE that the site and the material do not pose a risk to the public health and safety or the environment. Under 10 CFR 150.15a(a) and Section 274c of the Atomic Energy Act of 1954, as amended, the NRC must make this determination before an Agreement State may terminate a uranium milling license.

As summarized below and discussed in detail in the Enclosure, based on our review of the October 2004 draft CRR and additional information provided by CDPHE, the NRC has concluded that the information provided by the State is insufficient to support the requisite NRC determination, i.e., that the NRC concurs with CDPHE's determination that the 11e.(2) byproduct material disposed of at the Durita site does not pose an unacceptable risk to public health and safety or the environment.

Following CDPHE's submission of the October 2004 draft CRR to the NRC, a number of exchanges occurred between our agencies; these are listed in the Enclosure. An issue that has remained unresolved is CDPHE's decision to allow Hecla to discontinue ground water monitoring at the Durita site.

Through correspondence, discussions, and public meetings, the NRC has asked CDPHE to provide information to support its regulatory and technical basis for discontinuing the ground water monitoring program at the Durita site. Based on our review of the information provided by CDPHE, in 2005 (ML053360225) and again in 2006 (ML060730466), the NRC notified CDPHE that the NRC would be unable to concur with the ground water section of the CRR because it was not compliant with applicable standards and requirements and recommended to CDPHE that the licensee install an appropriate number of monitoring wells to sample the ground water and evaluate potential seepage from the tailings pile and closure cell at the site. The State disagreed with the NRC's recommendation and stated that the discontinuation of the ground water monitoring program was justified.

In an effort to resolve this matter, in July 2006, the NRC staff reviewed available documents maintained by CDPHE and visited the Durita site. The results of these activities were documented in an NRC staff assessment of hydrogeologic conditions at the Durita site, issued in May 2007 (ML071710354). The assessment concluded, in part, that additional ground water information or monitoring at the Durita site was necessary to determine whether there is an unacceptable risk to public health from the 11e.(2) byproduct material at the site. Following issuance of the NRC's assessment, a public meeting was held on May 9, 2007, to discuss its conclusions was held by the NRC with representatives of CDPHE and Hecla. On October 25, 2007, CDPHE transmitted a revised draft CRR to the NRC (ML14055A254). In November 2007, CDPHE responded to the NRC's assessment, restating CDPHE's position that there was no need for additional ground water monitoring at the Durita site.

In the time that followed, the information previously gathered by the NRC staff and the supplemental information provided by CDPHE continued to be reviewed. In May 2012, the NRC held a public meeting, at the request of Hecla, to provide an update on the status of the draft CRR for the Durita site. In May 2013, the NRC staff participated as observers during the CDPHE annual inspection of the Durita site. The NRC staff also undertook a comprehensive re-review and analysis of the available information regarding the site.

The re-review and analysis concluded that additional ground water monitoring at the Durita site is necessary before the NRC will be able to concur with CDPHE's determination. The State should coordinate with Hecla to assess the temporal variation of ground water flow based on the water levels collected from the wells and install additional wells in the uppermost saturated zone at the immediate downgradient edge of the waste disposal areas. Sufficient data, consisting of at least an additional two years of renewed ground water monitoring, should be collected to demonstrate that 11e.(2) byproduct material at the Durita sites does not pose an unacceptable current or future risk to public health and safety and the environment. Depending on the monitoring results, additional data may be needed to provide a reasonable assurance that any hydraulic communication between the uppermost saturated zone within the basal Mancos formation and the underlying Dakota sandstone aquifer is minimal, and that it is less likely that the Dakota aquifer would be impacted by the wastes stored at the Durita site if leachates or seepages occur from these disposal areas. A summary of our re-review and analysis is included in the Enclosure.

To fulfill its statutory responsibility, the NRC must determine that all applicable standards and requirements have been met prior to termination of an Agreement State license. Accordingly, the NRC needs to have high confidence that the 11e.(2) byproduct material disposed of at the Durita site will not pose an unacceptable risk to public health and safety or the environment.

Based on our review of the October 2004 draft CRR and the additional information provided by CDPHE, we conclude that the State has not provided adequate information and data to determine that there is not an unacceptable risk to public health and safety and the environment from wastes stored at the Durita site. Without additional information, the NRC will be unable to concur on a final CRR for the Durita site and the State will not be able to terminate the site's license.

Furthermore, the U.S. Department of Energy, Office of Legacy Management, has also noted that if ground water monitoring is deemed necessary, it would expect an additional two years, at least, of renewed ground water monitoring prior to transfer for long-term care. The transfer process will not commence until the NRC concurs on the final CRR for the site. Concurrence can only be provided by the NRC based on a final CRR that demonstrates that all applicable standards and requirements have been met.

If you have any questions, please contact Mr. Duncan White at 301-415-2598 or Duncan.White@nrc.gov.

Sincerely,

/RA/

Laura A. Dudes, Director
Division of Materials Safety and State Agreements
Office of Federal and State Materials
and Environmental Management Programs

Enclosure:
Summary of the NRC's Review of the Draft
CRR and Supporting Documentation

cc:
Mr. Richard Bush, UMTRCA Program Manager

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OFC	ASPB	ASPB	DWMEP
NAME	JFKatanic	ADWhite	LGuo
DATE	4/2/2014	4/7/2014	4/3/2014
OFC	DWMEP	OGC	MSSA
NAME	MNorato	BJones NLO	LDudes
DATE	4/7/2014	4/28/2014	5/13/2014

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U.S. Nuclear Regulatory Commission (NRC)
Summary of the NRC's Review of the
Draft Completion Review Report (CRR) and Supporting Documentation
Submitted by the
Colorado Department of Public Health & Environment (CDPHE)
Regarding the Hecla Mining Company Durita Site

Licensee:	Hecla Mining Company
License No.:	RML-317-02
Type of License:	Heap Leach Recovery Uranium Milling License
Location:	Montrose County, Colorado
Full/Partial Termination:	Full License Termination
Site Being Terminated:	Durita
Area Being Terminated:	Approximately 160 contiguous acres

NRC Roles and Responsibilities

As set forth in Section 274 of the Atomic Energy Act, as Amended, and 10 CFR 150.15a(a), NRC has the statutory authority and responsibility to concur on an Agreement State's license termination decision for uranium milling facilities licensed by an Agreement State.

Section 274 of the Atomic Energy Act, as Amended, describes the NRC cooperation with the States and provides for the NRC to enter into agreements with the Governor of any State to provide for discontinuance of the NRC's regulatory authority. Section 274c states, in part, that the Commission shall retain authority under any such agreement to make a determination that all applicable standards and requirements have been met prior to termination of a license for byproduct material, as defined in section 11e.(2).

Section 150.15a(a) of 10 CFR, *Continued Commission authority pertaining to byproduct material*, states, in part, that prior to the termination of any Agreement State license for byproduct material, or for any activity that results in the production of such material, the Commission shall have made a determination that all applicable standards and requirements pertaining to such material have been met. Inherent to this determination is an NRC finding that it concurs with CDPHE that the site and the material do not pose a risk to the public health and safety or the environment.

The Office of Federal and State Materials and Environmental Management Programs (FSME) Procedure SA-900 "Termination of Uranium Milling Licenses in Agreement States," describes the process to be used by the NRC staff to make the determination that all applicable standards and requirements have been met prior to an Agreement State terminating a uranium milling license. In general, the Agreement State conducts its review for decommissioning, reclamation and/or ground water restoration in accordance with its license requirements and State standards and requirements that are to be compatible with the applicable NRC requirements. The Agreement State is expected to approve its licensees' remediation plans and ensure that remediation activities have been completed in accordance with the approved plans consistent with applicable standards and requirements.

The general review process described in SA-900 consists of the Agreement State formally submitting a draft CRR to the NRC for review and comment before the Agreement State submits a final CRR. As described in SA-900, the NRC staff should not duplicate the State's review or conduct an independent detailed technical review of the proposed license termination or other supporting documentation. Rather, the NRC staff should examine whether the draft CRR has documented the basis for the State's conclusion that all applicable standards and requirements have been met. If, however, there are obvious flaws identified in the draft CRR or there are unique circumstances, the NRC staff may require more detailed technical information to conduct its review and fulfill its statutory responsibilities. A determination by the NRC that all applicable standards and requirements has been met prior to license termination can be made after the NRC reviews the following: (1) the final CRR that documents the State's bases that all applicable standards and requirements have been met; and (2) a review of the results of the State's uranium recovery program conducted under the Integrated Materials Performance Evaluation Program.

The Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA), provides for the remediation/reclamation of uranium mill tailings at Title I and Title II sites. The Durita site is a Title II site under UMTRCA. The U.S. Department of Energy (DOE), Office of Legacy Management (LM), will be the long-term custodian of the Durita site. Long-term custody can take place when the site specific license has been terminated and the NRC accepts the Long Term Surveillance Plan (LTSP) prepared by DOE LM. The NRC review of a draft LTSP is a separate process that is not part of the draft CRR review.

Site General Description and History

The Hecla Mining Company's (Hecla) Durita site is a heap leach uranium milling and tailings disposal site that is located on approximately 160 acres near Naturita in Montrose County, Colorado. The Hecla Durita site is licensed by the State of Colorado (Radioactive Materials License 317-02). The site was operated, decommissioned, and reclaimed under the Colorado license.

The license for the site was issued in 1976 to Ranchers Exploration and Development Corporation. In 1977, the facility was constructed and began operations as a secondary-extraction heap leach facility that recovered uranium and vanadium from mill tailings that had originally been processed through a mill in Naturita, Colorado. Tailings were trucked to the Durita site and placed into one of three heap leach tanks (piles) to which a dilute sulfuric acid solution was applied. The solution leached uranium and vanadium which was then transferred to an onsite extraction plant where uranium and vanadium were recovered by ion exchange and solvent extraction. Liquid waste was stored in six onsite evaporation ponds.

Operations at the site ceased in May 1979. At the close of operations, the three leach tanks at the site contained the following amounts of tailings: Tank 201: 267,300 cubic yards; Tank 202: 287,100 cubic yards; and Tank 203: 178,100 cubic yards. In 1984, Hecla merged with Ranchers Exploration and Development and became the owner of the Durita site. From the end of operations in 1979 to 1993, site activities consisted of licensee custodial care, monitoring, and some decontamination. In 1991, Hecla submitted a reclamation plan to CDPHE, which was accepted by CDPHE in 1993. During reclamation, some mill debris was disposed of by onsite burial in the out slopes and toes of the leach tanks.

In addition, the evaporation ponds were stabilized and consolidated into an onsite engineered closure cell with some demolition debris and radioactively contaminated soil. The collection pipes at the base of the leach tanks were plugged with concrete and the leach thanks were covered with an engineered earthen radon barrier, with re-vegetation of the top and a rock layer to prevent erosion on the out slopes. Reclamation of the site, in accordance with the plan that was approved by CDPHE, was completed in 1999.

Site Geologic Description

The 160 acre Durita uranium heap leach site is located on a gently sloping terrain at the southeast end of the Paradox valley, near Naturita, Colorado. The site subsurface materials consist of surficial alluvium deposits, underlain by Mancos Shale and Dakota Formation (sandstone interbedded with shale). The alluvium sediments consist of an unconsolidated heterogeneous mixture of clay, silt, sand and gravel, and are not laterally continuous across the site. Most of alluvium is distributed along the three intermittent, south to north drainage channels through the eastern and western boundaries and center of the site with a thickness of up to approximately 25 feet observed in borings (CDPHE, 2007). The drainage through the center of the site is enhanced as a diversion channel to route the surface runoff from upslope areas, including three heap leach waste disposal locations. Another diversion channel was built to route water from the steep slopes of Mancos Hill away from the evaporation pond waste impoundment (CDPHE, 2004).

The Mancos Shale, either exposed or covered by shallow alluvial deposits at the Durita site is believed to be the lower sections of the formation. It is severely weathered, especially near the surface (CDPHE, 2007), frequently exhibiting horizontal bedding planes, intercalated with more resistant claystone layers. The shale and claystone layers are cut by fractures and joints. The Mancos Shale also has inter-layered sandstone near the base of the formation. These basal interbedded sandstone layers form a transitional contact with the underlying Dakota Sandstone. As with the shale and claystone layers of the Mancos Shale subunits, the sandstone is also cut with near-vertical fractures of meter-scale length or longer, some with millimeter-scale aperture. The fractures and occasional faults found in the Mancos may have resulted from the structural uplift and subsequent collapse of a salt dome of the Paradox basin where the Durita site is situated. Fractures, joints, bedding planes, and occasional faults are observed in the sandstone layers with all other subunits of the basal Mancos at the interface with Dakota Formation in the outcrops along the Dry Creek north of the site.

However, the presence and extent, both areal and vertical, of these fractures and joints in the lower part of the Mancos and transition zone to the underlying Dakota formation are essentially unknown beneath the Durita site due to a lack of data. It is generally accepted that the extensive fractures observed in the near surface of Mancos are further exacerbated by stress relief and weathering when the upper part of the Mancos was eroded. If these fractures and joints are present in the lower Mancos and transition zone to the Dakota, they will provide conduits for percolation and ground water flow from the uppermost saturated zone within the Mancos to underlying Dakota sandstone aquifer.

Site Ground Water System

The uppermost saturated zone identified beneath the Durita site is located within the basal Mancos Formation and the transition zone to the Dakota Formation, with the Dakota and upper Morrison Formation as a regional aquifer.

During the geotechnical investigation conducted in 1977, 22 exploration boreholes and 32 percolation test borings were drilled in the general areas of the former evaporation pond and the leach tanks (CDPHE, 2007). Other installed borings with available boring logs include 7 monitoring wells completed in 1991 at the site (CDPHE, 2008). The depth of these borings varies greatly, ranging from a few feet to a maximum of 85 feet. A review of these borehole logs indicates that the uppermost saturated zone of ground water was found within the Mancos Shale, and no ground water or perched zone was observed in the alluvium at the site. However, perched aquifer in the alluvial deposits above the Mancos Shale was reported to the northwest of Dry Creek, indicating the occurrence of recharge from direct infiltration of precipitation and seepage of surface water from local drainages and runoff in the region (Fox, 1982).

The nearest user of ground water is the Coke Oven Ranch, located approximately a half mile northwest of the Durita site. The water supply well at the Coke Oven Ranch is completed in the aquifer within the Dakota Sandstone, with depths from 180 to 250 feet (NRC, 2007). Detailed information regarding the extent of a hydraulic connection between the uppermost water-bearing units at the Durita site and the underlying Dakota sandstone aquifer has not been made available for review. Although the Mancos shale is generally considered to be impermeable, the presence of fractures may weaken the integrity of Mancos as an effective impermeable layer to prevent downward migration of contaminants to the underlying aquifers.

Hydraulic Characteristics of the Uppermost Water-Saturated Zone

The ground water detection monitoring network established in 1991 consisted of seven wells, MW-8 through MW-14, completed in the sandstone layers with alternating shale and claystone in the lower portion of Mancos Formation. It has been noted that the uppermost water-bearing (saturated) zone identified in the sandstone layers within the lower portion of the Mancos shale was not likely capable of yielding a significant amount of ground water to wells. As a result, this may not fit the definition of an aquifer in 10 CFR Part 40, Appendix A or 6 CCR 1007-1, § 18.2. However, detection monitoring at the Durita site was performed in the uppermost saturated zone in the basal sandstone layers of Mancos shale, and the underlying Dakota sandstone is the uppermost aquifer at the Durita site.

The uppermost saturated zone being in a fractured media is complex. The well configuration and water level measurement data (e.g., those collected in 1991-1993) suggest that the uppermost saturated zone might be under confined condition in some areas, and unconfined in other areas (e.g., near MW-12). Apparent confined conditions may have resulted from misplacement or insufficient length of the well screen due to the uncertainty of water-bearing zone location or thickness, and intercept by borehole of fractures connected with saturated conditions at higher stratigraphic elevations. The water-bearing unit in MW-14, for instance was not identified during installation in the entire depth of 85 feet below the surface.

Monitoring well MW-14 was completed with a 10 foot long screen at the Mancos and Dakota transition zone at around 75 feet depth. The water levels in MW-14 later raised above the top of the well screen, resulting in a confined condition. It is also possible that the confinement nature of this uppermost water-bearing zone exhibits spatial variability across the site depending on the degree of the Mancos shale permeability.

Based on the limited water level data available at the site, it appears that the uppermost saturated zone is hydraulically connected with the land surface (under an unconfined condition). As the monitoring wells were completed, with a 10 foot long well screen over multi-stratigraphic units (sandstone, claystone, and shale) within the lower Mancos, the water level measurements made in these monitoring wells represented "average" water levels in the uppermost water-bearing zone. It is not possible to evaluate each of these units, or hydraulic connection between these units. However, spatial and temporal changes in water levels measured previously from these monitoring wells were analyzed to understand the hydrogeology of uppermost saturated zone as a whole. If the uppermost saturated zone is under an unconfined condition, it can be impacted by leachates from the wastes disposed at the site if seepage occurs. The NRC staff previously found that water levels from 1991 to 1993 were highly erratic, with an increase in MW-14, decreases in MW-9 and MW-11, and steady in MW-8 and MW-12 (NRC, 2007). Site reclamation activities that occurred during this time may have temporally altered the natural hydrogeological pathways, and may have been responsible for these water level variations. Water levels from 1993 to the end of the monitoring period show a consistent temporal pattern among monitoring wells, especially with pronounced increases in response to the relatively large amounts of precipitation that occurred in 1997. Spatial variation was also observed in water levels among monitoring wells. Although MW-9 and MW-10 were located in relative close proximity to each other, the water level increased by only about 1.0 foot in MW-9 versus 5.5 feet in MW-10 during the 1996-1998 time period. This spatial variation in water level response is not consistent with the characteristics of a confined aquifer, with a distant upslope recharge where the sandstones interbedded with shales and claystones intercept the land surface. The observed spatial patterns in water levels are likely the result of varying local recharge, implying that the uppermost saturated zone appears to be connected hydraulically to the land surface through various flow pathways in the fractured shale formation (NRC, 2007). The uppermost saturated zone is therefore considered unconfined.

Site Ground Water Monitoring

Initial ground water monitoring at the site began in 1976 with the installation of six monitoring wells in the uppermost saturated zone at the base of the Mancos Shale. Detection monitoring of ground water was conducted on a quarterly basis in these six wells during 1976 to 1991. The ground water monitoring data from these wells were evaluated by the State in 1990, and the State determined that the well installation records were incomplete, and that the records indicated that the screen sections of each monitoring well were not sand-packed, that seals were not placed above the screen around the well casings, and the annular space between the casing and borehole wall was not backfilled to the ground surface. Additionally, the backfilled materials placed around the casing at the surface of the ground deteriorated with time in some of the wells (CDPHE, 2004). Although the analysis of the data from these wells did not show releases of constituents of concern from the Durita facility, the State noted that it had questions and concerns about the construction of the wells and the quality of the data obtained from those wells.

The State determined that the ground water level and data quality may have been compromised due to the potential impact by surface runoff through the defective seals and along the unbackfilled annulus of the wells. Thus the State concluded that a credible assessment of the aquifer conditions was not supported by the data obtained from those wells. Subsequently, these six initial wells were abandoned and closed.

As a result of the uncertainty regarding the previously obtained data, a second phase of ground water monitoring was initiated in April 1991, with the installation of seven new monitoring wells (MW-8 through MW-14) in the uppermost saturated zone. The second phase of wells included two upgradient background monitoring wells (MW-8 and MW-14) located near the southeast corner of leach tanks LT-202 and LT-203, respectively, along the southern property boundary. Wells MW-11 and MW-12 were located at the northern site boundary as downgradient wells; MW-9 and MW-10 were located along the western site boundary; and MW-13 was located near the eastern site boundary. The wells were installed near the perimeter of the site, and no wells were installed towards the interior of the site. Although the site contains four discrete disposal areas (three former leach tanks and one closure cell), the licensee considered these disposal areas to be in close proximity and therefore considered the entire site to be a single "tailings management system." Although no releases of hazardous constituents were detected in the monitoring wells, through a license condition that became effective on April 1, 1995, CDPHE required Hecla to make the transition from a ground water detection monitoring program to a compliance monitoring program. The licensee's ground water compliance monitoring program, dated November 22, 1995, was approved by CDPHE. Concentration limits and point of compliance wells were established. Wells MW-11 and MW-12 that were located at the northern site boundary, were considered by the licensee to be the point of compliance wells at the hydraulically downgradient edge of the "tailings management system." It was noted by CDPHE that licensee data indicated that the point of compliance wells did not exceed applicable concentrations of background constituents.

10 CFR Part 40, Appendix A, Criterion 5B(1) and 6 CCR 1007-1, Part 18, Appendix A, Criterion 5B(1) both state, in part, that the objective in selecting the point of compliance is to provide the earliest practicable warning that the impoundment is releasing constituents of concern to the ground water. The NRC and State regulations further state that the point of compliance must be selected to provide prompt indication of ground water contamination on the hydraulically downgradient edge of the disposal area. In correspondence between CDPHE and Hecla, the State commented that Colorado regulations in 6 CCR 1007-1, Part 18, Appendix A, Criterion 5B state that the point of compliance must be selected to provide prompt identification of ground water contamination on the hydraulically downgradient edge of the disposal area. The CDPHE comment to Hecla was that none of the wells at the site monitor the aquifer at the downgradient edge of the disposal area. Hecla's response was that Durita site activities have had no detectable impact of the ground water, and that this was supported by the data. Hecla further noted that it disagreed with CDPHE about the need for any extension of the monitoring program. (CDPHE, 2005)

NRC Staff Assessment

None of the second phase of installed wells were located at the downgradient edge of the disposal areas. It is reasonable to consider leach tanks 201 and 202, located at the southwest corner of the site, to be one waste disposal area because the tanks are immediately adjacent to each other.

However, contrary to the regulatory requirements, wells were not installed at the hydraulically downgradient edge of leach tank 201, which is the more downgradient of the two leach tanks; nor was a well installed at the hydraulically downgradient edge of Leach tank 203, located toward the southeastern corner of the site. Based on the available ground water piezometric map constructed from a one-time water measurement for the uppermost saturated zone, wells MW-11 and MW-12, although located in the vicinity of the downgradient edge of the closure cell, would only have been able to capture potential seepage from a small portion of the cell due to their locations. It is generally expected that ground water flow direction exhibits temporal variation. However, this should have been evaluated to assess the adequacy of MW-11 and MW-12 to consistently detect seepage from the closure cell.

If MW-11 and MW-12 located at the northern property boundary were intended to serve as downgradient wells, the large distance from these wells to the heap leach tank waste disposal areas increases the uncertainties of the hydraulic connection of the monitoring wells to the waste disposal areas, given that the uppermost saturated zone being monitored is fractured and contains interbedded sandstone with shale and claystone. A positive connection from the waste disposal areas to the former downgradient monitoring wells has never been demonstrated. It is important to demonstrate such a connection when designing a ground water monitoring network in a fractured-rock aquifer, especially when distances from the waste disposal areas to the monitoring wells are large. The monitoring data collected from the wells prior to when they were closed may not be adequate to reliably assess potential seepage in the uppermost ground water-bearing zone from the waste disposal areas.

As noted earlier, although six wells were monitored on a quarterly frequency from 1976 to 1991, there were questions regarding the construction of the wells and the quality of the data obtained from these wells, resulting in the installation of new wells in 1991; however, none of the new wells were installed downgradient of the disposal areas. Colorado's analysis of the data from the second phase wells indicated no releases of constituents of concern and the licensee was allowed to cease sampling the wells in December 1998. The wells were subsequently abandoned and closed. Thus if the data from the original wells lacked quality as the State has previously indicated, it is reasonable for the NRC to conclude that the only available data of value is from the second set of wells, which were only monitored for a period of seven years, which, as discussed in more detail below, the NRC considers to be insufficient.

Given the significant length of estimated travel time required for constituents of concern to migrate from the waste disposal areas to the detection monitoring wells located at the property boundary, ranging from approximately 50 feet to 2,400 feet, seven years of monitoring is insufficient. The range for the estimated travel time varies considerably depending upon different assumptions and parameter values used. If one assumes there is a hydraulic connection between the furthest upgradient leach tanks to the former monitoring wells located at the northern property boundary, the shortest travel time from these leach tanks and closure cell is estimated to be between approximately 20 to 1,000 years, using the highest measured hydraulic conductivity values and with a reasonable assumption of effective porosity and no retardation considered. The average travel time estimated ranges from approximately 50 to 2,500 years, using an average hydraulic conductivity without consideration of a retardation factor. These estimates are within the ranges calculated previously (NRC, 2007).

Other estimated travel times provided by CDPHE and Hecla are on the order of 22,000 years, depending on the assumptions used, although some assumptions such as the hydraulic conductivity value used for these calculations are subject to debate.

The termination of the ground water monitoring program in 1998 provided approximately seven years of ground water monitoring, which is inadequate based on the estimated range of travel times.

Summary of the NRC Staff's review

The NRC performed a comprehensive review of the information available regarding the Durita site and the draft CRR. As set forth in Section 274c of the Atomic Energy Act, as Amended, and 10 CFR 150.15a(a), NRC has the statutory authority and responsibility to concur on an Agreement State's license termination decision for uranium milling facilities licensed by the Agreement State.

The initial monitoring wells at the site, which were monitored from 1976-1991, indicated no releases of constituents of concern; however, CDPHE concluded that data from these wells could not support a credible assessment of the natural hydrologic conditions. In 1991, a second set of monitoring wells was installed at the site; CDHPE's analysis of the data indicated no releases of constituents of concern and the licensee was allowed to cease sampling the wells in December 1998 and the wells were subsequently abandoned and closed.

Based on the NRC staff's review, the staff has concluded that the ground water monitoring network was inadequate to perform detection monitoring because: (1) monitoring wells were not installed at the downgradient edges of the discrete waste disposal areas on the site; (2) the distance from the waste disposal areas to the licensee-designated downgradient monitoring wells was too large to be effective; and (3) the wells were not monitored for a sufficient amount of time to overcome the inadequate placement of the wells.

Although the site contains four discrete disposal areas, the licensee considered the entire site to be a "tailings management system" and this was accepted by CDPHE. The licensee transitioned from a ground water detection monitoring program to a compliance monitoring program in 1995. The ground water monitoring network did not include monitoring wells at the downgradient edges of each of the waste disposal areas (three leach tanks and one closure cell). Although one well was installed in proximity to the closure cell, it was likely to only capture a small portion of any flow that originated from the closure cell.

The large distance from the designated downgradient monitoring wells to the onsite waste disposal areas increases the uncertainty whether the monitoring wells were hydraulically connected with the disposal areas given that the uppermost saturated zone is in a fractured media. A positive connection from the disposal areas to the downgradient monitoring wells has not been demonstrated and the data collected from the monitoring wells may not have been adequate to reliably assess any potential seepage in the uppermost ground water-bearing zone.

The second phase of installed wells was only monitored for seven years. Depending on the assumptions used, there is a significant amount of estimated travel time required for constituents of concern to migrate from the waste disposal areas to the downgradient monitoring wells.

The range of estimated time varies considerably based on assumptions but if it were assumed that there is a hydraulic connection between the furthest upgradient leach tanks to the downgradient monitoring wells, the shortest travel time is approximately 50 years. Site operations ceased in 1979 and ground water monitoring ceased in 1998, a period of only 20 years, only 7 of which had the potential to yield credible data.

Conclusion

The NRC's reanalysis of the draft CRR has resulted in the same conclusion as was communicated to CDPHE in 2005, 2006, and 2007; additional ground water monitoring at the Durita site is necessary in order to determine whether there is an unacceptable risk to human health and the environment. The NRC staff recognizes that the Durita facility's relatively short operational period of approximately two years, combined with the fact that processing fluids were captured, recirculated, and ultimately discharged into evaporation ponds would ideally reduce the likelihood of seepage impacts to the uppermost aquifer. However, the fact remains that an adequate detection monitoring program was never implemented to detect leakage of hazardous constituents from the disposal area. Before the NRC staff can concur with the CDPHE's license termination conclusions, the CDPHE will need to require additional monitoring wells to be installed at the downgradient edge of each disposal area (three leach tanks and one closure cell) and representative ground water sampling of the uppermost saturated zone to demonstrate that conditions are not a current or future risk to human health or the environment.

In addition, the licensee should assess the temporal variation of ground water flow based on the water levels collected from the wells installed in the second phase monitoring to ensure that the new monitoring wells are placed at the appropriate locations. Depending on the monitoring results, additional data may be needed to provide a reasonable assurance that any hydraulic communication between the uppermost saturated zone within the basal Mancos formation and the underlying Dakota sandstone aquifer is minimal, and that it is less likely that the Dakota aquifer would be impacted by the waste in the leach tanks and closure cell if leachates or seepages occur from these disposal areas.

In previous correspondence, DOE LM has indicated that since NRC would eventually regulate the Durita site under a DOE general license, it would adjust the scope of the draft LTSP according to the determination of the NRC. It was also noted that if ground water monitoring is deemed necessary, it would expect an additional two years, at least, of renewed ground water monitoring prior to transfer for long-term care. Due to the amount of time that has passed since DOE LM submitted a draft LTSP to NRC, DOE LM indicated that the transfer process, which typically takes about two years, would need to be restarted and revisions made to the draft LTSP as necessary. The transfer process will not commence until NRC concurs on the final CRR for the site. Concurrence can only be provided by NRC based on a final CRR that demonstrates that all applicable standards and requirements have been met.

References

CDPHE, 2004. Colorado Radioactive Materials License #317-02, Completion Review Report for the Durita site. ML042870433

CDPHE, 2005. FAX dated April 19, 2005, containing additional Hecla responses to CDPHE comments. ML053570031.

CDPHE, 2007. CDPHE letter dated November 8, 2007, Re: Colorado Radioactive Materials License #317-02, response to NRC Geologists Report Regarding Ground water at the Hecla-Durita Site. ML073190102

CDPHE, 2008. FAX dated July 18, 2008, containing Durita monitoring well boring logs. ML14051A179

Fox, 1982. F.M. Fox & Associates: Preliminary Geological, Hydrological and Geotechnical Evaluation of the Coke Oven Site, Montrose County, Colorado. ML14052A142

NRC, 2007. U.S. Nuclear Regulatory Commission, Assessment of Hydrogeologic Conditions and Need for Long-Term Ground water Monitoring at the Former Durita Uranium Mill, Naturita, Colorado. ML071710354

Additional Information Reviewed

- October 1, 2004: CDPHE submitted a draft CRR to NRC regarding the proposed termination of the Hecla license for the Durita site (ML042870433). The draft CRR stated CDPHE's position that all applicable standards and requirements had been met at the Durita site to allow the Hecla Mining Company license to be terminated.
- February 1, 2005: The U.S. DOE LM submitted to the NRC a draft LTSP for the Durita (UMTRCA Title II) Disposal Site (ML050410364). The LTSP was intended to satisfy the requirements of 10 CFR 40.28 in which the long term custodian must provide an LTSP to the NRC as a step in the license termination process.
- February 10, 2005: The NRC transmitted four general comments and 37 specific comments regarding the draft CRR to CDPHE for review and resolution (ML050410400). The specific comments were in regards to four technical review areas: (1) geotechnical stability; (2) surface water protection and erosion control; (3) radiation cleanup and control; and (4) ground water remediation.
- March 15, 2005: A fax was sent by CDPHE to the NRC that contained Hecla responses to several CDPHE comments, including travel time for ground water from the leach tanks to the site boundary (ML14052A022).
- April 19, 2005: A fax was sent by CDPHE to the NRC that contained additional Hecla responses to several CDPHE comments and other information regarding the detection monitoring program (ML053570031).
- June 6, 2005: A revised draft CRR was submitted to the NRC by CDPHE (ML053570032). The revised draft CRR incorporated CDPHE responses to the four general comments and 37 specific comments from the NRC.
- July 15, 2005: Based on the review of the revised draft CRR, the NRC transmitted three additional substantive comments and two editorial comments to CDPHE and noted that the ground water section of the revised draft CRR was still under review (ML053560286).
- September 7, 2005: CDPHE provided a response to the NRC's three additional substantive comments and two editorial comments but did not resubmit the draft CRR in its entirety (ML053560334).
- December 2, 2005: The NRC provided a letter to CDPHE discussing, in part, the staff's concern regarding the CDPHE's decision to allow Hecla to discontinue ground water monitoring and plug the wells at the Durita site prior to license termination (ML053360225).

The letter recommended that in order for the NRC to concur on the ground water section of the CRR, the licensee install an appropriate number of wells in order to sample the ground water and ensure that no seepage had occurred since the ground water monitoring program was terminated in 1998. The NRC staff concluded that there was not an adequate regulatory or technical basis for the State to terminate the ground water detection monitoring program at the Durita site.

- January 4, 2006: CDPHE submitted a letter to the NRC expressing disagreement with the NRC's position regarding the ground water monitoring program being prematurely terminated (ML060200101). It was also expressed that CDPHE had a concern that in its review, the NRC had gone beyond the scope of SA-900. The State furthermore expressed that reinstallation of wells was not necessary and that the draft CRR provided sufficient information to document the regulatory and technical bases for its conclusions.
- March 9, 2006: The NRC transmitted a letter to CDPHE that indicated that it was still unable to concur with the ground water section of the draft CRR (ML060730466). The letter respectfully suggested that CDPHE reconsider the NRC's December 2, 2005, letter regarding the proposed path forward that would allow the NRC to concur on the ground water section of the CRR.
- March 31, 2006: CDPHE provided a letter to the NRC in which it reaffirmed its belief that the discontinuance of the ground water monitoring program was justified (ML061000243). The State provided examples of other UMTRCA Title I and Title II sites that do not have long-term monitoring.
- April 24, 2006: CDPHE provided a fax to the NRC with an excerpt from a Fox Consulting Engineers and Geologists report entitled Preliminary Geological, Hydrological, and Geotechnical Evaluation of the Coke Oven Site, Montrose County, Colorado (ML14052A142).
- July 2006: In an effort to resolve questions regarding ground water at the Durita site, in coordination with CDPHE, NRC staff visited CDPHE offices and performed a review of available documents maintained by CDPHE. The NRC staff also visited the Durita site.
- May 3, 2007: The NRC staff issued the report, "Assessment of Hydrogeologic Conditions and Need for Long-Term Ground water Monitoring at the Former Durita Uranium Mill, Natuita, Colorado" (ML071710354). The report concluded, in part, that additional ground water information or monitoring at the Durita site is necessary and appropriate to determine whether there is an unacceptable risk to human health from the site conditions. The conclusion was based, in part, on the lack of ground water quality data from the interior of the site near the waste disposal areas; soil contamination below the engineered systems during the operational period; indications of the presence of preferential pathways for contaminant migration through ground water; and inadequate design of the perimeter ground water monitoring network. Documents provided to NRC during this review include:
    - July 31, 1982: FOX Consulting Engineers and Geologists report: Preliminary Geological, Hydrological, and Geotechnical Evaluation of the Coke Oven Site, Montrose Colorado (ML14070A482).
    - September 1, 1998: Hecla Mining Company, 1998 Annual Ground water Monitoring Report (ML14070A495).
    - December 28, 1998: Hecla Mining Company letter to CDPHE, Revised information from the 1998 Annual GW Monitoring Report (ML14070A489).
- May 7, 2007: Hecla issued a letter to the NRC stating that they fully complied with the CDPHE's approved program and expressed that the NRC was ignoring 23 years of ground water monitoring activities at the Durita site (ML071290608).

- May 9, 2007: A public meeting was held by the NRC with representatives of CDPHE and Hecla to discuss the status of the NRC review of the ground water evaluation for the Durita site (ML071160043).
- October 25, 2007: CDPHE transmitted a revised draft CRR to the NRC that incorporated its responses to the NRC's July 15, 2005, comments (ML14055A254).
- November 8, 2007: CDPHE submitted a written response to the NRC's hydrogeologic assessment report, restating its position that the monitoring wells were installed at appropriate locations consistent with the regulations, that the data fully supports the decision to decommission the wells, and that there was no need for additional ground water monitoring at the Durita site (ML073190102).
- July 17, 2008: CDPHE provided additional information to the NRC regarding the former monitoring wells at the Durita site (ML14051A729) and the boring logs for the wells (ML14051A179).
- May 1, 2012: A public meeting with NRC was held at the request of Hecla (ML12157A319). The meeting provided an update regarding the status of the NRC's review of the draft CRR for the Durita site.
- September 25, 2012: The U.S. DOE LM provided a letter to the NRC regarding ground water monitoring at the Durita site (ML12277A384). The letter noted that DOE LM will adjust the scope of the draft LTSP according to the determination of the NRC if NRC determines that it is necessary to include ground water monitoring in the long term care of the site. The letter also noted that if ground water monitoring was deemed necessary, DOE would expect at least an additional two years of renewed ground water monitoring prior to transfer.
- May 23, 2013: The NRC staff participated as observers during the CDPHE annual inspection of the Durita site.