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January 13, 1992

Mr. Ramon E. Hall  
United States Nuclear Regulatory Commission  
Region IV  
Uranium Recovery Field Office  
P.O. Box 25325  
Denver, Colorado 80225

RE: License SUA-1482, Johnny M Site, Responses to NRC's November 5, 1991, Letter

Dear Mr. Hall:

In the discussion presented in this letter you will find Hecla's responses to the five NRC concerns outlined in your November 5, 1991, letter. On December 18, 1991, Hecla requested an extension for responding because analytical results from the soil samples collected after the November cleanup effort at the site would not be available in time to respond within the 45 day time specified. Mr. Dana Ward of your staff granted a verbal extension to January 30, 1992, for providing these responses.

Please note that due to the unresolved issues concerning site cleanup, the regrading and seeding noted as to be completed in November in our October 17, 1991, letter to you, was not conducted in 1991. We are planning to conduct the regrading and seeding by May 1992. Therefore, if you require additional information or are planning a site cleanup verification inspection, we request that you conduct your activities in a time-frame that allows the work to proceed on this schedule. If a site visit by your staff is required, conducting it as early in the year as is possible would be most beneficial to Hecla. As was also noted in the previous transmittal, additional cleanup was conducted on September 17-19, 1991. This cleanup was based on the gamma measurements obtained by the NRC on your September 6, 1991, inspection. A third cleanup effort was conducted November 25 and 26, 1991, in the areas that the analytical results from NRC and Hecla soil sampling indicated were still above the specified cleanup criteria.

Concerns #1 & #2

Analysis of the soils collected at high gamma locations in the south area indicated the presence of tailings along the east cut slope directly east of the south vent concrete pad (Sample JMM12), and at the south vent site located within the concrete pad (Sample JMM11). Additional cleanup will be necessary to meet EPA criteria at these locations.

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### **Response**

Additional cleanup was conducted in this area during the September effort. Cleanup was guided by gamma measurements. After gamma levels indicated that the area should be clean, two representative soil cleanup verification samples were collected. These samples demonstrated analytical results of  $4.1 \pm 1.5$  and  $6.0 \pm 1.8$  pCi/g, indicating that the area radium activity is now below the south area cleanup criteria of 6.1 pCi/g.

### **Concern #3**

A sample collected outside the west fence in the pasture (JMM10) had a reading of  $240 \pm 20$  BQ/KG ( $6.4 \pm 0.54$  pCi/g). The background established by Hecla for the south area is  $1.1 \pm 0.1$  pCi/g for Radium 226. The single radium background sample (Sample JMMSEI) collected east of the cleanup area by the inspectors was 1.30 pCi/g. This result agrees closely with Hecla's findings. Using the 1.1 pCi/g radium background value added to EPA's radium cleanup criteria of 5 pCi/g would produce a minimum standard cleanup for radium at 6.1 pCi/g. Therefore a radium result of 6.4 pCi/g indicates that additional cleanup may be necessary west of the fence. Hecla must reexamine their findings from this area to determine if further cleanup is necessary.

### **Response**

Cleanup was conducted on the area west of the fence identified by the NRC on November 25, 1991. Soils were excavated from about midway between points S-10 and T-10, from the fence line, out approximately 30 feet west and 100 feet north, to a depth of approximately 8 to 12 inches. After the cleanup was complete, three soil samples were collected to a depth of six inches. Samples were collected 30 feet apart at about midway in the excavated area, beginning just north of the radiation sign on the fence. These samples were labeled SOF-1 through SOF-3. The three samples were transmitted to the analytical laboratory as sampled, and composited for analysis by the analytical laboratory. The composite yielded a Radium-226 activity of  $4.5 \pm 1.6$  pCi/g, demonstrating that the cleanup effort was successful in lowering the soil radium to below the cleanup criteria.

### **Concern #4**

Elevated gamma readings indicated that the cut bank located east of the concrete foundations may contain residual tailings. A sample collected from this area (Sample JMM22) indicates that tailings may be present. The results obtained for soil sample JMM22 were Ra-226 at  $3400 \pm 300$  BQ/KG and Total-U at  $1800 \pm 200$  BQ/KG.

### **Response**

Additional cleanup was conducted in this area during both the September 17-19 and November 25-26 cleanup efforts. Analytical results from soil samples collected after the September cleanup effort demonstrated that radium levels at approximately the A and C lines along the edge were still in excess of the cleanup criteria. Specifically, after the cleanup three soil samples were collected, designated as #1 North (collected in the A/B-10 area), #2

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North (collected in the B-10 area), and #3 North (collected in approximately the C-9 area). These samples demonstrated analytical results for Radium-226 of  $8.2 \pm 2.0$ ,  $1.0 \pm 1.5$ , and  $12 \pm 3$  pCi/g, respectively. In the November cleanup effort, additional bank and floor soils were excavated initially based on the soil results and then guided by gamma measurements. After the gamma measurements indicated that the area was clean, four cleanup verification samples were collected, two from the floor (designated with a G) and two from the slope of the bank (designated with an S). The sampling points were at C-9 and approximately midway between points A-10 and B-10. As shown in the data below, the four Radium-226 analytical results were all below the cleanup criteria indicating that the area cleanup was successful. Results are in pCi/g.

A/B-10G	$3.5 \pm 1.5$
A/B-10S	$3.5 \pm 1.4$
C-9G	$4.2 \pm 1.6$
C-9S	$0.9 \pm 0.9$

#### **Concern #5**

A composite sample (Sample JMM20) was taken in the western end of the cleanup area near the access road. This area had elevated gamma readings. This area was also noted by Mr. Kuhn to have been in close proximity to former ore piles. The results of the soil samples collected for the composite sample were inconclusive with both Ra-226 and Total-U about equal in activity. Further testing by Hecla should determine if this is ore, tailings or tailings mixed with ore. Please address this concern in your response.

#### **Response**

A site survey and soil testing report for the Johnny M Mine was submitted to your office in July 1988 in accordance with License Condition 10 of the site source material license. In this document, in the section entitled "Source of Residual Radioactivity", the areas to be cleaned up were specified. The boundaries of the tailings contaminated soils in the north area were identified in this report as to the northeast by B-8, to the northwest by B-6, to the southwest by D-6, and to the southeast by D-8. These boundaries were determined by extensive sampling and analysis, which was presented in the same report. Specifically, the ratios of Thorium-234 activities to the activities of other radionuclides in the U-238 decay chain were used to identify whether the Radium-226 in the soil was due to natural terrestrial radioactivity or to mill tailings. The boundaries were identified by a statistical analysis of the data in which the areas where tailings contamination existed were within the cleanup boundaries at a 95% confidence level. Therefore, because the area in question was designated as an ore area, initial area cleanup was not conducted. In addition, site soil sampling conducted in June 1991, further substantiated that Radium-226 in this area is from a natural source. The results presented below are from samples collected in June 1991, from a depth of 0-6 inches in pCi/g.

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<u>Sampling Location</u>	<u>U-238</u>	<u>Ra-226</u>	<u>U-238/Ra-226</u>
D-3	41.4	30 ± 4	1.38
Between D-3 and D-4	43.7	51 ± 5	0.86
D-4	5.5	1.1 ± 0.8	5.0
D-5	0.6	1.5 ± 0.9	0.4
E-2	141.3	97 ± 7	1.46
E-3	55.5	57 ± 5	0.97
E-4	12.4	17 ± 3	0.73
E-5	20.7	26 ± 4	0.80
Average	40.1	35.1 ± 3.7	1.14

Samples were also collected from the waste ore pile located behind the mine portal along the eastern edge (just east of grid point F-7). Three samples were collected demonstrating the following results in pCi/g.

<u>Sample No.</u>	<u>U-238</u>	<u>Ra-226</u>	<u>U-238/Ra-226</u>
1	117.9	120 ± 10	0.98
2	115.0	120 ± 10	0.96
3	46.0	61 ± 6	0.75

The analytical results presented above for the waste ore are consistent with the data for the designated as ore area presented earlier in this response. However, because the NRC sampling result was not consistent with the above data, the area in question was excavated during the November cleanup effort. An approximate 50 ft. by 50 ft. area between grid points D-3, D-4, E-3, and E-4 was excavated. The holes from the NRC sampling were still visible during the cleanup and were used as the center of the cleanup area. The excavation was watched closely and there was no visible evidence of tailings in the excavated material, only ore-like material was observed. Material was excavated until all visible ore was removed and sandstone was encountered. The excavation was to an approximate one foot depth. After the cleanup was complete, two soil samples were collected to a six inch depth and analyzed for Uranium and Radium-226. Samples were collected in the southwestern and northeastern quarters. These samples demonstrated U-238 activities of 31.6 and 5.8 pCi/g and Radium-226 activities of 32 ± 4 and 11 ± 2 pCi/g, respectively. These analytical results are consistent with the data previously presented in this response, indicating that the material in this area in question by your office was successfully removed.

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In summary, we believe we have addressed the concerns presented in your November 5, 1991, letter. Hecla has conducted two additional cleanup efforts since your site inspection of September 6, 1991. Cleanup verification soil samples collected indicate that the site meets the specified cleanup criteria.

Should you have questions about this transmittal or any other matters concerning the Johnny M Site, please feel free to contact me anytime.

Very truly yours,



Gary R. Gamble, CIH  
Environmental Engineer

GRG:esm