SHIELDALLOY METALLURGICAL CORPORATION

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040-07102

March 28, 2000

Ms. Marie Miller
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406-1415

Re: Final Survey/Sampling Report for the Storage Yard (License No. SMB-743)

Dear Ms. Miller:

During your March 13, 2000 inspection of the Shieldalloy Metallurgical Corporation (SMC) site in Newfield, New Jersey, an issue was raised in regard to the restricted release of a portion of the Storage Yard. At issue is the detection capability during the final survey in light of the varying background across the lateral extent of the survey area, as described in the final survey report, submitted to you previously.[1] Given the fact that the background varied from 24 to 120 μR/hour in the survey area, you asked for further documentation of the health physics technician's ability to detect a piece of ferrocolumbium slag at the pre-established release criterion of 15 μR/hour.

To address this concern, an analysis of the sensitivity of scanning for the extremes in background exposure rates was conducted in accordance with Section 6.7.2.1 of the Multi-Agency Radiation Survey and Site Investigation manual (MARSSIM).[2] The following parameters were used as input to this analysis:

- The survey objective was to detect a piece of ferrocolumbium slag with a dimension of one-inch in the direction of the scan.
- A Ludlum Model 44-10 two-inch by two-inch sodium iodide detector, coupled with a Ludlum Model 2241 scaler/ratemeter, was used in the survey.
- The efficiency of the detector was 900 counts per minute (cpm) per μR/hour.

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[1] Integrated Environmental Management, Inc., Report No. 94005/G-18198, "Soil Sampling/Survey of Storage Yard After Remediation", January 20, 2000.

[2] "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG-1575, December, 1997, equations (6-8), (6-9) and (6-10).

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- An index of sensitivity of 1.9 was used, consistent with a false positive proportion of 0.05 and a true positive proportion of 0.6.

- A surveyor efficiency of 50% was assumed.

From these assumptions, a maximum scan speed was calculated that would allow the health physics technician to detect an area of elevated surface exposure rate equivalent to 15 μR/hour under various ambient exposure rate conditions.

Appendix D of the final survey report contains a survey map showing the ambient exposure rate throughout the survey area.[3] For a rate of 24 μR/hour (21,600 cpm), the lowest recorded ambient exposure rate in the Storage Yard (north east corner), the calculations show that the maximum scan speed that would allow the health physics technician to detect a 15 μR/hour exposure rate difference would be approximately eight (8) feet per second. For a rate of 120 μR/hour (108,000 cpm), the highest recorded ambient exposure rate in the Storage Yard (west perimeter), the maximum scan speed that would allow the technician to detect a 15 μR/hour exposure rate difference would be approximately 1.6 feet per second. The actual scan speed used during the surveys was one (1) foot per second.[4]

For comparison, the minimum detectible above-background exposure rate for a one-foot per second scan speed was also determined. For all of the assumptions listed above, and a background exposure rate of 24 μR/hour (21,600 cpm), the minimum detectible exposure rate associated with a 1 foot per second scan speed would be 5.3 μR/hour. For a background exposure rate of 120 μR/hour (108,000 cpm), the minimum detectible exposure rate associated with a scan speed of 1 foot per second scan speed would be 11.8 μR/hour. Both of these values are below the pre-established release criterion of 15 μR/hour.

Finally, you were concerned that the variability in the background over the spatial extent of the Storage Yard might cause the health physics technician to inadvertently "miss" a piece of ferrocolumbium slag, mistakenly assuming that an incident of elevated surface exposure rate was simply a variation in background. SMC believes this concern is fully addressed by two features of the survey protocol:

- While the background did vary depending on the technician's proximity to the ferrocolumbium slag pile, its variability was low and predictable at any given geographical location. Thus, the technician was able to differentiate between gradual changes in response due to background variability alone, and rapid changes in response that were associated with a piece of ferrocolumbium slag.

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[3] Integrated Environmental Management, Inc., Report No. 94005/G-18198, "Soil Sampling/Survey of Storage Yard After Remediation", January 20, 2000, Appendix D, Survey Number SMC-0520-99, Page 2 of 2.

[4] Integrated Environmental Management, Inc., Report No. 94005/G-18198, "Soil Sampling/Survey of Storage Yard After Remediation", January 20, 2000, page 3, "Detection Limits".

- The technician was able to differentiate between variations in background vs. detection of a piece of ferrocolumbium slag by moving the detector farther away from the point of elevated response. If slag was present, small movements of the detector away from the ground surface had a noticeable effect on the instrument's response. A response due to variations in the ambient exposure rate alone did not exhibit this effect.

In summary, SMC believes that the design of the final survey allowed the health physics technician to detect pieces of ferrocolumbium slag with a high degree of confidence, even in the presence of elevated and variable background exposure rates. We are confident that our pre-established restricted release criteria for the Storage Yard have been met anywhere within the survey area.

If you have any questions or if I can provide you with addition information about the design and execution of the final survey of the Storage Yard, please give me a call at (856) 692-4200, Extension 226. We look forward to your timely concurrence with the conclusions of the final survey report, and to the start of re-forestation of the survey area.

Sincerely,

David R. Smith
Radiation Safety Officer

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