Mr. Eric P. Marsh, Manager Environmental, Safety and Health **RMI Environmental Services** P.O. Box 579 Ashtabula, Ohio 44004-579

SUBJECT: RMI RESPONSES TO NUCLEAR REGULATORY COMMISSION COMMENTS

Dear Mr. Marsh:

This letter acknowledges that we received the following RMI letter responses to Nuclear Regulatory Commission comments on RMI decommissioning documents: (1) RMI letter dated September 13, 1996, responding to NRC Comment 21a (on Tc-99 limits) dated May 3, 1996; and (2) RMI letter dated October 23, 1996, providing responses to NRC comments dated September 12, 1996.

We reviewed your responses, and find them to be acceptable, with the exception of certain remaining issues as provided in the enclosure to this letter. Please make the necessary revisions to your responses and decommissioning plan, and submit them to me within 30 days.

Please call me at (301) 415-6722 if you have any questions.

Sincerely.

[Original signed by]

Ronald B. Uleck, Ph.D., Project Manager Materials Decommissioning Section Low-Level Waste and Decommissioning Projects Branch Division of Waste Management Office of Nuclear Material Safety and Safeguards

Docket No.: 040-02384 License No.: SMB-602 Enclosure: As stated

cc: W. Best, U.S. DOE S. Bouchard, U.S. EPA C. Lipp, OH Dept. of Health R. Williams, OH EPA A. Lafavre, OH EPA

TICKET: DISTRIBUTION: Central File PUBLIC JSurmeier DI DO / DITT DNolcon/DITT

NO

NO

NO

NRC FILE CENTER COPY

LLDP r/f PLohaus DMACAN

NMSS r/f BJorgensen/RIII

FLEE/RIII		Une I SUII/ N	DHOSEL					
To receive a copy of	this	document in	small bo	x on MOFC:M	line enter	: "C" =	· Copy	without
attachment/enclosure	; *E*	= Copy with	attachme	nt/enclosur	e; "N" = No	copy		
Path & File Nam	ne :	S:\DWM\L	I DP\ RBI	UNRESPLE	T3 RMI			

OFC	LLDP	LLDP	LUDR	LLAP N	
NAME	RUleck	MHood	(LBell	JHtekey	
DATE	3/4/97	3/4/97	3/6/97	3/6/97	

OFFICIAL RECORD COPY

Delete: ACNW

ACNW: YES IG : YES LSS : YES

PDR

13%

Delete file after distribution: Yes ____ No ____

Category: Proprietary ____ or CF Only ____

9703120407 970306 ADOCK 04002384 PDR



UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

March 6, 1997

Mr. Eric P. Marsh, Manager Environmental, Safety and Health RMI Environmental Services P.O. Box 579 Ashtabula, Ohio 44004-579

SUBJECT: RMI RESPONSES TO NUCLEAR REGULATORY COMMISSION COMMENTS

Dear Mr. Marsh:

This letter acknowledges that we received the following RMI letter responses to Nuclear Regulatory Commission comments on RMI decommissioning documents: (1) RMI letter dated September 13, 1996, responding to NRC Comment 21a (on Tc-99 limits) dated May 3, 1996; and (2) RMI letter dated October 23, 1996, providing responses to NRC comments dated September 12, 1996.

We reviewed your responses, and find them to be acceptable, with the exception of certain remaining issues as provided in the enclosure to this letter. Please make the necessary revisions to your responses and decommissioning plan, and submit them to me within 30 days.

Please call me at (301) 415-6722 if you have any questions.

Sincerely. only B May

Ronald B. Uleck, Ph.D., Project Manager Materials Decommissioning Section Low-Level Waste and Decommissioning Projects Branch Division of Waste Management Office of Nuclear Material Safety and Safeguards

Docket No.: 040-02384 License No.: SMB-602

Enclosure: As stated

cc: W. Best, U.S. DOE S. Bouchard, U.S. EPA C. Lipp, OH Dept. of Health R. Williams, OH EPA A. Lafavre, OH EPA Docket No. 040-02384 License No. SMB-602

NRC STAFF REVIEW OF RMI RESPONSES TO STAFF COMMENTS ON THE DECOMMISSIONING PLAN FOR THE RMI TITANIUM COMPANY EXTRUSION PLANT RDP-ESH-007, REVISION 1

RMI Response Dated September 13, 1996, to NRC Comment on TC-99 Release Limit

1. In this response, the licence's justification for a TC-99 soil concentration limit of 220 pCi/g is based only on the average annual soil ingestion rate for an adult in an agricultural setting. This justification does not evaluate the public dose from any other pathway. A preliminary dose evaluation (performed by NRC staff) of 220 pCi/g of TC-99, using RESRAD and PG-8-08 default parameters, resulted in a dose estimate of 357 mrem/yr in 5 years. The licensee's justification is not complete as presented. RMI must (1) evaluate the derived dose limit for TC-99 for all pathways, and (2) demonstrate that the derived limit and the resulting public dose from this limit is as low as reasonably achievable.

RMI Responses Dated October 23, 1996, to NRC Comments on Section 4, "Planned Final Radiation Survey," of RDP-ESH-007

2. Response to Comment 4a concerning scanning: As requested, the license provided a survey scan action level to initiate further investigation of elevated activity of soil and concrete areas. NRC staff finds an action level of 2 times ambient background an acceptable action level. The licensee also illustrated the MDA calculation for scan and direct surveys.

The original NRC Comment 4a initially addressed the appropriateness of using characterization data as final survey for outdoor areas A, E, and G. Issues on using the characterization data of these areas as final survey data still exist. The licensee should address the following comments and provide additional information if necessary:

Enclosure

(a) Section 4.5.3, page 4-22, Direct Radiation Dose Rates - Background

The background used to calculate the scanning MDA (40 cpm) seems lower than normally encountered. The direct radiation background given on page 4-22 ranges from 40-90 cpm. Please provide information regarding the values, location, and the type of media surveyed to obtain the background value used to obtain net survey measurements for direct measurements, soil measurements and exposure rate measurements. Also, please describe the location where daily background measurements will be obtained when conducting the final survey for each measurement type (i.e., direct, exposure rate, etc.).

(b) Section 4.4.4.1, page 4-16, Scanning Methodology

The hand-held GM detector used during the characterization survey and listed in the final survey plan for outdoor survey scans is of concern to staff. The small probe area of a GM detector (15.5 cm²) makes the GM impractical for surface scans of large areas. The small probe area also reduces the sensitivity, thereby increasing the MDA for alpha/beta radiation. The true detection efficiency of a GM for beta radiation in an outdoor field environment is significantly lower than the estimated detection efficiency as indicated from source measurements.

The instrumentation most commonly used by industry to conduct surface scans of building/structural areas is a large area gas proportional counter, and for open land areas a NaI detector is more commonly used. The large area gas proportional counter would be more suitable than the hand held GM for surface scans of paved areas due to increased probe area, which would increase detector sensitivity, particularly for irregular surfaces. Instead of using a GM with a low efficiency of measuring beta, a NaI is more commonly used to measure gamma radiation in outdoor field environments. Unless otherwise justified, staff suggests that scanning surveys of concrete be conducted using a large area gas proportional counter, and open land areas should be scan surveyed using a NaI detector.

3. Response to Comment 4b on detection sensitivity: As stated above, the intent of the original NRC staff comment was to address whether the characterization data for unaffected areas A, E, and G may serve as final survey data. The scan surveys conducted of these were performed using a 15.5 cm² GM detector, and did not demonstrate sufficient sensitivity. alpha measurements are unreliable. Assuming the U-235 enrichment is 0.71% by weight, the resulting alpha to beta emission ratio is expected to approximate 1:1. Given that alpha to beta ratio of previous direct measurements conducted on site have been less than 1:1, the direct measurement of alpha radiation is shown to be unreliable. An acceptable approach in estimating the alpha emission is to determine the alpha/beta ratio empirically by isotopic analysis of site specific data. Once this ratio is determined, the alpha emission rate may be estimated from direct measurement of beta radiation. Performing alpha measurements at 10% of the direct will not demonstrate compliance with the guideline limits.

7. Response to Comment 17 concerning the relationship of gamma spectrometry analysis to total uranium: Please further describe how RMI concluded that the weighted average enrichment of U-235 is 0.56% from the information given in Section 3.1.3 of the DP. The lowest U-235 enrichment listed in this section is 0.711%. How can the weighted U-235 enrichment average be lower than the lowest enrichment given in this section?

In the second paragraph, the licensee incorrectly states that U-234 activity decreases with enrichment, when in fact U-234 activity increases with enrichment. Given that the enrichment of U-235 is probably greater than 0.71% and that U-234 activity increases with U-235 enrichment, it is incorrect to assume U-234 activity approximates J-238. Furthermore, the alpha to beta ratio increases with increasing enrichment of U-235. The licensee is required to perform sufficient isotopic analysis on site-specific data to demonstrate the enrichment of U-235 and the relationship of U-234 to U-238, if gamma spectrometry results are to be used to estimate total uranium.

- Response to Comment 19 concerning exposure rates: Please provide specific background data that was obtained to estimate the 7 uR/hr background rate, including variability.
- 9. Response to Comment 22a regarding sensitivity of scanning instrumentation: The original NRC Comment 22a requested that Table 4-2, Instrumentation for Radiological Surveys, include the MDA for the instrumentation listed. In the second follow-up NRC comment, dated September 12, 1996, NRC staff indicated that more effective instrumentation is commercially available to conduct scan surveys of large structural areas than a small probe area 3M detector. In the second response to this comment, the locensee reiterates that a MDA of less than 210 dpm/100 cm² (i.e., 1091 dpm/100 cm²) for the GM has been demonstrated in response comment 1.

However, the 1091 dpm/100 cm² MDA illustrated in RMI's response comment 1 is not the scanning MDA, but instead the MDA for a static direct GM measurement integrated over one minute. Furthermore, the scanning MDA given in RMI's response to our Comment 4a is too low. The beta detection efficiency of a GM detector in field environments has been shown to be significantly less than the manufacture's beta instrument efficiency (see NUREG-1507, "Minimum Detectable Concentration with Typical Radiation Survey Instruments for Various Contaminants and Field conditions," draft report for comment, August 1995). Therefore, the true TA of a GM detector for beta in an outdoor environment is significantly higher than the MDA illustrated to date by RMI.

As stated in the second NRC staff comment dated September 12, 1996, the MDA objective as stated on page 4-7 is unacceptably high. The MDA objective for surface survey measurements should be less than 25% of the guideline for surface release limits. Although achieving a measurement sensitivity of less than 25% for surface scans of soil areas may be difficult to achieve, the licensee should employ instrumentation and measurement techniques to obtain detection sensitivity as low as reasonably achievable. Please refer to Comment 3 above.

Additional Comments on Section / Planned Final Radiation Survey, " of RDP-ESH-007

10. Section 4.3.2, page 4-1, General Survey Objectives

This section states that "At the completion of each decommissioning and/or remediation activity . . . a final radiological survey will be conducted . . ." Please describe or include procedures to isolate remediated areas that have received a final survey from being re-contaminated.

11. Section 4.3.3.1, page 4-1, Surface Activity Objectives for Building, Structures and Equipment

The words "Small areas" in the second objective should be replaced with the words "Areas less than 100 cm²."

12. Section 4.3 3.2, page 4-4, Soil Activity Objectives

This section states that a "selected percentage (5% to 10%) of the samples will be analyzed for technetium-99 . ." What is the basis for this frequency of Tc-99 measurement? Since this site is contaminated with multiple radionuclides, the unity rule should be applied when evaluating compliance with recommended and derived criteria.

Note that Appendix A, page A-1, of NUREG/CR-5849 indicates that for sites with multiple radionuclides, only those radionuclides which would contribute greater than 10% of the total radiation dose or which are present at concentrations which exceed 10% of their respective guideline values need be considered as significant contaminants. Site-specific guidelines for multiple contaminants for release of the site are determined through the unity rule. Please note that the application of this guidance to 7 99 and uranium on the RMI site must be justified on an ALAK analysis, which provides a cost-benefit basis for determining how the unity rule may be applied.

To justify that Tc-99, a contaminant, need not be included in the unity rule, RMI must provide documentation and sample results demonstrating the concentrations of Tc-99 and the ratios of Tc-99 to uranium in soils throughout the site.

13. Section 4.3.6, pages 4-7 thru 4-9, Instrumentation

(a) On page 4-7, the stated detection sensitivity objective
(i.e., 75% of the guideline) for structures is too high.
The detection sensitivity objective for building/structural surfaces should be 25% of the guideline.

(b) On page 4-9, this section states that NaI detectors will be used to obtain exposure rate measurements. Please provide PIC correction factors to account for the energy dependant response of NaI detectors in the field.

(c) As discussed on page 4-9, in the event an instrument check does not result in a duplication within 20% of the check source, will previous survey measurements that were obtained that instrument be investigated?

14. Section 4.3.7, page 4-10, Laboratory Services

Please describe or provide procedures for external and internal laboratory audits and laboratory QA/QC evaluation.

15. Section 4.4.2.1.1, page 4-13, Buildings - Affected Areas

What and/or where are the criteria for disposing of building materials as solid waste?

16. Section 4.4.2.1.1, page 4-13, Buildings - Affected Areas

Building materials that have been remediated and have received a final survey should be approved for release prior

to use as backfill material. This requirement should be included in this section.

17. Section 4.4.2.2.1, page 4-14, Building - Unaffected Areas

Were any measurements obtained to support classification of these areas as unaffected?

This section states "If future surveys indicated that the average contamination exceeds 25% of the release limit for unrestricted use . . . the area will be reclassified as an Affected area." This section should also include a reclassification or investigation action level for individual elevated measurements discovered in unaffected areas.

18. Section 4.4.2.2.2, page 4-14, Soil - Unaffected Areas

This section states "If the average contamination exceeds 75% of the release limit . . . the area(s) will be reclassified." Reclassification from an unaffected area to an affected area is based on the activity levels of individual measurements, not an average. This section should be revised to reflect this.

19. Section 4.4.3, page 4-15, Reference Grids

It is the understanding of NRC staff that the only media that will remain after remediation activities have been completed are paved concrete and asphalt areas, soil, and groundwater. However, Section 4 of the Decommissioning Plan refers to surface scans of building interiors. Will there be affected interior building surfaces present during the final survey? Will the remaining concrete floor be used as foundation for buildings to be built in the future. If the scanning MDA for concrete areas is close to the guideline limit, a 1m x 1m grid pattern should be used.

The first sentence of the last paragraph on this page states "Areas where the average contamination levels exceed 25% of the surface contamination guideline . . . will be reclassified as Affected Areas and resurveyed accordingly." Reclassification from an unaffected area to an affected area is based on the activity levels of individual measurements, not an average. This section should be revised to reflect this.

20. Section 4.4.4, page 4-17, Surface Scans

The final survey report should include detailed results of the scan surveys conducted for each survey area. The final survey report should illustrate the location and activity of elevated levels identified by scan surveys. This commitment should be included in the Decommissioning Plan.

21. Section 4.4.5.1, page 4-17, Direct Measurements

Conducting direct alpha measurements at only 10% of the direct measurement locations is unacceptable. See Comment 6 above.

22. Section 4.4.5.1.1, page 4-17, Direct Measurements - Affected Areas

The scanning technique of a pancake GM probe is not capable of detecting residual uranium activity at 25% of the guideline level. Please refer to Comment 2(b) above.

23. Section 4.4.8.1.1, page 4-19, Surface Soil - Affected Areas

This section states that "If compliance cannot be demonstrated, additional samples will be taken, the sample results evaluated and the area remediated, if necessary." Please describe in more detail where and what frequency of samples will be taken, how they will be evaluated against previously obtained data, and what results will constitute remediation.

The last paragraph in this section states that "contact beta/gamma levels will be made prior to sampling to determine whether surface contamination is present." Please explain why this is necessary.

24. Section 4.4.8.1.2, page 4-19, Surface Soil - Unaffected Areas

This section states "At each surface sampling location, contact beta/gamma levels will be monitored before sampling to determine whether subsurface contamination may be present." Please clarify the purpose of obtaining the contact beta/gamma levels.

25. Section 4.4.8.1.1, page 4-19, Surface Soil - Affected Areas; and Section 4.4.8.1.2, page 4-19, Surface Soil - Unaffected Areas

As stated in Comment 13 above, what is the basis for an analytical frequency of Tc-99? Without sufficient justification, analyzing only 5% of soil samples for Tc-99 to demonstrate compliance with the limit is unacceptable. The licensee should consider a surrogate measure of Tc-99 or analyze all soil samples for Tc-99. Section 4.5.3, page 4-22, Direct Radiation Dose Rates -Background

The dose (exposure) rate background levels within the plant (0.02 to 0.07 mrem/hour) seem higher than what would be expected. Please provide data regarding the values and location of background measurements that were obtained to determine this background exposure rate range. Also, please describe the location where daily background values will be obtained for measurement type.

27. Section 4.8.2, page 4-27, Data Review, Analysis and Auditing

This section states that from an analysis of the data "a decision will be made as to whether additional sampling is required . . . " Please provide more detail regarding

additional sampling methods and when additional sampling will be performed.

28. Section 4.8.4, page 4-28, Comparing Means with the Release Criterion

Please describe how the compliance with the unity rule will be met at the 95% confidence level.

29. Section 4.9, page 4-31, Report

In addition to summary tables of the survey results, the final survey report should provide diagrams or maps of each survey area illustrating each sample location and tables listing each individual sample result for each survey area, including location number, survey instrumentation used, background measurement, critical level, MDA, and measured activity for each sample type.

30. Table 4-2, Instrumentation for Radiological Surveys

As indicated in our Comment 9 above, the 1130 MDA indicated in this table for the GM probe is not the MDA for surface scans. Please correct.

A:\RMIRESP.FSP

NRC staff recommends that RMI re-evalaute the use of this survey instrumentation and data as final survey measurements.

4. Response to Comment 4c on additional investigations for locations with elevated levels of contaminants: As mentioned previously, the location and value of background soil used to calculate net values for areas A, E, and G should be provided.

From the licensee's response to this comment, there appears to be some confusion between elevated activity levels that require remediation and those that require reclassification. The purpose of reclassification action levels is to identify those survey areas that require a more detailed, thorough final survey. In the response to this comment the licensee states

"... if any one sample in an area exceeds three times the free release limit ..., or if 10 m x 10 m grid averaging calculation yield 100 m² areas that exceed the free release limit, the specific hot spots or 100 m² areas identified will be reclassified as affected and remediated."

The first issue is that the action levels described above are for remediation, not reclassification. The reclassification action level should be defined differently than the action level for remediation. A reclassification action level simply requires a more thorough survey approach for an area previously thought to be unaffected. Reclassification of an unaffected area to an affected area may or may not require remediation.

The second issue regarding the licensee response is that, depending upon the sampling results, the entire survey unit, not just the specific locations of elevated activity levels, may need to be reclassified and surveyed as an affected area.

- 5. Response to Comment 14b on sensitivity of scanning instrumentation: The licensee's response states that "Areas of elevated levels . . [and] post remediated readings will be obtained and documented." Please specify where this information will be documented and what information will be included in the final survey report.
- 6. Response to Comment 15 concerning the need for alpha/beta ratios: The licensee's argument that previous direct alpha measurements were consistently less than the beta gamma activity validates NRC staff's previous comment that direct