



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20565

SEP 23 1992

Docket Nos. 50-54
70-687

License Nos. SNM-639
R-81

Mr. James J. McGovern, President/Plant Manager
Cintichem, Inc.
P.O. Box 816
Tuxedo, New York 10987

Dear Mr. McGovern,

The Nuclear Regulatory Commission staff has reviewed the proposed residual soil contamination criteria for your Tuxedo, NY facility (forwarded to this office by letter dated July 15, 1992) and the ground-water flow model (forwarded to this office by letter dated August 12, 1992). Based on our review, we identified several issues that need to be clarified or resolved before we can approve your proposed cleanup criteria. These issues include the following:

1. Condition G of Amendment #6 of your Special Nuclear Material License states that the residual soil contamination limits developed by Cintichem "will be based on the principle that residual contamination be as low as reasonably achievable" (ALARA). During our phone conversation of July 9, 1992 I requested that information submitted in support of your proposed residual soil contamination limits address ALARA. In response to my request, you indicated that a description of how Cintichem's residual soil contamination criteria addressed ALARA would be included in support of your proposed residual soil contamination limits. The proposed residual soil contamination limits submitted to NRC on July 15, 1992 does not include this information. Please provide a description of how the proposed residual soil contamination criteria address ALARA. The most appropriate way to provide this information to NRC would be in an ALARA analysis that evaluates the costs and benefits associated with decontamination of the site to alternative levels. The analysis should clearly demonstrate that the proposed criteria are as low as is reasonably achievable, taking into account the state of technology, and the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to the utilization of atomic energy in the public interest (cf. 10 CFR 20.1(c)).
2. The proposed criteria outline residual contamination limits for surface and subsurface soil. It is unclear whether these limits would apply to the surface and subsurface of each contaminated area or do the surface criteria apply only to those areas that are suspected of being contaminated within the top six inches and subsurface criteria apply only to areas where the contamination exists below six inches. Also,

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please explain in more detail the rationale for proposing two different sets of contamination criteria in terms of potential public exposures and assumed exposure scenarios.

3. Attachment 1 of your July 15, 1992 letter (examples of RESRAD inputs) shows that for at least two set of calculations (5 and 18) a 1 meter thick groundcover was assumed to be in place above the contaminated soil. During our meeting of February 5, 1992, NRC informed Cintichem that credit would not be allowed for any cover material at the site since under unrestricted release conditions no further control will be exercised at the site after decommissioning and, therefore no assurance can be provided that the cover will remain intact. Please re-run all RESRAD calculations without taking credit for a groundcover and provide copies of these calculations to NRC. In addition, please provide NRC with summaries of all pathway analysis inputs and results.
4. In deriving the surface soil values in Table 2, the nuclides whose concentrations are controlled by ingestion are affected by the contamination depth of 0.15 meters (6 inches). This leads to residual contamination criteria that are higher than those which would be calculated if the depth of contamination is equal to or greater than the assumed root depth of 0.9 meters. Please provide justification that contamination extends no deeper than the upper 0.15 meters of soil in these zones and that an uncontaminated soil layer of at least 0.75 meters exists below this contaminated zone. Alternatively, you may wish to consider determining surface criteria values assuming a 0.9 meter depth of contamination, provided this is reasonably consistent with the actual site characteristics in terms of the depth of soil and extent of contamination.
5. Table 3 indicates that the mass balance water transport model is used for the surface zone calculations. However, the examples of RESRAD inputs show that the non-dispersion model was used for both surface and sub-surface zone calculations. Please explain this discrepancy or recalculate the values for the surface zone using the mass balance model.
6. The statement in your cover letter of July 15, 1992, "If residual contamination exists in more than one area or zone, the individual criteria will be additive..." is unclear. Please clarify whether you are referring to the surface and subsurface soil, the criteria for each radionuclide, or both?
7. Does Cintichem intend to use the building rubble as backfill once it is determined to be "clean" based on the criteria outlined in Regulatory Guide 1.86? If so, do you intend to include any residual radioactive material in the rubble as part of the source term for the exposure assessment?
8. Cintichem proposes to allow residual soil contamination to be averaged over 100 m² and allow "hot spots" of up to three times the proposed criteria to remain at the site. Please describe your "hotspot" criteria

and approach for implementing these criteria, including descriptions of the maximum size and number of "hot spots" per 100 m² you would leave on the site using these criteria. Staff would find the method discussed in Section 2.2 and Section 8.5.2 of draft NUREG/CR-5849 acceptable as long as the concentration averaged over any 100m² area does not exceed the proposed soil contamination limit.

9. In the event contamination is found on the bedrock behind the facility walls, do you intend to perform further characterization (i.e., core drilling) to determine the depth of contamination in the bedrock? If contamination were discovered below the surface of the bedrock, what cleanup criteria would apply to this contamination?
10. The proposed residual soil contamination limits for ^{110m}Ag, ⁹⁵Zr, and ⁹⁵Nb are outlined in Attachment II. These radionuclides are not included in the RESRAD code. However, you developed limits for these radionuclides using RESRAD by substituting radionuclides with similar half-lives. This approach did not apparently account for differences between the nuclides in terms of their radiation energies, decay schemes, and environmental transport characteristics. Please justify this approach and demonstrate that the approach provides valid estimates of potential doses from these radionuclides. Also, it may be appropriate to use another dose assessment model such as PATHRAE to aid in determining residual soil contamination criteria for these isotopes.
11. The report by Leggette, Brashears, and Graham indicates that ³H was detected in all monitoring wells at the site. Please characterize the extent and distribution of ³H in the sampling wells adjacent to the Indian Kill Reservoir and in samples taken from the reservoir.
12. Distribution coefficients (K_ds) were determined for only three radionuclides (¹³⁴Cs, ¹³⁷Cs and ¹⁴⁴Ce) using empirical data (ASTM 4319-83). During our phone conversation on September 17, 1992, you indicated that you limited your experiments to ¹³⁴Cs, ¹³⁷Cs and ¹⁴⁴Ce because these are the only three radionuclides detected in the soil at the site. The remaining K_d values for radionuclides found at the site were derived using vegetable/soil transfer factors developed by Sheppard and Thibault. The transfer factor method only provides approximate K_d values and should be used only when site-specific parameters are not available or if the potential dose contribution from these nuclides can be shown to be small. In your presentation to NRC and the New York State Department of Environmental Conservation (NYSDEC) staff on June 23, 1992, you indicated that Cintichem would determine K_d values for all isotopes found in the soil at the site using the American Society of Testing and Materials (ASTM) method 4319-83. Please determine the K_d values as outlined to NRC and NYSDEC or provide justification for using this alternative method.

When determining K_d values Cintichem should ensure that:

- a. K_d values are developed for all significant (in terms of dose) radionuclides found at the site;
- b. The K_d values should represent all contaminated areas and hydrogeologic units along the transport pathway;
- c. The physical and chemical conditions of the soil selected for K_d determination should be similar to the contaminated soil, for the isotopes found in the soil;
- d. The precision of K_d determinations should conform to that found in ASTM 4319-83.

Cintichem may choose not to determine K_d values and instead use zero (0) (i.e., zero retardation) for K_d values in the RESRAD model or determine the leach rates for the radionuclides in the contaminated soil. Leach rates may be used in lieu of K_d s in RESRAD.

13. The reported K_d values for ^{134}Cs and ^{137}Cs were $106 \text{ cm}^3/\text{gm}$ and $271 \text{ cm}^3/\text{gm}$, respectively. As these isotopes exhibit similar properties, it is expected that they would have similar K_d values. Because these values differ by more than a factor of 2, we suggest that Cintichem review the test methodology used to develop the K_d s for these isotopes and the resulting test data to determine if any miscalculations may have occurred and confirm that the tests conducted to develop these K_d s conformed with the parameters outlined in ASTM 4313-83.
14. Table 1 is entitled "Allowable Increases in the Concentration of Radioisotopes Based on Current EPA Criteria" (emphasis added). It is unclear if Cintichem is proposing residual soil contamination limits that could lead to the radionuclide concentrations in groundwater up to the limits listed in column 5 of Table 1 (i.e., limit = X pCi/l, where X = EPA Drinking Water Maximum Contaminant Level) or if your proposed soil contamination limits would add up to this amount of activity to the groundwater (i.e., limit = X pCi/l + background). The former interpretation would be acceptable to the NRC staff. Please clarify this point.

Please respond to these questions and issues within 30 days of the date of this letter.

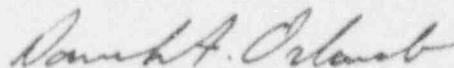
In addition, on several occasions staff has requested results from the analysis of the historical water samples for ^{90}Sr . I understand that this sample analysis has now been completed. Please provide, under separate cover so as not to delay action on the questions outlined above, the results of the historical sample analysis and any analysis of these results you may have developed.

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If you have any questions on these issues, please contact me at 301 504-2566.

Sincerely,



Dominick A. Orlando, Project Manager
Regulatory Issues Section
Decommissioning and Regulatory
Issues Branch
Division of Low-Level Waste Management
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cc: (See attached list)

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Sincerely,

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Dominick A. Orlando, Project Manager
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Decommissioning and Regulatory
Issues Branch
Division of Low-Level Waste Management
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cc: (See attached list)

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PDR YES NO Category: Proprietary or CF only
ACNW YES NO

SUBJECT ABSTRACT: QUESTIONS ON CINTICHEM'S PROPOSED RESIDUAL SOIL
CONTAMINATION LIMITS

OFC:	LLDR	LLDR <i>W</i>	LLDR <i>M</i>		
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