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PETER MAGGIORE  
SECRETARY

July 1, 1999

Dr. Ines Triay, Manager  
Carlsbad Area Office  
Department of Energy  
P. O. Box 3090  
Carlsbad, New Mexico 88221

Dear Dr. Triay:

**RE: RFETS Waste Determination for RF005.01 - Preliminary Review**

The New Mexico Environment Department (NMED) has conducted a preliminary review of the document entitled "Non-Mixed Waste Determination for TRU Stabilized Pyrochemical Salts - Profile No. RF005.01" dated June 1999. Attached are NMED's comments concerning: 1) the general completeness of the information provided for review; 2) the basis for DOE's non-mixed waste determination; and 3) our evaluation of RFETS' compliance with the WIPP Waste Analysis Plan, in light of proposed Final Permit Condition IV.B.2.b.

If you have any questions, please contact Mr. Steve Zappe of my staff at (505) 827-1560, x1013.

Sincerely,

James P. Bearzi  
Chief  
Hazardous and Radioactive Materials Bureau

Attachment

- cc: Greg Lewis, NMED
- John Tymkowich, HRMB
- Steve Zappe, HRMB
- Susan McMichael, NMED OGC
- David Neleigh, EPA Region 6
- Mary Kruger, EPA ORIA
- Connie Walker, TechLaw
- WIPP File - Red '99

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**Review of Non-Mixed Determination for TRU Stabilized Pyrochemical Salts-  
Profile No. RF005.01**

A. General Completeness Analysis

The *Non-Mixed Determination for TRU Stabilized Pyrochemical Salts - Profile No. RF005.01 Document* (Document) was examined to determine whether all of the referenced material was included in the supplemental information package. All information referenced within the Document which DOE CAO indicated had been provided were included in the information package. Upon more detailed review of the Document and associated References, the DOE should provide the following information to facilitate technical review of the Document:

- Flow charts for the pyroredox and vacuum melt processes, including Building(s) where the processes were performed
- "Wastes Stream and Residue Identification And Characterization, Building 707, Version 6.0"
- Reference P053: "Reconstruction of Historical Rocky Flats Operations and Identification of Release Points"
- "LDR Assessment for Transuranic Waste Streams, Rocky Flats Environmental Technology Site," WASTREN, Inc., August 27, 1997
- "Assessment of RCRA Metal Contaminating Plutonium," Letter from Kevin Peters to Pam Edrich, January 29, 1998.
- Visual Examination Forms and Associated Videotapes (representative selection)
- "Presence of Chromium in Pyrochemical Salts at Rocky Flats Environmental Technology Site," prepared by KMI Services and Lamb Associated, EG&G, 1993
- "Environmental Technologies Internal Technical Report," Analysis of Volatile Organic Compounds on Specific Waste Forms, Scott Brendecke, et. al., 94-039, October 19, 1994.
- "Statistical Evaluation of Toluene Analysis Results in the Headspace Gas of Transuranic (TRU) Waste Drums--ELD-012-97," memorandum from E.L. D'Amico to D.K. Sullivan, August 12, 1997, and related memoranda/documentation.
- Visual Examination Procedure 4-W84-RS-0114

B. Technical Comments on the Non-Mixed Determination for TRU Stabilized Pyrochemical Salts-Profile No. RF005.01.

- 1) The Document does not include sufficient acceptable knowledge information to completely confirm the validity of RFETS' non-hazardous waste determination. Missing information could be in the above references, but additional information must be provided concerning the pyroreox and vacuum melt processes including flow diagrams and assessments performed to evaluate hazardous constituents present in waste. Specific references documenting the presence or absence of VOCs/SVOCs in each of the waste streams (i.e. IDCs 365, 404, 412, 414, and 416 comprising IDC 454X) and in all materials placed in the IDC 454X waste drums should be provided. In addition, the attached acceptable knowledge summary does not provide sufficient information regarding the IDCs that comprise the IDC 454 waste stream with respect to the wide range of chromium results (including 2 samples well over the regulatory threshold). The chromium results indicate a significant level of heterogeneity of chromium in the waste. This heterogeneity could be attributed to:

- inadequate control of the processes that originally were used to generate the salt wastes to allow for fluctuating levels of chromium;
- significant differences in the composition of waste in IDCs 365, 404, 412, 414, and 416 that are not adequately explained in the acceptable knowledge documentation;
- introduction of chromium contamination that was not otherwise identified in the acceptable knowledge documentation; or
- the method of sampling may not be representative due to liquid stratification of certain wastes. The acceptable knowledge does not address the homogeneity of each of the IDCs that comprise waste stream IDC 454.

Provide more detailed acceptable knowledge to include information about IDCs 365, 404, 412, 414, and 416 that would explain the elevated levels and wide concentration range of chromium in some of the metals samples. In addition, metals analyses of all waste samples should be clearly traceable to the precedent IDC.

- 2) The Document indicates that the salt stabilization treatment would sufficiently degrade any VOCs or SVOCs present in waste, but analytical/technical justification for this assertion is not provided.
- 3) Specific waste mixing and management activities should be clarified with regard to salt stabilization. Supplemental information infer that sampling was performed on an individual IDC basis (i.e. containers of IDC 365, 404, 412, 414, or 416 waste), but the IDCs associated with each can number are not provided. A listing of IDCs/can number should be provided.
- 4) Provide additional justification for combining IDC 365, 404, 412, 414, and 416 into a single waste stream IDC. Analytical data and other RFETS documentation imply that there may be significant chemical differences with respect to metals and process differences between these IDCs which bring this combination into question.

- 5) The discussion(s) pertaining to radiolysis is incomplete. Stakeholders have questioned the generation of reactive, corrosive, and ignitable waste, as well as TC wastes due to radiolysis. Sections of the Document should be revised to specifically indicate the effects of radiolysis with respect to generation of these waste. In addition, the Document indicates that the waste configuration/contents specifically preclude radiolytic gas generation, but do not provide any additional information pertaining to this assertion including visual examination results, radiolytic decay products/particles and the impact these might have on radiolytic gas generation, etc.
- 6) The Document states, on page 5, that "only contents of the same IDC are allowed in one payload container." Does this mean that containers include only IDC 365 (for example), or that payload containers are a mix of IDCs 365, 404, 412, 414, and 416 as part of IDC 454X? See comment number B.3 above.
- 7) Metals data were inappropriately evaluated on a log-normalized basis by RFETS. RFETS did not adequately investigate the possibility that the log-normal fit of the data was due to differences in the concentration means of the precedent IDCs that comprise the IDC 454 waste stream, and combining these IDCs may therefore be inappropriate. EPA guidance indicates that the occurrence of log-normal distributions of data are attributed to random and multiplicative dilution and mixing of contaminants with uncontaminated air or water (EPA 1992, pg. 2). Log-normally distributed data is expected when the contaminants are in an uncontained and uncontrolled environment, such as that associated with a spill or a release to the environment. However, the acceptable knowledge for the IDC 454X waste indicates that the pyrochemical salts were derived from well defined processes that used materials meeting specified composition requirements. The wastes were not released to the environment or subject to uncontrolled or undefined mixing or dilution. The salts were also subject to thermal treatment that functioned to thoroughly mix and homogenize the waste. Based on the acceptable knowledge provided, the contaminants in this waste should have been thoroughly mixed and normally distributed. The log-normal distribution of the data indicates a source of variability that is not indicated in the acceptable knowledge documentation. RFETS should further examine the waste to determine if the demonstrated variability of the waste is due to differences in the precedent IDCs or if the process and process components are not as well controlled as indicated in the acceptable knowledge documentation. Evaluation of the data for chromium indicates that two of the nine sample results were significantly higher than the regulatory threshold for chromium. Evaluation of the data assuming a normal distribution indicated that the waste was hazardous for chromium. Evaluation of the data on a log-normal basis resulted in a determination that the chromium levels were elevated but below the regulatory threshold. Log normalization of the data reduced the impact of the two results that were significantly above the regulatory threshold. However, RFETS did not adequately correlate the variable chromium concentration levels to precedent IDCs nor address the possibility that the precedent IDCs should be segregated into separate waste streams based on the chromium levels in the waste.
- 8) The reason for using SW-846 method 7742 (Selenium by Atomic Absorption and borohydride reduction) is not fully explained. The laboratory was unable to achieve an

adequate level of detection using the ICP methodology. However, the underlying cause was not identified and there was no discussion regarding the potential impact on other analytical parameters. Specifically, there was no discussion regarding the potential impact of interference due to high salt concentrations in the waste on selenium as well as the other analytical parameters.

In addition, RFETS did not adequately explain the selenium concentration difference in sample 98H1474-005 when the ICP results are compared to the Atomic Absorption results. The Atomic Absorption result for the sample is 3.0U mg/kg, where U signifies that the result is a non-detect. The ICP result for the sample is 40 mg/kg, which is twice the regulatory threshold. RFETS did not provide any evidence regarding spectral or chemical interferences that would result in such a significant difference in selenium results.

- 9) The acceptable knowledge documentation indicated that mercury was not expected in any of the waste streams and that the subsequent pyrochemical treatment would have volatilized any residual mercury in the waste. However, mercury was found at a concentration of 1.1 mg/kg in sample 99H3511-003. This value is 5-10 times the detection limit for the remaining samples. RFETS does not explain the presence of mercury in the waste stream when RFETS indicates that the acceptable knowledge shows the waste composition and treatment would result in an absence of mercury in the waste.
- 10) The reason for the wide disparity of lead values in the samples was not adequately explained. Lead was found in the samples at values ranging from 14.0U mg/kg to 120 mg/kg. The regulatory threshold for lead, as indicated by RFETS, is 100 mg/kg.

C. Waste Analysis Plan Compliance with respect to the Non-Mixed Determination for TRU Stabilized Pyrochemical Salts-Profile No. RF005.01

- 1) The metals data associated with IDC 454X were log-normalized but Attachment B2 of the revised draft permit does not allow for the log-normalization of data. According to the formula provided in Attachment B2 in Equation B2-7, the site would be required to collect 56 metals samples based on the normal chromium results that are provided; using log-normalized data, a total of 4 samples would have been required. Although a total of 9 samples were collected, which is greater than the required number calculated using log-normal data, this still falls short of the 56 samples required using formula in Attachment B2.
- 2) The  $UCL_{90}$  based on the *normal* data for chromium is 130.42 mg/kg which is over the RTL of 100 indicated for chromium. As such, this waste would be hazardous for chromium if calculated using the revised draft permit equations and requirements. The *log-normalized*  $UCL_{90}$  for chromium in the Document is 4.25, which is less than the log-normalized Regulatory Threshold of 4.61. That is, if normalized data were used as mandated in the revised draft permit, the waste would not be adequately characterized as non-hazardous for chromium.

- 3) Headspace gas analyses are required for every waste container as specified in Module II.C and Section B-3(a)(1) of Attachment B of the revised draft permit. However, Section 3.4.1 of the Non-Mixed Waste Determination for TRU Stabilized Pyrochemical Salts indicates that headspace gas sampling and data were not performed on IDC 454X containers. RFETS justifies this exception based on visual examination results, acceptable knowledge information regarding the presence of VOCs/SVOCs, and lack of radiolytic gas generation. However, several questions remain concerning this justification (refer to comments above).
- 4) Solids sample analysis for SVOCs and VOCs is required in the revised draft Permit, Attachment B, Waste Analysis Plan (**WAP**). The WAP does not exclude confirmatory sampling of SVOC and VOC totals analyses based on process knowledge. However, SVOC and VOC analysis of salt samples was not performed for IDC 454, as RFETS indicates that the thermal stabilization process would volatilize or destroy all potential VOC and SVOC compounds in the waste. Refer to comment number B.2, above.
- 5) Visual examination data forms and videotapes were not provided for the waste containers. Section B1-3 of Attachment B1 of the revised draft permit specifies the requirement that all visual examination activities will be video/audio taped and documented on a visual examination data form. Documentation of visual examination activities must be provided.
- 6) There was no discussion of the data quality objectives (**DQOs**) for this waste stream. The Document did not indicate DQOs levels as specified in sections B3-1 and B3-8 of Attachment B3 of the WAP, nor did it indicate how DQOs were evaluated or whether the DQOs were met for IDC 454X.
- 7) There is no indication that the facility collected co-located samples (field duplicates), equipment blanks (or used certified clean disposable sampling equipment), and demonstrated adequate decontamination procedures as specified in section B1-2b of the WAP.
- 8) The site used the retrievably stored sampling number collection calculations, but collected the samples using newly generated sampling techniques. Whether the waste would actually be considered newly generated (because it was repackaged) or retrievably stored (because it was generated prior to issuance of a final permit) is somewhat ambiguous. If the permit had been issued, the waste would be newly generated/repackaged. The proposed final permit has been modified to allow use of the retrievably stored sample number calculation for newly generated waste *if* this results in more samples being collected, but as indicated in comment number C.1 above and in the site's own documentation, use of the newly generated process would result in *many more* samples being collected due to sample inhomogeneity. (This is probably why the site sought-- and was granted by CAO-- an allowance to use the retrievably stored calculation). Since this activity has transpired pre-permit, the waste would be considered retrievably stored, and the appropriate sample number collection methodology (i.e., retrievably stored) was used. However, the revised draft permit does not allow scoop sampling of retrievably stored waste, and therefore the waste was not sampled in accordance with the WAP.

**References**

**(EPA, 1992)** *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance (DRAFT)*, Office of Solid Waste Permits and State Programs Division, USEPA, July 1992