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**SANDIA NATIONAL LABORATORIES
WASTE ISOLATION PILOT PLANT**

**Analysis Plan For Inventory Reconciliation:
Compliance Recertification Application**

Task 1.4.1.2

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1. INTRODUCTION AND OBJECTIVES

In 1996 the Department of Energy (DOE) completed a performance assessment (PA) calculation for the Waste Isolation Pilot Plant (WIPP). The PA was part of the Compliance Certification Application (CCA) submitted to the Environmental Protection Agency (EPA) to demonstrate compliance with the radiation protection regulations of 40 CFR 191 and 40 CFR 194 (DOE 1996a). As required by the WIPP Land Withdrawal Act (Public Law 102-579), DOE is required to submit documentation to EPA for the recertification of the WIPP every five years in order to continue operating the site. This required that a Compliance Recertification Application (CRA) be prepared, and CRA-2004 was submitted to the EPA in March 2004 (DOE 2004).

Upon submittal, EPA will perform a completeness review prior to starting the process to determine if CRA-2004 demonstrates continued compliance with the disposal regulations. During their review, EPA will request additional information from DOE which may require supplementary PA analyses. Additionally, stakeholders may request information from EPA regarding CRA-2004. Such stakeholder requests may also require supplementary PA analyses (upon direction from DOE).

This Analysis Plan (AP) describes the work that Los Alamos National Laboratory-Carlsbad Operations (LANL-CO) and Sandia National Laboratories (SNL) will perform in preparing a revision of the CRA-2004 TRU waste inventory for use in supplementary PA calculations which may be requested to evaluate the importance of possible inconsistencies in the inventory. This work involves correction of data inconsistencies that apply to the inventory as it was described on September 30, 2002 (the inventory data cut-off date provided for CRA-2004).

1.1 BACKGROUND

Preparation of the transuranic (TRU) waste inventory for CRA-2004 (DOE 2004) was governed by AP-092, *Analysis Plan for Transuranic Waste Inventory Update Report, 2003* and AP-097, *Analysis Plan For Deriving Radionuclide Inventory Information for Performance Assessment Calculations: Compliance Recertification Application*.

During the final preparation of CRA-2004, Mr. P.E. Shoemaker (Shoemaker 2003) of Sandia National Laboratories (SNL) requested a review of the waste stream profiles that form the basis of the inventory estimates for CRA-2004 (DOE 2004). The review was performed by Mr. J.P. Harvill (2004) of Washington TRU Solutions LLC (WTS). Mr. Harvill (2004) found a number of inconsistencies and possible omissions in the reporting of TRU waste inventories for CRA-2004. In response to Mr. Harvill's review, LANL-CO and SNL investigated the noted inconsistencies and possible omissions. The results of the laboratories investigations are documented in Leigh and Crawford (2004). The work scope defined in this AP incorporates the recommendations that have been made in Leigh and Crawford (2004) and its supporting documents.

In addition, the EPA as part of its completeness review of CRA-2004 has visited several of the TRU waste sites to review information about the TRU waste inventory. Site presentations to the EPA have highlighted the need for some inventory updates before CRA-2004 can be deemed complete. The need for some updates to the CRA-2004 has also been noted by outside reviewers (Hancock et. al., 2004). Some of the updates involved incorporation of information that was received after the 2002 cut off date.

1.2 OBJECTIVE

The purpose of this AP is to describe the process that LANL-CO and SNL will follow in preparing a revision of the CRA-2004 TRU waste inventory for use in supplementary PA calculations that may be requested as a result of the review of the CRA-2004 inventory by LANL-CO, SNL, the TRU waste sites, the EPA, and external reviewers responding to the EPA public meetings.

This plan includes the strategy for conducting, and documenting the calculations associated with the revision of the CRA-2004 TRU waste inventory. Also included in this AP are discussions of applicable Nuclear Waste Management Program (NWMP) Procedures, personnel assignments, training requirements, schedule, and deliverables that pertain to this work.

2. APPROACH

LANL-CO and SNL investigated data inconsistencies and possible omissions identified in Harvill (2004) and documented recommendations for corrections to and clarifications of the CRA-2004 TRU waste inventory in a series of reports that were summarized in Leigh and Crawford (2004). The work scope defined in this AP encompasses the recommendations made in those reports. In addition, the work scope defined in this AP includes updates that have been identified in the TRU Waste site presentations to EPA and changes CBFO has requested in response to EPA comments. This data consists of updated information obtained from the sites after September 30, 2002, that is pertinent to updating the inventory. Specific recommendations made in Leigh and Crawford (2004) and its supporting documents will be implemented under this scope of work. In addition, when a systematic omission or inconsistency identified in Harvill (2004) was substantiated in Leigh and Crawford (2004) and its supporting documents, queries of the Transuranic Waste Baseline Inventory Database (TWBID) Revision 2.1 Version 3.12 database (LANL 2003a) will be run to identify other possible instances of the systematic omission so that they all can be corrected, even when each omission was not separately identified in Harvill (2004).

2.1 WASTE STREAM VOLUMES

None of the concerns noted in Harvill (2004) concerning waste stream volumes were substantiated in Leigh and Crawford (2004) and its supporting documents. However, the concerns expressed by Harvill (2004) arose from the lack of clarifying historical information on the waste profile forms for the individual waste streams. The purpose of the waste profile forms was not necessarily to document historical information, but to document to the extent possible current inventory. For example, Harvill (2004) noted a marked decrease in CH-TRU waste

volumes expected from the Savannah River Site (SRS). SRS has provided an adequate explanation for this observed phenomenon (Crawford 2004), but it is not documented on the waste profile forms. The scope of work defined in this AP includes adding clarifying statements with regard to waste stream volumes to the waste profile forms for Idaho National Engineering and Environmental Laboratory (INEEL), Oak Ridge National Laboratory (ORNL), and SRS.

In addition, all final form containers reported on the waste profile forms need to be viable payload containers for shipment to WIPP. Therefore, all final form volumes reported on the waste profile forms should be integrally divisible by the internal volume of the payload container to obtain a number of containers that is an integral number. Final form waste streams can not contain fractional numbers of payload containers. A query of the TWBID Revision 2.1 Version 3.12 Data Version 4.09 database will be run to identify instances where the calculated number of payload containers is not a whole number. The final form waste stream volume will be adjusted so that the calculated number of payload containers is a whole number.

Finally, a query of the TWBID Revision 2.1 Version 3.12 Data Version 4.09 will be run to identify any cases where the final form waste container is not a viable payload container for WIPP. The final form container will be changed to a viable payload container for WIPP and the final form volume will be adjusted accordingly.

Updates to waste stream volumes have also been requested by Hanford and INEEL. Specifically, Hanford has pointed out that some waste streams should not have been included in the projected waste because they had been removed from the site forecast without clear notification to the inventory team. This was identified in an email that was sent to the inventory team in 2003 (Cooney 2003). In addition to the Hanford waste change, a change in the waste streams reported as WIPP shippable is required for INEEL. This update takes into account the Idaho court decision to ship all waste off the INEEL site but does not affect any other site waste streams. The pre-1970 buried waste stream, IN-Z001, contains 55,800 m³ of “as-generated” waste. As part of this AP, a better definition of the shippable waste volume fraction will be obtained from the site.

2.2 WASTE AND PACKAGING MATERIALS

Several of the concerns noted in Harvill (2004) about waste material densities and packaging material densities were substantiated in Leigh and Crawford (2004) and its supporting documents. In particular, the packaging materials for waste streams from Los Alamos National Laboratories (LANL) will be revised based on the recommendations in Lott (Lott 2004a). Cellulose in INEEL waste streams listed as requiring treatment will be revised based on the recommendations in Lott (Lott 2004c).

In addition, a change will be made to the assignment of waste material densities in cases where the waste material densities for a waste stream were not reported by the TRU waste site. Previously, missing values for waste material densities were assigned using the methods documented in LANL (2003b). Since then a crosswalk between the Transuranic Waste Baseline Inventory Report Revision 2 (DOE 1995) waste streams and the waste streams reported in the

data call for CRA-2004 has been developed and published in CRA-2004 (DOE 2004). Based on this crosswalk of waste streams, omitted values for waste material densities will be assigned.

As a result of updates such as the two that are mentioned in section 2.1, there may be additional changes to the waste and packaging material parameters. These changes will be addressed in separate analyses written in accordance with NP 9-1, *Analyses*.

2.3 RADIONUCLIDE ACTIVITIES

Several of the concerns noted in Harvill (2004) concerning radionuclide concentrations were substantiated in Leigh and Crawford (2004) and its supporting documents. All recommendations made in Leigh and Crawford (2004) and its supporting documents with regards to radionuclide concentrations will be implemented under this scope of work. Some of the specific corrections are noted in subsections 2.3.1 through 2.3.6 below.

In addition, a systematic inconsistency (decay dates) identified in Leigh and Crawford (2004) and its supporting documents will be corrected. Radionuclide values that are being reported on the waste profile forms for CRA-2004 are the values submitted by the TRU waste sites, and they have not been decay corrected to the inventory date, 12/31/2001. All of the other radionuclide values given in Appendix DATA Attachment F of CRA-2004 have been decay corrected to 12/31/2001. As a result, the radionuclide concentration values reported on the waste profile forms are not comparable to the other values reported in CRA-2004 (in particular, the CRA-2004 PA used the decay corrected values). The scope of work defined in this AP includes changing TWBID Revision 2.1 Version 3.12 Data Version 4.09 so that the radionuclide concentrations decay corrected to 12/31/2001 are reported on the waste profile forms for CRA-2004.

As a result of updates such as the two that are mentioned in section 2.1, there may be additional changes to the radionuclides. These changes will be addressed in separate analyses written in accordance with NP 9-1, *Analyses*.

2.3.1 Radionuclide Concentrations for Am-241

Concerns about the absence of Am-241 in waste streams where it is expected that Am-241 would be present were noted primarily in the INEEL, LANL, and SRS waste streams. The scope of work defined in this AP includes correcting concentrations for Am-241 based on the recommendations in Hallman (2004a), Crawford (2004), Leigh (2004a) and Leigh (2004b).

2.3.2 Radionuclide Concentrations for Sr-90

The absence of Sr-90 in waste streams where it is expected that Sr-90 would be present were noted primarily in the LANL and Argonne National Laboratory East (ANL-E) waste streams. The scope of work defined in this AP includes correcting concentrations for Sr-90 based on the recommendations in Hallman (2004a) and Hallman (2004b).

2.3.3 Radionuclide Concentrations for Pu-241

While not noted in Harvill (2004), an under-reporting of Pu-241 in the INEEL Advanced Mixed Waste Treatment Facility (AMWTF) waste streams was discovered. The scope of work defined in this AP includes correcting concentrations for Pu-241 in the AMWTF waste streams. The results of this evaluation and calculation will be documented as an analysis under NP 9-1, *Analyses*.

2.3.4 Radionuclide Concentrations for Ba-137m and Y-90

The inconsistent reporting of daughter isotopes (like Ba-137m and Y-90) were noted primarily in the INEEL, LANL, and SRS waste streams. Since none of the daughter isotopes in question are important for PA, Leigh and Crawford (2004) concludes that none of them should be reported on the waste profile forms. The scope of work defined in this AP includes deleting radionuclide concentrations for unimportant daughter isotopes from the waste profile forms.

2.3.5 Radionuclide Concentrations for Cm-244

Concerns about the reporting of Cm-244 were noted in some LANL waste streams. The scope of work defined in this AP includes correcting concentrations for Cm-244 based on the recommendations in Hallman (2004a)

2.3.6 Radionuclide Concentrations in LA-TA-55-48

While not noted in Harvill (2004), a site-reporting error was discovered for the LANL waste stream LA-TA-55-48. As reported based on the data call, LA-TA-55-48 is expected to have a calculated Fissile Gram Equivalent (FGE) that exceeds shipping and disposal limits. The scope of work defined in this AP includes re-evaluating the data submitted for LA-TA-55-48 and if necessary, calculating final form waste stream volumes and packaging configurations for LA-TA-55-48 that are suitable for shipment to WIPP. The results of this evaluation and calculation will be documented as an analysis under NP 9-1, *Analyses*.

2.4 WASTE STREAM DESCRIPTIONS

Harvill (2004) made note of some cases where the waste stream name, waste stream description, waste material parameters, final waste forms, EPA codes and other fields on the waste profile forms contain inconsistent information. All text discrepancies noted by Harvill (2004) will be corrected on the waste profile forms. In addition, a series of queries on the TWBID Revision 2.1 Version 3.12 Data Version 4.09 will be run to identify additional inconsistencies among the fields on the waste profile forms. For example, queries will check for EPA codes assigned to non-mixed waste streams, hazardous waste components in comment fields that are not designated as mixed waste streams. If needed the TRU waste site that submitted the data will be contacted for clarification of their data. If the data cannot be clarified with the site, irregular information will be removed from comment fields, waste stream descriptions and waste stream names.

2.5 EPA CODES

In addition to those discrepancies that are identified as a result of the work described in Section 2.4 above, some waste streams included double entries of some waste codes that have remained as remnants from a previous version of the database. These double entries will be identified by manual inspection and by query. Where double entries are found, extra codes will be removed.

3. TASKS

Task #	Task Description	Responsible Individual(s)	Deliverable(s)	Estimated Start Date	Target Date
1	Document Waste Volume Changes and enter changes into TWBID Rev. 2.1	S. Lott B. Crawford C. Leigh	SP 9-6 forms to implement waste stream volume changes.	7/5/04	7/30/04
2	Document and enter changes to Waste Material Parameters	J. McTaggart B. Crawford C. Leigh	SP 9-6 forms to implement waste and packaging materials changes	7/5/04	7/30/04
3	Document and enter changes to Radionuclides	A. Hallman B. Crawford C. Leigh	Analysis of Pu-241 in AMWTF waste streams Analysis of LA-TA-55-48. SP 9-6 forms to implement radionuclide activity changes	7/5/04	7/30/04
4	Run queries on Waste Stream Descriptions and other possible conflicting fields. Document and delete discrepant information.	G. Van Soest B. Crawford C. Leigh	SP 9-6 forms to implement waste stream description changes for waste streams	6/25/04	6/30/04
5	Run queries for redundant EPA codes. Document and delete extra entries.	G. Van Soest J. McTaggart B. Crawford C. Leigh	Analyses supporting SP 9-6 forms. SP 9-6 forms to implement EPA code changes for waste streams.	6/25/04	6/30/04
6	Update TWBID Revision 2.1 Data Version 4.09 to Data Version 4.10	G. Van Soest S. Lott B. Crawford C. Leigh	Generate new volume, WMPs, and Radionuclide tables. Print out of new Waste Stream Profiles for CRA Revision	7/5/04	7/30/04
7	Preparation of CRA-2004 TRU	S. Lott	Final report for	7/1/04	8/31/04

Task #	Task Description	Responsible Individual(s)	Deliverable(s)	Estimated Start Date	Target Date
	waste inventory final report	B. Crawford Kristy Smith C. Leigh	CRA-2004 inventory (publication domain to be decided)		
8	Document Hanford Revised Projected Waste volumes and update the TWBID Rev. 2.1 database	B. Crawford S. Lott J. Trone	SP 9-6 forms to implement waste volume changes for Hanford RL waste streams	9/23/04	9/28/04
9	Document INEEL pre-1970 waste stream inclusion in WIPP Shippable Inventory and update the TWBID Rev. 2.1 database	B. Crawford S. Lott J. Trone	SP 9-6 forms to include addition of INEEL IN-Z001 waste stream in the WIPP Shippable Appendix	9/23/04	9/28/04
10	Update TWBID Rev. 2.1 to data version 4.10 to 4.11	G. VanSoest B. Crawford J. Moon	TransORIGEN Analysis for data version 4.11	9/28/04	9/30/04
11	Print new waste profile forms	G. VanSoest B. Crawford K. Smith	Waste Profile forms for Appendices I, J, and K for the revision to the update report.	10/1/04	10/8/04

4. SOFTWARE LIST

TWBID Revision 2.1 Version 3.12 and TWBID Revision 2.1 Version 3.13.

5. DOCUMENTATION, QA REQUIREMENTS, AND RECORDS

5.1 TRAINING

Training will be performed in accordance with the requirements in NP 2-1, *Qualification and Training*.

5.2 INVENTORY DATA AND DATABASE MANAGEMENT

Data changes pertaining to clarification of the inventory information contained in CRA-2004 are expected from implementation of this AP. The data changes identified as a result of working this plan will be managed in accordance with the specific procedure SP 9-6, *Baseline Inventory Report (BIR) Change Report Data Collection and Entry*. At the conclusion of the work scope defined, new data versions of TWBID Revision 2.1 will be issued as described in Section 3.

5.3 COMPUTER CODES

TWBID Revision 2.1 Version 3.12 was qualified as software under NP 19-1, *Software Requirements*. Any revisions to TWBID Revision 2.1 that are required as part of the work scope defined in this AP will be conducted under NP 19-1, *Software Requirements*. On September 1, 2004 a Version 3.13 of TWBID Revision 2.1 was qualified under NP 19-1, *Software Requirements*.

5.4 ANALYSIS AND DOCUMENTATION

All analyses required as part of the work scope defined in this AP will be conducted under the applicable requirements in NP 9-1, *Analyses* Records will be submitted to the records center using NP 17-1, *Records*.

Those changes that must be made to data will be recorded on SP 9-6-3 forms in accordance with SP 9-6, *Baseline Inventory Report (BIR) Change Report Data Collection and Entry*.

5.5 REVIEWS

All records and analyses required to complete the tasks identified in this AP will undergo technical, quality assurance and management reviews before submission to the SNL WIPP Records Center in accordance with NP 6-1, *Document Review Process* and NP 9-1, *Analyses* as appropriate.

6. SPECIAL CONSIDERATIONS

None

7. REFERENCES

Crawford 2004. Inventory Reassessment and Recommendation Report: SR-001, Revision 0. Analysis Report. ERMS #535653. Carlsbad, NM: Los Alamos National Laboratories.

Cooney 2004. Hanford's Future BIR Waste Streams. ERMS # 536778. Hanford Richland Operation, Richland, Washington.

DOE (U.S. Department of Energy) 2004. *Title 40 CFR 191 Subparts B and C Compliance Recertification Application 2004*. DOE/WIPP 2004-3231, pending issue.

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DOE, 1996b. "Transuranic Waste Baseline Inventory Report", Revision 3, DOE/CAO-95-1121, June 1996.

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Hallman 2004a. Inventory Reassessment and Recommendation Report: LANL-001. Analysis Report. ERMS # 534768. Carlsbad, NM: Los Alamos National Laboratories.

Hallman 2004b. Inventory Reassessment and Recommendation Report: AE-002. Analysis Report. ERMS #535443 . Carlsbad, NM: Los Alamos National Laboratories.

Hancock, Coghlan, Petrie and Ash 2004. Letter to EPA Docket ID No. OAR-2004-0025, September 21, 2004.

Harvill 2004. Summary of Review of Transuranic Waste Baseline Inventory Waste Profile Forms Developed to Support the Compliance Recertification Application. ERMS # 534062. January 7, 2004.

LANL 2003a. "Transuranic Waste Baseline Inventory Database, Revision 2.1, Version 3.12, Data Version 0.4.09". ERMS# 526293. Carlsbad, NM: Los Alamos National Laboratory.

LANL 2003b. Data Corrections in the TWBID Revision 2.1 Database. ERMS #528538. March 26, 2003.

Leigh 2004a. Inventory Reassessment and Recommendation Report: IN-001. Analysis Report. ERMS #535463 . Carlsbad, NM: Los Alamos National Laboratories

Leigh 2004b. Inventory Reassessment and Recommendation Report: IN-002, Revision 0. Analysis Report. ERMS #535612 . Carlsbad, NM: Los Alamos National Laboratories.

Leigh and Crawford 2004. Inventory Reassessment Summary For the CRA-2004 TRU Waste Inventory. ERMS # 534059

Lott 2004a. Inventory Review and Reconciliation Report: LA-002, Waste Material Parameters. Analysis Report. ERMS # 534518. Carlsbad, NM: Los Alamos National Laboratories.

Lott 2004b. Inventory Review and Reconciliation Report IN-003, Revision 0. Analysis Report. ERMS #535779 . Carlsbad, NM: Los Alamos National Laboratories.

Lott 2004c. Inventory Reassessment and Recommendation Report IN-005, Revision 0. Analysis Report. ERMS #535727 . Carlsbad, NM: Los Alamos National Laboratories.

Shoemaker 2003. Letter Requesting Joe Harvill Review of CRA-2004 Waste Profile Forms. ERMS # 534059. December 1, 2003.

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