

71-9218



PK:07:00009  
\*\*Revised\*\*  
UFC:1000.00

May 1, 2007

Mr. Meraj Rahimi, Project Manager  
NMSS/SFPO MS/013D13  
U.S. Nuclear Regulatory Commission  
One White Flint North  
15555 Rockville Pike  
Rockville, MD 20852-2738

Subject: REVISION TO REPORT PURSUANT TO 10 CFR 71.95 DATED MARCH 21, 2007

Dear Mr. Rahimi:

This letter is submitted as a revision to Washington TRU Solutions, LLC (WTS) letter number PK:07:00009, dated March 21, 2007. This letter incorporates the additional information requested from your office during a telephone conference on April 19, 2007 between WTS and the U.S. Nuclear Regulatory Commission. On behalf of the U. S. Department of Energy Carlsbad Field Office (CBFO), this letter is submitted to report a condition pursuant to 10 CFR 71.95 regarding the use of TRUPACT-II, numbers 170, 172, 187, and 188. The TRUPACT-II operates under the U.S. Nuclear Regulatory Commission Certificate of Compliance Number 9218.

*(1) A brief abstract describing the major occurrences during the event, including all component or system failures that contributed to the event and significant corrective action taken or planned to prevent recurrence:*

Three shipments of transuranic waste listed below were shipped in TRUPACT-IIs with an incorrect evaluation of the hydrogen/methane concentration in 12 individual 55-gallon drums. The shipments were completed, the contents removed from the TRUPACT-IIs, and the payload containers emplaced in the Waste Isolation Pilot Plant (WIPP) underground before the non-compliance was discovered.

- Shipment SR070001 from Savannah River Site to WIPP
  - TRUPACT-II No. 187 containing one Ten Drum Overpack No. SRTP01740
- Shipment SR070002 from Savannah River Site to WIPP
  - TRUPACT-II No. 172 containing one Ten Drum Overpack No. SRTP01741
  - TRUPACT-II No. 188 containing one Ten Drum Overpack No. SRTP01742
- Shipment LA070005 from Los Alamos National Laboratory to WIPP
  - TRUPACT-II No. 170 containing 14 55-gallon drums – One Nonconforming Drum

No hardware failed. The incorrect hydrogen/methane concentration evaluation was caused by a programming error in the electronic database system that is used to record and calculate concentrations of flammable gasses. The consequence of the programming error was three shipments were made, containing a total of 12 drums that would not have passed the electronic flammable gas compliance evaluation. However, the drums were evaluated upon discovery of the programming error and determined to not represent a safety violation due to the fact that the actual shipping duration and waste configuration did not result in exceeding 5% hydrogen equivalent concentration in the innermost waste confinement layer.

NMSS01

To prevent recurrence, the programming error has been corrected.

*(2) A clear, specific, narrative description of the event that occurred so that knowledgeable readers conversant with the requirements of part 71, but not familiar with the design of the packaging, can understand the complete event. The narrative description must include the following specific information as appropriate for the particular event:*

The U.S. Nuclear Regulatory Commission Certificate of Compliance Number 9218, Revision 18, Section 7 requires that payload containers be assigned to a shipping category, which provides a link to the methodology for ensuring concentrations of flammable gasses do not exceed the flammability equivalent of 5% hydrogen in the innermost waste layer of confinement.

Flammable gasses of concern include hydrogen and methane that may be generated by radiolysis plus flammable volatile organic compounds such as acetone or toluene that may be present in the waste matrix. An electronic database system is used to record the concentration of flammable gasses and to calculate the flammable gas generation rate. Hydrogen and methane are typically reported in volume percent (v%) and flammable volatile organic compounds are typically reported in parts per million (ppmv).

The flammable gas generation rate was incorrectly calculated for the twelve 55-gallon drums in question because hydrogen/methane concentrations were initially entered into the electronic database in a ppmv data field and through a programming error subsequently retrieved from the database for compliance calculation purposes from a v% data field which had a null value. The use of the null value for v% rather than the correct value for ppmv resulted in an underprediction of the actual flammable gas generation rate and incorrectly authorized shipment of the 12 drums which would have otherwise failed the electronic evaluation for the assigned shipping categories.

The software utilized to verify compliance with the approved "CH-TRAMPAC, Section 5.0 Gas Generation Requirements" consists of three separate components: 1.) Data entry spreadsheet, 2.) WIPP Waste Information System (WWIS), 3.) WWIS TRAMPAC Evaluation Software (WTES). The data entry spreadsheet is an interface software tool implemented by the shipping sites to input the required data into the WWIS. The WWIS is the data base for the WIPP repository which stores all waste disposal records on a waste container basis. The WTES is the software package that pulls the needed information from the WWIS, and then performs the evaluation for compliance to the CH-TRAMPAC, Section 5.0 Gas Generation Requirements.

Changes in the WIPP Site Hazardous Waste Facility Permit (HWFP) issued by the New Mexico Environment Department in November of 2006 resulted in changes to the shipping sites data entry spreadsheet. The HWFP no longer required Head Space Gas Samples (HSGS) be obtained for each waste container, and instead allowed statistical sampling of waste streams. As a consequence, an alpha designator was added to the HSGS information in the data entry spreadsheet to identify if the HSGS was obtained for TRAMPAC compliance purposes, HWFP compliance purposes, or both ("T", "P" or "B" respectively).

The units of measure used to report HSGS results are dependent upon the method used to quantify the specific analyte. Hydrogen and methane are quantified by either a flame or a photo ionization detector, and are reported in v%. All other analytes are quantified using a gas chromatograph and mass spectrometer, and are reported in ppmv.

The data entry spreadsheet was programmed to look for the character string which would identify the quantification method used for each analyte. If it recognized this string as indicating either hydrogen or methane, it would report the information to the WWIS system in v%. If not, it would report the information

to the WWIS in ppmv. When the alpha designator was added to the information on the data entry spreadsheet, the spreadsheet no longer recognized the quantification method character string, and thus reported the information to the WWIS in the wrong units for hydrogen and methane. Because the WWIS had been programmed to accept either units of measure for all analytes, WWIS accepted the data without issue and the problem was not detected during the data entry spreadsheet testing. WWIS stored the analyte concentration information in separate locations within the database, one for ppmv data, and one for v% data.

When WTES was programmed to pull this information from the WWIS for use in the TRAMPAC gas generation compliance calculations, it was programmed to look for the hydrogen and the methane data in the v% storage locations only. It was programmed to obtain the data for all other analytes from the ppmv storage locations. Further, when the WTES pulled the hydrogen and methane data for these drums from the WWIS, it found the v% storage location empty (null) and interpreted this as a zero value.

As a consequence, the gas generation calculations intended to ensure compliance with the TRAMPAC did not address the contributions of hydrogen and methane for these drums.

Eleven of the 12 drums were shipped from Savannah River Site (SRS) in three different Ten Drum Overpacks (TDOPs). The TDOPs also contained additional drums that correctly passed the flammable gas evaluation. One of the 12 drums was shipped from Los Alamos National Laboratory (LANL) in a 7-pack with additional drums that correctly passed the flammable gas evaluation.

An independent evaluation of the actual shipping durations and the waste configurations of the shipments in question using applicable Safety Analysis Report (SAR) methodology and utilizing known waste characteristics determined a hydrogen equivalent concentration in the innermost waste confinement layer that did not exceed 5%.

*(2)(i) Status of components or systems that were inoperable at the start of the event and that contributed to the event;*

All hardware components were operable at the start of the event. The electronic database system for recording and calculating flammable gas concentrations was operable; however the hydrogen/methane concentrations were being evaluated incorrectly under certain specific conditions depending upon when input as a ppmv value rather than a v% value was being used.

*(2)(ii) Dates and approximate times of occurrences;*

- January 08, 2007, Shipment SR070001
- January 10, 2007, Shipment SR070002
- January 18, 2007, Shipment LA070005

*(2)(iii) The cause of each component or system failure or personnel error, if known;*

No hardware components failed. The electronic database system for recording and calculating flammable gas concentrations under certain conditions did not properly evaluate the available input data fields to ensure that the input data provided in v% or ppmv were correctly discerned and utilized in the flammable gas compliance evaluation. Data management personnel did not initially identify the error

during pre-release testing where the more typically utilized v% data field was handled properly but the previously unutilized ppmv data field was ignored by the compliance software routine.

*(2)(iv) The failure mode, mechanism, and effect of each failed component, if known;*

This criterion is not applicable to the event because no hardware components failed.

*(2)(v) A list of systems or secondary functions that were also affected for failures of components with multiple functions;*

This criterion is not applicable to the event because no hardware components with multiple functions failed. No secondary software systems were affected.

*(2)(vi) The method of discovery of each component or system failure or procedural error;*

No components failed. The electronic database system programming error that led to the non-compliance was discovered by WIPP personnel during re-evaluation of SRS and LANL payload container data.

*(2)(vii) For each human performance-related root cause, a discussion of the cause(s) and circumstances;*

The root cause of the non-compliance was an electronic database programming error that only utilized data from the v% field for hydrogen/methane concentration rather than properly utilizing either the v% or ppmv data field that was available for data input. When data was entered into the ppmv data field rather than the v% data field, the v% value was treated as a null value and incorrectly utilized in the compliance evaluation.

*(2)(viii) The manufacturer and model number (or other identification) of each component that failed during the event; and*

Manufacturer and model numbers associated with component failure are not applicable because no components failed. Issue was caused by error in Version 5.4 of the WWIS data base software.

(2)(ix) For events occurring during use of a packaging, the quantities and chemical and physical form(s) of the package contents.

Shipment SR070001

**TRUPACT-II No. 187, Ten Drum Overpack SRTP01740**

<u>Radionuclides:</u>	<u>Ci</u>	<u>%</u>	<u>Physical and Chemical Form:</u>	<u>Weight (kg)</u>
<sup>241</sup> Am	3.21E-01	0.09%	Iron base metal alloys	359.60
<sup>243</sup> Am	6.14E-06	0.00%	Al. base metal alloys	1.10
<sup>214</sup> Bi	4.81E-07	0.00%	Other metal Alloys	1.00
<sup>243</sup> Cm	2.00E-06	0.00%	Other inorganic materials	15.10
<sup>137</sup> Cs	4.75E-06	0.00%	Cellulosics	5.90
<sup>22</sup> Na	4.55E-05	0.00%	Rubber	17.10
<sup>237</sup> Np	6.95E-04	0.00%	Plastics	180.60
<sup>214</sup> Pb	3.22E-05	0.00%	Steel Container Materials	<u>725.60</u>
<sup>238</sup> Pu	3.37E+02	90.36%		1,306.00
<sup>239</sup> Pu	2.46E-01	0.07%		
<sup>241</sup> Pu	3.53E+01	9.47%		
<sup>242</sup> Pu	1.03E-04	0.00%		
<sup>90</sup> Sr	4.75E-06	0.00%		
<sup>232</sup> Th	3.80E-06	0.00%		
<sup>208</sup> Tl	6.32E-05	0.00%		
<sup>232</sup> U	1.77E-04	0.00%		
<sup>234</sup> U	5.89E-02	0.02%		
<sup>235</sup> U	1.45E-06	0.00%		
<sup>238</sup> U	<u>1.48E-05</u>	0.00%		
	3.72E+02			

Shipment SR070002**TRUPACT-II No. 172, Ten Drum Overpack SRTP01741**

<u>Radionuclides:</u>	<u>Ci</u>	<u>%</u>	<u>Physical and Chemical Form:</u>	<u>Weight (kg)</u>
<sup>241</sup> Am	1.62E-01	0.03%	Iron base metal alloys	309.90
<sup>243</sup> Am	4.40E-06	0.00%	Al. base metal alloys	0.50
<sup>214</sup> Bi	4.19E-07	0.00%	Other metal alloys	0.00
<sup>245</sup> Cm	4.63E-08	0.00%	Other inorganic materials	13.00
<sup>137</sup> Cs	4.91E-07	0.00%	Cellulosics	9.70
<sup>154</sup> Eu	2.99E-07	0.00%	Rubber	5.20
<sup>22</sup> Na	2.23E-05	0.00%	Plastics	215.90
<sup>237</sup> Np	1.84E-05	0.00%	Steel container materials	<u>725.60</u>
<sup>214</sup> Pb	3.88E-06	0.00%		1,279.80
<sup>238</sup> Pu	4.59E+02	91.52%		
<sup>239</sup> Pu	2.95E-01	0.06%		
<sup>241</sup> Pu	4.19E+01	8.37%		
<sup>242</sup> Pu	1.40E-04	0.00%		
<sup>90</sup> Sr	4.91E-07	0.00%		
<sup>232</sup> Th	6.45E-06	0.00%		
<sup>208</sup> Tl	5.13E-05	0.00%		
<sup>232</sup> U	1.53E-04	0.00%		
<sup>234</sup> U	<u>8.09E-02</u>	0.02%		
	5.01E+02			

Shipment SR070002 (cont.)**TRUPACT-II No. 188, Ten Drum Overpack SRTP01742**

<u>Radionuclides:</u>	<u>Ci</u>	<u>%</u>	<u>Physical and Chemical Form:</u>	<u>Weight (kg)</u>
<sup>241</sup> Am	2.05E-01	0.05%	Iron base metal alloys	336.90
<sup>214</sup> Bi	1.05E-06	0.00%	Al. base metal alloys	2.40
<sup>154</sup> Eu	1.26E-07	0.00%	Other metal alloys	0.00
<sup>22</sup> Na	2.78E-05	0.00%	Other inorganic materials	12.10
<sup>237</sup> Np	1.63E-05	0.00%	Cellulosics	6.00
<sup>214</sup> Pb	4.67E-06	0.00%	Rubber	20.90
<sup>238</sup> Pu	3.80E+02	89.30%	Plastics	173.90
<sup>239</sup> Pu	2.61E-01	0.06%	Steel container materials	<u>725.60</u>
<sup>241</sup> Pu	4.50E+01	10.58%		1,277.80
<sup>242</sup> Pu	1.16E-03	0.00%		
<sup>232</sup> Th	2.83E-05	0.00%		
<sup>208</sup> Tl	5.40E-05	0.00%		
<sup>232</sup> U	1.24E-04	0.00%		
<sup>234</sup> U	<u>6.63E-02</u>	0.02%		
	4.25E+02			

Shipment LA070005**TRUPACT-II No. 170, 55 Gallon Drum Payload**

<u>Radionuclides:</u>	<u>Ci</u>	<u>%</u>	<u>Physical and Chemical Form:</u>	<u>Weight (kg)</u>
<sup>241</sup> Am	1.08E+00	5.40%	Iron base metal alloys	8.00
<sup>243</sup> Am	7.34E-05	0.00%	Organics	11.00
<sup>243</sup> Cm	1.40E-05	0.00%	Cellulosics	28.90
<sup>60</sup> Co	6.59E-07	0.00%	Rubber	7.00
<sup>137</sup> Cs	1.12E-04	0.00%	Solidified inorganic mtl.	1,027.00
<sup>237</sup> Np	2.88E-04	0.00%	Plastics	58.20
<sup>214</sup> Pb	8.45E-06	0.00%	Steel container materials	<u>502.50</u>
<sup>238</sup> Pu	6.90E-01	3.44%		1,642.60
<sup>239</sup> Pu	5.29E+00	26.34%		
<sup>240</sup> Pu	1.21E+00	6.00%		
<sup>241</sup> Pu	1.18E+01	58.82%		
<sup>242</sup> Pu	1.22E-03	0.01%		
<sup>90</sup> Sr	1.12E-04	0.00%		
<sup>208</sup> Tl	2.31E-06	0.00%		
<sup>234</sup> U	1.56E-04	0.00%		
<sup>235</sup> U	<u>3.17E-06</u>	0.00%		
	2.01E+01			

(3) An assessment of the safety consequences and implications of the event. This assessment must include the availability of other systems or components that could have performed the same function as the components and systems that failed during the event.

There were no safety consequences resulting from the event. An independent evaluation of the 12 drums, when considering the actual shipping duration, waste configuration and characterization data, indicates that the flammable gas concentrations did not exceed greater than 5% hydrogen in the innermost layer of confinement.

All other requirements of the TRUPACT-II Certificate of Compliance were met.

(4) A description of any corrective actions planned as a result of the event, including the means employed to repair any defects, and actions taken to reduce the probability of similar events occurring in the future.

The following corrective actions have been taken:

1. The electronic database system program has been revised to ensure hydrogen and methane data entries are correctly evaluated for either v% or ppmv data field entries.

2. The electronic database system has been evaluated to ensure that similar errors did not occur in other compliance evaluations.
3. Data from all previous shipments were reviewed to ensure the non-compliance is limited to the above listed shipments.
4. A test plan was developed and performance testing completed prior to implementation of the software correction.
5. The probability of recurrence will be reduced through enhanced beta testing of the pre-release WIPP WWIS software. The test program will be enhanced by expanding the program to include beta testing by the shipping site WWIS users. A revision to DOE/CBFO 97-2273, *WWIS User's Manual*, Revision 12, was issued on March 27, 2007 to require WWIS development staff to provide the shipping sites with a beta test version of the pre-release WWIS software and reporting of shipping site beta test results will be coordinated through CBFO.

The following corrective actions are planned for implementation:

1. A periodic, independent evaluation of the Payload Container Transportation Certification Documents (PCTCD) and Payload Assembly Transportation Certification Documents (PATCD) will be performed for planned shipments by subject matter experts to ensure that the results of the software compliance evaluation program are within expected values for the different parameters, including gas generation evaluations.
2. Transportation Certification Officials and Waste Certification Officials will be provided additional training in evaluating the PCTCD and PATCD and to look for trends and potential discrepancies prior to shipments being made.

*(5) Reference to any previous similar events involving the same packaging that are known to the licensee or certificate holder.*

There are no known similar events where the hydrogen/methane concentration was incorrectly evaluated due to a programming error.

*(6) The name and telephone number of a person within the licensee's organization who is knowledgeable about the event and can provide additional information.*

M. W. Pearcy, Manager  
Project Certification  
WTS Central Characterization Project  
(505) 234-7394

D. R. Kump, Manager  
Waste Information Tracking Systems  
(505) 234-7230

*(7) The extent of exposure of individuals to radiation or to radioactive materials without identification of individuals by name.*

There were no exposures to individuals as a result of the event.

Mr. M. Rahimi

- 10 -

PK:07:00009  
\*\*Revised\*\*

If you have any questions or require additional information regarding this report, please contact me at (505) 234-7396.

Sincerely,

A handwritten signature in black ink, appearing to be 'T. E. Sellmer', with the word 'for' written in smaller letters below the signature.

T. E. Sellmer, Packaging Manager

TES:jeh

cc: M. R. Brown, CBFO	ED
M. A. Italiano, CBFO	ED
D. S. Miehs, CBFO	ED
M. P. Navarette, CBFO	ED