71-9218

Washington
TRU Solutions LLC

PK:07:00009
UFC:1000.00

March 21, 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: REPORT PURSUANT TO 10 CFR 71.95

Dear Mr. Rahimi:

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

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 of 12 drums that should not have passed the 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.

To prevent recurrence, the programming error has been corrected.

NMSS01

(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 and flammable volatile organic compounds are typically reported in parts per million (ppm).

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 ppm data field and through a programming error subsequently retrieved from the database for compliance calculation purposes from a volume percent data field which had a null value. The use of the null value for volume percent rather than the correct value for ppm 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.

Eleven of the 12 drums were shipped from Savannah River Site in three different Ten Drum Over-packs. The Ten Drum Over-packs also contained additional drums that correctly passed the flammable gas evaluation. One of the 12 drums was shipped from Los Alamos National Laboratory 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 ppm value rather than a volume percent 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 volume percent or ppm 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 volume percent data field was handled properly but the previously unutilized ppm 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 Savannah River Site and Los Alamos National Laboratory 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 volume percent field for hydrogen/methane concentration rather than properly utilizing either the volume percent or ppm data field that was available for data input. When data was entered into the ppm data field rather than the volume percent data field, the volume percent 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.

(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

Radionuclides:	Ci	%
^{241}Am	3.21E-01	0.09%
^{243}Am	6.14E-06	0.00%
^{214}Bi	4.81E-07	0.00%
^{243}Cm	2.00E-06	0.00%
^{137}Cs	4.75E-06	0.00%
^{22}Na	4.55E-05	0.00%
^{237}Np	6.95E-04	0.00%
^{214}Pb	3.22E-05	0.00%
^{238}Pu	3.37E+02	90.36%
^{239}Pu	2.46E-01	0.07%
^{241}Pu	3.53E+01	9.47%
^{242}Pu	1.03E-04	0.00%
^{90}Sr	4.75E-06	0.00%
^{232}Th	3.80E-06	0.00%
^{208}Tl	6.32E-05	0.00%
^{232}U	1.77E-04	0.00%
^{234}U	5.89E-02	0.02%
^{235}U	1.45E-06	0.00%
^{238}U	1.48E-05	0.00%
	3.72E+02	

Physical and Chemical Form:	Weight (kg)
Iron base metal alloys	359.60
Al. base metal alloys	1.10
Other metal Alloys	1.00
Other inorganic materials	15.10
Cellulosics	5.90
Rubber	17.10
Plastics	180.60
Steel Container Materials	725.60
	1,306.00

Shipment SR070002

TRUPACT-II No. 172, Ten Drum Overpack SRTP01741

Radionuclides:	Ci	%
^{241}Am	1.62E-01	0.03%
^{243}Am	4.40E-06	0.00%
^{214}Bi	4.19E-07	0.00%
^{245}Cm	4.63E-08	0.00%
^{137}Cs	4.91E-07	0.00%
^{154}Eu	2.99E-07	0.00%
^{22}Na	2.23E-05	0.00%
^{237}Np	1.84E-05	0.00%
^{214}Pb	3.88E-06	0.00%
^{238}Pu	4.59E+02	91.52%
^{239}Pu	2.95E-01	0.06%
^{241}Pu	4.19E+01	8.37%
^{242}Pu	1.40E-04	0.00%
^{90}Sr	4.91E-07	0.00%
^{232}Th	6.45E-06	0.00%
^{208}Tl	5.13E-05	0.00%
^{232}U	1.53E-04	0.00%
^{234}U	8.09E-02	0.02%
	5.01E+02	

Physical and Chemical Form:	Weight (kg)
Iron base metal alloys	309.90
Al. base metal alloys	0.50
Other metal alloys	0.00
Other inorganic materials	13.00
Cellulosics	9.70
Rubber	5.20
Plastics	215.90
Steel container materials	725.60
	1,279.80

Shipment SR070002 (cont.)

TRUPACT-II No. 188, Ten Drum Overpack SRTP01742

Radionuclides:	Ci	%
^{241}Am	2.05E-01	0.05%
^{214}Bi	1.05E-06	0.00%
^{154}Eu	1.26E-07	0.00%
^{22}Na	2.78E-05	0.00%
^{237}Np	1.63E-05	0.00%
^{214}Pb	4.67E-06	0.00%
^{238}Pu	3.80E+02	89.30%
^{239}Pu	2.61E-01	0.06%
^{241}Pu	4.50E+01	10.58%
^{242}Pu	1.16E-03	0.00%
^{232}Th	2.83E-05	0.00%
^{208}Tl	5.40E-05	0.00%
^{232}U	1.24E-04	0.00%
^{234}U	6.63E-02	0.02%
	4.25E+02	

Physical and Chemical Form:	Weight (kg)
Iron base metal alloys	336.90
Al. base metal alloys	2.40
Other metal alloys	0.00
Other inorganic materials	12.10
Cellulosics	6.00
Rubber	20.90
Plastics	173.90
Steel container materials	725.60
	1,277.80

Shipment LA070005

TRUPACT-II No. 170, 55 Gallon Drum Payload

Radionuclides:	Ci	%
^{241}Am	1.08E+00	5.40%
^{243}Am	7.34E-05	0.00%
^{243}Cm	1.40E-05	0.00%
^{60}Co	6.59E-07	0.00%
^{137}Cs	1.12E-04	0.00%
^{237}Np	2.88E-04	0.00%
^{214}Pb	8.45E-06	0.00%
^{238}Pu	6.90E-01	3.44%
^{239}Pu	5.29E+00	26.34%
^{240}Pu	1.21E+00	6.00%
^{241}Pu	1.18E+01	58.82%
^{242}Pu	1.22E-03	0.01%
^{90}Sr	1.12E-04	0.00%
^{208}Tl	2.31E-06	0.00%
^{234}U	1.56E-04	0.00%
^{235}U	3.17E-06	0.00%
	2.01E+01	

Physical and Chemical Form:	Weight (kg)
Iron base metal alloys	8.00
Organics	11.00
Cellulosics	28.90
Rubber	7.00
Solidified inorganic mtl.	1,027.00
Plastics	58.20
Steel container materials	502.50
	1,642.60

(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 volume percent or ppm 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 Waste Information Systems (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*, will be implemented 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.

(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.

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

Sincerely,

T. E. Sellmer, Packaging Manager

TES:jeh

cc: M. R. Brown, CBFO ED
A. L. Holland, CBFO ED
M. A. Italiano, CBFO ED