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DEPARTMENT OF
ENVIRONMENTAL QUALITY

DRC-2010-006401

December 13, 2010

CD10-0358

Mr. Rusty Lundberg
Director
Utah Division of Radiation Control
P.O. Box 144810
Salt Lake City, UT 84114-4810

Re: Radioactive Material License # UT 2300249: Self-identified Noncompliance with
Condition 9.B

Dear Mr. Lundberg:

EnergySolutions hereby notifies DRC of a situation of noncompliance with License Condition 9.B. Condition 9.B states that the Clive facility may not receive waste that exceeds the Class A limits. As a result of a comprehensive internal audit, it has been determined that the Clive facility has received and disposed 23 containers that, as manifested, exceed the Class A limits. These containers arrived in a total of 15 shipments as tabulated below.

<u>Bates number</u>	<u>Arrival date</u>
L37876	6/6/2001
L85036	6/6/2005
L85073	6/6/2005
L112300	2/26/2010
L112311	2/26/2010
L112320	3/1/2010
L112381	3/8/2010
L112403	3/15/2010
L112405	3/15/2010
L112409	3/15/2010
L112437	3/18/2010
M10392	3/10/2008
PM00151	12/16/2003
PM00804	8/20/2008
PM00976	9/16/2009

Attachment 1 provides further detail on these shipments, including sum of fraction calculations, notes as to why each container exceeds Class A, and whether the shipment was sampled for radiologic data upon receipt. Attachment 2 provides disposal information, including lift identification, average lift elevation, and depth below the

current waste surface. All “L” Bates numbers are disposed in the Class A cell; the shipments with “M” or “PM” Bates numbers are disposed in the Mixed Waste cell. The depth below current waste surface varies due to slope of the current waste surface. Figures 1 and 2 outline each lift area within the Class A and Mixed waste cells, respectively.

While each container of concern, taken individually, exceeds the Class A limits, EnergySolutions believes that the overall situation does not compromise the facility’s performance basis and does not introduce an un-analyzed condition relative to protection of human health and the environment. The following lines of evidence support this position.

Practical and ALARA considerations of recovering disposed material: The total volume of waste, interim rad cover, and temporary cover that would need to be excavated to remove these containers is estimated at 75,402 cubic yards for the Class A cell, and 31,068 cubic yards for the Mixed Waste cell. Furthermore, these containers were disposed in bulk waste and CLSM lifts together with other containers from the same shipment as well as other shipments; and with non-contaminated soil and CLSM fill material. Therefore, any recovered waste would be significantly lower in radionuclide concentration than the initial container and be classified as Class A waste once exhumed due to the significant increase in waste volume.

The volume of waste represented by the 19 containers disposed in the Class A cell represents less than 0.003% of the current embankment volume. The volume of waste represented by the 4 containers disposed in the Mixed Waste cell represents less than 0.0001% of the current embankment volume. Current embankment volume for these calculations is taken from the 2010 annual as-built survey. Due to placement with other waste shipments as well as clean soil and CLSM fill material, it is not feasible to locate and recover the contents specific to any of these 23 individual containers. The lifts holding these containers have a combined volume of 18,582 cubic yards for the Class A cell and 9,431 cubic yards for the Mixed Waste cell.

ALARA considerations would also suggest that attempts to recover this material be avoided. While standard controls to reduce occupational dose would be applied to any recovery effort, incurring that dose should convey a corresponding benefit in terms of reducing public and environmental impacts. As discussed below, the overall situation does not compromise the facility’s performance basis and therefore there would be no benefit to accompany occupational dose received in excavating this material.

Utah Rule R313-15-1009, Classification and Characteristics of Low-Level Radioactive Waste: Utah Rule R313-15-1009 mirrors U.S. Nuclear Regulatory Commission regulations in 10 CFR 61.55 for determining the classification of low-level radioactive waste (LLRW). For determining the radionuclide concentrations in waste,

this rule states, “The concentration of a radionuclide may be averaged over the volume of waste, or the weight of waste” (R313-15-1009(1)(h)). This rule allows generators to classify their waste streams based on the average concentrations in the waste.

EnergySolutions evaluated each waste stream represented by the containers listed in Attachment 1. Below is the average for each waste stream determined from all of the shipments received to date.

Waste Stream	Weight (lbs)	Volume (cf)	Table 1 (% of Class A)	Table 2 (% of Class A)
8009-01	14,061,156	755,829	0.5%	0.3%
8009-10	6,810,301	313,947	< 0.0001%	< 0.001%
ZG038-01	1,724,160	21,158	2.0%	60%
9062-03	148,680	1,314	0.15%	2.1%
0421-33	36,859	655	0.34%	2.0%
9328-06	24,430	619	44%	0.03%
9079-08	59,040	3,394	5.3%	1.1%

As shown in the table, each waste stream average is significantly less than the Class A limits.

In addition to evaluating the waste stream average, EnergySolutions also evaluated the shipment average since there were multiple containers on each shipment for all but 2 shipments (L85036 and L85037, which each consisted of a single container) listed above. As shown in Attachment 3, if the generator would have combined the waste from each package into one bulk container, the radionuclide concentrations would have resulted in a manifested shipment meeting the Class A limits.

Overall Class A cell source term: Based on disposal records to date, the overall source term for the cells is a very small fraction of that analyzed in the facility performance assessment. Using 2010 as-built volume and the sum of waste radiological data for the Class A cell, EnergySolutions estimates that the current radioactivity concentration is less than 4% of the Class A limits. Please note that, in order to simplify the calculation, this figure was developed assuming that all activity disposed in the Class A and Class A North cells is present in the Class A cell only. Therefore, even this small fraction is slightly over-stated. For the Mixed Waste cell, the current radioactivity concentration is less than 2% of the Class A limits.

Waste was placed with lower activity waste and native soil during disposal: Each container was placed into a lift area together with lower activity wastes and native soil; or in a CLSM lift. Therefore, none of the containers remains an isolated, concentrated unit within the disposal cell.

Background: On August 13, 2010, an update to the automated classification check in our waste tracking database (EWIS) was implemented. This update was programmed and implemented to address identified deficiencies in the prior classification check. These deficiencies included calculation of class based on container gross weight, rather than net weight. While gross container weight may be acceptable for classifying waste in some circumstances, it is not acceptable in all circumstances and is therefore a non-conservative approach. Also, some of the containers failed for Sr-90 which is volume calculated. The updated class check algorithm was peer reviewed by Clive's Director of Health Physics and Director of Waste Acceptance for adequacy and accuracy prior to implementation.

After implementing the updated classification check for incoming shipments, the check was used to evaluate historical data as an audit tool and to provide additional software verification and validation. Upon doing so, a total of 66 containers, received in a total of 51 shipments, flagged as potentially exceeding Class A limits. The internal audit evaluated the entire history of shipments to the Clive facility. Attachment 4 provides a list of all 66 containers identified as a result of this audit. A number of the classification concerns with these containers have been resolved for the reasons listed in the "notes" column; and the provided sum of fractions reflects these corrections. These notes are discussed further below.

- "Incorrect Ni-63 Limit" applies to shipments where the container was identified as greater than Class A because EWIS did not correctly identify the Ni-63 activity was from activated metal. There are several class limits that consider if the isotope activity is from activated metal. The new update to EWIS will apply the appropriate limit when the activated metal property of the waste is identified in EWIS. The conservative limit for the isotope is used when the activated metal property is not identified. These containers will no longer be listed as greater than Class A by EWIS once the isotope active metal properties are updated.
- "Weight Concentration Nuclides" indicates that the prior classification algorithm had incorrectly evaluated classification based on gross weight.
- "Manifest calculation error" EWIS isotopic activity did not match manifest.
- "Sr-90" indicates that the radionuclide of concern for classification is Sr-90.
- "EWIS Calculation" identifies shipments where the EWIS container waste weight was less than the actual waste weight. Because the new classification procedure uses net weight to calculate the radioactivity concentration it resulted in calculated concentrations that were greater than the actual concentrations.
- Notes that identify voids and cubic feet are details to the source of the classification issue.

Compliance with the “Contingency Plan for Non-Conforming Results”: The Waste Characterization Plan requires the following information in situations where non-conforming material is discovered to have been disposed:

- Name of generator
- Name of non-conforming waste stream
- Amount of non-conforming disposed waste
- Location of non-conforming waste in the disposal cell
- Date non-conforming waste was accepted
- Date non-conforming waste was placed in disposal cell
- Description of waste placed on and around non-conforming waste
- Plan of action for resolving non-conformance
- Compliance schedule

Attachment 2 provides this information, except for the plan of action and compliance schedule discussed below. The waste placed on and around the non-conforming waste depends on the individual lift area in question. These details are available from engineering records but not included with this letter.

The plan of action for resolving this non-conformance consists of two parts. Part 1 is contained in this letter, which provides justification above for leaving the waste where it is disposed within the Class A and Mixed Waste cells.

Part 2 is corrective action to prevent recurrence. Condition Report CL-CR10-106 has been initiated to track completion of these corrective actions. Recurrence will be prevented through ongoing application of the updated classification algorithm. As noted above, this was implemented on August 13, 2010. Prior to this implementation date, the updated classification algorithm was subject to independent verification. Both the Director of Waste Acceptance and the Environmental Manager independently calculated class for the 66 containers initially identified as a concern. A secondary verification was performed by the Corporate Director of Radiation Safety by hand-calculating classification for 22 of the 23 containers of concern. These independent calculations closely matched the sum of fractions reported by the classification algorithm, confirming that the current algorithm is conservatively evaluating waste classification.

As a follow-up corrective action to prevent recurrence, application of the classification algorithm will be proceduralized in order to provide instruction to facility shipping and receiving personnel. Procedure CL-SR-PR-041 will be revised to document an administrative control at 75% of the class A limit, so that incoming shipments require Director of Health Physics review and approval before acceptance when at or above this limit. In addition, a quarterly “constancy check” will be required to verify that ongoing modifications to the EWIS system do not inadvertently affect function of the

classification algorithm. These revisions will be complete and implemented by February 14, 2011. Accordingly, that date provides the compliance schedule for this issue.

Administrative controls to prevent unauthorized modification to the classification algorithm within EWIS are already in place. Procedure CL-AD-PR-060, step 4.8, requires that the facility EWIS/WITS Committee review and approve any programming change request prior to implementation. Step 4.9 of this procedure requires that modifications be tested and verified prior to implementation.

Also, please be aware that generator 8009-01, generator of several of the containers of concern, voluntarily suspended shipments to the Clive facility on November 19, 2010. Shipments from this generator remain suspended pending completion of their own investigation and corrective action plan to prevent recurrence.

Please contact me at 801-649-2179 with any questions regarding this issue.

Sincerely,

A handwritten signature in black ink, appearing to read "Rick Chalk".

 Rick Chalk
Director of Health Physics

enclosures

cc: John Hultquist, DRC (w/ encl.)

Attachment 1: Containers that exceed Class A

Bates	EWIS Container #	Notes	Sample	SOF Table 1	SOF Table 2
L112300	0003	Weight Concentration Nuclides		1.00	
L112311	0001	Weight Concentration Nuclides		2.09	0.07
	0002	Weight Concentration Nuclides		1.91	0.07
	0008	Weight Concentration Nuclides		1.56	0.05
	0010	Weight Concentration Nuclides		1.24	0.06
L112320	0001	Weight Concentration Nuclides		1.52	0.07
	0002	Weight Concentration Nuclides		1.36	0.04
	0006	Weight Concentration Nuclides		1.42	0.08
L112381	0010	Weight Concentration Nuclides		2.41	
L112403	0001	Weight Concentration Nuclides		1.67	0.06
L112405	0001	Weight Concentration Nuclides	Yes	1.81	0.05
	0002	Weight Concentration Nuclides	Yes	1.75	0.08
L112409	0002	Weight Concentration Nuclides		2.01	0.06
	0003	Weight Concentration Nuclides		1.58	0.07
	0004	Weight Concentration Nuclides		1.45	0.08
L112437	0002	Weight Concentration Nuclides		1.32	0.19
L37876	0007	Sr-90	Yes		1.17
L85036	0001	40% Void - Sr-90	Yes		1.15
L85073	0001	20% Void - Sr-90			1.04
M10392	0023	0.027 cuft / 80% Void - Sr-90	Yes		1.00
PM00151	0006	Sr-90 / 0.03 cuft	Yes		1.04
PM00804	0010	Weight Concentration Nuclides		1.10	0.00
PM00976	0025	Weight Concentration Nuclides	Yes	1.16	

Attachment 2: Disposal Information

Bates #	Shipment	Container No.	Generator	Waste Stream	Waste (cu. Ft.)	Disposal Date	Location Name	Average Lift Elevation (ft)	MAX ELEV. (ft)	MIN ELEV. (ft)	MAX DEPTH (ft)	MIN DEPTH (ft)
L112300	8009-01-1020	X10C0506703	DOE, Oak Ridge	DAW/Debris	87.0	3/1/10	AWJ01100305MM-06	4282.6	4295	4283	12.4	0.4
L112311	8009-01-1021	X10C0102456	DOE, Oak Ridge	DAW/Debris	90.0	3/2/10	AWM01100920MM-02	4269.9	4278	4270	8.1	0.1
L112311	8009-01-1021	X10C0012438	DOE, Oak Ridge	DAW/Debris	90.0	3/2/10	AWM01100920MM-02	4269.9	4278	4270	8.1	0.1
L112311	8009-01-1021	X10C0103790	DOE, Oak Ridge	DAW/Debris	90.0	3/2/10	AWM01100920MM-02	4269.9	4278	4270	8.1	0.1
L112311	8009-01-1021	X10C0301419	DOE, Oak Ridge	DAW/Debris	91.0	3/2/10	AWM01100920MM-02	4269.9	4278	4270	8.1	0.1
L112320	8009-01-1023	X10C0012435	DOE, Oak Ridge	DAW/Debris	90.0	3/3/10	AWI07100921MM-02	4291.5	4305	4292	13.5	0.5
L112320	8009-01-1023	X10C0103824	DOE, Oak Ridge	DAW/Debris	90.0	3/3/10	AWI07100921MM-02	4291.5	4305	4292	13.5	0.5
L112320	8009-01-1023	X10C0301420	DOE, Oak Ridge	DAW/Debris	91.0	3/3/10	AWI07100921MM-02	4291.5	4305	4292	13.5	0.5
L112381	8009-01-1035	X10C0506580	DOE, Oak Ridge	DAW/Debris	58.0	3/10/10	AWL01100407FF	4283.4	4288	4283	4.6	0
L112403	8009-01-1043	X10C0012439	DOE, Oak Ridge	DAW/Debris	90.0	3/16/10	AWI12100409MM-06	4317.7	4319	4318	1.3	0.3
L112405	8009-01-1053	X10C0012433	DOE, Oak Ridge	DAW/Debris	90.0	3/29/10	AWJ01100511DU-07	4284.4	4295	4285	10.6	0.6
L112405	8009-01-1053	X10C0000107	DOE, Oak Ridge	OAW/Debris	90.0	3/29/10	AWN23100223MM-16	4283.4	4298	4283	14.6	0
L112409	8009-01-1050	X10C0400310	DOE, Oak Ridge	DAW/Debris	90.0	3/16/10	AWI01100429MM-25	4309.4	4310	4309	0.6	0
L112409	8009-01-1050	X10C0000105	DOE, Oak Ridge	DAW/Debris	90.0	3/16/10	AWN23100430MM-19	4289.1	4298	4290	8.9	0.9
L112409	8009-01-1050	X10C9901032	DOE, Oak Ridge	DAW/Debris	90.0	3/16/10	AWI01100429MM-25	4309.4	4310	4309	0.6	0
L112437	8009-01-1055	X10C0102820	DOE, Oak Ridge	DAW/Debris	90.0	3/19/10	AWL23100505MM-14	4290.9	4301	4291	10.1	0.1
L37876	ZG038-01-0008	IT-117	DOE, ORNL	Tank W1A Soil	106.0	7/17/01	AWC20010615M	4276.8	4301	4281	24.2	4.2
L85036	8009-10-5262	BFLU0000138	DOE, Oak Ridge	Dry Active Waste/Debris	405.0	6/15/05	AWF11050609MM-00	4280.5	4309	4288	28.5	7.5
L85073	8009-10-5263	BFLU0000314	DOE, Oak Ridge	Dry Active Waste/Debris	540.0	6/14/05	AWL07051127MM-00	4288.1	4304	4298	15.9	9.9
M10392	9062-03-0001	1906-OI-099	MOTA - Plum Brook Reactor	MACRO Waste	1.5	6/11/08	MW8A080812MV-01	4296.3	4310	4296.3	13.7	0
PM00151	0421-33-0001	18919	Perma-Fix (DSSI)	PF1 Stabilized Waste	7.5	8/24/04	MW6A040818SE	4288	4313	4310	25	22
PM00804	9328-06-0002	C08197511	DOE, LANL/ES Federal Services	PCB Lead Shapes and Debris	6.7	9/23/08	MW8A080923MV	4300.3	4306	4300.3	5.7	0
PM00976	9079-08-0001	RHZ-103-A16907	Fluor Hanford	PCB liquids / VTD	7.3	4/2/10	MW9A091014MV	4283.1	4283.1	4283.1	0	0
PM00976	9079-08-0001	RHZ-103-A16907	Fluor Hanford	PCB liquids / VTD	Dup	4/2/10	MW8B100419E-27	4309.6	4309.6	4309.6	0	0
PM00976	9079-08-0001	RHZ-103-A16907	Fluor Hanford	PCB liquids / VTD	Dup	4/2/10	MW9A100419FF	4283.8	4283.8	4283.8	0	0

Attachment 3: Shipment-level Classification

		Data	
Bates No	Shipment #	Sum of Fractions - Table 1	Sum of Fractions - Table 2
L112300	8009-01-1020	5.80E-02	3.33E-03
L112311	8009-01-1021	7.75E-01	2.78E-02
L112320	8009-01-1023	4.59E-01	1.44E-02
L112381	8009-01-1035	1.52E-01	6.51E-04
L112403	8009-01-1043	1.68E-01	5.50E-03
L112405	8009-01-1053	3.21E-01	1.24E-02
L112409	8009-01-1050	3.37E-01	1.71E-02
L112437	8009-01-1055	2.40E-01	1.52E-02
L37876	ZG038-01-0008	2.51E-02	6.70E-01
L85036	8009-10-5262	1.56E-04	1.15E+00
L85073	8009-10-5263	2.98E-06	1.04E+00
M10392	9062-03-0001	1.04E-03	1.41E-02
PM00151	0421-33-0001	1.66E-03	6.05E-02
PM00804	9328-06-0002	5.18E-01	1.11E-03
PM00976	9079-08-0001	2.52E-01	1.19E-04

Attachment 4: Containers that flagged on EWIS audit

Bates	EWIS Container #	Notes	Correction	Sample	SOF Table 1	SOF Table 2
L101449	0016	Incorrect Limit for Ni-63	Used Act Metal Limit		0.00	0.11
	0017	Incorrect Limit for Ni-63	Used Act Metal Limit		0.00	0.10
	0019	Incorrect Limit for Ni-63	Used Act Metal Limit		0.00	0.11
L112300	0003	Weight Concentration Nuclides	None		1.00	
L112311	0001	Weight Concentration Nuclides	None		2.09	0.07
	0002	Weight Concentration Nuclides	None		1.91	0.07
	0008	Weight Concentration Nuclides	None		1.56	0.05
	0010	Weight Concentration Nuclides	None		1.24	0.06
L112320	0001	Weight Concentration Nuclides	None		1.52	0.07
	0002	Weight Concentration Nuclides	None		1.36	0.04
	0006	Weight Concentration Nuclides	None		1.42	0.08
L112381	0010	Weight Concentration Nuclides	None		2.41	
L112403	0001	Weight Concentration Nuclides	None		1.67	0.06
L112405	0001	Weight Concentration Nuclides	None	Yes	1.81	0.05
	0002	Weight Concentration Nuclides	None	Yes	1.75	0.08
L112409	0002	Weight Concentration Nuclides	None		2.01	0.06
	0003	Weight Concentration Nuclides	None		1.58	0.07
	0004	Weight Concentration Nuclides	None		1.45	0.08
	0002	Weight Concentration Nuclides	None		1.32	0.19
L112437	0002	Weight Concentration Nuclides	None		1.32	0.19
L19196	0001	Manifest Calculation Error	Made Corrections		0.00	
L19246	001	Manifest Calculation Error	Made Corrections		0.00	
L19524	001	Manifest Calculation Error	Made Corrections		0.00	
L37876	0007	Sr-90	None	Yes		1.17
L47774	0001	Incorrect Limit for Ni-63	Used Act Metal Limit	Yes		0.24
L85036	0001	40% Void - Sr-90	None	Yes		1.15
L85073	0001	20% Void - Sr-90	None			1.04
L92222	0054	Manifest Calculation Error	Made Corrections		0.00	
L93582	0005	EWIS Calculation	Refreshed EWIS Screen	Yes	0.15	0.12
L93584	0004	EWIS Calculation	Refreshed EWIS Screen		0.05	0.14
L93762	0001	EWIS Calculation	Refreshed EWIS Screen		0.01	0.01
L93765	0001	EWIS Calculation	Refreshed EWIS Screen	Yes	0.01	0.02
L93771	0001	EWIS Calculation	Refreshed EWIS Screen		0.02	0.02
L94683	0001	EWIS Calculation	Refreshed EWIS Screen		0.00	0.00
L95827	0001	EWIS Calculation	Refreshed EWIS Screen	Yes	0.00	0.00
L96094	0001	Incorrect Limit for Ni-63	Used Act Metal Limit			0.22
	0002	Incorrect Limit for Ni-63	Used Act Metal Limit			0.22
L96160	0001	EWIS Calculation	Refreshed EWIS Screen		0.01	0.01
L97132	0001	EWIS Calculation	Refreshed EWIS Screen		0.00	0.00
L97279	0001	EWIS Calculation	Refreshed EWIS Screen		0.01	0.02
L97694	0001	EWIS Calculation	Refreshed EWIS Screen		0.01	0.02
L98051	0001	EWIS Calculation	Refreshed EWIS Screen		0.01	0.01
L98053	0001	EWIS Calculation	Refreshed EWIS Screen		0.01	0.01
L98247	0001	EWIS Calculation	Refreshed EWIS Screen		0.11	0.00
L98480	0001	EWIS Calculation	Refreshed EWIS Screen		0.00	0.01
L99128	0001	EWIS Calculation	Refreshed EWIS Screen		0.02	0.18
L99915	0001	EWIS Calculation	Refreshed EWIS Screen		0.05	0.14
M01516	0001	Manifest Calculation Error	Made Corrections		0.02	
M09861	0001	Incorrect Limit for Ni-63	Used Act Metal Limit			0.11
M10392	0023	0.027 cuft / 80% Void - Sr-90	None	Yes		1.00
M11349	0001	Incorrect Limit for Ni-63	Used Act Metal Limit			0.82
PM00151	0006	Sr-90 / 0.03 cuft	None	Yes		1.04
PM00804	0010	Weight Concentration Nuclides	None		1.10	0.00
PM00976	0025	Weight Concentration Nuclides	None	Yes	1.16	
PR05593	0001	Incorrect Limit for Ni-63	Used Act Metal Limit		0.04	0.68
C00902	26008364	EWIS Calculation	Refreshed EWIS Screen			0.68
C00916	RS-RVI-013	Incorrect Limit for Ni-63	Used Act Metal Limit			0.11
	RS-RVI-014	Incorrect Limit for Ni-63	Used Act Metal Limit			0.14
	RS-RVI-007	Incorrect Limit for Ni-63	Used Act Metal Limit			0.29
C00915	RS-RVI-006	Incorrect Limit for Ni-63	Used Act Metal Limit			0.23
	RS-RVI-012	Incorrect Limit for Ni-63	Used Act Metal Limit			0.14
	RS-RVI-015	Incorrect Limit for Ni-63	Used Act Metal Limit			0.14
C01063	RS-RVI-023	Incorrect Limit for Ni-63	Used Act Metal Limit			0.36
C01066	RS-RVI-024	Incorrect Limit for Ni-63	Used Act Metal Limit			0.36
C01068	RS-RVI-028	Incorrect Limit for Ni-63	Used Act Metal Limit			0.22
C01071	RS-RVI-036	Incorrect Limit for Ni-63	Used Act Metal Limit			0.36
C01635	0001	I-129 MDA Used in Calculation	Corrected Manifest		0.20	0.66

