



Via Email

**REVISED** January 10, 2023

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**Energy Technology Engineering Center Closure Project**  
**Department of Energy**  
**Environmental Management Consolidated Business Center**  
**4100 Guardian Street, Suite 160**  
**Simi Valley, CA 93063**

**Attention: Josh Mengers, ETEC Federal Project Director**

**Subject: FOIA EMCBC-2022-00149-F Data Package**

**Reference:** Letter from Melody C. Bell, [Freedom of Information Act Request - EMCBC-2022-00149-F](#), Undated, EMCBC-00249-22, Digitally signed September 29, 2022

Dear Dr. Mengers,

I am addressing this letter to you, Josh, rather than Michelle Farris at the FOIA Office of EMCBC since my comments on the FOIA data package relate to activities within your direct purview.

These comments are in response to the referenced letter and its enclosed data package on a flash drive. The data package was a response to my FOIA EMCBC-2022-00149-F. My comments are somewhat lengthy for several reasons. They are addressed to several organizations, and it is necessary to explain the background and issues fully to several diverse parties recognizing that the individuals responsible for compiling the FOIA response package are likely not the same individuals who prepared the original shipping documents and are certainly not the staff at EnergySolutions to whom the alleged LLRW was sent. Although EnergySolutions (Clive) is an NRC and State of Utah licensed facility, I am not including the NRC or Utah on distribution.

#### **FOIA EMCBC-2022-00149-F**

DOE and DTSC have been criticized for agreeing to dispose of decommissioned material and building debris from buildings with no history of radiological use, as low-level radioactive waste (LLRW). See communications with DTSC (<https://philrutherford.com/ssfl.html#2020aoc>) and Section 23.0 of [Nuclear Decommissioning at the Santa Susana Field Laboratory](#).

The objective of FOIA EMCBC-2022-00149-F was to require DOE to provide waste characterization/profiling/manifesting data that proved that building debris from decommissioned buildings and buildings with no history of radiological use was in fact contaminated above state and federal cleanup standards, that would justify classifying, managing, shipping, and disposing of the debris as low-level radioactive waste (LLRW). Specifically the following documents were requested.



- Documents for shipments of demolition debris from RMHF buildings (4034, 4044, 4075, 4563, 4658, 4665, 4688, 4021, 4022, 4621) and buildings 4019 4024, 4029, 4133, 4038, 4057, 4462 and 4463 from the Energy Technology Engineering Center (ETEC) to EnergySolutions, Clive, Utah.
- Export Permits from the Southwestern LLRW Compact Commission.
- EnergySolutions' forms, "Radioactive Waste Profile"
- NRC Forms 540/541, "Uniform Low-Level Radioactive Waste Manifest"
- Radiation surveys of transport roll-offs, containers, trailer, and cab of haulers
- All other DOT required documentation for these shipments
- All other EnergySolutions required documentation for these shipments
- Periods of these shipments and documents are for 2020, 2021 and 2022

Unfortunately, the data package provided in response to FOIA EMCBC-2022-00149-F raises more questions than it answers. These questions are outlined below.

## **BUILDING IDENTIFICATION**

None of the material provided in response to FOIA EMCBC-2022-00149-F refers to any specific building name or number as source of the debris other than calling it generically, ETEC LLRW. This was done whether the building debris was from,

- non-decommissioned and therefore potentially contaminated RMHF buildings and SNAP Building 4024,
- decommissioned buildings 4019, 4029 that had been released for unrestricted use by DOE
- 4133 that had been determined by CDPH-RHB to have met the requirements for release for unrestricted use, or,
- buildings with no history of radiological use, 4038, 4057, 4462 and 4463.

All building debris was essentially characterized using identical radiological data based on the maximum upper bound alpha/beta contamination survey data from a historical RMHF survey, plus isotopic analysis of "three" loose contamination wipes taken from an unidentified contaminated RMHF building. This limited upper-bound characterization data is only marginally appropriate for all RMHF buildings, but obviously totally inappropriate for other buildings, and appears to have been done intentionally to obfuscate and bypass the criticisms about disposing of decommissioned and non-radiological buildings as low-level radioactive waste.

## **SPECIFIC PDF FILES IN DATA PACKAGE**

### **[FILE 'J SCOTT DECLARATION' of '00149 RUTHERFORD'.pdf](#)**

Although I have no complaint regarding redactions of signatures, names, phone numbers and email addresses of persons signing various forms, I question that this information can be classified as



“competitive business information,” as indicated by claimed exemption 4. It is arguably “personally identifiable information,” or exemption 6.

**[FILE 'FOIA RESPONSE LTR 14 DEC 21' of '00149 RUTHERFORD'.pdf](#)**

This boiler plate of legalese was digitally signed on December 14, 2021, by the North Wind General Counsel a little more than a month after the November 9, 2021, FOIA was submitted. It said little more than J. Scott’s declaration but took seven pages to say it. Hopefully no additional resources were wasted generating this standard boiler plate.

**[FILE 'ENERGY SOLUTIONS FORMS' of '00149 RUTHERFORD'.pdf](#)**

EnergySolutions Radioactive Waste Profile Record forms described only five different waste streams,

Waste Stream ID	Waste Stream Name	Date Signed	Volume <sup>1</sup>
• 7332-01	ETEC LLW Debris	1/21/2020	10,000 cu. ft.
• 7332-02	ETEC LLW Oversized Debris	1/21/2020	10,000 cu. ft.
• 7332-03	LLRW Debris with PCBs	4/15/2020	500 cu. ft.
• 7332-05	ETEC LLW Non-aqueous oil	8/20/2021	54 cu. ft.
• 9732-01	Mixed Low-level Debris	4/29/2020	500 cu. ft.
• 7332-01 (duplicate)	ETEC LLW Debris	1/21/2020	10,000 cu. ft.

All waste streams have identical “Special Nuclear Material Exemption Certifications.” All SNM Certifications have identical artificial, arbitrary maximum concentrations of U-235 and plutonium isotopes. This implies that all building debris from the non-decommissioned RMHF and SNAP Building 4024, decommissioned buildings 4019, 4029 and 4133, and non-radiological buildings, 4038, 4057, 4462 and 4463, are identically characterized for SNM content. This does not make sense. Please explain the rationale for this.

**[Waste stream 7332-01](#)** has arbitrary whole-number manifested upper concentrations (e.g. some 10 pCi/g and most 1.0 pCi/g) and weighted average concentrations for 11 radionuclides. Note that the weighted average concentrations are less than the EPA/DTSC draft provisional soil LUTVs for Am-241, Cm-243, Cm-245, Ra-226, Ra-228 (BTV), U-234, U-235 and U-238. The manifested upper concentrations are less than the EPA/DTSC draft provisional soil LUTVs for Ra-226, Ra-228, U-234 and U-238.<sup>2</sup> Please

<sup>1</sup> Only waste stream 7332-05 specifies volume and the units of volume as ft<sup>3</sup> for this data location, although the standard EnergySolutions form, CL-WM-PR-001 F2 (EC-0230) Revision 9, specifies volume in units of ft<sup>3</sup> for data in this location. It is therefore assumed that the unspecified property and units for the remaining waste streams are also volume (ft<sup>3</sup>).

<sup>2</sup> One might argue that comparing arbitrary alleged building debris volumetric contamination to soil background LUTVs does not make sense. However, that is exactly what the 2010 AOC demands when it defines soil as including building debris, but fails to prescribe a process for determining, or numerical values for, LUTVs for building debris.



explain the derivation of these volumetric concentrations from a single set of alpha/beta surface contamination and the isotopic speciation of three wipe tests of surface contamination.

**Waste stream 7332-02** has arbitrary whole-number manifested upper concentrations (e.g. Cs-137 at 5 pCi/g and the rest at 1.0 pCi/g) and weighted average concentrations for 11 radionuclides. Note that the weighted average concentrations are less than the EPA/DTSC draft provisional soil LUTVs for Am-241, Cm-243, Cm-245, Ra-226, Ra-228 (BTV), U-234, U-235 and U-238. The manifested upper concentrations are less than the EPA/DTSC draft provisional soil LUTVs for Ra-226, Ra-228, U-234 and U-238. While the upper and weighted average concentrations for Cs-127, Pu-239, Ra-226, Ra-228, Sr-90, U-234, U-235 and U-238 are identical for waste streams 7332-01 and 7332-02, they are markedly different for Am-241, Cm-243 and Cm-245. Please explain the basis for these similarities and differences, especially given that the historical basis for these numbers appears to be identical. See narratives below.

**Waste stream 7332-03** has upper manifested and weighted average concentrations for 24 radionuclides in contrast to waste streams 7332-01 and 7332-02 which have concentrations for 11 radionuclides. Please explain why? Please explain how the weighted average concentration for U-238 of 7 pCi/g is larger than the manifested upper concentration of 1 pCi/g. Please explain how the upper manifested (350 pCi/g) and weighted average (325 pCi/g) concentrations for Pu-241 are so high compared to other radionuclides, and almost identical.

**Waste stream 7332-05** is non-aqueous oil contains Cs-137 and H-3. Please confirm that the oil (assumed density of 0.8 g/cc) has upper manifested concentrations of  $300 \times 800 = 240,000$  pCi/L of Cs-137 and  $7500 \times 800 = 6,000,000$  pCi/L of H-3. Since the oil is non-aqueous, can we assume that hydrogen atoms in the oil have been replaced by tritium atoms?

**Waste stream 9732-01** contains the same 24 radionuclides as waste stream 7332-03 plus K-40. 23 of 24 common weighted average concentrations of waste stream 9732-01 are identical to those of waste stream 7332-03. The only different weighted average is Cs-137. In contrast, of the manifested upper concentrations, 14 are consistent and 10 are different when comparing waste streams 9732-01 and 7332-03. Please explain the basis for the similarities and differences.

Note that the total volume of all waste streams, neglecting the duplicate waste stream 7332-01, is 21,054 cu. ft or 780 cu. yds. This appears to be somewhat low. The nominal volume of a roll-off container is 20 cu. yds., therefore the total waste stream volume from all RMHF, Building 4024 and all remaining decommissioned and non-radiological buildings could be shipped in  $780 / 20 = 39$  roll-offs. The next review of SNM Exemption Certifications show ~376 truck shipments comprising  $2 \times 20$  cu. yd. roll-offs of waste stream 7332-02 alone, which would imply  $376 \times 20 \times 2 \times 27 = 406,080$  cu. ft., somewhat greater than 10,000 cu. ft.<sup>3</sup> Clearly the volume numbers are inconsistent. Please confirm that these five waste streams are the only waste streams, or are there more? Please confirm or correct the volumes stated in the Radioactive Waste Profile Records.

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<sup>3</sup> Assuming  $2 \times 20$  cu. yd. roll-offs per shipment



## RADIOLOGICAL CHARACTERIZATION NARRATIVES

Several narratives provide the basis for radiological characterization of each waste stream and demonstrate that the basis is essentially identical for each waste stream. Italicized quotes are taken directly from the Radioactive Waste Profile Records.

### Waste Stream ID: 7332-01

The radiological characterization narrative for waste stream 7332-01 is,

*"This document provides a basis for the radiological characterization associated with low-level waste (LLW) radioactive debris generated from dismantlement and demolition (D&D) of remaining facilities at the Santa Susana Field Laboratory (SSFL) in Ventura County, California. This debris contains friable asbestos containing LLW (i.e., ACM LLW), and LLW debris with no asbestos, or two waste streams. Both of these waste streams will be included in a single ES-Clive, UT LLW profile. The initial volume of waste included under revision 0 of this waste profile is estimated at 10,000 ft<sup>3</sup>. This is expected to represent ~5 shipments of bulk rolloff containers (40 CY) with 2 rolloff containers per shipment delivered by rolloff truck for direct land disposal at ES-Clive, UT."*

*"In terms of input contamination levels, representative surveys were provided in **Final - Compiled Summary Report: Radioactive Materials Handling Facility Building Survey, Santa Susana Field Laboratory, Ventura County, California**. Based on that report, high alpha and beta/gamma contamination survey results are conservatively used to provide the upper bound of radioactivity content in this LLW debris waste profile (alpha 1,407 dpm/100 cm<sup>2</sup>. Beta 50,616 dpm/100 cm<sup>2</sup>). This is acceptable, because even these high values are low and inconsequential in regards to: Class A waste limits under 10 CFR 61.55, DOT packaging and transportation limits, and other radiological related WAC limits at ES-Clive, UT."*

*"These values are used for evaluating the DOT classification for this waste profile. The Rad. Data and DOT Calc. Summary uploaded/attached to this profile provides a summary of 2020 ETEC GEL data which is also included, DOT calculations, and activity ratio derivations for radionuclides of concern. The radiological characterization approach is provided in the SNM section of this profile."*

*"This is D&D debris waste with very low concentrations of SNM and TRU radionuclides. All SNM and TRU concentrations/radionuclide are reported at a max. of 1 pCi/g when in fact they are all < 1 pCi/g. The weighted average pCi/g value for each SNM and/or TRU radionuclide is the actual detected value in radiological sampling results. **In February of 2020 three smear samples were taken and analyzed at GEL laboratories**. This analytical laboratory report identifies the relative activity ratios of detected radionuclides of concern to the ES-Clive, UT WAC, and to DOT determinations. Enriched uranium is present as an oxide."*



*“All waste is essentially SCO.<sup>4</sup> Maximum historical HP surface surveys performed in facilities at ETEC are documented in **Final - Compiled Summary Report: RMHF Building Survey, Santa Susana Field Laboratory, Ventura County, CA**. Based upon this report the maximum contamination levels reported are used in the DOT rad. characterization basis for this waste profile. The maximum results were 1,407 dpm/100 cm<sup>2</sup> alpha and 50,616 dpm/100 cm<sup>2</sup> beta-gamma (total fixed plus removable). These results are above DOT SCO-I limits and below and meet SCO-II contamination limits (for removable contamination). We assumed all direct survey results are 100% removable for alpha and beta/gamma.”*

*“For volumetric waste profiling we used the 2.05 pCi/g maximum Cs-137 result reported in waste associated with this profile (the profile allows a maximum concentration of 5 pCi/g). Other radionuclides activity concentrations are ratioed from Cs-137 based upon the extensive swipe sample activity per radionuclide mentioned above. **GEL laboratory results for these 3 swipe samples are provided in the attached laboratory analytical report** (uploaded/attached).”*

*“All detected radionuclides in the GEL lab report are included in the waste profile. Maximum values were made to be 1 pCi/g except for Cs-137, which is reported at a maximum of 2.05 pCi/g from historical surveys above. All other detected radionuclides in the GEL swipes are truly below 1 pCi/g. Actual calculated pCi/g for all reported radionuclides -- based upon their respective activity ratio to Cs-137 (at assumed max. of 2.05 pCi/g) are reported under the “weighted average” pCi/g in this waste profile.”*

*“All activity concentrations of SNM are very low, < 1 pCi/g and is uniformly distributed throughout the waste. U-235 concentrations will be very significantly less than the allowable 1900 pCi/g per 600 kg contiguous mass. Also, this debris waste meets the physical description of SCO per DOT. Radioactivity comes from surface contamination on all waste items which are debris, and not sludges, rad. materials,, process equipment, associated with rad. material processes, etc. Tools, construction materials, desks, construction equipment and various DAW materials are included waste forms in this profile. Only incidental dirt, gravel will be present.”*

*“Mass of waste is assumed to be 35,000 pounds. Based upon 20 boxes of similar debris generated in late 2019 and 2020 on the project, and scale derived net. waste weight data, this is a bounding high net waste mass/weight. The mass in grams is multiplied by the weighted average pCi/g in the waste profile to derive the activity per radionuclide and drives all other DOT and WAC related rad. calculations -- including manifested values on NRC 540/541 forms.”*

*“NOTE: Cs-137 is assumed to be at max. of 2.05 pCi/g for Max, and Weighted Avg. for conservative derivation of Activity for all other reported radionuclides.”*

Please provide the basis for the 2.05 pCi/g for Cs-137. If the basis is the “three wipe tests”, please provide the laboratory reports and the process used to convert the measured surface concentration to volumetric concentration.

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<sup>4</sup> SCO = surface contaminated object





### Waste Stream ID: 7332-02

This waste stream contains friable ACM and oversize debris.

The radiological characterization narrative for waste stream 7332-02 is identical, word-for-word, to that of 7332-01. The radionuclides in Section C are mostly identical except that the upper concentrations for Am-241, Cm-243 and Cm-245 are 10x less for waste stream 7332-02 than for waste stream 7332-01 and the weighted average concentrations are approximately 1000x less for waste stream 7332-02 than for waste stream 7332-01. Please explain.

### Waste Stream ID: 7332-03

This small waste stream contains PCBs.

The radiological characterization narrative for waste stream 7332-03 is identical to that of waste streams 7332-01 and 7332-02, with the exception of the paragraph below, which is omitted, maybe unintentionally.

*"All detected radionuclides in the GEL lab report are included in the waste profile. Maximum values were made to be 1 pCi/g except for Cs-137, which is reported at a maximum of 2.05 pCi/g from historical surveys above. All other detected radionuclides in the GEL swipes are truly below 1 pCi/g. Actual calculated pCi/g for all reported radionuclides -- based upon their respective activity ratio to Cs-137 (at assumed max. of 2.05 pCi/g) are reported under the "weighted average" pCi/g in this waste profile."*

Also, given the claimed 500 cu. ft. volume of this waste stream, it seems unlikely that the mass would be the alleged 35,000 pounds, the same as 7332-01 and 7332-02 waste streams.

Given the similarity in the narratives and the identical arbitrary source of upper bound alpha/beta contamination date and identical isotopic speciation from the same three wipe tests, please explain why waste streams 7332-01 and 7332-02 have only 11 radionuclides specified in Section C, whereas waste stream 7332-03 has 24 radionuclides in Section C. Please explain the reason why the upper bound (350 pCi/g) and weighted average (325 pCi/g) of Pu-241 are significantly higher than all other radionuclides. Please explain how the U-238 weighted average (7 pCi/g) is 7x higher than the upper concentration (1 pCi/g).

### Waste Stream ID: 7332-05

This small waste stream is non-aqueous oil.

There is no radiological characterization narrative for this waste stream. A statement was made that the oil was sampled for chemicals but no mention of radionuclides. Relatively high levels of cesium-137 and H-3 are reported in units of pCi/g rather than pCi/L which would be more conventional for liquids. The Cs-137 weighted average per container of liquid is 2.05 pCi/g, the same value used for the other solid waste streams, which appears illogical. Please explain.



### Waste Stream ID: 9732-01

This small waste stream is MLLRW.

The radiological characterization narrative is essentially the same as waste streams 7332-01, 7332-02 and 7332-03.

The radiological characterization narrative is,

*“Radiological characterization is based upon process knowledge, HP surveys, and historical analytical data from past sampling campaigns. Radionuclides of concern consist primarily of fission products and naturally occurring radioactive materials. Trace transuranics well below 1 nCi/g may be present and there is no SNM in this waste stream.*”

*“The basis for manifested radionuclides is the **North Wind Portage technical basis document (TBD)** for this profile. Historical sampling and analysis data, process knowledge and calculations are used for the radiological characterization of this waste stream. All of this is documented in the TBD to demonstrate compliance with the ES-Clive, UT Waste Acceptance Criteria.”*

*“This is a D&D waste with very low concentrations of SNM and TRU radionuclides. ALL SNM and TRU concentrations are reported at a max of 1 pCi/g when they are all <1 pCi/g. The weighted average pCi/g value for each SNM and/or TRU isotope is the actual detected value from sampling results. **In February 2020, three smears were collected and analyzed by GEL Laboratories.** The report identified the relative activity ratios of detected radionuclides of concern that ES-Clive, UT WAC, and to DOT determinations. Enriched uranium is present as an oxide.”*

*“All waste is essentially SCO. Maximum historical HP surface surveys performed in facilities at ETEC are documented in **Final - Compiled Summary Report: RMHF Building Survey, Santa Susana Field Laboratory, Ventura County, CA.** Based upon this report the maximum contamination levels reported are used in the DOT rad. characterization basis for this waste profile. The maximum results were 1,407 dpm/100 cm<sup>2</sup> alpha and 50,616 dpm/100 cm<sup>2</sup> beta-gamma (total fixed plus removable). These results are above DOT SCO-I limits and below and meet SCO-II contamination limits (for removable contamination). We assumed all direct survey results are 100% removable for alpha and beta/gamma.”*

*“For volumetric waste profiling we used the 2.05 pCi/g maximum Cs-137 result reported in waste associated with this profile (the profile allows a maximum concentration of 5 pCi/g). Other radionuclides activity concentrations are ratioed from Cs-137 based upon the extensive swipe sample activity per radionuclide mentioned above. **GEL laboratory results for these three swipes are provided in the attached lab analytical report.**”*

*“All activity concentrations of SNM are very low, <1 pCi/g and is uniformly distributed throughout the waste. U-235 concentrations will be very significantly less than the allowable 1900 pCi/g per 600 kg contiguous mass. Also, this debris waste meets the physical description of SCO per DOT. Radioactivity comes from surface contamination on all waste items which are debris, and not sludges, rad. materials, process equipment, associated with rad. material*





*processes, etc. Tools, construction materials, desks, construction equipment and various DAW materials are included waste forms in this profile. Only incidental dirt, gravel will be present."*

*"Mass of waste is assumed to be 35,000 pounds. Based upon 20 boxes of similar debris generated in late 2019 and 2020 on the project, and scale derived net. waste weight data, this is a bounding high net waste mass/weight. The mass in grams is multiplied by the weighted average pCi/g in the waste profile to derive the activity per radionuclide and drives all other DOT and WAC related rad. calculations -- including manifested values on NRC 540/541 forms."*

*"NOTE: Cs-137 is assumed to be at max. of 2.05 pCi/g for Max, and Weighted Avg. for conservative derivation of Activity for all other reported radionuclides."*

Note the claim that transuranics are below 1 nCi/g is inconsistent with the later statement that all SNM and TRU concentrations ... are <1 pCi/g.

Given that the basis for all concentration estimates according to the narratives above, is based on the same limited upper bound estimates for gross alpha/beta and 3 sample wipes for which isotopic quantification was performed, and given that the upper bound estimates are all rounded to one significant figure, please explain how weighted average concentrations per container (to three significant figures) were made when multiple sample analysis was not performed for any container, much less a single container or even a single waste stream.

Please explain how the same limited RMHF measured data results in different radionuclide sets for waste streams.

Waste Stream	No. of Radionuclides
7332-01	11
7332-02	11
7332-03	24
7332-05	2
9732-01	25

Please provide the traceable calculational basis for the dissimilar upper concentrations and weighted average concentrations in Section C for each waste stream. Please show which waste stream applies to which of the 18 individual buildings, identifying each building by its building number.

**BASIS FOR RADIOLOGICAL CHARACTERIZATION**

The essentially identical radiological characterization narrative for all four solid waste streams, 7332-01, 7332-02, 7332-05 and 9732-01, includes a statement that upper bound alpha/beta contamination levels are taken from *"Final - Compiled Summary Report: Radioactive Materials Handling Facility Building Survey, SSFL, Ventura County, California."* Also referenced is *"North Wind Portage technical basis document (TBD)"*, and *"isotopic analysis by GEL of three wipe samples taken in the RMHF in February 2020."*



It is presumed that the first reference above is the 2007 report, “Combined Summary Report: Radioactive Materials Handling Facility Building Surveys”, conducted by Cabrera Services for Boeing.<sup>5</sup> Note the possible erroneous use of “Compiled’ in place of “Combined.”

The radioactive characterization narratives state ...

*“Based on that report, high alpha and beta/gamma contamination survey results are conservatively used to provide the upper bound of radioactivity content in this LLW debris waste profile (alpha 1,407 dpm/100 cm<sup>2</sup>. Beta 50,616 dpm/100 cm<sup>2</sup>).”*

If this presumption is correct, then it would be logical to search for these upper bound surface contamination data in the Cabrera report. Indeed these total surface contamination data were identified by scan measurements on the north wall of building 4075 in the RMHF ([Table 3.2.2](#)). Scan measurements are performed to locate radiation anomalies that might indicate areas with elevated residual radioactivity where further data collection is warranted. Subsequent static 1-minute measurements including high scan measurement locations were subsequently conducted. Static data including the north wall of building 4075 are shown in [Table 3.2.3](#). Maximum static data for the north wall of 4075 were alpha = 84 dpm/100 cm<sup>2</sup> (MDC = 51 dpm/100 cm<sup>2</sup>) and beta = 517 dpm/100 cm<sup>2</sup> (MDC = 895 dpm/100 cm<sup>2</sup>). Subsequent wipe sample data for removable contamination are provided in [Table 3.2.4](#). Maximum removable contamination on the north wall of building 4075 was non-detect at alpha = 5 dpm/100 cm<sup>2</sup> (MDC = 13 dpm/100 cm<sup>2</sup>) and beta = 28 dpm/100 cm<sup>2</sup> (MDC = 211 dpm/100 cm<sup>2</sup>). Clearly the choice of the highest scan data is overly conservative. It is worth mentioning that the Cabrera report actually concludes that,

*“With the exception of concrete foundations and building roofs, the building materials from Building 4075, 4563, 4621, 4658, and 4665 are suitable for release. Survey data show that the residual radioactivity, either superficially or volumetrically, will result in a dose less than or equal to 1.0 mrem/yr TEDE, which is protective of public health and safety and justifies building material release.”*

Please provide the North Wind Technical Basis Document (TBD) if different from the above Cabrera document and the GEL isotopic analysis report and location of the three wipe samples taken at the RMHF in 2020.

**File [‘ALL OTHER ENERGYSOLUTIONS’ of ‘00149 RUTHERFORD’.pdf](#)**

This file comprises 376 copies of EnergySolutions form “Special Nuclear Material Exemption Certification.” All are dated 3/2/2020. All have identical artificial, arbitrary maximum concentrations of U-235 and plutonium isotopes. All forms are for waste stream 7332-02. Each has a different Manifest No. 7332-02-XXXX. Since some forms have duplicate manifest numbers, it is assumed that these separate manifests represent ≤376 individual 2-rolloff or 1-rolloff shipments of a single waste stream ID, 7332-02.

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<sup>5</sup> Cabrera Services, “Final - Combined Summary Report: Radioactive Materials Handling Facility Building Surveys”, October 2007. Available at [https://www.etec.energy.gov/library/main/07-1016-00\\_Boeing\\_SSFL\\_RMHF\\_FINAL\\_Report.pdf](https://www.etec.energy.gov/library/main/07-1016-00_Boeing_SSFL_RMHF_FINAL_Report.pdf). Accessed December 14, 2022.



Therefore where are the “Special Nuclear Material Exemption Certification” forms for the other waste stream IDs, 7332-01, 7332-03, 7332-05 and 9732-01?

**File [‘ALL OTHER DOT’ of ‘00149 RUTHERFORD’.pdf](#)**

This file contains numerous documents “Non-DOT Regulated Shipment Instructions”, each one specifically stating that,

- *“This is to document that the package(s) represented on Shipment 7332-02-XXXX are excepted from DOT regulations per 49CFR173. The information provided is a guide to response or contact for Exempt Quantities of Radioactive Materials*
  - *The quantity of radioactive materials present minimal risk to transport workers, emergency response personnel and the general public if an incident occurs.*
  - *No radioactive hazard communications are required, the unlikely spread of contamination or exposure to radiation would only represent minimal hazard and the radiation does not change the flammability or other properties of the materials.*
  - *Presence of radioactive materials will not change effectiveness of fire control techniques.*
  - *Medical problems take priority over radiological concern.”*

These instructions are provided for 74 manifested shipments, all for waste stream 7332-02.

This file also included several instruction pages for Radioactive Material, Excepted Package, Limited Quantity, 7 UN 2910, but no manifest number was assigned.

This file also included several EnergySolutions’ Special Nuclear Material Exemption Certification forms. It is assumed that these were duplicates of the SNM Certifications in File [‘ALL OTHER ENERGYSOLUTIONS’ of ‘00149 RUTHERFORD’.pdf](#).

**File [‘NRC FORM 540-541’ of ‘00149 RUTHERFORD’.pdf](#)**

This file contains 408 Uniform Low-level Radioactive Waste Manifests (NRC Form 540/541). Almost all manifests are for waste stream 7332-02 with only one each (plus a duplicate) for manifests 7332-03-003, 7332-05-003 and 9732-01-003, and none for waste stream 7332-01.

Please explain why manifest for [shipment 9732-01-0003 \(page 384\)](#) has only one radionuclide, Cs-137, manifested when the [waste stream 9732-01 \(page 72\)](#) has 25 radionuclides profiled.

Please explain why [manifest for shipment 7332-03-0003 \(pages 379-380\)](#) has only on radionuclide, Cs-137, when the [waste stream 7332-03 \(page 41\)](#) has 24 radionuclides profiled.

Please explain why the majority of waste manifests for waste stream 7332-02 include “data” for only 6 radionuclides, Am-241, Cs-137, Pu-239, Ra-226, Sr-90 and U-234, when the waste profile has 11 radionuclides

406 of these solid debris waste stream 7332-02 manifests represents a mixture of single 20-cubic yard containers and 2 x 20-cubic yard roll-off containers. That would translate into approximately ( 203 x 20 )



+ ( 203 x 2 x 20 ) = 12,000 cubic yards of waste. This is significantly more than the total volumes identified for all waste streams of 780 cubic yards, yet significantly less than the predicted 46,000 cu. yds. of debris predicted from all DOE buildings.<sup>6,7</sup> Please explain the volume discrepancies.

EnergySolutions Radioactive Waste Profile Record for waste stream [7332-02](#) (comprising almost all NRC 540/541 waste manifests) specifies the following container weighted average concentrations in Table 1.<sup>8</sup>

**Table 1. Container Weighted Average Concentrations for Waste Stream [7332-02](#)**

Waste Stream 7332-02		
Nuclide	Weighted Ave. per Container*	Nuclide ratio per Cs-137*
	pCi/g	-
Am-241	4.750E-03	0.0023
Cm-243	8.220E-04	0.0004
Cm-245	6.470E-04	0.0003
Cs-137	2.050E+00	1.0000
Pu-239	6.120E-02	0.0299
Ra-226	1.820E-02	0.0089
Ra-228	2.570E-02	0.0125
Sr-90	6.340E-01	0.3093
U-234	1.980E-02	0.0097
U-235	4.140E-03	0.0020
U-238	6.500E-03	0.0032

\* EnergySolutions Waste Profile Record

The data in red are the calculated ratios of the radionuclide concentrations normalized to cesium-137. This normalized ratio enables comparison to container relative radionuclide concentrations in the NRC

<sup>6</sup> North Wind Portage, “Radioactive Materials Handling Facility (RMHF) Decommissioning & Demolition Plan”, RMHF-PLA-10784, Revision 4, June 19, 2020. Available at [https://philrutherford.com/SSFL/doe\\_building\\_demolition/RMHF\\_Decommissioning\\_and\\_Demolition\\_Plan\\_Revision\\_4\\_20200619.pdf](https://philrutherford.com/SSFL/doe_building_demolition/RMHF_Decommissioning_and_Demolition_Plan_Revision_4_20200619.pdf). Accessed January 9, 2023.

<sup>7</sup> North Wind Portage, “Waste Management Plan, Energy Technology Engineering Center, Santa Susana Field Laboratory, Simi Valley, CA”, WMP-10784, Revision 3, August 7, 2020. Available at [https://philrutherford.com/SSFL/doe\\_building\\_demolition/69227\\_WMP-10784\\_Rev\\_3\\_Waste\\_Management\\_Plan.pdf](https://philrutherford.com/SSFL/doe_building_demolition/69227_WMP-10784_Rev_3_Waste_Management_Plan.pdf). Accessed January 9, 2023.

<sup>8</sup> EnergySolutions Form CL-WM-PR-001 F2 ((EC-0230), Radioactive Waste Profile Record, Santa Susana Field Laboratory, EPA ID CA3890090001, Waste Stream 7332-02, PDF page 22. Available at [https://philrutherford.com/SSFL/doe\\_building\\_demolition/FOIA/Data\\_Package/'ENERGY%20SOLUTIONS%20FORMS'%20of%20'00149%20RUTHERFORD'.pdf#page=22](https://philrutherford.com/SSFL/doe_building_demolition/FOIA/Data_Package/'ENERGY%20SOLUTIONS%20FORMS'%20of%20'00149%20RUTHERFORD'.pdf#page=22). Accessed December 10, 2022



541 radioactive waste manifests shown below. A detailed inspection of waste container concentrations and activities on NRC Forms 541 unearths some interesting and incomprehensible numbers. Two random manifests were chosen, [7332-02-0004](#)<sup>9</sup> and [7332-02-0007](#).<sup>10</sup> These two shipments were made within a week of each other in July-August of 2020 and were therefore debris from unspecified RMHF buildings. Column 16 of NRC Form 541 includes container weighted average concentrations in pCi/g and total activity in mCi, manifested for the eleven radionuclides above.

These are reproduced and shown in black font in the following Table 2.

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<sup>9</sup> [NRC Form 541, Manifest 7332-02-0004. Shipping date 7/29/2020. PDF page 852-853.](#)

<sup>10</sup> [NRC Form 541, Manifest 7332-02-0007. Shipping date 8/5/2020. PDF page 865-866.](#)



**Table 2. Concentrations and Activities for RMHF Waste Manifests [7332-02-0004](#) and [7332-02-0007](#)**

NRC 541 Manifest 7332-02-004 (PDF pages 852-853)					NRC 541 Manifest 7332-02-007 (PDF pages 865-866)						
Shipping Date: July 29, 2020					Shipping Date: August 5, 2020						
<b>Container ID 6090-024/7332</b>					<b>Container ID 6087-031/7332</b>						
Nuclide	Weighted Averaged Conc.	Nuclide ratio per Cs-137	Total Activity		Nuclide	Weighted Averaged Conc.	Nuclide ratio per Cs-137	Total Activity			
	pCi/g	-	mCi			pCi/g	-	mCi			
Am-241	1.93314E-02	0.0023	7.5409E-05		Am-241	9.10460E-03	0.0023	7.5409E-05			
Cm-243	3.34535E-03	0.0004	1.3050E-05		Cm-243	1.57558E-03	0.0004	1.3050E-05			
Cm-245	2.63314E-03	0.0003	1.0272E-05		Cm-245	1.24014E-03	0.0003	1.0272E-05			
Cs-137	8.34302E+00	1.0000	3.2545E-02		Cs-137	3.92935E+00	1.0000	3.2545E-02			
Pu-239	2.49070E-01	0.0299	9.7159E-04		Pu-239	1.17306E-01	0.0299	9.7159E-04			
Ra-226	7.40698E-02	0.0089	2.8894E-04		Ra-226	3.48860E-02	0.0089	2.8894E-04			
Ra-228	1.04593E-01	0.0125	4.0800E-04		Ra-228	4.92607E-02	0.0125	4.0800E-04			
Sr-90	2.58023E+00	0.3093	1.0065E-02		Sr-90	1.21522E+00	0.3093	1.0065E-02			
U-234	8.05814E-02	0.0097	3.1434E-04		U-234	3.79518E-02	0.0097	3.1434E-04			
U-235	1.68488E-02	0.0020	6.5725E-05		U-235	7.92538E-03	0.0020	6.5725E-05			
U-238	2.64535E-02	0.0032	1.0319E-04		U-238	1.24589E-02	0.0032	1.0319E-04			
			<b>Subtotal</b>	<b>4.4861E-02</b>				<b>Subtotal</b>	<b>4.4861E-02</b>		
<b>Container ID 6303-025/7332</b>					<b>Container ID 6271-030/7332</b>						
Nuclide	Weighted Averaged Conc.	Nuclide ratio per Cs-137	Total Activity		Nuclide	Weighted Averaged Conc.	Nuclide ratio per Cs-137	Total Activity			
	pCi/g	-	mCi			pCi/g	-	mCi			
Am-241	1.93314E-02	0.0023	9.7818E-05		Am-241	2.10977E-02	0.0023	7.5409E-05			
Cm-243	3.34535E-03	0.0004	1.6419E-05		Cm-243	3.65102E-03	0.0004	1.3050E-05			
Cm-245	2.63314E-03	0.0003	1.2923E-05		Cm-245	2.87373E-03	0.0003	1.0272E-05			
Cs-137	8.34302E+00	1.0000	4.0946E-02		Cs-137	9.10533E+00	1.0000	3.2545E-02			
Pu-239	2.49070E-01	0.0299	1.2224E-03		Pu-239	2.71827E-01	0.0299	9.7159E-04			
Ra-226	7.40698E-02	0.0089	3.6665E-04		Ra-226	8.08376E-02	0.0089	2.8894E-04			
Ra-228	1.04593E-01	0.0125	5.1331E-04		Ra-228	1.14150E-01	0.0125	4.0800E-04			
Sr-90	2.58023E+00	0.3093	1.2663E-02		Sr-90	2.81599E+00	0.3093	1.0065E-02			
U-234	8.05814E-02	0.0097	3.9548E-04		U-234	8.79442E-02	0.0097	3.1434E-04			
U-235	1.68488E-02	0.0020	8.2692E-05		U-235	1.83883E-02	0.0020	6.5725E-05			
U-238	2.64535E-02	0.0032	1.2983E-04		U-238	2.88706E-02	0.0032	1.0319E-04			
			<b>Subtotal</b>	<b>5.6447E-02</b>				<b>Subtotal</b>	<b>4.4861E-02</b>		
				<b>Total</b>	<b>1.0131E-01</b>					<b>Total</b>	<b>8.9721E-02</b>
<b>Container ID</b>					<b>Container ID</b>						
<b>Weight</b>					<b>Weight</b>						
6090-024/7332	Waste & Container (kgs)		6,531.73		6087-031/7332	Waste & Container (kgs)		10,913.43			
6303-025/7332	Waste & Container (kgs)		7,538.71		6271-030/7332	Waste & Container (kgs)		6,205.14			
Total Waste & Container (kgs)			<b>14,070.44</b>		Total Waste & Container (kgs)			<b>17,118.58</b>			
Net Waste (kgs)			8,808.76		Net Waste (kgs)			11,856.91			
2 Containers (kgs)			<b>5,261.67</b>		2 Containers (kgs)			<b>5,261.67</b>			
1 Container (kgs)			<b>2,630.84</b>		1 Container (kgs)			<b>2,630.84</b>			
6090-024/7332	Net Waste (kgs)		<b>3,900.89</b>		6087-031/7332	Net Waste (kgs)		<b>8,282.60</b>			
6303-025/7332	Net Waste (kgs)		<b>4,907.87</b>		6271-030/7332	Net Waste (kgs)		<b>3,574.31</b>			





Data in black font in Table 2 are reproduced directly from the original NRC Form 541 as completed by DOE's contractor North Wind Portage. Data in red font in Table 2 is calculated from NRC Form 541 entries. Data for four containers in two shipments are shown.

The first observation is that the calculated radionuclide concentration ratios calculated in Table 1 for waste stream 7332-02 are identical in all four containers for waste stream 7332-02. That is good and is to be expected for a common waste stream.

The second observation is that the radionuclide concentrations for the two containers in shipment 7332-02-004 are also identical. This may be expected because there is no other information in the 7332-02 waste profile that would indicate a process for varying those radionuclide concentrations.

The third observation is that the two containers in shipment 7332-02-007 have dissimilar concentrations than shipment 7332-02-004 and also dissimilar concentrations between each other. However the nuclide concentration ratios in red font are still consistent with waste stream 7332-02. It is not obvious how the relative radionuclide ratios stay constant while the magnitude of the concentration is now changing by an unknown process. Please explain.

The fourth observation is that the two containers in shipment 7332-02-007 and one container in shipment 7332-02-004 have identical total activities (4.4861E-02 mCi) and identical individual radionuclide activities to five significant decimal places even though the net waste weights are more than a factor of two different.

It appears that the calculational process for the manifests was ...

$$\text{concentration} = \text{activity} / \text{weight}$$

... rather than the appropriate ...

$$\text{activity} = \text{concentration} \times \text{weight}$$

One paragraph taken from the radiological characterization narratives of each waste stream is the logical statement,

*"The mass [of waste] in grams is multiplied by the weighted average pCi/g in the waste profile to derive the activity per radionuclide and drives all other DOT and WAC related rad. calculations -- including manifested values on NRC 540/541 forms."*

Please explain this illogical process that assumes the total activities are known and the concentrations are calculated.

A similar random check was performed of later manifested shipments conducted following the explosive demolition of the clean non-radiological buildings 4462 and 4463 in October 2021. Data transcribed



from the relevant NRC 541 Forms are shown in black in Table 3 for shipment [7332-02-0174](#) (10/20/2021)<sup>11</sup> and shipment [7332-02-0238](#) (11/15/2021).<sup>12</sup>

**Table 3. Concentrations and Activities for SPTF Waste Manifests [7332-02-0174](#) and [7332-02-0238](#)**

NRC 541 Manifest 7332-02-0174 (PDF page 276)					NRC 541 Manifest 7332-02-0238 (PDF page 402)				
Shipping Date: October 20, 2021					Shipping Date: November 15, 2021				
Container ID 234MS/7332					Container ID 234MS/7332				
Nuclide	Weighted Averaged Conc.	Nuclide ratio per Cs-137	Total Activity		Nuclide	Weighted Averaged Conc.	Nuclide ratio per Cs-137	Total Activity	
	pCi/g	-	mCi			pCi/g	-	mCi	
Am-241	4.68252E-03	0.0023	7.5400E-05		Am-241	7.07369E-03	0.0023	7.5400E-05	
Cm-243	-	-	-		Cm-243	-	-	-	
Cm-245	-	-	-		Cm-245	-	-	-	
Cs-137	2.01833E+00	1.0000	3.2500E-02		Cs-137	3.04896E+00	1.0000	3.2500E-02	
Pu-239	6.02393E-02	0.0298	9.7000E-04		Pu-239	9.09998E-02	0.0298	9.7000E-04	
Ra-226	1.79476E-02	0.0089	2.8900E-04		Ra-226	2.71123E-02	0.0089	2.8900E-04	
Ra-228	-	-	-		Ra-228	-	-	-	
Sr-90	6.21024E-01	0.3077	1.0000E-02		Sr-90	9.38142E-01	0.3077	1.0000E-02	
U-234	1.95001E-02	0.0097	3.1400E-04		U-234	2.94577E-02	0.0097	3.1400E-04	
U-235	-	-	-		U-235	-	-	-	
U-238	-	-	-		U-238	-	-	-	
Subtotal			4.4148E-02		Subtotal			4.4148E-02	
<b>Container ID</b>				<b>Weight</b>	<b>Container ID</b>				<b>Weight</b>
234MS/7332				Waste & Container (kgs)	234MS/7332				Waste & Container (kgs)
				16,102.53					10,659.42
				Net Waste (kgs)					Net Waste (kgs)
				16,102.53					10,659.42
				Container (kgs)					1 Container (kgs)
				0.00					0.00

Several observations are apparent.

Both shipments in Table 3 are from the same waste stream 7332-02 as shipments in Table 2. However only six radionuclides, Am-241, Cs-137, Pu-239, Ra-226, Sr-90 and U-234 are manifested and not the eleven radionuclides in the 7332-02 waste profile. The concentration ratios in red of these six radionuclides are identical to those in Table 1 and Table 2.

Please explain why five radionuclides, Cm-243, Cm-235, Ra-228, U-235 and U-238 are missing.

Once again, two separate containers in two separate shipments have identical total activities (4.4148E-02 mCi) and identical individual radionuclide activities to five decimal places even though the two containers have significantly different waste weights. Neglecting the missing radionuclides in these two shipments in Table 3, the common radionuclides have identical activities to the three containers

<sup>11</sup> [NRC Form 541, Manifest 7332-02-0174. Shipping date 10/20/2021. PDF page 276.](#)

<sup>12</sup> [NRC Form 541, Manifest 7332-02-0238. Shipping date 11/15/2021. PDF page 402..](#)



identified in Table 2. Please explain how 5 of 6 containers in Tables 2 and 3 have identical total common radionuclide activities even though the net waste weights of each container are significantly different.

Please explain why the weight of waste plus container is identical to the net weight of the waste, with the implication that the weight of the container is zero.

Spot checks of many other 6-radionuclide manifests show that they have identical individual radionuclide total activities, weighted average concentrations, and identical net weights. For example ...

Manifests 7332-02-238, -0239, -0240, -0214, -0215, -0216, -0217, -0218, -0219, -0220, -0221, -0222, -0223, -0224, -0225, -0226, -0227 all have identical waste weights of 10,659.42 kgs.

Manifests 7332-02-170, -0160, -0164, -0171, -0172, -0173, -0174, -0175, -0176, -0177, -0178, -0179, -0180, -0181, -0182, -0183, -0184, -0185 all have identical waste weights of 16,102.53 kgs.

Please explain how this is possible.

These examples of systematic, inconsistent, and illogical data in the NRC 540/541 manifests suggests that most, if not all of the 408 manifests are likely to have similar problems. Time does not allow detailed investigation of each and every one.

Clearly, the data in the NRC 541 forms is internally inconsistent. One wonders why no quality control was implemented by North Wind who prepared these forms, by DOE who is the federal generator and who should have better oversight, and by EnergySolutions who is supposed to ensure its federal customers comply with its own waste acceptance criteria, paperwork, and NRC regulations.

## SUMMARY

FOIA EMCBC-2022-00149-F requested waste characterization, shipping, and disposal data for all eighteen DOE buildings demolished and disposed during 2020, 2021 and 2022. The intent was to investigate how DOE characterized decommissioned and non-radiological buildings as LLRW. Based on the lack of any reference to specific building names/numbers, and the questionable data provided, this proved an impossible task.

Liberal use is made of arbitrary conservative upper bound estimates for SNM, TRU, fission products and NORM in order to estimate total manifest activities. This may be an acceptable conservative process for waste from the non-decommissioned, potentially contaminated RMHF buildings since these upper bound measurements were taken at the RMHF. However it is not appropriate to use upper bound RMHF data for non-RMHF buildings that have been decommissioned and released for unrestricted use. And it is totally unacceptable for non-radiological buildings with no history of radiological use. Using questionable upper bound scan contamination data from RMHF to falsify data for non-radiological buildings in order to justify disposal at EnergySolutions as LLRW is dishonest.

Data in the NRC Forms 540/541 is systematically inconsistent and illogical. The apparent lack of any quality control of manifest data by all participants is troubling and warrants investigation by the NRC and the Utah Division of Waste Management and Radiation Control.



Although building identification may not be a regulatory requirement on the subject shipping forms, the lack of any building identification for any waste streams, radioactive waste profiles or manifests suggests an intentional cover-up of what is real LLRW and what is fake LLRW, designed to obfuscate DOE's and DTSC's commitment to dispose of non-radiologically impacted waste as LLRW "out of an abundance of caution."

The preceding comments are those of the undersigned author and do not represent the views or opinions of the landowner, The Boeing Company. Boeing terminated its contract with the DOE in September 2014 and is not a party to the DOE-owned building demolition program.

Sincerely,

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