

4. The LPES report (LPES, 2013) considers transportation of liquid radioactive waste. Please state what is the liquid waste considered in this analysis. State if this is referring to the additional solid waste from solidified wastewater which had previously been slated for treatment through evaporative processes (Supplement ER, Section 4.2.7). If this is the additional solid waste, The LPES report (LPES, 2013) only evaluates 4 “liquid waste” shipments rather than “approximately 20 additional truckloads of low level waste transported to Clive, Utah, annually” as stated in Section 4.2.7 of the Supplement ER.

#### UUSA Response

See attached response to RAI 4.

#### NRC Staff Response:

Further clarification is needed. Section 4.2.6.4 of the Supplemental ER (Rev. 4c.) states “The number of these waste material packages will increase with the expansion, from approximately 477 fifty-five gallon drums of solid waste annually, to between 1,140 and 1,380. Using a nominal 60 drums per waste truck shipment, approximately 19 to 23 low level waste shipments per year are anticipated with the expansion.” The present response indicates that all 23 shipments “are the result of the solidified wastewater”. If that is the case, what would become of the solid radioactive waste generated as described in Section 3.12.6 of the Supplemental ER (which refers to Section 3.12.2 of the ER)? According to Table 4.2-2 of ER 21 (Jan. 2013 version), as provided in response to #1 above, 160 waste shipments are going to Barnwell, Clive, or Oak Ridge. Are the 23 shipments due to solidified wastewater in addition to the 160 or are they part of the 160? Or is the 160 now reduced to 23? In addition, Table 4.13-1 of the Supplemental ER shows a projection for the annual amount of radioactive waste generated during Phase 5 which totals 2,198,371 lbs, the bulk of which is solidified wastewater. Typical full loads (legal weight) on a tractor/semi-trailer combination are about 40,000 to 45,000 lbs. If a full load based on weight (40,000 lbs) were sent each time, approximately 55 annual shipments would be required to transport the waste in Table 4.13-1. Clarify the number of annual shipments of radioactive waste expected when the UUSA facility is operating at 10 MSWU per year. Give the expected breakdown by radioactive waste type as listed in Table 4.13-1 of the Supplement ER and revise the Supplement ER and transportation report accordingly.

#### UUSA Follow-up Response:

It should be clarified that the number 160 shown in Table 4.2-2 to Barnwell, Clive, or Oak Ridge, and noted in your response were drum counts, not shipment counts. This table has subsequently been replaced in later versions of the ER and in the Supplemental ER to indicate number of shipments to the Clive, Utah facility.

Based on your request for further clarification on waste transportation, we reviewed the material that had been provided in sections 4.2-Transportation and 4.13- Waste of the ER 21 and Supplemental ER (Rev 4c), as well as additional information that was available from the facility for waste generation rates based on current operations since start-up. These reviews have resulted in a modification to the number of total drums of waste, total shipments, and therefore the impact due to transportation of radiological waste. A rerun of the transportation model has been completed utilizing the following breakdown of wastes by type, packaging and shipment numbers as inputs:

- liquid wastes (wastewater with a U235 content of 15 grams or less to be containerized and transported to an offsite facility for solidification and disposal) approximate weight of 425 lbs/drum.
  - 64,000 lbs annual generation rate, 150 drums, could be managed on 3 shipments, however we retained rate of 4 annual shipments previously evaluated
- Solid wastes – this will be inclusive of the solidified wastewater and the other miscellaneous radiological wastes as noted on Table 4-13.1 of the ER 21 as follows:
  - Activated carbon – 2150 lbs, at **200** lbs/drum = **11** drums
  - Activated alumina – 15,480 lbs at **200** lb/drum = **78** drums
  - Assorted paper cloth materials – 15,050 lbs at **400** lb/drum = **38** drums
  - Ventilation filters – 220,190 lbs at **88** lbs/container = **2503** containers (assume drums)
  - Total miscellaneous = **2630** drums
  - Solidified waste water - 1,881,200 lbs at **800** lbs/drum = **2350** drums
  - Total solid waste = **4980** drums at 50 drums per shipment = **100** shipments

Although some shipments of drummed waste may be able to accommodate up to 60 drums due to the individual weight per drum, we have assumed only 50 drums per shipment to address the truck weight restrictions identified in your response. The destinations for the shipments remain as in the previous submittals, with all wastes shipped to the disposal location at Clive, Utah. The input to the transportation model was for 100 shipments per year of solid waste and 4 shipments per year of liquid waste.

The text in Supplemental ER section 4.2 was revised to match the quantities of waste described above.

These revised inputs (number of waste shipments) were used in a new RADTRAN analysis along with the revised dose data for a location of 1 meter from the side of a truck loaded with 60 drums of waste (details provided in our response to question 5). Please note that during the model rerun a previous transposition error in Table 5.1 of the LPES August 2013 report was noted, and a correction has been made to that table in the January 2014 version in addition to reflecting the impact of the new transportation model run with higher number of waste shipments. Table 5.1 in August 2013 report inadvertently indicated a higher impact due to the Paducah and Hobbs link impacts appearing twice in the table as shown below:

Table 5.1 (August 2013)

Link	Accidents	Fatalities
Port Hope, ON	4.11E+00	2.94E-02
Metropolis, IL	2.62E+00	1.88E-02
Richland, WA	5.81E-01	4.17E-03
Columbia, SC	4.41E-01	3.16E-03
Wilmington, NC	4.84E-01	3.47E-03
Clive, UT (Solid Waste)	4.23E+00	3.04E-02
Clive, UT (Liquid Waste)	2.75E-02	1.97E-04
Paducah, KY	4.23E+00	3.04E-02
Hobbs, NM	2.75E-02	1.97E-04
<b>Total</b>	<b>1.68E+01</b>	<b>1.20E-01</b>

Source: SNL, 2007.

The January 2014 revision of Table 5.1 from LPES report (as shown below) indicates less impact even though there are more shipments to Clive, Utah due to the correction in the August 2013 table.

New Table 5.1

Link	Accidents	Fatalities
Port Hope, ON	4.11E+00	2.94E-02
Metropolis, IL	2.62E+00	1.88E-02
Richland, WA	5.81E-01	4.17E-03
Columbia, SC	4.41E-01	3.16E-03
Wilmington, NC	4.84E-01	3.47E-03
Clive, UT (Solid Waste)	6.09E-01	4.37E-03
Clive, UT (Liquid Waste)	2.15E-02	1.54E-04
Paducah, KY	4.23E+00	3.04E-02
Hobbs, NM	2.75E-02	1.97E-04
<b>Total</b>	<b>1.31E+01</b>	<b>9.42E-02</b>

Source: SNL, 2007.

The transportation model (LPES, January 2014) sums the impacts of all radiological transport including feed, product, and tails cylinders as well as waste shipments. The results of the revised transportation model using the increased number of shipments and increased dose are shown in the provided report, attachment 1. The incremental increase in impact is insignificant for the additional waste shipments considered in this review. This is due to the low overall impact contribution the waste shipments will have to the transportation of radiological material to and from the site in total. As shown in Table 5.3 from the LPES, January 2014 report, the line items for the transport of wastes to Clive, Utah are extremely small (E-06 and E-07), and therefore do not have a significant impact on the total latent cancer fatalities once added to the relatively higher impacts of transporting the feed product and tails associated with the expansion.

**Table 5-3. Latent Cancer Fatalities from Accidents during Transportation of Radioactive Materials**

Link	Inhaled	Resuspended Soil	Cloud Shine	Ground	Total Risk of LCF
Port Hope, ON	1.28E-02	5.33E-04	4.01E-09	2.84E-07	1.33E-02
Metropolis, IL	4.65E-03	1.94E-04	1.46E-09	1.03E-07	4.84E-03
Richland, WA	5.99E-03	2.50E-04	1.44E-09	9.82E-08	6.23E-03
Columbia, SC	4.58E-03	1.92E-04	1.10E-09	7.51E-08	4.77E-03
Wilmington, NC	4.72E-03	1.97E-04	1.14E-09	7.74E-08	4.92E-03
Clive, UT (Solid)	9.45E-06	3.94E-07	2.96E-12	2.09E-10	9.85E-06
Clive, UT (Liquid)	3.78E-07	1.58E-08	1.18E-13	8.40E-12	3.94E-07
Paducah, KY	3.48E-03	1.46E-04	1.17E-09	8.46E-08	3.63E-03
Hobbs, NM	1.02E-05	4.28E-07	3.43E-12	2.49E-10	1.07E-05
<b>Total</b>	<b>3.62E-02</b>	<b>1.51E-03</b>	<b>1.03E-08</b>	<b>7.23E-07</b>	<b>3.77E-02</b>

Source: SNL, 2007.

This revised analysis resulted in changes to Supplemental ER sections 4.2.6 and 4.2.7 as well as tables 4.2-1, 4.2-2 and 4.2-3 to reflect the new results.