

# **Transportation Modeling Results for Complex Transformation SPEIS**

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*This document provides results for the Complex Transformation Supplemental Programmatic Environmental Impact Statement transportation analysis and the inputs used to arrive at the results.*

**1. No Action Alternative**

The No Action Alternative analyzed the impacts associated with current transportation campaigns associated with transportation of pits and CSAs. It was assumed that 50 pits are transported both ways between LANL and Pantex annually, representing four shipments. 200 CSAs are assumed to travel both ways between Y-12 and Pantex, representing 16 shipments.

**Table 1.1 – Shipment Characteristics by Population Zone – LANL to Pantex**

|  | Rural | Suburban | Urban  |
|--|-------|----------|--------|
| Distance (km)                          | 533.9 | 42.7     | 8.6    |
| Population Density (/km <sup>2</sup> ) | 6.5   | 390.6    | 2148.0 |

**Table 1.2 – Non-Radiological Impacts – Transport of 50 Pits – LANL - Pantex**

|                     | Per Shipment | Annual Impacts |
|---------------------|--------------|----------------|
| Accidents           | 1.41E-04     | 6.75E-06       |
| Accident Fatalities | 5.64E-04     | 2.70E-05       |
| Emission Fatalities | 5.79E-07     | 2.32E-06       |

**Table 1.3 – Radiological Impacts - Transport of 50 Pits – LANL - Pantex**

|                       | Handling   |          | Incident-Free |          | Accident Impacts |          | Truck Stop |          | MEI        |          |
|-----------------------|------------|----------|---------------|----------|------------------|----------|------------|----------|------------|----------|
|                       | Person-Rem | LCF      | Person-Rem    | LCF      | Person-Rem       | LCF      | Person-Rem | LCF      | Person-Rem | LCF      |
| <b>Per-Shipment</b>   | 2.33E+00   | 1.40E-03 | 3.73E-02      | 2.24E-05 | 1.49E-09         | 8.95E-13 | 1.14E-06   | 6.83E-10 | 6.29E-07   | 3.78E-10 |
| <b>Annual Impacts</b> | 9.32E+00   | 5.59E-03 | 1.49E-01      | 8.95E-05 | 5.97E-09         | 3.58E-12 | 4.55E-06   | 2.73E-09 | 2.52E-06   | 1.51E-09 |

**Table 1.4 – Shipment Characteristics by Population Zone – Y-12 to Pantex**

|  | Rural  | Suburban | Urban  |
|--|--------|----------|--------|
| Distance (km)                          | 1314.0 | 424.9    | 42.4   |
| Population Density (/km <sup>2</sup> ) | 13.1   | 299      | 2224.9 |

**Table 1.5 – Non-Radiological Impacts – Transport of 200 CSAs – Y-12 - Pantex**

|                     | Per Shipment | Annual Impacts |
|---------------------|--------------|----------------|
| Accidents           | 3.79E-04     | 1.83E-05       |
| Accident Fatalities | 6.06E-03     | 2.93E-04       |
| Emission Fatalities | 3.58E-06     | 5.73E-05       |

**Table 1.6 – Radiological Impacts - Transport of 200 CSAs – Y-12 - Pantex**

|                       | Handling   |          | Incident-Free |          | Accident Impacts |          | Truck Stop |          | MEI        |          |
|-----------------------|------------|----------|---------------|----------|------------------|----------|------------|----------|------------|----------|
|                       | Person-Rem | LCF      | Person-Rem    | LCF      | Person-Rem       | LCF      | Person-Rem | LCF      | Person-Rem | LCF      |
| <b>Per-Shipment</b>   | 6.31E-01   | 3.79E-04 | 1.51E-01      | 9.06E-05 | 1.57E-17         | 9.44E-21 | 2.84E-07   | 1.71E-10 | 1.57E-07   | 9.44E-11 |
| <b>Annual Impacts</b> | 1.01E+01   | 6.06E-03 | 2.42E+00      | 1.45E-03 | 2.52E-16         | 1.51E-19 | 4.55E-06   | 2.73E-09 | 2.52E-06   | 1.51E-09 |

## 2. The Distributed Centers of Excellence Alternative

For the Distributed Centers of Excellence (DCE) Alternative, impacts were estimated for the transportation of 200 pits between Pantex and the four other CPC candidate sites. For this alternative, impacts were also assessed for the transportation of programmatic nuclear materials from LANL to the other four candidate CPC candidate sites. Surplus and excess nuclear materials were assumed to be transported from LANL to SRS and Y-12.

**Table 2.1 – Route Characteristics of the DCE Alternative**

|                      |                                  | Rural    | Suburban | Urban    |
|----------------------|----------------------------------|----------|----------|----------|
| <b>Pantex – LANL</b> | Distance (km)                    | 5.34E+02 | 4.27E+01 | 8.60E+00 |
|                      | Pop. Density (/km <sup>2</sup> ) | 6.50E+00 | 3.91E+02 | 2.15E+03 |
| <b>Pantex – NTS</b>  | Distance (km)                    | 1.62E+03 | 1.29E+02 | 2.49E+01 |
|                      | Pop. Density (/km <sup>2</sup> ) | 6.10E+00 | 3.34E+02 | 2.30E+03 |
| <b>Pantex – SRS</b>  | Distance (km)                    | 1.48E+03 | 6.21E+02 | 8.06E+01 |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.34E+01 | 3.32E+02 | 2.27E+03 |
| <b>Pantex – Y-12</b> | Distance (km)                    | 1.31E+03 | 4.25E+02 | 4.24E+01 |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.31E+01 | 2.99E+02 | 2.22E+03 |
| <b>LANL – NTS</b>    | Distance (km)                    | 1.29E+03 | 1.21E+02 | 1.63E+01 |
|                      | Pop. Density (/km <sup>2</sup> ) | 6.50E+00 | 3.15E+02 | 2.33E+03 |
| <b>LANL – SRS</b>    | Distance (km)                    | 1.98E+03 | 6.60E+02 | 8.93E+01 |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.15E+01 | 3.32E+02 | 2.25E+03 |
| <b>LANL – Y-12</b>   | Distance (km)                    | 1.82E+03 | 4.64E+02 | 5.10E+01 |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.12E+01 | 3.02E+02 | 2.21E+03 |

**Table 2.2 – Non-Radiological Impacts – DCE Pit Shipments**

|                      |                     | Per Shipment | Annual Impacts |
|----------------------|---------------------|--------------|----------------|
| <b>Pantex – LANL</b> | Accidents           | 1.41E-04     | 2.26E-03       |
|                      | Accident Fatalities | 6.75E-06     | 1.08E-04       |
|                      | Emission Fatalities | 5.79E-07     | 9.27E-06       |
| <b>Pantex – NTS</b>  | Accidents           | 2.02E-04     | 3.23E-03       |
|                      | Accident Fatalities | 1.29E-06     | 2.06E-05       |
|                      | Emission Fatalities | 1.65E-06     | 2.65E-05       |
| <b>Pantex – SRS</b>  | Accidents           | 6.81E-04     | 1.09E-02       |
|                      | Accident Fatalities | 2.70E-05     | 4.32E-04       |
|                      | Emission Fatalities | 6.13E-06     | 9.81E-05       |
| <b>Pantex – Y-12</b> | Accidents           | 3.79E-03     | 6.06E-02       |
|                      | Accident Fatalities | 1.83E-05     | 2.93E-04       |
|                      | Emission Fatalities | 3.58E-06     | 5.73E-05       |

**Table 2.3 – Non-Radiological Impacts – LANL Nuclear Material Shipments**

|                      |                     | <b>Per Shipment</b> | <b>Annual Impacts</b> |
|----------------------|---------------------|---------------------|-----------------------|
| <b>LANL – NTS</b>    | Accidents           | 2.02E-04            | 8.08E-04              |
|                      | Accident Fatalities | 1.33E-05            | 5.32E-05              |
|                      | Emission Fatalities | 1.26E-06            | 5.06E-06              |
| <b>LANL – Pantex</b> | Accidents           | 1.41E-04            | 5.64E-04              |
|                      | Accident Fatalities | 9.49E-06            | 3.80E-05              |
|                      | Emission Fatalities | 5.79E-07            | 2.32E-06              |
| <b>LANL – SRS</b>    | Accidents           | 8.00E-04            | 3.20E-03              |
|                      | Accident Fatalities | 3.75E-05            | 1.50E-04              |
|                      | Emission Fatalities | 6.65E-06            | 2.66E-05              |
| <b>LANL – Y-12</b>   | Accidents           | 5.00E-04            | 2.00E-03              |
|                      | Accident Fatalities | 2.94E-05            | 1.18E-04              |
|                      | Emission Fatalities | 4.09E-06            | 1.64E-05              |

**Table 2.4 – Radiological Impacts – DCE Alternative**

|   |              | Handling   |          | Incident -Free |          | Accident Impacts |          | Truck Stop |          | Area Residents |          | MEI        |          |
|---|--------------|------------|----------|----------------|----------|------------------|----------|------------|----------|----------------|----------|------------|----------|
|   |              | person-rem | LCF      | person-rem     | LCF      | person-rem       | LCF      | person-rem | LCF      | person-rem     | LCF      | person-rem | LCF      |
| <i>Pit Shipments between Pantex and CPC Sites</i> |              |            |          |                |          |                  |          |            |          |                |          |            |          |
| LANL  | per shipment | 2.33E+00   | 1.40E-03 | 3.73E-02       | 2.24E-05 | 1.49E-09         | 8.94E-13 | 3.50E-06   | 2.10E-09 | 2.94E-05       | 1.76E-08 | 1.57E-07   | 9.42E-11 |
|   | Annual       | 3.73E+01   | 2.24E-02 | 5.97E-01       | 3.58E-04 | 2.38E-08         | 1.43E-11 | 5.60E-05   | 3.36E-08 | 4.70E-04       | 2.82E-07 | 1.57E-07   | 9.42E-11 |
| NTS   | per shipment | 2.33E+00   | 1.40E-03 | 1.13E-01       | 6.75E-05 | 2.29E-09         | 1.38E-12 | 3.50E-06   | 2.10E-09 | 2.94E-05       | 1.76E-08 | 1.57E-07   | 9.42E-11 |
|   | Annual       | 3.73E+01   | 2.24E-02 | 1.80E+00       | 1.08E-03 | 3.67E-08         | 2.20E-11 | 5.60E-05   | 3.36E-08 | 4.70E-04       | 2.82E-07 | 1.57E-07   | 9.42E-11 |
| SRS   | per shipment | 2.33E+00   | 1.40E-03 | 2.07E-01       | 1.24E-04 | 1.23E-08         | 7.38E-12 | 3.50E-06   | 2.10E-09 | 2.94E-05       | 1.76E-08 | 1.57E-07   | 9.42E-11 |
|   | Annual       | 3.73E+01   | 2.24E-02 | 3.32E+00       | 1.99E-03 | 1.97E-07         | 1.18E-10 | 5.60E-05   | 3.36E-08 | 4.70E-04       | 2.82E-07 | 1.57E-07   | 9.42E-11 |
| Y12   | per shipment | 2.33E+00   | 1.40E-03 | 1.51E-01       | 9.06E-05 | 2.97E-09         | 1.78E-12 | 3.50E-06   | 2.10E-09 | 2.94E-05       | 1.76E-08 | 1.57E-07   | 9.42E-11 |
|   | Annual       | 3.73E+01   | 2.24E-02 | 2.42E+00       | 1.45E-03 | 4.75E-08         | 2.85E-11 | 5.60E-05   | 3.36E-08 | 4.70E-04       | 2.82E-07 | 1.57E-07   | 9.42E-11 |
| <i>LANL Programmatic Materials to CPC Sites</i>   |              |            |          |                |          |                  |          |            |          |                |          |            |          |
| NTS   | PuMet        | 6.80E-01   | 4.08E-04 | 7.35E-02       | 4.41E-05 | 1.70E-02         | 1.02E-05 | 5.71E-10   | 3.43E-13 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
|   | PuOx         | 2.02E-01   | 1.21E-04 | 7.35E-02       | 4.41E-05 | 1.70E-02         | 1.02E-05 | 1.45E-09   | 8.70E-13 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
|   | U/Pu Met     | 6.30E-01   | 3.78E-04 | 7.35E-02       | 4.41E-05 | 1.70E-02         | 1.02E-05 | 1.55E-11   | 9.30E-15 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
|   | Uox          | 3.78E-01   | 2.27E-04 | 7.35E-02       | 4.41E-05 | 1.70E-02         | 1.02E-05 | 4.55E-17   | 2.73E-20 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
| Pantex  | PuMet        | 6.80E-01   | 4.08E-04 | 3.00E-02       | 1.80E-05 | 1.02E-09         | 6.12E-13 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | PuOx         | 2.02E-01   | 1.21E-04 | 3.00E-02       | 1.80E-05 | 2.59E-09         | 1.55E-12 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | U/Pu Met     | 6.30E-01   | 3.78E-04 | 3.00E-02       | 1.80E-05 | 2.77E-11         | 1.66E-14 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | Uox          | 3.78E-01   | 2.27E-04 | 3.00E-02       | 1.80E-05 | 8.14E-17         | 4.88E-20 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
| SRS   | PuMet        | 6.80E-01   | 4.08E-04 | 1.71E-01       | 1.03E-04 | 9.44E-09         | 5.66E-12 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | PuOx         | 2.02E-01   | 1.21E-04 | 1.71E-01       | 1.03E-04 | 2.40E-08         | 1.44E-11 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | U/Pu Met     | 6.30E-01   | 3.78E-04 | 1.71E-01       | 1.03E-04 | 2.56E-10         | 1.54E-13 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | Uox          | 3.78E-01   | 2.27E-04 | 1.71E-01       | 1.03E-04 | 7.52E-16         | 4.51E-19 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
| Y-12  | PuMet        | 6.80E-01   | 4.08E-04 | 1.38E-01       | 8.28E-05 | 3.05E-09         | 1.83E-12 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | PuOx         | 2.02E-01   | 1.21E-04 | 1.38E-01       | 8.28E-05 | 7.74E-09         | 4.64E-12 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | U/Pu Met     | 6.30E-01   | 3.78E-04 | 1.38E-01       | 8.28E-05 | 8.26E-11         | 4.96E-14 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
|   | Uox          | 3.78E-01   | 2.27E-04 | 1.38E-01       | 8.28E-05 | 2.43E-16         | 1.46E-19 | 2.10E-08   | 1.26E-11 | 2.83E-07       | 1.70E-10 | 1.57E-07   | 9.42E-11 |
| <i>LANL Surplus Excess Materials to CPC Sites</i> |              |            |          |                |          |                  |          |            |          |                |          |            |          |
| SRS   | Np/Th        | 6.30E-01   | 3.78E-04 | 1.71E-01       | 1.03E-04 | 7.12E-01         | 4.27E-04 | 4.74E-17   | 2.84E-20 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
|   | Pu           | 2.02E-01   | 1.21E-04 | 1.71E-01       | 1.03E-04 | 7.12E-02         | 4.27E-05 | 1.91E-11   | 1.15E-14 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
|   | U/Pu         | 2.02E-01   | 1.21E-04 | 1.71E-01       | 1.03E-04 | 7.12E-02         | 4.27E-05 | 1.91E-11   | 1.15E-14 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
| Y-12  | Np/Th        | 6.55E-01   | 3.93E-04 | 1.38E-01       | 8.28E-05 | 4.81E-02         | 2.89E-05 | 1.53E-17   | 9.18E-21 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
|   | Pu           | 3.02E-01   | 1.81E-04 | 1.38E-01       | 8.28E-05 | 7.12E-02         | 4.27E-05 | 6.51E-16   | 3.91E-19 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |
|   | U/Pu         | 5.04E-01   | 3.02E-04 | 1.38E-01       | 8.28E-05 | 7.12E-02         | 4.27E-05 | 6.18E-12   | 3.71E-15 | 2.10E-08       | 1.26E-11 | 2.83E-07   | 1.70E-10 |

### 3. CNPC Alternative Analysis

Analysis was conducted for the one-time transportation impacts involving the shipment of Category I/II SNM. These shipments involved pits currently at Pantex and HEU at Y-12 being transported to candidate CNPC sites.

**Table 3.1 – Route Characteristics of the CNPC Alternative**

|                      |                                  | <b>Rural</b> | <b>Suburban</b> | <b>Urban</b> |
|----------------------|----------------------------------|--------------|-----------------|--------------|
| <b>Pantex – LANL</b> | Distance (km)                    | 5.34E+02     | 4.27E+01        | 8.60E+00     |
|                      | Pop. Density (/km <sup>2</sup> ) | 6.50E+00     | 3.91E+02        | 2.15E+03     |
| <b>Pantex – NTS</b>  | Distance (km)                    | 1.62E+03     | 1.29E+02        | 2.49E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 6.10E+00     | 3.34E+02        | 2.30E+03     |
| <b>Pantex – SRS</b>  | Distance (km)                    | 1.48E+03     | 6.21E+02        | 8.06E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.34E+01     | 3.32E+02        | 2.27E+03     |
| <b>Pantex – Y-12</b> | Distance (km)                    | 1.31E+03     | 4.25E+02        | 4.24E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.31E+01     | 2.99E+02        | 2.22E+03     |
| <b>Y-12 – LANL</b>   | Distance (km)                    | 1.82E+03     | 4.64E+02        | 5.10E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.12E+01     | 3.02E+02        | 2.21E+03     |
| <b>Y-12 – NTS</b>    | Distance (km)                    | 2.90E+03     | 5.51E+02        | 6.73E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 9.30E+00     | 3.08E+02        | 2.25E+03     |
| <b>Y-12 – Pantex</b> | Distance (km)                    | 1.31E+03     | 4.25E+02        | 4.24E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.31E+01     | 2.99E+02        | 2.22E+03     |
| <b>Y-12 – SRS</b>    | Distance (km)                    | 3.02E+02     | 2.92E+02        | 3.73E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.92E+01     | 3.54E+02        | 2.27E+03     |

**Table 3.2 – Non-Radiological Impacts – CNPC Pit Shipments**

|                      |                     | <b>Per Shipment</b> | <b>Campaign Impacts</b> |
|----------------------|---------------------|---------------------|-------------------------|
| <b>Pantex – LANL</b> | Accidents           | 1.41E-04            | 6.63E-02                |
|                      | Accident Fatalities | 6.74E-06            | 3.17E-03                |
|                      | Emission Fatalities | 5.79E-07            | 2.72E-04                |
| <b>Pantex – NTS</b>  | Accidents           | 3.16E-04            | 1.49E-01                |
|                      | Accident Fatalities | 1.70E-05            | 7.99E-03                |
|                      | Emission Fatalities | 1.65E-06            | 7.77E-04                |
| <b>Pantex – SRS</b>  | Accidents           | 6.79E-04            | 3.19E-01                |
|                      | Accident Fatalities | 9.76E-05            | 4.59E-02                |
|                      | Emission Fatalities | 6.13E-06            | 9.81E-05                |
| <b>Pantex – Y-12</b> | Accidents           | 3.79E-04            | 1.78E-01                |
|                      | Accident Fatalities | 1.19E-05            | 5.59E-03                |
|                      | Emission Fatalities | 3.58E-06            | 5.73E-05                |

**Table 3.3 – Non-Radiological Impacts – CNPC HEU Shipments**

|                      |                     | <b>Per Shipment</b> | <b>Campaign Impacts</b> |
|----------------------|---------------------|---------------------|-------------------------|
| <b>Y-12 – LANL</b>   | Accidents           | 5.00E-04            | 2.35E-01                |
|                      | Accident Fatalities | 2.94E-05            | 1.38E-02                |
|                      | Emission Fatalities | 4.09E-06            | 2.21E-03                |
| <b>Y-12 – NTS</b>    | Accidents           | 6.75E-04            | 3.17E-01                |
|                      | Accident Fatalities | 3.98E-05            | 1.87E-02                |
|                      | Emission Fatalities | 5.22E-06            | 2.82E-03                |
| <b>Y-12 – Pantex</b> | Accidents           | 3.79E-04            | 1.78E-01                |
|                      | Accident Fatalities | 2.09E-05            | 9.82E-03                |
|                      | Emission Fatalities | 3.58E-06            | 1.93E-03                |
| <b>Y-12 – SRS</b>    | Accidents           | 3.24E-04            | 1.52E-01                |
|                      | Accident Fatalities | 1.09E-05            | 5.12E-03                |
|                      | Emission Fatalities | 2.91E-06            | 1.57E-03                |

**Table 3.4 – Radiological Impacts – CNPC Alternative**

|  |              | Handling   |          | Crew       |          | Impacts to Public |          | Accident   |          | Truck Stop |          | Area Resident |          | MEI        |          |
|--|--------------|------------|----------|------------|----------|-------------------|----------|------------|----------|------------|----------|---------------|----------|------------|----------|
|  |              | Person-rem | LCF      | Person-rem | LCF      | Person-rem        | LCF      | Person-rem | LCF      | Person-rem | LCF      | Person-rem    | LCF      | Person-rem | LCF      |
| <i>Pit Shipments from Pantex to CNPC Sites</i> |              |            |          |            |          |                   |          |            |          |            |          |               |          |            |          |
| LANL   | per shipment | 2.33E+00   | 1.40E-03 | 3.00E-02   | 1.80E-05 | 7.19E-03          | 4.31E-06 | 1.49E-09   | 8.95E-13 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|  | Campaign     | 1.10E+03   | 6.57E-01 | 1.41E+01   | 8.46E-03 | 3.38E+00          | 2.03E-03 | 7.01E-07   | 4.20E-10 | 9.87E-06   | 5.92E-09 | 1.33E-04      | 7.95E-08 | 1.57E-07   | 9.42E-11 |
| NTS  | per shipment | 2.33E+00   | 1.40E-03 | 9.07E-02   | 5.44E-05 | 2.16E-02          | 1.30E-05 | 2.27E-09   | 1.36E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|  | Campaign     | 1.10E+03   | 6.57E-01 | 4.26E+01   | 2.56E-02 | 1.02E+01          | 6.09E-03 | 1.07E-06   | 6.39E-10 | 9.87E-06   | 5.92E-09 | 1.33E-04      | 7.95E-08 | 1.57E-07   | 9.42E-11 |
| SRS  | per shipment | 2.33E+00   | 1.40E-03 | 1.43E-01   | 8.58E-05 | 6.42E-02          | 3.85E-05 | 1.23E-08   | 7.36E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|  | Campaign     | 1.10E+03   | 6.57E-01 | 6.72E+01   | 4.03E-02 | 3.02E+01          | 1.81E-02 | 5.76E-06   | 3.46E-09 | 9.87E-06   | 5.92E-09 | 1.33E-04      | 7.95E-08 | 1.57E-07   | 9.42E-11 |
| Y12  | per shipment | 2.33E+00   | 1.40E-03 | 1.10E-01   | 6.60E-05 | 4.11E-02          | 2.47E-05 | 2.97E-09   | 1.78E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|  | Campaign     | 1.10E+03   | 6.57E-01 | 5.17E+01   | 3.10E-02 | 1.93E+01          | 1.16E-02 | 1.39E-06   | 8.36E-10 | 9.87E-06   | 5.92E-09 | 1.33E-04      | 7.95E-08 | 1.57E-07   | 9.42E-11 |
| <i>HEU Shipments from Y-12 to CNPC Sites</i>   |              |            |          |            |          |                   |          |            |          |            |          |               |          |            |          |
| NTS  | per shipment | 8.18E+00   | 4.91E-03 | 1.38E-01   | 8.28E-05 | 4.81E-02          | 2.89E-05 | 8.60E-09   | 5.16E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|  | Campaign     | 4.42E+03   | 2.65E+00 | 7.45E+01   | 4.47E-02 | 2.60E+01          | 1.56E-02 | 4.64E-06   | 2.79E-09 | 1.13E-05   | 6.80E-09 | 1.52E-04      | 9.14E-08 | 1.57E-07   | 9.42E-11 |
| Pantex   | per shipment | 8.18E+00   | 4.91E-03 | 1.98E-01   | 1.19E-04 | 6.24E-02          | 3.74E-05 | 1.01E-08   | 6.06E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|  | Campaign     | 4.42E+03   | 2.65E+00 | 1.07E+02   | 6.42E-02 | 3.37E+01          | 2.02E-02 | 5.45E-06   | 3.27E-09 | 1.13E-05   | 6.80E-09 | 1.52E-04      | 9.14E-08 | 1.57E-07   | 9.42E-11 |
| SRS  | per shipment | 8.18E+00   | 4.91E-03 | 1.10E-01   | 6.60E-05 | 4.11E-02          | 2.47E-05 | 5.75E-09   | 3.45E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|  | Campaign     | 4.42E+03   | 2.65E+00 | 5.94E+01   | 3.56E-02 | 2.22E+01          | 1.33E-02 | 3.11E-06   | 1.86E-09 | 1.13E-05   | 6.80E-09 | 1.52E-04      | 9.14E-08 | 1.57E-07   | 9.42E-11 |
| Y-12   | per shipment | 8.18E+00   | 4.91E-03 | 4.92E-02   | 2.95E-05 | 2.83E-02          | 1.70E-05 | 1.82E-08   | 1.09E-11 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|  | Campaign     | 4.42E+03   | 2.65E+00 | 2.66E+01   | 1.59E-02 | 1.53E+01          | 9.17E-03 | 9.83E-06   | 5.90E-09 | 1.13E-05   | 6.80E-09 | 1.52E-04      | 9.14E-08 | 1.57E-07   | 9.42E-11 |

#### 4. CNC Alternative Analysis

Transportation analysis was performed for the CNC Option of the CCE Alternative. This option assumes that pit and CSA production would be consolidated at one of the CNC sites. A/D/HE Center activities would continue to be conducted at Pantex or would be transferred to NTS.

**Table 4.1 – Route Characteristics of the CNC Alternative**

|                      |                                  | <b>Rural</b> | <b>Suburban</b> | <b>Urban</b> |
|----------------------|----------------------------------|--------------|-----------------|--------------|
| <b>Pantex – LANL</b> | Distance (km)                    | 5.34E+02     | 4.27E+01        | 8.60E+00     |
|                      | Pop. Density (/km <sup>2</sup> ) | 6.50E+00     | 3.91E+02        | 2.15E+03     |
| <b>Pantex – NTS</b>  | Distance (km)                    | 1.62E+03     | 1.29E+02        | 2.49E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 6.10E+00     | 3.34E+02        | 2.30E+03     |
| <b>Pantex – SRS</b>  | Distance (km)                    | 1.48E+03     | 6.21E+02        | 8.06E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.34E+01     | 3.32E+02        | 2.27E+03     |
| <b>Pantex – Y-12</b> | Distance (km)                    | 1.31E+03     | 4.25E+02        | 4.24E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 1.31E+01     | 2.99E+02        | 2.22E+03     |
| <b>NTS – LANL</b>    | Distance (km)                    | 1.29E+03     | 1.21E+02        | 1.63E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 6.50E+00     | 3.15E+02        | 2.33E+03     |
| <b>NTS – SRS</b>     | Distance (km)                    | 3.07E+03     | 7.47E+02        | 1.06E+02     |
|                      | Pop. Density (/km <sup>2</sup> ) | 9.60E+00     | 3.34E+02        | 2.27E+03     |
| <b>NTS – Y-12</b>    | Distance (km)                    | 2.90E+03     | 5.51E+02        | 6.73E+01     |
|                      | Pop. Density (/km <sup>2</sup> ) | 9.30E+00     | 3.08E+02        | 2.25E+03     |

**Table 4.2 – Non-Radiological Impacts – CNC Pit or CSA Shipments – Pantex as A/D/HE Center**

|                      |                     | <b>Per Shipment</b> | <b>Annual Impacts</b> |
|----------------------|---------------------|---------------------|-----------------------|
| <b>Pantex – LANL</b> | Accidents           | 1.41E-04            | 2.26E-03              |
|                      | Accident Fatalities | 6.74E-06            | 1.08E-04              |
|                      | Emission Fatalities | 5.79E-07            | 9.27E-06              |
| <b>Pantex – NTS</b>  | Accidents           | 3.16E-04            | 5.06E-03              |
|                      | Accident Fatalities | 1.70E-05            | 2.72E-04              |
|                      | Emission Fatalities | 1.65E-06            | 2.65E-05              |
| <b>Pantex – SRS</b>  | Accidents           | 6.79E-04            | 1.09E-02              |
|                      | Accident Fatalities | 9.76E-05            | 1.56E-03              |
|                      | Emission Fatalities | 6.13E-06            | 9.81E-05              |
| <b>Pantex – Y-12</b> | Accidents           | 3.79E-04            | 6.06E-03              |
|                      | Accident Fatalities | 1.19E-05            | 1.90E-04              |
|                      | Emission Fatalities | 3.58E-06            | 5.73E-05              |

**Table 4.3 – Non-Radiological Impacts – CNC Pit or CSA Shipments – NTS as A/D/HE Center**

|                   |                     | <b>Per Shipment</b> | <b>Annual Impacts</b> |
|-------------------|---------------------|---------------------|-----------------------|
| <b>NTS – LANL</b> | Accidents           | 2.02E-04            | 3.23E-03              |
|                   | Accident Fatalities | 1.29E-05            | 2.06E-04              |
|                   | Emission Fatalities | 1.26E-06            | 2.02E-05              |
| <b>NTS – SRS</b>  | Accidents           | 9.07E-04            | 1.45E-02              |
|                   | Accident Fatalities | 1.10E-04            | 1.76E-03              |
|                   | Emission Fatalities | 7.78E-06            | 1.24E-04              |
| <b>NTS – Y-12</b> | Accidents           | 6.66E-04            | 1.07E-02              |
|                   | Accident Fatalities | 2.78E-05            | 4.45E-04              |
|                   | Emission Fatalities | 5.22E-06            | 8.36E-05              |

**Table 4.4 – Radiological Impacts – CNC Alternative**

|   |              | Handling   |          | Crew       |          | Impacts to Public |          | Accident   |          | Truck Stop |          | Area Resident |          | MEI        |          |
|---|--------------|------------|----------|------------|----------|-------------------|----------|------------|----------|------------|----------|---------------|----------|------------|----------|
|   |              | Person-rem | LCF      | Person-rem | LCF      | Person-rem        | LCF      | Person-rem | LCF      | Person-rem | LCF      | Person-rem    | LCF      | Person-rem | LCF      |
| <b><i>Pit Shipments from Pantex to CNPC Sites</i></b>     |              |            |          |            |          |                   |          |            |          |            |          |               |          |            |          |
| LANL  | per shipment | 2.33E+00   | 1.40E-03 | 3.00E-02   | 1.80E-05 | 7.19E-03          | 4.31E-06 | 1.49E-09   | 8.95E-13 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 4.80E-01   | 2.88E-04 | 1.15E-01          | 6.90E-05 | 2.39E-08   | 1.43E-11 | 3.36E-07   | 2.02E-10 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| NTS   | per shipment | 2.33E+00   | 1.40E-03 | 9.07E-02   | 5.44E-05 | 2.16E-02          | 1.30E-05 | 2.27E-09   | 1.36E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 1.45E+00   | 8.71E-04 | 3.46E-01          | 2.07E-04 | 3.63E-08   | 2.18E-11 | 3.36E-07   | 2.02E-10 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| SRS   | per shipment | 2.33E+00   | 1.40E-03 | 1.43E-01   | 8.58E-05 | 6.42E-02          | 3.85E-05 | 1.23E-08   | 7.36E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 2.29E+00   | 1.37E-03 | 1.03E+00          | 6.16E-04 | 1.96E-07   | 1.18E-10 | 3.36E-07   | 2.02E-10 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| Y12   | per shipment | 2.33E+00   | 1.40E-03 | 1.10E-01   | 6.60E-05 | 4.11E-02          | 2.47E-05 | 2.97E-09   | 1.78E-12 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 1.76E+00   | 1.06E-03 | 6.58E-01          | 3.95E-04 | 4.75E-08   | 2.85E-11 | 3.36E-07   | 2.02E-10 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| <b><i>CSA Shipments between Pantex and CNPC Sites</i></b> |              |            |          |            |          |                   |          |            |          |            |          |               |          |            |          |
| LANL  | per shipment | 2.33E+00   | 1.40E-03 | 3.00E-02   | 1.80E-05 | 7.19E-03          | 4.31E-06 | 7.88E-15   | 4.73E-18 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 4.80E-01   | 2.88E-04 | 1.15E-01          | 6.90E-05 | 1.26E-13   | 7.56E-17 | 3.36E-07   | 2.02E-10 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| NTS   | per shipment | 2.33E+00   | 1.40E-03 | 9.07E-02   | 5.44E-05 | 2.16E-02          | 1.30E-05 | 1.21E-14   | 7.26E-18 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 1.45E+00   | 8.71E-04 | 3.46E-01          | 2.07E-04 | 1.94E-13   | 1.16E-16 | 3.36E-07   | 2.02E-10 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| SRS   | per shipment | 2.33E+00   | 1.40E-03 | 1.43E-01   | 8.58E-05 | 6.42E-02          | 3.85E-05 | 6.51E-14   | 3.91E-17 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 2.29E+00   | 1.37E-03 | 1.03E+00          | 6.16E-04 | 1.04E-12   | 6.25E-16 | 3.36E-07   | 2.02E-10 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| Y12   | per shipment | 2.33E+00   | 1.40E-03 | 1.10E-01   | 6.60E-05 | 4.11E-02          | 2.47E-05 | 1.89E-14   | 1.13E-17 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 1.76E+00   | 1.06E-03 | 6.58E-01          | 3.95E-04 | 3.02E-13   | 1.81E-16 | 3.36E-07   | 2.02E-10 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| <b><i>Pit Shipments between NTS and CNPC Sites</i></b>    |              |            |          |            |          |                   |          |            |          |            |          |               |          |            |          |
| LANL  | per shipment | 2.33E+00   | 1.40E-03 | 7.35E-02   | 4.41E-05 | 1.70E-02          | 1.02E-05 | 8.31E-10   | 4.99E-13 | 2.10E-09   | 1.26E-12 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 1.18E+00   | 7.06E-04 | 2.72E-01          | 1.63E-04 | 1.33E-08   | 7.98E-12 | 3.36E-08   | 2.02E-11 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| SRS   | per shipment | 2.33E+00   | 1.40E-03 | 2.07E-01   | 1.24E-04 | 7.97E-02          | 4.78E-05 | 1.41E-08   | 8.46E-12 | 2.10E-09   | 1.26E-12 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 3.31E+00   | 1.99E-03 | 1.28E+00          | 7.65E-04 | 2.26E-07   | 1.35E-10 | 3.36E-08   | 2.02E-11 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| Y-12  | per shipment | 2.33E+00   | 1.40E-03 | 1.95E-01   | 1.17E-04 | 6.28E-02          | 3.77E-05 | 5.39E-09   | 3.23E-12 | 2.10E-09   | 1.26E-12 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 3.12E+00   | 1.87E-03 | 1.00E+00          | 6.03E-04 | 8.62E-08   | 5.17E-11 | 3.36E-08   | 2.02E-11 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| <b><i>CSA Shipments between NTS and CNPC Sites</i></b>    |              |            |          |            |          |                   |          |            |          |            |          |               |          |            |          |
| LANL  | per shipment | 2.33E+00   | 1.40E-03 | 7.35E-02   | 4.41E-05 | 1.70E-02          | 1.02E-05 | 4.41E-15   | 2.65E-18 | 2.10E-09   | 1.26E-12 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
|   | Campaign     | 3.73E+01   | 2.24E-02 | 1.18E+00   | 7.06E-04 | 2.72E-01          | 1.63E-04 | 7.06E-14   | 4.23E-17 | 3.36E-08   | 2.02E-11 | 4.51E-06      | 2.71E-09 | 1.57E-07   | 9.42E-11 |
| SRS   | per          | 2.33E+00   | 1.40E-03 | 2.07E-01   | 1.24E-04 | 7.97E-02          | 4.78E-05 | 7.06E-14   | 4.23E-17 | 2.10E-09   | 1.26E-12 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |

|      |              |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|------|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|      | shipment     |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|      | Campaign     | 3.73E+01 | 2.24E-02 | 3.31E+00 | 1.99E-03 | 1.28E+00 | 7.65E-04 | 1.27E-12 | 7.62E-16 | 3.36E-08 | 2.02E-11 | 4.51E-06 | 2.71E-09 | 1.57E-07 | 9.42E-11 |
| Y-12 | per shipment | 2.33E+00 | 1.40E-03 | 1.95E-01 | 1.17E-04 | 6.28E-02 | 3.77E-05 | 2.86E-14 | 1.72E-17 | 2.10E-09 | 1.26E-12 | 2.82E-07 | 1.69E-10 | 1.57E-07 | 9.42E-11 |
|      | Campaign     | 3.73E+01 | 2.24E-02 | 3.12E+00 | 1.87E-03 | 1.00E+00 | 6.03E-04 | 4.58E-13 | 2.75E-16 | 3.36E-08 | 2.02E-11 | 4.51E-06 | 2.71E-09 | 1.57E-07 | 9.42E-11 |

## 5. Waste Shipments

Transportation impacts were analyzed for the shipment of low-level radioactive wastes. Impacts were assessed for shipments from Y-12 to NTS and from Pantex to NTS. Three annual volumes were analyzed for both scenarios; 7,800 cubic yards, 12,300 cubic yards, and 24,000 cubic yards. It was assumed that 80 Class A 55-gallon drums could be transported in each truck shipment.

**Table 5.1 – Route Characteristics of the LLW Shipments**

|                     |                                  | <b>Rural</b> | <b>Suburban</b> | <b>Urban</b> |
|---------------------|----------------------------------|--------------|-----------------|--------------|
| <b>Y-12 – NTS</b>   | Distance (km)                    | 2.90E+03     | 5.51E+02        | 6.73E+01     |
|                     | Pop. Density (/km <sup>2</sup> ) | 9.30E+00     | 3.08E+02        | 2.25E+03     |
| <b>Pantex – NTS</b> | Distance (km)                    | 1.62E+03     | 1.29E+02        | 2.49E+01     |
|                     | Pop. Density (/km <sup>2</sup> ) | 6.10E+00     | 3.34E+02        | 2.30E+03     |

**Table 5.2 – Non-Radiological Impacts – LLW Shipments**

|                     |                     | <b>Per Shipment</b> | <b>7,800 yd3</b> | <b>12,300 yd3</b> | <b>24,000 yd3</b> |
|---------------------|---------------------|---------------------|------------------|-------------------|-------------------|
| <b>Y-12 – NTS</b>   | Accidents           | 6.75E-04            | 2.59E-01         | 4.08E-01          | 7.95E-01          |
|                     | Accident Fatalities | 3.98E-05            | 1.52E-02         | 2.40E-02          | 4.69E-02          |
|                     | Emission Fatalities | 5.22E-06            | 2.00E-03         | 3.16E-03          | 6.15E-03          |
| <b>Pantex – NTS</b> | Accidents           | 2.02E-04            | 7.73E-02         | 1.22E-01          | 2.38E-01          |
|                     | Accident Fatalities | 1.29E-06            | 4.93E-04         | 7.78E-04          | 1.52E-03          |
|                     | Emission Fatalities | 1.65E-06            | 6.33E-04         | 9.99E-04          | 1.95E-03          |

**Table 5.3 – Radiological Impacts – LLW Shipments**

|  | Handling   |          | Crew       |          | Impacts to Public |          | Accident   |          | Truck Stop |          | Area Resident |          | MEI        |          |
|--|------------|----------|------------|----------|-------------------|----------|------------|----------|------------|----------|---------------|----------|------------|----------|
|  | Person-rem | LCF      | Person-rem | LCF      | Person-rem        | LCF      | Person-rem | LCF      | Person-rem | LCF      | Person-rem    | LCF      | Person-rem | LCF      |
| <b><i>LLW Shipments between Y-12 and NTS</i></b>   |            |          |            |          |                   |          |            |          |            |          |               |          |            |          |
| per shipment                                       | 2.28E+00   | 1.37E-03 | 1.98E-01   | 1.19E-04 | 6.24E-02          | 3.74E-05 | 3.68E-08   | 2.21E-11 | 2.10E-08   | 1.26E-11 | 2.82E-07      | 1.69E-10 | 1.57E-07   | 9.42E-11 |
| 7,800 cubic yards                                  | 8.73E+02   | 5.24E-01 | 7.58E+01   | 4.55E-02 | 2.39E+01          | 1.43E-02 | 1.41E-05   | 8.46E-09 | 8.04E-06   | 4.83E-09 | 1.08E-04      | 6.48E-08 | 1.57E-07   | 9.42E-11 |
| 12,300 cubic yards                                 | 1.38E+03   | 8.26E-01 | 1.20E+02   | 7.18E-02 | 3.77E+01          | 2.26E-02 | 2.22E-05   | 1.33E-08 | 1.27E-05   | 7.61E-09 | 1.70E-04      | 1.02E-07 | 1.57E-07   | 9.42E-11 |
| 24,000 cubic yards                                 | 2.69E+03   | 1.61E+00 | 2.33E+02   | 1.40E-01 | 7.35E+01          | 4.41E-02 | 4.34E-05   | 2.60E-08 | 2.47E-05   | 1.48E-08 | 3.32E-04      | 1.99E-07 | 1.57E-07   | 9.42E-11 |
| <b><i>LLW Shipments between Pantex and NTS</i></b> |            |          |            |          |                   |          |            |          |            |          |               |          |            |          |
| per shipment                                       | 2.88E+00   | 1.73E-03 | 8.53E-03   | 5.12E-05 | 2.70E-03          | 1.62E-05 | 5.13E-08   | 3.08E-11 | 2.10E-08   | 2.88E+00 | 2.88E+00      | 2.88E+00 | 1.57E-07   | 9.42E-11 |
| 7,800 cubic yards                                  | 1.10E+03   | 6.62E-01 | 3.27E+00   | 1.96E-02 | 1.03E+00          | 6.20E-03 | 1.97E-05   | 1.18E-08 | 8.05E-06   | 4.83E-09 | 1.08E-04      | 6.48E-08 | 1.57E-07   | 9.42E-11 |
| 12,300 cubic yards                                 | 1.38E+03   | 8.26E-01 | 5.15E+00   | 3.09E-02 | 1.63E+00          | 9.78E-03 | 3.10E-05   | 1.86E-08 | 1.27E-05   | 7.61E-09 | 1.70E-04      | 1.02E-07 | 1.57E-07   | 9.42E-11 |
| 24,000 cubic yards                                 | 2.68E+03   | 1.61E+00 | 1.00E+01   | 6.03E-02 | 3.18E+00          | 1.91E-02 | 6.05E-05   | 3.63E-08 | 2.48E-05   | 1.48E-08 | 3.32E-04      | 1.99E-07 | 1.57E-07   | 9.42E-11 |