Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	75	0

Connectors Loads

The impact limiter is attached to the shock absorbers using welded in shear pins between the 2x9 plate and the grouted melter package shock absorbers.

Pin Shear Force: = 100,000 lbs (Figure 6-53)

$$\text{Shear Stress} = \frac{100{,}000 lbs}{3.14 in^2} = 31{,}800 psi \quad \text{vs 21,600 psi shear yield}$$

LDCC Stress

Figure 6-54 shows the stress in the LDCC at the worst time instance through the NCT drop time history. There are no significant regions of indicated crush on the outside surface. Within ABAQUS/Viewer, the mass of the uncrushed elements is queried, resulting in a mass of 188.964, vs the total LDCC mass of 189.051 (in units of lbs/386.4 in/sec^2). The crushed LDCC is directly adjacent to the melter, occurring there due to the tendency of the irregular shaped melter to create high pressure points on the adjacent LDCC, compared to the uniform surface of the container walls. There is also a small band around the outside surface, near the back wall of the WVMP.

LDCC Mass Crushed = (189.051-188.964)/189.051 = 0.05%

Door Gaps

The bolt analysis already shows no bolt failures, thus indicating no door or door gap relative motion. Figure 6-55 shows a deflection contour of the door and the wall extensions that surround the door. The maximum summation of gap movement is queried within ABAQUS/Viewer, and shown to be 0.24 inch. The deflection is not at the door face seal, but at the door outer edge seal. Due to the hard impact, the opposite wall vibrates slightly. The FEA model underestimates the amount of structural damping that occurs, so the deflection is likely overpredicted. Nevertheless, the deflection at the face seal is shown to be zero. Therefore, no change in the seal.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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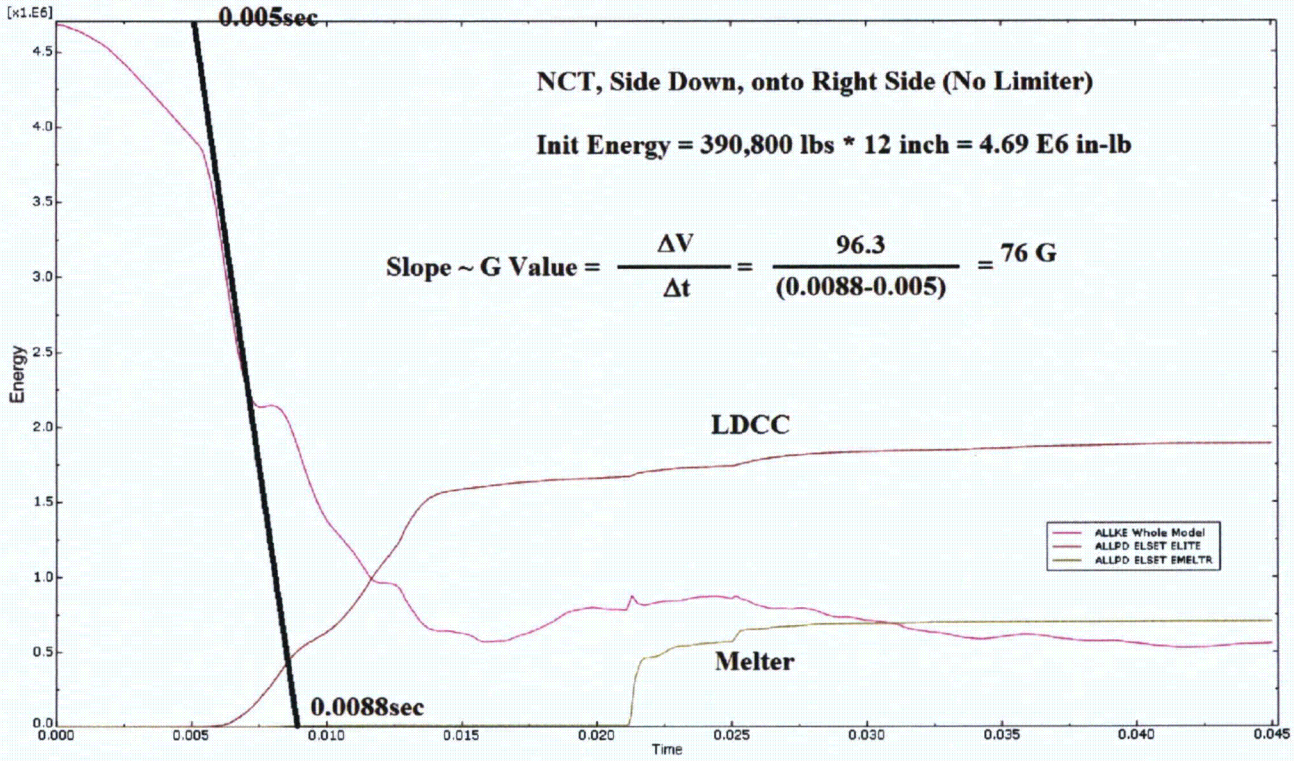

Figure 6-47 Energy Time History for NCT Drop, WVMP oriented with Hard Side Down, Showing correct initial energy, an 0.010 second time duration to absorb the impact, with largest energy dissipation occurring in 0.003 sec, and an effective G-value of 76 G.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	77	0

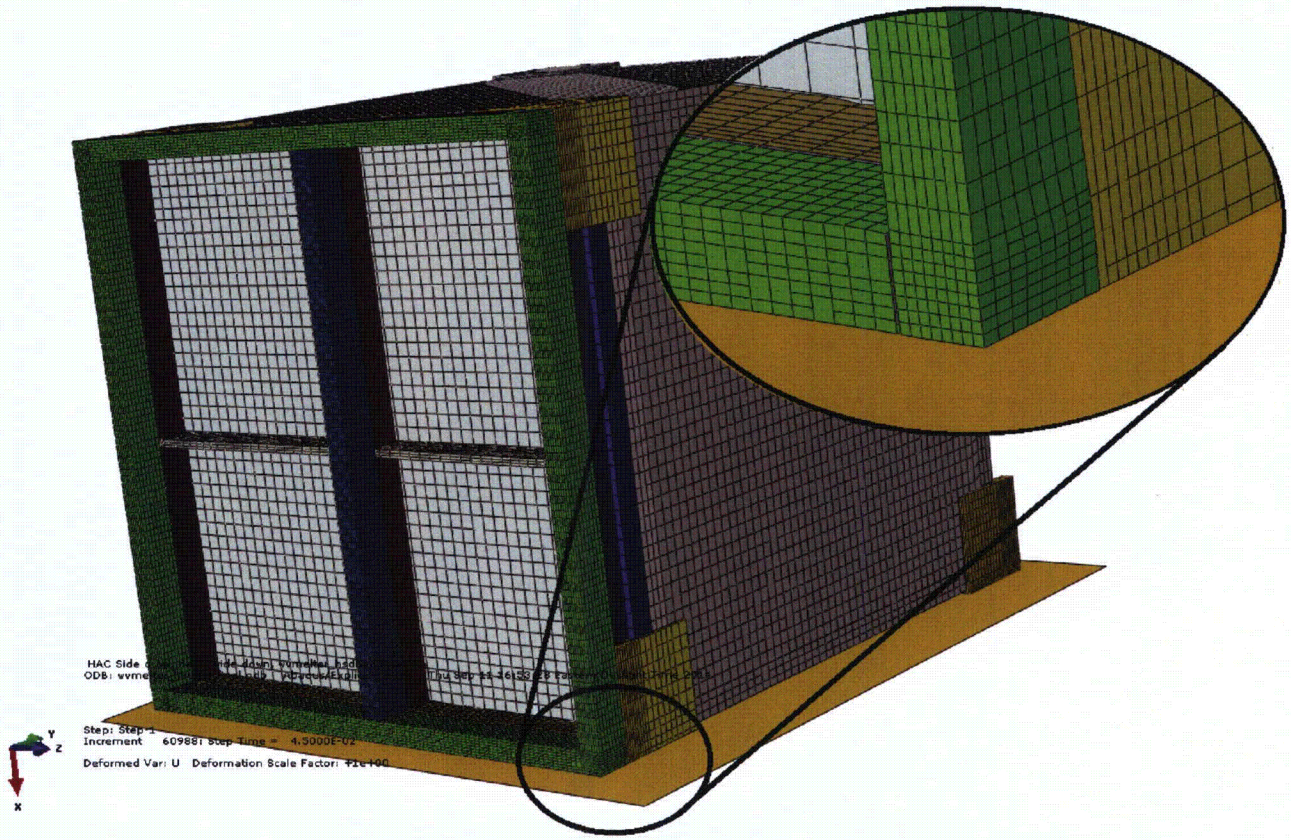

Figure 6-48 Deformed Shape of WVMP after NCT Drop, Hard Side Down (Right Side).

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	78	0

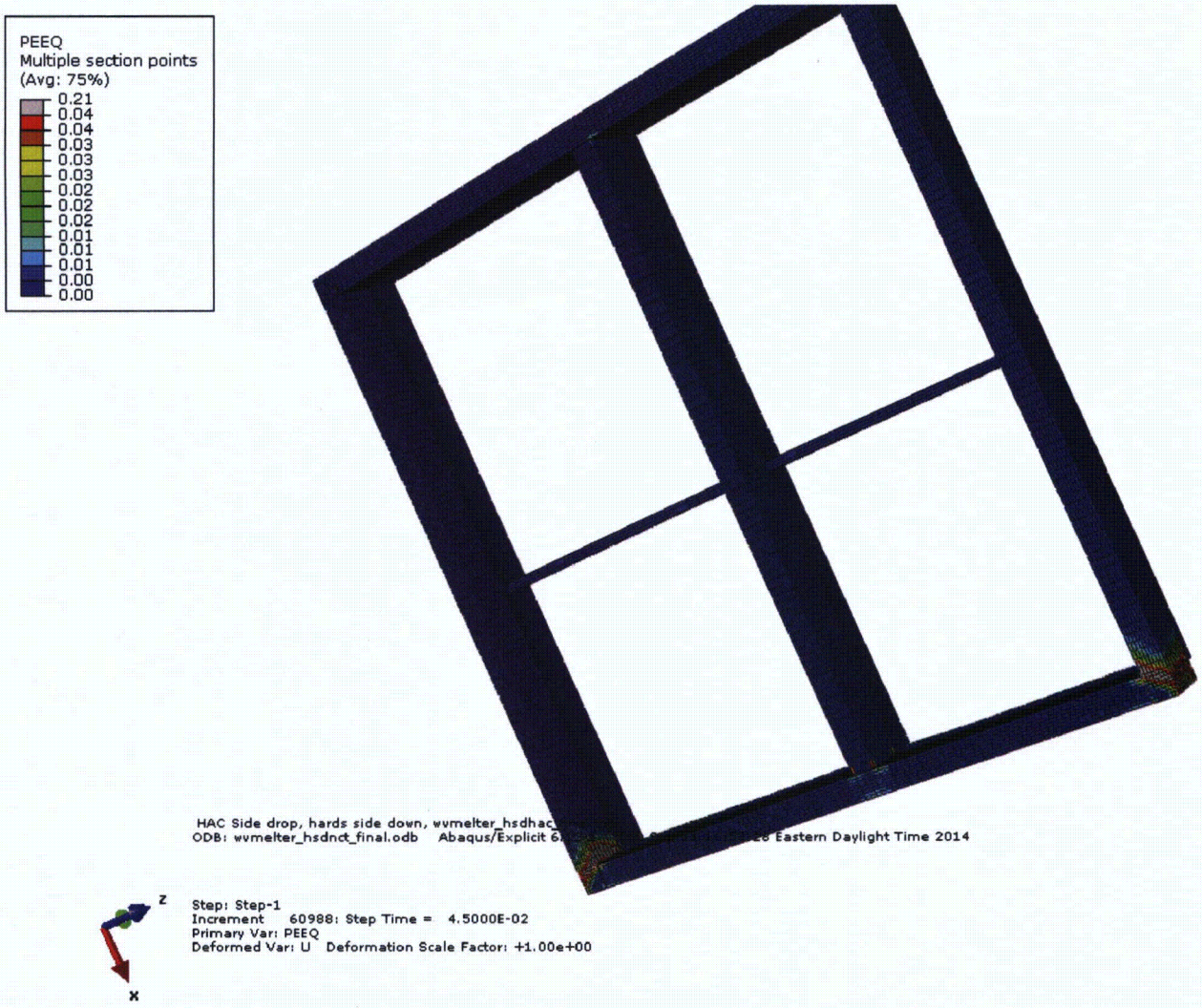

Figure 6-49 Contour Plot of Plastic Strain in Impact Limiter of WVMP after NCT Drop, Hard Side Down. The Limiter width extends ½ inch beyond Grouted melter envelope, thus are subject to some compression During Side impact, evident in the strain plot.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	79	0

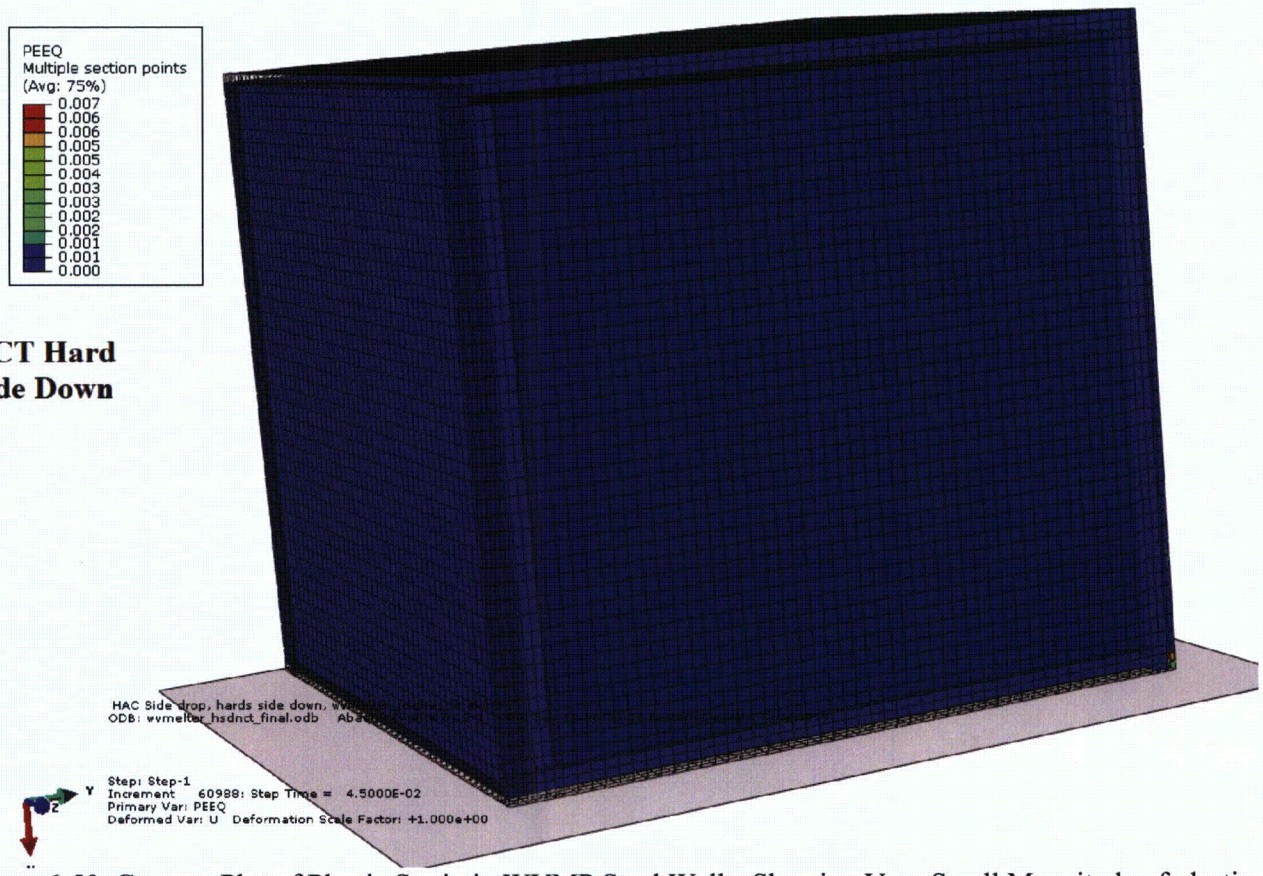

Figure 6-50 Contour Plot of Plastic Strain in WVMP Steel Walls, Showing Very Small Magnitude of plastic Strains after NCT Drop, Hard Side Down (Strain is only at outer corner, secondary in nature).

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	80	0

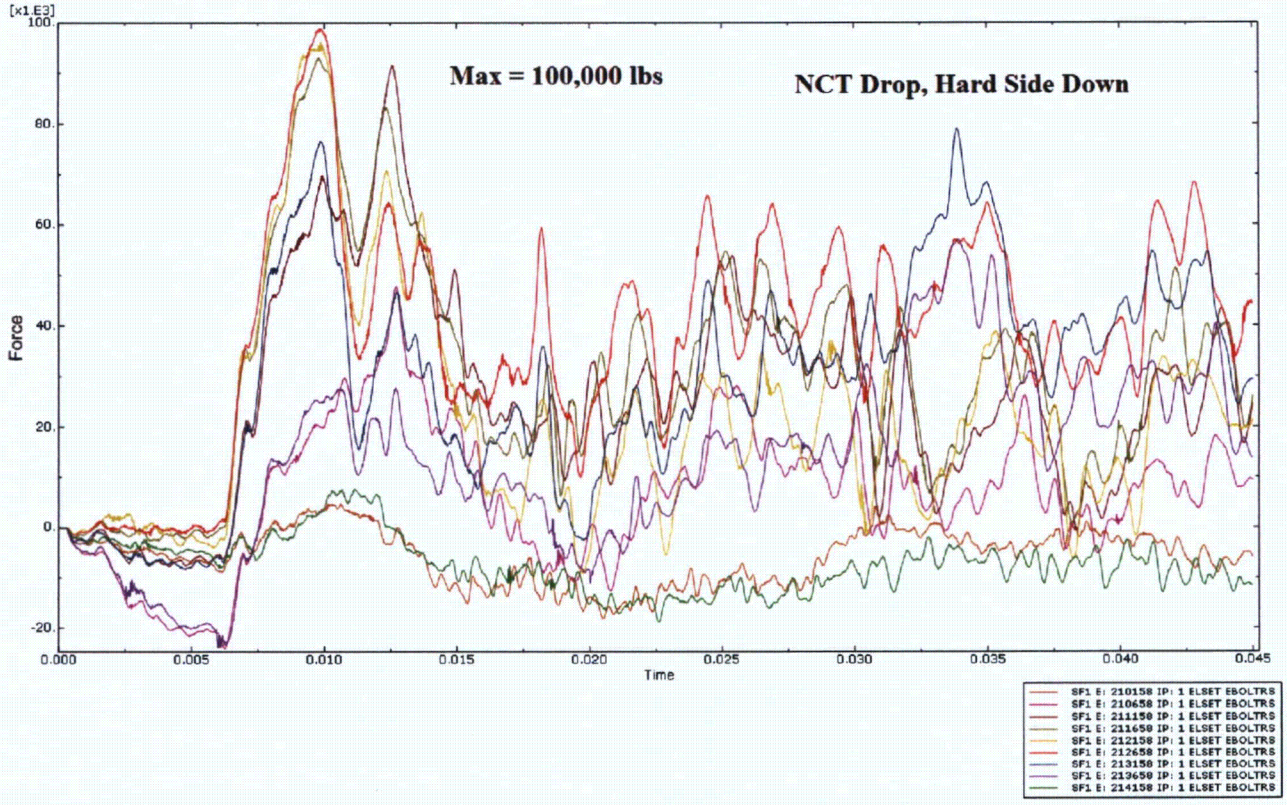

Figure 6-51 Bolt Tensile History, Hard Side Down, NCT, For Door Bolts Along Right Side of Door (including corners)

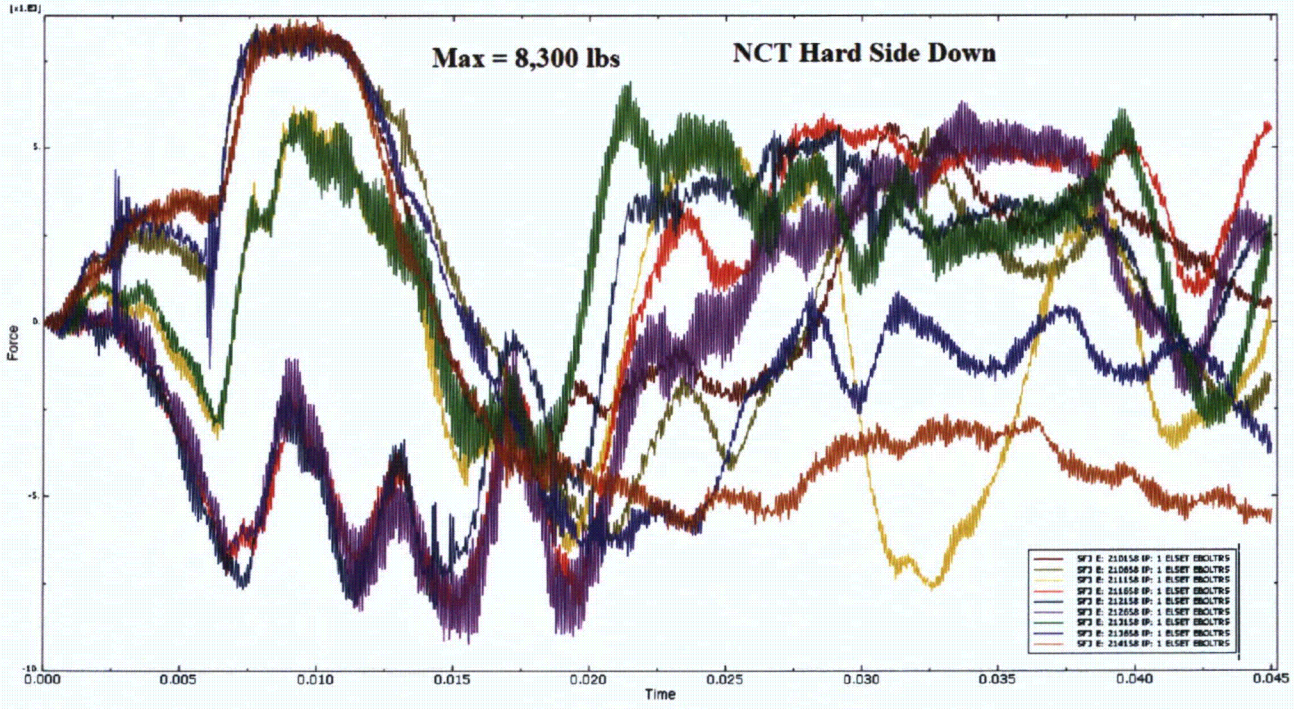

Figure 6-52 Bolt Shear, Hard Side Down NCT Drop

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	81	0

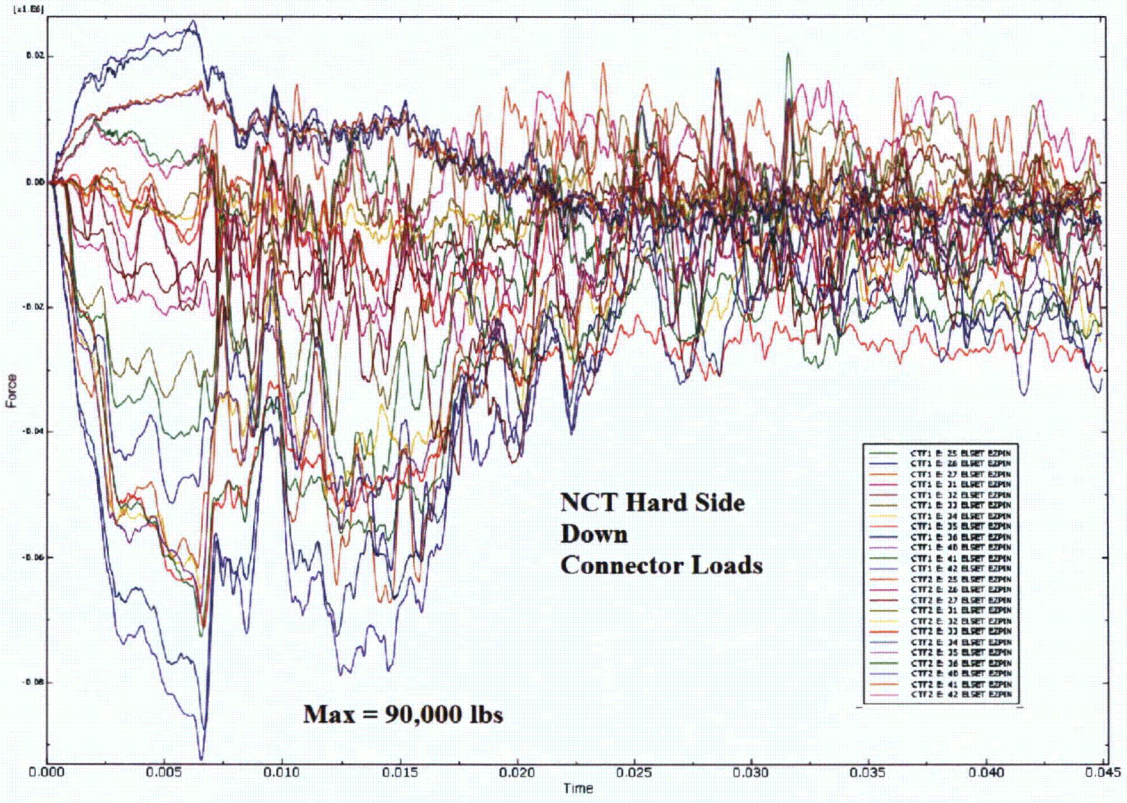

Figure 6-53 Connector Shear Loads Pins between 2x9 and Bumpers, Hard Side Down NCT Drop

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	82	0

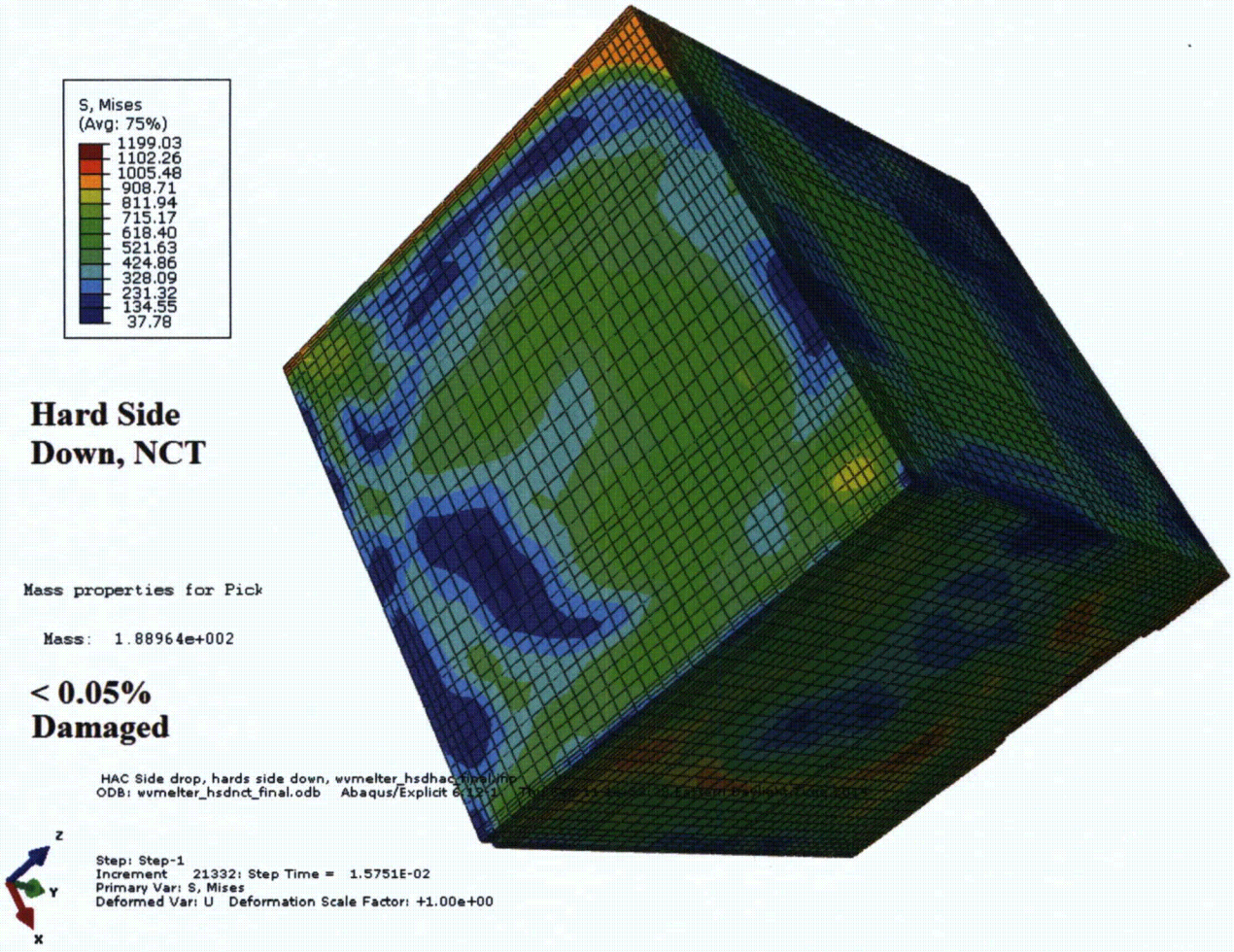

Figure 6-54 Stress Plot of LDCC, Hard Side Down NCT Drop, showing less than 0.05% LDCC damaged

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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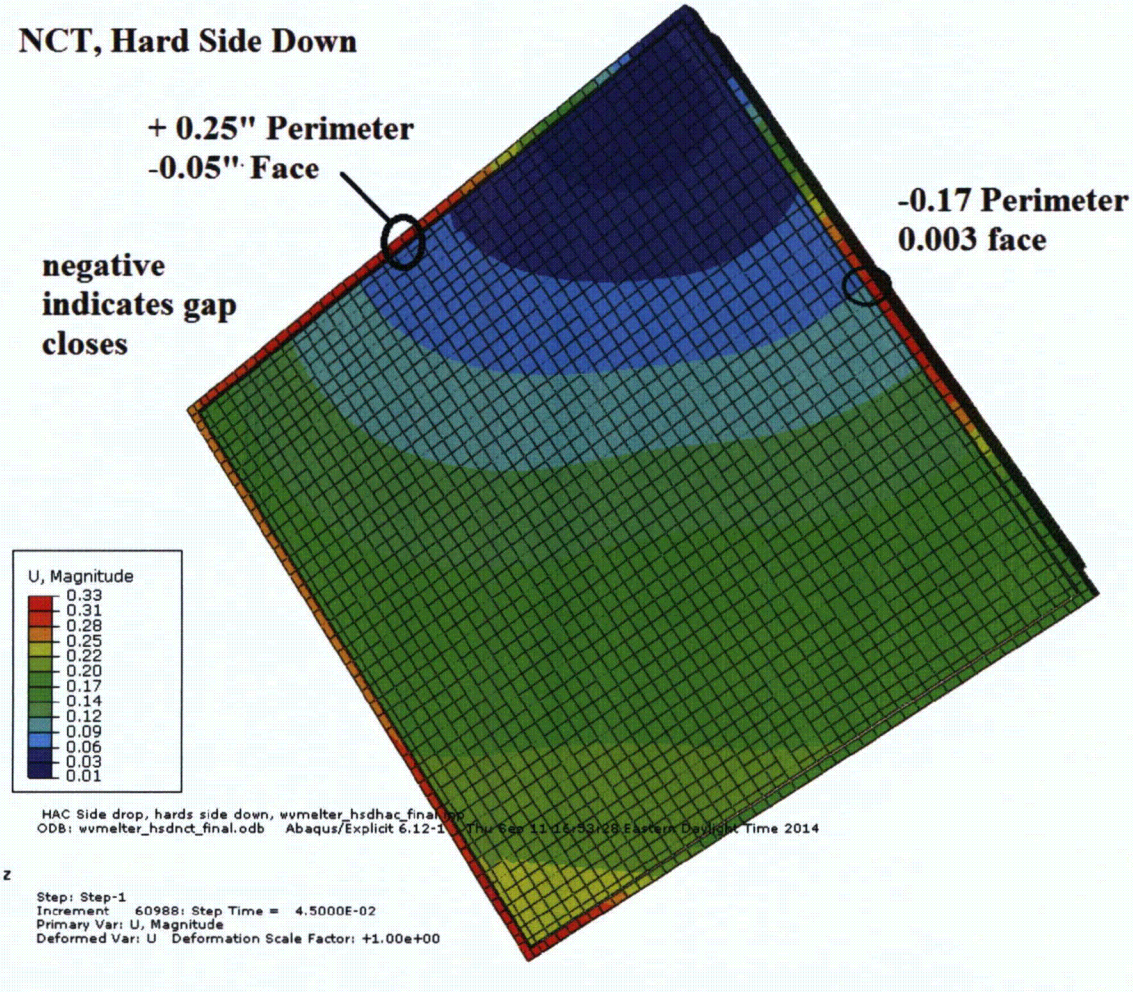
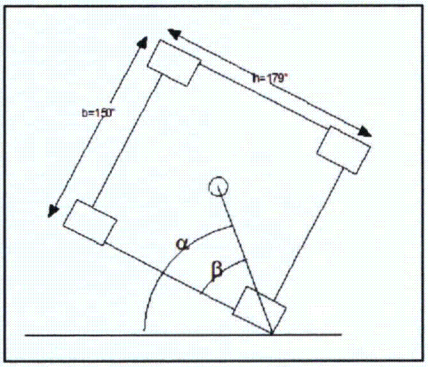


Figure 6-55 Plot of Door and Door Seal Deflections, Showing Essentially No Door Seal Change During NCT Drop, Hard Side Down, Max Perimeter Seal Differential = 0.25 inch, Max Face Seal Change = 0.05 inch (Door Pressed into Seal).

6.10.5 NCT Tip-Over/Slap-Down



CG over edge and flat drops were specifically evaluated for NCT, with the result being essentially no damage. A variation of those two drops is the tip-over occurring after a CG over corner, or a slap-down. The extreme is the tip-over after CG over corner. The WVMP would rotate over until a flat side struck the impact surface. Integrating the equation:

$$\text{Torque} = \text{Weight} * L\cos(\alpha) = J\,\ddot{\theta}$$

for the range α from 90 degrees (cg over corner), to β (flat side down), results in a predicted ground impact velocity no worse than the simple 1 foot flat side drop already evaluated. Although the CG is initially higher than the NCT 1 ft drop, the very high mass moment of inertia of the WVMP prevents high rotational velocities. Therefore, the 1 foot drop already evaluated addresses this condition.

6.11 HAC 30 Ft Drops

6.11.1 HAC Drop Inputs

Per 10 CFR 71.71(7), the 390,800 lbs WVMP should be subjected to a 30 foot free drop onto a flat, essentially unyielding horizontal surface. The velocity at impact from a 30 ft (360 inch) free drop is:

$$V = \sqrt{2 \cdot G \cdot H} = \sqrt{2 \cdot 386.4 in/s^2 \cdot 360 inch} = 527.5 in/\sec$$

Temperature and Pressures

The pressure and temperature conditions for the HAC are identical to those used in the NCT analysis.

HAC Drop Orientations

For HAC, the CFR imposes a 30 foot drop in a worst case orientation. Because of the cube shape and the structural differences between the top (LDCC gaps), bottom, front, back, and left or right sides, a single bounding drop orientation is not defensible. Some orientations are expected to challenge the bolted opening, but not the LDCC, and other drops are vice versa. Seven orientations are simulated for this HAC impact, as shown in Figure 6-56 and Figure 6-57. These are:

- CG over front bottom edge
- Front Side Down (to challenge the impact limiter's protection of the bolted wall)
- Left or right side down drop (bounds bottom down, as discussed in NCT drop simulations)
- CG over front bottom corner (Expected to cause the greatest door seal demand)
- CG over back bottom edge
- Top Down over Edge (to challenge LDCC due to gap between LDCC and top slab)
- CG over a Side Edge (to challenge container wall integrity),

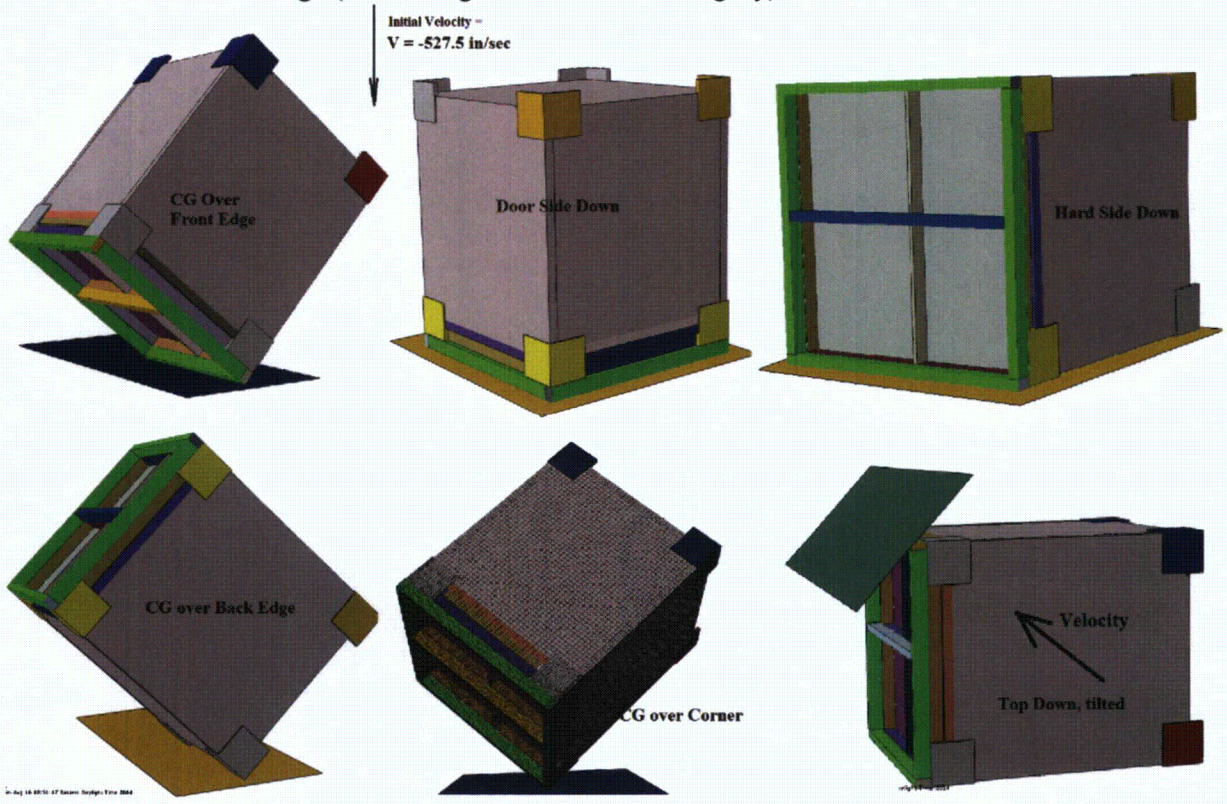


Figure 6-56 Six of the Seven Configurations Simulated for HAC Drop Conditions

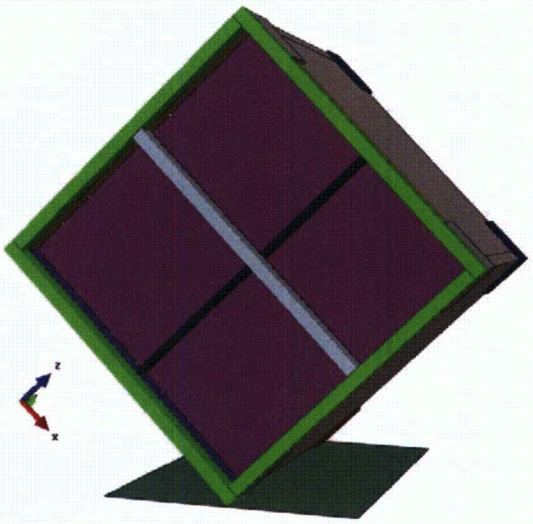
Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	85	0

Selected Output

Each of the selected HAC drop orientations are expected challenge different components, the results presented in the following sections are focused toward that component. Each section will discuss the components targeted.

The loads in the shear pins that attach the impact limiter to the shock absorbers are not explicitly checked in the HAC drops. The FEA model for the shear pins is constructed to represent accurate load versus displacement relations, so that behavior of the pins is assessed implicitly through impact limiter displacements. The only role these pins play is to keep the impact limiter in place during and after the NCT. The construction of the impact limiter and the ways its nested inside the GMP shock absorbets is such that the impact forces tend to self-energize the impact limiter to remain in place.



CG over side edge

Figure 6-57 Seventh HAC Drop Configuration

A key aspect of tracking the functionality of the impact limiter is to monitor the displacements of the door seal. The door is bolted to the containers walls. The 6 inch thick walls feature a 6.25 inch extension, (2.0 inch thick plate) to surround the 6 inch door and ¼ inch gasket.

Face Seal: The 4 inch wide, gasketed seal surface between door and container wall edges

Perimeter Seal: The region between the edge of the door and the wall extensions, filled with RTV.

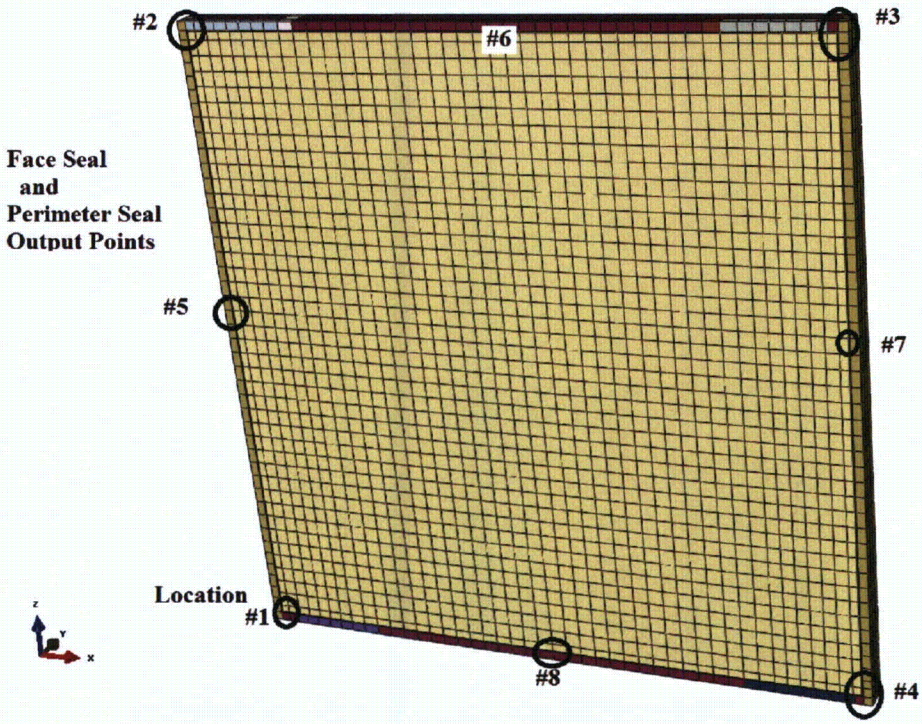


Figure 6-58 Location Identifiers for Door Seal Monitoring

6.11.2 CG Over Front Edge Results

The CG over front edge orientation is selected as it is expected to produce the most damage to the impact limiter. For HAC drop conditions, with the WVMP in the tilted orientation, the tube steel portion of the impact limiter is expected to be fully utilized early in the impact, and the shock absorbers will absorb the remaining impact. Because the tube steel portion of the limiter plays no role in the subsequent HAC fire, that component is sacrificial. The goal is to demonstrate that the combined impact limiter and shock absorber can absorb the 30 foot fall, document the LDCC stress status, and track the displacements at the door seal.

Energy Histories During Impacts

Figure 6-59 shows the initial energy corresponding to the 30 foot free fall. The initial time portion of the impact history (from 0 to 0.015 sec) show low drop-off in kinetic energy. From 0.015 to 0.035 second, the foamed tube steel compresses and stiffens, and the shock absorbers begin to bend. This region is where the higher accelerations occur, at 51.5 G. The plastic dissipation from the LDCC and from the Melter is shown to be an insignificant contributor, confirmed by the relative low percentage of LDCC damage (discussed below).

G-value = 51.5 G

Stress, Strain and Deformed Shape

Figure 6-60 shows the deformed shape of the WVMP after the HAC, CG over Edge drop. Figure 6-61 shows a detail of one of the bottom shock absorbers. Figure 6-62 presents a view of just the shock absorbers and the front-most region of the container walls, showing that the deformation is limited to the corner and that the container walls are essentially undamaged.

Figure 6-63 shows the total accumulated plastic strains in the container walls (including door). The only regions of plasticity in the metal structure are at the two lower corners, and this is limited to the 2" thick by 6 inch edge plate that surrounds the bolted door. The maximum strain is 31%, (vs 56% allowed) and is localized to a 2" x 2" area.

Bolt Tensile Loads

The FEA model is set up to represent bolt failure and to remove bolts that fail. All bolts fail in this drop simulation. Failure begins at time = 0.02 seconds, which per the energy plot is the early stages of the high acceleration regime.

LDCC Stress

Figure 6-67 shows the stress in the LDCC at the worst time instance through the HAC drop. LDCC crushing is indicated at the cube corners of the LDCC and at the bottom, around the perimeter of the melter frame. The crush at corners occurs because as the 6 inch walls flex, and the stiffer (less bendable) LDCC react the inertial loads at the corners. Within ABAQUS/Viewer, the mass of the uncrushed elements in Figure 6-67 is queried, resulting in a mass of 171.499, vs the total LDCC mass of 189.051 (in units of lbs/386.4 in/sec^2).

LDCC Mass Crushed = (189.051-171.499)/189.051 = 9.3%

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	87	0

Door Gaps

The door begins to move relative to its initial position. The 2x9 plates act to hold the door in place. Figure 6-64 shows the displaced shape after the HAC drop, showing very little face seal displacement at the bottom and at the corners. At the mid-spans, the face displaces 3.5 to 4.0 inches, but the perimeter seal tends to close up. Figure 6-65 shows the face seal displacement time history through the entire drop sequence. Figure 6-66 shows the perimeter seal displacement history.

At Wall Mid-Span, away from Impact Point:
Face Seal = 4.0 inch
Perimeter Seal = < ¼ inch

At Wall Mid-Span, At Impact Point:
Face Seal = 0.7 inch Figure 6-65, face 8
Perimeter Seal = 1.8 inch

At Wall Corners:
Face Seal = 1.3 inch Figure 6-65, face 1,2,3,4
Perimeter Seal = < ¼ inch

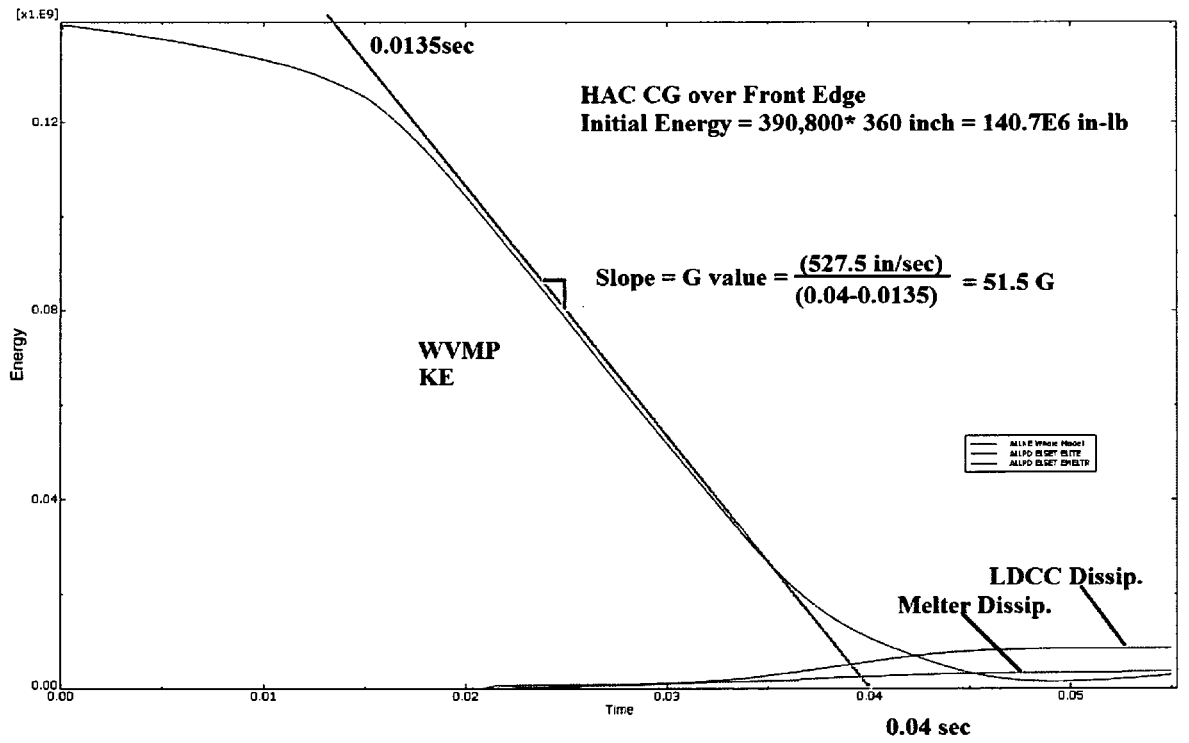


Figure 6-59 Energy Time History for HAC Drop, WVMP oriented with CG over Front Bottom Edge, Showing insignificant plastic energy dissipation in the melter, and an effective G-value of 51.5 G.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	88	0

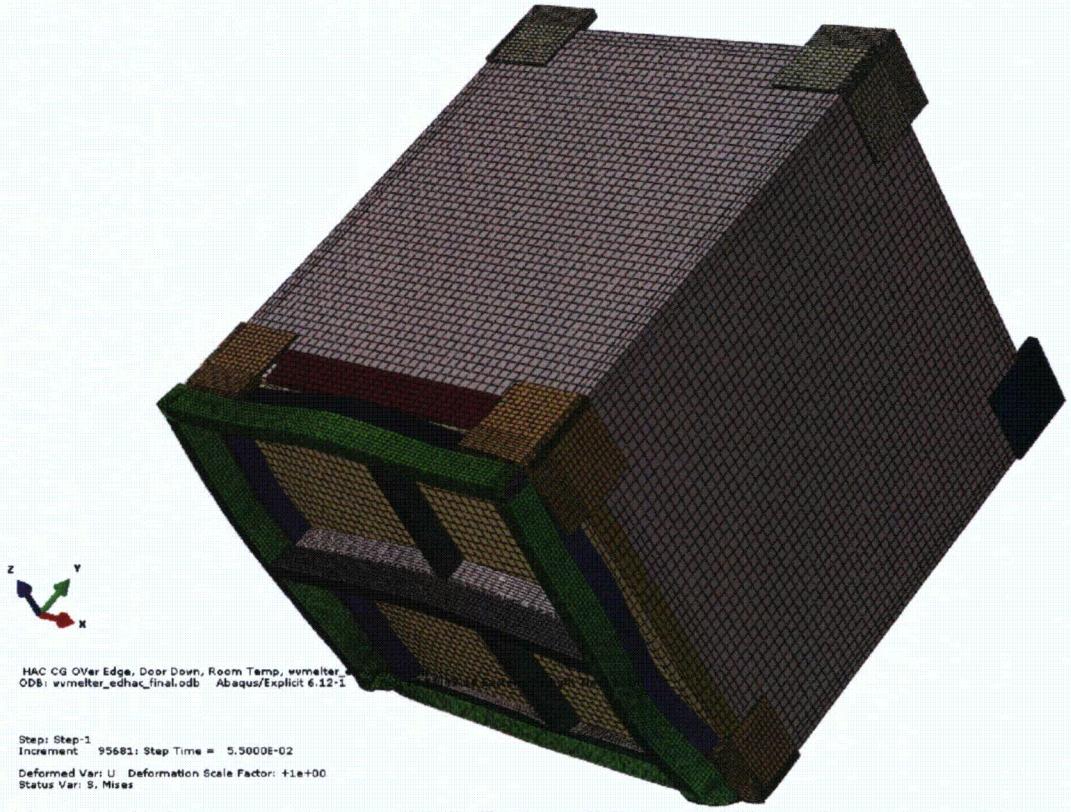


Figure 6-60 Deformed Shape of WVMP after HAC Drop, CG over Front Bottom Edge.

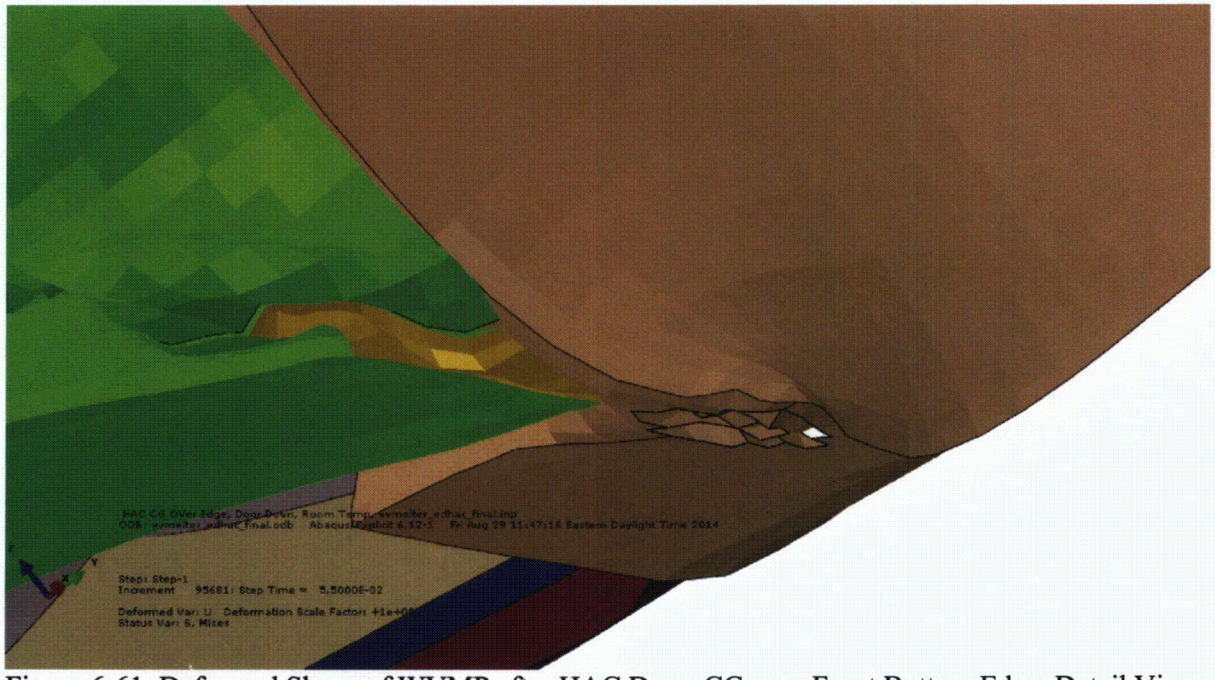


Figure 6-61 Deformed Shape of WVMP after HAC Drop, CG over Front Bottom Edge, Detail View

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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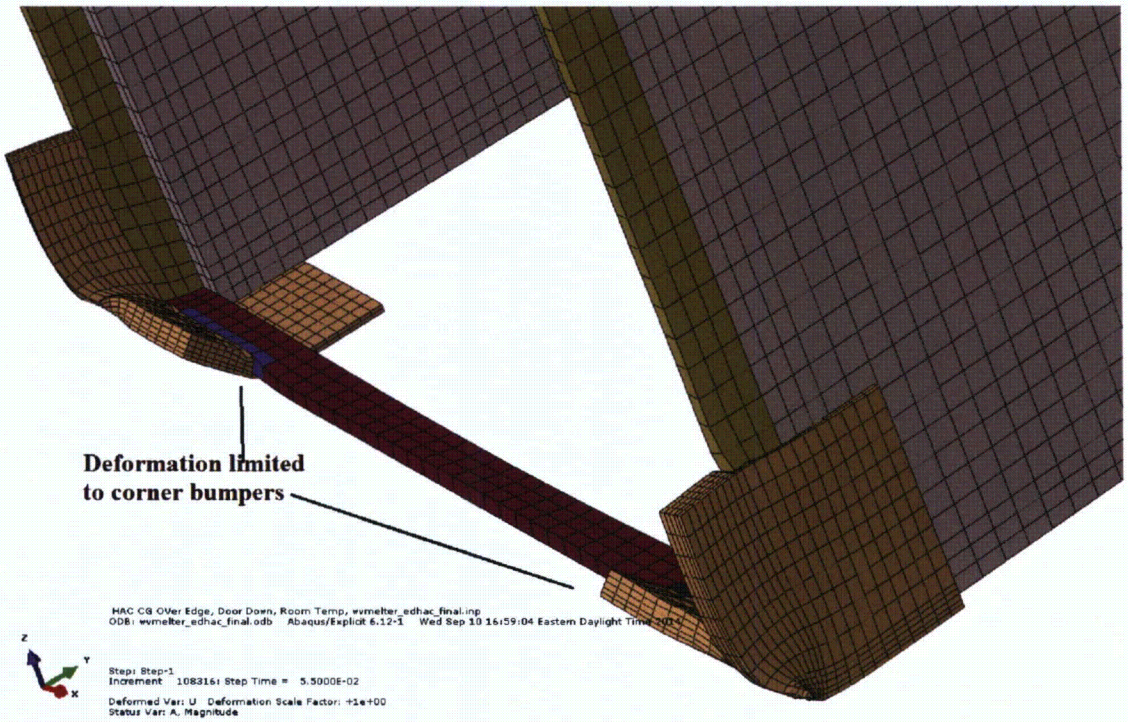


Figure 6-62 Detail plot of Deformed Shape of Shock absorbers and edge Seal plate after HAC Drop, CG over Front Bottom Edge, Showing the deformations are limited to the shock absorbers.

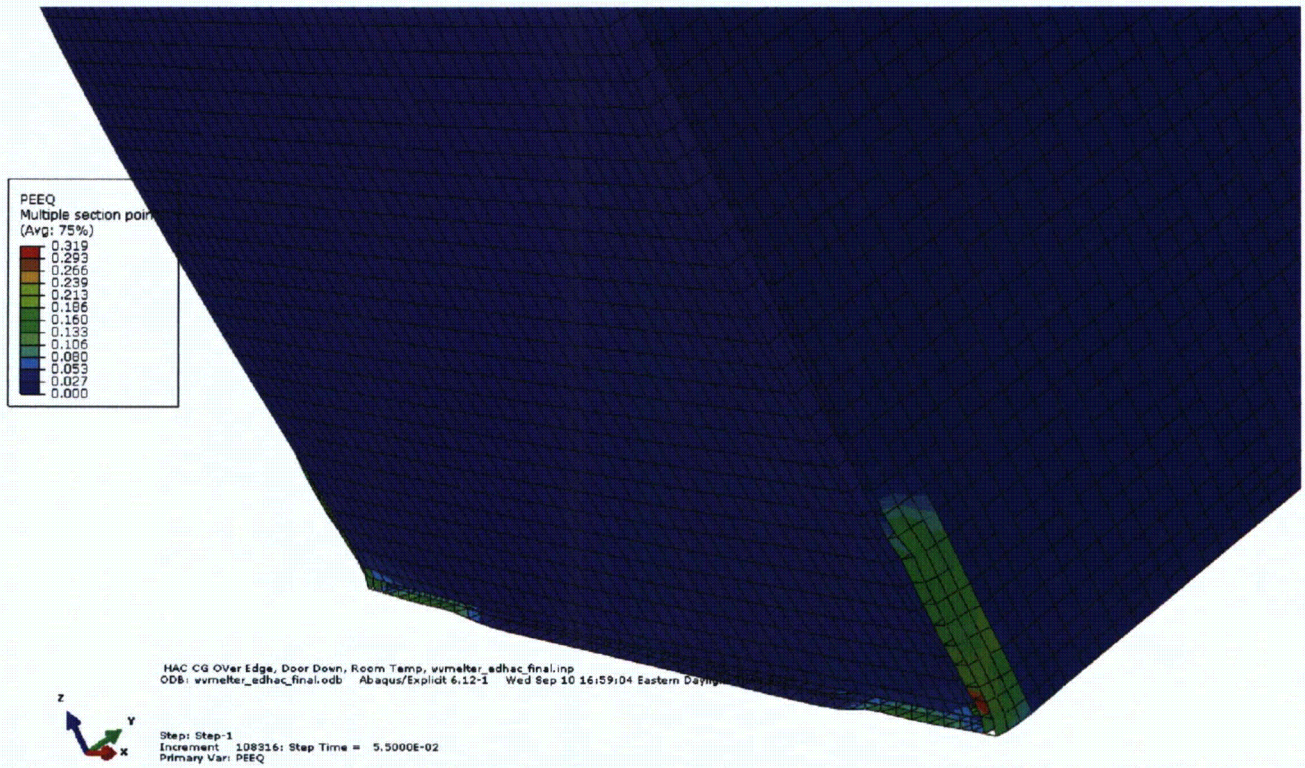


Figure 6-63 Contour Plot of Plastic Strain in WVMP Container Structure, after HAC Drop, CG over Front Bottom Edge, Showing Only Local 31% plastic Strain (But within 56% strain limit).

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	90	0

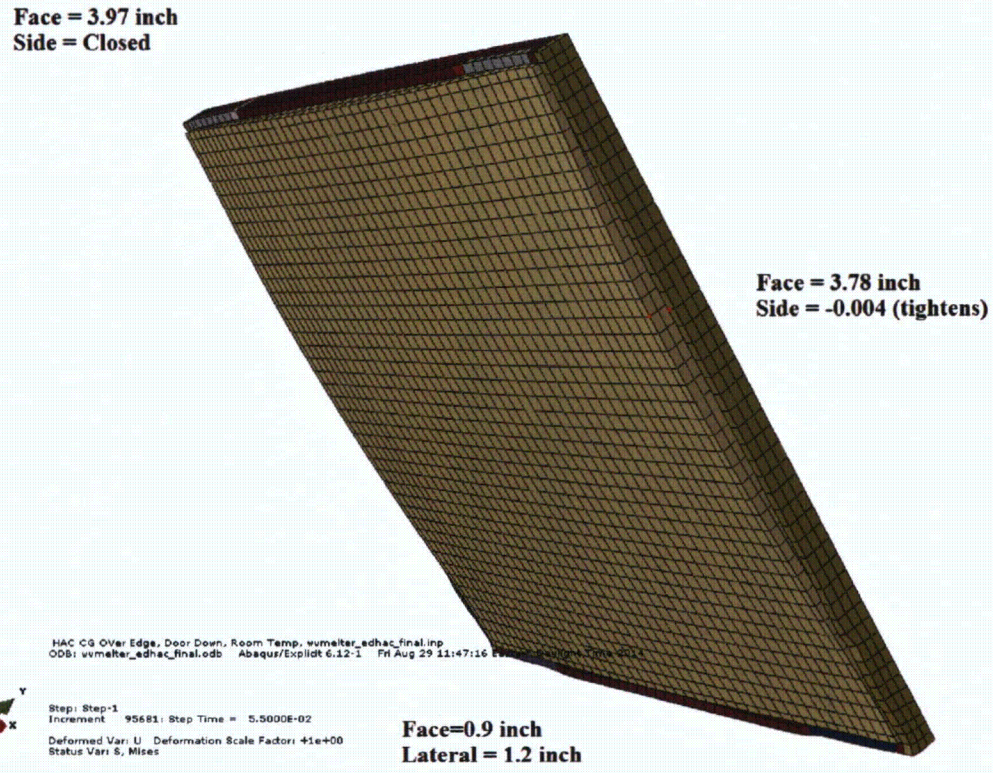


Figure 6-64 Displaced Shape of WVMP Bolted Side Door and Seal Surfaces , CG over Edge, HAC,

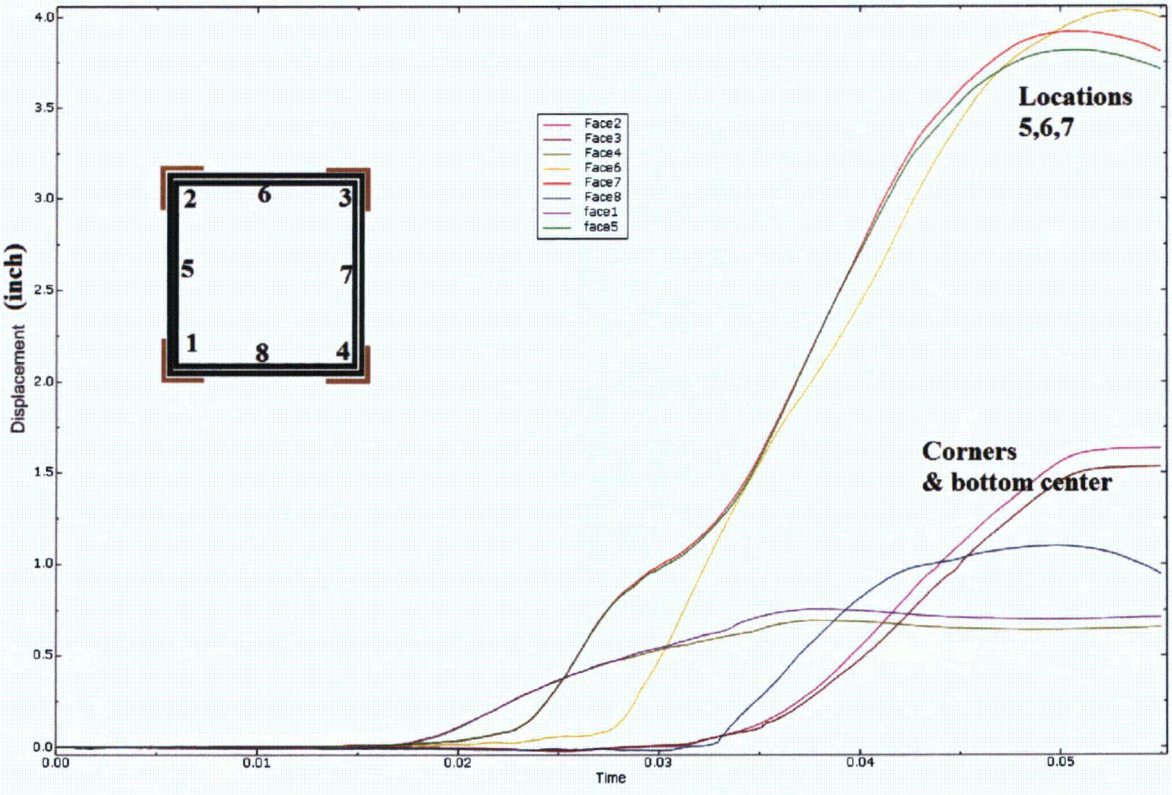


Figure 6-65 Face Gap, CG over Edge, HAC, For Door Bolts Along Top and Bottom Edge of Door.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	91	0

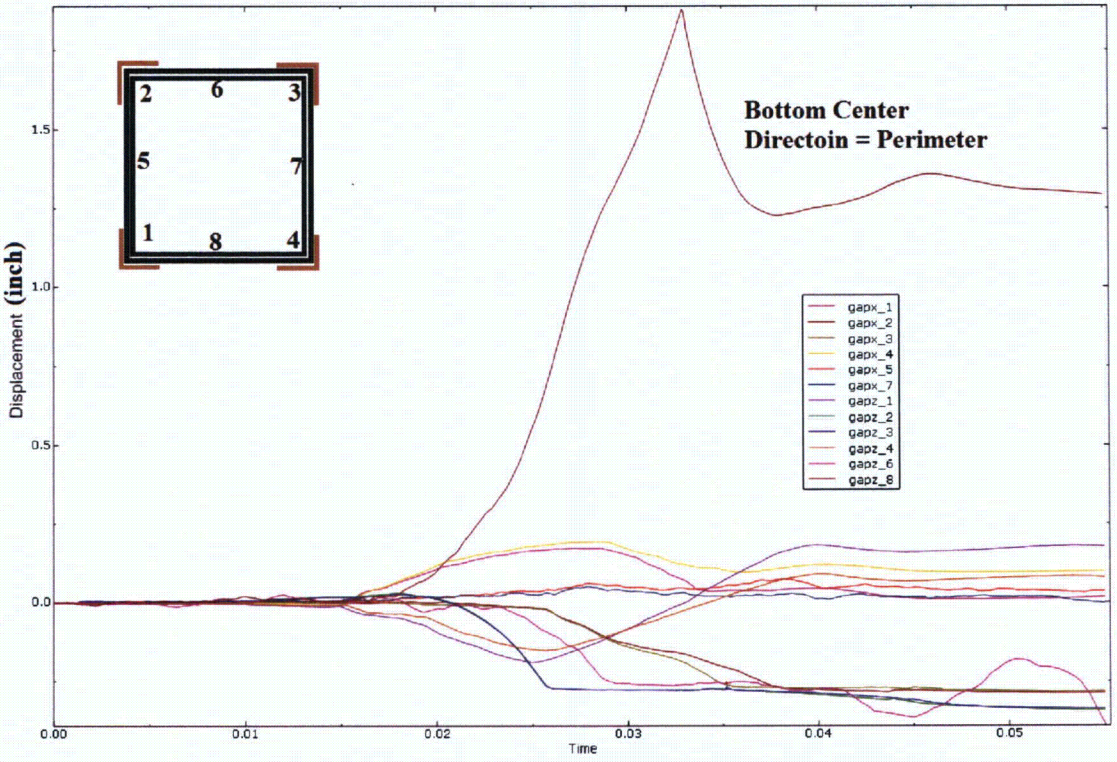
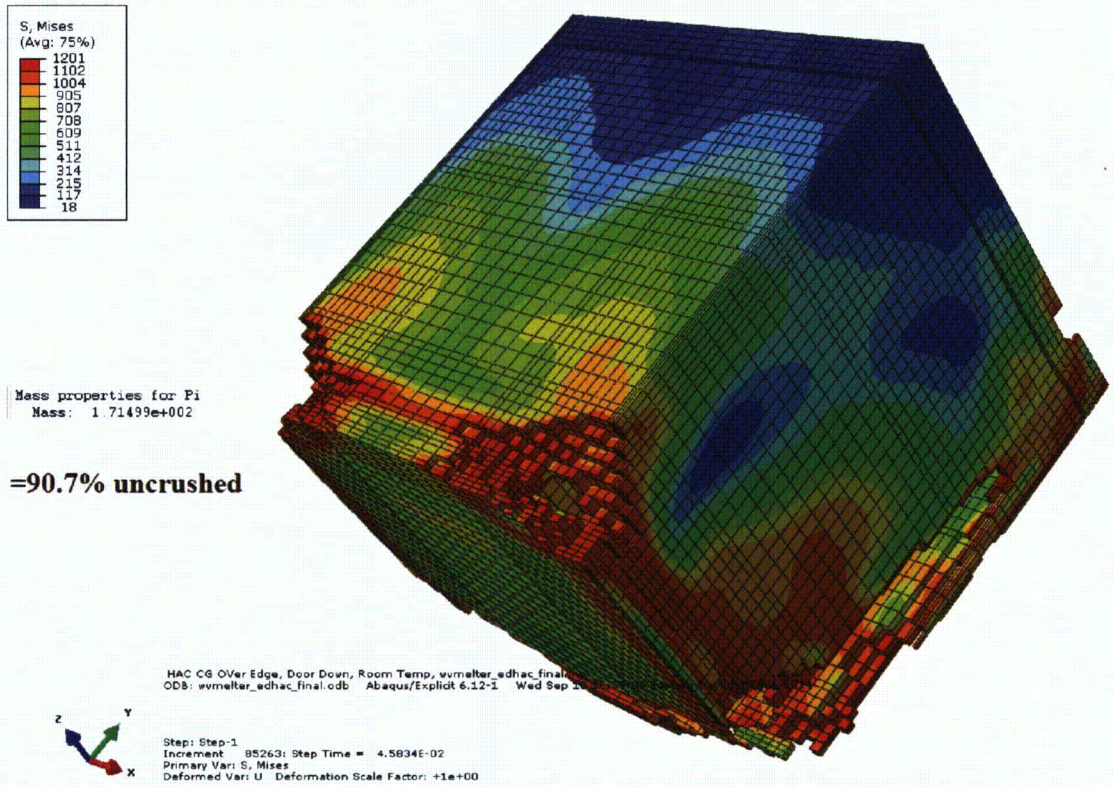


Figure 6-66 Perimeter Seal Displacement, HAC, CG over Front Corner



=90.7% uncrushed

Figure 6-67 LDCC Status after HAC Drop, CG over Front Edge, Showing less than 10% LDCC crush.

6.11.3 Side Down, Limiter Side, Results

This orientation is chosen as it fully utilizes the impact limiter and targets one of the early identified areas of structural concern (the bolted side door).

Energy Histories During Impacts

Figure 6-68 shows the kinetic and plastic energy history during the drop. The initial energy corresponds to the 30 foot free fall. The kinetic energy curve appears smooth and continuous, indicating that the impact absorber provides an effective absorber of the motion. The curvature of the KE history (smooth parabolic) matches that of an ideal linear absorber that provides constant acceleration. The indicated G value is 97.5 G. The plastic energy dissipation from the LDCC and from the Melter is shown on the energy time history. The plots shown very little energy absorbed by the LDCC or the melter, indicating low structural demand.

G-value = 97.5 G

Stress, Strain and Deformed Shape

Figure 6-69 shows the deformed shape of the WVMP after the HAC Drop, Side Down over limiter. The crushable tube steel is shown highly crushed. Figure 6-70 shows the total plastic strains in the container structure, showing zero plasticity in all walls except for the bolted side door. This side door bears the inertial loads of the contents. Figure 6-71 presents a view of just the shock absorbers, show low strain everywhere (less than 10%), except corner tips in compression.

Bolt Tensile Loads

Figure 6-72 and Figure 6-73 show bolt tensile load history for the bolts along the side and along the top. Whiles the bolts are not credited in HAC, the plots do show that the majority of bolts survive the HAC side down drop. Only the bolts at the mid-span are shown as failing.

LDCC Stress

Figure 6-77 shows the stress in the LDCC at the worst time instance through the HAC drop. LDCC crushing is indicated at the cube corners of the LDCC. The crush at corners occurs because as the 6 inch walls flex, the stiffer LDCC reacts the inertial loads at the corners. Within ABAQUS/Viewer, the mass of the uncrushed elements is queried, resulting in a mass of 178.787, vs the total LDCC mass of 189.051 (in units of lbs/386.4 in/sec^2).

LDCC Mass Crushed = (189.051-178.787)/189.051 = 5.5%

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	93	0

Door Gaps

In the Side down drop, the 2x9 plates of the impact limiter are shown effective at keeping door seal displacements minimized. Figure 6-74 shows the displacement contour of the door and edge seals. The contour shows the entire grouted melter package drops 7.5 inch, due to 7.5 inch crush of the 10 inch tube steel (75% utilization, which is essentially the limit for that foam-filled member). Figure 6-75 shows the face-seal displacement history, which shows no movement at the corners, and only 0.18 inch along the mid-spans. Figure 6-76 shows the perimeter seal displacements (both X, and Z components). The maximum displacement is 0.1 inch.

At Wall Mid-Span

Face Seal = 0.18 inch

Perimeter Seal = 0.10 inch

At Wall Corners:

Face Seal = 0.0 inch

Perimeter Seal = 0.0 inch

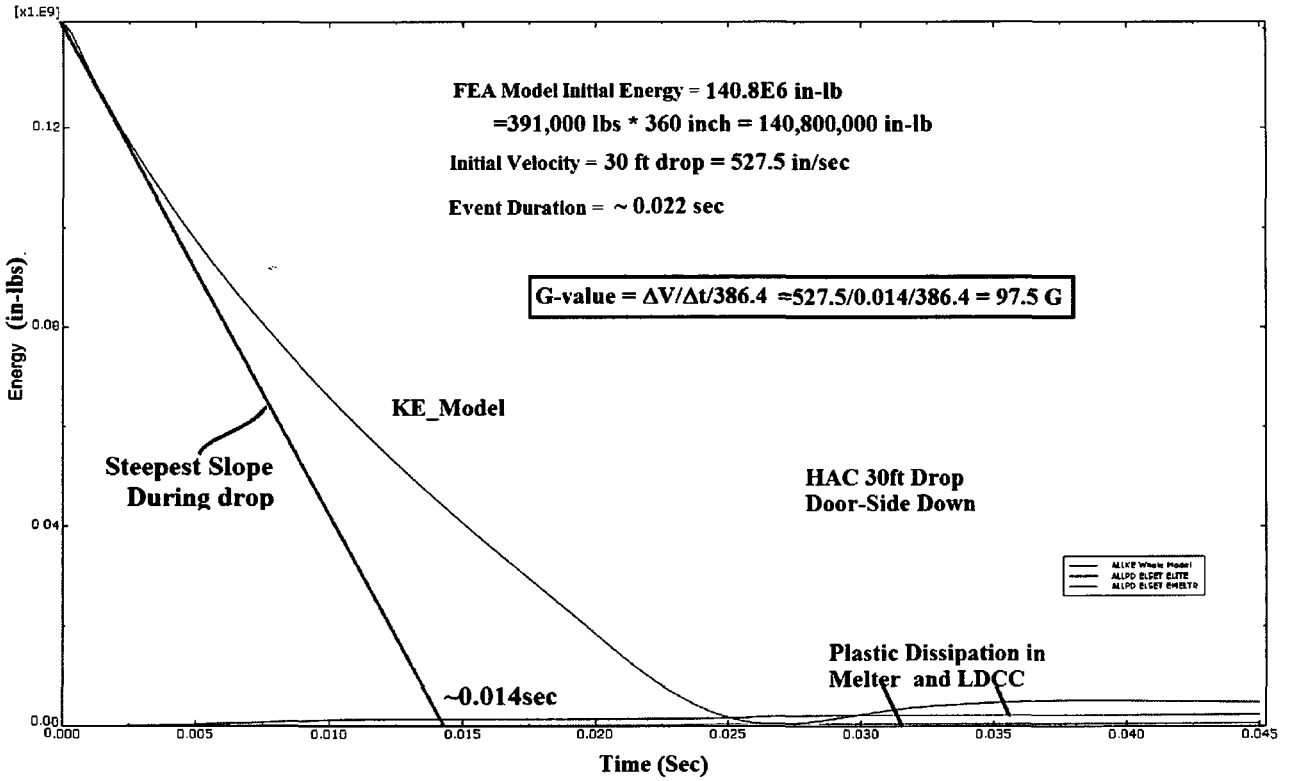


Figure 6-68 Energy Time History for HAC Drop, WVMP oriented Side Down over Impact Limiter, Showing insignificant plastic energy dissipation in the melter, and an effective G-value of 97.5 G.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	94	0

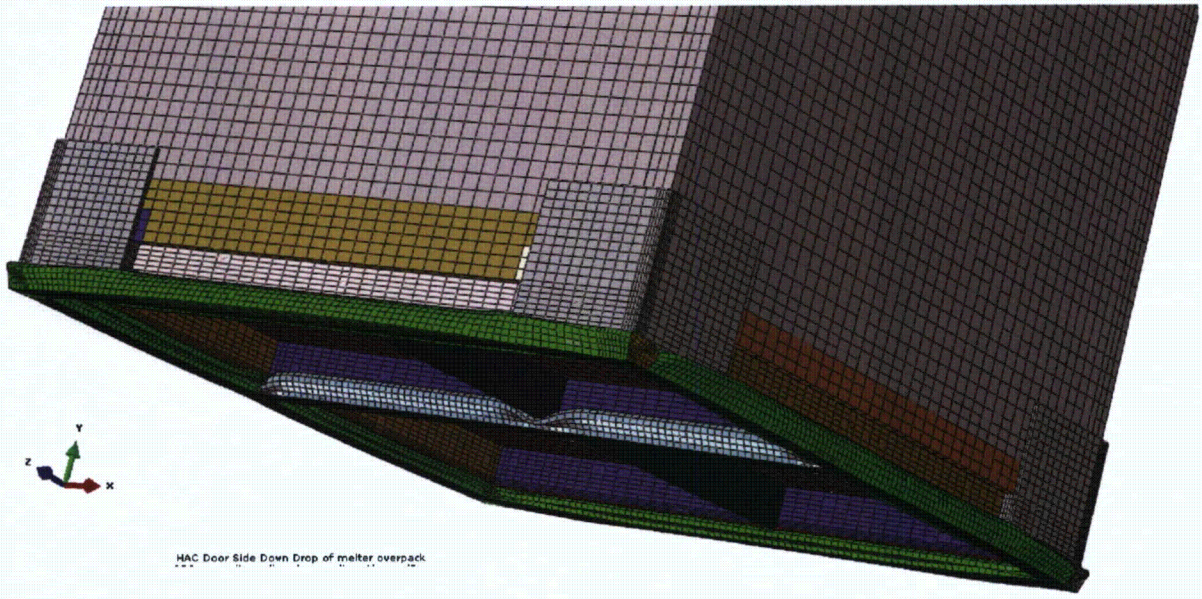


Figure 6-69 Deformed Shape of WVMP after HAC Drop, Side Down Over Limiter.

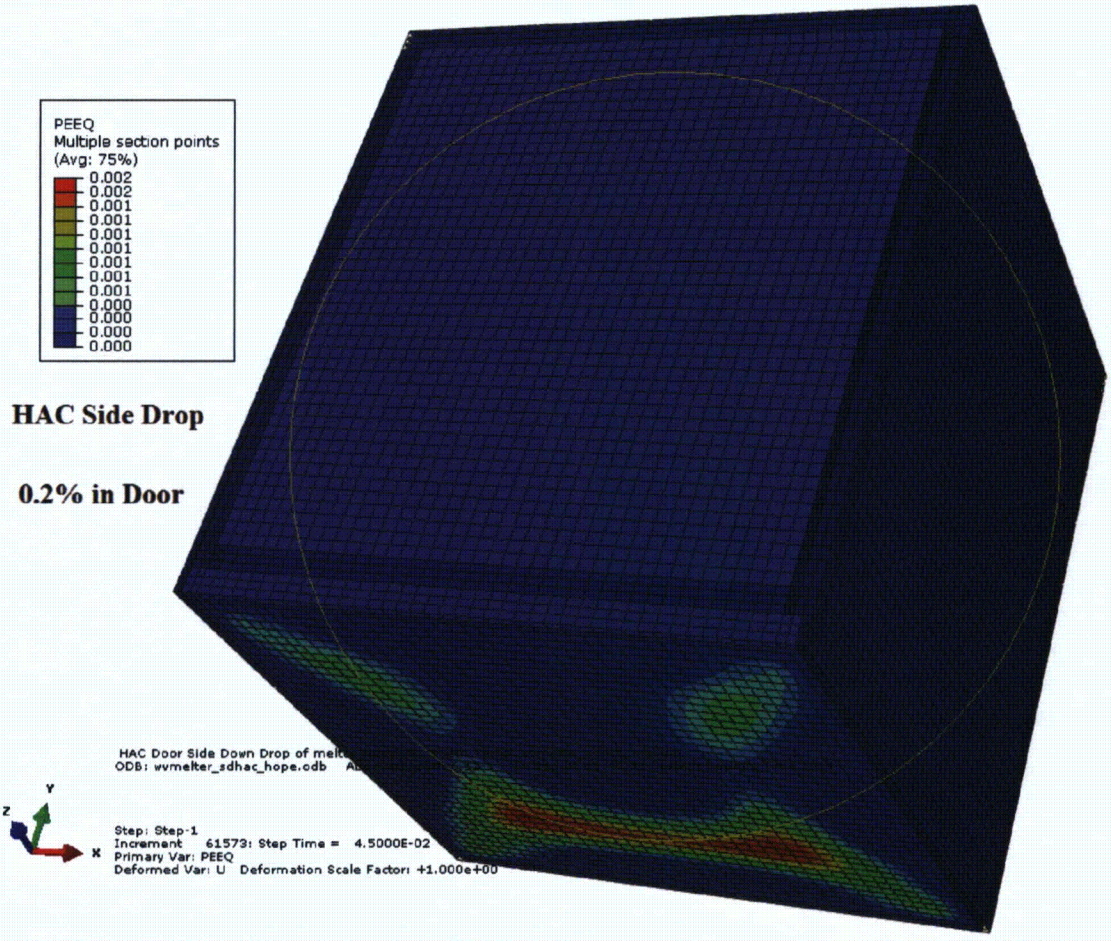


Figure 6-70 Contour Plot of Plastic Strain in WVMP Container Structure, after HAC Drop, Side Down Over Impact Limiter, Showing 0.2% Strain in Bolted Side Door, and no plastic Strains Elsewhere.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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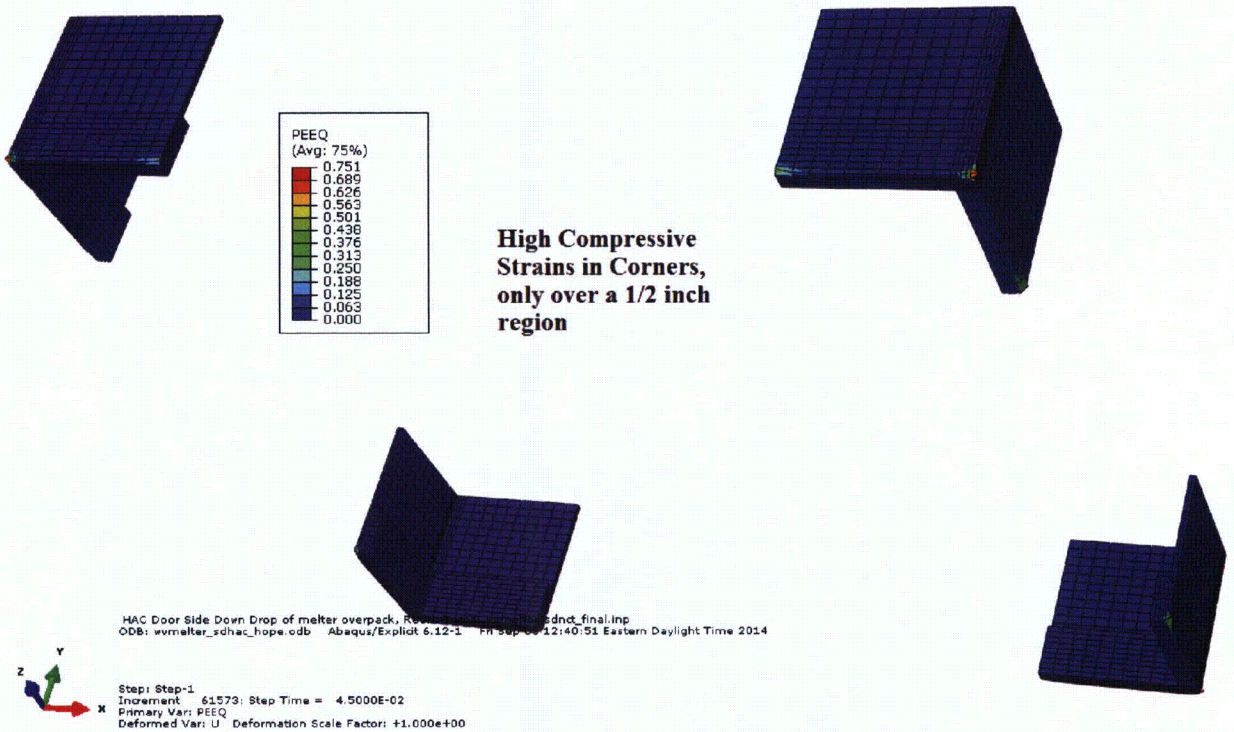

Figure 6-71 Contour of Plastic Strains in Shock absorbers on Impact Side, HAC Side Drop onto Limiter, Showing high compressive strains limited to corner tips (1/2 inch x ½ inch region). Remaining sections show no plasticity.

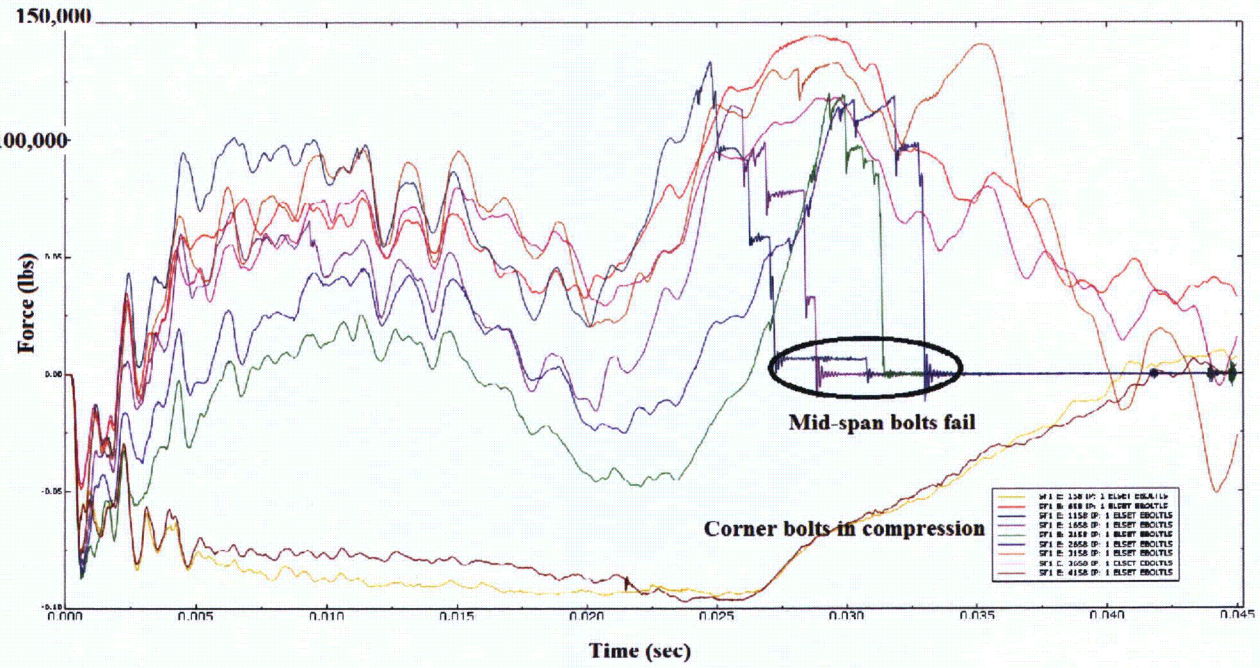

Figure 6-72 Bolt Tensile Load History for Bolts on Left Side, HAC Side Drop onto Limiter. Showing corner bolts in compression, and mid-span bolts in tension. Failure indicated on Middle Four Bolts.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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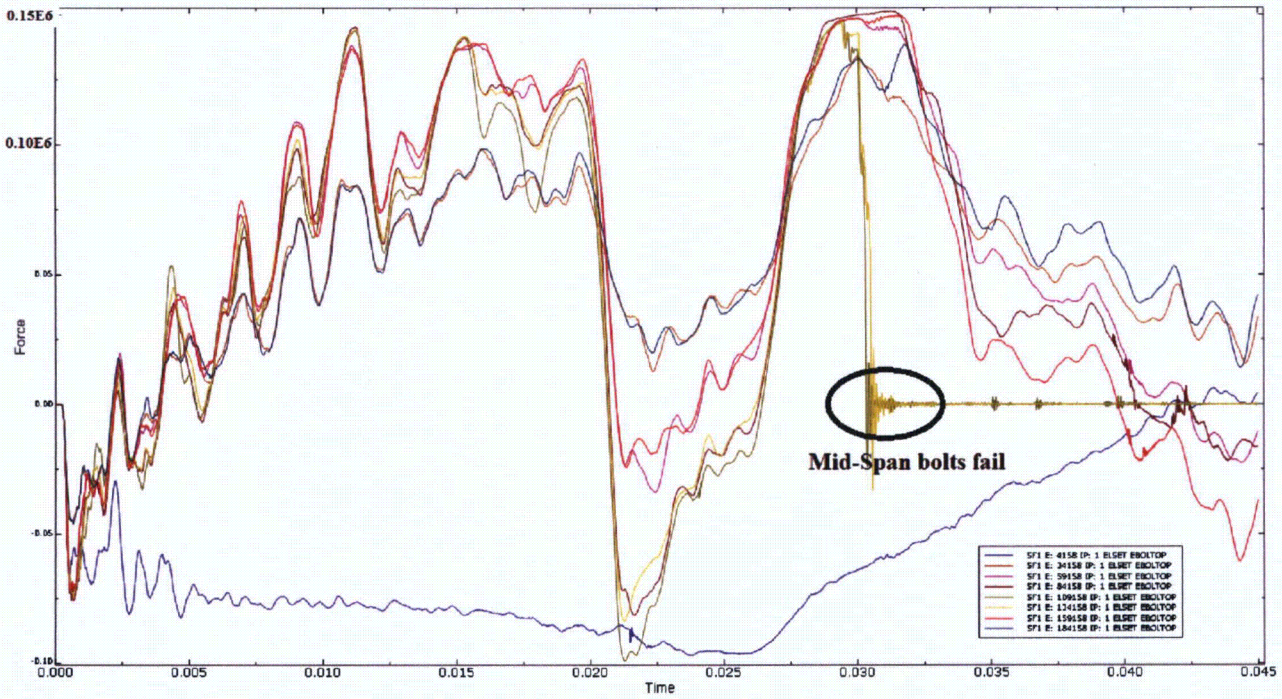

Figure 6-73 Bolt Tensile Load History for Bolts on Top Side, HAC Side Drop onto Limiter. Showing corner bolts in compression, and mid-span bolts in tension. Failure indicated on Middle Two Bolts

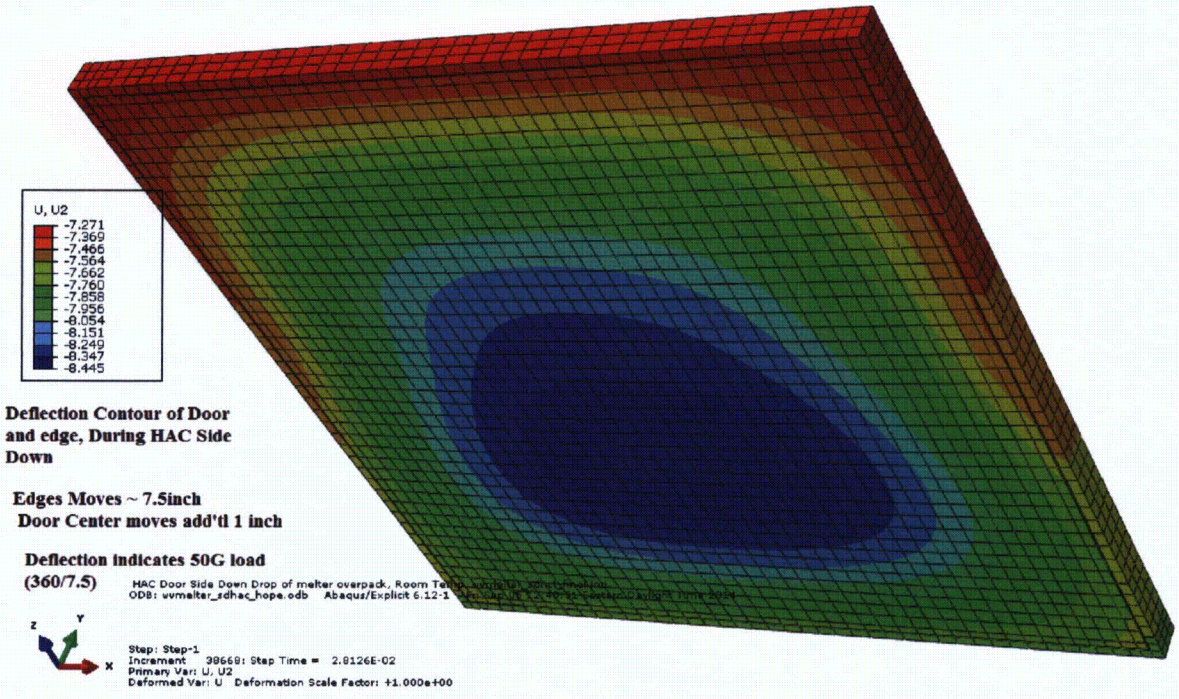

Figure 6-74 Displacement Contour of WVMP Bolted Side Door, HAC Side Down over Impact Limiter

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	97	0

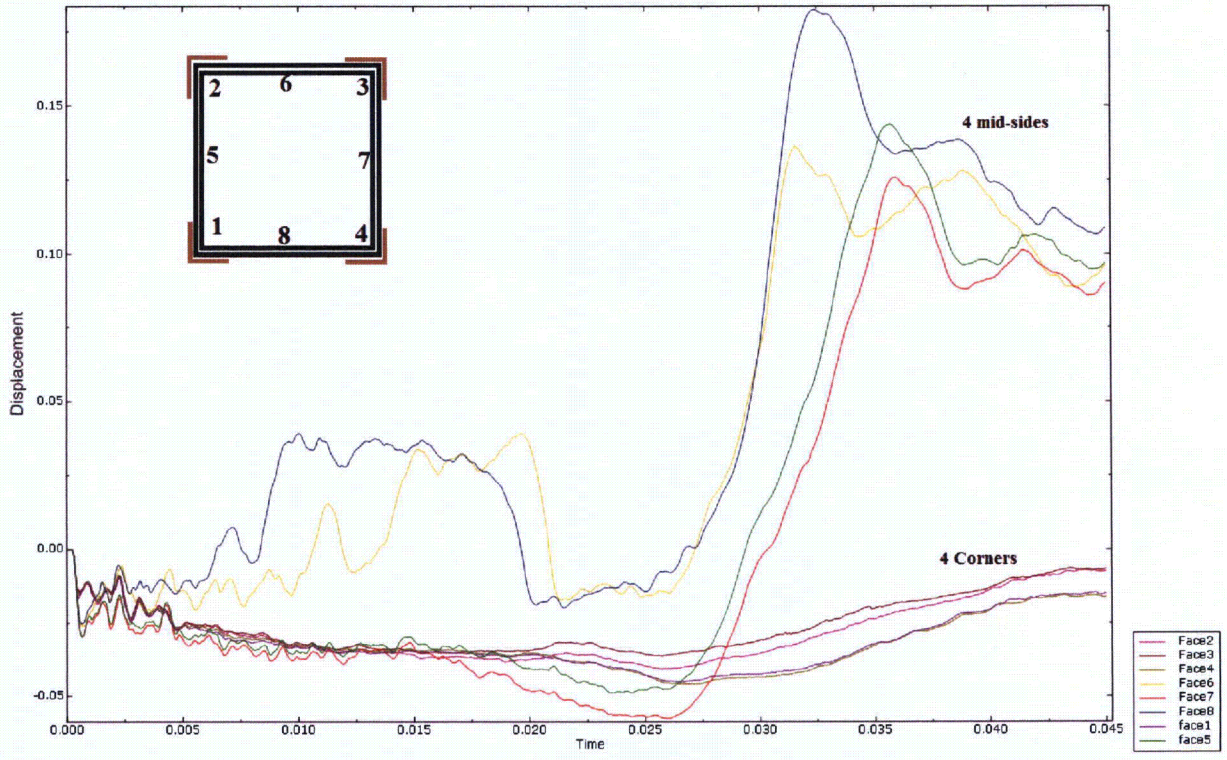

Figure 6-75 Face Seal Displacement, HAC Side Down Over Imapct Limiter, Showing closure at corners, and 0.18 inch displacement at mid-spans (5,6,7,8)

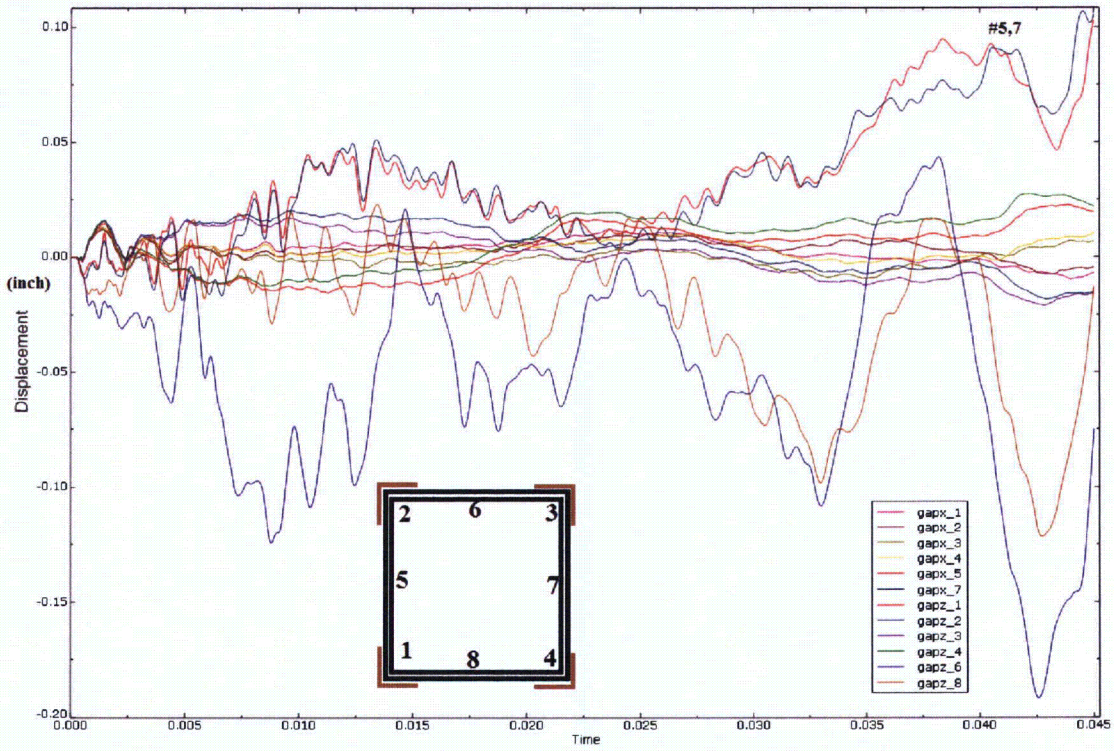

Figure 6-76 Perimeter Seal Displacement, HAC Side Down Over Imapct Limiter, Showing closure at all positions, all directions, except for 0.1 inch at side mid-spans (#5, #7).

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	98	0

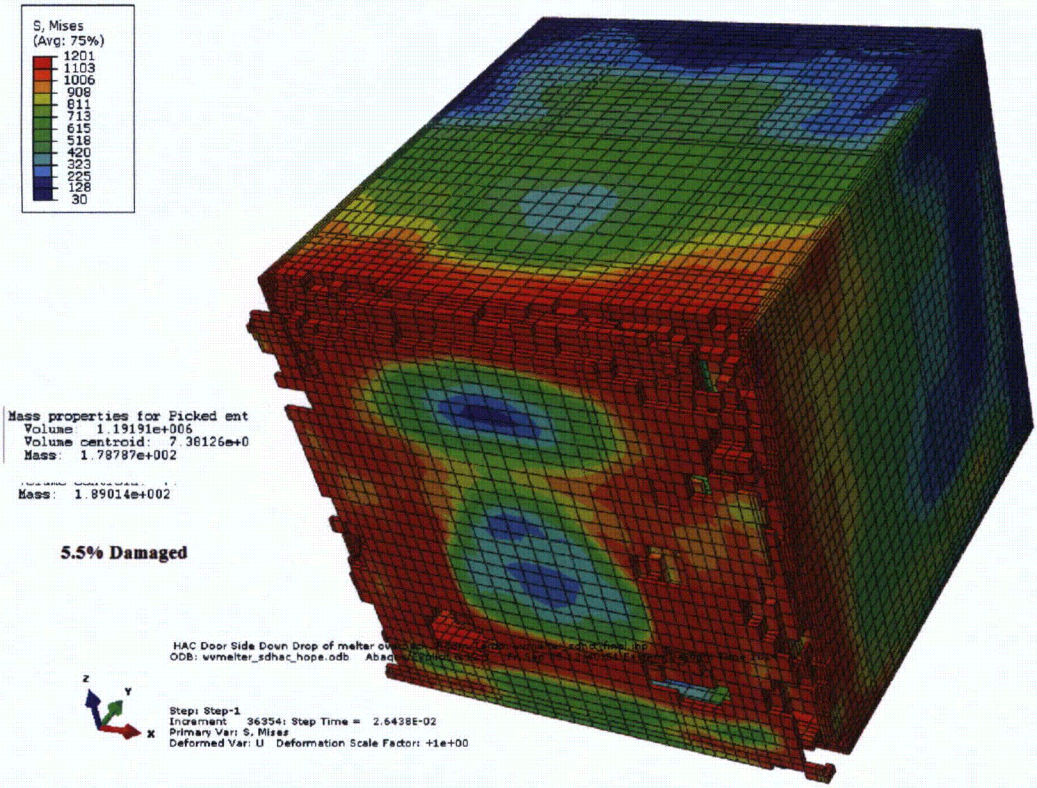

Figure 6-77 LDCC Status after HAC Drop Side Down onto Limiter, Showing less than 6% LDCC crush.

6.11.4 CG Over Front Corner Results

As in the NCT drop, this orientation is selected as its is expected to produce high demand on the door seal, due to the oblique load input.

Energy Histories During Impacts

Figure 6-78 shows the kinetic and plastic energy history during the drop. The initital energy corresponds to the 30 foot free fall. The Kinectic energy curve appears smooth and continuous, indicating that the impact absorber provides an effective absorber of the motion. The indicated G value is 53 G. The plastic dissipation from the LDCC and from the Melter is shown to be a insignificant contributor.

G-value = 53 G

Stress, Strain and Deformed Shape

Figure 6-79 and Figure 6-80 show the deformed shape of the WVMP afer the HAC, CG over front corner drop. The plots shows high deformation to the limiter and shock absorber, but the container structure is essentially undeformed. This is confirmed in the plastic strain plots. Figure 6-81 shows the deformation at the door seal region at the point of impact, with deformation limited to some fish-mouth bending of the 2 inch perimeter extension. Figure 6-82 shows the total plastic strain in the container structure. The high strains are located at the leading edge of the 2 inch thick by 6.25" long extension plate. Figure 6-83 shows the container structure strain with the 2 inch thick extension plate removed from view, showing the the structural portion of the container is not highly strained.

Bolt Tensile Loads

The FEA model is set up to represent bolt failure and to remove bolts that fail. About 80% of the bolts fail in this drop simulation. Failure begins at time = 0.03 seconds, which per the energy plot is the early stages of the high acceleration regime.

LDCC Stress

Figure 6-87 shows the stress in the LDCC at the worst time instance through the HAC drop. LDCC crushing is indicated at the cube corners of the LDCC and at the bottom, around the perimeter of the melter frame. The crush at corners occurs because as the 6 inch walls flex, the stiffer LDCC react the inertial loads at the corners. Within ABAQUS/Viewer, the mass of the uncrushed elements is queried, resulting in a mass of 168.382, vs the total LDCC mass of 189.051 (in units of lbs/386.4 in/sec^2).

LDCC Mass Crushed = (189.051-168.382)/189.051 = 11%

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	100	0

Door Gaps

In the CG over front corner drop, the impact loads act to drive the container walls into a diamond shape. The analysis shows that the combination of the impact limiters limiting the G-load and the high stiffness of the 6 inch thick walls are effective in resisting this demand. Figure 6-84 shows the deformed shape of the door and edge seals, with some key deflections noted. Figure 6-85 shows the face-seal displacement history, which 3.25 inch movement at the midpans opposite the impact point (#5, #6). The displacements at the corners is 1 inch or less. Figure 6-86 shows the perimeter seal displacements (both X, and Z components). The maximum displacement is 3.2 inch, occurring near the impact, at positions #7, #8. In this drop, the large face movements are balanced with minimal perimeter seal movement, and vice versa, minimizing breach potential.

At Wall Mid-Span away from impact

Face Seal = 3.2 inch (pts #5, #6, Figure 6-85)

Perimeter Seal = 0.9 inch (pts #5,6, Figure 6-86)

At Wall Mid-Span near impact

Face Seal = 1.5 inch (pts #5, #6, Figure 6-85)

Perimeter Seal = 3.20 inch (pts #7, 8 Figure 6-86)

At Wall Corners:

Face Seal = 1.25 inch (pts #1-4, Figure 6-85)

Perimeter Seal = 0.9 inch (pts # 1-4 Figure 6-86)

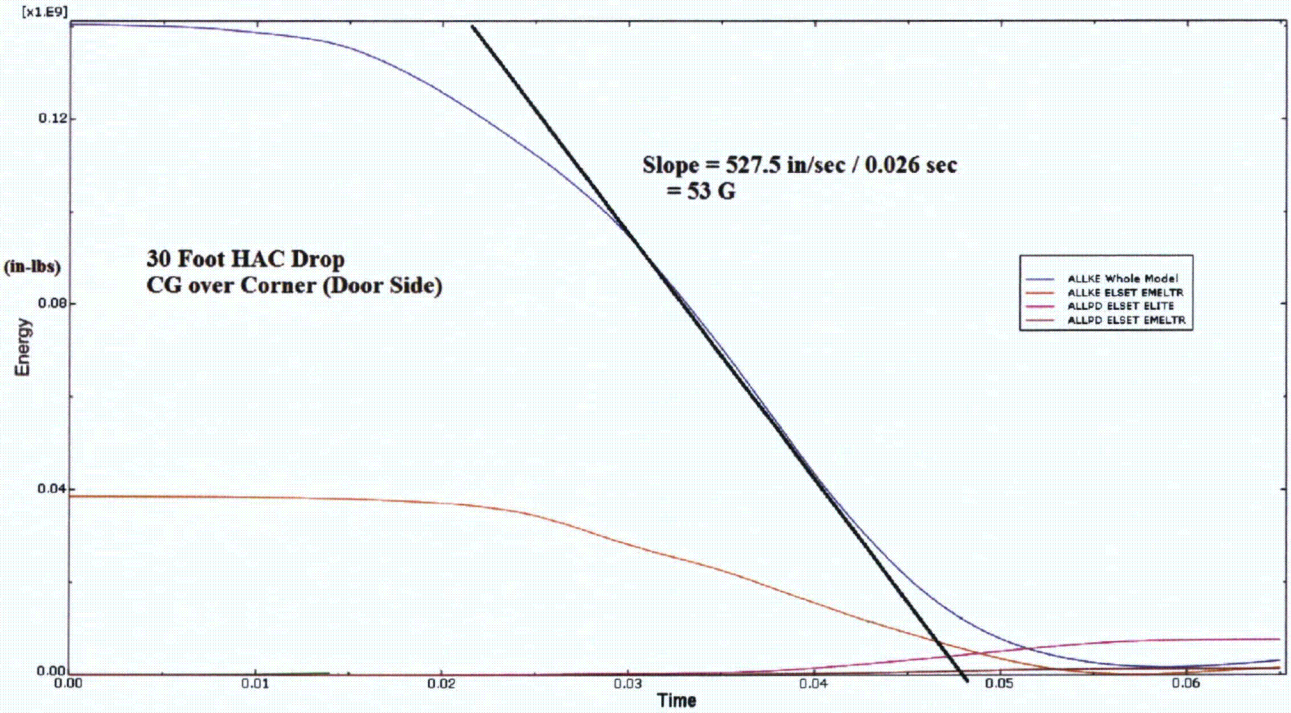

Figure 6-78 Energy Time History for HAC Drop, WVMP oriented with CG over Front Corner, Showing insignificant plastic energy dissipation in the melter, and an effective G-value of 53 G.

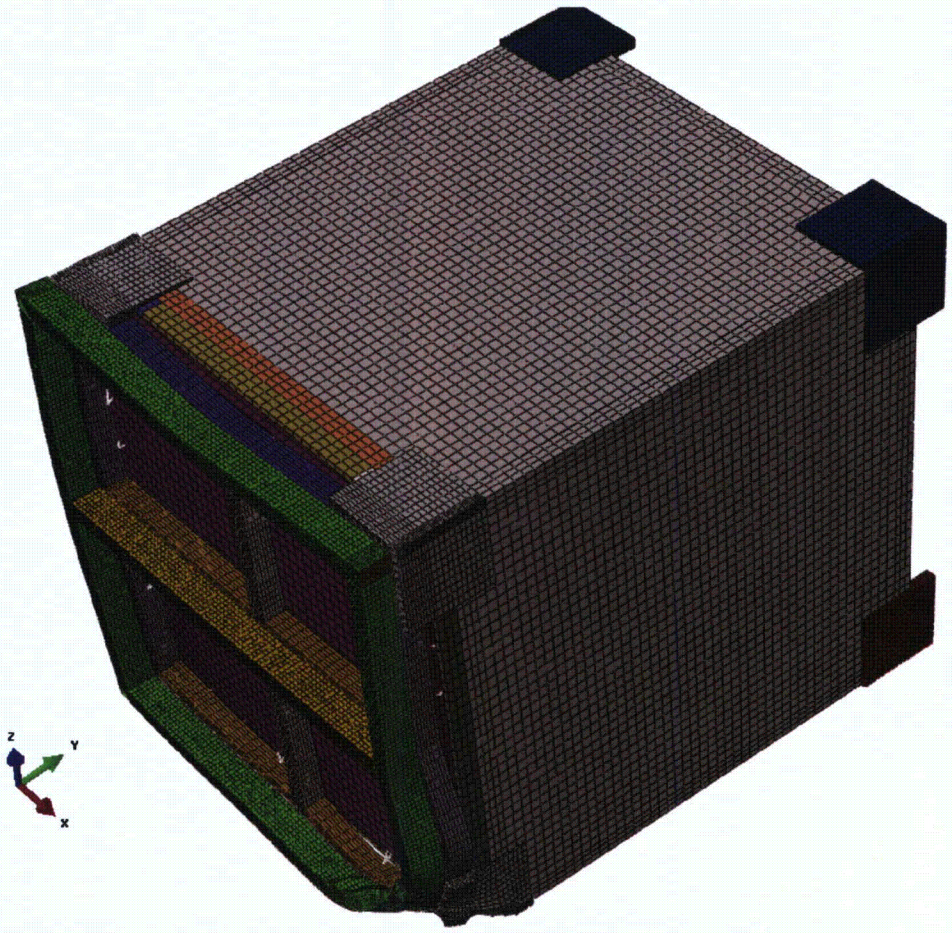

Figure 6-79 Deformed Shape of WVMP after HAC Drop, CG over Front Corner.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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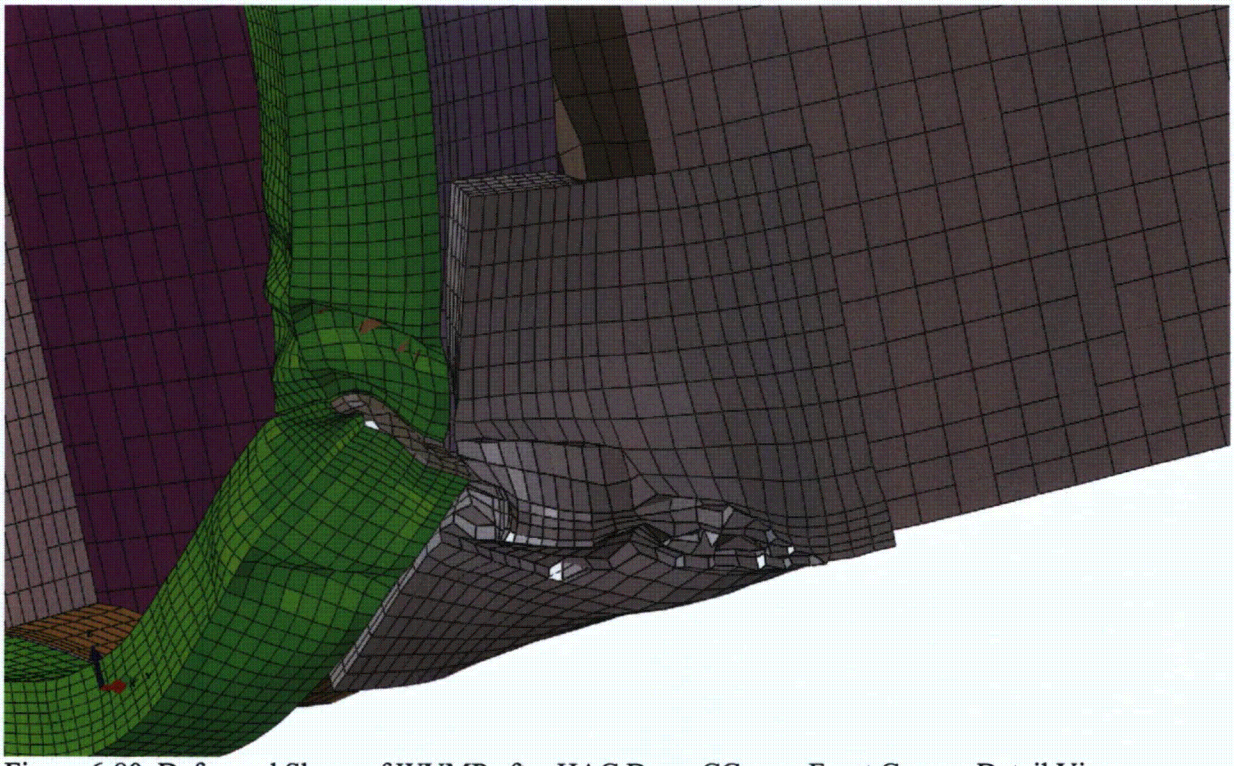

Figure 6-80 Deformed Shape of WVMP after HAC Drop, CG over Front Corner, Detail View

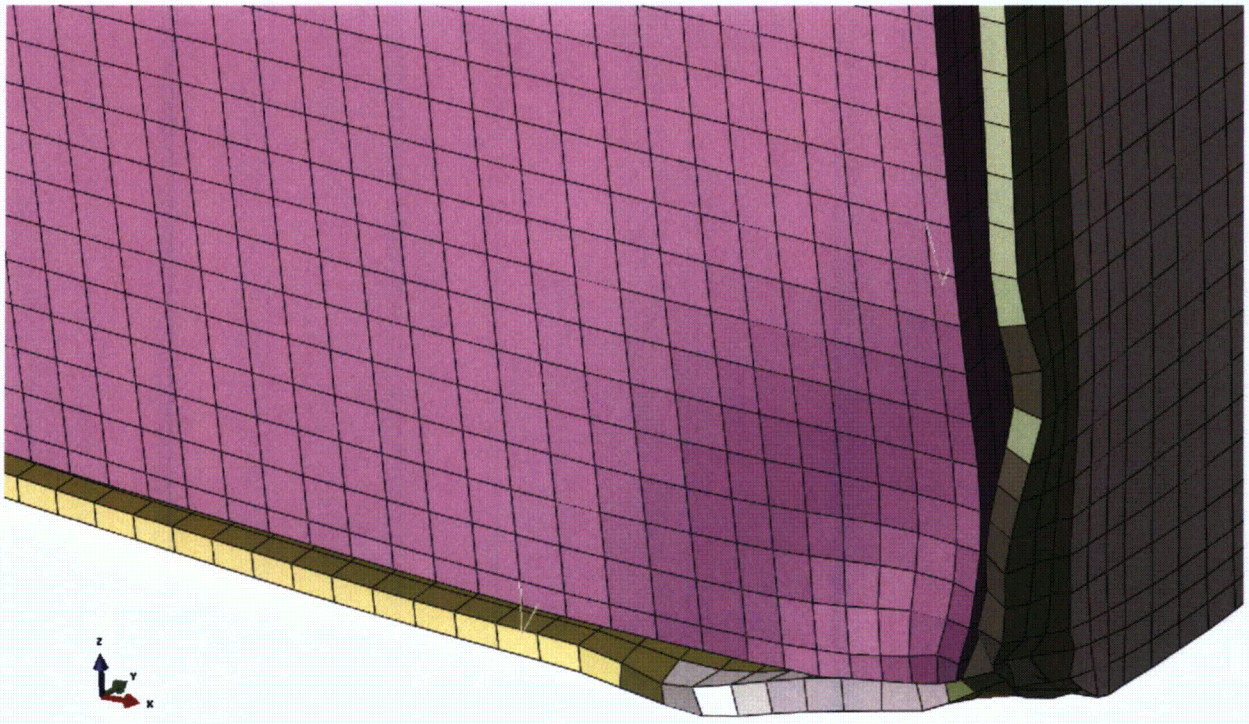

Figure 6-81 Detail plot of Deformed Shape at Door Edges, after HAC Drop, CG over Corner, Showing mainly lateral displacements at the 2inch thick extension plates surrounding the door.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	103	0

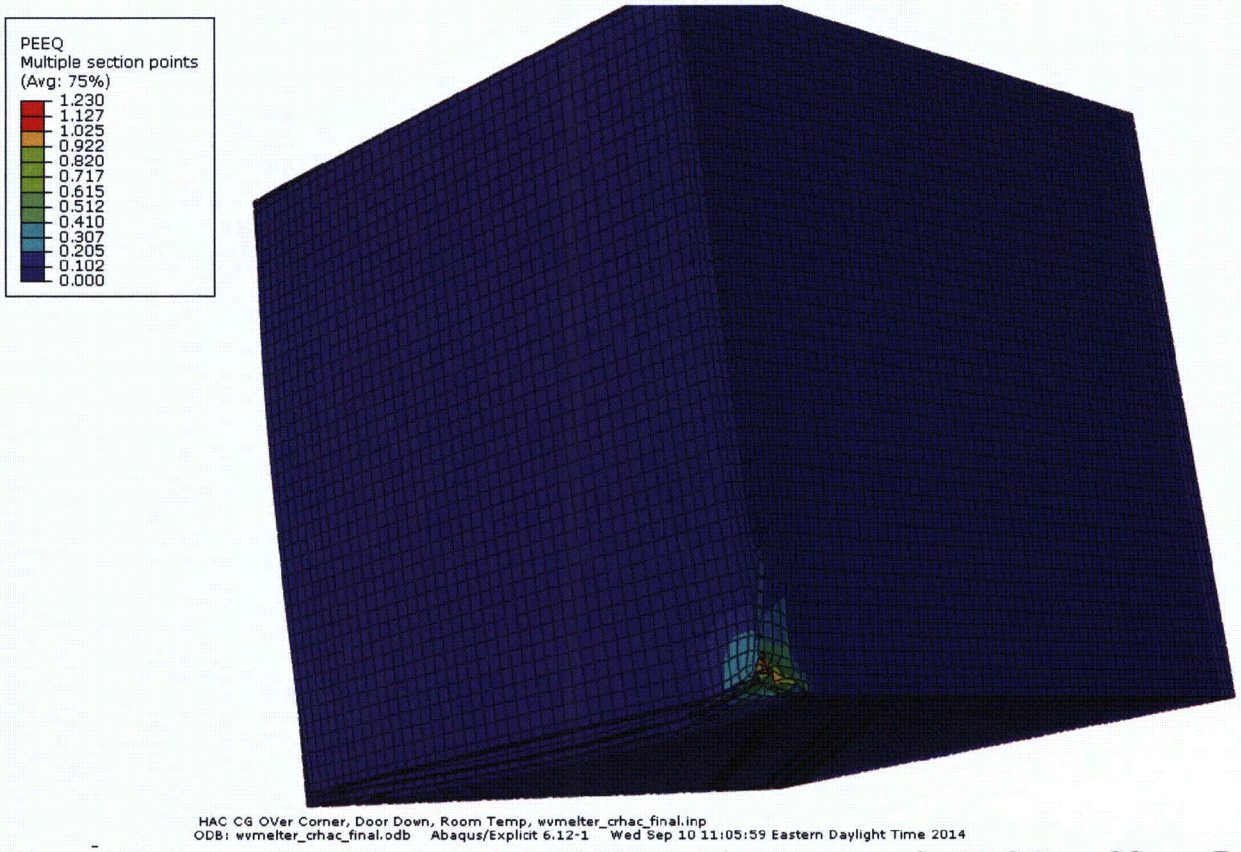

Figure 6-82 Contour Plot of Plastic Strain in WVMP Container Structure, after HAC Drop, CG over Front Corner, Showing Local High plastic Strain in the 2" thick Edge extension surrounding the door.

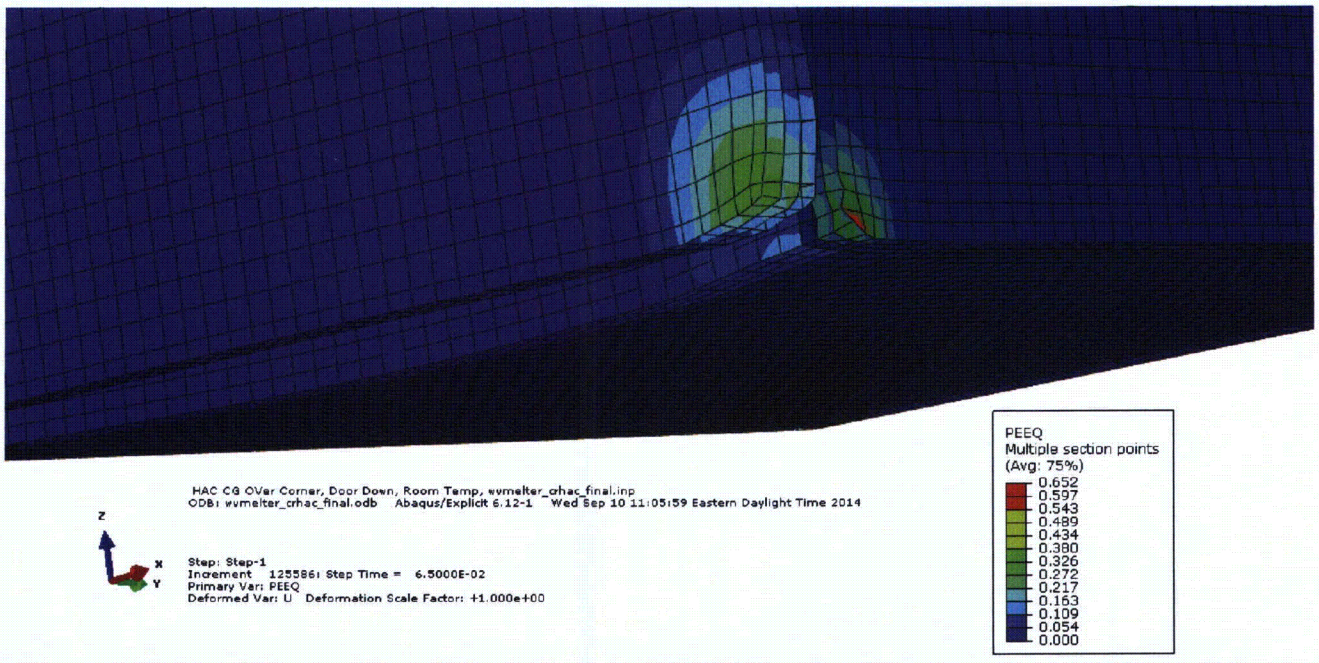

Figure 6-83 Detail Contour Plot of Plastic Strain in WVMP Container Structure, after HAC Drop, CG over Front Corner, With 2" plates Removed from View.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	104	0

Gap to Door Face
A = 0.72 inch
B = 3.16 inch
C = 1.32 inch
D = 2.86 inch
E = 0.64 inch

Door Edge Gap Change
A= closed
B= closed
C= 0.5 inch
D= 1.13 inch
D1 = 2.5 inch
E= closed

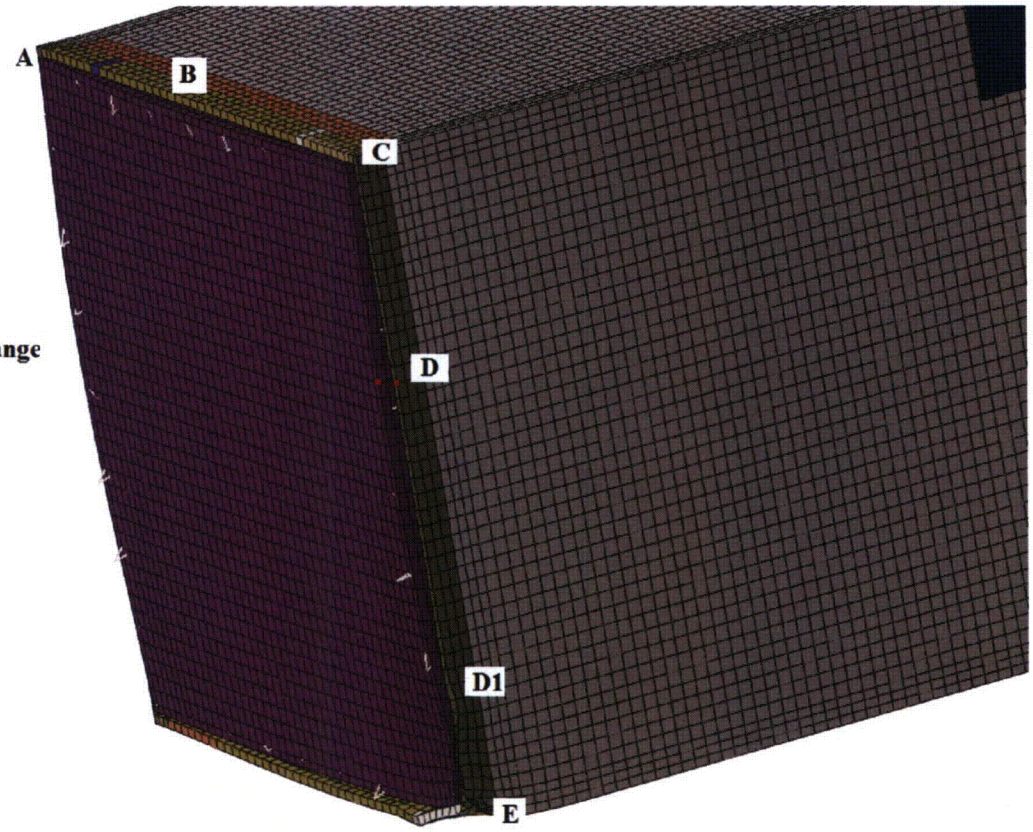

Figure 6-84 Deformed Shape of Door Region, HAC Drop, CG over Corner, Showing Displacements at Seal.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	105	0

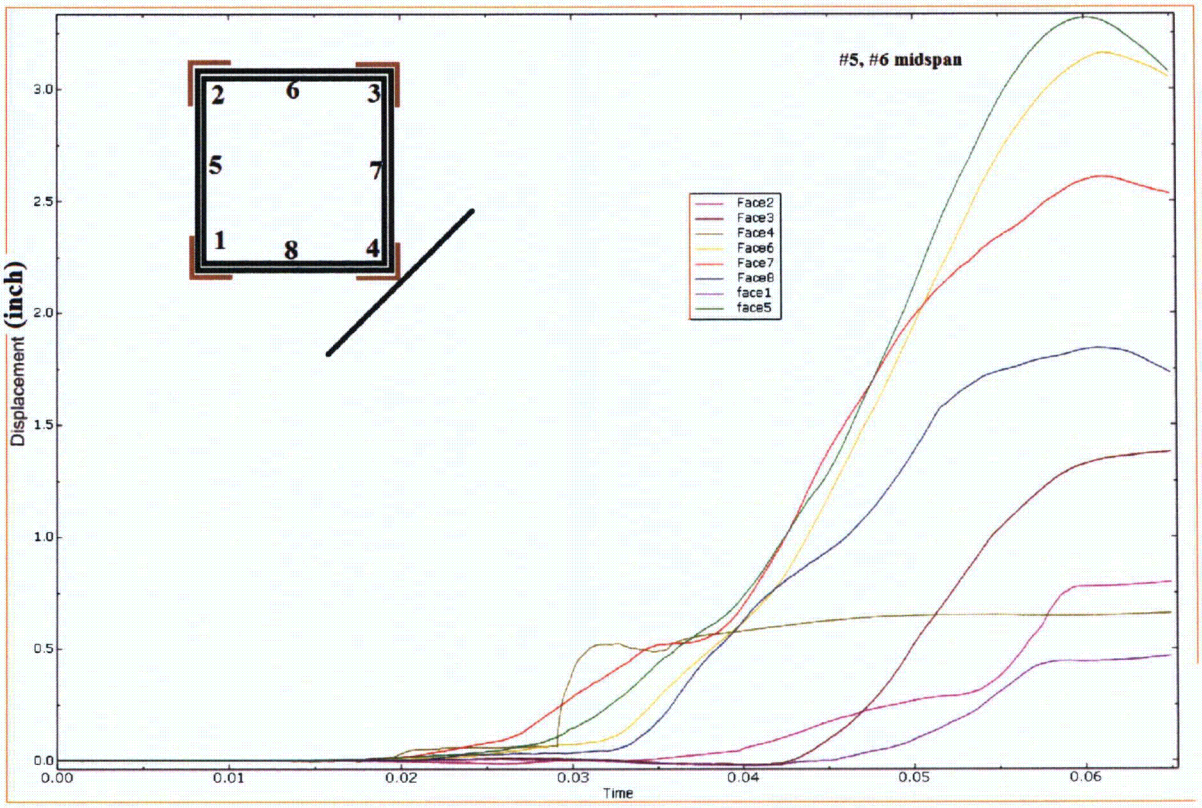

Figure 6-85 Face Gap, CG over Front Corner, HAC,

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	106	0

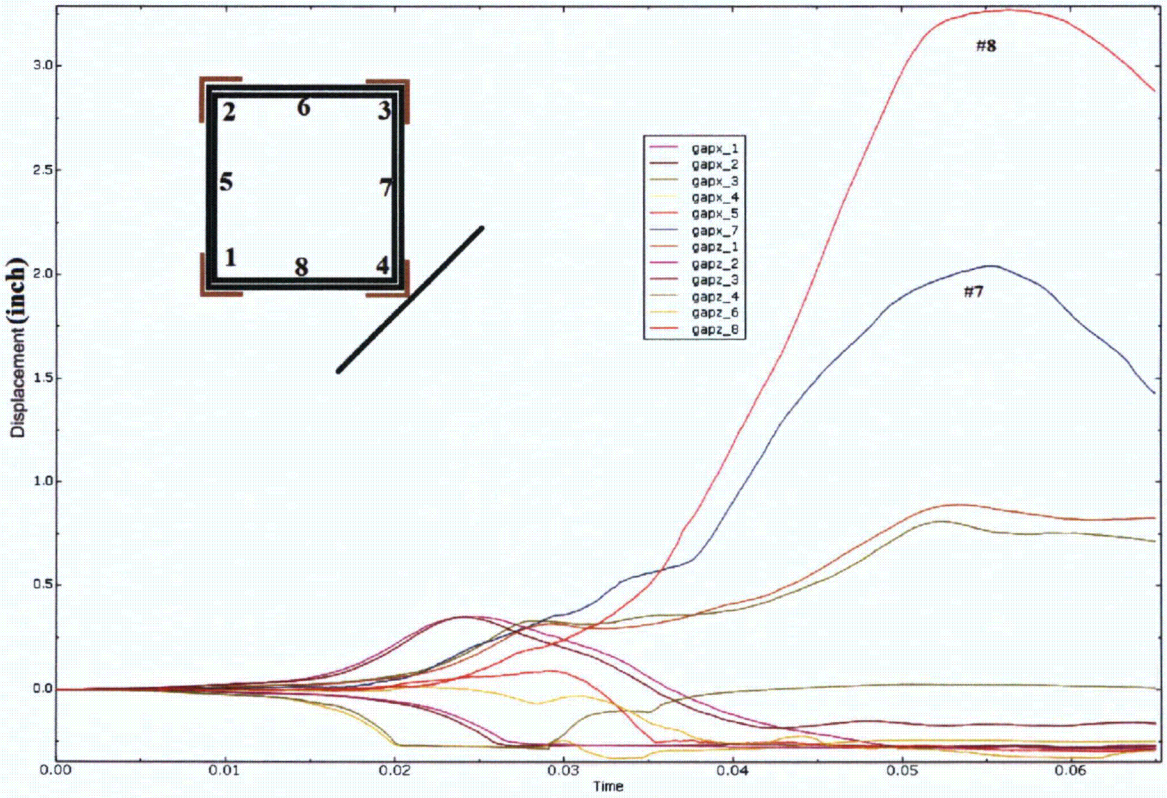

Figure 6-86 Perimeter Seal Displacement, HAC, CG over Front Corner

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	107	0

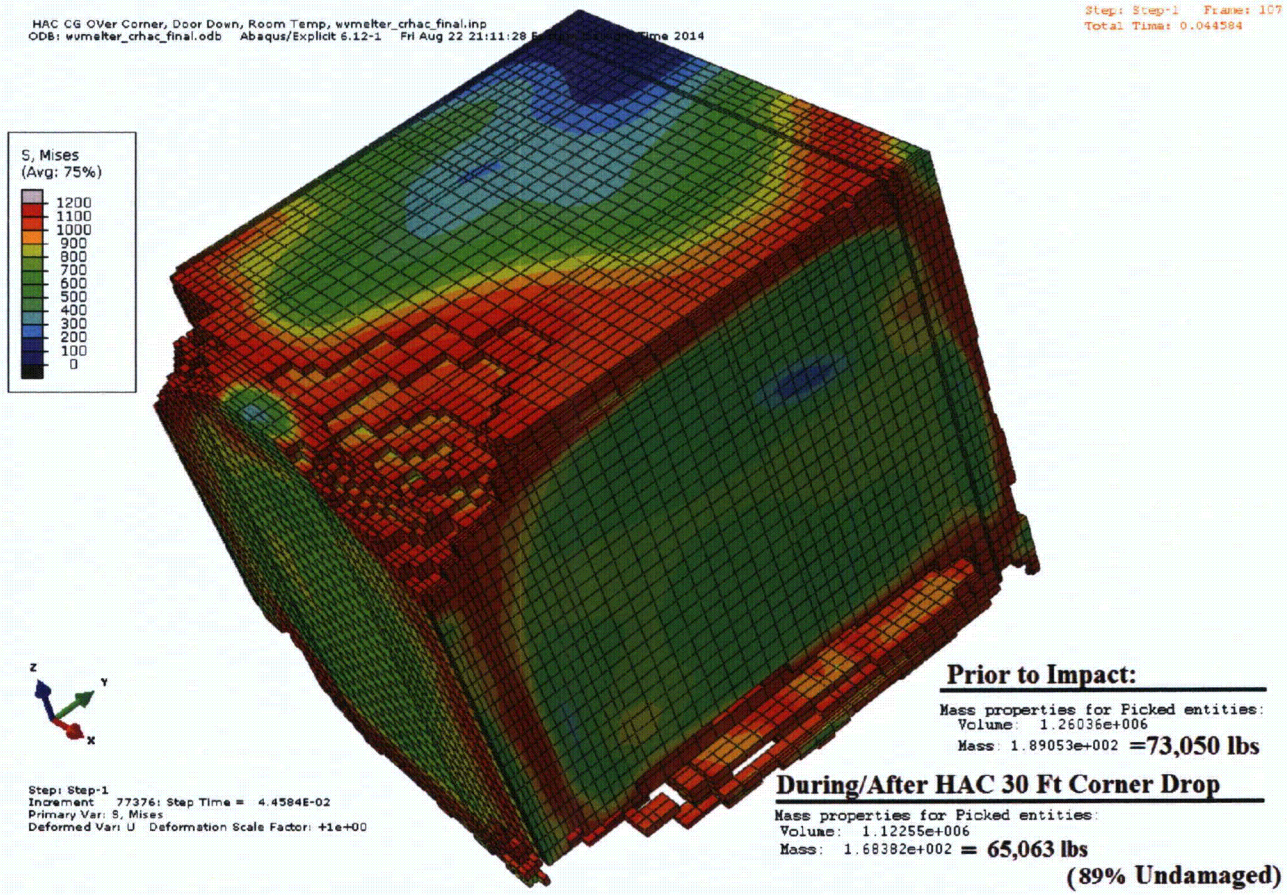

Figure 6-87 LDCC Status after HAC Drop, CG over Front Corner, Showing 11% LDCC crush.

6.11.5 Flat Side Down (Hard Drop)

As was done in the NCT drop simulations, this drop orientation is chosen because landing flat-side down onto a rigid surface is expected to place high demands on the LDCC due to the High G impact. This drop is not expected to challenge the bolted closure or the container walls. As in the NCT, the right side wall is chosen, as it is judged that the melter is weaker in this direction and the LDCC is more vunerable.

Energy Histories During Impacts

Figure 6-88 shows the kinetic and plastic energy history during the drop. The initital energy corresponds to the 30 foot free fall. The Kinectic energy is aborbed quickly, resulting in the high G-value indicated (546G). This also is the explantion for the high plastic dissipation energy occurring in the LDCC, which is shown to absorb 40% of the drop energy. The plastic dissipation from Melter is shown to be a insignificant contributor.

G-value = 546 G

Stress, Strain and Deformed Shape

Figure 6-90 shows the deformed shape of the WVMP afer the HAC, Hard Side Down Drop. The plot shows low deformation of the container structure. The primary deformation is in the lowermost slab, and occurs due to the shock absorbers creating a 1 inch gap between the bottom wall and the impacted surface. Figure 6-89 shows the plastic strains occurring from this condition. The maximum strains are 8% which are local strains where the shock absorber interfaces with the 2 inch wall extension at the bolted wall. Elsewhere, strains are less then 4.5%. These strains are within the materials strain capacity.

Bolt Tensile Loads

Bolt tensile load histories are shown for this drop simulation, as this drop was expected to not challenge the bolted closure. Figure 6-93 shows a maximm bolt tensile loads of less than 80,000 lbs, vs a computed capascity of 138,000 lbs. Nearly all bolts remain intact. A few bolts along the side impacting the ground are shown to fail within the FEA model. These bolts fail due to shear rather than tensile. The shear mode actually has more ductility than allowed within the FEA model. Nevertheless, the lack of significant bolt failues confirms intital judgements for this drop orientation and shows that the sealed joint remains close fitting during and after the drop.

LDCC Stress

Figure 6-94 shows the LDCC after the hard side down drop. Within ABAQUS/Viewer, the mass of the uncrushed elements is queried, resulting in a mass of 168.382, vs the total LDCC mass of 189.051 (in units of lbs/386.4 in/sec^2). While the LDCC crush is high, there are no available openings for significant release.

LDCC Mass Crushed = (189.051-123.744)/189.051 = 35%

Door Gaps

In the bottom down drop, there are no strong force drivers that would cause measurable deflections at the bolted wall joint. This is confirmed in the deformed views shown in Figure 6-91 and in the bolt tensile force history discussed above. The displacement contour in Figure 6-92 shows only 0.33 inch displacement at the perimeter seal joint. The face seal displacement is essentially zero.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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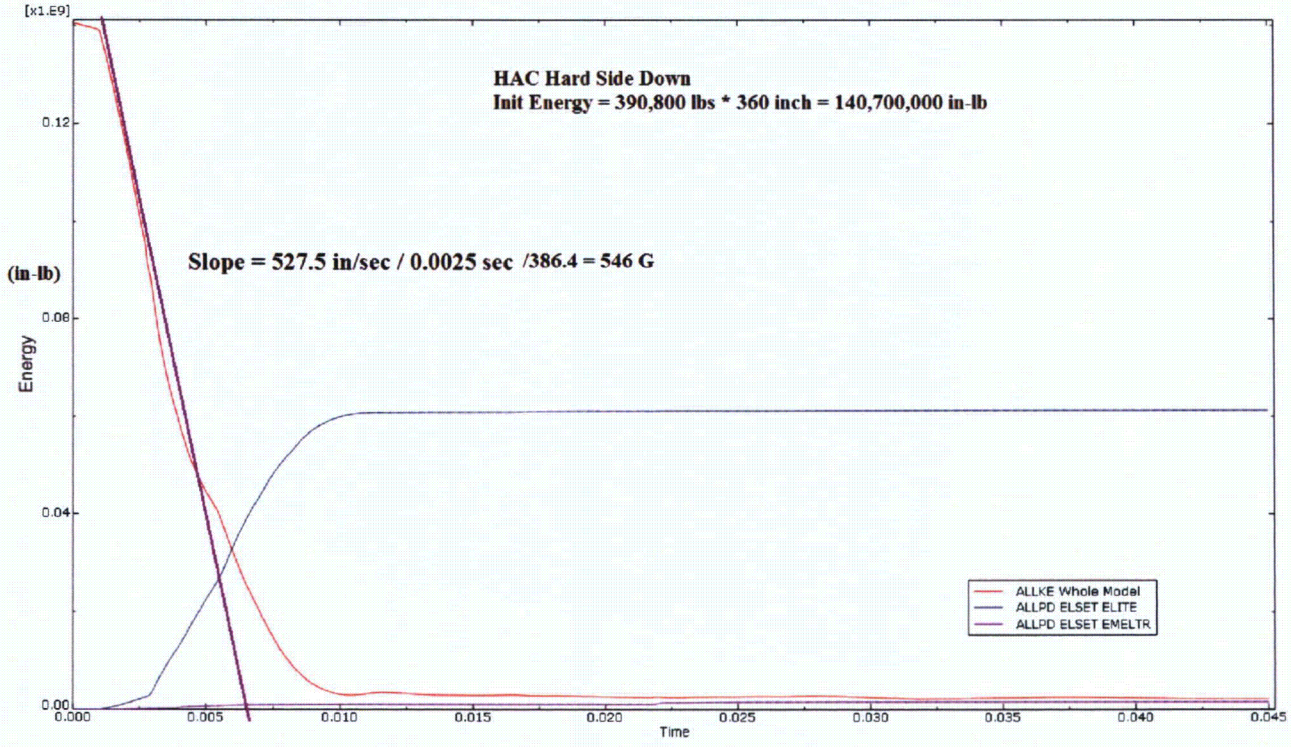

Figure 6-88 Energy Time History for HAC Drop, Hard Side Down, Showing 546 G and high plastic dissipation within LDCC (about 40% of the drop energy).

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	110	0

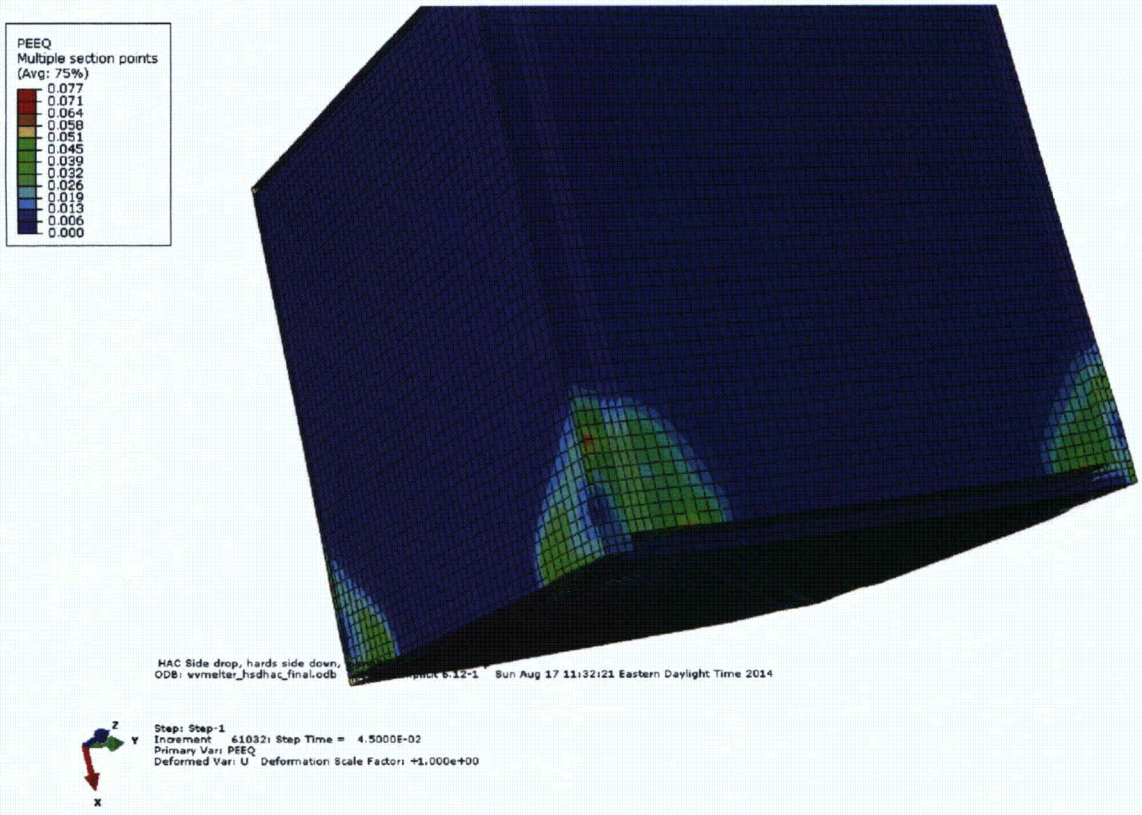

Figure 6-89 Contour Plot of Plastic Strain in WVMP Container Structure, after HAC Drop, Hard Side Down, Showing less than 8% Max Strains.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	111	0

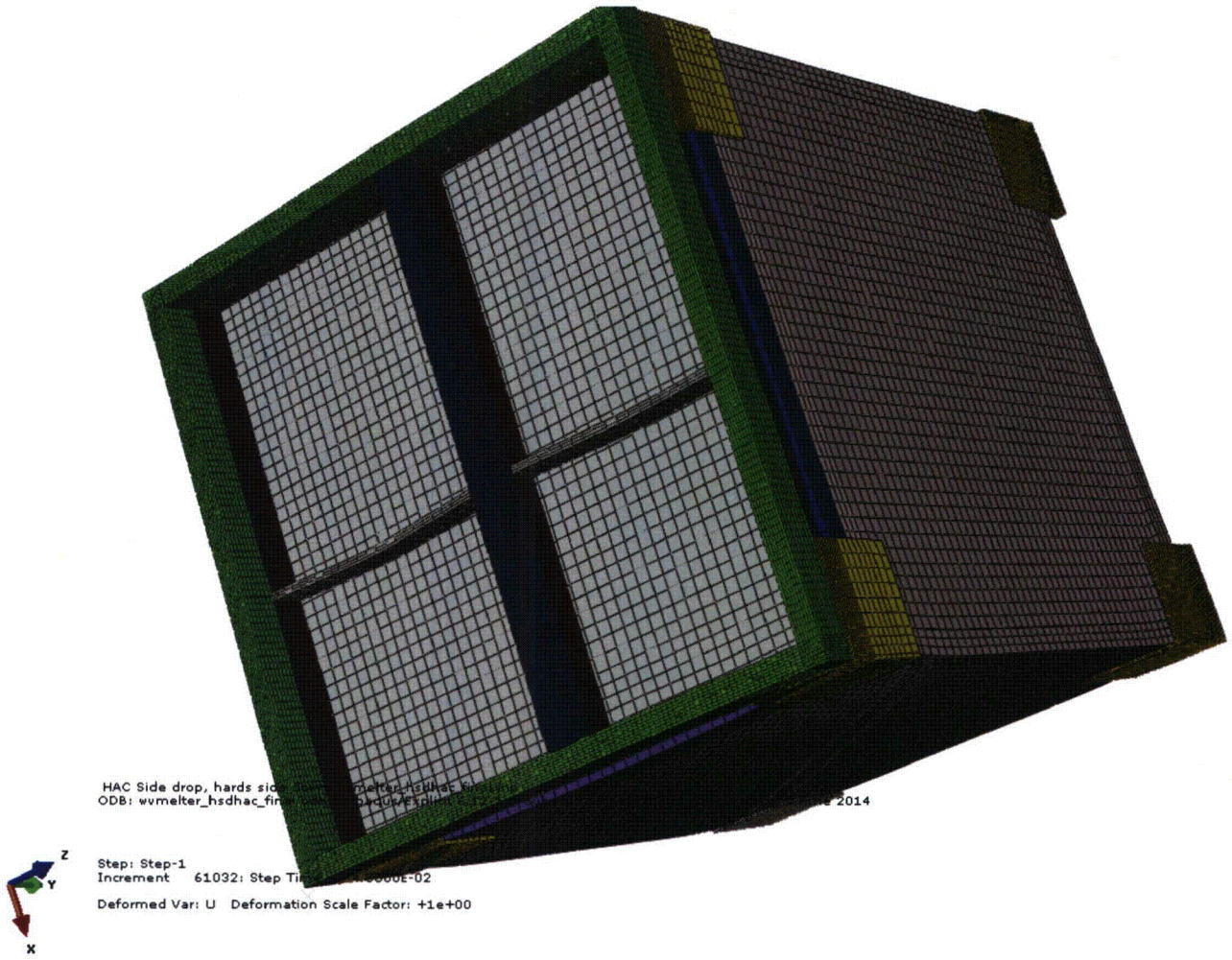

Figure 6-90 Deformed Shape of WVMP, HAC Drop, Hard Side Down. Deformation is Limited to the Bending Action of the Bottom Plate, due to the 1 inch Gap Created by the shock absorber Plate Thickness.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	112	0

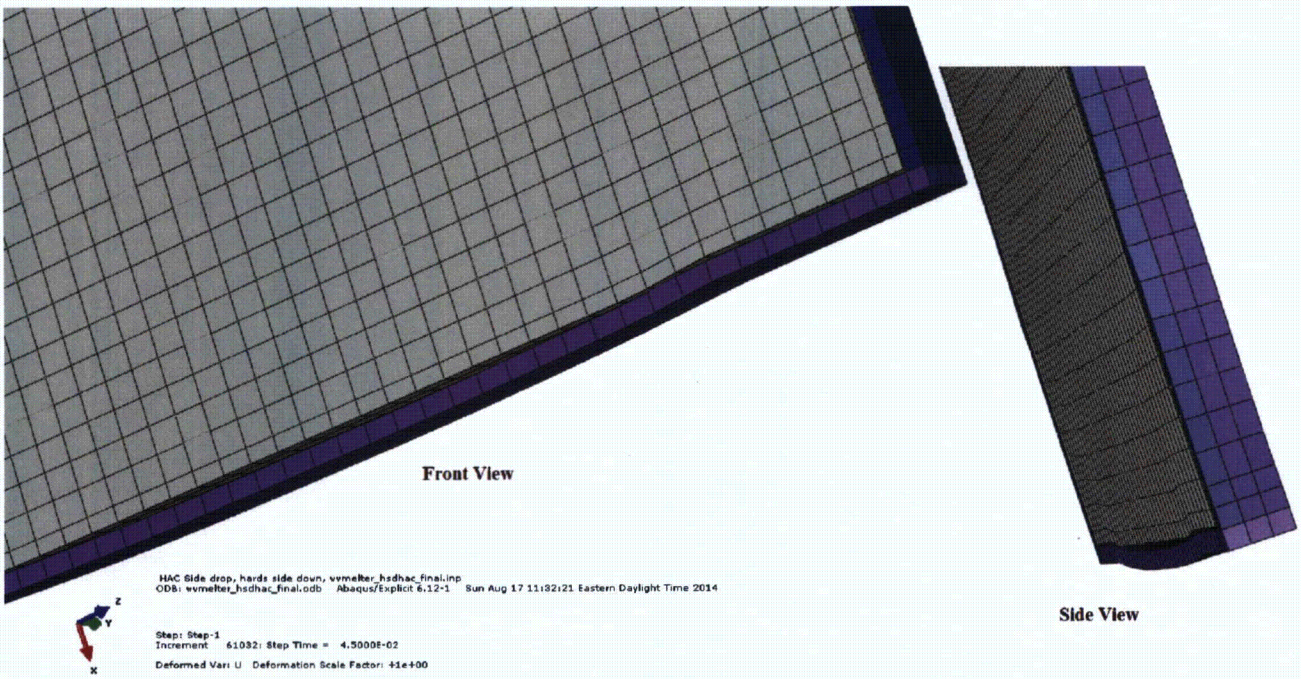

Figure 6-91 Deformed Shape of Door Region, HAC Drop, Hard Side Down, Showing Insignificant Displacements at Seal.

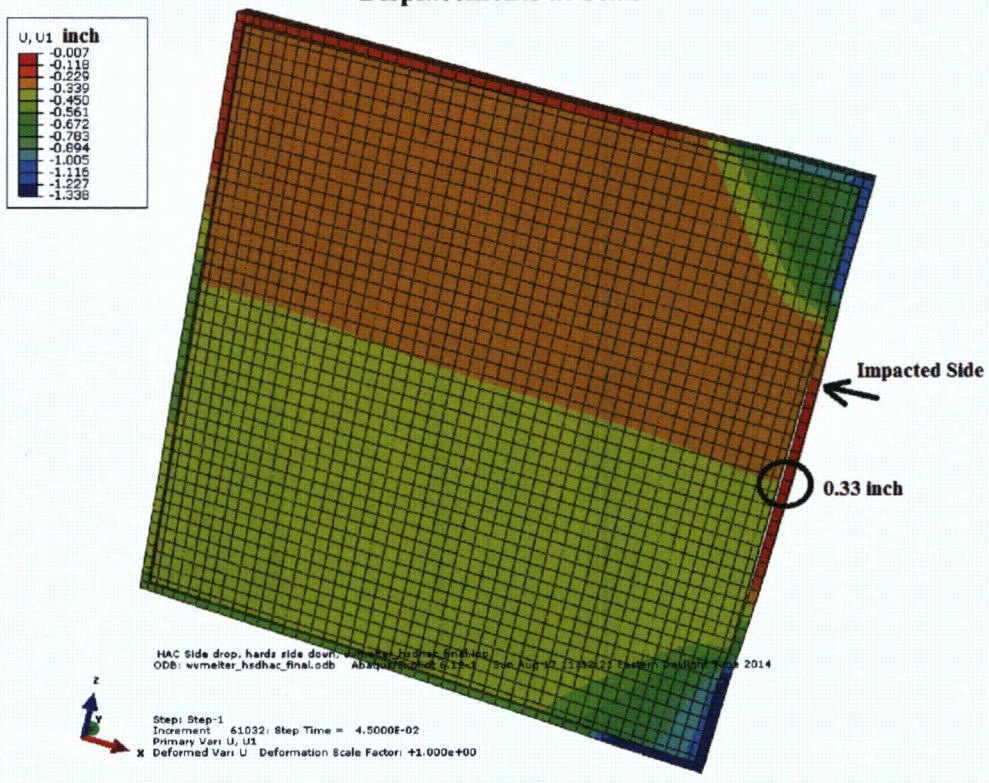

Figure 6-92 Deflection Contour at Bolted Wall, Showing only 0.33 inch Joint Displacement (Perimeter direction), HAC Drop, Hard Side Down.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	113	0

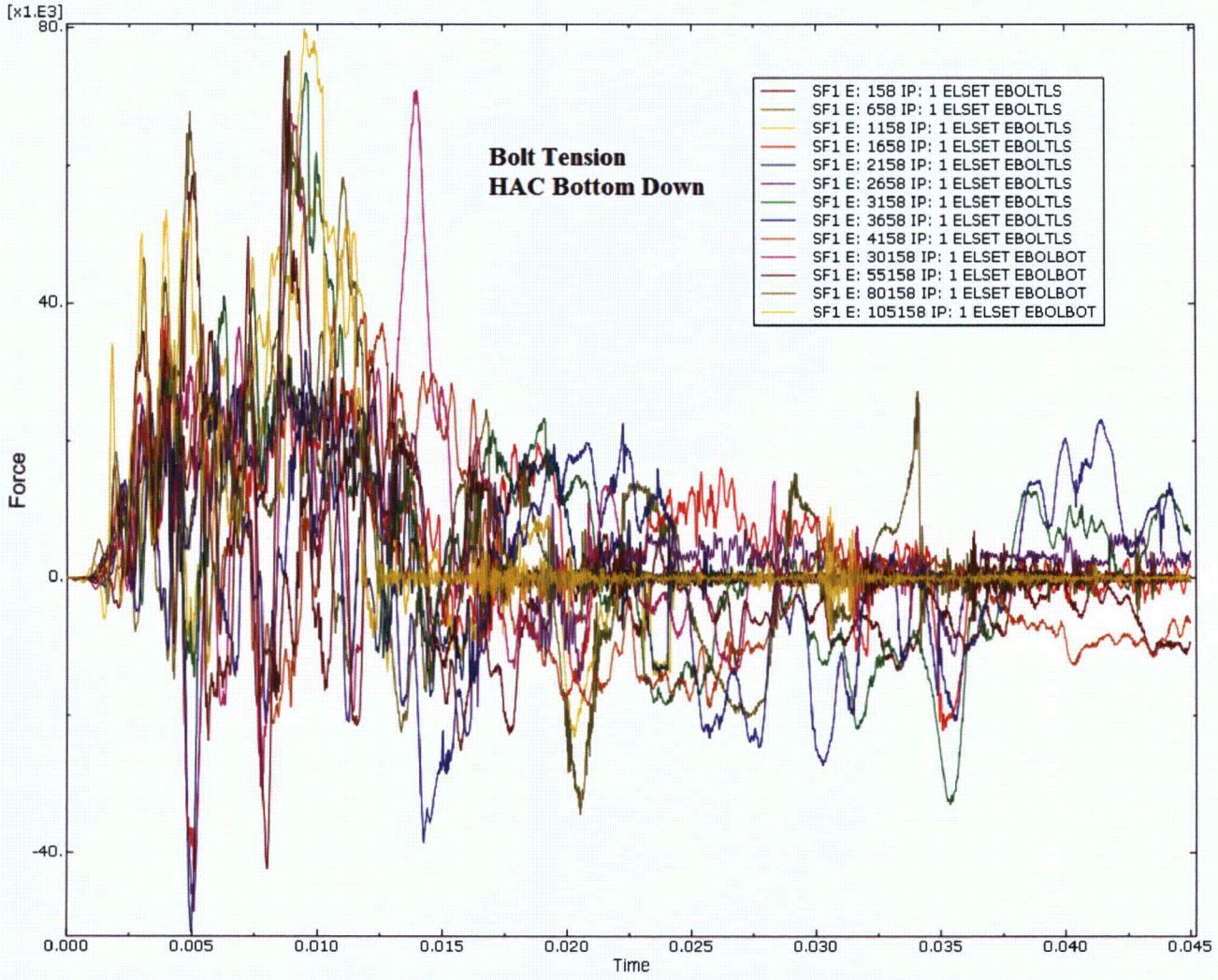

Figure 6-93 Bolt Tension History for A representative set of bolts (left side and top) securing the bolted side door to the container. Maximum tensile loads of 80,000 lbs are within the bolts capcity..

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	114	0

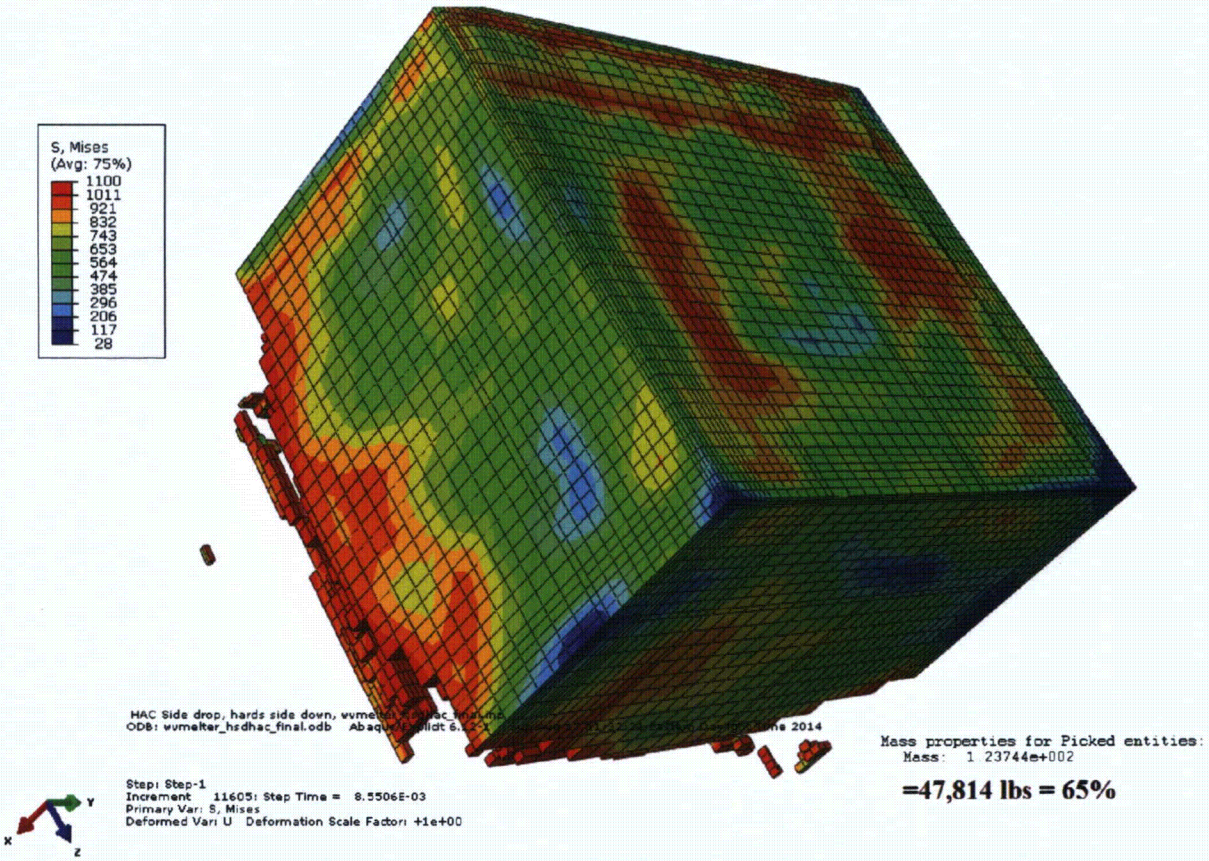

Figure 6-94 LDCC Status after HAC Drop, Hard Side Down, Showing 35% LDCC crush.

6.11.6 CG over Side Edge Results

This orientation is selected to maximize demand on the container walls. As there are no sacrificial impact absorbers along the side edges, the high G load should also challenge the LDCC.

Energy Histories During Impacts

Figure 6-95 shows the kinetic and plastic energy history during the drop. The initital energy corresponds to the 30 foot free fall. The indicated G value is 137 G, indicative of the lack of external energy absorber, other than the 6 inch thick container. The plastic dissipation from the LDCC is shown to account for ~20% of the energy absorbed. The Melter is shown to be a insignificant contributor (~5%).

G-value = 137 G

Stress, Strain and Deformed Shape

Figure 6-96 shows the deformed shape of the WVMP afer the HAC, CG over Side Edge drop. Some wall deflections are evident. Figure 6-97 and Figure 6-98 show a detail view of deformation of just the bolted side door, first at the worst case time instance, and then at the end of the simulation.

Figure 6-99 shows the plastic strains developed in the container walls. The maximum strains are within the ASME allowed for peak strains. Figure 6-100 shows a detail plot of strain in the weld joint between the lower plate and side plate. The maximum surface stains are 10%, occurring on both the inner and outer surface, attributable to bending. The strain is within the primary strain limit..

Bolt Tensile Loads

The FEA model is set up to represent bolt failure and to remove bolts that fail. In this drop, nearly all bolts fail in shear due to the high inertial loads and are removed from the FEA simulation.

LDCC Stress

Figure 6-104 shows the LDCC stress state at the end of the analysis, with elements that may have crushed during the impact removed. Within ABAQUS/Viewer, the mass of the uncrushed elements is queried, resulting in a mass of 132.056, vs the total LDCC mass of 189.051 (in units of lbs/386.4 in/sec^2).

LDCC Mass Crushed = (189.051-132.056)/189.051 = 30%

Door Gaps

Figure 6-101 shows the displacements at the face seal of the bolted door. The maximum displacement is 1.2 inch, vs an available 6 inch of overlap with the door edge and the wide wall extensions. The displacement at the four courners is less than 0.4 inch. Figure 6-102 and Figure 6-103 show the laterial direction displacements at the perimeter seal. The two midpans adjacent to the impacted corner have 5 to 6 inch displacements for a bief instance (from 0.015 to 0.04 sec), and then recover such that the deflections are less than the 4 inch face-seal distance on the adjacent surface.

Face Seal = 1.2 inch (pts #5, #6, #7, #8, Figure 6-101)
= 0.4 inch (pts #1, #2, #3, #4, Figure 6-101)

Perimeter Seal = 5.8, recovers to 4.5 inch (pts #5, #6, #7, #8, Figure 6-102,Figure 6-103)
= 2.0 inch (pts #1, #2, #3, #4, Figure 6-102,Figure 6-103)

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	116	0

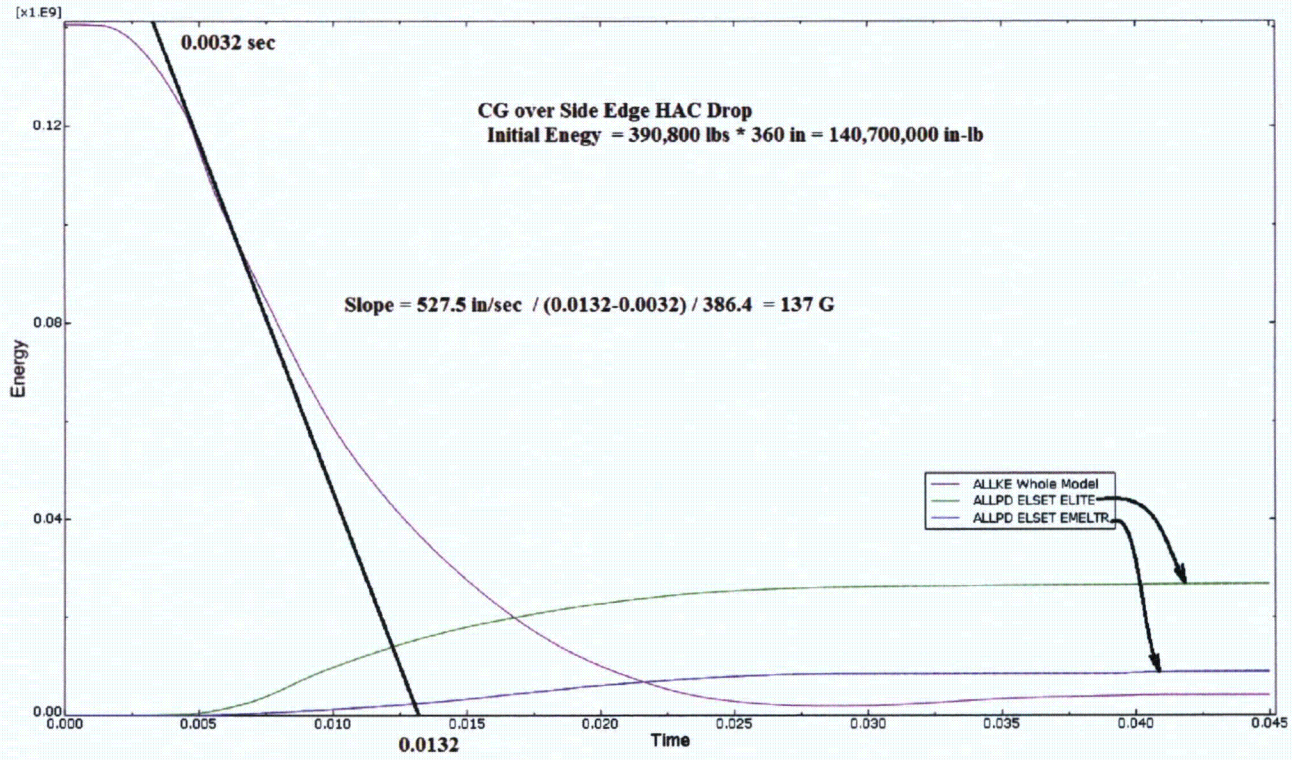

Figure 6-95 Energy Time History for HAC Drop, WVMP oriented with CG over Side Edge, Showing plastic energy dissipation in the melter (small) and LDCC (mild), and an effective G-value of 137 G.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	117	0

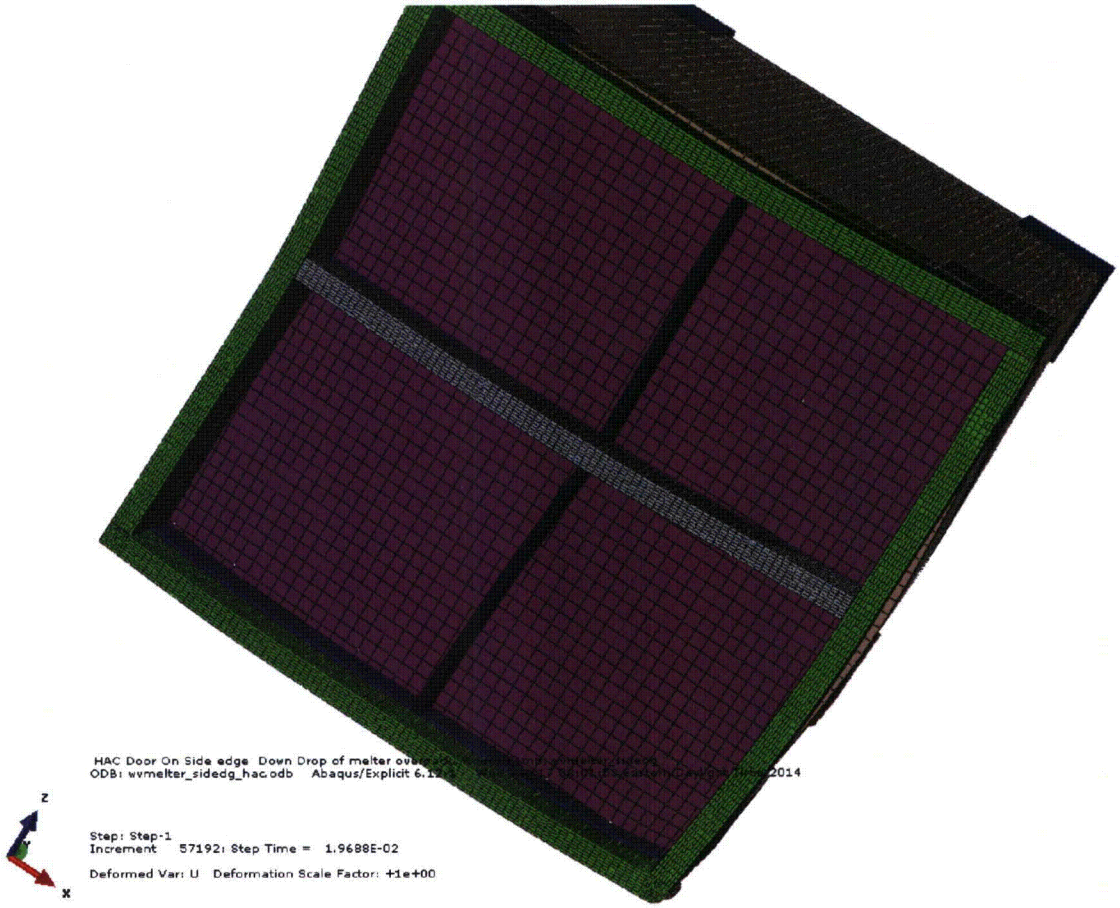

Figure 6-96 Deformed Shape of WVMP after HAC Drop, CG over Side Edge.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	118	0

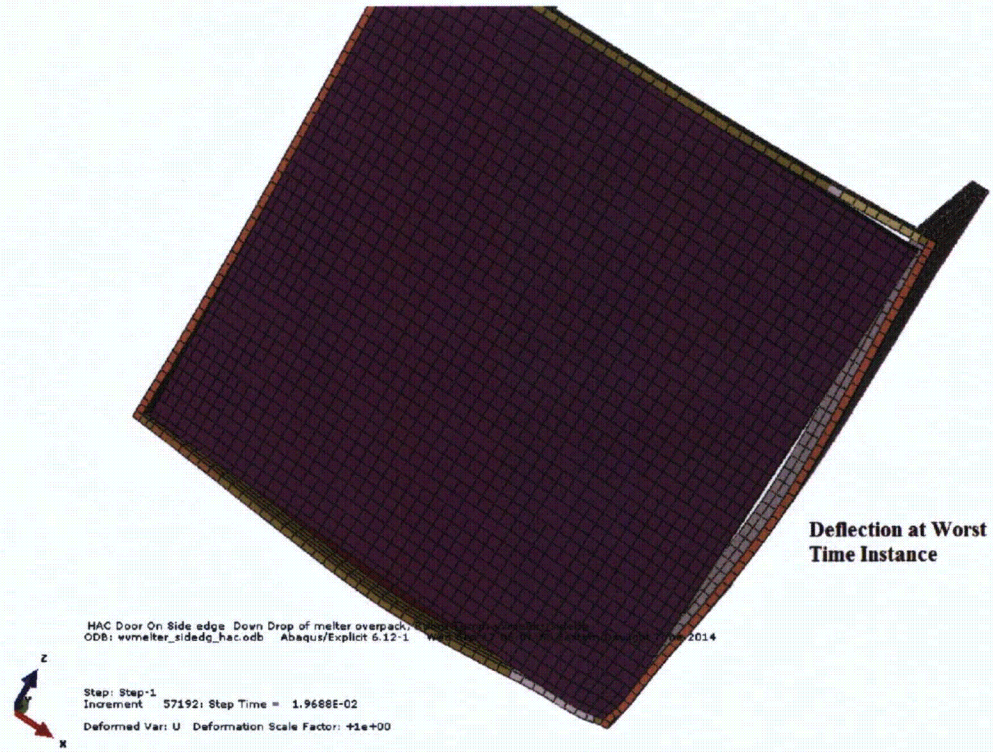

Figure 6-97 Detail View of Bolted Side Door, Deformed Shape, at time ~ 0.02 sec, showing the worst Deflections. HAC Drop, CG over Side Edge

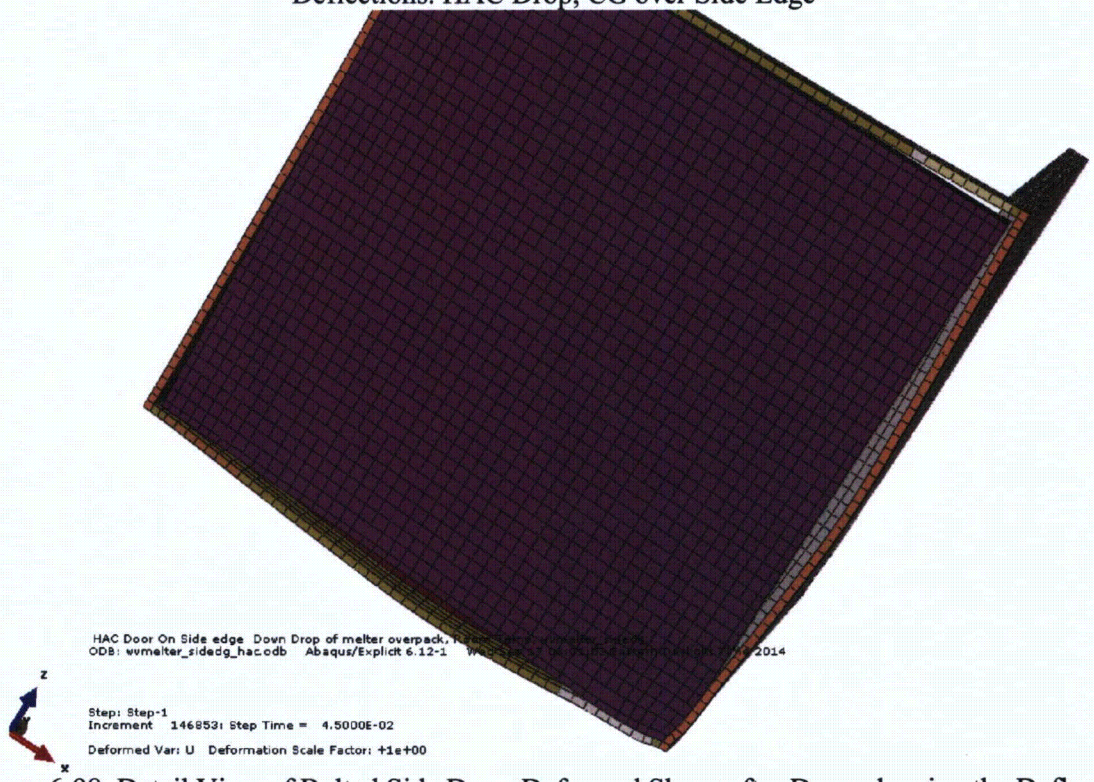

Figure 6-98 Detail View of Bolted Side Door, Deformed Shape after Drop, showing the Deflection Recovery. HAC Drop, CG over Side Edge

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	119	0

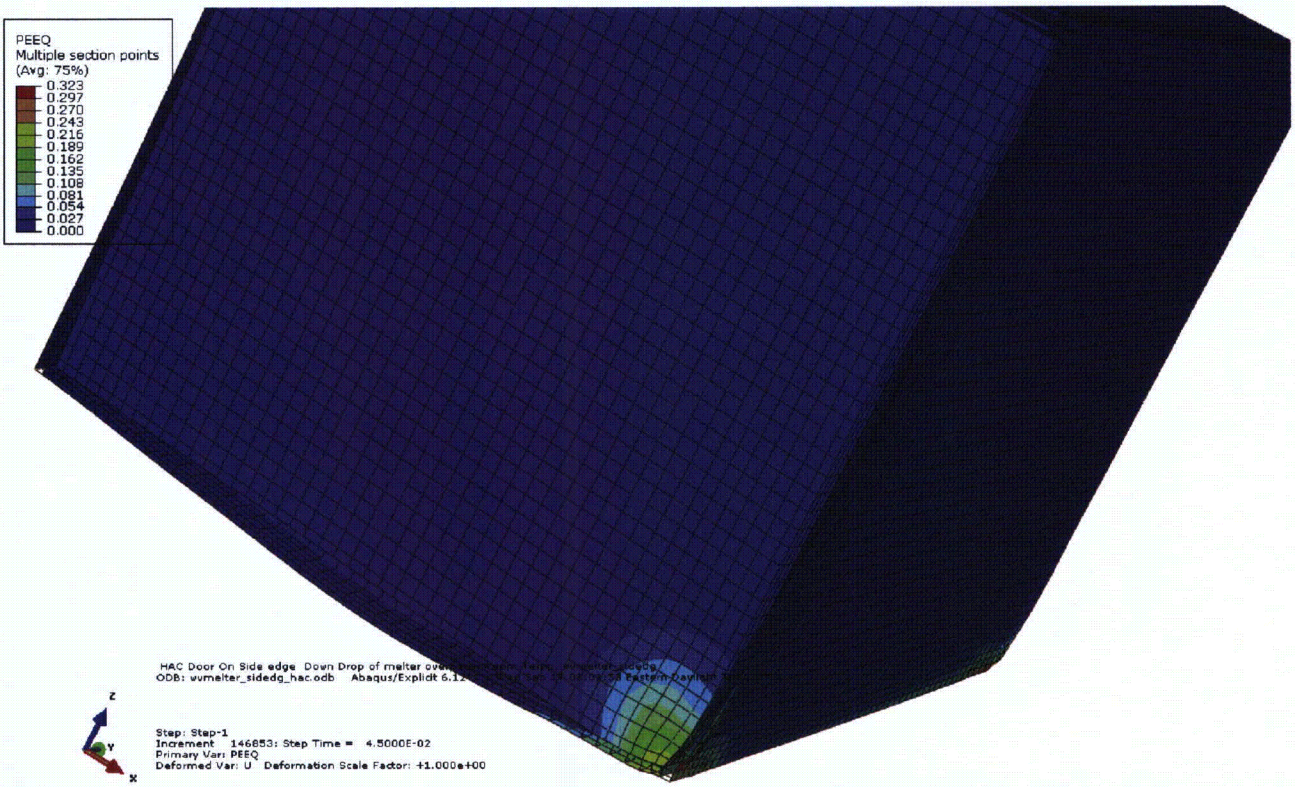

Figure 6-99 Contour Plot of Plastic Strain in WVMP Container Structure, after HAC Drop, CG over Side Edge, Showing Strains Occurring along the Impacted Edge.

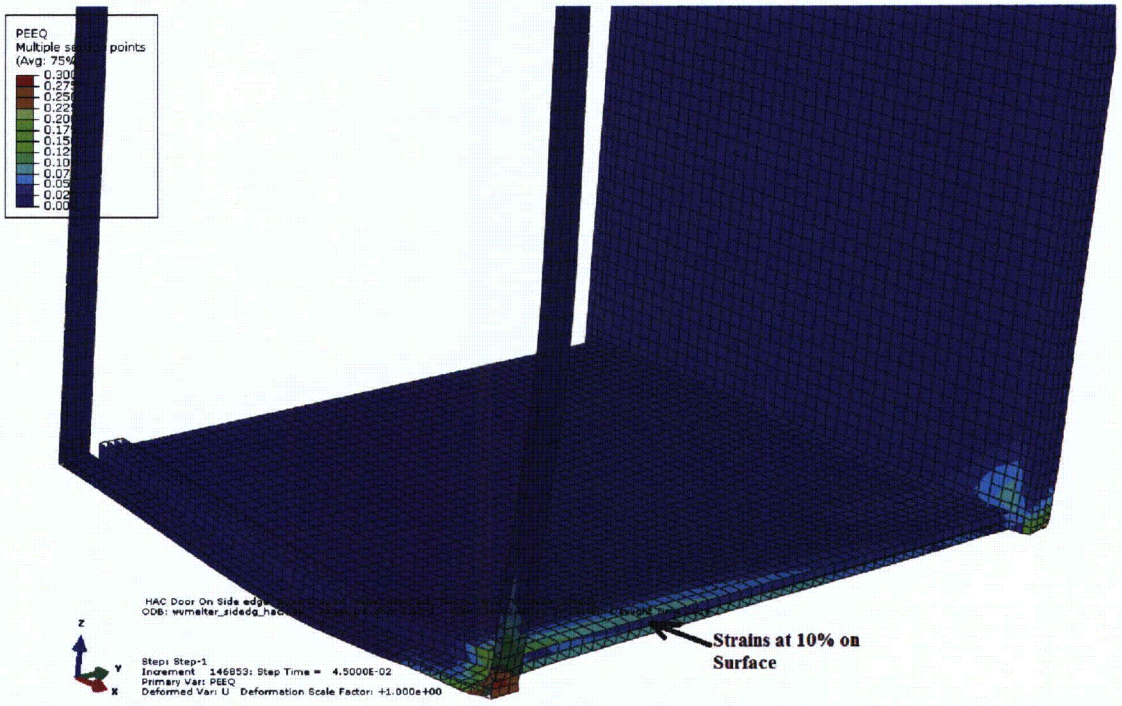

Figure 6-100 Contour Plot of Plastic Strain in WVMP Container Structure, after HAC Drop, CG over Side Edge, Showing Details of Strains at Welded Joint.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	120	0

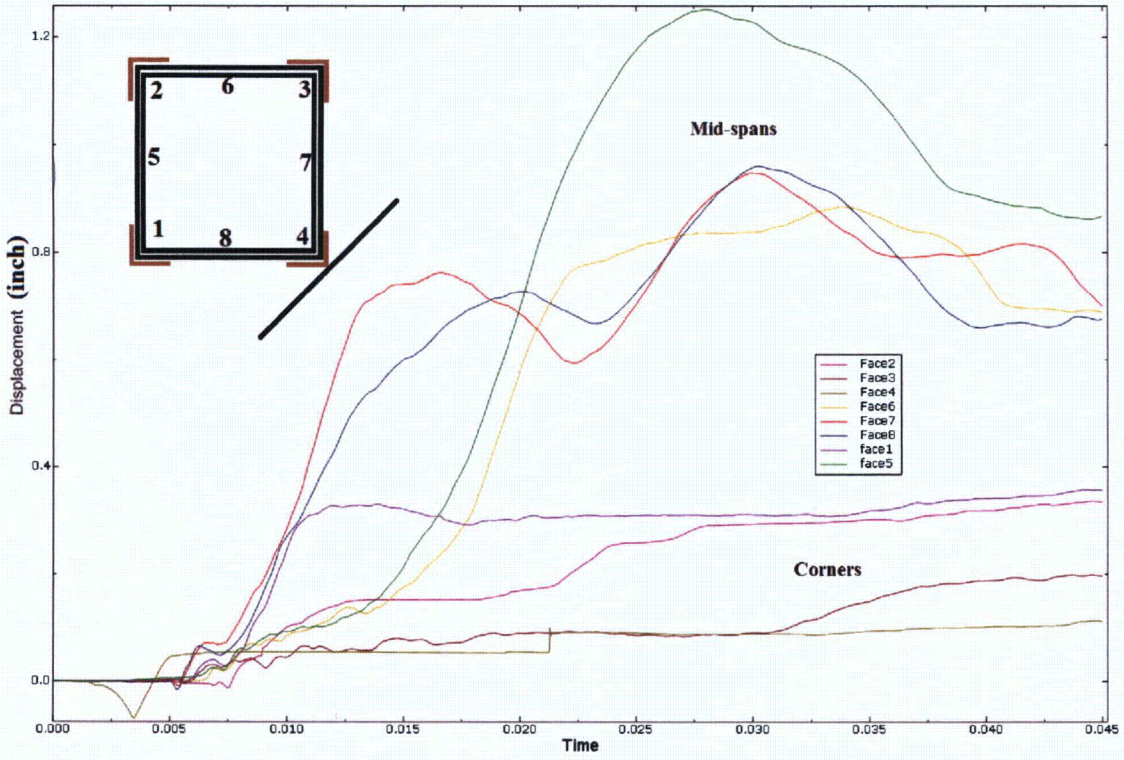

Figure 6-101 Face Seal Displacements, CG over Side Edge, HAC, Showing 1.2 inch Displacement at Mid-Spans, less than 0.4 inch at corners.

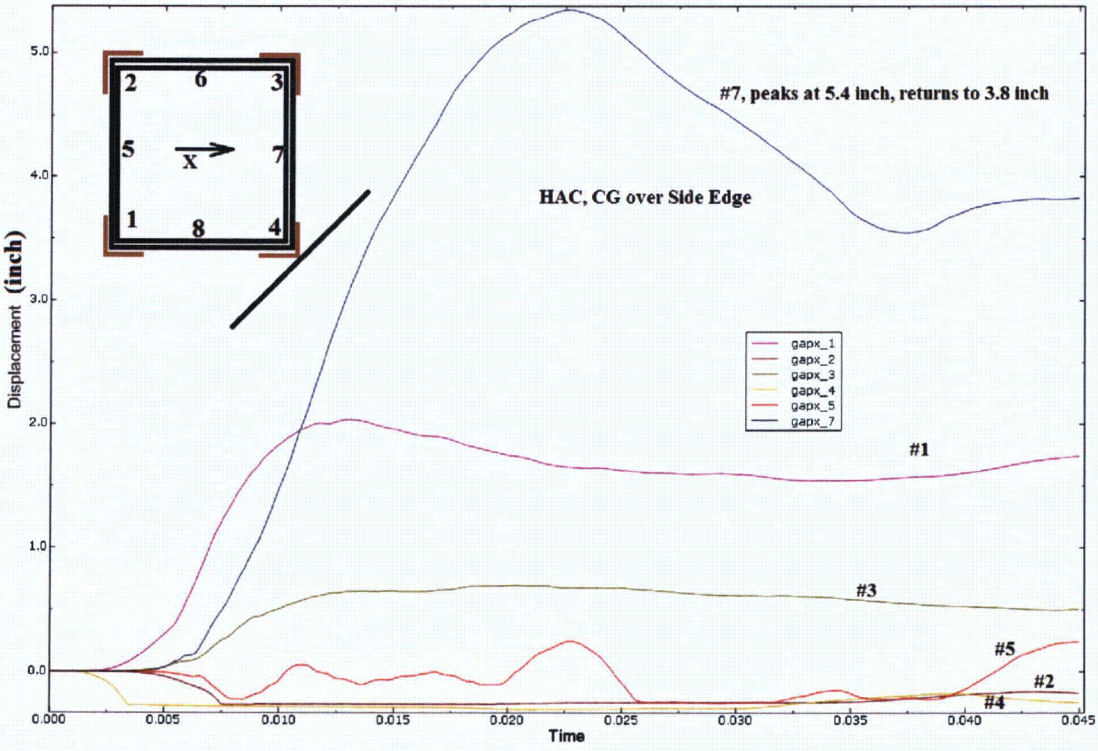

Figure 6-102 Perimeter Seal Displacement, X direction (left to right), HAC, CG over Side Edge, Location 7 Opens, then recovers to less than the 4 inch face cover distance. Some Locations Tighten.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	121	0

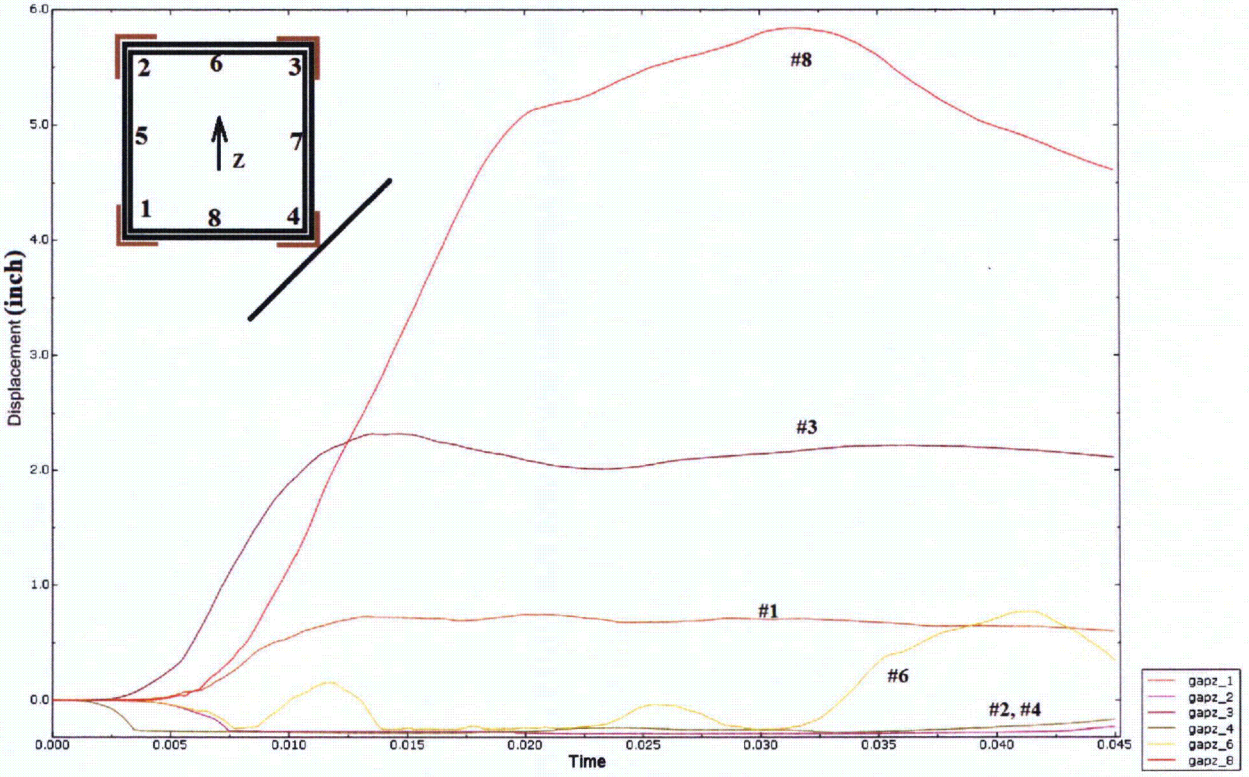

Figure 6-103 Perimeter Seal Displacement, Z direction (Up-Down), HAC, CG over Side Edge. Location 8 Opens, then recovers to to close to the 4 inch face cover distance, Some Locations Tighten

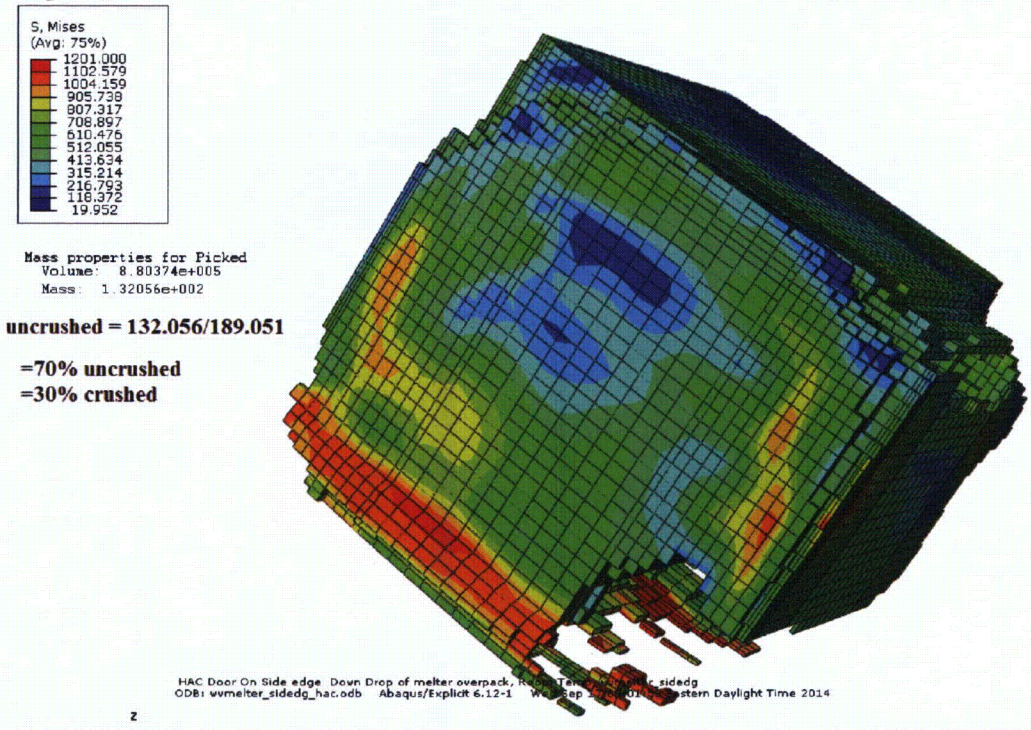

Figure 6-104 LDCC Status after HAC Drop, CG over Side Edge, Showing 30% LDCC crush.

6.11.7 Top Side Down, CG over Edge Results

This orientation is selected to investigate the effects of the small (~8 inch to 12 inch) between the top of the LDCC and the top wall of the container.

Energy Histories During Impacts

Figure 6-105 shows the kinetic and plastic energy history during the drop. The two-stage reaction is evident, with the LDCC top gap closure delinerating the first stage from second stage. During the initial impact, the mass of the melter and LDCC remains in free-fall (inside the container). This effects actually reduces container deformation and g-level, since the different masses act separately in this configuration. At time T=0.05sec, the LDCC gap is closed, denoted by the increase in LDCC plastic dissipation. The plastic dissipation from the melter is hardly registerable on the full scale.

G-value = 47 G

Stress, Strain and Deformed Shape

The deflections, stresses and strains in the container are bounded by the bottom down drops. This is due to as explained in the energy history sectin above. With the WVMP fallingtop down, the internal mass acts separately than the container mass. Two half impacts are not as severe as a single summation impact, since components are able to recover between the two time instances.

Figure 6-106 through Figure 6-111 show views of the simulation at various time instances. The bolted side door is removed from view so that the LDCC status is visible. The time instances in which the LDCC strikes the container top is in agreement with the time instance evident in the energy plot.

Bolt Tensile Loads

AS in the other drops, the most bolts fail in this scenario.

LDCC Stress

Figure 6-112 shows the LDCC stress state at the end of the analysis, with elements that may have crushed during the impact removed. Within ABAQUS/Viewer, the mass of the uncrushed elements is queried, resulting in a mass of 149.324, vs the total LDCC mass of 189.051 (in units of lbs/386.4 in/sec^2). The LDCC crushed in this orientation is twice that compared to the otherwise identical bottom down orientation (Section 6.11.2).

LDCC Mass Crushed = (189.051-149.324)/189.051 = 21%

Door Gaps

As stated above, the two-step action of the container and LDCC creates less impact demand compared to the otherwise identail bottom down drop orientations. These results are bounded by previous analysis.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	123	0

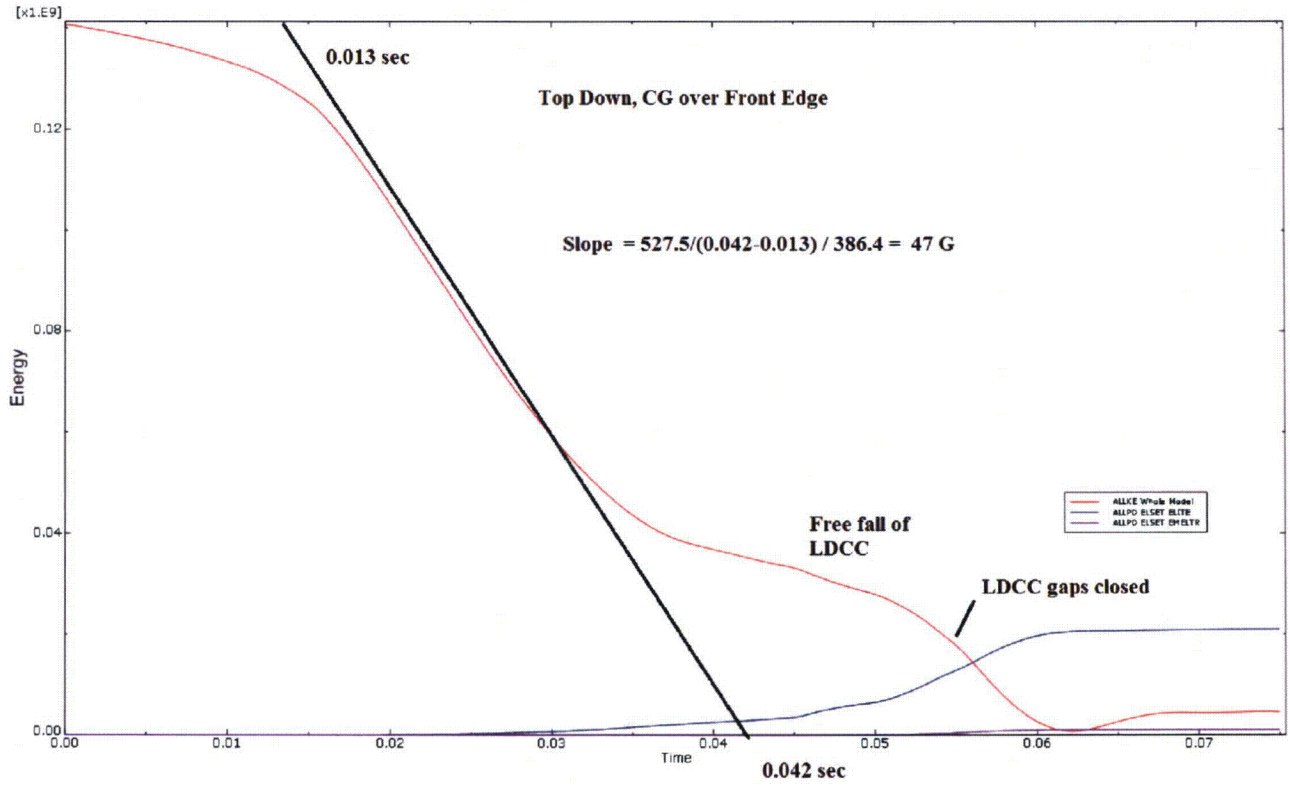

Figure 6-105 Energy Time History for HAC Drop, WVMP oriented Top Down with CG over Side Edge, Showing the Two-Stagge response as the Structure impacts the ground and the LDCC then closes the top gap. Zero plastic energy dissipation in the melter. LDCC plastic dissipation curve demonstates Time instance of Contact. Impact G level = 47G.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	124	0

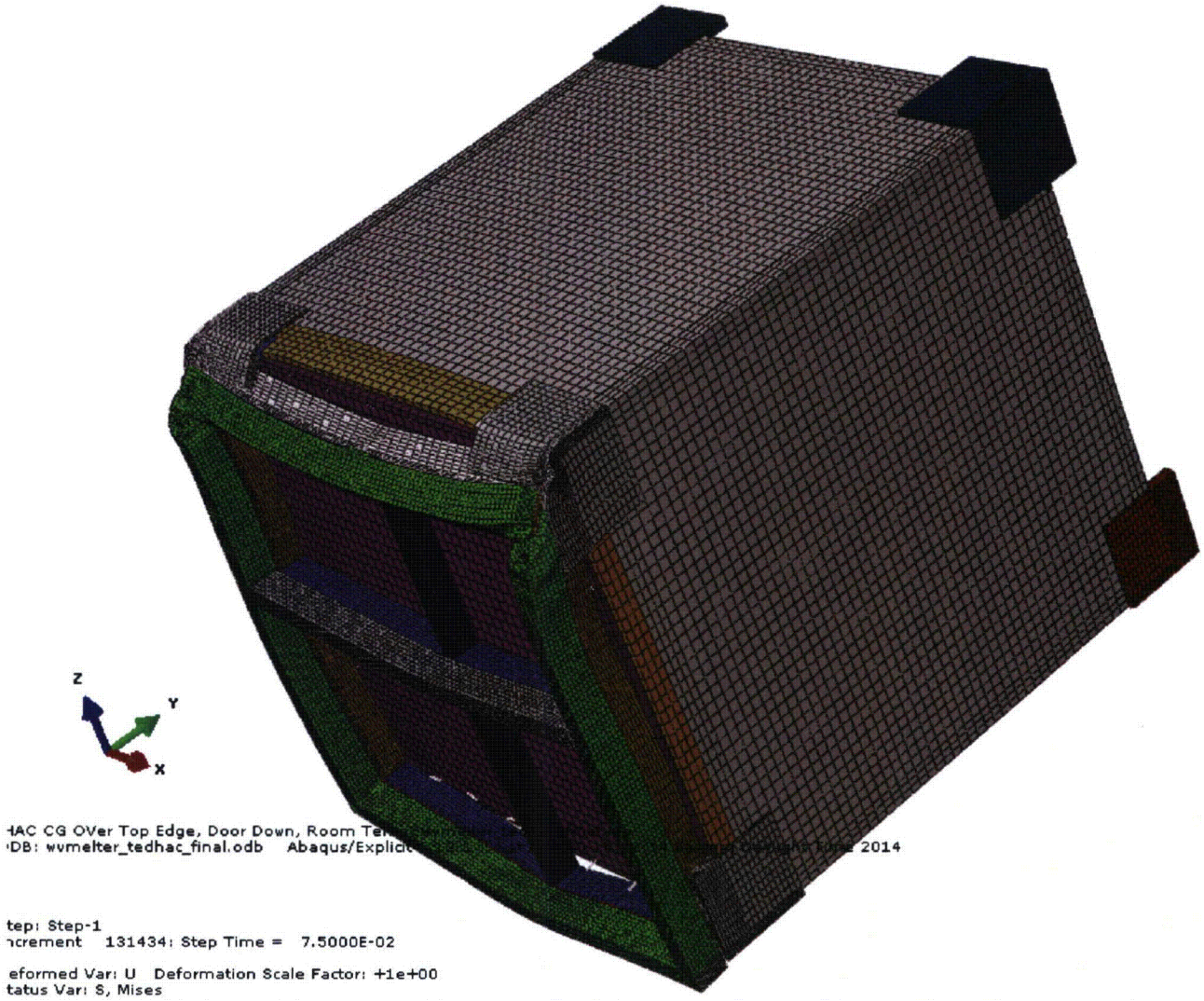

Figure 6-106 Deformed Shape of WVMP after HAC Drop, Top Down, CG over Front Edge. View is shown Inverted from Drop Direction, so that Top of WVMP is shown up.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	125	0

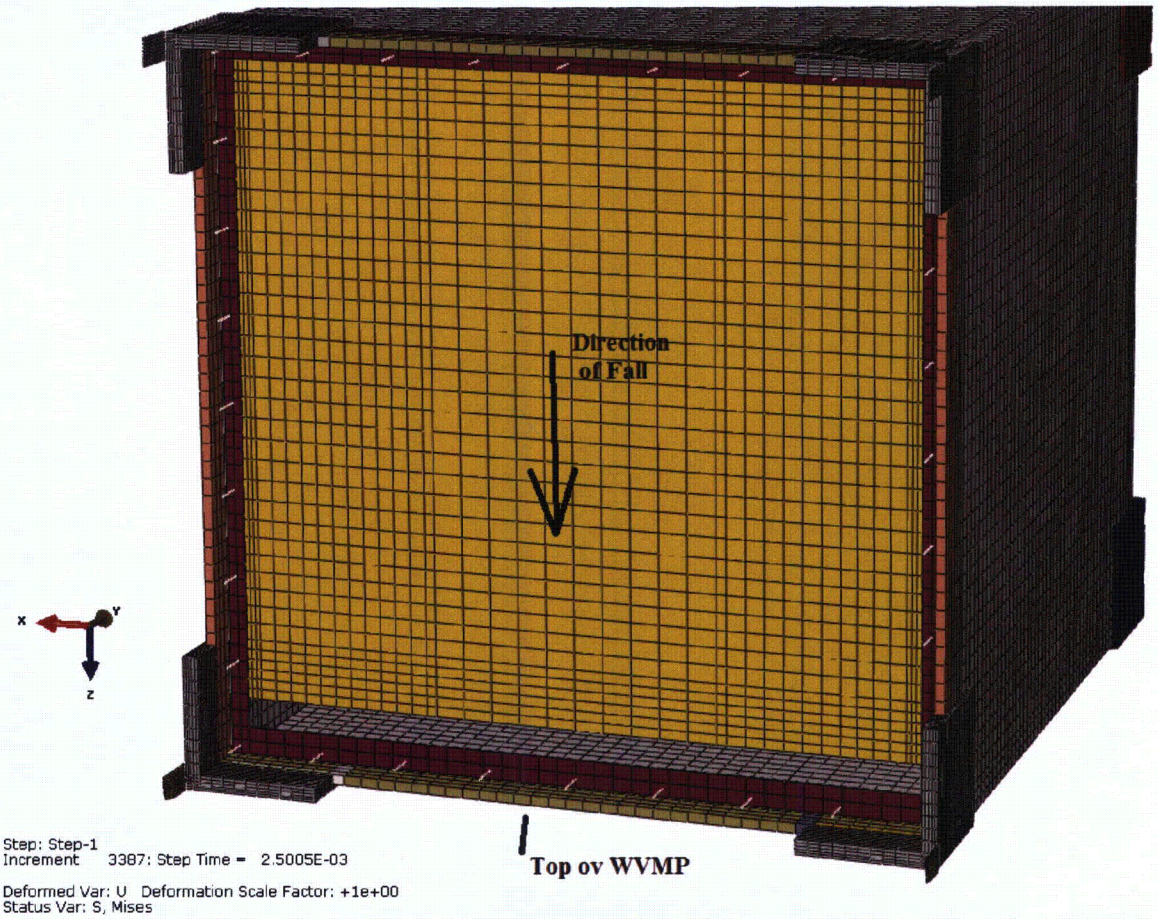

Figure 6-107 Detail View Inside WVMP Showing LDCC, at Time = 0.0025 sec, Showing Gap between LDCC and Container Top

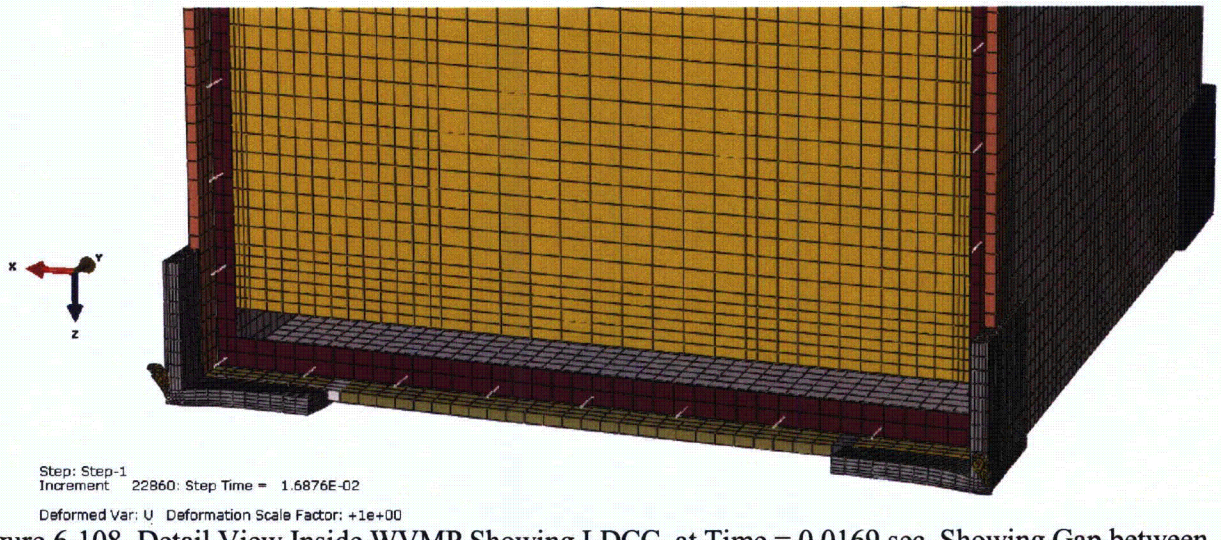

Figure 6-108 Detail View Inside WVMP Showing LDCC, at Time = 0.0169 sec, Showing Gap between LDCC and Container Top

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	126	0

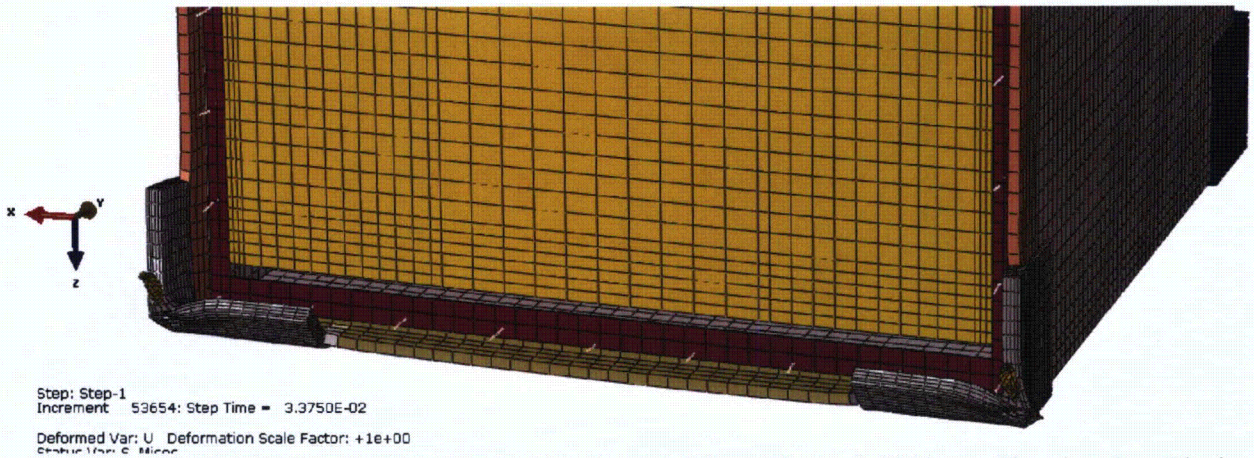

Figure 6-109 Detail View Inside WVMP Showing LDCC, at Time = 0.0338 sec, Showing Gap Closing between LDCC and Container Top

Figure 6-110 Detail View Inside WVMP Showing LDCC, at Time = 0.0431 sec, Showing Gap Closed between LDCC and Container Top

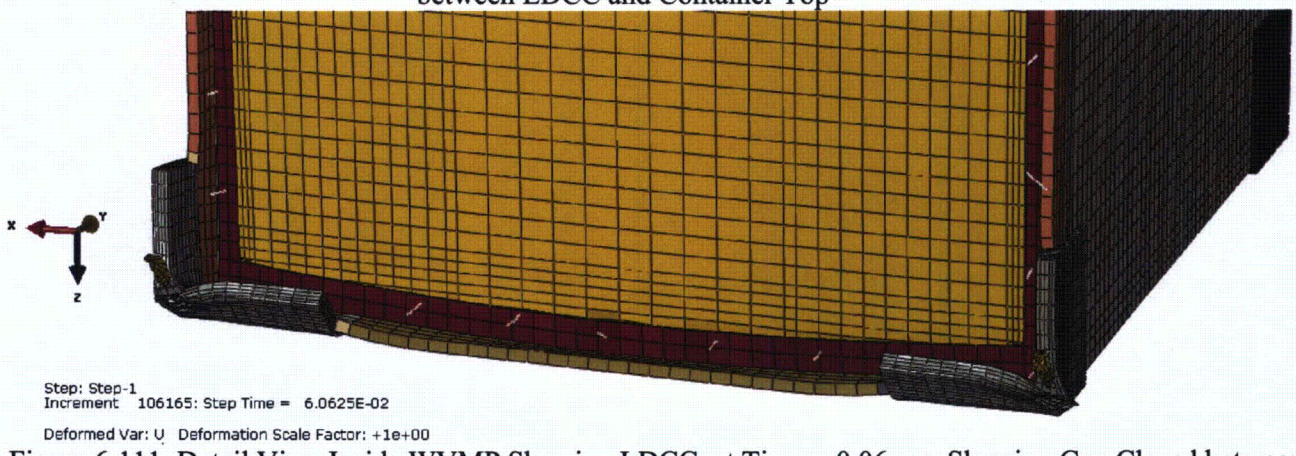

Figure 6-111 Detail View Inside WVMP Showing LDCC, at Time = 0.06 sec, Showing Gap Closed between LDCC and Container Top.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	127	0

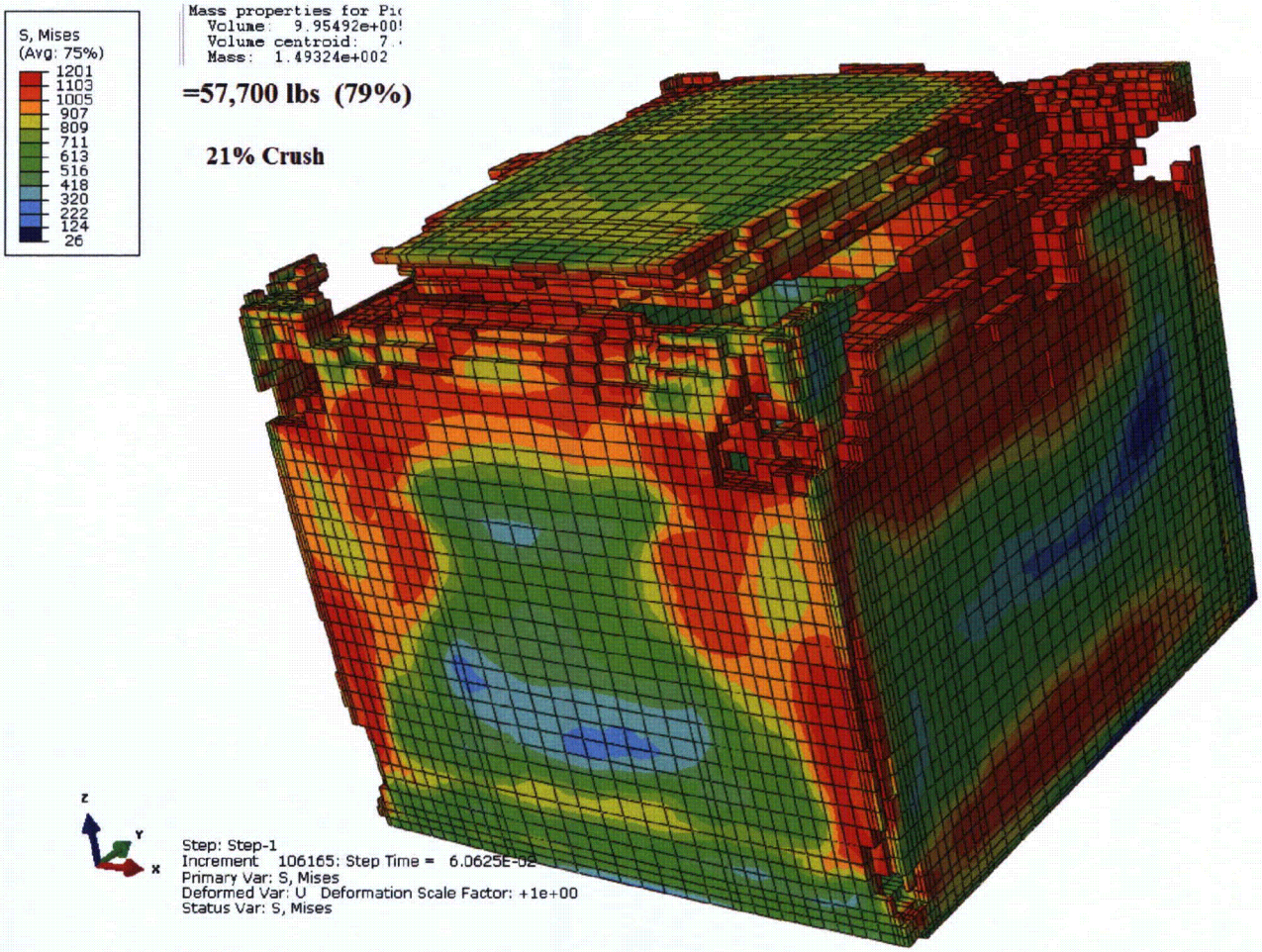

Figure 6-112 LDCC Status after HAC Drop, Top Down, CG over Front Edge, Showing 21 % LDCC crush (View Rotated From Fall Direction, Top of WVMP is up).

6.11.8 Back Side Edge Down

The 30 foot drop has the WVMP oriented with the side opposite the bolted door oriented down at an angle that places CG over the back side lower shock absorbers (See Figure 6-56). This drop configuration is not expected to be bounding in terms of LDCC crush, container damage, or bolted wall displacement. Limited output is shown to confirm this assessment.

Energy Histories During Impacts

Figure 6-113 shows the kinetic and plastic energy history during the drop. Figure 6-114 contains a synchronized view of the enery time history and the deformation time history captured at the point of full utilization of the shock absorbers. As shown, nearly all (85%) of the drop energy is absorbed at this time instance. This also matches the Figure 6-113 energy curves which shows this same time instance as the point where the LDCC begins plastic dissipation. The Kinectic energy plot indicates a 101 G impact.

G-value = 101 G

Stress, Strain and Deformed Shape

Figure 6-114 shows the deformation is limited to the corners bumpers at the impact point. Figure 6-115 shows the total accumulated plastic strains, with peak strains at 11% and general surface strains at 5% and insignificant mid-plate strains. The plastic strains occur only at the shock absorber locations.

Bolt Tensile Loads

Bolt tensile load histories are shown for this drop simulation, as this drop was expected to not challenge the bolted closure. The results are similar to the hard side down drops, in that the tensile loads are within capacity, and a few mid-span bolts fail in shear on the lower most side, from the content inertial loads. Figure 6-116 shows a maximm bolt tensile loads at 85,000 lbs, vs a computed capascity of 138,000 lbs. Nearly all bolts remain intact. The lack of significant bolt failures confirms intital judgements for this drop orientation and shows that the sealed joint remains close fitting during and after the drop.

LDCC Stress

Figure 6-118 shows the LDCC after the back edge drop. Within ABAQUS/Viewer, the mass of the uncrushed elements is queried, resulting in a mass of 174.700, vs the total LDCC mass of 189.051 (in units of lbs/386.4 in/sec^2). The LDCC crush percentage is low, and located at the back wall, away from the bolted side door.

LDCC Mass Crushed = (189.051-174.700)/189.051 = 7.6%

Door Gaps

In this drop orientation, there are no strong force drivers that would cause measurable deflections at the bolted wall joint. This is confirmed in the deformed views shown inFigure 6-117 and in the bolt tensile force history discussed above. The displacement contour shows only 0.33 inch displacement at the perimeter seal joint. The face seal displacement is essentially zero.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	129	0

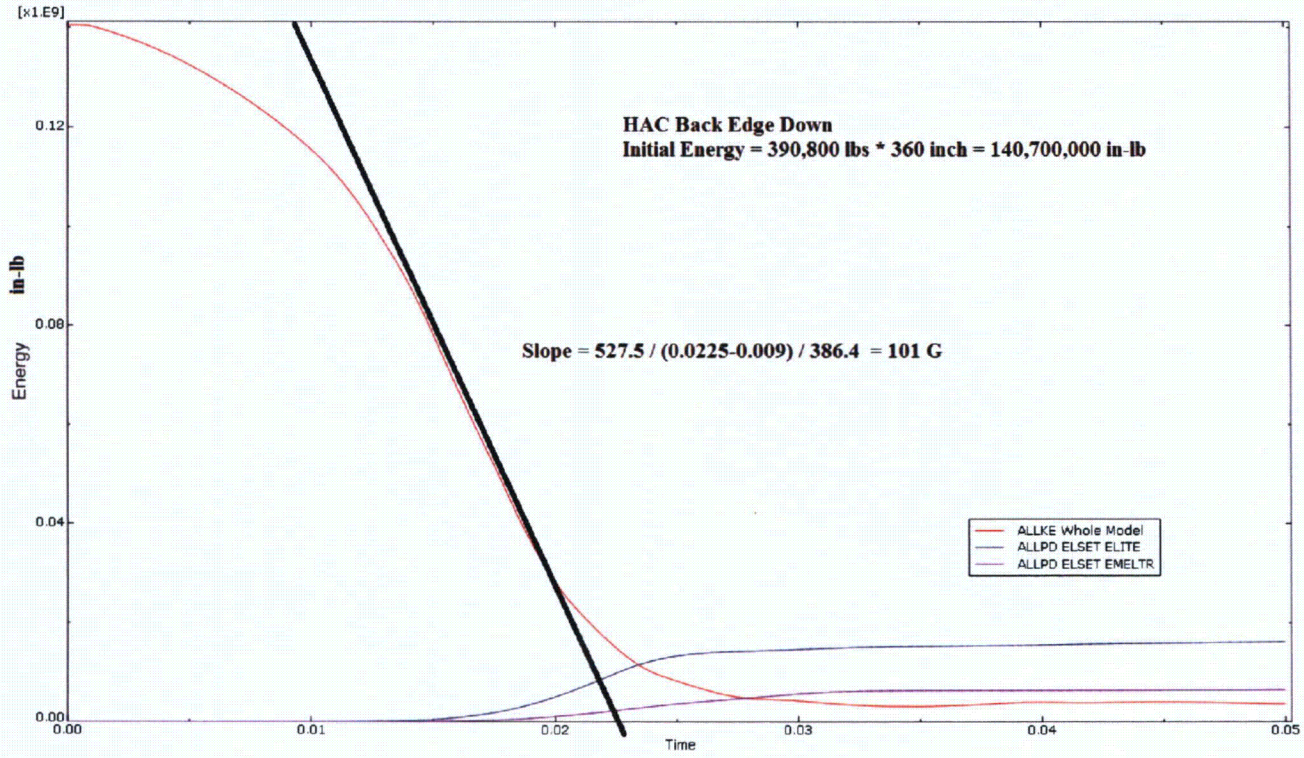

Figure 6-113 Energy Time History for HAC Drop, Back Edge Down, Showing 101 G, and Low Dissipation from LDCC or Melter.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	130	0

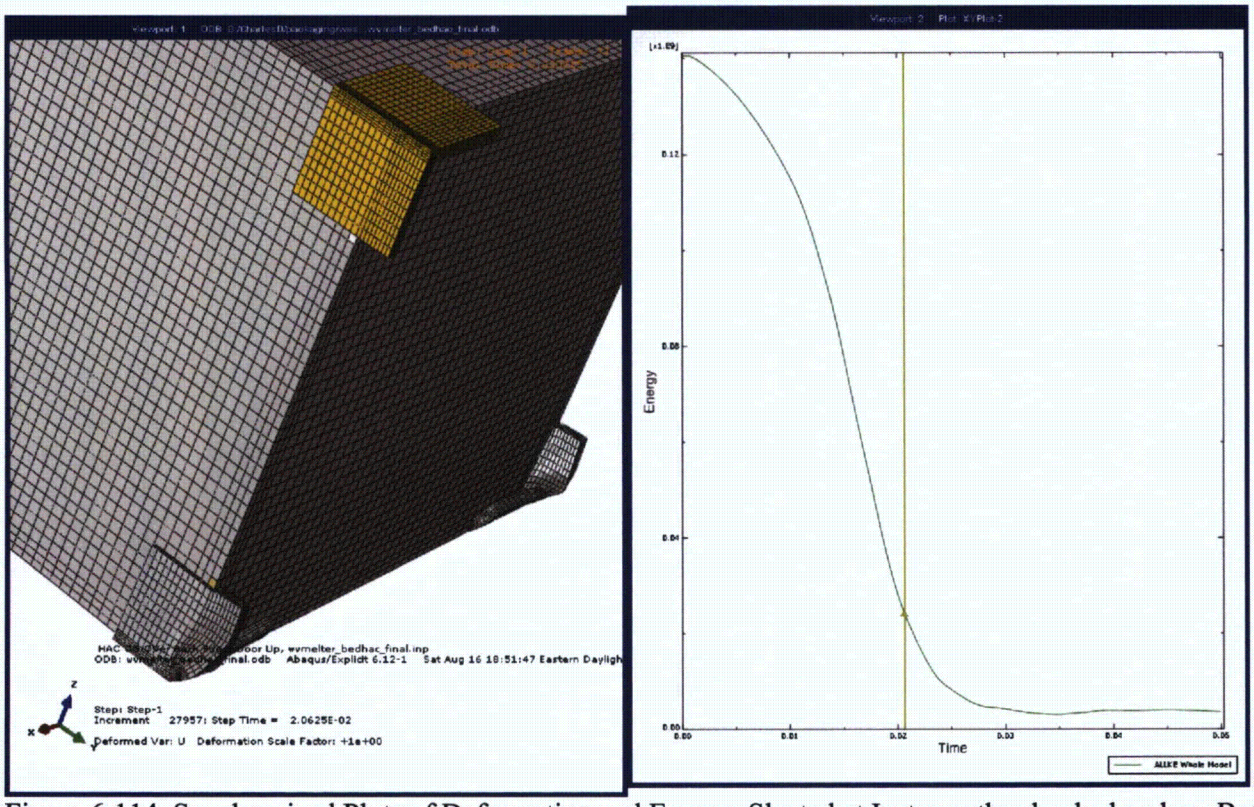

Figure 6-114 Synchronized Plots of Deformation and Energy, Slected at Instance the shock absorbers Bottom Out, Showing 85% of the energy is Absorbed prior to Bottoming out of the Back Side Bumpers.

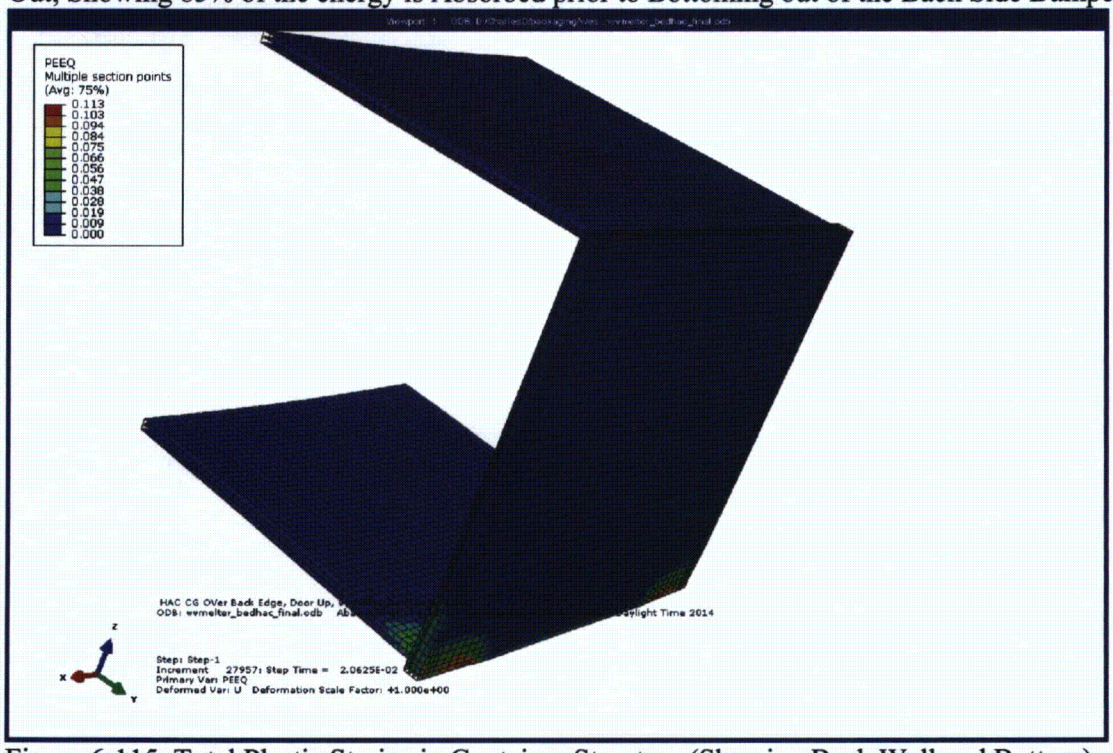

Figure 6-115 Total Plastic Strains in Container Structure (Showing Back Wall and Bottom) after HAC Back Edge Drop.

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	131	0

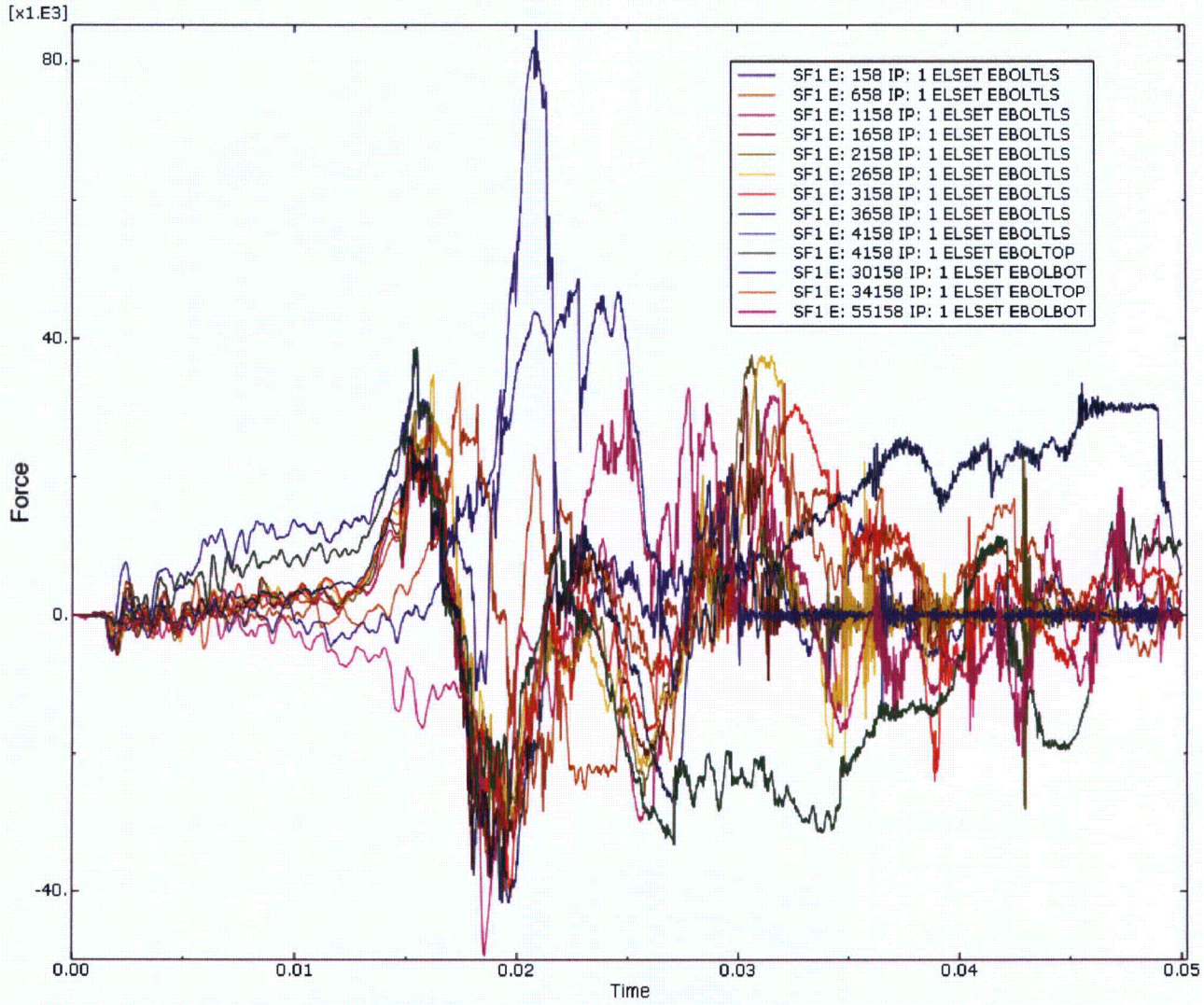

Figure 6-116 Bolt Tensile History, Showing Maximum Tensile Loads at 85,000 lbs. Two Bolts have indicated failure, which aer Dueto shear loads at the Bottom Wall. .

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
M-CLC-A-00497	132	0

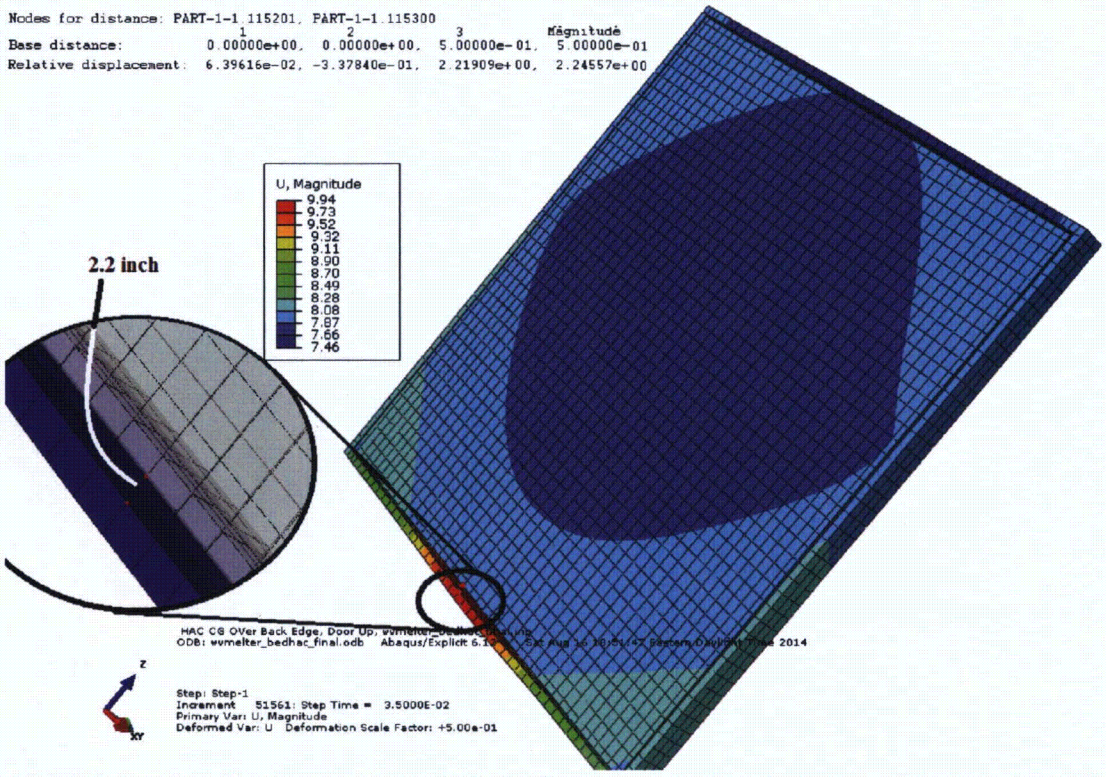

Figure 6-117 Deflection Contour at Bolted Wall, Showing only 0.33 inch Joint Displacement (Perimeter direction), HAC Drop, Hard Side Down.

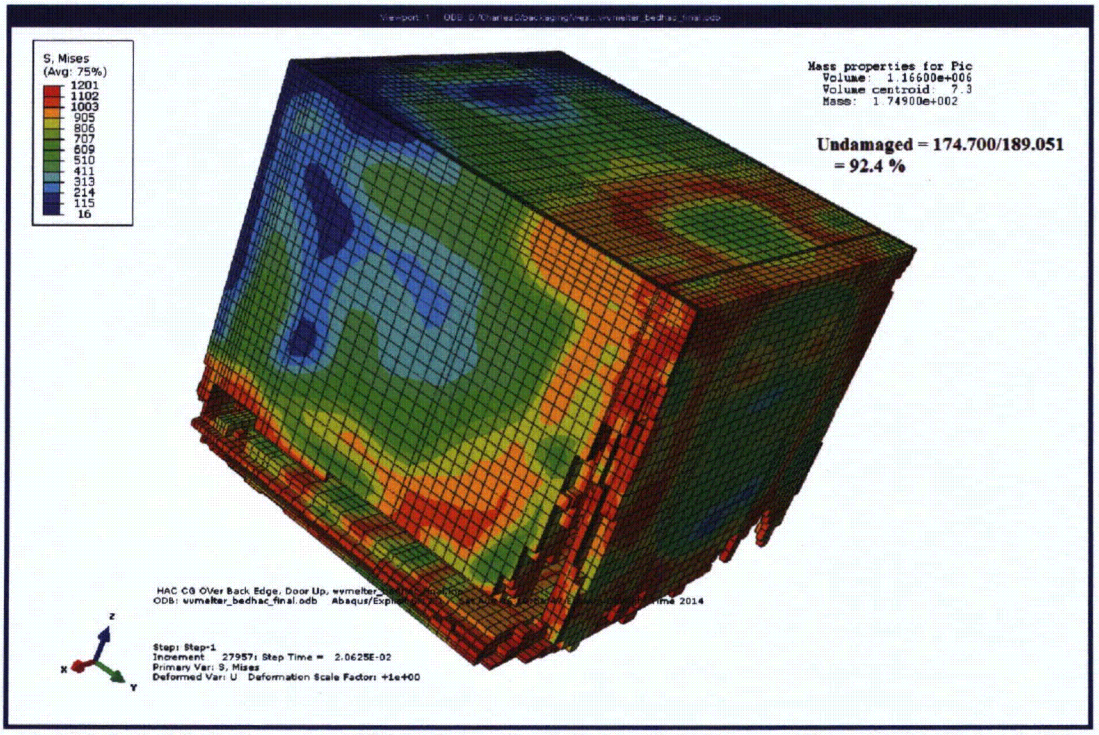

Figure 6-118 LDCC Status after HAC Drop Back Edge Side Down, Showing 7.5 % LDCC crush.

7.0 Summary of Results

The overall assessment used combined loads to establish the condition of the BTSP overpack and internals (when applicable) during NCT events. HAC drop events were also evaluated for the drum and CV bolting, per NUREG 6007. Majors results established during the specific load case evaluations are shown below.

Shipping and Vibration
Package evaluated for 4G random acceleration per shipping and transporation PSD. No bolt loosening occurs, no foam utilization occurs (negligible), no unacceptable fatigue.

Concrete Load = 78 psi vs 1200 psi crush strength (6.5% of allowable)
Bolt Stress = 19.5 ksi, vs 105 ksi bolt yield strength (19 % of allowable)

Lifting
The shipping configuration does not include any lifting lugs.

Compressive Stacking, Buckling
Not applibable. The WVMP weight exempts itself from this requirement. The buckling analysis shows that the WVMP will not buckle. The buckling stress capacity exceeds the primary tensile stress limits. Therefore, meeting tensile stress limits automatically precludes buckling.

Reduced/Increased Pressure, NCT and HAC
The WVMP can withstand worst case combinations of MNOP and reduced/increased external pressure.
NCT Conditions: 23.2 psi demand (MNOP plus red/inc pressure) vs 97 psi capacity
HAC Conditions: 73 psi demand (HAC Fire) vs 126 psi capacity

Thermal
The thermal loads were shown insignificant.

NCT Drops
The WVMP was evaluated for CG over edge drops, CG over limiter side down and CG over hard side down drops. The results shows acceptable response during the NCT and and the the impact limiter remains in place and fully effective for subsequent HAC events. The grouted melter package is not damaged during NCT drops. Specifc results are shown below.

Table 7-1 Results for NCT Drop Analysis

	G-Level	Limiter Deformation	LDCC Damage	Closure Bolts	Door Seal Status
CG over Edge	5.0 G	Minor denting on lowermonet tubesteel	< 0.005%	D/A = 50%	maintained
CG over Limiter	49 G	Insignificant	0.06%	D/A = 96%	Maintained
CG over Hard Side	76G	None	0.05%	D/A at 100% D/C = 73 %	maintained

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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HAC Drops

The WVMP was evaluated for seven different impact orientations for the 30 foot drop. These include the three performed for NCT, plus additional orientations to include inverted positions, and onto the back side and side edges.

The HAC drops are severe enough to fail the closure bolts in nearly all cases. The exceptions are for orientations that have the bolted side door tilted upward. The results produced the following general trends:

- The container survives the HAC drops without appreciable deformation or material strains. The most localized damage to the container walls occurred in the CG over corner, where the corner experienced high compression. The most general deformation occurred in the CG over side edge, where the impact causes pressure loads on the two adjacent walls, thus bending in the corner joint. The maximum strains of 10% were within the material's capacity.
- The closure bolts fail in most drops, exceptions being drops onto hard sides.
- An inverse relation was shown between LDCC crush and door seal deformation. The high G impact drops that damaged the most percentage of concrete came from flat-side down impacts and back-side down impacts. These drop scenarios were associated with lower demands on the bolt wall seal joint. Orientations that challenged the wall seal were the front corner drops (on edge or corner). These drops were associated with minimal LDCC damage, as the impact limiter was effective in reducing the impact G-level.
- The maximum impact G-level is 546 G, which per reference 32 and section 5.2, corresponds to less than 1% glass breakage.

8.0 References

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31. ASTM A574, Standard Specification for Alloy Steel Socket-Head Cap Screws.
32. BNWL-1903/UC-70, Impact Testing of Vitreous Simulated High-Level Waste in Containers, May 1975

Attachment A - FEA Input Listings

Side Down, HAC

```
*Heading
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overpack, Room Temp,
wvmelter_sdhac_final.inp
*** Perimeter 2x9 plate with 6x10 box
cushion
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contact=NO
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107, 0., 12.25, 0.0
153, 0.0, 155, 0.0
156, 0.0, 161, 0.0
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:  portions ommitted
:
*****************************
*****  Foam Fill in Vertical beams
*****************************
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**F   top rite, checked
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**E   top right, checked
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42,261165,428042
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:  portions ommitted
:
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Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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6.0,5
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=confoam

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*SOLID SECTION,ELSET=efbump,MATERIAL=mA36

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SECTION,ELSET=ebubump,MATERIAL=m516_70

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*SOLID
SECTION,ELSET=erefract,MATERIAL=mrefrac

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control=yes
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section,sect=rect,elset=ecflany,material=mS
ST
2.9,0.43
0,1,0
*beam
section,sect=rect,elset=ecflanx,material=mS
ST
2.9,0.43
1,0,0
*beam
section,sect=rect,elset=ewflan,material=mSS
T
8,0.43
0,1,0
*beam section,section=circ,
elset=ebolt1,material=mbolts
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Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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elset=ebolt2,material=mbolts
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1,0,0
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*Material, name=mbolts
*Density
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*Elastic
 2.83e+07, 0.30
*plastic
 105000.,     0.
 106000., 0.0014
 145000,0.16
*shear failure
0.03
*Expansion
9.2e-06
*Material, name=mgas
*Density
 0.00008,
*Elastic
 2.83e+06, 0.35
*plastic
 25000.,     0.
 26000., 0.014
 27000., 0.08
 28000., 0.20
*Material, name=mSST
*Density
 0.000738
*elastic
29.0E6, 0.30
*plastic
38000,  0.0
39000,  0.04009219
60000, 0.1
*************************
*Material, name=msst_elas
*Density
 0.000775,
*elastic
28.3E6, 0.31
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*Density
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*elastic
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*plastic
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39000,  0.04009219
40000,  0.04664
41000,  0.0515
42000,  0.0563
43000,  0.0606
44000,  0.0648
45000,  0.0688
46000,  0.0727
47000,  0.0765
48000,  0.0803
49000,  0.084
50000,  0.087
55000,  0.107
58000,  0.120
61000,  0.133
62000,  0.137
68000,  0.167
72000,  0.188
75000,  0.204
78000,  0.222
80000,  0.234
81000,  0.240
84000,  0.259
87000,  0.278
91000,  0.305
92000,  0.312
113360., 0.482
*Material, name=m500
*Density
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*plastic
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49066.66,0.00825
50600,0.01425
52133.33,0.01970
53666.66,0.02483
55200,0.03088
56733.33,0.03833
58266.66,0.04743
59800,0.05843
61333.33,0.07164
62866.66,0.08740
64400,0.10612
65933.3,0.12827
67466.66,0.15436
69000,0.18500
70533.33333,0.22083
72066.66,0.26260
73600,0.31114
75133.3,0.36736
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*Density
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*elastic
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*plastic
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41000,0.007884894
42000,0.010160922
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45000,0.020114381
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56000,0.066628297
57000,0.071649377
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59000,0.08256631
60000,0.088492847
61000,0.094748869
62000,0.101346358
63000,0.108296987
64000,0.115612398
65000,0.123304366
66000,0.131384902
67000,0.139866299
68000,0.148761158
69000,0.158082399
70000,0.167843251
71000,0.178057254
72000,0.188738243
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74000,0.211557954
75000,0.223725755
76000,0.236418683
76274.94902,0.240002646
************************
**** Properties for lite concrete
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*Density
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*Elastic
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*Crushable Foam
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*Crushable Foam Hardening
 1200., 0.0
 1220., 0.01
 1290., 0.02
 1370.,  0.04
 2200.,  0.05
**** Properties for Foam Fill
*Material, name=mfoam
*Density
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*Elastic
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*Crushable Foam
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*Crushable Foam Hardening
1981, 0.0
1982, 0.0484
1983, 0.168
1984, 0.300
2139, 0.45
2528, 0.62
3323, 0.82
3443, 0.95
4683, 1.07
7683, 1.21
**** Properties for Refractory
*Material, name=mrefrac
*Density
 0.00022876,
*Elastic
3000000.,0.2
*Crushable Foam
 0.3916, 0.2798
*Crushable Foam Hardening
 10000., 0.0
 10020., 0.01
 10090., 0.02
 10170.,  0.04
 20000.,  0.05
************************************
Floor
**** Options: Floor placement, corner at
(x=*, y=-17, z=-2)
*node
10, 80, 0.,74
10, 74, 0.,74
1, -121, -19.001, 164.0
2,  162, -19.001, 164.0
3,  162, -19.001,-28.0
4, -121, -19.001,-28.0
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21,1,2,3,4
*rigid body,elset=floor,refnode=10
*nset,nset=ref
10
:
:  portions ommitted
:
*** Options: initital velocity  96.7 for 1
ft, 527.5 for 30 ft
*initial conditions,type=velocity
nmeltall,2,-527.5
:
:  portions ommitted
:
** STEP: Step-1
**RESTART,WRITE,FREQUENCY=1
*STEP
*dynamic,explicit
,0.045
*output,field,variable=preselect,number
interval=80
*contact output,general
contact,variable=preselect
*Element Output,elset=ebot_e,
directions=YES
1,2,3,4,5
sf, PE, PEEQ, S
*output,history,variable=PRESELECT,time
interval=0.0001
*output, history,time interval=0.00002
*node output, nset=ngaps
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*element output, elset=eboltls
sf
*element output, elset=eboltrs
sf
*element output, elset=ebolbot
sf
*element output, elset=eboltop
sf
*element output,elset=eXpin
ctf
*element output,elset=eZpin
ctf
*Energy Output, elset=elite
ALLKE,ALLPD
*Energy Output, elset=emeltr
ALLKE, ALLPD
*END STEP
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Calculation Continuation Sheet

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Attachment B Measured Weights

The followings are interim weights records Via Enerpac RSC-1002 Hydraulic Cylinders

Pre-Grout Weight

MELTER WASTE PACKAGE GROUTING IMPLEMENTATION/QA PLAN
(SUBJECT TO CHANGE BASED ON ENCOUNTERED CONDITIONS)
(Rev 2, October 23, 2013)

1.0 BACKGROUND

The current Certificate of Conformance for the melter waste package, as designed and provided by WMG, Inc., indicates:

> *"Packaging requirements, prior to shipment, include the addition of Low Density Cellular Concrete (LDCC) at a density that yields a minimum compressive strength of 1,000 PSI. The maximum gross weight of the completed package shall not exceed 390,000 pounds."*

GeoScience Group was awarded a contract to develop a LDCC recipe that meets these criteria and provide such material to the WVDP for placement into the melter waste package.

1.1 1,000 Pounds Per Square Inch (PSI) Specification

As indicated in Section 2.2 of the Statement of Work (SOW) (Mix Design), GeoScience is required to:

> *"... submit a mix design for the proposed grout, to meet the above specification requirements. The mix design shall be proven by laboratory testing (e.g., compressive strength tests) with the results submitted to CHBWV for approval prior to grout placement. If the schedule does not permit*

ATTACHMENT C
CALCULATION OF PRE-GROUTED MELTER WEIGHT
(by Neil Armknecht, 2013)

Melter package was weighed using four Enerpac RSC-1002 hydraulic cylinders.

Each cylinder has an effective area of 19.63 square inches.

Individual cylinder pressures (per calibrated gauges) as follow:

Cylinder 1 = 2810 psi

Cylinder 2 = 5500 psi

Cylinder 3 = 2500 psi

Cylinder 4 = 5180 psi

Total = 15990 psi

Mult. by effective area of cylinder = 19.63 in sq

Therefore = 313,883.7 lbs current weight

Calculation Continuation Sheet

Calculation No.	Sheet No.	Rev.
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Post-Grout Weight

Melter Container TC-474-B Post Grout Weight (per WIP W1303694)

Melter package was weighed using four Enerpac RSC-1002 hydraulic cylinders.

Each cylinder has an effective area of 19.63 square inches.

Individual cylinder pressures (per calibrated gauges) as follow:

Cylinder 1 = 5000 psi

Cylinder 2 = 4850 psi

Cylinder 3 = 4800 psi

Cylinder 4 = 4950 psi

Total = 19600 psi

Mult. by effective area of cylinder = 19.63 in sq

Therefore = 384,748 lbs current weight

Calculation Continuation Sheet

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For 11 to 40 lb_m/ft^3									
Temp	Correlation Factor	Crush Strength, psi, Parallel to Direction of Rise							
		10%	20%	30%	40%	50%	60%	65%	70%
-20°F	C_T	1.35	1.33	1.32	1.31	1.31	1.30	1.28	1.26
75°F	Y_{int}	**4.3422**	**3.8755**	**3.5241**	**3.0307**	**3.0402**	**3.4889**	**5.8935**	**5.6055**
	S	**1.8809**	**1.9321**	**1.9872**	**2.0755**	**2.1451**	**2.2143**	**2.1041**	**2.2368**
100°F	C_T	0.86	0.87	0.88	0.88	0.89	0.90	0.90	0.97
140°F	C_T	0.72	0.74	0.75	0.75	0.75	0.76	0.76	0.81
180°F	C_T	0.62	0.63	0.65	0.65	0.65	0.65	0.64	0.68
220°F	C_T	0.56	0.56	0.57	0.57	0.56	0.54	0.54	0.57
260°F	C_T	0.40	0.40	0.41	0.42	0.41	0.43	0.43	0.47

Table 8: Static to Dynamic Crush Strength Adjustment

Strain	10%	20%	30%	40%	50%	60%	65%	70%
Y_{int}	1.2971	1.4397	1.5181	1.3887	1.4419	1.4275	1.3871	1.4660
S	1.0330	1.0069	0.9941	1.0028	0.9912	0.9831	0.9910	0.9586

The dynamic crush strength is calculated at each %-strain and a function of the static crush strength at the same %-strain;

$$\sigma_{Dynamic} = y_{int} (\sigma_{Static})^{s}$$

Caution: Use only units of PSI for input σ_{static} value.

Calculation Continuation Sheet

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Attachment C: G-Value from Energy Plot

The FEA free-drop simulation includes output of whole model kinetic energy. This is a velocity-squared quantity, where velocity is the net velocity of the package mass. As an estimating tool, the rate of change of energy can be used to establish approximante deceleration levels, by looking a the steepest slopes of the energy history during the impact. For the NCT edgedown case, the energy and velocity and acceleration histories are tracked throughout the impact time history to demonstrate that the slope of the energy history provides a suitable tool for representing the impact G-value.

- Kinectic Energy History represents a velocity squared term ($E = \frac{1}{2} MV^2$)
- Kinectic Energy, "E" is used to compute average package velocity ($V = \sqrt{\frac{2E}{m}}$)
- Change in velocity between time steps is used to compute acceleration, A = $\Delta V/\Delta t$

Step 1: Compute Velocity from Energy

Using the data in the first row of Table B-1, the velocity is computed:

WVMP Mass = 390,800 lbs = 1,011.4 lb*sec^2/in

Energy = 2,196,370 in-lb

$$\text{Velocity} = V = \sqrt{\frac{2E}{m}} = \sqrt{\frac{2 \cdot 2196370}{1011.4}} = 65.9 in/\sec$$

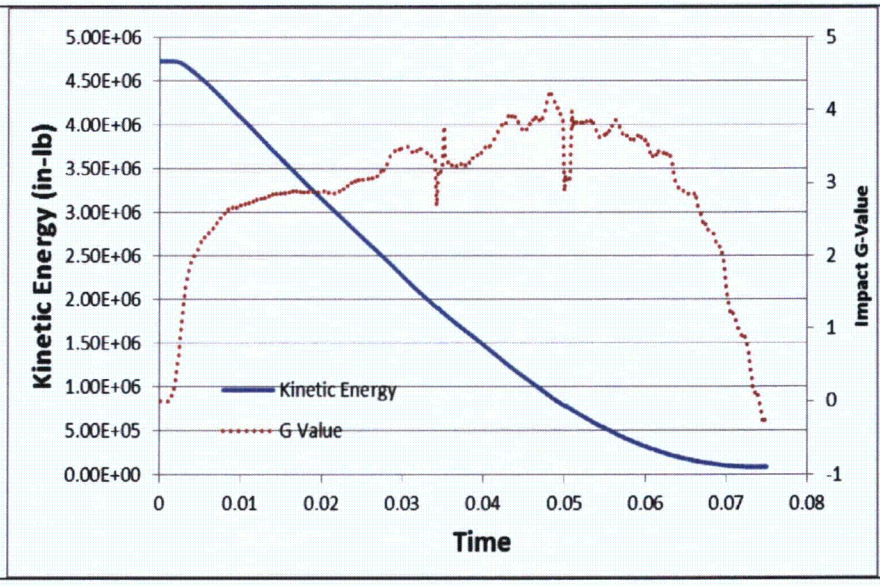
Step 2: Compute Deceleration

Using time = 3.08E-2 as the example, the deceleration is computed by looking at velocity change over the time interval:

Acceleration = (66.0405 in/s – 66.1745 in/sec)/ (0.0308-0.0307 sec) = 1,340 in/sec^2

Acceleration = {1,340 in/sec^2 } / 386.4 in/s^2/G = 3.47 G

The above calculations are performed for all points in the output time history (Table C-1). The rsults are plotted below and show a maximum G-value of 4.5 G. By comparison, the simplified Energy plot slope methods predicts 5.0 G.



Calculation Continuation Sheet

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Time	Energy	Velocity	Accel	
0	4.72E+06	96.64349072		
1.00E-04	4.72E+06	96.64328611	0.005274	
2.00E-04	4.72E+06	96.64328611	0	
3.00E-04	4.72E+06	96.64328611	0	
4.00E-04	4.72E+06	96.64328611	0	
5.01E-04	4.72E+06	96.64329747	-0.00029	
6.00E-04	4.72E+06	96.64326337	0.000886	
7.01E-04	4.72E+06	96.643252	0.000293	
8.00E-04	4.72E+06	96.64324063	0.000295	
9.01E-04	4.72E+06	96.64322927	0.000293	
1.00E-03	4.72E+06	96.6432179	0.000295	
1.10E-03	4.72E+06	96.64320653	0.000293	
1.20E-03	4.72E+06	96.64320653	0	
1.30E-03	4.72E+06	96.64319516	0.000295	
1.40E-03	4.72E+06	96.64302465	0.004395	
1.50E-03	4.72E+06	96.64000044	0.078533	
1.60E-03	4.72E+06	96.63708994	0.075023	
Time History Data Cut for Brevity				
3.07E-02	2.21E+06	66.17451186	3.498168	
3.08E-02	**2.20E+06**	**66.04059167**	**3.455477**	**⇐ Example**
3.09E-02	2.19E+06	65.90688317	3.460365	
Time History Data Cut for Brevity				
7.39E-02	8.62E+04	13.07080965	0.076332	
7.40E-02	8.63E+04	13.07056107	0.006453	
7.41E-02	8.63E+04	13.07176813	-0.03133	
7.42E-02	8.63E+04	13.07454084	-0.07161	
7.43E-02	8.65E+04	13.08024737	-0.14754	
7.44E-02	8.67E+04	13.0884964	-0.2137	
7.45E-02	8.69E+04	13.09939966	-0.28218	
7.46E-02	8.71E+04	13.11041887	-0.28432	
7.47E-02	8.73E+04	13.1225147	-0.3143	
7.48E-02	8.75E+04	13.13029893	-0.20065	
7.49E-02	8.77E+04	13.13743692	-0.18585	
7.50E-02	8.78E+04	13.14479721	-0.19048	

WVMP SAR Reference 3-7

West Valley Demonstration Project Waste Characterization of Vitrification Melter, WVDP-577, Brandjes, C., CH2M Hill-B&W West Valley, LLC, West Valley, New York, September 2014.

West Valley Demonstration Project

Doc. ID Number	WVDP-577
Revision Number	0
Revision Date	09/18 /14

WEST VALLEY DEMONSTRATION PROJECT
WASTE CHARACTERIZATION OF VITRIFICATION MELTER

Cognizant Author: T. M. Pieczynski

Cognizant Manager: P. M. Sauer

CHBWV
West Valley Decommissioning Team

CH2MHILL • B&W West Valley, LLC
10282 Rock Springs Road
West Valley, New York USA 14171-9799

West Valley Demonstration Project
Waste Characterization of Vitrification Melter

September 2014

Revision 0

Christopher Brandjes
Prepared By (Signature on File)

09/08/2014
Date

Todd Pieczynski
Prepared By (Signature on File)

09/08/2014
Date

Table of Contents

Appendix 12 – Melter Surface Area Activity and Decay Corrections Calculations (RADCALC)

DRAWINGS

Drawing 1 – Melter Refractory Assembly Drawing

1.0 INTRODUCTION

The purpose of this document is to describe in detail the methodology used and the results of the characterization of the West Valley Demonstration Project (WVDP) molten glass vitrification Melter (Melter).

The information used to characterize the Melter consists of analytical results taken from vitrified glass and slurry samples, Radiation and Contamination Survey Reports, and Melter Refractory Assembly Drawings detailing the construction materials and layout of the Melter.

Section 2 of this report describes the history of the Melter. Section 3 provides an executive summary. Section 4 provides a description of the characterization methods for each of the defined source terms. Section 5 provides the summary of characterization results for all of the combined source terms.

2.0 HISTORICAL INFORMATION

The WVDP molten glass vitrification Melter consists of an electrically heated box structure approximately 10 feet on each side. The outer shell is formed of stainless steel. The interior is lined with a composite of various refractory materials to with-stand high temperatures. The sides and bottom of the outer shell are covered with a cooling water jacket. The Melter is divided into two sections. The main section contains the Melter cavity, which has an overall height of 4.5 feet. The upper part of the cavity is rectangular in shape, with the lower part in the form of an inverted truncated rectangular pyramid. During normal operation, the Melter would accommodate 227 gallons (approximately 30 cubic feet) of slurry. The slurry was heated with three electrodes, one of which served as the floor of the vessel. The discharge section of the Melter contains a primary and a secondary pour chamber, each with spouts and silicon carbide radiant heaters.

During operation, Batches of slurry feed material were transferred from the Melter Feed Hold Tank (MHFT) to the Melter. Inside the Melter, calcined wastes and glass formers were melted and fused into a glass pool where they homogenized. Homogenized molten glass in the Melter was transferred through the discharge section into stainless steel canisters for safe storage. The silicon carbide heaters used in the discharge section of the Melter were expected to have limited service life based on system testing, and two heater assemblies failed during use. Another operating problem was encountered when the primary glass discharge port plugged with glass near the end of vitrification operations. The secondary pour chamber was then utilized to complete vitrification.

In September 2002, after completion of vitrification of primary wastes, the Melter was used to process decontamination solutions, emptied using two evacuated canisters, and shut down. Based on recorded data, approximately 2,200 kg of molten residual glass were removed from the Melter during this process. The residual material which could not be removed by these processes consists of the glass in the plugged discharge port (spout), glass collected in the bottom of the Melter cavity (the heel), and the residual glass material that migrated into the cracks and crevices of the Melter cavity refractory brick and coated the refractory brick during operations.

3.0 EXECUTIVE SUMMARY

The Melter contains four primary source terms consisting of (1) the heel contained within the Melter cavity, (2) residual glass contained within the cracks, crevices and interstitial spacing associated to the refractory brick, (3) the plugged discharge port (spout), and (4) the exterior surface contamination associated to the Melter. Each of these source terms was characterized independently utilizing available historical information, analytical results and swipe sample results. The total activity associated to the Melter is 3,554 Ci (including daughter products). Total fissile (gram) content of the Melter is 81.56 grams. Total number of A2's associated to the Melter is 214.9. Thermal Decay Heat (watts) associated to the Melter is 9.194

Primary isotopes of concern consist of Cs-137 (Ba-137m) and Sr-90 (Y-90) contributing greater than 99.8% of the total activity associated to the Melter. Other nuclides of concern include actinides, fission products, activation products and all associated daughter products with a total contribution to total activity to be less than 0.2%. APPENDIX 1 gives a breakdown of the total activity by source term, quantity of fissile material by source term and activity of primary isotopes by source terms. Section 4 contains identifies the characterization methodology, activity calculations and decay correction (RadCalc calculation) sheets for each of the individual source terms.

In characterizing the Melter, a conservative approach was taken to ensure that the isotopic distribution and associated activity was bounded. Decay correction was incorporated in the final activity reports.

4.0 WASTE CHARACTERIZATION

The Melter was characterized utilizing analytical data associated to the waste materials that were processed through it, swipe samples within the vitrification cell and swipe samples of the Melter. Representative samples are used to determine Cs-137 and Sr-90 based scaling factors for calculating the hard to detect nuclides.

The radioactivity associated with the Melter is contained in four separate source terms. The first source term is contained within the Melter cavity, consisting of a heel that was produced during the processing of the decontamination solutions used for flushing the remaining residual waste from the Melter Feed Hold Tank (MFHT) and Concentrator Feed Make-Up Tank (CFMT). Once the flushing of the two tanks was complete, the rinseate was sent to the Melter for vitrification. Based on recorded data, approximately 2,200 kg of molten residual glass was removed from the Melter using two evacuated canister assemblies, leaving 300 kg of residual glass to comprise the heel.

The second source term is comprised of all the residual glass contained within the cracks, crevices and interstitial spacing between all of the refractory brick within the Melter cavity. The activity associated with this source term was derived by evaluating all of the different Batches of material that was processed though the Melter and applying it to a very conservative volume of material based on the actual volume of refractory brick. Total calculated mass of residual glass associated to the refractory brick material is 68.2 kg.

The third source term is comprised of the material that is contained within the plugged discharge port (Spout) and associated structures. During the processing of Batch 75, the discharge port became plugged. The volume of material associated to the plugged discharge port consists of material contained within the spout and pour chamber. The spout and pour chamber consists of 2,325 cubic inches of vitrified glass weighing 99.0 kg.

The fourth source term is comprised of activity associated to the surface contamination of the exterior Melter body and components. Based on measurements associated with the Melter

Refractory Assembly drawings, the exterior Melter body and components consist of a total surface area of 522,261.6 cm^2. By using the maximum result from swipe samples taken from the exterior of the Melter body and applying a conservative wiping efficiency, a bounding total removable activity associated to the exterior of the Melter was determined to be 14.36 Ci.

4.1 Melter Heel Characterization

The Melter heel consists of 300 kg of residual glass contained with the lower body of the Melter cavity. The heel was produced during the processing of the decontamination solutions used for flushing the remaining residual waste from the Melter Feed Hold Tank (MFHT) and Concentrator Feed Make-Up Tank (CFMT). Once the flushing of the two tanks was complete, the rinseate was sent to the Melter for vitrification. Based on recorded data, approximately 2,200 kg of molten residual glass was removed from the Melter using two evacuated canister assemblies, leaving 300 kg of residual glass to comprise the heel.

For determining the isotopic distribution and associated activities related to the Melter heel, analytical data from glass shard samples taken from the Evacuated Canisters was utilized (containers MV-997 and MV-998). For analysis, each of the glass shard samples were split into three separate samples and analyzed (See APPENDIX 2 for Shard Sample Analysis – Sample 04-0073 (#1, #2, #3) and Sample 04-0074 (#1, #2, #3)). In calculating the total activity for the heel, for each isotope, an average of all six sample results (uCi/g) was used and multiplied by the 300 kg of vitrified glass that comprised the heel (see APPENDIX 3 for Melter Heel Activity Calculations). In order to derive a more accurate activity, the isotopic activity was decayed from 7/18/2002 to 9/02/2014 (original expected shipment date).

The total activity associated to the Melter heel (decayed corrected) is 1.117E+03 Ci (including all daughter products) with 29.23 grams of fissile material. Melter heel contains 63.15 A2's with a Thermal Decay Heat of 2.834 W.

4.2 Residual Glass Contained within Refractory Brick Characterization

During the course of six years of vitrification, molten glass would seep into cracks, crevices and interstitial spacing between and within the pieces of refractory brick. Based on the Melter Refractory Assembly Drawings PNL-011-01 through -018 (DRAWING 1), the volume of refractory brick contained within the Melter cavity is 92.7 ft^3, being comprised of two types: Monofrax Refractory (61.88 ft^3) and Zirmul Refractory (30.82 ft^3). For the purposes of determining the total volume of residual glass contained within the cracks, crevices and interstitial spacing, a conservative estimate of 1% of the total volume of refractory brick was applied. This estimate was based on the cross sectioning samples (APPENDIX 4) that were taken of similar refractory material and video taken of inside of the Melter cavity.

For determining the isotopic distribution and associated activities, the average geometric mean for all of the samples taken from Batches 6 through 77 were used. Analytical results from Batches 6 through 69 were analyzed for Cs-137 and Sr-90 (predominant isotopes in waste

matrix). Analytical results for Batches 70 through 77 included actinides, fission products and activation products. For Batches 6 through 69, the actinides and activation products were scaled in based on the Sr-90 contribution in relation to the geometric mean for Batches 70-77.

As previously stated, the total volume of refractory contained within the Melter is 92.7 ft^3. The total volume of residual glass, based on the conservative estimate of 1% of the total volume of refractory, is 0.927 ft^3. With the glass matrix having a specific gravity of 2.6 g/cc, the total mass of residual glass contained within the cracks, crevices and interstitial spacing is 68.2 kg. By applying the geometric mean of the batched material that was processed through the Melter, the total activity associated to this source term (decay corrected) is 630 Ci (including all daughter products). The refractory contains 67.13 A2's with a Thermal Decay Heat of 1.768 W. The residual glass contained within the refractory contains 32.68 g of fissile material. APPENDIX 5 identifies the original activity calculations and RADCALC decay corrected calculations, glass volume and mass calculations, and volume and mass calculations for the refractory brick.

4.3 Plugged Discharge Port (Spout) Characterization

During the processing of Batch 75, Canister 266, the west discharge port of the melter became clogged (plugged) and unusable. For the purposes of characterization of this source term, the plugged discharge port and associated area is presumed to be completely full. Based on the Melter Refractory Assembly drawings (Drawing 1) the plugged discharge port and associated area consists of a volume of 2,325 cubic inches containing 99 kg of vitrified glass. The plugged discharge port and associated area consist of the pour spout and pour chamber.

For the purposes of determining the isotopic distribution and associated activity, sample data from Batch 75 Canister 266 was used (APPENDIX 6). The Cs-137 and Sr-90 values came directly from the Canister 266 glass shard analytical results. The actinides, remaining fission and activation products were scaled using Radman Waste Stream from the Heel material (APPENDIX 7). By applying analytical results of Batch 75, Canister 266 material that was processed through the Melter and applying the scaling factors identified in Heel material, the total activity associated to this source term (decay corrected) is 1,793 Ci (including all daughter products) with 18.99 g of fissile material. The plugged discharge port contains 82.44 A2's and generates 4.551 W of thermal Decay Heat. APPENDIX 8 contains the activity and RADCALC calculations identifying the decay corrected activity of this material from 9/02/2014.

4.4 Melter Exterior Surface Contamination Characterization

The final source term associated to the Melter is the exterior shell and associated components (i.e. electrodes, passive feed nozzle, airlift, etc.). The external Melter surface contamination was determined by calculating the total activity bases on swipe samples taken on the exterior surface of the Melter and multiplying it by the total surface area of the Melter. A conservative isotopic distribution consisting of the airborne sample analysis from the contaminated vitrification cell (see APPENDIX 9) and the isotopic distribution associated with the refractory was utilized to bound the isotopic activity.

Based on the Melter Refractory Assembly drawing (DRAWING 1), the surface are of the Melter was calculated to be 80,950.7 in^2 (522,261.6 cm^2) with the body of the Melter having a surface area of 79,537.02 in^2 (513,141.01 cm^2) and the associated components having a surface area of 1,413.7 in^2 (9,120.6 cm^2).

The isotopic distribution for the Melter surface contamination was derived by utilizing the distribution associated with the Vitrification Airborne sample results in combination with the isotopic distribution associated with the refractory brick contained within the Melter. A comparison of both isotopic distributions and percent abundance was completed. All of the isotopes associated with each distribution were included in the final distribution. The most conservative percent abundance was used when both distributions contained the same isotope. When only one of the distributions contained an isotope, that isotope was included to the final distribution with its corresponding percent abundance.

In April of 2004, three smear samples were taken on the Melter body (see APPENDIX 10 – Rad Survey Report 124255). Contact dose rate reading of these smear samples were reported as 2R/hr, 2R/hr and 6R/hr. Each smear sample was taken over a 100 cm^2 surface area. Due to the small sample population the most conservative results (6R/hr) was applied to the entire surface are of the container. In accordance with Radiological Engineering Calculation CALC-2007-48 (APPENDIX 11), 1 mR/hr is equal to approximately 67,000 dpm B^- / Y. To ensure that the total removable activity associated to the exterior of the Melter has been accounted for, a smear wiping efficiency factor of 10% was included. Based on this information, the total removable activity associated to the exterior surface of the Melter is (decay corrected) 14.36 Ci (including all daughter products) with 0.66 g of fissile material (see APPENDIX 12) with a concentration of 27.50 uCi/cm^2. The Melter exterior surface activity contains 2.136 A2's and produces a thermal Decay Heat of 0.041 W.

5.0 RESULTS

Based on the results of this characterization analysis, the Melter contains a total activity of 3,554 Ci (including all daughter products) with Cs-137 (Ba-137m) contributing 3,143 Ci (88.425%) and Sr-90 (Y-90) contributing 407.1 Ci (11.453%). 99.6% of the total activity associated with the Melter is contained within the Melter cavity in the form of residual glass contained within the refractory brick, heel and plugged discharge consisting of 3,540 Ci. The total surface contamination activity associated to the Melter is 14.36 Ci. The activity from surface contamination represents approximately 0.404% of the total activity at a concentration of 27.50 uCi/cm^2. The Melter contains 2.149E+02 A_2's and generates 9.194 watts (decay heat).

APPENDIX 1

Activity Summary

APPENDIX 1 - Activity Summary

Activity Breakdown by Source Term

Source Term	Total Act (Ci)	Fissile Mass (g)	A2's	Decay Heat (W)	% of Total Activity
Exterior Contamination (decay corrected)	1.436E+01	6.569E-01	2.136E+00	4.054E-02	0.404%
Melter Spout (decay corrected)	1.793E+03	1.899E+01	8.244E+01	4.551E+00	50.445%
Refractory (decay corrected)	6.300E+02	3.268E+01	6.713E+01	1.768E+00	17.725%
Melter Heel (decay corrected)	1.117E+03	2.923E+01	6.315E+01	2.834E+00	31.426%
Totals	3.554E+03	8.156E+01	2.149E+02	9.194E+00	100.000%

Activity Associated to Primary Isotopes

	Exterior Surface	Spout	Refractory	Heel	Totals	
	Act (Ci)	Act (Ci)	Act (Ci)	Act (Ci)	Act (Ci)	% of Total Act
Cs-137	5.062E+00	8.566E+02	2.132E+02	5.419E+02	1.617E+03	45.487%
Ba-137m	4.778E+00	8.086E+02	2.012E+02	5.116E+02	1.526E+03	42.938%
Sr-90	2.213E+00	6.332E+01	1.068E+02	3.120E+01	2.035E+02	5.726%
Y-90	2.213E+00	6.333E+01	1.068E+02	3.121E+01	2.036E+02	5.727%
Total Activity of Primary Isotopes						99.878%
Remaining Activity						0.122%

APPENDIX 2

Glass Shard Sample Report (04-0073 & 04-0074)

APPENDIX 2

Sample Report

Report Date : 5/22/2014 Revision Date : 03/10/2004

User Sample ID: 04-0073#1
Description: SHD-WV-997-02,03
Activity Units: uCi/gm
Sample Date: 09/16/2002

Nuclide	Activity	LLD	%Abundance	Scaling Nuclide	Scaling Factor
Cm-243	8.340E-03	False	0.000 %	Cs-137	3.808E-06
Cm-244	2.180E-01	False	0.009 %	Cs-137	9.954E-05
Mn-54	8.120E-02	False	0.003 %	Cs-137	3.708E-05
Co-60	4.040E-02	False	0.002 %	Cs-137	1.845E-05
Ni-63	4.840E-01	False	0.021 %	Cs-137	2.210E-04
Sr-90	1.270E+02	False	5.469 %	Cs-137	5.799E-02
Tc-99	9.670E-03	False	0.000 %	Cs-137	4.416E-06
Cs-137	2.190E+03	False	94.307 %	N/A	N/A
Eu-154	6.560E-01	False	0.028 %	Cs-137	2.995E-04
Th-228	2.940E-02	False	0.001 %	Cs-137	1.342E-05
Th-230	2.100E-04	False	0.000 %	Cs-137	9.589E-08
Th-232	2.450E-04	False	0.000 %	Cs-137	1.119E-07
U-232	2.660E-02	False	0.001 %	Cs-137	1.215E-05
U-233	1.080E-02	False	0.000 %	Cs-137	4.932E-06
U-234	5.170E-03	False	0.000 %	Cs-137	2.361E-06
U-235	2.120E-04	False	0.000 %	Cs-137	9.680E-08
U-236	6.350E-04	False	0.000 %	Cs-137	2.900E-07
U-238	1.150E-03	False	0.000 %	Cs-137	5.251E-07
Np-237	3.850E-03	False	0.000 %	Cs-137	1.758E-06
Pu-238	3.340E-01	False	0.014 %	Cs-137	1.525E-04
Pu-239	7.650E-02	False	0.003 %	Cs-137	3.493E-05
Pu-240	5.850E-02	False	0.003 %	Cs-137	2.671E-05
Pu-241	1.540E+00	False	0.066 %	Cs-137	7.032E-04
Am-241	1.490E+00	False	0.064 %	Cs-137	6.804E-04
Am-243	1.470E-02	False	0.001 %	Cs-137	6.712E-06
Cm-242	1.020E-01	False	0.004 %	Cs-137	4.658E-05

Sample Report

Report Date : 5/22/2014 Revision Date : 03/10/2004

User Sample ID: 04-0073#2
Description: SHD-WV-997-02,03
Activity Units: uCi/gm
Sample Date: 09/16/2002

Nuclide	Activity	LLD	%Abundance	Scaling Nuclide	Scaling Factor
K-40	4.440E-02	False	0.002 %	Cs-137	1.965E-05
Ni-63	5.480E-01	False	0.023 %	Cs-137	2.425E-04
Sr-90	1.300E+02	False	5.396 %	Cs-137	5.752E-02
Zr-95	1.370E+01	False	0.569 %	Cs-137	6.062E-03
Tc-99	9.420E-03	False	0.000 %	Cs-137	4.168E-06
Cs-137	2.260E+03	False	93.816 %	N/A	N/A
Eu-154	5.940E-01	False	0.025 %	Cs-137	2.628E-04
Th-228	2.720E-02	False	0.001 %	Cs-137	1.204E-05
Th-230	1.940E-04	False	0.000 %	Cs-137	8.584E-08
Th-232	1.880E-04	False	0.000 %	Cs-137	8.319E-08
U-232	2.620E-02	False	0.001 %	Cs-137	1.159E-05
U-233	1.060E-02	False	0.000 %	Cs-137	4.690E-06
U-234	5.070E-03	False	0.000 %	Cs-137	2.243E-06
U-235	1.840E-04	False	0.000 %	Cs-137	8.142E-08
U-236	5.510E-04	False	0.000 %	Cs-137	2.438E-07
U-238	1.200E-03	False	0.000 %	Cs-137	5.310E-07
Np-237	2.680E-03	False	0.000 %	Cs-137	1.186E-06
Pu-238	3.520E-01	False	0.015 %	Cs-137	1.558E-04
Pu-239	8.050E-02	False	0.003 %	Cs-137	3.562E-05
Pu-240	6.150E-02	False	0.003 %	Cs-137	2.721E-05
Pu-241	1.650E+00	False	0.068 %	Cs-137	7.301E-04
Am-241	1.510E+00	False	0.063 %	Cs-137	6.681E-04
Am-243	1.490E-02	False	0.001 %	Cs-137	6.593E-06
Cm-242	1.050E-01	False	0.004 %	Cs-137	4.646E-05
Cm-243	8.450E-03	False	0.000 %	Cs-137	3.739E-06
Cm-244	2.210E-01	False	0.009 %	Cs-137	9.779E-05

Sample Report

Report Date : 5/22/2014 Revision Date : 03/10/2004

User Sample ID: 04-0073#3
Description: SHD-WV-997-02,03
Activity Units: uCi/gm
Sample Date: 09/16/2002

Nuclide	Activity	LLD	%Abundance	Scaling Nuclide	Scaling Factor
Ni-63	5.140E-01	False	0.020 %	Cs-137	2.089E-04
Sr-90	1.250E+02	False	4.826 %	Cs-137	5.081E-02
Tc-99	9.860E-03	False	0.000 %	Cs-137	4.008E-06
Cs-137	2.460E+03	False	94.976 %	N/A	N/A
Eu-154	5.510E-01	False	0.021 %	Cs-137	2.240E-04
Th-228	3.120E-02	False	0.001 %	Cs-137	1.268E-05
Th-230	2.230E-04	False	0.000 %	Cs-137	9.065E-08
Th-232	1.610E-04	False	0.000 %	Cs-137	6.545E-08
U-232	2.830E-02	False	0.001 %	Cs-137	1.150E-05
U-233	1.150E-02	False	0.000 %	Cs-137	4.675E-06
U-234	5.490E-03	False	0.000 %	Cs-137	2.232E-06
U-235	1.980E-04	False	0.000 %	Cs-137	8.049E-08
U-236	5.950E-04	False	0.000 %	Cs-137	2.419E-07
U-238	8.780E-04	False	0.000 %	Cs-137	3.569E-07
Pu-238	3.540E-01	False	0.014 %	Cs-137	1.439E-04
Pu-239	8.160E-02	False	0.003 %	Cs-137	3.317E-05
Pu-240	6.240E-02	False	0.002 %	Cs-137	2.537E-05
Pu-241	1.660E+00	False	0.064 %	Cs-137	6.748E-04
Am-241	1.480E+00	False	0.057 %	Cs-137	6.016E-04
Am-243	1.460E-02	False	0.001 %	Cs-137	5.935E-06
Cm-242	1.020E-01	False	0.004 %	Cs-137	4.146E-05
Cm-243	8.270E-03	False	0.000 %	Cs-137	3.362E-06
Cm-244	2.160E-01	False	0.008 %	Cs-137	8.780E-05

Sample Report

Report Date : 5/22/2014 Revision Date : 03/04/2004

User Sample ID: 04-0074#1
Description: SHD-WV-998-01,02
Activity Units: uCi/gm
Sample Date: 09/20/2002

Nuclide	Activity	LLD	%Abundance	Scaling Nuclide	Scaling Factor
Ni-63	6.140E-01	False	0.023 %	Cs-137	2.486E-04
Sr-90	1.790E+02	False	6.738 %	Cs-137	7.247E-02
Tc-99	3.690E-03	False	0.000 %	Cs-137	1.494E-06
Cs-137	2.470E+03	False	92.982 %	N/A	N/A
Eu-154	9.570E-01	False	0.036 %	Cs-137	3.874E-04
Th-228	3.570E-02	False	0.001 %	Cs-137	1.445E-05
Th-230	2.410E-04	False	0.000 %	Cs-137	9.757E-08
Th-232	3.230E-04	False	0.000 %	Cs-137	1.308E-07
U-232	2.980E-02	False	0.001 %	Cs-137	1.206E-05
U-233	1.220E-02	False	0.000 %	Cs-137	4.939E-06
U-234	5.810E-03	False	0.000 %	Cs-137	2.352E-06
U-235	2.260E-04	False	0.000 %	Cs-137	9.150E-08
U-236	6.790E-04	False	0.000 %	Cs-137	2.749E-07
U-238	1.470E-03	False	0.000 %	Cs-137	5.951E-07
Pu-238	4.900E-01	False	0.018 %	Cs-137	1.984E-04
Pu-239	1.120E-01	False	0.004 %	Cs-137	4.534E-05
Pu-240	8.570E-02	False	0.003 %	Cs-137	3.470E-05
Pu-241	2.290E+00	False	0.086 %	Cs-137	9.271E-04
Am-241	2.220E+00	False	0.084 %	Cs-137	8.988E-04
Am-243	3.070E-02	False	0.001 %	Cs-137	1.243E-05
Cm-242	1.780E-01	False	0.007 %	Cs-137	7.206E-05
Cm-243	1.320E-02	False	0.000 %	Cs-137	5.344E-06
Cm-244	3.450E-01	False	0.013 %	Cs-137	1.397E-04

Sample Report

Report Date : 5/22/2014 Revision Date : 03/04/2004

User Sample ID: 04-0074#2
Description: SHD-WV-998-01,02
Activity Units: uCi/gm
Sample Date: 09/20/2002

Nuclide	Activity	LLD	%Abundance	Scaling Nuclide	Scaling Factor
Co-60	6.060E-02	False	0.002 %	Cs-137	2.424E-05
Ni-63	5.750E-01	False	0.022 %	Cs-137	2.300E-04
Sr-90	1.650E+02	False	6.176 %	Cs-137	6.600E-02
Tc-99	3.920E-03	False	0.000 %	Cs-137	1.568E-06
Cs-137	2.500E+03	False	93.570 %	N/A	N/A
Eu-154	9.400E-01	False	0.035 %	Cs-137	3.760E-04
Th-228	3.010E-02	False	0.001 %	Cs-137	1.204E-05
Th-230	2.040E-04	False	0.000 %	Cs-137	8.160E-08
Th-232	2.620E-04	False	0.000 %	Cs-137	1.048E-07
U-232	2.920E-02	False	0.001 %	Cs-137	1.168E-05
U-233	1.190E-02	False	0.000 %	Cs-137	4.760E-06
U-234	5.680E-03	False	0.000 %	Cs-137	2.272E-06
U-235	2.220E-04	False	0.000 %	Cs-137	8.880E-08
U-236	6.650E-04	False	0.000 %	Cs-137	2.660E-07
U-238	1.700E-03	False	0.000 %	Cs-137	6.800E-07
Np-237	4.420E-03	False	0.000 %	Cs-137	1.768E-06
Pu-238	4.390E-01	False	0.016 %	Cs-137	1.756E-04
Pu-239	1.010E-01	False	0.004 %	Cs-137	4.040E-05
Pu-240	7.750E-02	False	0.003 %	Cs-137	3.100E-05
Pu-241	2.080E+00	False	0.078 %	Cs-137	8.320E-04
Am-241	1.970E+00	False	0.074 %	Cs-137	7.880E-04
Am-243	2.720E-02	False	0.001 %	Cs-137	1.088E-05
Cm-242	1.380E-01	False	0.005 %	Cs-137	5.520E-05
Cm-243	1.140E-02	False	0.000 %	Cs-137	4.560E-06
Cm-244	2.980E-01	False	0.011 %	Cs-137	1.192E-04

Sample Report

Report Date : 5/22/2014 Revision Date : 03/10/2004

User Sample ID: 04-0074#3
Description: SHD-WV-998-01,02
Activity Units: uCi/gm
Sample Date: 09/20/2002

Nuclide	Activity	LLD	%Abundance	Scaling Nuclide	Scaling Factor
C-14	1.150E-02	False	0.000 %	Cs-137	4.792E-06
Ni-63	5.740E-01	False	0.023 %	Cs-137	2.392E-04
Sr-90	1.050E+02	False	4.184 %	Cs-137	4.375E-02
Tc-99	3.590E-03	False	0.000 %	Cs-137	1.496E-06
Cs-137	2.400E+03	False	95.631 %	N/A	N/A
Eu-154	5.660E-01	False	0.023 %	Cs-137	2.358E-04
Th-228	1.980E-02	False	0.001 %	Cs-137	8.250E-06
Th-230	1.340E-04	False	0.000 %	Cs-137	5.583E-08
Th-232	1.690E-04	False	0.000 %	Cs-137	7.042E-08
U-232	2.450E-02	False	0.001 %	Cs-137	1.021E-05
U-233	1.000E-02	False	0.000 %	Cs-137	4.167E-06
U-234	4.780E-03	False	0.000 %	Cs-137	1.992E-06
U-235	1.860E-04	False	0.000 %	Cs-137	7.750E-08
U-236	5.580E-04	False	0.000 %	Cs-137	2.325E-07
U-238	1.090E-03	False	0.000 %	Cs-137	4.542E-07
Np-237	2.800E-03	False	0.000 %	Cs-137	1.167E-06
Pu-238	3.010E-01	False	0.012 %	Cs-137	1.254E-04
Pu-239	7.090E-02	False	0.003 %	Cs-137	2.954E-05
Pu-240	5.410E-02	False	0.002 %	Cs-137	2.254E-05
Pu-241	1.430E+00	False	0.057 %	Cs-137	5.958E-04
Am-241	1.270E+00	False	0.051 %	Cs-137	5.292E-04
Am-243	1.750E-03	False	0.000 %	Cs-137	7.292E-07
Cm-242	9.120E-02	False	0.004 %	Cs-137	3.800E-05
Cm-243	7.270E-03	False	0.000 %	Cs-137	3.029E-06
Cm-244	1.900E-01	False	0.008 %	Cs-137	7.917E-05

APPENDIX 3

Melter Heel Activity and Decay Correction Calculations (RADCALC)

APPENDIX 3 - MELTER Heel Activity Calculations

	04-0074#3	04-0073#1	04-0073#2	04-0073#3	04-0074#1	04-0074#2		Average		300000	grams
Nuclide	**Activity (uCi/g)**	**Activity (uCi/g)**	**Activity (uCi/g)**	**Activity (uCi/g)**	**Activity (uCi/g)**	**Activity (uCi/g)**		**Activity (uCi/g)**		**Total Act (uCi)**	**Total Act (Ci)**
Am-241	1.27E+00	1.49E+00	1.51E+00	1.48E+00	2.22E+00	1.97E+00		1.66E+00		4.97E+05	4.97E-01
Am-243	1.75E-02	1.47E-02	1.49E-02	1.46E-02	3.07E-02	2.72E-02		1.99E-02		5.98E+03	5.98E-03
C-14	1.15E-02	1.06E-02	1.10E-02	1.19E-02	1.22E-02	1.22E-02		1.16E-02		3.47E+03	3.47E-03
Cm-242	9.12E-02	1.02E-01	1.05E-01	1.02E-01	1.78E-01	1.38E-01		1.19E-01		3.58E+04	3.58E-02
Cm-243	7.27E-03	8.34E-03	8.45E-03	8.27E-03	1.32E-02	1.14E-02		9.49E-03		2.85E+03	2.85E-03
Cm-244	1.90E-01	2.18E-01	2.21E-01	2.16E-01	3.45E-01	2.98E-01		2.48E-01		7.44E+04	7.44E-02
Co-60	5.02E-02	4.04E-02	4.82E-02	5.18E-02	5.32E-02	6.06E-02		5.07E-02		1.52E+04	1.52E-02
Cs-137	2.40E+03	2.19E+03	2.26E+03	2.46E+03	2.47E+03	2.50E+03		2.38E+03		7.14E+08	7.14E+02
Eu-154	5.66E-01	6.56E-01	5.94E-01	5.51E-01	9.57E-01	9.40E-01		7.11E-01		2.13E+05	2.13E-01
K-40	5.02E-02	4.64E-02	4.44E-02	5.18E-02	5.32E-02	5.34E-02		4.99E-02		1.50E+04	1.50E-02
Mn-54	7.53E-02	8.12E-02	7.23E-02	7.77E-02	7.98E-02	8.01E-02		7.77E-02		2.33E+04	2.33E-02
Ni-63	5.74E-01	4.84E-01	5.48E-01	5.14E-01	6.14E-01	5.75E-01		5.52E-01		1.65E+05	1.65E-01
Np-237	2.80E-03	3.85E-03	2.68E-03	3.60E-03	3.70E-03	4.42E-03		3.51E-03		1.05E+03	1.05E-03
Pu-238	3.01E-01	3.34E-01	3.52E-01	3.54E-01	4.90E-01	4.39E-01		3.78E-01		1.14E+05	1.14E-01
Pu-239	7.09E-02	7.65E-02	8.05E-02	8.16E-02	1.12E-01	1.01E-01		8.71E-02		2.61E+04	2.61E-02
Pu-240	5.41E-02	5.85E-02	6.15E-02	6.24E-02	8.57E-02	7.75E-02		6.66E-02		2.00E+04	2.00E-02
Pu-241	1.43E+00	1.54E+00	1.65E+00	1.66E+00	2.29E+00	2.08E+00		1.78E+00		5.33E+05	5.33E-01
Sr-90	1.05E+02	1.27E+02	1.30E+02	1.25E+02	1.79E+02	1.65E+02		1.39E+02		4.16E+07	4.16E+01
Tc-99	3.59E-03	9.67E-03	9.42E-03	9.86E-03	3.69E-03	3.92E-03		6.69E-03		2.01E+03	2.01E-03
Th-228	1.98E-02	2.94E-02	2.72E-02	3.12E-02	3.57E-02	3.01E-02		2.89E-02		8.67E+03	8.67E-03
Th-230	1.34E-04	2.10E-04	1.94E-04	2.23E-04	2.41E-04	2.04E-04		2.01E-04		6.03E+01	6.03E-05
Th-232	1.69E-04	2.45E-04	1.88E-04	1.61E-04	3.23E-04	2.62E-04		2.25E-04		6.74E+01	6.74E-05
U-232	2.45E-02	2.66E-02	2.62E-02	2.83E-02	2.98E-02	2.92E-02		2.74E-02		8.23E+03	8.23E-03
U-233	1.00E-02	1.08E-02	1.06E-02	1.15E-02	1.22E-02	1.19E-02		1.12E-02		3.35E+03	3.35E-03
U-234	4.78E-03	5.17E-03	5.07E-03	5.49E-03	5.81E-03	5.68E-03		5.33E-03		1.60E+03	1.60E-03
U-235	1.86E-04	2.12E-04	1.84E-04	1.98E-04	2.26E-04	2.22E-04		2.05E-04		6.14E+01	6.14E-05
U-236	5.58E-04	6.35E-04	5.51E-04	5.95E-04	6.79E-04	6.65E-04		6.14E-04		1.84E+02	1.84E-04
U-238	1.09E-03	1.15E-03	1.20E-03	8.78E-04	1.47E-03	1.70E-03		1.25E-03		3.74E+02	3.74E-04
Zr-95	1.43E+01	1.32E+01	1.37E+01	1.47E+01	1.51E+01	1.52E+01		1.44E+01		4.31E+06	4.31E+00

Note - This table does not depict the decay corrected activity. Decay correction and final total activity will be identifed on Radcalc decay calculation.

Radcalc 4.1 6/27/2014 9:02 AM
File Name: Melter Heal with Shard Data_062714.rad

This report was generated using an unvalidated installation of Radcalc version 4.1.

Radcalc 4.1: C:\WVDP - Melter\Recharacterization Information\Melter Heal Data\Melter Heal with Shard Data_062714.rad

Performed By: Chris Brandjes
Checked By:

========== Input Information ==========

Comments:
Activity calculation for melter heel based on the average of six Shard Sample results of the Evacuated Canister material.

Initial Source Data:

Isotope	Ci	Gm	TBq
C-14	3.470E-03	7.747E-04	1.284E-04
K-40	1.500E-02	2.121E+03	5.550E-04
Mn-54	2.330E-02	3.004E-06	8.621E-04
Co-60	1.520E-02	1.343E-05	5.624E-04
Ni-63	1.650E-01	2.922E-03	6.105E-03
Sr-90	4.160E+01	3.012E-01	1.539E+00
Zr-95	4.310E+00	2.006E-04	1.595E-01
Tc-99	2.010E-03	1.190E-01	7.437E-05
Cs-137	7.140E+02	8.214E+00	2.642E+01
Eu-154	2.130E-01	7.880E-04	7.881E-03
Th-228	8.670E-03	1.058E-05	3.208E-04
Th-230	6.030E-05	2.926E-03	2.231E-06
Th-232	6.740E-05	6.146E+02	2.494E-06
U-232	8.230E-03	3.729E-04	3.045E-04
U-233	3.350E-03	3.478E-01	1.240E-04
U-234	1.600E-03	2.574E-01	5.920E-05
U-235	6.150E-05	2.846E+01	2.276E-06
U-236	1.840E-04	2.879E+00	6.808E-06
U-238	3.740E-04	1.113E+03	1.384E-05
Np-237	1.050E-03	1.490E+00	3.885E-05
Pu-238	1.140E-01	6.657E-03	4.218E-03
Pu-239	2.610E-02	4.208E-01	9.657E-04
Pu-240	2.000E-02	8.814E-02	7.400E-04
Pu-241	5.330E-01	5.150E-03	1.972E-02
Am-241	4.970E-01	1.450E-01	1.839E-02
Am-243	5.980E-03	2.994E-02	2.213E-04
Cm-242	3.580E-02	1.081E-05	1.325E-03
Cm-243	2.850E-03	5.813E-05	1.055E-04
Cm-244	7.440E-02	9.143E-04	2.753E-03
Total Activity:	7.617E+02		2.818E+01

* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	1	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	301	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	43.08	ft^3
Waste Mass:	300	kg

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Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Date to begin source decay: 9/20/2002
Date container sealed: 9/2/2014

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
C-14	3.465E-03	7.736E-04	1.282E-04
K-40	1.500E-02	2.121E+03	5.550E-04
Mn-54	1.437E-06	1.853E-10	5.318E-08
Co-60	3.157E-03	2.790E-06	1.168E-04
Ni-63	1.520E-01	2.691E-03	5.622E-03
Sr-90	3.120E+01	2.259E-01	1.154E+00
Y-90	3.121E+01	5.739E-05	1.155E+00
Zr-95	1.299E-20	6.045E-25	4.805E-22
Nb-95	2.864E-20	7.283E-25	1.060E-21
Nb-95m	1.487E-22	3.900E-28	5.502E-24
Tc-99	2.010E-03	1.190E-01	7.437E-05
Cs-137	5.419E+02	6.234E+00	2.005E+01
Ba-137m	5.116E+02	9.506E-07	1.893E+01
Eu-154	8.123E-02	3.005E-04	3.005E-03
Hg-206	9.794E-16	8.744E-24	3.624E-17
Tl-206	6.881E-14	3.167E-22	2.546E-15
Tl-207	2.559E-09	1.344E-17	9.468E-11
Tl-208	2.717E-03	9.176E-12	1.005E-04
Tl-209	8.094E-08	1.979E-16	2.995E-09
Tl-210	6.540E-11	9.495E-20	2.420E-12
Pb-209	3.747E-06	8.129E-13	1.386E-07
Pb-210	5.155E-08	6.709E-10	1.907E-09
Pb-211	2.566E-09	1.039E-16	9.494E-11
Pb-212	7.563E-03	5.443E-09	2.798E-04
Pb-214	3.114E-07	9.497E-15	1.152E-08
Bi-209	8.103E-25	9.000E-09	2.998E-26
Bi-210	5.139E-08	4.142E-13	1.901E-09
Bi-211	2.566E-09	6.248E-18	9.494E-11
Bi-212	7.563E-03	5.162E-10	2.798E-04
Bi-213	3.747E-06	1.935E-13	1.386E-07
Bi-214	3.114E-07	7.053E-15	1.152E-08
Bi-215	2.100E-15	1.777E-23	7.768E-17
Po-210	4.712E-08	1.049E-11	1.743E-09
Po-211	7.005E-12	6.760E-23	2.592E-13
Po-212	4.844E-03	2.713E-20	1.792E-04
Po-213	3.667E-06	2.907E-22	1.357E-07
Po-214	3.114E-07	9.668E-22	1.152E-08
Po-215	2.566E-09	8.704E-23	9.494E-11
Po-216	7.563E-03	2.172E-14	2.798E-04
Po-218	3.114E-07	1.119E-15	1.152E-08
At-215	1.026E-14	1.956E-29	3.798E-16
At-217	3.748E-06	2.328E-18	1.387E-07
At-218	5.917E-11	1.715E-21	2.189E-12
At-219	2.165E-15	2.269E-24	8.009E-17
Rn-217	4.497E-10	4.671E-24	1.664E-11
Rn-218	5.917E-14	4.002E-26	2.189E-15
Rn-219	2.566E-09	1.973E-19	9.494E-11
Rn-220	7.563E-03	8.230E-12	2.798E-04
Rn-222	3.114E-07	2.024E-12	1.152E-08

Fr-221	3.748E-06	2.158E-14	1.387E-07
Fr-223	3.608E-11	9.328E-19	1.335E-12
Ra-223	2.566E-09	5.009E-14	9.494E-11
Ra-224	7.563E-03	4.723E-08	2.798E-04
Ra-225	3.760E-06	9.590E-11	1.391E-07
Ra-226	3.118E-07	3.154E-07	1.154E-08
Ra-228	5.144E-05	1.887E-07	1.903E-06
Ac-225	3.748E-06	6.458E-11	1.387E-07
Ac-227	2.614E-09	3.615E-11	9.672E-11
Ac-228	5.144E-05	2.302E-11	1.903E-06
Th-227	2.548E-09	8.293E-14	9.429E-11
Th-228	7.562E-03	9.225E-06	2.798E-04
Th-229	3.778E-06	1.777E-05	1.398E-07
Th-230	6.047E-05	2.934E-03	2.237E-06
Th-231	6.150E-05	1.157E-10	2.276E-06
Th-232	6.740E-05	6.146E+02	2.494E-06
Th-234	3.740E-04	1.615E-08	1.384E-05
Pa-231	1.554E-08	3.291E-07	5.751E-10
Pa-233	1.052E-03	5.069E-08	3.892E-05
Pa-234	5.610E-07	2.840E-13	2.076E-08
Pa-234m	3.740E-04	5.446E-13	1.384E-05
U-232	7.309E-03	3.311E-04	2.704E-04
U-233	3.350E-03	3.478E-01	1.239E-04
U-234	1.604E-03	2.579E-01	5.933E-05
U-235	6.150E-05	2.846E+01	2.276E-06
U-235m	2.608E-02	8.476E-10	9.649E-04
U-236	1.840E-04	2.879E+00	6.808E-06
U-237	7.365E-06	9.025E-11	2.725E-07
U-238	3.740E-04	1.113E+03	1.384E-05
Np-237	1.052E-03	1.493E+00	3.892E-05
Np-239	5.973E-03	2.575E-08	2.210E-04
Pu-238	1.039E-01	6.067E-03	3.844E-03
Pu-239	2.609E-02	4.207E-01	9.655E-04
Pu-240	2.005E-02	8.836E-02	7.418E-04
Pu-241	2.990E-01	2.889E-03	1.106E-02
Am-241	4.952E-01	1.445E-01	1.832E-02
Am-243	5.973E-03	2.991E-02	2.210E-04
Cm-242	3.084E-10	9.315E-14	1.141E-11
Cm-243	2.162E-03	4.411E-05	8.001E-05
Cm-244	4.696E-02	5.771E-04	1.737E-03
Total Activity:	1.117E+03		4.134E+01
w/o Daughters:	5.744E+02		2.125E+01

Decay Heat:

Heat Generated on Start Date:	0.889	W
Heat Generated on Seal Date:	2.834	W

========== Regulatory Requirements Warning ==========

Radcalc utilizes numerically based criteria to classify packages against the regulations. Many regulations also include subjective criteria that Radcalc does not consider. The user must check to ensure that all requirements in the regulations are met.

========== DOT Classification Results ==========

* DOT classification calculations are made at the end of the user-specified decay time.

Radioactive Determination:

Radioactive:	Yes		(ACEMs and ALECs > 1.0)
ACEM Limit Fraction:	6806000	ACEMs	(Number of ACEMs)
ALEC Limit Fraction:	2.125E+09	ALECs	(Number of ALECs)

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* This package is not exempt from 49 CFR Subchapter C.

Effective A2s for Mixture:	3.365E+11	Bq	
Type Determination:			
Type:	B		(A2s > 1.0)
A2 Limit Fraction:	63.15	A2s	(Number of A2s)
Limited Quantity Determination:			
Limited Quantity:	No		(Solid, activity > 0.001 A2)
Activity:	63.15	A2	
	1117	Ci	
	41.34	TBq	
Fissile:	Yes		
Fissile Excepted:	Yes (c)		
LSA Determination:			
LSA-I:	No		(Fissile excepted, ACEMs > 30 x rad limits)
LSA-II:	No		(A2s/gm > 0.0001)
LSA-III:	Yes		(A2s/gm <= 0.002)
Specific Activity:	0.0002105	A2/gm	
	0.003724	Ci/gm	
HRCQ Determination:			
HRCQ:	No		(A2s <= 3000, Activity <= 1000 TBq)
A2 Limit Fraction:	63.15	A2s	
Activity:	1117	Ci	
	41.34	TBq	
Fissile Determination:			
Fissile:	Yes		(Contains fissile isotopes per 49 CFR 173.403)
Fissile Excepted Determination:			
Fissile Excepted:	Yes (c)		(Fissile <= 180 grams, non-fissile > = 2000 * fissile
Fissile Mass:	29.23	gm	
Container beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	gm	
Container Mass:	1000	gm	
Waste lead:	0	gm	
Waste beryllium, graphite, and hydrogenous material enriched with deuterium:	0	gm	
Waste Mass:	300000	gm	
Solid Non-Fissile Mass:	300000	gm	
Total Uranium Mass:	1145	gm	
U-233 Mass:	0.3478	gm	
U-235 Mass:	28.46	gm	
Uranium Enrichment:	2.486	%	
Total Plutonium Mass:	0.5181	gm	
Pu-239 Mass:	0.4207	gm	
Pu-241 Mass:	0.002889	gm	
Reportable Quantity Determination:			
Reportable Quantity:	Yes		(RQs > = 1.0)
RQ Limit Fraction:	1441	RQs	(Number of RQs)

Shipping Papers and Labels:

	Isotope	Number of A2s	Fraction of A2s	Cumulative A2s	Cumulative Fraction of A2s
+	Cs-137	33.42	0.5292	33.42	0.5292
+	Am-241	18.32	0.2901	51.74	0.8193
+	Sr-90	3.848	0.06093	55.59	0.8802

+	Pu-238	3.844	0.06087	59.43	0.9411
+	Pu-239	0.9655	0.01529	60.4	0.9564
	Cm-244	0.8687	0.01376	61.27	0.9701
	Pu-240	0.7418	0.01175	62.01	0.9819
	Th-228	0.2798	0.00443	62.29	0.9863
	U-232	0.2704	0.004282	62.56	0.9906
	Am-243	0.221	0.0035	62.78	0.9941
	Pu-241	0.1844	0.00292	62.97	0.997
	Cm-243	0.08001	0.001267	63.05	0.9983

\+ Contains 95% of the total A2s and must be included per 49 CFR 173.433.
* Radionuclides comprising less than 0.1% of the total A2s are not shown in the list.

========== DOE Classification Results ==========

* DOE classification calculations are made at the end of the user-specified decay time.

DOE-STD-1027 Category Determination:

Category:	Cat 3	(Cat3s > 1.0, Cat2s <= 1.0)
Cat 2 Limit Fraction:	0.02215	
Cat 3 Limit Fraction:	12.31	

* The DOE-STD-1027 category determination is based on dose-related limits.
The user must apply any criticality-related limits separately.

Dose-Equivalent Curies:

ICRP-72 DE-Ci:	0.6769
FGR-11 DE-Ci:	0.85

TRU Waste Determination:

TRU Waste:	Yes	(TRU activity > 100 nCi/gm)
TRU Activity:	2182	nCi/g

WIPP Quantities:

FGE Value:	19.07
PE-Ci Value:	0.686

========== NRC Classification Results ==========

* NRC classification calculations are made at the end of the user-specified decay time.

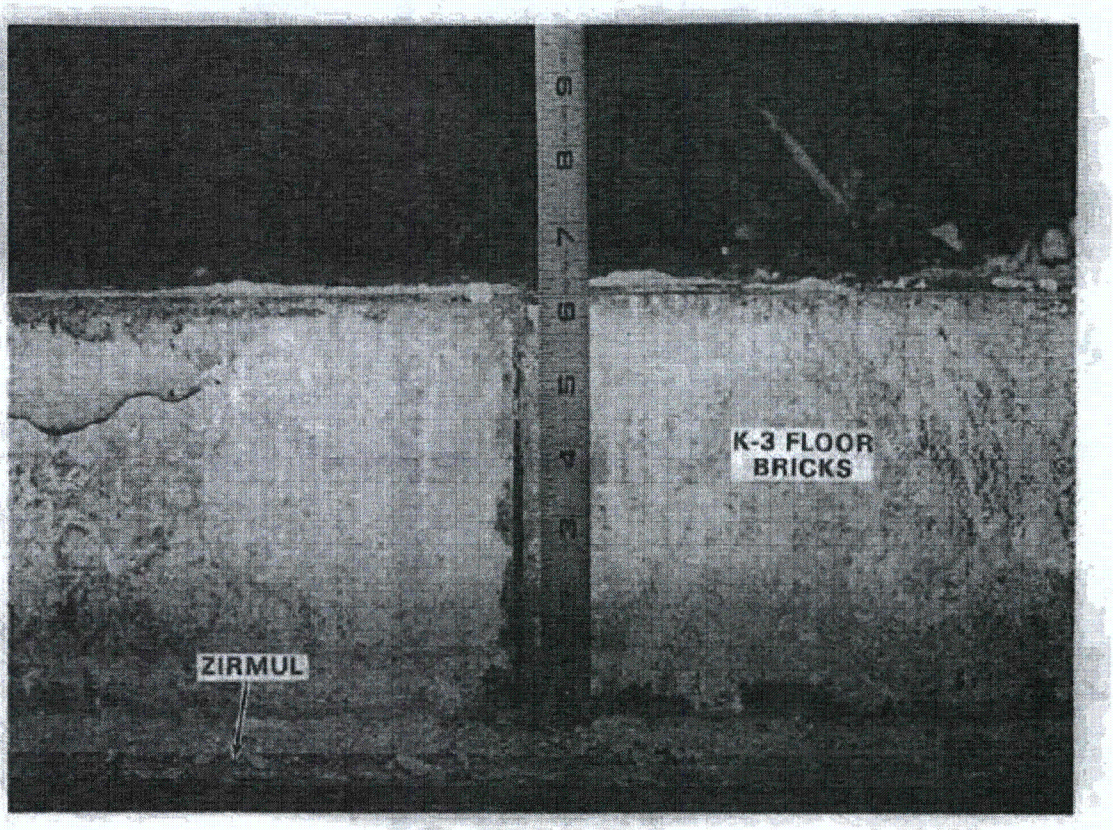
NRC Container Category:

Container Category:	III	
LSA-I:	No	
LSA-II:	No	
LSA-III:	Yes	
Total Activity:	1117	Ci
A2 Limit Fraction:	63.15	A2s

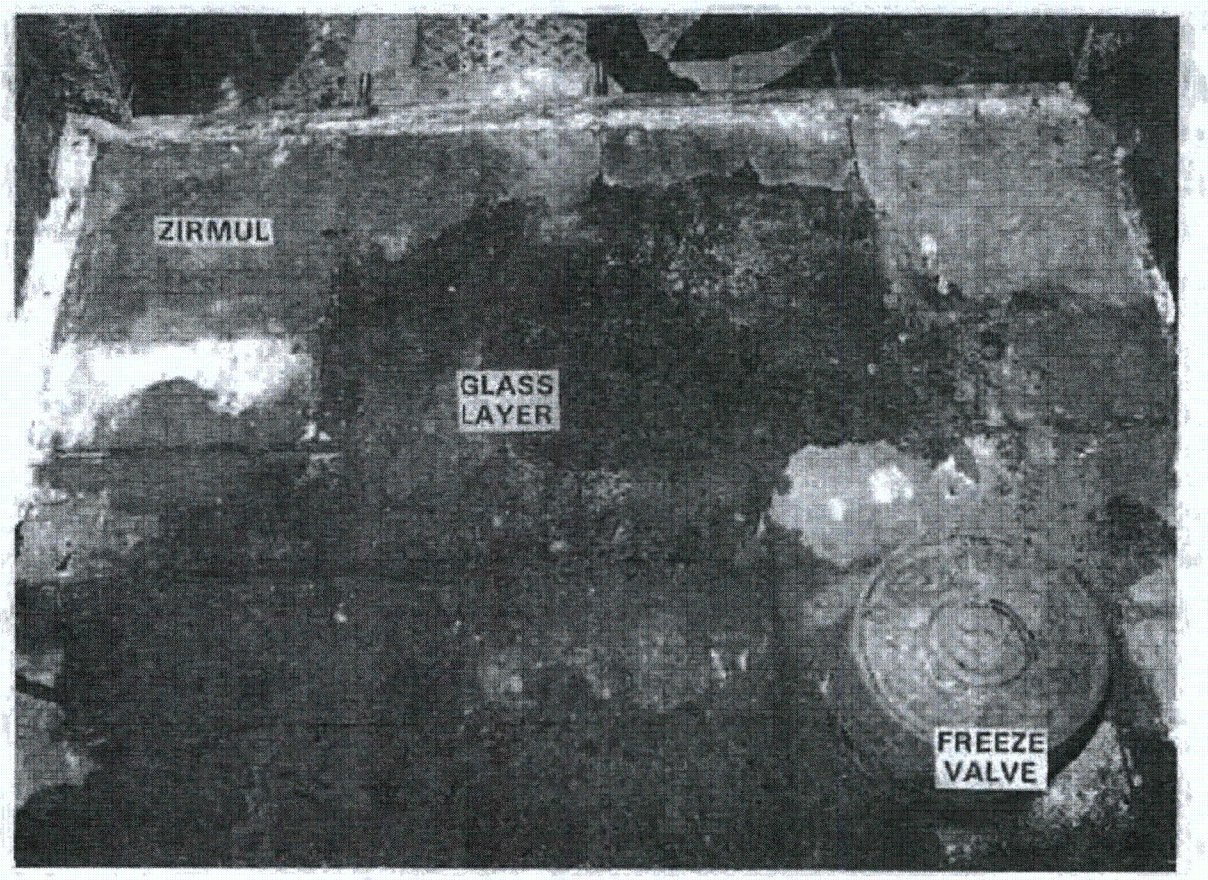
APPENDIX 4

Miscellaneous Pictures of Vitrified Glass Contained within Refractory

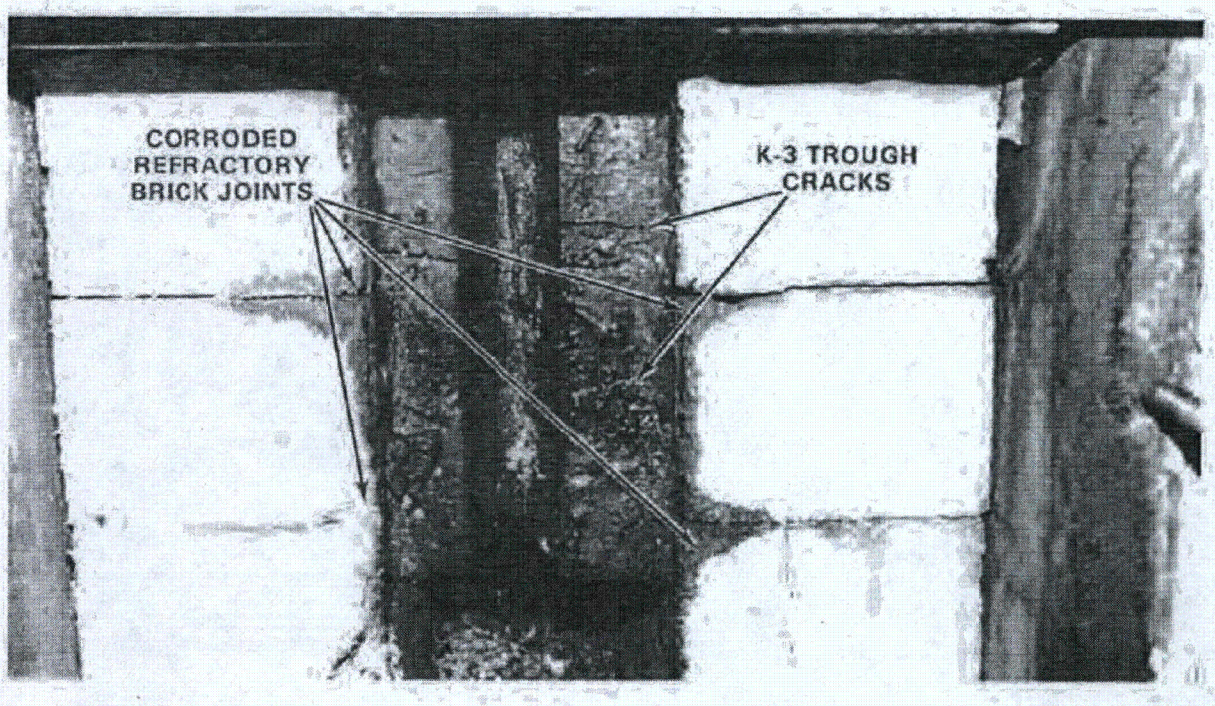
(PNL-3959, Materials and Design Experience in a Slurry-Fed Electric Glass Melter)

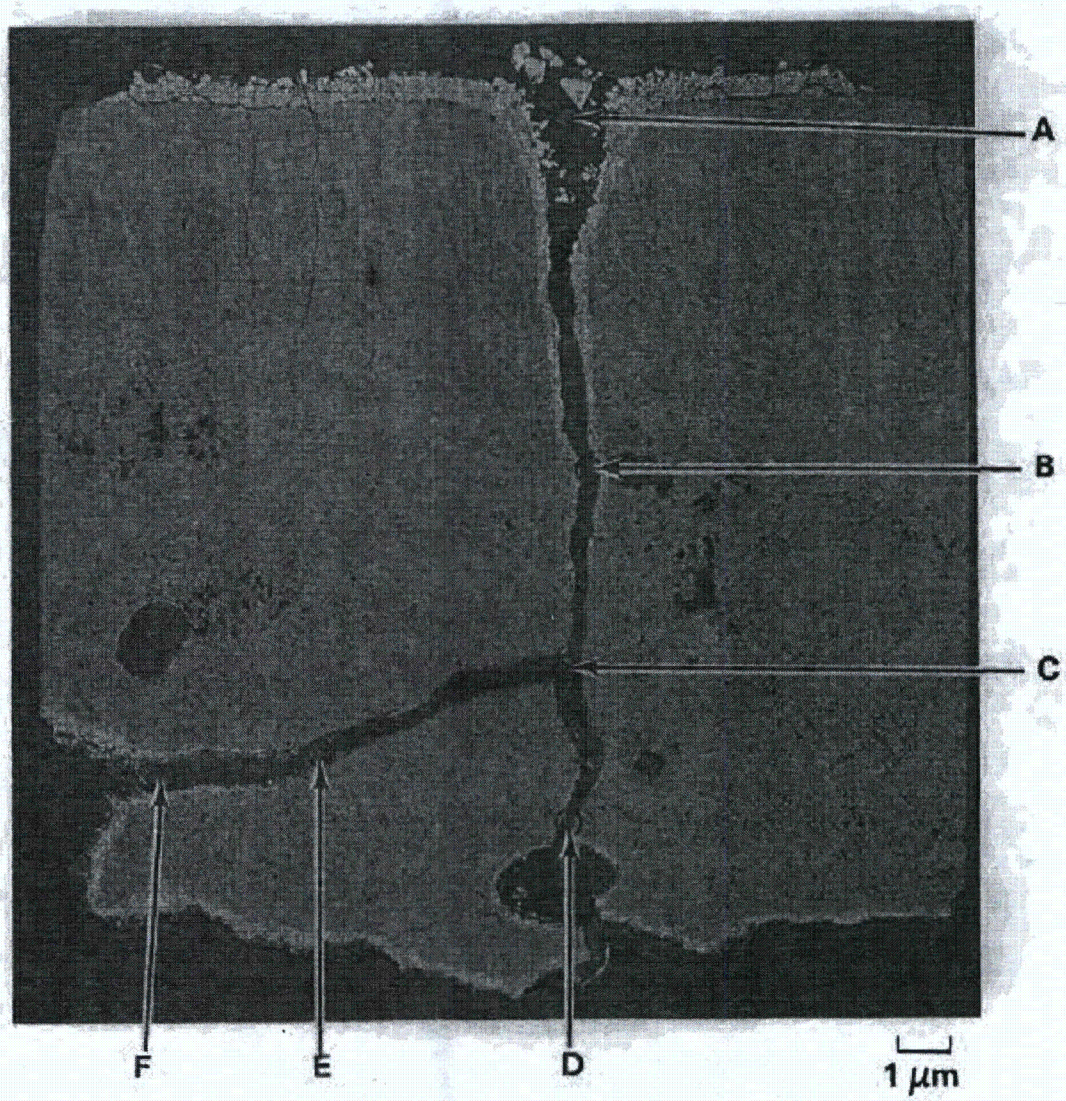

K-3 FLOOR
BRICKS
ZIRMUL

Miscellaneous Melter Photos
Continued

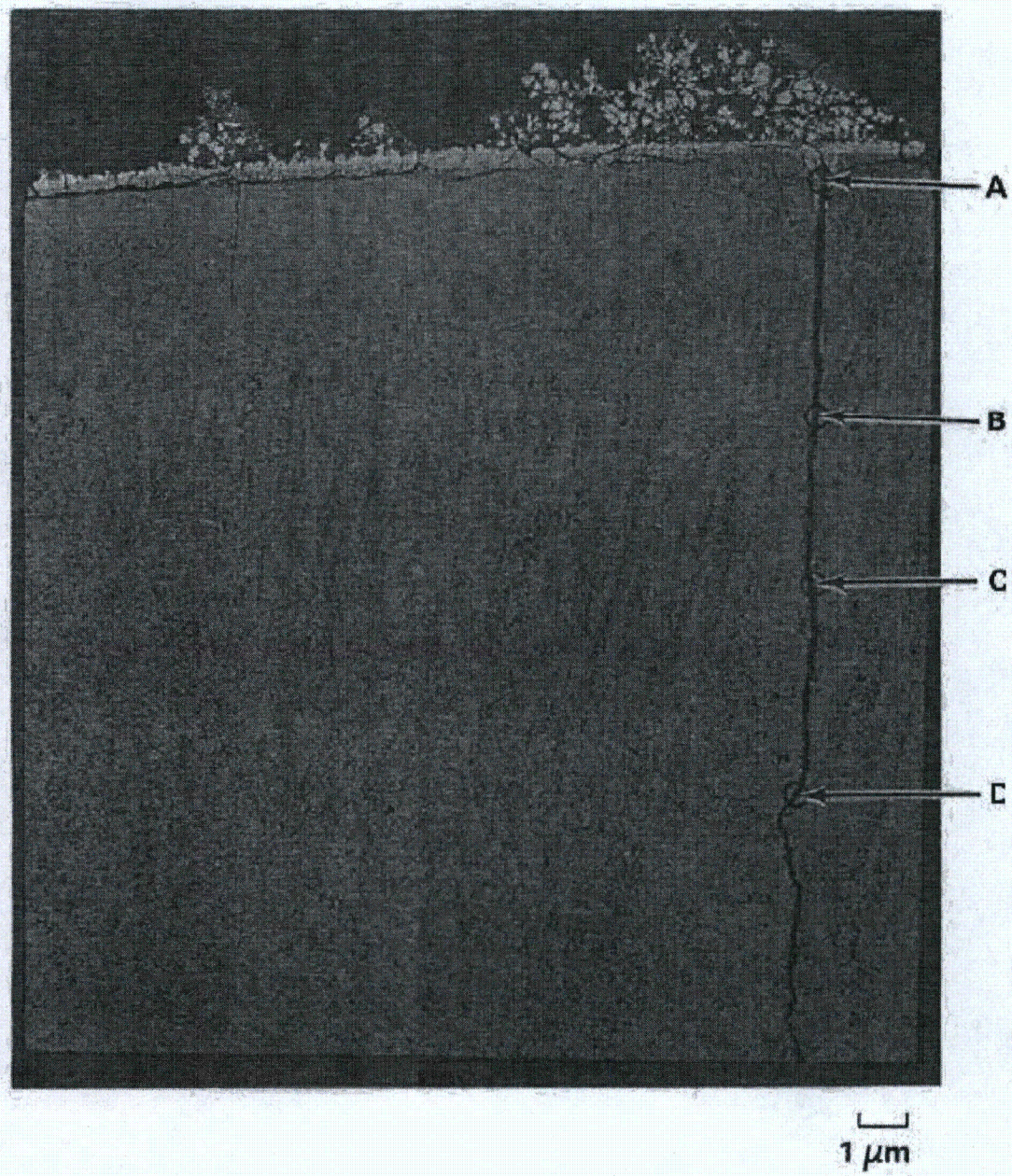


Glass Layer on the Zirmul Floor Blocks


CORRODED
REFRACTORY
BRICK JOINTS
K-3 TROUGH
CRACKS

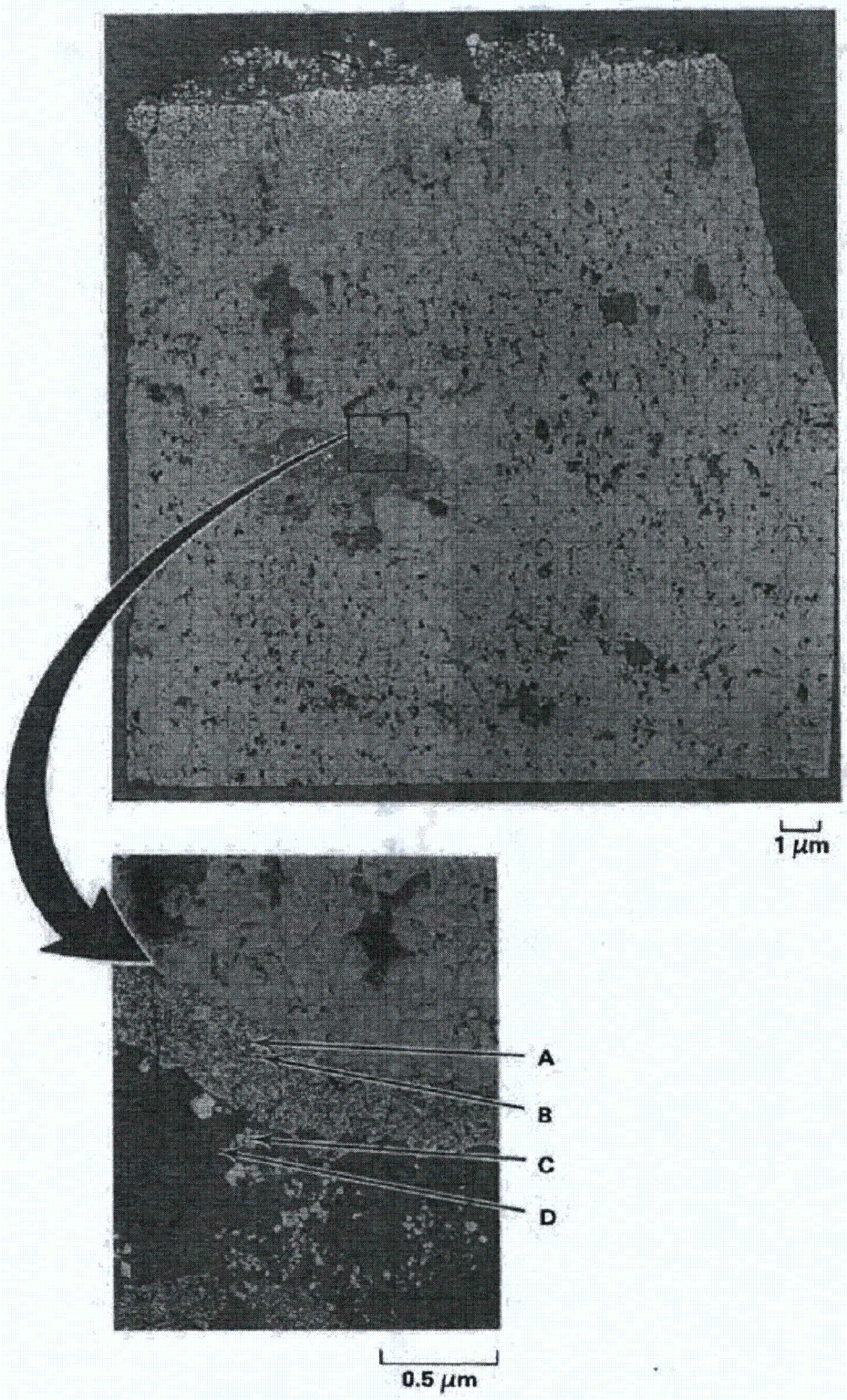

A
B
C
F
E
D
1 μm

Miscellaneous Melter Photos
Continued



Glass-Filled Crack in Monofrax K-3

Pore in Monofrax K-3 Core



APPENDIX 5

Melter Refractory Activity and Decay Correction Calculations (RADCALC)

APPENDIX 5 - Refractory Activity Calculations

Monofrax Refractory

Description	
Volume (ft3)	61.88
Density (lbs/ft3)	243.5
Total Weight (lbs)	15067.78

Zirmul Refractory

Description	
Volume (ft3)	30.82
Density (lbs/ft3)	196
Total Weight (lbs)	6040.72

1% of the total Volume	*Volume (ft3)*	*Mass (lbs)*	*Mass (g)*
Monofrax Refractory	0.6188	150.6778	68407.72
Zirmul Refractory	0.3082	60.4072	27424.87

Glass Calc (Based on 1% of total volume of refractory	*Volume (ft3)*	*Volume (cc)*	*Mass (g)*
Monofrax Refractory	0.6188	17522.47	45558.41
Zirmul Refractory	0.3082	8727.25	22690.86
Totals			68249.27

	Geomean (6-69)	Geomean (70-77)	Ave (Conc.) Geomean for 6-77	Ave (Act) Geomean for 6-77
Isotope	Conc. (uCi/g)	Conc. (uCi/g)	Conc. (uCi/g)	Act (Ci)
Cs-137	4.83E+03	3.43E+03	4.13E+03	2.82E+02
Sr-90	4.00E+03	1.89E+02	2.10E+03	1.43E+02
Am-241	2.35E+01	1.57E+00	1.25E+01	8.56E-01
Am-243	1.85E-01	1.23E-02	9.85E-02	6.73E-03
Cm-242	1.88E-01	1.25E-02	1.00E-01	6.84E-03
Cm-243	1.10E-01	7.35E-03	5.89E-02	4.02E-03
Cm-244	2.95E+00	1.97E-01	1.58E+00	1.08E-01
Co-60	1.80E+00	1.20E-01	9.61E-01	6.56E-02
Eu-154	4.03E+01	2.69E+00	2.15E+01	1.47E+00
Np-237	2.32E-02	1.55E-03	1.24E-02	8.46E-04
Pu-238	4.26E+00	2.84E-01	2.27E+00	1.55E-01
Pu-239	1.02E+00	6.80E-02	5.45E-01	3.72E-02
Pu-240	7.80E-01	5.19E-02	4.16E-01	2.84E-02
Pu-241	1.02E+01	6.79E-01	5.44E+00	3.71E-01
Tc-99	1.43E+00	9.54E-02	7.65E-01	5.22E-02
Th-228	6.26E-02	4.17E-03	3.34E-02	2.28E-03
Th-230	4.18E-04	2.78E-05	2.23E-04	1.52E-05
Th-232	1.15E-03	7.64E-05	6.12E-04	4.18E-05
U-232	1.37E-02	9.10E-04	7.29E-03	4.97E-04
U-233	1.61E-02	1.07E-03	8.57E-03	5.85E-04
U-234	7.67E-03	5.10E-04	4.09E-03	2.79E-04
U-235	1.90E-03	1.27E-04	1.01E-03	6.92E-05
U-236	5.70E-03	3.80E-04	3.04E-03	2.08E-04
U-238	3.19E-03	2.13E-04	1.70E-03	1.16E-04
			Total	4.28E+02

Note - This table does not relflect decay corrected activity. Decay corrected activity is addressed in Radcalc decay calculation.

Radcalc 4.1 6/26/2014 3:57 PM
File Name: Refractory with Ave. Geomean 6-77 Act.rad

This report was generated using an unvalidated installation of Radcalc version 4.1.

Radcalc 4.1: C:\WVDP - Melter\Recharacterization Information\Refractory with Ave. Geomean 6-77 Act.rad

Performed By: Chris Brandjes
Checked By:

========== Input Information ==========

Comments:
Activity associated to refractory using average Geomean for all samples.

Mass of glass is baed on 1% of total volume of Refractory with a glass density of 2.6 g/cc.

Decayed from 7/18/2002 to 09/02/2014. Representing last Sample Date.

Initial Source Data:

Isotope	Ci	Gm	TBq
Co-60	6.560E-02	5.797E-05	2.427E-03
Sr-90	1.430E+02	1.035E+00	5.291E+00
Tc-99	5.220E-02	3.090E+00	1.931E-03
Cs-137	2.820E+02	3.244E+00	1.043E+01
Eu-154	1.470E+00	5.439E-03	5.439E-02
Th-228	2.280E-03	2.782E-06	8.436E-05
Th-230	1.520E-05	7.375E-04	5.624E-07
Th-232	4.180E-05	3.812E+02	1.547E-06
U-232	4.970E-04	2.252E-05	1.839E-05
U-233	5.850E-04	6.073E-02	2.165E-05
U-234	2.790E-04	4.488E-02	1.032E-05
U-235	6.920E-05	3.202E+01	2.560E-06
U-236	2.080E-04	3.255E+00	7.696E-06
U-238	1.160E-04	3.451E+02	4.292E-06
Np-237	8.460E-04	1.200E+00	3.130E-05
Pu-238	1.550E-01	9.051E-03	5.735E-03
Pu-239	3.720E-02	5.998E-01	1.376E-03
Pu-240	2.840E-02	1.252E-01	1.051E-03
Pu-241	3.710E-01	3.585E-03	1.373E-02
Am-241	8.560E-01	2.498E-01	3.167E-02
Am-243	6.730E-03	3.370E-02	2.490E-04
Cm-242	6.840E-03	2.066E-06	2.531E-04
Cm-243	4.020E-03	8.200E-05	1.487E-04
Cm-244	1.080E-01	1.327E-03	3.996E-03
Total Activity:	4.282E+02		1.584E+01

* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	1	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	69.19	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	0.927	ft^3
Waste Mass:	150.3	lb
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg

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Waste Void Volume: 0 m^3

Decay Time Data:
Date to begin source decay: 7/18/2002
Date container sealed: 9/2/2014

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
Co-60	1.332E-02	1.177E-05	4.927E-04
Sr-90	1.068E+02	7.732E-01	3.951E+00
Y-90	1.068E+02	1.964E-04	3.952E+00
Tc-99	5.220E-02	3.090E+00	1.931E-03
Cs-137	2.132E+02	2.452E+00	7.887E+00
Ba-137m	2.012E+02	3.739E-07	7.446E+00
Eu-154	5.527E-01	2.045E-03	2.045E-02
Hg-206	2.537E-16	2.265E-24	9.385E-18
Tl-206	1.782E-14	8.204E-23	6.594E-16
Tl-207	2.960E-09	1.554E-17	1.095E-10
Tl-208	1.806E-04	6.098E-13	6.681E-06
Tl-209	1.434E-08	3.507E-17	5.307E-10
Tl-210	1.672E-11	2.427E-20	6.186E-13
Pb-209	6.641E-07	1.441E-13	2.457E-08
Pb-210	1.335E-08	1.738E-10	4.940E-10
Pb-211	2.968E-09	1.202E-16	1.098E-10
Pb-212	5.026E-04	3.617E-10	1.860E-05
Pb-214	7.960E-08	2.428E-15	2.945E-09
Bi-209	1.457E-25	1.618E-09	5.392E-27
Bi-210	1.331E-08	1.073E-13	4.925E-10
Bi-211	2.968E-09	7.227E-18	1.098E-10
Bi-212	5.026E-04	3.430E-11	1.860E-05
Bi-213	6.640E-07	3.429E-14	2.457E-08
Bi-214	7.962E-08	1.803E-15	2.946E-09
Bi-215	2.428E-15	2.054E-23	8.984E-17
Po-210	1.222E-08	2.720E-12	4.522E-10
Po-211	8.103E-12	7.819E-23	2.998E-13
Po-212	3.219E-04	1.803E-21	1.191E-05
Po-213	6.498E-07	5.152E-23	2.404E-08
Po-214	7.960E-08	2.472E-22	2.945E-09
Po-215	2.968E-09	1.007E-22	1.098E-10
Po-216	5.026E-04	1.443E-15	1.859E-05
Po-218	7.962E-08	2.860E-16	2.946E-09
At-215	1.187E-14	2.263E-29	4.393E-16
At-217	6.641E-07	4.126E-19	2.457E-08
At-218	1.513E-11	4.385E-22	5.597E-13
At-219	2.503E-15	2.624E-24	9.262E-17
Rn-217	7.969E-11	8.278E-25	2.949E-12
Rn-218	1.513E-14	1.023E-26	5.597E-16
Rn-219	2.968E-09	2.282E-19	1.098E-10
Rn-220	5.026E-04	5.469E-13	1.859E-05
Rn-222	7.962E-08	5.176E-13	2.946E-09
Fr-221	6.641E-07	3.825E-15	2.457E-08
Fr-223	4.172E-11	1.079E-18	1.544E-12
Ra-223	2.968E-09	5.794E-14	1.098E-10
Ra-224	5.026E-04	3.138E-09	1.859E-05
Ra-225	6.663E-07	1.699E-11	2.465E-08
Ra-226	7.972E-08	8.064E-08	2.950E-09
Ra-228	3.211E-05	1.178E-07	1.188E-06
Ac-225	6.641E-07	1.144E-11	2.457E-08
Ac-227	3.023E-09	4.180E-11	1.119E-10
Ac-228	3.211E-05	1.437E-11	1.188E-06

Th-227	2.947E-09	9.592E-14	1.091E-10
Th-228	5.024E-04	6.129E-07	1.859E-05
Th-229	6.695E-07	3.148E-06	2.477E-08
Th-230	1.523E-05	7.389E-04	5.635E-07
Th-231	6.920E-05	1.302E-10	2.560E-06
Th-232	4.180E-05	3.812E+02	1.547E-06
Th-234	1.160E-04	5.008E-09	4.292E-06
Pa-231	1.775E-08	3.757E-07	6.566E-10
Pa-233	8.493E-04	4.093E-08	3.142E-05
Pa-234	1.740E-07	8.810E-14	6.438E-09
Pa-234m	1.160E-04	1.689E-13	4.292E-06
U-232	4.406E-04	1.996E-05	1.630E-05
U-233	5.850E-04	6.073E-02	2.165E-05
U-234	2.841E-04	4.569E-02	1.051E-05
U-235	6.920E-05	3.202E+01	2.560E-06
U-235m	3.717E-02	1.208E-09	1.375E-03
U-236	2.080E-04	3.255E+00	7.696E-06
U-237	5.083E-06	6.229E-11	1.881E-07
U-238	1.160E-04	3.451E+02	4.292E-06
Np-237	8.493E-04	1.205E+00	3.143E-05
Np-239	6.722E-03	2.898E-08	2.487E-04
Pu-238	1.409E-01	8.226E-03	5.212E-03
Pu-239	3.719E-02	5.997E-01	1.376E-03
Pu-240	2.847E-02	1.255E-01	1.054E-03
Pu-241	2.064E-01	1.994E-03	7.636E-03
Am-241	8.449E-01	2.466E-01	3.126E-02
Am-243	6.722E-03	3.366E-02	2.487E-04
Cm-242	4.488E-11	1.356E-14	1.661E-12
Cm-243	3.038E-03	6.196E-05	1.124E-04
Cm-244	6.771E-02	8.320E-04	2.505E-03
Total Activity:	6.300E+02		2.331E+01
w/o Daughters:	3.220E+02		1.191E+01

Decay Heat:
Heat Generated on Start Date: 0.5161 W
Heat Generated on Seal Date: 1.768 W

========== Regulatory Requirements Warning ==========

Radcalc utilizes numerically based criteria to classify packages against the regulations. Many regulations also include subjective criteria that Radcalc does not consider. The user must check to ensure that all requirements in the regulations are met.

========== DOT Classification Results ==========

* DOT classification calculations are made at the end of the user-specified decay time.

Radioactive Determination:

Radioactive:	Yes		(ACEMs and ALECs > 1.0)
ACEM Limit Fraction:	12760000	ACEMs	(Number of ACEMs)
ALEC Limit Fraction:	1.190E+09	ALECs	(Number of ALECs)

* This package is not exempt from 49 CFR Subchapter C.

Effective A2s for Mixture: 1.775E+11 Bq

Type Determination:

Type:	B		(A2s > 1.0)
A2 Limit Fraction:	67.13	A2s	(Number of A2s)

Limited Quantity Determination:

Limited Quantity:	No		(Solid, activity > 0.001 A2)

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Activity:	67.13	A2	
	630	Ci	
	23.31	TBq	
Fissile:	Yes		
Fissile Excepted:	Yes (c)		

LSA Determination:

LSA-I:	No		(Fissile excepted, ACEMs > 30 x rad limits)
LSA-II:	No		(A2s/gm > 0.0001)
LSA-III:	Yes		(A2s/gm <= 0.002)
Specific Activity:	0.0009844	A2/gm	
	0.00924	Ci/gm	

HRCQ Determination:

HRCQ:	No		(A2s <= 3000, Activity <= 1000 TBq)
A2 Limit Fraction:	67.13	A2s	
Activity:	630	Ci	
	23.31	TBq	

Fissile Determination:

Fissile:	Yes		(Contains fissile isotopes per 49 CFR 173.403)

Fissile Excepted Determination:

Fissile Excepted:	Yes (c)		(Fissile <= 180 grams, non-fissile > = 2000 * fissile
Fissile Mass:	32.68	gm	
Container beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	gm	
Container Mass:	1000	gm	
Waste lead:	0	gm	
Waste beryllium, graphite, and hydrogenous material enriched with deuterium:	0	gm	
Waste Mass:	68190	gm	
Solid Non-Fissile Mass:	68160	gm	
Total Uranium Mass:	380.5	gm	
U-233 Mass:	0.06073	gm	
U-235 Mass:	32.02	gm	
Uranium Enrichment:	8.415	%	
Total Plutonium Mass:	0.7354	gm	
Pu-239 Mass:	0.5997	gm	
Pu-241 Mass:	0.001994	gm	

Reportable Quantity Determination:

Reportable Quantity:	Yes		(RQs > = 1.0)
RQ Limit Fraction:	1606	RQs	(Number of RQs)

Shipping Papers and Labels:

	Isotope	Number of A2s	Fraction of A2s	Cumulative A2s	Cumulative Fraction of A2s
+	Am-241	31.26	0.4657	31.26	0.4657
+	Sr-90	13.17	0.1962	44.43	0.6619
+	Cs-137	13.15	0.1958	57.58	0.8578
+	Pu-238	5.212	0.07765	62.79	0.9354
+	Pu-239	1.376	0.0205	64.17	0.9559
	Cm-244	1.253	0.01866	65.42	0.9746
	Pu-240	1.054	0.01569	66.47	0.9903
	Am-243	0.2487	0.003705	66.72	0.994
	Pu-241	0.1273	0.001896	66.85	0.9959
	Cm-243	0.1124	0.001674	66.96	0.9976
	U-235m	0.06876	0.001024	67.03	0.9986

\+ Contains 95% of the total A2s and must be included per 49 CFR 173.433.
* Radionuclides comprising less than 0.1% of the total A2s are not shown in the list.

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========== DOE Classification Results ==========

* DOE classification calculations are made at the end of the user-specified decay time.

DOE-STD-1027 Category Determination:

Category:	Cat 3	(Cat3s > 1.0, Cat2s <= 1.0)
Cat 2 Limit Fraction:	0.02833	
Cat 3 Limit Fraction:	12.38	

* The DOE-STD-1027 category determination is based on dose-related limits.
The user must apply any criticality-related limits separately.

Dose-Equivalent Curies:

ICRP-72 DE-Ci:	1.054
FGR-11 DE-Ci:	1.465

TRU Waste Determination:

TRU Waste:	Yes	(TRU activity > 100 nCi/gm)
TRU Activity:	15580	nCi/g

WIPP Quantities:

FGE Value:	21.28
PE-Ci Value:	1.105

========== NRC Classification Results ==========

* NRC classification calculations are made at the end of the user-specified decay time.

NRC Container Category:

Container Category:	III	
LSA-I:	No	
LSA-II:	No	
LSA-III:	Yes	
Total Activity:	630	Ci
A2 Limit Fraction:	67.13	A2s

APPENDIX 6

Analytical Data for Batch 75

Appendix 6 - Analytical Data for Batch 75

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS	NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Am241	8.28E-02	1.37E+00	2	uCi/g	Rep2 (B75	Cs-137	1.16E+04	1.00E+00
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Am241	1.01E-01	1.68E+00	4	uCi/g	Rep4 (B75	Sr-90	8.70E+02	7.47E-02
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Am241	1.05E-01	1.75E+00	3	uCi/g	Rep3 (B75	Am-241	3.86E+00	3.32E-04
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Am241	9.16E-02	1.52E+00	1	uCi/g	Rep1 (B75	Am-243	4.60E-02	3.95E-06
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.24E-01	3.72E+00	3	uCi/g	Rep3 (03db	Cm-242	4.37E-02	3.75E-06
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.33E-01	3.87E+00	7	uCi/g	Rep7 (07db	Cm-243	2.51E-02	2.16E-06
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.26E-01	3.75E+00	8	uCi/g	Rep8 (08db	Cm-244	6.72E-01	5.77E-05
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.43E-01	4.04E+00	6	uCi/g	Rep6 (06db	Co-60	2.96E-01	2.54E-05
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.33E-01	3.88E+00	1	uCi/g	Rep1 (01db	Eu-154	2.95E+00	2.53E-04
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.21E-01	3.66E+00	5	uCi/g	Rep5 (18 db	Np-237	7.14E-03	6.13E-07
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.51E-01	4.17E+00	4	uCi/g	Rep4 (04db	Pu-238	1.27E+00	1.09E-04
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.34E-01	3.87E+00	2	uCi/g	Rep2 (02db	Pu-239	3.04E-01	2.61E-05
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am241	2.29E-01	3.80E+00	9	uCi/g	Rep9 (09db	Pu-240	2.32E-01	1.99E-05
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	4.61E-02	1.33E-01	1	uCi/g	Rep1	Tc-99	1.59E-01	1.36E-05
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	5.58E-02	1.32E-01	2	uCi/g	Rep2			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	3.48E-02	8.98E-02	7	uCi/g	Rep7			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	3.43E-02	1.06E-01	9	uCi/g	Rep9			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	5.52E-02	1.42E-01	5	uCi/g	Rep5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	7.47E-02	1.25E-01	4	uCi/g	Rep4			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	4.09E-02	1.13E-01	6	uCi/g	Rep6			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	5.79E-02	1.59E-01	3	uCi/g	Rep3			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Am-241	3.53E-02	1.36E-01	8	uCi/g	Rep8			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Am-241	7.97E-02	2.49E-01	3	uCi/g	Rep3 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Am-241	1.08E-01	3.64E-01	2	uCi/g	Rep2 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Am-241	9.89E-02	2.96E-01	1	uCi/g	Rep1 (B75			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Am-241	8.69E-02	3.42E-01	3	uCi/g	Rep3			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Am-241	1.28E-01	4.78E-01	1	uCi/g	Rep1			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Am-241	1.21E-01	4.65E-01	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Am-241	6.88E-02	5.35E-01	1	uCi/g	Rep1			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Am-241	8.36E-02	5.55E-01	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Am-241	8.33E-02	5.25E-01	3	uCi/g	Rep3			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Am-241	2.39E-01	7.67E-01	1	uCi/g	Rep1 (38			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Am-241	2.67E-01	7.18E-01	2	uCi/g	Rep2 (39			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Am-241	4.17E-01	7.09E-01	3	uCi/g	Rep3 (40			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Am-241	5.57E-01	1.07E+00	3	uCi/g	Rep3			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Am-241	4.07E-01	8.47E-01	2	uCi/g	Rep2			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Am-241	3.27E-01	1.00E+00	1	uCi/g	Rep1			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Am-241	2.65E-01	8.74E-01	1	uCi/g	Rep1			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Am-241	2.68E-01	8.92E-01	2	uCi/g	Rep2			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Am-241	2.74E-01	9.02E-01	3	uCi/g	Rep3			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Am-241	6.10E-01	1.50E+00	3	uCi/g	Rep3 (64DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Am-241	3.43E-01	7.48E-01	1	uCi/g	Rep1 (62DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Am-241	5.18E-01	9.70E-01	2	uCi/g	Rep2 (63DB			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Am-241	4.36E-01	1.31E+00	1	uCi/g	Rep1			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Am-241	5.18E-01	1.24E+00	2	uCi/g	Rep2			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Am-241	5.63E-01	1.12E+00	3	uCi/g	Rep3			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Am-241	7.91E-01	1.31E+00	3	uCi/g	Rep3 (B75			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Am-241	1.10E+00	1.58E+00	2	uCi/g	Rep2 (B75			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Am-241	7.99E-01	1.57E+00	1	uCi/g	Rep1 (B75			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Am-241	1.18E+00	2.25E+00	4	uCi/g	Rep4			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Am-241	6.62E-01	1.79E+00	3	uCi/g	Rep3			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Am-241	8.90E-01	1.69E+00	2	uCi/g	Rep2			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Am-241	5.63E-01	1.79E+00	1	uCi/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241	1.98E+00	4.64E+00	5	uCi/g	Rep5			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241	8.64E-01	3.08E+00	3	uCi/g	Rep3			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241	9.52E-01	3.87E+00	6	uCi/g	Rep6			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241	9.96E-01	4.03E+00	7	uCi/g	Rep7			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241	2.31E+00	2.92E+00	1	uCi/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241		<2.73E+0	8	uCi/g	Rep8			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241	6.94E-01	3.95E+00	4	uCi/g	Rep4			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241	1.25E+00	4.27E+00	2	uCi/g	Rep2			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am-241	1.01E+00	3.37E+00	9	uCi/g	Rep9			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Am243	1.35E-03	2.10E-02	1	uCi/g	Rep1 (B75			

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS	NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Am243	1.49E-03	2.32E-02	4	uCi/g	Rep4 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Am243	1.55E-03	2.41E-02	3	uCi/g	Rep3 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Am243	1.22E-03	1.89E-02	2	uCi/g	Rep2 (B75			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	2.92E-03	4.52E-02	9	uCi/g	Rep9 (09db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	2.88E-03	4.47E-02	8	uCi/g	Rep8 (08db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	2.82E-03	4.36E-02	5	uCi/g	Rep5 (18 db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	2.86E-03	4.44E-02	3	uCi/g	Rep3 (03db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	2.97E-03	4.61E-02	7	uCi/g	Rep7 (07db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	2.99E-03	4.61E-02	2	uCi/g	Rep2 (02db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	3.10E-03	4.82E-02	6	uCi/g	Rep6 (06db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	2.98E-03	4.63E-02	1	uCi/g	Rep1 (01db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Am243	3.20E-03	4.97E-02	4	uCi/g	Rep4 (04db			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Cm242	1.77E-03	2.22E-02	3	uCi/g	Rep3 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Cm242	1.34E-03	1.61E-02	1	uCi/g	Rep1 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Cm242	1.28E-03	1.52E-02	2	uCi/g	Rep2 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Cm242	1.40E-03	1.76E-02	4	uCi/g	Rep4 (B75			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.95E-03	4.45E-02	2	uCi/g	Rep2 (02db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.54E-03	4.40E-02	6	uCi/g	Rep6 (06db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.51E-03	4.52E-02	9	uCi/g	Rep9 (09db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.20E-03	4.27E-02	8	uCi/g	Rep8 (08db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.46E-03	4.45E-02	1	uCi/g	Rep1 (01db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.47E-03	4.46E-02	7	uCi/g	Rep7 (07db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.74E-03	4.16E-02	5	uCi/g	Rep5 (18 db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.25E-03	4.14E-02	3	uCi/g	Rep3 (03db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm242	3.65E-03	4.49E-02	4	uCi/g	Rep4 (04db			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Cm243/244	1.71E-02	2.80E-01	1	uCi/g	Rep1 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Cm243/244	1.54E-02	2.50E-01	2	uCi/g	Rep2 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Cm243/244	1.87E-02	3.04E-01	3	uCi/g	Rep3 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Cm243/244	1.86E-02	3.05E-01	4	uCi/g	Rep4 (B75			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.35E-02	7.03E-01	2	uCi/g	Rep2 (02db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.15E-02	6.82E-01	8	uCi/g	Rep8 (08db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.03E-02	6.51E-01	5	uCi/g	Rep5 (18 db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.20E-02	6.88E-01	9	uCi/g	Rep9 (09db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.53E-02	7.41E-01	6	uCi/g	Rep6 (06db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.28E-02	7.02E-01	7	uCi/g	Rep7 (07db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.52E-02	7.38E-01	4	uCi/g	Rep4 (04db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.10E-02	6.71E-01	3	uCi/g	Rep3 (03db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cm243/244	4.28E-02	7.01E-01	1	uCi/g	Rep1 (01db			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60	3.02E-03	5.59E-03	8	uCi/g	Rep8			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60		<3.95E-3	6	uCi/g	Rep6			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60		<6.27E-3	1	uCi/g	Rep1			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60	1.74E-03	4.23E-03	9	uCi/g	Rep9			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60	2.32E-03	5.82E-03	7	uCi/g	Rep7			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60	1.02E-02	1.78E-02	2	uCi/g	Rep2			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60		<5.79E-3	5	uCi/g	Rep5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60	5.97E-03	9.66E-03	4	uCi/g	Rep4			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Co-60	7.08E-03	9.71E-03	3	uCi/g	Rep3			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Co-60	5.22E-03	1.22E-02	3	uCi/g	Rep3 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Co-60		<1.10E-2	2	uCi/g	Rep2 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Co-60	7.07E-03	2.01E-02	1	uCi/g	Rep1 (B75			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Co-60	2.40E-02	2.99E-02	1	uCi/g	Rep1			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Co-60		<1.43E-2	3	uCi/g	Rep3			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Co-60		<1.19E-2	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Co-60		<1.44E-2	1	uCi/g	Rep1			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Co-60		<1.55E-2	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Co-60		<1.33E-2	3	uCi/g	Rep3			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Co-60		<3.28E-2	3	uCi/g	Rep3 (40			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Co-60	1.87E-02	4.10E-02	1	uCi/g	Rep1 (38			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Co-60		<1.90E-2	2	uCi/g	Rep2 (39			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Co-60		<3.51E-2	2	uCi/g	Rep2			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Co-60		<2.80E-2	1	uCi/g	Rep1			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Co-60		<2.75E-2	3	uCi/g	Rep3			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Co-60		<3.34E-2	2	uCi/g	Rep2			

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS	NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Co-60		<2.94E-2	1	uCi/g	Rep1			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Co-60	1.39E-02	3.42E-02	3	uCi/g	Rep3			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Co-60	8.22E-02	1.03E-01	3	uCi/g	Rep3 (64DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Co-60	4.10E-02	1.00E-01	2	uCi/g	Rep2 (63DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Co-60		<3.14E-2	1	uCi/g	Rep1 (62DB			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Co-60		<6.39E-2	3	uCi/g	Rep3 (B75			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Co-60	8.81E-02	9.87E-02	2	uCi/g	Rep2 (B75			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Co-60		<5.01E-2	1	uCi/g	Rep1 (B75			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Co-60	4.37E-02	7.48E-02	1	uCi/g	Rep1			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Co-60	4.42E-02	8.65E-02	3	uCi/g	Rep3			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Co-60	1.25E-01	1.59E-01	4	uCi/g	Rep4			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Co-60		<5.06E-2	2	uCi/g	Rep2			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60	9.23E-02	2.81E-01	9	uCi/g	Rep9			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60	2.05E-01	3.53E-01	7	uCi/g	Rep7			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60		<2.04E-1	1	uCi/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60	9.86E-02	2.89E-01	5	uCi/g	Rep5			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60	1.03E-01	2.07E-01	3	uCi/g	Rep3			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60	1.61E-01	2.52E-01	4	uCi/g	Rep4			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60		<1.69E-1	6	uCi/g	Rep6			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60	3.21E-01	3.93E-01	2	uCi/g	Rep2			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Co-60		<2.50E-1	8	uCi/g	Rep8			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	7.74E+00	3.17E+02	2	uCi/g	Rep2			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	7.52E+00	2.88E+02	6	uCi/g	Rep6			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	8.54E+00	3.28E+02	3	uCi/g	Rep3			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	7.63E+00	3.13E+02	8	uCi/g	Rep8			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	6.84E+00	2.89E+02	7	uCi/g	Rep7			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	7.47E+00	3.15E+02	1	uCi/g	Rep1			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	7.85E+00	3.22E+02	5	uCi/g	Rep5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	7.87E+00	3.32E+02	4	uCi/g	Rep4			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Cs-137	6.60E+00	2.53E+02	9	uCi/g	Rep9			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Cs-137	2.15E+01	7.98E+02	2	uCi/g	Rep2 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Cs-137	1.59E+01	5.93E+02	3	uCi/g	Rep3 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Cs-137	1.68E+01	6.36E+02	1	uCi/g	Rep1 (B75			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Cs-137	3.00E+01	1.14E+03	1	uCi/g	Rep1			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Cs-137	2.80E+01	1.05E+03	3	uCi/g	Rep3			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Cs-137	3.03E+01	1.13E+03	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Cs-137	3.86E+01	1.43E+03	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Cs-137	3.96E+01	1.50E+03	1	uCi/g	Rep1			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Cs-137	3.48E+01	1.30E+03	3	uCi/g	Rep3			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Cs-137	4.40E+01	1.85E+03	3	uCi/g	Rep3 (40			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Cs-137	4.49E+01	1.72E+03	2	uCi/g	Rep2 (39			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Cs-137	4.41E+01	1.81E+03	1	uCi/g	Rep1 (38			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Cs-137	5.41E+01	2.22E+03	2	uCi/g	Rep2			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Cs-137	5.24E+01	2.15E+03	3	uCi/g	Rep3			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Cs-137	5.95E+01	2.28E+03	1	uCi/g	Rep1			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Cs-137	6.29E+01	2.62E+03	6	uCi/g	Rep6			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Cs-137	6.40E+01	2.66E+03	4	uCi/g	Rep4			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Cs-137	6.29E+01	2.66E+03	1	uCi/g	Rep1			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Cs-137	6.87E+01	2.64E+03	3	uCi/g	Rep3			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Cs-137	6.84E+01	2.61E+03	5	uCi/g	Rep5			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Cs-137	6.48E+01	2.66E+03	2	uCi/g	Rep2			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Cs-137	7.48E+01	3.07E+03	3	uCi/g	Rep3 (64DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Cs-137	8.13E+01	3.12E+03	1	uCi/g	Rep1 (62DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Cs-137	7.53E+01	3.18E+03	2	uCi/g	Rep2 (63DB			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Cs-137	9.21E+01	3.78E+03	2	uCi/g	Rep2			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Cs-137	1.05E+02	4.02E+03	3	uCi/g	Rep3			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Cs-137	8.88E+01	3.75E+03	1	uCi/g	Rep1			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Cs-137	1.13E+02	4.52E+03	1	uCi/g	Rep1 (B75			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Cs-137	1.03E+02	4.30E+03	2	uCi/g	Rep2 (B75			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Cs-137	1.01E+02	4.11E+03	3	uCi/g	Rep3 (B75			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Cs-137	1.25E+02	5.08E+03	3	uCi/g	Rep3			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Cs-137	1.16E+02	4.89E+03	1	uCi/g	Rep1			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Cs-137	1.17E+02	4.91E+03	2	uCi/g	Rep2			

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS	NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Cs-137	1.13E+02	4.72E+03	4	uCi/g	Rep4			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	2.88E+02	1.11E+04	5	uCi/g	Rep5			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	3.14E+02	1.17E+04	6	uCi/g	Rep6			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	3.06E+02	1.14E+04	3	uCi/g	Rep3			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	3.36E+02	1.22E+04	9	uCi/g	Rep9			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	3.18E+02	1.18E+04	4	uCi/g	Rep4			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	3.20E+02	1.19E+04	7	uCi/g	Rep7			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	2.87E+02	1.10E+04	1	uCi/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	3.03E+02	1.20E+04	8	uCi/g	Rep8			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Cs-137	3.16E+02	1.17E+04	2	uCi/g	Rep2			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Density		1.02 (29.9	1	g/mL	Rep1 (B74			
01-2499	11/26/2001		10 - 13	11/24/2001	B75WI10 - 13	CFMT	WI (ACT #11)	075	Density		1.32 (25.8	1	g/mL	Rep1			
01-2574	12/6/2001		10 thru 13	12/6/2001	B75 WGF 10-13	CFMT	WGF (ACT #18	075	Density		1.40 (30.9	1	g/mL	Rep1			
01-2624	12/11/2001		10 THRU 1	12/11/2001	B75SF10 - B75SF13	CFMT	SF (ACT #25C)	75	Density		1.44 (31.2	1	g/mL	Rep1			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	3.05E-02	1.01E-01	4	uCi/g	Rep4			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	1.35E-02	6.50E-02	9	uCi/g	Rep9			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	1.81E-02	6.82E-02	7	uCi/g	Rep7			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	2.79E-02	8.81E-02	5	uCi/g	Rep5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	2.60E-02	8.84E-02	6	uCi/g	Rep6			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	2.72E-02	8.54E-02	1	uCi/g	Rep1			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	2.50E-02	9.10E-02	2	uCi/g	Rep2			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	1.59E-02	7.44E-02	8	uCi/g	Rep8			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-154	2.50E-02	1.06E-01	3	uCi/g	Rep3			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Eu-154	4.12E-02	1.74E-01	3	uCi/g	Rep3 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Eu-154	5.32E-02	2.18E-01	2	uCi/g	Rep2 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Eu-154	5.19E-02	2.05E-01	1	uCi/g	Rep1 (B75			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Eu-154	5.94E-02	2.39E-01	3	uCi/g	Rep3			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Eu-154	8.41E-02	2.68E-01	1	uCi/g	Rep1			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Eu-154	1.43E-01	2.46E-01	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Eu-154	5.11E-02	2.69E-01	1	uCi/g	Rep1			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Eu-154	7.66E-02	2.55E-01	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Eu-154	4.91E-02	2.80E-01	3	uCi/g	Rep3			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Eu-154	1.46E-01	5.44E-01	3	uCi/g	Rep3 (40			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Eu-154	1.40E-01	4.48E-01	1	uCi/g	Rep1 (38			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Eu-154	1.14E-01	4.70E-01	2	uCi/g	Rep2 (39			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Eu-154	1.86E-01	7.23E-01	3	uCi/g	Rep3			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Eu-154	1.52E-01	6.62E-01	2	uCi/g	Rep2			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Eu-154	1.50E-01	6.83E-01	1	uCi/g	Rep1			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Eu-154	1.45E-01	6.77E-01	1	uCi/g	Rep1			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Eu-154	1.04E-01	5.83E-01	3	uCi/g	Rep3			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Eu-154	1.27E-01	5.93E-01	2	uCi/g	Rep2			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Eu-154		<5.39E-1	2	uCi/g	Rep2 (63DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Eu-154	3.05E-01	1.15E+00	3	uCi/g	Rep3 (64DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Eu-154	2.06E-01	6.39E-01	1	uCi/g	Rep1 (62DB			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Eu-154	3.33E-01	1.11E+00	3	uCi/g	Rep3 (B75			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Eu-154		<9.13E-1	1	uCi/g	Rep1 (B75			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Eu-154		<8.13E-1	2	uCi/g	Rep2 (B75			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Eu-154	3.33E-01	1.08E+00	2	uCi/g	Rep2			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Eu-154	3.44E-01	1.43E+00	3	uCi/g	Rep3			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Eu-154	4.09E-01	1.53E+00	4	uCi/g	Rep4			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Eu-154	3.17E-01	1.06E+00	1	uCi/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154	8.40E-01	2.80E+00	3	uCi/g	Rep3			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154	1.19E+00	4.15E+00	8	uCi/g	Rep8			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154	1.07E+00	3.62E+00	2	uCi/g	Rep2			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154	5.63E-01	1.74E+00	4	uCi/g	Rep4			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154	8.07E-01	2.69E+00	7	uCi/g	Rep7			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154		<2.57E+0	1	uCi/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154		<8.76E-1	9	uCi/g	Rep9			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154	7.04E-01	2.88E+00	5	uCi/g	Rep5			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Eu-154	9.45E-01	2.78E+00	6	uCi/g	Rep6			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<3.25E-2	9	uCi/g	Rep9			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<7.29E-2	5	uCi/g	Rep5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<4.77E-2	7	uCi/g	Rep7			

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS		NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<4.34E-2	8	uCi/g	Rep8				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<6.59E-2	6	uCi/g	Rep6				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<7.27E-2	3	uCi/g	Rep3				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<5.42E-2	2	uCi/g	Rep2				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<6.37E-2	1	uCi/g	Rep1				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Eu-155		<8.75E-2	4	uCi/g	Rep4				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Eu-155		<1.29E-1	2	uCi/g	Rep2 (B75				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Eu-155		<1.29E-1	1	uCi/g	Rep1 (B75				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Eu-155		<1.09E-1	3	uCi/g	Rep3 (B75				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Eu-155		<8.89E-2	3	uCi/g	Rep3				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Eu-155		<1.70E-1	1	uCi/g	Rep1				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Eu-155		<1.08E-1	2	uCi/g	Rep2				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Eu-155		<1.06E-1	3	uCi/g	Rep3				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Eu-155		<1.12E-1	2	uCi/g	Rep2				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Eu-155		<6.33E-2	1	uCi/g	Rep1				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Eu-155		<4.18E-1	3	uCi/g	Rep3 (40				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Eu-155		<2.49E-1	2	uCi/g	Rep2 (39				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Eu-155		<2.14E-1	1	uCi/g	Rep1 (38				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Eu-155		<6.73E-1	3	uCi/g	Rep3				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Eu-155		<3.23E-1	1	uCi/g	Rep1				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Eu-155		<4.23E-1	2	uCi/g	Rep2				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Eu-155		<2.94E-1	3	uCi/g	Rep3				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Eu-155		<4.17E-1	1	uCi/g	Rep1				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Eu-155		<3.13E-1	2	uCi/g	Rep2				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Eu-155		<5.94E-1	1	uCi/g	Rep1 (62DB				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Eu-155		<6.42E-1	3	uCi/g	Rep3 (64DB				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Eu-155		<9.28E-1	2	uCi/g	Rep2 (63DB				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Eu-155		<7.74E-1	3	uCi/g	Rep3 (B75				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Eu-155		<1.30E+0	2	uCi/g	Rep2 (B75				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Eu-155		<1.10E+0	1	uCi/g	Rep1 (B75				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Eu-155		<1.35E+0	4	uCi/g	Rep4				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Eu-155		<7.14E-1	1	uCi/g	Rep1				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Eu-155		<8.66E-1	3	uCi/g	Rep3				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Eu-155		<6.08E-1	2	uCi/g	Rep2				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	1.96E-01	2.31E-01	3	uCi/g	Rep3				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	1.77E-01	2.25E-01	2	uCi/g	Rep2				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	2.25E-01	3.25E-01	6	uCi/g	Rep6				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	1.36E-01	1.86E-01	1	uCi/g	Rep1				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	7.31E-02	1.83E-01	10	uCi/g	Rep10				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	5.82E-02	1.31E-01	12	uCi/g	Rep12				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	6.45E-02	1.49E-01	13	uCi/g	Rep13				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	7.14E-02	2.03E-01	11	uCi/g	Rep11				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossAlpha	1.90E-01	2.24E-01	5	uCi/g	Rep5				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	GrossAlpha	1.14E-01	4.63E-01	2	uCi/g	Rep2				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	GrossAlpha	1.07E-01	4.35E-01	3	uCi/g	Rep3				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	GrossAlpha	1.07E-01	4.42E-01	1	uCi/g	Rep1				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	GrossAlpha	1.35E-01	6.39E-01	1	uCi/g	Rep1				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	GrossAlpha	1.43E-01	7.20E-01	2	uCi/g	Rep2				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	GrossAlpha	1.18E-01	4.74E-01	3	uCi/g	Rep3				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	GrossAlpha	3.69E-01	8.81E-01	2	uCi/g	Rep2				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	GrossAlpha	3.66E-01	8.73E-01	3	uCi/g	Rep3				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	GrossAlpha	3.14E-01	6.80E-01	1	uCi/g	Rep1				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	GrossAlpha		Not Measu	4	uCi/g	Rep4; U2				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	GrossAlpha	2.86E-01	6.49E-01	2	uCi/g	Rep2 (39				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	GrossAlpha	3.54E-01	9.98E-01	3	uCi/g	Rep3				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	GrossAlpha	3.95E-01	1.26E+00	1	uCi/g	Rep1 (38				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	GrossAlpha	4.56E-01	1.49E+00	1	uCi/g	Rep1				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	GrossAlpha	4.51E-01	1.23E+00	3	uCi/g	Rep3				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	GrossAlpha	4.55E-01	1.40E+00	2	uCi/g	Rep2				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	GrossAlpha	7.63E-01	2.01E+00	3	uCi/g	Rep3 (B 75				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	GrossAlpha	6.04E-01	1.16E+00	2	uCi/g	Rep2 (B 75				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	GrossAlpha	5.43E-01	7.98E-01	1	uCi/g	Rep1 (B 75				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	GrossAlpha		<2.65E+0	4	uCi/g	Rep4 (B75				

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS	NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	GrossAlpha		<2.63E+0	5	uCi/g	Rep5 (B75			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	GrossAlpha		<3.06E+0	6	uCi/g	Rep6 (B75			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	GrossAlpha	1.94E+00	2.96E+00	3	uCi/g	Rep3 (#82			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	GrossAlpha	1.78E+00	3.39E+00	1	uCi/g	Rep1 (#80			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	GrossAlpha	1.57E+00	2.52E+00	2	uCi/g	Rep2 (#81			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	7.13E+00	3.83E+02	1	uCi/g	Rep1			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	8.25E+00	4.20E+02	5	uCi/g	Rep5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	6.69E+00	4.06E+02	10	uCi/g	Rep10			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	6.62E+00	4.05E+02	12	uCi/g	Rep12			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	5.77E+00	3.49E+02	11	uCi/g	Rep11			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	9.47E+00	4.93E+02	3	uCi/g	Rep3			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	8.15E+00	4.08E+02	6	uCi/g	Rep6			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	8.02E+00	4.15E+02	2	uCi/g	Rep2			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	GrossBeta	5.68E+00	3.42E+02	13	uCi/g	Rep13			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	GrossBeta	1.24E+01	7.78E+02	3	uCi/g	Rep3			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	GrossBeta	1.54E+01	9.71E+02	2	uCi/g	Rep2			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	GrossBeta	1.23E+01	7.74E+02	1	uCi/g	Rep1			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	GrossBeta	2.13E+01	1.36E+03	3	uCi/g	Rep3			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	GrossBeta	2.30E+01	1.47E+03	2	uCi/g	Rep2			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	GrossBeta	2.16E+01	1.37E+03	1	uCi/g	Rep1			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	GrossBeta	3.05E+01	1.84E+03	2	uCi/g	Rep2			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	GrossBeta	3.01E+01	1.82E+03	1	uCi/g	Rep1			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	GrossBeta	2.78E+01	1.66E+03	3	uCi/g	Rep3			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	GrossBeta		Not Measu	4	uCi/g	Rep4: U2			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	GrossBeta	3.57E+01	2.18E+03	2	uCi/g	Rep2 (39			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	GrossBeta	3.66E+01	2.24E+03	1	uCi/g	Rep1 (38			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	GrossBeta	3.90E+01	2.39E+03	3	uCi/g	Rep3			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	GrossBeta	4.75E+01	2.93E+03	2	uCi/g	Rep2			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	GrossBeta	4.71E+01	2.91E+03	1	uCi/g	Rep1			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	GrossBeta	4.65E+01	2.84E+03	3	uCi/g	Rep3			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	GrossBeta	5.67E+01	3.36E+03	2	uCi/g	Rep2 (B 75			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	GrossBeta	5.89E+01	3.48E+03	1	uCi/g	Rep1 (B 75			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	GrossBeta	5.72E+01	3.41E+03	3	uCi/g	Rep3 (B 75			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	GrossBeta	8.59E+01	4.19E+03	6	uCi/g	Rep6 (B75			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	GrossBeta	7.72E+01	3.81E+03	4	uCi/g	Rep4 (B75			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	GrossBeta	8.45E+01	4.28E+03	5	uCi/g	Rep5 (B75			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	GrossBeta	1.03E+02	5.29E+03	3	uCi/g	Rep3 (#82			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	GrossBeta	9.16E+01	4.92E+03	1	uCi/g	Rep1 (#80			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	GrossBeta	8.97E+01	4.76E+03	2	uCi/g	Rep2 (#81			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Na		Not Measu	8	ug/g	Rep8			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Np237	3.49E-04	4.20E-03	4	uCi/g	Rep4 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Np237	2.33E-04	2.47E-03	2	uCi/g	Rep2 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Np237	2.60E-04	3.11E-03	3	uCi/g	Rep3 (B75			
01-2326	11/2/2001		108-112	9/25/2001	B75WH108,109,111 &112	CFMT	WH	75WH	Np237	2.57E-04	2.69E-03	1	uCi/g	Rep1 (B75			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	5.86E-04	7.38E-03	1	uCi/g	Rep1 (01db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	5.11E-04	6.54E-03	4	uCi/g	Rep4 (04db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	6.22E-04	6.87E-03	2	uCi/g	Rep2 (02db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	7.07E-04	8.78E-03	7	uCi/g	Rep7 (07db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	6.77E-04	7.95E-03	6	uCi/g	Rep6 (06db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	5.62E-04	6.95E-03	9	uCi/g	Rep9 (09db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	6.08E-04	6.21E-03	5	uCi/g	Rep5 (18 db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	5.15E-04	6.44E-03	8	uCi/g	Rep8 (08db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Np237	5.79E-04	7.17E-03	3	uCi/g	Rep3 (03db			
01-2500	11/26/2001		14	11/24/2001	B75WI14	CFMT	WI (ACT #11)	075	pH	0.1	5.6 (24 °C	1	su	Rep1			
01-2515	11/28/2001		B75PH01,0	11/28/2001	75PH01,75PH02	CFMT	B75 AFTER AC	75	pH	0.1	2.1 (27 °C	1	su	Rep1			
01-2575	12/6/2001		14 thru 16	12/6/2001	B75 WGF 14-16	CFMT	WGF (ACT #18	075	pH	0.1	4.4 (27 °C	1	su	Rep1			
01-2575	12/6/2001		14 thru 16	12/6/2001	B75 WGF 14-16	CFMT	WGF (ACT #18	075	pH	0.1	4.5 (27 °C	3	su	Rep3			
01-2575	12/6/2001		14 thru 16	12/6/2001	B75 WGF 14-16	CFMT	WGF (ACT #18	075	pH	0.1	4.5 (27 °C	2	su	Rep2			
01-2622	12/11/2001		04 THRU 0	12/11/2001	B75SF04 - B75SF06	CFMT	SF (ACT #25C)	75	pH	0.1	4.1 (27 °C	3	su	Rep3			
01-2622	12/11/2001		04 THRU 0	12/11/2001	B75SF04 - B75SF06	CFMT	SF (ACT #25C)	75	pH	0.1	4.2 (27 °C	2	su	Rep2			
01-2622	12/11/2001		04 THRU 0	12/11/2001	B75SF04 - B75SF06	CFMT	SF (ACT #25C)	75	pH	0.1	4.1 (27 °C	1	su	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<8.77E-5	9	uCi/g	Rep9 (09db			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<8.77E-5	1	uCi/g	Rep1 (01db			

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS		NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<1.04E-4	4	uCi/g	Rep4 (04db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<8.77E-5	2	uCi/g	Rep2 (02db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<8.77E-5	7	uCi/g	Rep7 (07db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<7.74E-5	3	uCi/g	Rep3 (03db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<9.46E-5	6	uCi/g	Rep6 (06db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<8.08E-5	8	uCi/g	Rep8 (08db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu236		<8.08E-5	5	uCi/g	Rep5 (18 db				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	1.81E-03	3.08E-02	1	uCi/g	Rep1 (1				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	1.67E-03	3.72E-02	8	uCi/g	Rep8 (8DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	3.46E-03	6.32E-02	3	uCi/g	Rep3 (3				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	1.45E-03	2.94E-02	7	uCi/g	Rep7 (7				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	2.51E-03	3.83E-02	6	uCi/g	Rep6 (11				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	2.94E-03	3.61E-02	4	uCi/g	Rep4 (4				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	1.35E-03	2.60E-02	9	uCi/g	Rep9 (9DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	2.32E-03	3.54E-02	5	uCi/g	Rep5 (5				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-238	2.18E-03	3.45E-02	2	uCi/g	Rep2 (2				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Pu-238	4.69E-03	7.93E-02	3	uCi/g	Rep3				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Pu-238	4.89E-03	7.93E-02	1	uCi/g	Rep1				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Pu-238	5.20E-03	9.13E-02	2	uCi/g	Rep2				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Pu-238	7.22E-03	1.31E-01	2	uCi/g	Rep2				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Pu-238	5.73E-03	1.30E-01	1	uCi/g	Rep1				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Pu-238	5.63E-03	1.27E-01	3	uCi/g	Rep3				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Pu-238	5.68E-03	1.43E-01	2	uCi/g	Rep2 (WH-				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Pu-238	5.87E-03	1.50E-01	1	uCi/g	Rep1 (WH-				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Pu-238	5.32E-03	1.27E-01	3	uCi/g	Rep3 (WH-				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Pu-238	8.59E-03	2.11E-01	1	uCi/g	Rep1 (38				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Pu-238	7.98E-03	1.95E-01	2	uCi/g	Rep2 (39				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Pu-238	7.79E-03	2.00E-01	3	uCi/g	Rep3 (40				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Pu-238	9.27E-03	2.62E-01	2	uCi/g	Rep2 (44				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Pu-238	9.75E-03	2.64E-01	1	uCi/g	Rep1 (43				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Pu-238	1.11E-02	2.77E-01	3	uCi/g	Rep3				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Pu-238	1.06E-02	3.10E-01	3	uCi/g	Rep3 (01-				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Pu-238	1.16E-02	3.16E-01	1	uCi/g	Rep1 (01-				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Pu-238	9.22E-03	2.99E-01	2	uCi/g	Rep2 (01-				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Pu-238	9.59E-03	3.71E-01	2	uCi/g	Rep2 (63				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Pu-238	1.11E-02	3.03E-01	1	uCi/g	Rep1 (62				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Pu-238	1.05E-02	3.93E-01	3	uCi/g	Rep3 (64				
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Pu-238	1.28E-02	4.21E-01	1	uCi/g	Rep1				
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Pu-238	1.29E-02	4.06E-01	2	uCi/g	Rep2				
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Pu-238	1.61E-02	4.40E-01	3	uCi/g	Rep3				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Pu-238	1.60E-02	4.49E-01	2	uCi/g	Rep2				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Pu-238	1.55E-02	4.57E-01	1	uCi/g	Rep1				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Pu-238	1.53E-02	4.62E-01	3	uCi/g	Rep3				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Pu-238	1.98E-02	4.64E-01	6	uCi/g	Rep6 (#109				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Pu-238	2.30E-02	5.33E-01	7	uCi/g	Rep7 (#111				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Pu-238	2.04E-02	4.70E-01	5	uCi/g	Rep5 (#108				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Pu-238	1.47E-02	4.88E-01	8	uCi/g	Rep8 (#112				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	5.10E-02	1.17E+00	5	uCi/g	Rep5				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	6.00E-02	1.27E+00	7	uCi/g	Rep7				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	6.18E-02	1.28E+00	2	uCi/g	Rep2				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	4.99E-02	1.17E+00	8	uCi/g	Rep8				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	6.11E-02	1.27E+00	9	uCi/g	Rep9				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	6.75E-02	1.51E+00	4	uCi/g	Rep4				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	5.81E-02	1.27E+00	1	uCi/g	Rep1				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	6.13E-02	1.37E+00	6	uCi/g	Rep6				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Pu-238	5.04E-02	1.12E+00	3	uCi/g	Rep3				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	1.16E-03	1.50E-02	2	uCi/g	Rep2 (2				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	7.26E-04	1.14E-02	9	uCi/g	Rep9 (9DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	1.76E-03	2.62E-02	3	uCi/g	Rep3 (3				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	9.81E-04	1.38E-02	1	uCi/g	Rep1 (1				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	7.81E-04	1.29E-02	7	uCi/g	Rep7 (7				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	8.99E-04	1.63E-02	8	uCi/g	Rep8 (8DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	1.20E-03	1.46E-02	5	uCi/g	Rep5 (5				

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS		NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	1.57E-03	1.57E-02	4	uCi/g	Rep4 (4				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Pu-239+240	1.35E-03	1.68E-02	6	uCi/g	Rep6 (11				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Pu-239+240	2.61E-03	3.78E-02	2	uCi/g	Rep2				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Pu-239+240	2.33E-03	3.21E-02	3	uCi/g	Rep3				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Pu-239+240	2.48E-03	3.33E-02	1	uCi/g	Rep1				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Pu-239+240	2.90E-03	5.68E-02	1	uCi/g	Rep1 ,				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Pu-239+240	2.81E-03	5.44E-02	3	uCi/g	Rep3				
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Pu-239+240	3.78E-03	5.97E-02	2	uCi/g	Rep2				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Pu-239+240	3.12E-03	7.14E-02	1	uCi/g	Rep1 (WH-				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Pu-239+240	2.85E-03	6.10E-02	3	uCi/g	Rep3 (WH-				
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Pu-239+240	3.05E-03	6.82E-02	2	uCi/g	Rep2 (WH-				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Pu-239+240	4.09E-03	8.98E-02	1	uCi/g	Rep1 (38				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Pu-239+240	4.05E-03	8.90E-02	2	uCi/g	Rep2 (39				
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Pu-239+240	3.89E-03	8.99E-02	3	uCi/g	Rep3 (40				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Pu-239+240	5.16E-03	1.15E-01	3	uCi/g	Rep3				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Pu-239+240	4.65E-03	1.14E-01	1	uCi/g	Rep1 (43				
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Pu-239+240	4.40E-03	1.12E-01	2	uCi/g	Rep2 (44				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Pu-239+240	4.15E-03	1.23E-01	2	uCi/g	Rep2 (01-				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Pu-239+240	5.43E-03	1.36E-01	1	uCi/g	Rep1 (01-				
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Pu-239+240	4.87E-03	1.32E-01	3	uCi/g	Rep3 (01-				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Pu-239+240	5.87E-03	1.29E-01	1	uCi/g	Rep1 (62				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Pu-239+240	5.46E-03	1.63E-01	3	uCi/g	Rep3 (64				
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Pu-239+240	4.99E-03	1.54E-01	2	uCi/g	Rep2 (63				
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Pu-239+240	5.81E-03	1.71E-01	2	uCi/g	Rep2				
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Pu-239+240	7.21E-03	1.84E-01	3	uCi/g	Rep3				
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Pu-239+240	5.58E-03	1.73E-01	1	uCi/g	Rep1				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Pu-239+240	6.63E-03	1.89E-01	3	uCi/g	Rep3				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Pu-239+240	6.93E-03	1.82E-01	2	uCi/g	Rep2				
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Pu-239+240	6.87E-03	1.91E-01	1	uCi/g	Rep1				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Pu-239+240	9.04E-03	1.94E-01	5	uCi/g	Rep5 (#108				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Pu-239+240	9.06E-03	1.99E-01	6	uCi/g	Rep6 (#109				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Pu-239+240	6.53E-03	2.04E-01	8	uCi/g	Rep8 (#112				
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Pu-239+240	1.03E-02	2.27E-01	7	uCi/g	Rep7 (#111				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	3.05E-02	5.36E-01	2	uCi/g	Rep2				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	2.94E-02	5.10E-01	7	uCi/g	Rep7				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	3.29E-02	6.42E-01	4	uCi/g	Rep4				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	3.08E-02	5.41E-01	9	uCi/g	Rep9				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	2.50E-02	5.04E-01	8	uCi/g	Rep8				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	2.47E-02	4.86E-01	5	uCi/g	Rep5				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	2.49E-02	4.71E-01	3	uCi/g	Rep3				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	2.87E-02	5.41E-01	1	uCi/g	Rep1				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu-239+240	3.04E-02	5.89E-01	6	uCi/g	Rep6				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<5.72E-3	8	uCi/g	Rep8 (08db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<5.47E-3	3	uCi/g	Rep3 (03db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<6.25E-3	2	uCi/g	Rep2 (02db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<7.38E-3	4	uCi/g	Rep4 (04db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<6.21E-3	9	uCi/g	Rep9 (09db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<5.72E-3	5	uCi/g	Rep5 (18 db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<6.21E-3	7	uCi/g	Rep7 (07db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<6.21E-3	1	uCi/g	Rep1 (01db				
01-2498	11/26/2001		01 - 09	11/24/2001	B75WH01 - 09	CFMT	WH (ACT #11)	075	Pu242		<6.69E-3	6	uCi/g	Rep6 (06db				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	7.19E-01	2.50E+01	3	uCi/g	Rep3 (3DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	5.73E-01	1.87E+01	5	uCi/g	Rep5 (5DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	6.35E-01	2.11E+01	6	uCi/g	Rep6				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	6.11E-01	2.08E+01	2	uCi/g	Rep2 (2DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	5.11E-01	1.80E+01	1	uCi/g	Rep1 (1DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	6.23E-01	1.93E+01	4	uCi/g	Rep4 (4DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	6.14E-01	2.03E+01	8	uCi/g	Rep8 (8DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	5.31E-01	1.65E+01	7	uCi/g	Rep7 (7DB):				
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Sr90	5.45E-01	1.63E+01	9	uCi/g	Rep9 (9DB):				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Sr90	1.23E+00	4.91E+01	1	uCi/g	Rep1 (B75				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Sr90	1.49E+00	6.12E+01	2	uCi/g	Rep2 (B75				
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Sr90	1.20E+00	4.75E+01	3	uCi/g	Rep3 (B75				

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS	NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Sr90	2.04E+00	8.77E+01	4	uCi/g	Rep4 (B75			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Sr90	2.12E+00	9.16E+01	5	uCi/g	Rep5 (B75			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Sr90	1.96E+00	8.42E+01	6	uCi/g	Rep6 (B75			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Sr90	2.35E+00	1.02E+02	3	uCi/g	Rep3 (B75			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Sr90	2.47E+00	1.07E+02	2	uCi/g	Rep2 (B75			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Sr90	2.50E+00	1.09E+02	1	uCi/g	Rep1 (B75			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Sr90	2.99E+00	1.31E+02	1	uCi/g	Rep1 (38			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Sr90	2.86E+00	1.25E+02	2	uCi/g	Rep2 (39			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Sr90	3.22E+00	1.42E+02	3	uCi/g	Rep3 (40			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Sr90	4.07E+00	1.80E+02	1	uCi/g	Rep1 (B75			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Sr90	3.86E+00	1.69E+02	3	uCi/g	Rep3 (B75			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Sr90	3.96E+00	1.75E+02	2	uCi/g	Rep2 (B75			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Sr90	4.30E+00	1.95E+02	2	uCi/g	Rep2 (47			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Sr90	4.28E+00	1.95E+02	3	uCi/g	Rep3 (48			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Sr90	4.29E+00	1.93E+02	1	uCi/g	Rep1 (46			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Sr90	5.31E+00	2.49E+02	5	uCi/g	Rep5 (63			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Sr90	4.00E+00	1.84E+02	4	uCi/g	Rep4 (62			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Sr90	5.56E+00	2.60E+02	6	uCi/g	Rep6 (64			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Sr90	5.50E+00	2.57E+02	2	uCi/g	Rep2 (#81			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Sr90	5.82E+00	2.72E+02	1	uCi/g	Rep1 (#80			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	Sr90	6.15E+00	2.87E+02	3	uCi/g	Rep3 (#82			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Sr90	7.23E+00	3.31E+02	1	uCi/g	Rep1 (85			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Sr90	6.75E+00	3.09E+02	2	uCi/g	Rep2 (86			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	Sr90	6.74E+00	3.10E+02	3	uCi/g	Rep3 (87			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Sr90	7.26E+00	3.37E+02	4	uCi/g	Rep4 (112			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Sr90	6.75E+00	3.11E+02	2	uCi/g	Rep2 (109			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Sr90	8.17E+00	3.80E+02	3	uCi/g	Rep3 (111			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	Sr90	7.09E+00	3.24E+02	1	uCi/g	Rep1 (108			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.84E+01	9.04E+02	6	uCi/g	Rep6 (6DB):			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.69E+01	8.22E+02	3	uCi/g	Rep3 (3DB):			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.85E+01	8.98E+02	1	uCi/g	Rep1 (1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.74E+01	8.55E+02	7	uCi/g	Rep7 (7DB):			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.77E+01	8.70E+02	9	uCi/g	Rep9 (9DB):			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.98E+01	9.65E+02	4	uCi/g	Rep4 (4DB):			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.80E+01	8.69E+02	2	uCi/g	Rep2 (2DB):			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.70E+01	8.33E+02	8	uCi/g	Rep8 (8DB):			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Sr90	1.66E+01	8.11E+02	5	uCi/g	Rep5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	1.33E-03	1.03E-02	11	uCi/g	Rep11 (B75			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	1.29E-03	8.61E-03	6	uCi/g	Rep6 (B75			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	1.35E-03	7.89E-03	4	uCi/g	Rep4 (B75			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	1.17E-03	7.32E-03	5	uCi/g	Rep5 (B75			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	1.29E-03	9.71E-03	10	uCi/g	Rep10 (B75			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	1.24E-03	8.07E-03	7	uCi/g	Rep7 (B75			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	1.29E-03	8.53E-03	3	uCi/g	Rep3 (B75			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	9.48E-04	8.11E-03	1	uCi/g	Rep1 (B75			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	Tc99	1.13E-03	7.77E-03	2	uCi/g	Rep2 (B75			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Tc99	1.74E-03	1.58E-02	3	uCi/g	Rep3			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Tc99	1.92E-03	1.84E-02	2	uCi/g	Rep2			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	Tc99	1.70E-03	1.54E-02	1	uCi/g	Rep1			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Tc99	2.08E-03	2.13E-02	2	uCi/g	Rep2			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Tc99	2.07E-03	2.15E-02	3	uCi/g	Rep3			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	Tc99	2.13E-03	2.31E-02	1	uCi/g	Rep1			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Tc99	2.17E-03	2.65E-02	3	uCi/g	Rep3			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Tc99	2.04E-03	2.55E-02	1	uCi/g	Rep1			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	Tc99	2.17E-03	2.61E-02	2	uCi/g	Rep2			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Tc99	2.54E-03	3.54E-02	2	uCi/g	Rep2 (39):			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Tc99	2.46E-03	3.39E-02	1	uCi/g	Rep1 (38):			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	Tc99	2.54E-03	3.56E-02	3	uCi/g	Rep3 (40):			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Tc99	2.65E-03	3.65E-02	1	uCi/g	Rep1			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Tc99	3.07E-03	4.19E-02	3	uCi/g	Rep3			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	Tc99	2.95E-03	4.23E-02	2	uCi/g	Rep2			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Tc99	2.84E-03	4.33E-02	1	uCi/g	Rep1			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Tc99	2.69E-03	4.22E-02	2	uCi/g	Rep2			

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS	NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	Tc99	2.71E-03	4.42E-02	3	uCi/g	Rep3			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Tc99	2.82E-03	4.76E-02	6	uCi/g	Rep6 (64DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Tc99	2.74E-03	5.11E-02	5	uCi/g	Rep5 (63DB			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	Tc99	2.73E-03	5.06E-02	4	uCi/g	Rep4 (62DB			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	6.86E-03	1.67E-01	4	uCi/g	Rep4			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	5.29E-03	1.34E-01	9	uCi/g	Rep9			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	6.80E-03	1.65E-01	6	uCi/g	Rep6			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	6.90E-03	1.70E-01	1	uCi/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	6.67E-03	1.63E-01	3	uCi/g	Rep3			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	6.55E-03	1.63E-01	5	uCi/g	Rep5			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	6.58E-03	1.62E-01	7	uCi/g	Rep7			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	7.04E-03	1.66E-01	2	uCi/g	Rep2			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	Tc99	5.42E-03	1.39E-01	8	uCi/g	Rep8			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	2.23E-03	4.23E-02	7	uCi/g	Rep7 (7			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	3.34E-03	4.95E-02	2	uCi/g	Rep2 (2			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	2.79E-03	4.46E-02	1	uCi/g	Rep1 (1			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	2.57E-03	5.35E-02	8	uCi/g	Rep8 (8DB):			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	2.08E-03	3.74E-02	9	uCi/g	Rep9 (9DB):			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	3.85E-03	5.51E-02	6	uCi/g	Rep6 (11			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	4.51E-03	5.18E-02	4	uCi/g	Rep4 (4			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	3.52E-03	5.00E-02	5	uCi/g	Rep5 (5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	TotAlphaPu	5.22E-03	8.94E-02	3	uCi/g	Rep3 (3			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	TotAlphaPu	7.80E-03	1.29E-01	2	uCi/g	Rep2			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	TotAlphaPu	7.02E-03	1.11E-01	3	uCi/g	Rep3			
01-1440	7/17/2001		21-23	7/17/2001	75WH21-75WH23	CFMT	WH	75	TotAlphaPu	7.37E-03	1.13E-01	1	uCi/g	Rep1			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	TotAlphaPu	1.10E-02	1.90E-01	2	uCi/g	Rep2			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	TotAlphaPu	8.64E-03	1.87E-01	1	uCi/g	Rep1			
01-1501	7/24/2001		24-29	7/23/2001	B75WH24-B75WH26	CFMT	WH	75	TotAlphaPu	8.44E-03	1.81E-01	3	uCi/g	Rep3			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	TotAlphaPu	8.16E-03	1.88E-01	3	uCi/g	Rep3 (WH-			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	TotAlphaPu	8.73E-03	2.11E-01	2	uCi/g	Rep2 (WH-			
01-1557	7/30/2001		32,33,34	7/30/2001	75WH32-75WH34	CFMT	WH	75	TotAlphaPu	8.99E-03	2.21E-01	1	uCi/g	Rep1 (WH-			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	TotAlphaPu	1.17E-02	2.90E-01	3	uCi/g	Rep3 (40			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	TotAlphaPu	1.27E-02	3.01E-01	1	uCi/g	Rep1 (38			
01-1621	8/7/2001		38-40	8/7/2001	75WH38-75WH40	CFMT	WH	075	TotAlphaPu	1.20E-02	2.84E-01	2	uCi/g	Rep2 (39			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	TotAlphaPu	1.37E-02	3.73E-01	2	uCi/g	Rep2 (44			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	TotAlphaPu	1.44E-02	3.77E-01	1	uCi/g	Rep1 (43			
01-1656	8/13/2001		43 THRU 4	8/13/2001	B75WH # 43 - 45	CFMT	WH	75	TotAlphaPu	1.63E-02	3.92E-01	3	uCi/g	Rep3			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	TotAlphaPu	1.34E-02	4.21E-01	2	uCi/g	Rep2 (01-			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	TotAlphaPu	1.54E-02	4.42E-01	3	uCi/g	Rep3 (01-			
01-1722	8/21/2001		46-48,52-5	8/20/2001	75WH46,47,48,52,53	CFMT	WH	75	TotAlphaPu	1.70E-02	4.52E-01	1	uCi/g	Rep1 (01-			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	TotAlphaPu	1.46E-02	5.25E-01	2	uCi/g	Rep2 (63			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	TotAlphaPu	1.70E-02	4.32E-01	1	uCi/g	Rep1 (62			
01-1778	8/27/2001		62-64	8/25/2001	75WH62-64	CFMT	WH	75	TotAlphaPu	1.59E-02	5.56E-01	3	uCi/g	Rep3 (64			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	TotAlphaPu	1.87E-02	5.77E-01	2	uCi/g	Rep2			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	TotAlphaPu	1.84E-02	5.94E-01	1	uCi/g	Rep1			
01-1892	9/10/2001		80-84	9/4/2001	75WH80- 75WH84	CFMT	WH	75	TotAlphaPu	2.33E-02	6.24E-01	3	uCi/g	Rep3			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	TotAlphaPu	2.30E-02	6.30E-01	2	uCi/g	Rep2			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	TotAlphaPu	2.24E-02	6.48E-01	1	uCi/g	Rep1			
01-1918	9/16/2001		03	9/15/2001	B75WH	CFMT	WH	75	TotAlphaPu	2.19E-02	6.51E-01	3	uCi/g	Rep3			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	TotAlphaPu	2.95E-02	6.64E-01	5	uCi/g	Rep5 (#108			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	TotAlphaPu	3.33E-02	7.60E-01	7	uCi/g	Rep7 (#111			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	TotAlphaPu	2.89E-02	6.64E-01	6	uCi/g	Rep6 (#109			
01-2026	9/26/2001		108-112	9/25/2001	B75WH108-112	CFMT	WH	75	TotAlphaPu	2.12E-02	6.91E-01	8	uCi/g	Rep8 (#112			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	9.18E-02	1.96E+00	6	uCi/g	Rep6			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	9.23E-02	1.82E+00	2	uCi/g	Rep2			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	7.57E-02	1.66E+00	5	uCi/g	Rep5			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	1.00E-01	2.16E+00	4	uCi/g	Rep4			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	9.19E-02	1.81E+00	9	uCi/g	Rep9			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	7.49E-02	1.68E+00	8	uCi/g	Rep8			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	8.93E-02	1.78E+00	7	uCi/g	Rep7			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	8.68E-02	1.81E+00	1	uCi/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	TotAlphaPu	7.53E-02	1.59E+00	3	uCi/g	Rep3			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<2.28E+2	1	ug/g	Rep1			

PRIM_SAM_KEY	SAM_DATE	COMP_DAT	BOTTLES	COL_DATE	SAMP_IDC	SAMPOINT	SAMTYPE	VITBATCH	RES_TYP1	UNCERTAINTYVALUE	RESULT_VALUE	REP_NUM	ROAUNITS	ROAFLAGS	NUCLIDE	AVERAGE ACTIVITY (uCi/g) WI	Scaling factors
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<3.16E+2	3	ug/g	Rep3			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<3.13E+2	7	ug/g	Rep7			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<2.66E+2	5	ug/g	Rep5			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<3.30E+2	4	ug/g	Rep4			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<3.34E+2	8	ug/g	Rep8			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<3.16E+2	9	ug/g	Rep9			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<3.13E+2	2	ug/g	Rep2			
01-1392	7/11/2001		75WH1-17	7/11/2001	B75WH	CFMT	WH	75	U		<2.78E+2	6	ug/g	Rep6			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.32E+02	2	ug/g	Rep2			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.87E+02	6	ug/g	Rep6			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.54E+02	4	ug/g	Rep4			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.21E+02	3	ug/g	Rep3			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.19E+02	9	ug/g	Rep9			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.66E+02	7	ug/g	Rep7			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.40E+02	8	ug/g	Rep8			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.05E+02	1	ug/g	Rep1			
01-2498	11/26/2001		01 - 09	11/24/2001	B75WI01 - 09	CFMT	WI (ACT #11)	075	U		8.32E+02	5	ug/g	Rep5			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		5.30E+02	2	ug/g	Rep2			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		<5.24E+2	4	ug/g	Rep4			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		<4.55E+2	6	ug/g	Rep6			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		<4.79E+2	8	ug/g	Rep8			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		<4.03E+2	1	ug/g	Rep1			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		<4.03E+2	9	ug/g	Rep9			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		<5.76E+2	5	ug/g	Rep5			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		<4.78E+2	3	ug/g	Rep3			
01-2573	12/6/2001	8/26/2002	1 thru 9	12/6/2001	B75 WGF 1-9	CFMT	WGF (ACT #18	75	U		<4.42E+2	7	ug/g	Rep7			

APPENDIX 7

RADMAN Waste Stream Report

APPENDIX 7 - RADMAN Waste Stream Report

RADMAN Waste Stream

New Waste Stream Data

Report Date : 3/22/2004 during New Waste Stream Revision Date: 03/22/2004

Waste Description	West Valley Glass	Chemical Form	Glass
Generating Process	Vitrification Operations	Activated Metal	No
State Code	N/A	Physical Form	Solid
Solidification Agent	<none>	Activity Units	uCi/gm

Nuclide Name	Activity	Nuclide Type	Scaling Factor	Base Nuclide
H-3	1.89E-02	FP	<LLD>	Cs-137
C-14	1.15E-02	AP	4.84E-06	Cs-137
K-40	4.44E-02	NO	1.87E-05	Cs-137
Mn-54	8.12E-02	AP	3.42E-05	Cs-137
Co-60	4.95E-02	AP	2.08E-05	Cs-137
Ni-63	5.50E-01	AP	2.31E-04	Cs-137
Sr-90	1.36E+02	FP	5.73E-02	Cs-137
Zr-95	1.37E+01	FP	5.76E-03	Cs-137
Tc-99	6.00E-03	FP	2.52E-06	Cs-137
I-129	3.06E-03	FP	<LLD>	Cs-137
Cs-137	2.38E+03	FP	1.00E+00	Cs-137
Ce-144	1.40E+00	FP	<LLD>	Cs-137
Eu-154	6.93E-01	AP	2.92E-04	Cs-137
Th-228	2.85E-02	AP	1.20E-05	Cs-137
Th-230	1.98E-04	AP	8.32E-08	Cs-137
Th-232	2.18E-04	NO	9.15E-08	Cs-137
U-232	2.74E-02	AP	1.15E-05	Cs-137
U-233	1.12E-02	AP	4.71E-06	Cs-137
U-234	5.32E-03	NO	2.24E-06	Cs-137
U-235	2.04E-04	NO	8.58E-08	Cs-137
U-236	6.12E-04	AP	2.57E-07	Cs-137
U-238	1.22E-03	NO	5.13E-07	Cs-137
Np-237	3.36E-03	TR	1.41E-06	Cs-137
Pu-238	3.73E-01	TR	1.57E-04	Cs-137
Pu-239	8.58E-02	TR	3.61E-05	Cs-137
Pu-240	6.55E-02	TR	2.76E-05	Cs-137
Pu-241	1.75E+00	TR	7.36E-04	Cs-137

Nuclide Name	Activity	Nuclide Type	Scaling Factor	Base Nuclide
Am-241	1.63E+00	TR	6.84E-04	Cs-137
Am-243	1.90E-02	TR	7.98E-06	Cs-137
Cm-242	1.16E-01	TR	4.88E-05	Cs-137
Cm-243	9.28E-03	TR	3.90E-06	Cs-137
Cm-244	2.42E-01	TR	1.02E-04	Cs-137

APPENDIX 8

Plugged Discharge Port (Spout) Activity and Decay Correction Calculations (RADCALC)

APPENDIX 8 - Clogged Spout Actvity Calculations

	Total Mass (g)	99000	
	uCi/g	uCi	Ci
Sr-90	870	86130000	86.13
Cs-137	11644	1152756000	1152.756
Scaling			

Isotope	Act (Ci)	Scaling Factor		Scaling Factors from Heel	Scaling Factors from Analytical	Diff. in Scaling Factors
C-14	2.22E-03	1.93E-06		4.83E-06		
K-40	8.60E-03	7.46E-06		1.87E-05		
Mn-54	1.57E-02	1.36E-05		3.41E-05		
Co-60	2.93E-02	2.54E-05		2.12E-05	2.54E-05	8.35E-01
Ni-63	1.07E-01	9.25E-05		2.32E-04		
Sr-90	***8.61E+01***	***Analytica***		Analytical		
Zr-95	2.65E+00	2.30E-03		5.76E-03		
Tc-99	1.57E-02	1.36E-05		2.81E-06	1.36E-05	2.07E-01
Cs-137	**1.15E+03**	**1.00E+00**		1.00E+00	1.00E+00	
Eu-154	2.92E-01	2.53E-04		2.99E-04	2.53E-04	1.18E+00
Th-228	5.56E-03	4.82E-06		1.21E-05		
TH-230	3.88E-05	3.37E-08		8.45E-08		
Th-232	4.34E-05	3.76E-08		9.44E-08		
U-232	5.29E-03	4.59E-06		1.15E-05		
U-233	2.16E-03	1.87E-06		4.69E-06		
U-234	1.03E-03	8.93E-07		2.24E-06		
U-235	3.95E-05	3.43E-08		8.60E-08		
U-236	1.19E-04	1.03E-07		2.58E-07		
U-238	2.41E-04	2.09E-07		5.24E-07		
Np-237	7.07E-04	6.13E-07		1.44E-06	6.13E-07	2.35E+00
Pu-238	1.26E-01	1.09E-04		1.59E-04	1.09E-04	1.46E+00
Pu-239	3.01E-02	2.61E-05		3.66E-05	2.61E-05	1.40E+00
Pu-240	2.29E-02	1.99E-05		2.80E-05	1.99E-05	1.41E+00
Pu-241	3.43E-01	2.97E-04		7.46E-04		
Am-241	3.83E-01	3.32E-04		6.96E-04	3.32E-04	2.10E+00
Am-243	4.55E-03	3.95E-06		8.38E-06	3.95E-06	2.12E+00
Cm-242	4.32E-03	3.75E-06		5.02E-05	3.75E-06	1.34E+01
Cm-243	2.49E-03	2.16E-06		3.99E-06	2.16E-06	1.85E+00
Cm-244	6.65E-02	5.77E-05		1.04E-04	5.77E-05	1.80E+00
				Ave Difference in Scaling Factor		**2.51E+00**

Appendix 8 - Decay Calc for Clogged Discharge Port

Radcalc 4.1 6/26/2014 3:46 PM
File Name: Melter Spout_062614.rad

This report was generated using an unvalidated installation of Radcalc version 4.1.

Radcalc 4.1: C:\WVDP - Melter\Radcalcs from ANL Computer\Melter Spout_062614.rad

Performed By: Chris Brandjes
Checked By:

========== Input Information ==========

Comments:
Melter Spout - Act. based on 99 kg of glass at 2.6 g/cc density (1.35 ft3).

Decayed from 11/26/2001 to 09/02/2014. 11/26/2001 was the last Sample Date.

Initial Source Data:

Isotope	Ci	Gm	TBq
C-14	2.220E-03	4.957E-04	8.214E-05
K-40	8.600E-03	1.216E+03	3.182E-04
Mn-54	1.570E-02	2.024E-06	5.809E-04
Co-60	2.930E-02	2.589E-05	1.084E-03
Ni-63	1.070E-01	1.895E-03	3.959E-03
Sr-90	8.610E+01	6.234E-01	3.186E+00
Zr-95	2.650E+00	1.233E-04	9.805E-02
Tc-99	1.570E-02	9.295E-01	5.809E-04
Cs-137	1.150E+03	1.323E+01	4.255E+01
Eu-154	2.920E-01	1.080E-03	1.080E-02
Th-228	5.560E-03	6.783E-06	2.057E-04
Th-230	3.880E-05	1.882E-03	1.436E-06
Th-232	4.340E-05	3.958E+02	1.606E-06
U-232	5.290E-03	2.397E-04	1.957E-04
U-233	2.160E-03	2.242E-01	7.992E-05
U-234	1.030E-03	1.657E-01	3.811E-05
U-235	3.950E-05	1.828E+01	1.462E-06
U-236	1.190E-04	1.862E+00	4.403E-06
U-238	2.410E-04	7.170E+02	8.917E-06
Np-237	7.070E-04	1.003E+00	2.616E-05
Pu-238	1.260E-01	7.358E-03	4.662E-03
Pu-239	3.010E-02	4.853E-01	1.114E-03
Pu-240	2.290E-02	1.009E-01	8.473E-04
Pu-241	3.430E-01	3.314E-03	1.269E-02
Am-241	3.830E-01	1.118E-01	1.417E-02
Am-243	4.550E-03	2.278E-02	1.684E-04
Cm-242	4.320E-03	1.305E-06	1.598E-04
Cm-243	2.490E-03	5.079E-05	9.213E-05
Cm-244	6.650E-02	8.172E-04	2.461E-03
Total Activity:	1.240E+03		4.589E+01

* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	1	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	100	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	1.35	ft^3
Waste Mass:	99	kg

Radcalc 4.1 6/26/2014 3:46 PM
File Name: Melter Spout_062614.rad

Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Date to begin source decay: 11/26/2001
Date container sealed: 9/2/2014

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
C-14	2.217E-03	4.949E-04	8.201E-05
K-40	8.600E-03	1.216E+03	3.182E-04
Mn-54	4.997E-07	6.443E-11	1.849E-08
Co-60	5.467E-03	4.831E-06	2.023E-04
Ni-63	9.799E-02	1.735E-03	3.626E-03
Sr-90	6.332E+01	4.584E-01	2.343E+00
Y-90	6.333E+01	1.165E-04	2.343E+00
Zr-95	3.172E-22	1.476E-26	1.174E-23
Nb-95	6.994E-22	1.779E-26	2.588E-23
Nb-95m	3.631E-24	9.524E-30	1.344E-25
Tc-99	1.570E-02	9.295E-01	5.809E-04
Cs-137	8.566E+02	9.854E+00	3.169E+01
Ba-137m	8.086E+02	1.503E-06	2.992E+01
Eu-154	1.043E-01	3.857E-04	3.858E-03
Hg-206	7.135E-16	6.370E-24	2.640E-17
Tl-206	5.014E-14	2.308E-22	1.855E-15
Tl-207	1.863E-09	9.781E-18	6.893E-11
Tl-208	1.733E-03	5.852E-12	6.412E-05
Tl-209	5.578E-08	1.364E-16	2.064E-09
Tl-210	4.495E-11	6.527E-20	1.663E-12
Pb-209	2.582E-06	5.602E-13	9.555E-08
Pb-210	3.755E-08	4.888E-10	1.390E-09
Pb-211	1.868E-09	7.567E-17	6.911E-11
Pb-212	4.823E-03	3.471E-09	1.785E-04
Pb-214	2.140E-07	6.528E-15	7.919E-09
Bi-209	5.969E-25	6.629E-09	2.208E-26
Bi-210	3.745E-08	3.018E-13	1.385E-09
Bi-211	1.868E-09	4.548E-18	6.911E-11
Bi-212	4.823E-03	3.292E-10	1.785E-04
Bi-213	2.582E-06	1.334E-13	9.554E-08
Bi-214	2.141E-07	4.848E-15	7.921E-09
Bi-215	1.527E-15	1.292E-23	5.648E-17
Po-210	3.454E-08	7.686E-12	1.278E-09
Po-211	5.099E-12	4.921E-23	1.887E-13
Po-212	3.089E-03	1.730E-20	1.143E-04
Po-213	2.527E-06	2.004E-22	9.349E-08
Po-214	2.140E-07	6.646E-22	7.919E-09
Po-215	1.868E-09	6.337E-23	6.911E-11
Po-216	4.823E-03	1.385E-14	1.784E-04
Po-218	2.141E-07	7.689E-16	7.921E-09
At-215	7.472E-15	1.424E-29	2.765E-16
At-217	2.583E-06	1.605E-18	9.555E-08
At-218	4.067E-11	1.179E-21	1.505E-12
At-219	1.574E-15	1.650E-24	5.823E-17
Rn-217	3.099E-10	3.219E-24	1.147E-11
Rn-218	4.067E-14	2.751E-26	1.505E-15
Rn-219	1.868E-09	1.436E-19	6.911E-11
Rn-220	4.823E-03	5.248E-12	1.784E-04
Rn-222	2.141E-07	1.392E-12	7.921E-09

Fr-221	2.583E-06	1.487E-14	9.555E-08
Fr-223	2.623E-11	6.782E-19	9.705E-13
Ra-223	1.868E-09	3.647E-14	6.911E-11
Ra-224	4.823E-03	3.012E-08	1.784E-04
Ra-225	2.591E-06	6.607E-11	9.585E-08
Ra-226	2.143E-07	2.168E-07	7.930E-09
Ra-228	3.409E-05	1.250E-07	1.261E-06
Ac-225	2.583E-06	4.451E-11	9.555E-08
Ac-227	1.901E-09	2.628E-11	7.033E-11
Ac-228	3.409E-05	1.525E-11	1.261E-06
Th-227	1.854E-09	6.035E-14	6.861E-11
Th-228	4.822E-03	5.883E-06	1.784E-04
Th-229	2.602E-06	1.224E-05	9.629E-08
Th-230	3.892E-05	1.888E-03	1.440E-06
Th-231	3.950E-05	7.432E-11	1.462E-06
Th-232	4.340E-05	3.958E+02	1.606E-06
Th-234	2.410E-04	1.041E-08	8.917E-06
Pa-231	1.066E-08	2.258E-07	3.946E-10
Pa-233	7.086E-04	3.414E-08	2.622E-05
Pa-234	3.615E-07	1.830E-13	1.337E-08
Pa-234m	2.410E-04	3.510E-13	8.917E-06
U-232	4.660E-03	2.111E-04	1.724E-04
U-233	2.160E-03	2.242E-01	7.992E-05
U-234	1.034E-03	1.664E-01	3.827E-05
U-235	3.950E-05	1.828E+01	1.462E-06
U-235m	3.007E-02	9.774E-10	1.113E-03
U-236	1.190E-04	1.862E+00	4.403E-06
U-237	4.556E-06	5.583E-11	1.686E-07
U-238	2.410E-04	7.170E+02	8.917E-06
Np-237	7.086E-04	1.005E+00	2.622E-05
Np-239	4.545E-03	1.959E-08	1.681E-04
Pu-238	1.139E-01	6.653E-03	4.215E-03
Pu-239	3.009E-02	4.852E-01	1.113E-03
Pu-240	2.294E-02	1.011E-01	8.488E-04
Pu-241	1.850E-01	1.787E-03	6.844E-03
Am-241	3.804E-01	1.110E-01	1.408E-02
Am-243	4.545E-03	2.276E-02	1.681E-04
Cm-242	1.047E-11	3.164E-15	3.876E-13
Cm-243	1.854E-03	3.781E-05	6.860E-05
Cm-244	4.067E-02	4.998E-04	1.505E-03
Total Activity:	1.793E+03		6.634E+01
w/o Daughters:	9.209E+02		3.408E+01

Decay Heat:

Heat Generated on Start Date:	1.408	W
Heat Generated on Seal Date:	4.551	W

========== Regulatory Requirements Warning ==========

Radcalc utilizes numerically based criteria to classify packages against the regulations. Many regulations also include subjective criteria that Radcalc does not consider. The user must check to ensure that all requirements in the regulations are met.

========== DOT Classification Results ==========

* DOT classification calculations are made at the end of the user-specified decay time.

Radioactive Determination:

Radioactive:	Yes		(ACEMs and ALECs > 1.0)
ACEM Limit Fraction:	32470000	ACEMs	(Number of ACEMs)
ALEC Limit Fraction:	3.407E+09	ALECs	(Number of ALECs)

Radcalc 4.1 6/26/2014 3:46 PM
File Name: Melter Spout_062614.rad

* This package is not exempt from 49 CFR Subchapter C.

Effective A2s for Mixture:	4.133E+11	Bq	
Type Determination:			
Type:	B		(A2s > 1.0)
A2 Limit Fraction:	82.44	A2s	(Number of A2s)
Limited Quantity Determination:			
Limited Quantity:	No		(Solid, activity > 0.001 A2)
Activity:	82.44	A2	
	1793	Ci	
	66.34	TBq	
Fissile:	Yes		
Fissile Excepted:	Yes (c)		
LSA Determination:			
LSA-I:	No		(Fissile excepted, ACEMs > 30 x rad limits)
LSA-II:	No		(A2s/gm > 0.0001)
LSA-III:	Yes		(A2s/gm <= 0.002)
Specific Activity:	0.0008327	A2/gm	
	0.01811	Ci/gm	
HRCQ Determination:			
HRCQ:	No		(A2s <= 3000, Activity <= 1000 TBq)
A2 Limit Fraction:	82.44	A2s	
Activity:	1793	Ci	
	66.34	TBq	
Fissile Determination:			
Fissile:	Yes		(Contains fissile isotopes per 49 CFR 173.403)
Fissile Excepted Determination:			
Fissile Excepted:	Yes (c)		(Fissile <= 180 grams, non-fissile > = 2000 * fissile
Fissile Mass:	18.99	gm	
Container beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	gm	
Container Mass:	1000	gm	
Waste lead:	0	gm	
Waste beryllium, graphite, and hydrogenous material enriched with deuterium:	0	gm	
Waste Mass:	99000	gm	
Solid Non-Fissile Mass:	98980	gm	
Total Uranium Mass:	737.5	gm	
U-233 Mass:	0.2242	gm	
U-235 Mass:	18.28	gm	
Uranium Enrichment:	2.478	%	
Total Plutonium Mass:	0.5947	gm	
Pu-239 Mass:	0.4852	gm	
Pu-241 Mass:	0.001787	gm	
Reportable Quantity Determination:			
Reportable Quantity:	Yes		(RQs > = 1.0)
RQ Limit Fraction:	2366	RQs	(Number of RQs)

Shipping Papers and Labels:

	Isotope	Number of A2s	Fraction of A2s	Cumulative A2s	Cumulative Fraction of A2s
+	Cs-137	52.82	0.6408	52.82	0.6408
+	Am-241	14.08	0.1707	66.9	0.8115
+	Sr-90	7.809	0.09473	74.71	0.9062

+	Pu-238	4.215	0.05113	78.92	0.9574
	Pu-239	1.113	0.01351	80.04	0.9709
	Pu-240	0.8488	0.0103	80.88	0.9812
	Cm-244	0.7525	0.009128	81.64	0.9903
	Th-228	0.1784	0.002164	81.81	0.9925
	U-232	0.1724	0.002092	81.99	0.9945
	Am-243	0.1681	0.00204	82.16	0.9966
	Pu-241	0.1141	0.001384	82.27	0.998

\+ Contains 95% of the total A2s and must be included per 49 CFR 173.433.
* Radionuclides comprising less than 0.1% of the total A2s are not shown in the list.

========== DOE Classification Results ==========

* DOE classification calculations are made at the end of the user-specified decay time.

DOE-STD-1027 Category Determination:

Category:	Cat 3	(Cat3s > 1.0, Cat2s <= 1.0)
Cat 2 Limit Fraction:	0.02564	
Cat 3 Limit Fraction:	19.37	

* The DOE-STD-1027 category determination is based on dose-related limits.
The user must apply any criticality-related limits separately.

Dose-Equivalent Curies:

ICRP-72 DE-Ci:	0.6396
FGR-11 DE-Ci:	0.8536

TRU Waste Determination:

TRU Waste:	Yes	(TRU activity > 100 nCi/gm)
TRU Activity:	5601	nCi/g

WIPP Quantities:

FGE Value:	12.46
PE-Ci Value:	0.577

========== NRC Classification Results ==========

* NRC classification calculations are made at the end of the user-specified decay time.

NRC Container Category:

Container Category:	III	
LSA-I:	No	
LSA-II:	No	
LSA-III:	Yes	
Total Activity:	1793	Ci
A2 Limit Fraction:	82.44	A2s

APPENDIX 9

Airborne Sample Analysis from Vitrification Cell

APPENDIX 9 - Airborne Sample Analysis

Analysis of Multiple Sample Data Sets (SCAL)

Sample Data Set Scaling Factor Comparison
(Last Column is Scaling Factor for All Data Set Values)

Session Date : 7/1/2014

Waste :	Airborne contamination	Airborne Contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	
Date :	11/02/1999	11/02/1999	11/02/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	01/21/2000	01/21/2000	Average
Sample Id :	99-1961	99-1959	99-1960	99-2062	99-2085	99-2060	99-2061	99-2059	99-2085# 10	99-2061# 6	Data Set Scaling
Units :	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Sample	uCi/Sample	Factor
Nuclide	Sample Scaling Factors										
Co-60	8.92E-05	2.22E-04	**	1.29E-04	8.41E-05	1.01E-04	9.19E-05	4.91E-05	3.66E-04	1.11E-03	1.81E-04
Sr-90	3.09E-01	5.65E-01	5.00E-01	4.63E-01	3.83E-01	4.19E-01	2.52E-01	1.92E-01	4.93E-01	1.66E-01	3.48E-01
Tc-99	3.63E-05	3.04E-06	4.80E-05	5.52E-07	1.95E-05	4.08E-07	3.58E-07	2.24E-07	9.88E-06	1.18E-05	3.42E-06
Cs-137	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00
Eu-154	2.48E-03	5.10E-03	4.30E-03	3.05E-03	3.10E-03	3.32E-03	1.79E-03	1.46E-03	4.37E-03	1.17E-03	2.73E-03
Pu-238	5.62E-04	1.04E-03	5.70E-04	1.02E-03	7.36E-04	7.34E-04	4.52E-04	3.09E-04	8.99E-04	2.18E-04	5.89E-04
Pu-239	1.46E-04	2.70E-04	1.52E-04	2.71E-04	1.90E-04	1.94E-04	1.11E-04	8.18E-05	2.32E-04	5.60E-05	1.53E-04
Pu-240	1.02E-04	1.88E-04	1.05E-04	1.88E-04	1.32E-04	1.35E-04	7.72E-05	5.66E-05	1.62E-04	3.89E-05	1.06E-04
Am-241	4.97E-03	9.62E-03	6.80E-03	7.49E-03	4.55E-03	6.37E-03	3.82E-03	2.74E-03	5.42E-03	4.62E-03	5.33E-03
H-3	**	**	**	**	**	**	**	**	1.34E-06	1.71E-06	2.99E-06
C-14	**	**	**	**	**	**	**	**	9.77E-05	9.05E-04	5.88E-04
Fe-55	**	**	**	**	**	**	**	**	3.72E-04	1.45E-03	1.45E-03
Ni-59	**	**	**	**	**	**	**	**	2.11E-05	**	7.88E-05
Ni-63	**	**	**	**	**	**	**	**	1.51E-03	9.93E-04	2.41E-03
I-129	**	**	**	**	**	**	**	**	1.59E-05	5.78E-05	5.99E-05
Pm-147	**	**	**	**	**	**	**	**	1.06E-02	2.79E-03	1.07E-02
U-232	**	**	**	**	**	**	**	**	4.11E-05	1.56E-04	1.58E-04
U-233	**	**	**	**	**	**	**	**	1.13E-06	3.05E-06	3.66E-06
U-234	**	**	**	**	**	**	**	**	3.96E-07	1.07E-06	1.29E-06
U-235	**	**	**	**	**	**	**	**	3.08E-08	1.36E-07	1.28E-07
U-236	**	**	**	**	**	**	**	**	7.17E-08	3.18E-07	2.98E-07
U-238	**	**	**	**	**	**	**	**	2.55E-07	**	9.48E-07

** - Indicates NO Value for Nuclide

Waste :	Airborne c ontaminati on	Airborne C ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	
Date :	11/02/1999	11/02/1999	11/02/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	01/21/2000	01/21/2000	Average
Sample Id :	99-1961	99-1959	99-1960	99-2062	99-2085	99-2060	99-2061	99-2059	99-2085# 10	99-2061# 6	Data Set Scaling
Units :	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Sample	uCi/Sample	Factor
Nuclide	Sample Scaling Factors										
Np-237	**	**	**	**	**	**	**	**	2.40E-06	7.59E-07	2.67E-06
Pu-241	**	**	**	**	**	**	**	**	5.48E-03	1.36E-03	5.39E-03
Pu-242	**	**	**	**	**	**	**	**	5.17E-06	3.66E-06	8.60E-06
Am-243	**	**	**	**	**	**	**	**	2.96E-04	1.69E-04	4.41E-04
Cm-242	**	**	**	**	**	**	**	**	5.32E-05	5.71E-05	1.09E-04
Cm-244	**	**	**	**	**	**	**	**	1.06E-03	8.91E-04	1.92E-03
Cm-245	**	**	**	**	**	**	**	**	2.38E-03	1.83E-03	4.13E-03
Cm-246	**	**	**	**	**	**	**	**	3.88E-04	2.99E-04	6.72E-04

** - Indicates NO Value for Nuclide

Analysis of Multiple Sample Data Sets (SCAL)

Sample Data Set Fractional Abundance Comparison
(Last Column is Average Abundance for All Data Set Values)

Session Date : 7/1/2014

Waste :	Airborne c ontaminati on	Airborne C ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on
Units :	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Sample	uCi/Sample
Sample Id :	99-1961	99-1959	99-1960	99-2062	99-2085	99-2060	99-2061	99-2059	99-2085# 10	99-2061# 6
Date :	11/02/1999	11/02/1999	11/02/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	01/21/2000	01/21/2000

The Topical Criteria for Co-60 (+/- 2) are Exceeded as Follows :

Sample	0.01	0.00	0.09
Average	0.01	0.01	0.01
Variance	2.17	3.19	7.15

The Topical Criteria for Cs-137 (+/- 2) are Exceeded as Follows :

Sample
Average
Variance

The Topical Criteria for Ce-144 (+/- 5) are Exceeded as Follows :

Sample
Average
Variance

Analysis of Multiple Sample Data Sets (SCAL)

Sample Data Set Fractional Abundance Comparison — Session Date : 7/1/2014

(Last Column is Average Abundance for All Data Set Values)

Waste :	Airborne c ontaminati on	Airborne C ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	
Date :	11/02/1999	11/02/1999	11/02/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	01/21/2000	01/21/2000	
Sample Id :	99-1961	99-1959	99-1960	99-2062	99-2085	99-2060	99-2061	99-2059	99-2085# 10	99-2061# 6	Average Data Set
Units :	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Sample	uCi/Sample	Abundance
Nuclide	Sample Abundances in %										
Co-60	0.00677	0.01402	**	0.00874	0.00604	0.00707	0.00730	0.00410	0.02394	0.09366	0.01310
Sr-90	23.44375	35.72570	33.06920	31.37935	27.49610	29.32729	20.04233	16.03183	32.28174	14.04884	25.09735
Tc-99	0.00275	0.00019	0.00317	0.00004	0.00140	0.00003	0.00003	0.00002	0.00065	0.00100	0.00025
Cs-137	75.91960	63.23449	66.13839	67.79719	71.87101	69.91417	79.45353	83.57577	65.50503	84.41625	72.21240
Eu-154	0.18810	0.32242	0.28461	0.20673	0.22269	0.23200	0.14244	0.12195	0.28650	0.09859	0.19695
Pu-238	0.04266	0.06600	0.03768	0.06928	0.05292	0.05132	0.03593	0.02586	0.05891	0.01836	0.04256
Pu-239	0.01109	0.01706	0.01003	0.01838	0.01367	0.01354	0.00880	0.00683	0.01520	0.00473	0.01105
Pu-240	0.00771	0.01188	0.00697	0.01274	0.00947	0.00943	0.00613	0.00473	0.01059	0.00328	0.00768
Am-241	0.37755	0.60823	0.44996	0.50755	0.32669	0.44515	0.30350	0.22891	0.35510	0.39004	0.38484
H-3	**	**	**	**	**	**	**	**	0.00009	0.00014	0.00022
C-14	**	**	**	**	**	**	**	**	0.00640	0.07641	0.04243
Fe-55	**	**	**	**	**	**	**	**	0.02435	0.12200	0.10454
Ni-59	**	**	**	**	**	**	**	**	0.00139	**	0.00569
Ni-63	**	**	**	**	**	**	**	**	0.09859	0.08380	0.17436
I-129	**	**	**	**	**	**	**	**	0.00104	0.00488	0.00432
Pm-147	**	**	**	**	**	**	**	**	0.69406	0.23538	0.77533
U-232	**	**	**	**	**	**	**	**	0.00269	0.01319	0.01142
U-233	**	**	**	**	**	**	**	**	0.00007	0.00026	0.00026
U-234	**	**	**	**	**	**	**	**	0.00003	0.00009	0.00009
U-235	**	**	**	**	**	**	**	**	0.00000	0.00001	0.00001
U-236	**	**	**	**	**	**	**	**	0.00000	0.00003	0.00002
U-238	**	**	**	**	**	**	**	**	0.00002	**	0.00007

** - Indicates NO Value for Nuclide

Waste :	Airborne contamination	Airborne Contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	Airborne contamination	
Date :	11/02/1999	11/02/1999	11/02/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	01/21/2000	01/21/2000	
Sample Id :	99-1961	99-1959	99-1960	99-2062	99-2085	99-2060	99-2061	99-2059	99-2085# 10	99-2061# 6	Average Data Set
Units :	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Sample	uCi/Sample	Abundance
Nuclide	Sample Abundances in %										
Np-237	**	**	**	**	**	**	**	**	0.00016	0.00006	0.00019
Pu-241	**	**	**	**	**	**	**	**	0.35913	0.11461	0.38917
Pu-242	**	**	**	**	**	**	**	**	0.00034	0.00031	0.00062
Am-243	**	**	**	**	**	**	**	**	0.01937	0.01423	0.03185
Cm-242	**	**	**	**	**	**	**	**	0.00348	0.00482	0.00786
Cm-244	**	**	**	**	**	**	**	**	0.06967	0.07517	0.13883
Cm-245	**	**	**	**	**	**	**	**	0.15603	0.15466	0.29799
Cm-246	**	**	**	**	**	**	**	**	0.02542	0.02520	0.04855

** - Indicates NO Value for Nuclide

Analysis of Multiple Sample Data Sets (SCAL)

Sample Data Set Value Comparison

Session Date : 7/1/2014

(Last Column is Average Value for All Data Sets)

Waste :	Airborne c ontaminati on	Airborne C ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	
Date :	11/02/1999	11/02/1999	11/02/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	01/21/2000	01/21/2000	Average Value ALL Data Sets
Sample Id :	99-1961	99-1959	99-1960	99-2062	99-2085	99-2060	99-2061	99-2059	99-2085# 10	99-2061# 6	
Units :	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Sample	uCi/Sample	
Nuclide	------	------	------	------	------	------	------	------	------	------	------
Co-60	4.97E-05	1.57E-04	**	2.36E-04	1.11E-04	2.70E-04	1.02E-04	1.56E-04	1.78E-03	1.52E-03	2.37E-04
Sr-90	1.72E-01	4.00E-01	1.22E-01	8.47E-01	5.05E-01	1.12E+00	2.80E-01	6.10E-01	2.40E+00	2.28E-01	4.54E-01
Tc-99	2.02E-05	2.15E-06	1.17E-05	1.01E-06	2.58E-05	1.09E-06	3.97E-07	7.11E-07	4.81E-05	1.62E-05	4.47E-06
Cs-137	5.57E-01	7.08E-01	2.44E-01	1.83E+00	1.32E+00	2.67E+00	1.11E+00	3.18E+00	4.87E+00	1.37E+00	1.31E+00
Eu-154	1.38E-03	3.61E-03	1.05E-03	5.58E-03	4.09E-03	8.86E-03	1.99E-03	4.64E-03	2.13E-02	1.60E-03	3.57E-03
Pu-238	3.13E-04	7.39E-04	1.39E-04	1.87E-03	9.72E-04	1.96E-03	5.02E-04	9.84E-04	4.38E-03	2.98E-04	7.71E-04
Pu-239	8.14E-05	1.91E-04	3.70E-05	4.96E-04	2.51E-04	5.17E-04	1.23E-04	2.60E-04	1.13E-03	7.67E-05	2.00E-04
Pu-240	5.66E-05	1.33E-04	2.57E-05	3.44E-04	1.74E-04	3.60E-04	8.57E-05	1.80E-04	7.87E-04	5.33E-05	1.39E-04
Am-241	2.77E-03	6.81E-03	1.66E-03	1.37E-02	6.00E-03	1.70E-02	4.24E-03	8.71E-03	2.64E-02	6.33E-03	6.97E-03
H-3	**	**	**	**	**	**	**	**	6.52E-06	2.34E-06	3.91E-06
C-14	**	**	**	**	**	**	**	**	4.76E-04	1.24E-03	7.68E-04
Fe-55	**	**	**	**	**	**	**	**	1.81E-03	1.98E-03	1.89E-03
Ni-59	**	**	**	**	**	**	**	**	1.03E-04	**	1.03E-04
Ni-63	**	**	**	**	**	**	**	**	7.33E-03	1.36E-03	3.16E-03
I-129	**	**	**	**	**	**	**	**	7.74E-05	7.92E-05	7.83E-05
Pm-147	**	**	**	**	**	**	**	**	5.16E-02	3.82E-03	1.40E-02
U-232	**	**	**	**	**	**	**	**	2.00E-04	2.14E-04	2.07E-04
Cm-245	**	**	**	**	**	**	**	**	1.16E-02	2.51E-03	5.40E-03
Cm-246	**	**	**	**	**	**	**	**	1.89E-03	4.09E-04	8.79E-04
U-233	**	**	**	**	**	**	**	**	5.49E-06	4.18E-06	4.79E-06
U-234	**	**	**	**	**	**	**	**	1.93E-06	1.47E-06	1.68E-06
U-235	**	**	**	**	**	**	**	**	1.50E-07	1.87E-07	1.67E-07
U-236	**	**	**	**	**	**	**	**	3.49E-07	4.35E-07	3.90E-07

** - Indicates NO Value for Nuclide

Waste :	Airborne c ontaminati on	Airborne C ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	Airborne c ontaminati on	
Date :	11/02/1999	11/02/1999	11/02/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	11/12/1999	01/21/2000	01/21/2000	Average
Sample Id :	99-1961	99-1959	99-1960	99-2062	99-2085	99-2060	99-2061	99-2059	99-2085# 10	99-2061# 6	Value ALL
Units :	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Swipe	uCi/Sample	uCi/Sample	Data Sets
Nuclide	------	------	------	------	------	------	------	------	------	------	------
U-238	**	**	**	**	**	**	**	**	1.24E-06	**	1.24E-06
Np-237	**	**	**	**	**	**	**	**	1.17E-05	1.04E-06	3.49E-06
Pu-241	**	**	**	**	**	**	**	**	2.67E-02	1.86E-03	7.05E-03
Pu-242	**	**	**	**	**	**	**	**	2.52E-05	5.02E-06	1.12E-05
Am-243	**	**	**	**	**	**	**	**	1.44E-03	2.31E-04	5.77E-04
Cm-242	**	**	**	**	**	**	**	**	2.59E-04	7.82E-05	1.42E-04
Cm-244	**	**	**	**	**	**	**	**	5.18E-03	1.22E-03	2.51E-03
Totals :	7.34E-01	1.12E+00	3.69E-01	2.70E+00	1.84E+00	3.82E+00	1.40E+00	3.80E+00	7.43E+00	1.62E+00	1.81E+00
Co-60/ Cs-137 Ratios:	8.92E-05	2.22E-04	**	1.29E-04	8.41E-05	1.01E-04	9.19E-05	4.91E-05	3.66E-04	1.11E-03	

** - Indicates NO Value for Nuclide

Analysis of Multiple Sample Data Sets (SCAL)

NRC Criteria for Scaling Factors (+/- 10) are Exceeded as Follows :

Session Date : 7/1/2014

Nuclide	Sample Id	Date	Sample Scaling Factor	Average Scaling Factor	Variance
Tc-99	99-1961	11/02/1999	3.63E-05	3.42E-06	10.61
Tc-99	99-1960	11/02/1999	4.80E-05	3.42E-06	14.03
Tc-99	99-2059	11/12/1999	2.24E-07	3.42E-06	15.28

APPENDIX 10

Melter Smear Survey Report

APPENDIX 10 - Melter Smear Survey Report

124255 — **Radiation and Contamination Survey Report**

Survey Number: 124255 — West Valley Nuclear Services Co.

Location: EDR
Work Area: EDR
Purpose Of Survey: SUPPORT ENTRY
Additional Information Attached: ☐ YES ☐ NO ☑ ON BACK

Instruments Used

	TYPE	SERIAL #	EFF.
☒ SCINTILLATION	177	102730	
☒ GM	177	75562	
☒ IONIZATION	R020	3841	
☒ PROPORTIONAL	TEMP	14437	α 26.9
☐			β 40.7

AREA/MATERIALS SURVEYED	SMEARABLE NET (DPM/100 cm²) COUNT TIME 1 MIN ALPHA	SMEARABLE NET BETA	DIRECT CHECK NET CPM ALPHA	DIRECT CHECK NET CPM BETA	RADIATION LEVEL WO READING	DISTANCE	Cor. Factor	Cor. Reading
(3) MASKS	<20	<200	—	<100				
(3) PAPRS	<20	<200	<5	<100				
RADIO	<20	<200	<5	<100				
R020	<20	<200	<5	<100				
SMEARS FROM VIT CELL								
(all smears - 100 cm²) MELTER 1					2R/hr	CONTACT		
2					2R/hr	CONTACT		
3					6R/hr	CONTACT		
CFMT 1					500mR/hr	CONTACT		
2					5R/hr	CONTACT		
3					5R/hr	CONTACT		
MFHT 1					15R/hr	CONTACT		
2					15R/hr	CONTACT		
3					15R/hr	CONTACT		

CONCLUSIONS - AREA/MATERIALS: ☐ RELEASABLE ☐ NON-RELEASABLE ☑ INFORMATION ONLY
COMMENTS (IF ANY): PER RP ENGINEER, 1mR/hr = 6,000 dpm B

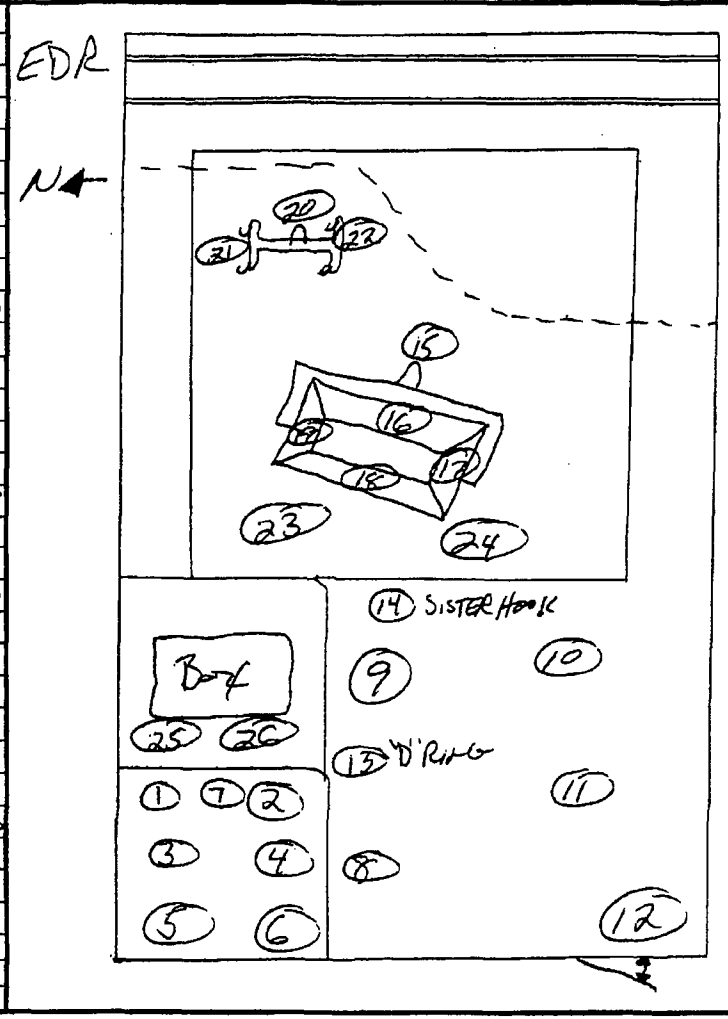
RECOMMENDATIONS: ☒ NO FURTHER ACTION REQUIRED ☐ FURTHER ACTION REQUIRED
IF FURTHER ACTION REQUIRED, DESCRIBE:

Technician Name: SMITH, DANIEL S
Signature:
Date: 20 Apr 2004
Time: 0830

Reviewer Name (Print):
Signature:
Date: 4/20/04
Time: 1345

SMEARABLE NET (DPM/100 cm²) Count Time | Min.		
#	ALPHA	BETA
1	<20	<200
2	↓	↓
3	↓	↓
4	↓	↓
5	↓	↓
6	↓	↓
7	<20	<200
8	33	792
9	<20	253
10	<20	<200
11	↓	↓
12	↓	↓
13	<20	<200
14	<20	239
15	<20	<200
16	37	2609
17	22	772
18	56	1977
19	<20	<200
20	<20	652
21	<20	280
22	26	1483
23	<20	<200
24	↓	↓
25	↓	↓
26	<20	<200

COMMENTS:



NON-MERCURY
LINER # HG-8

Box #

	CONTACT mR/hr	1 METER
TOP	3.0	0.5
BOTTOM	2.0	0.3
SIDE 1	13.0	1.0
SIDE 2	0.5	0.2
SIDE 3	0.3	0.1
SIDE 4	2.0	0.4

Survey #: 124255

WV-1156, Rev. 10

APPENDIX 11

Radiological Engineering Calculation (CALC-2007-048)

CALC-2007- 048
Page 1 of 2

Radiological Engineering Calculation

Rule of thumb calculation to convert RO-20 Window Open (wo) readings of paper smears in mR/hr to dpm Beta-gamma.

Background

There are times in High Contamination Areas that a paper smear will have too much activity on it to be able to count it with normally used instruments (Tennelec/GMs). This calculation will provide a rule of thumb to convert mR/hr Window Open (wo) readings using and RO-20 to dpm beta-gamma on paper smears.

Given

1. This is for paper smears only; cloth smears typically pick up more activity.
2. The primary beta-gamma isotopes are Cs-137 and Sr-90.
3. Smear is held close to contact to a RO-20 (in a plastic bag) with the wo.
4. The highest and lowest smear from the surveys were eliminated to avoid single smear bias (surveys 142175 and 121948.

Evaluation

See Attached Calculation Sheet.

Conclusions

When counting paper smears with a (wo) R0-20 in a plastic bag, **1mR/hr = approximately 67,000 dpm beta-gamma.**

Prepared by: David Biela David Biela 12-26-07
Print Name / Signature / Date

Peer Reviewed by: Richard Black Richard Black 12/26/07
Print Name / Signature / Date

Radiological Engineering Calculation

Rule of thumb calculation to convert RO-20 Window Open (wo) readings of paper smears in mR/hr to dpm Beta-gamma.

SURVEY RESULTS

SURVEY NUMBER	mR/hr RO-20 (wo)	dpm (based on gm conversion)	dpm / 1 mR/hr RO-20 (wo)
142175	0.8	62,500	78,125
142175	0.3	15,625	52,083
121948	15.0	1,250,000	83,333
121948	9.0	500,000	55,556
AVERAGE			**67,274**

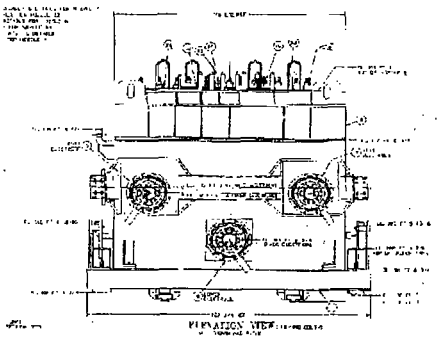
APPENDIX 12

Melter Surface Area Activity and Decay Correction Calculations (RADCALC)

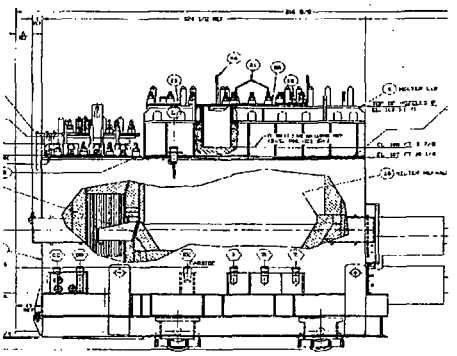
APPENDIX 12 - Melter Act and Decay Calc for Exterior Surface Contamination

Melter Surface Area

	Length (in)	Height (in)	Surface area (in^2)	Surface area (cm^2)	Surface area (cm^2);Both sides
Electrode Face & Opposite side					
Melter body	105.5	75.75	7991.625	51558.77	103117.54
Melter lid	105.5	24.5	2584.75	16675.77	33351.548
Melter base	129.75	12	1557	10045.14	20090.282



	Length (in)	Height (in)	Surface area (in^2)	Surface area (cm^2)	Surface area (cm^2);Both sides
Sides Adjacent to Electrodes					
Melter body & base	124.5	85.75	10675.88	68876.48	137752.95
Melter lid	85.125	24.5	2085.563	13455.22	26910.43



	Length (in)	Width (in)	Surface area (in^2)	Surface area (cm^2)	Surface area (cm^2);Both sections
Top					
Discharge Area (times 2)	16.875	47.8125	1763.086	11374.73	22749.45
Lid Assembly area	85.125	105.5	8980.688	57939.8	
Bottom	129.75	132.875	17240.53	111229	

Total surface area of Melter box= 513141.01 cm^2

Ancelart Equipment on Lid of MELTER

Number of Items	Ave.Length (in)	Radius (in)	Surface area (in^2)	Surface area (cm^2)
100	4	0.5	1413.7	9120.6

Total surface area of MELTER= 522261.61 cm^2

Total Activity Calculation

Smear Result R/hr	Smear sample Area cm^2	Total Surface Area cm^2	Wipe Efficiency	dpm/ cm^2	Total dpm	Total Act (Ci)
6	100	522261.6	10%	4020000	2.09949E+12	9.46

1. Per RP Engineer - 1mR/hr =67,000 dpm B

APPENDIX 12 - Activity Calculation for Surface Contamination of Exterior of MELTER

Airborene Sample Data		From Refractory		Final Isotopic Data Used for Characterization			
Isotope	Ave Data Set Scaling Factor (from Airborne)	Isotope	Scaling Factors	Isotope	Scaling Factors	% Abundance	Act (Ci)
Cs-137	1.00E+00	Cs-137	1.00E+00	Cs-137	1.00E+00	67.975%	6.43E+00
Ba-137m				Ba-137m		0.944 times Cs-137	6.07E+00
Sr-90	3.48E-01	Sr-90	4.42E-01	Sr-90	4.42E-01	30.045%	2.84E+00
Y-90				Y-90		Same as Sr-90	2.84E+00
Pm-147	1.07E-02			Pm-147	1.07E-02	0.727%	6.88E-02
Am-241	5.33E-03	Am-241	2.66E-03	Am-241	5.33E-03	0.362%	3.43E-02
Eu-154	2.73E-03	Eu-154	4.57E-03	Eu-154	4.57E-03	0.311%	2.94E-02
Ni-63	2.41E-03			Ni-63	2.41E-03	0.164%	1.55E-02
Fe-55	1.45E-03			Fe-55	2.45E-03	0.167%	1.58E-02
Pu-238	5.89E-04	Pu-238	4.82E-04	Pu-238	5.89E-04	0.040%	3.79E-03
C-14	5.88E-04			C-14	5.88E-04	0.040%	3.78E-03
Co-60	1.81E-04	Co-60	2.04E-04	Co-60	2.04E-04	0.014%	1.31E-03
U-232	1.58E-04			U-232	1.58E-04	0.011%	1.02E-03
Pu-239	1.53E-04	Pu-239	1.16E-04	Pu-239	1.53E-04	0.010%	9.84E-04
Pu-240	1.06E-04	Pu-240	8.83E-05	Pu-240	1.06E-04	0.007%	6.82E-04
Ni-59	7.88E-05			Ni-59	7.88E-05	0.005%	5.07E-04
I-129	5.99E-05			I-129	5.99E-05	0.004%	3.85E-04
U-233	3.66E-06	U-233	1.82E-06	U-233	3.66E-06	0.000%	2.35E-05
Tc-99	3.42E-06	Tc-99	1.62E-04	Tc-99	1.62E-04	0.011%	1.04E-03
H-3	2.99E-06			H-3	2.99E-06	0.000%	1.92E-05
U-234	1.29E-06	U-234	8.68E-07	U-234	1.29E-06	0.000%	8.30E-06
U-238	9.48E-07	U-238	3.62E-07	U-238	9.48E-07	0.000%	6.10E-06
U-236	2.98E-07	U-236	6.46E-07	U-236	6.46E-07	0.000%	4.15E-06
U-235	1.28E-07	U-235	2.15E-07	U-235	2.15E-07	0.000%	1.38E-06
		Cm-242	2.13E-05	Cm-242	2.13E-05	0.001%	1.37E-04
		Am-243	2.09E-05	Am-243	2.09E-05	0.001%	1.34E-04
		Cm-243	1.25E-05	Cm-243	1.25E-05	0.001%	8.04E-05
		Th-228	7.08E-06	Th-228	7.08E-06	0.00048%	4.56E-05
		Np-237	2.63E-06	Np-237	2.63E-06	0.00018%	1.69E-05
		Th-232	1.30E-07	Th-232	1.30E-07	0.00001%	8.35E-07
		Th-230	4.73E-08	Th-230	4.73E-08	0.000003%	3.04E-07
		Pu-241	1.15E-03	Pu-241	1.15E-03	0.078%	7.42E-03
		Cm-244	3.34E-04	Cm-244	3.34E-04	0.023%	2.15E-03

1. Used maximum smear result from Survey Number 124255 to calculate total act on exterior of melter.
2. Used 67,000 dpm = 1 mR/hr to convert from Dose to Act/100 cm2
3. Used wiping efficiency of 10% (within DOT guidelines)
4. Activity calculated is presumed to be removable only - no value calculted for fixed.
5. Surface area of melter was derived from Reference Drawings and included ancelary equipment on top lid (elecrtodes, airlift, passive cooled feed nozzel)for 100 electrodes being 4" tall with a 0.5" radius
6. Decay was not included in activity determination since smear was taken 4/20/04
7. Isotopic distribution included the higher of the two scalling factors when comparing results from Airborne samples and the Average Geomean of all of the batches (refractory distribution). If isotopes did not appear a distribution, they were added at their respetive abundance for that material resulting in a relative abundanc of 1.47

Radcalc 4.1 9/9/2014 10:58 AM
File Name: Act Calc for Exterior Surface Contamination.rad

This report was generated using an unvalidated installation of Radcalc version 4.1.

Radcalc 4.1: C:\WVDP - Melter\Recharacterization Information\Exterior of Melter\Act Calc for Exterior Surface Contamination.rad

Performed By: Chris Brandjes
Checked By:

========== Input Information ==========

Comments:
Activity Calc for Exterior Surface of Melter

Initial Source Data:

Isotope	Ci	Gm	TBq
H-3	1.920E-05	1.997E-09	7.104E-07
C-14	3.780E-03	8.439E-04	1.399E-04
Fe-55	1.580E-02	6.641E-06	5.846E-04
Co-60	1.310E-03	1.158E-06	4.847E-05
Ni-59	5.070E-04	6.352E-03	1.876E-05
Ni-63	1.550E-02	2.745E-04	5.735E-04
Sr-90	2.840E+00	2.056E-02	1.051E-01
Tc-99	1.040E-03	6.157E-02	3.848E-05
I-129	3.850E-04	2.235E+00	1.425E-05
Cs-137	6.430E+00	7.397E-02	2.379E-01
Pm-147	6.880E-02	7.417E-05	2.546E-03
Eu-154	2.940E-02	1.088E-04	1.088E-03
Th-228	4.560E-05	5.563E-08	1.687E-06
Th-230	3.040E-07	1.475E-05	1.125E-08
Th-232	8.350E-07	7.615E+00	3.090E-08
U-232	1.020E-03	4.621E-05	3.774E-05
U-233	2.350E-05	2.440E-03	8.695E-07
U-234	8.300E-06	1.335E-03	3.071E-07
U-235	1.380E-06	6.386E-01	5.106E-08
U-236	4.150E-06	6.494E-02	1.536E-07
U-238	6.100E-06	1.815E+01	2.257E-07
Np-237	1.690E-05	2.398E-02	6.253E-07
Pu-238	3.790E-03	2.213E-04	1.402E-04
Pu-239	9.840E-04	1.587E-02	3.641E-05
Pu-240	6.820E-04	3.005E-03	2.523E-05
Pu-241	7.420E-03	7.170E-05	2.745E-04
Am-241	3.430E-02	1.001E-02	1.269E-03
Am-243	1.340E-04	6.710E-04	4.958E-06
Cm-242	1.370E-04	4.138E-08	5.069E-06
Cm-243	8.040E-05	1.640E-06	2.975E-06
Cm-244	2.150E-03	2.642E-05	7.955E-05
Total Activity:	9.457E+00		3.499E-01

* Radionuclides with an A1/A2 fraction of less than 0.001 will not be shown in the output.

Container Data:

Container Void Volume:	0	m^3
Container Mass:	1	kg
Mass of solid beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	kg
Gross Mass:	10430	kg

Waste Data:

Waste Form:	Normal	
Waste State:	Solid	
Waste Volume:	2	m^3

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Waste Mass:	10430	kg
Mass of solid lead:	0	kg
Mass of solid beryllium, graphite, and hydrogenous material enriched with deuterium:	0	kg
Waste Void Volume:	0	m^3

Decay Time Data:
Date to begin source decay: 4/20/2004
Date container sealed: 9/2/2014

========== Radioactive Decay Results ==========

Decayed Source:

Isotope	Ci	Gm	TBq
H-3	1.072E-05	1.115E-09	3.966E-07
C-14	3.775E-03	8.429E-04	1.397E-04
Fe-55	1.141E-03	4.797E-07	4.223E-05
Co-60	3.351E-04	2.961E-07	1.240E-05
Ni-59	5.070E-04	6.352E-03	1.876E-05
Ni-63	1.443E-02	2.556E-04	5.340E-04
Sr-90	2.213E+00	1.602E-02	8.187E-02
Y-90	2.213E+00	4.070E-06	8.189E-02
Tc-99	1.040E-03	6.157E-02	3.848E-05
I-129	3.850E-04	2.235E+00	1.424E-05
Cs-137	5.062E+00	5.823E-02	1.873E-01
Ba-137m	4.778E+00	8.879E-09	1.768E-01
Pm-147	4.445E-03	4.792E-06	1.645E-04
Sm-147	1.593E-12	6.938E-05	5.893E-14
Eu-154	1.274E-02	4.713E-05	4.713E-04
Hg-206	3.774E-18	3.369E-26	1.396E-19
Tl-206	2.650E-16	1.220E-24	9.805E-18
Tl-207	4.377E-11	2.298E-19	1.620E-12
Tl-208	3.317E-04	1.120E-12	1.227E-05
Tl-209	4.920E-10	1.203E-18	1.820E-11
Tl-210	2.861E-13	4.153E-22	1.058E-14
Pb-209	2.278E-08	4.941E-15	8.428E-10
Pb-210	1.986E-10	2.585E-12	7.349E-12
Pb-211	4.389E-11	1.778E-18	1.624E-12
Pb-212	9.232E-04	6.645E-10	3.416E-05
Pb-214	1.362E-09	4.154E-17	5.039E-11
Bi-209	4.268E-27	4.740E-11	1.579E-28
Bi-210	1.979E-10	1.595E-15	7.322E-12
Bi-211	4.389E-11	1.069E-19	1.624E-12
Bi-212	9.232E-04	6.301E-11	3.416E-05
Bi-213	2.278E-08	1.176E-15	8.428E-10
Bi-214	1.362E-09	3.085E-17	5.040E-11
Bi-215	3.602E-17	3.048E-25	1.333E-18
Po-210	1.789E-10	3.982E-14	6.621E-12
Po-211	1.198E-13	1.156E-24	4.433E-15
Po-212	5.914E-04	3.311E-21	2.188E-05
Po-213	2.229E-08	1.767E-24	8.247E-10
Po-214	1.362E-09	4.229E-24	5.039E-11
Po-215	4.389E-11	1.489E-24	1.624E-12
Po-216	9.232E-04	2.651E-15	3.416E-05
Po-218	1.362E-09	4.893E-18	5.040E-11
At-215	1.756E-16	3.346E-31	6.496E-18
At-217	2.278E-08	1.415E-20	8.429E-10
At-218	2.588E-13	7.502E-24	9.576E-15
At-219	3.714E-17	3.893E-26	1.374E-18
Rn-217	2.734E-12	2.839E-26	1.011E-13
Rn-218	2.588E-16	1.750E-28	9.576E-18
Rn-219	4.389E-11	3.374E-21	1.624E-12

Rn-220	9.232E-04	1.005E-12	3.416E-05
Rn-222	1.362E-09	8.855E-15	5.040E-11
Fr-221	2.278E-08	1.312E-16	8.429E-10
Fr-223	6.190E-13	1.600E-20	2.290E-14
Ra-223	4.389E-11	8.569E-16	1.624E-12
Ra-224	9.232E-04	5.765E-09	3.416E-05
Ra-225	2.287E-08	5.833E-13	8.461E-10
Ra-226	1.364E-09	1.380E-09	5.047E-11
Ra-228	5.957E-07	2.185E-09	2.204E-08
Ac-225	2.278E-08	3.926E-13	8.429E-10
Ac-227	4.485E-11	6.202E-13	1.660E-12
Ac-228	5.957E-07	2.666E-13	2.204E-08
Th-227	4.364E-11	1.420E-15	1.615E-12
Th-228	9.232E-04	1.126E-06	3.416E-05
Th-229	2.300E-08	1.081E-07	8.509E-10
Th-230	3.048E-07	1.479E-05	1.128E-08
Th-231	1.380E-06	2.596E-12	5.106E-08
Th-232	8.350E-07	7.615E+00	3.090E-08
Th-234	6.100E-06	2.634E-10	2.257E-07
Pa-231	3.026E-10	6.406E-09	1.120E-11
Pa-233	1.701E-05	8.198E-10	6.295E-07
Pa-234	9.149E-09	4.633E-15	3.385E-10
Pa-234m	6.100E-06	8.883E-15	2.257E-07
U-232	9.202E-04	4.169E-05	3.405E-05
U-233	2.350E-05	2.440E-03	8.695E-07
U-234	8.406E-06	1.352E-03	3.110E-07
U-235	1.380E-06	6.386E-01	5.106E-08
U-235m	9.832E-04	3.195E-11	3.638E-05
U-236	4.150E-06	6.494E-02	1.536E-07
U-237	1.107E-07	1.356E-12	4.095E-09
U-238	6.100E-06	1.815E+01	2.257E-07
Np-237	1.701E-05	2.414E-02	6.295E-07
Np-239	1.339E-04	5.772E-10	4.953E-06
Pu-238	3.492E-03	2.039E-04	1.292E-04
Pu-239	9.838E-04	1.586E-02	3.640E-05
Pu-240	6.832E-04	3.011E-03	2.528E-05
Pu-241	4.494E-03	4.342E-05	1.663E-04
Am-241	3.383E-02	9.873E-03	1.252E-03
Am-243	1.339E-04	6.703E-04	4.953E-06
Cm-242	1.380E-11	4.168E-15	5.106E-13
Cm-243	6.327E-05	1.291E-06	2.341E-06
Cm-244	1.442E-03	1.772E-05	5.336E-05
Total Activity:	1.436E+01		5.313E-01
w/o Daughters:	7.361E+00		2.724E-01

Decay Heat:
Heat Generated on Start Date: 0.01185 W
Heat Generated on Seal Date: 0.04054 W

========== Regulatory Requirements Warning ==========

Radcalc utilizes numerically based criteria to classify packages against the regulations. Many regulations also include subjective criteria that Radcalc does not consider. The user must check to ensure that all requirements in the regulations are met.

========== DOT Classification Results ==========

* DOT classification calculations are made at the end of the user-specified decay time.

Radioactive Determination:
Radioactive: Yes (ACEMs and ALECs > 1.0)

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ACEM Limit Fraction:	2022	ACEMs	(Number of ACEMs)
ALEC Limit Fraction:	27130000	ALECs	(Number of ALECs)
* This package is not exempt from 49 CFR Subchapter C.			
Effective A2s for Mixture:	1.275E+11	Bq	
Type Determination:			
Type:	B		(A2s > 1.0)
A2 Limit Fraction:	2.136	A2s	(Number of A2s)
Limited Quantity Determination:			
Limited Quantity:	No		(Solid, activity > 0.001 A2)
Activity:	2.136	A2	
	14.36	Ci	
	0.5313	TBq	
Fissile:	Yes		
Fissile Excepted:	Yes (a)		
LSA Determination:			
LSA-I:	No		(Fissile excepted, ACEMs > 30 x rad limits)
LSA-II:	Yes		(A2s/gm <= 0.0001)
LSA-III:	Yes		(A2s/gm <= 0.002)
Specific Activity:	2.047E-07	A2/gm	
	1.376E-06	Ci/gm	
HRCQ Determination:			
HRCQ:	No		(A2s <= 3000, Activity <= 1000 TBq)
A2 Limit Fraction:	2.136	A2s	
Activity:	14.36	Ci	
	0.5313	TBq	
Fissile Determination:			
Fissile:	Yes		(Contains fissile isotopes per 49 CFR 173.403)
Fissile Excepted Determination:			
Fissile Excepted:	Yes (a)		(Fissile isotopes <= 2 grams)
Fissile Mass:	0.6569	gm	
Container beryllium, lead, graphite, and hydrogenous material enriched with deuterium:	0	gm	
Container Mass:	1000	gm	
Waste lead:	0	gm	
Waste beryllium, graphite, and hydrogenous material enriched with deuterium:	0	gm	
Waste Mass:	10430000	gm	
Solid Non-Fissile Mass:	0	gm	
Total Uranium Mass:	18.86	gm	
U-233 Mass:	0.00244	gm	
U-235 Mass:	0.6386	gm	
Uranium Enrichment:	3.387	%	
Total Plutonium Mass:	0.01912	gm	
Pu-239 Mass:	0.01586	gm	
Pu-241 Mass:	4.342E-05	gm	
Reportable Quantity Determination:			
Reportable Quantity:	Yes		(RQs > = 1.0)
RQ Limit Fraction:	36.84	RQs	(Number of RQs)

Shipping Papers and Labels:

	Isotope	Number of A2s	Fraction of A2s	Cumulative A2s	Cumulative Fraction of A2s
+	Am-241	1.252	0.586	1.252	0.586

+	Cs-137	0.3121	0.1461	1.564	0.7322
+	Sr-90	0.2729	0.1278	1.837	0.8599
+	Pu-238	0.1292	0.0605	1.966	0.9204
+	Pu-239	0.0364	0.01704	2.002	0.9374
+	Th-228	0.03416	0.01599	2.037	0.9534
	U-232	0.03405	0.01594	2.071	0.9694
	Cm-244	0.02668	0.01249	2.097	0.9819
	Pu-240	0.02528	0.01183	2.123	0.9937
	Am-243	0.004953	0.002319	2.128	0.996
	Pu-241	0.002771	0.001297	2.13	0.9973
	Cm-243	0.002341	0.001096	2.133	0.9984

\+ Contains 95% of the total A2s and must be included per 49 CFR 173.433.
* Radionuclides comprising less than 0.1% of the total A2s are not shown in the list.

========== DOE Classification Results ==========

* DOE classification calculations are made at the end of the user-specified decay time.

DOE-STD-1027 Category Determination:

Category:	< Cat 3	(Cat3s <= 1.0)
Cat 2 Limit Fraction:	0.000995	
Cat 3 Limit Fraction:	0.309	

* The DOE-STD-1027 category determination is based on dose-related limits.
The user must apply any criticality-related limits separately.

Dose-Equivalent Curies:

ICRP-72 DE-Ci:	0.0374
FGR-11 DE-Ci:	0.05027

TRU Waste Determination:

TRU Waste:	No	(TRU activity <= 100 nCi/gm)
TRU Activity:	3.758	nCi/g

WIPP Quantities:

FGE Value:	0.4294
PE-Ci Value:	0.04041

========== NRC Classification Results ==========

* NRC classification calculations are made at the end of the user-specified decay time.

NRC Container Category:

Container Category:	III	
LSA-I:	No	
LSA-II:	Yes	
LSA-III:	Yes	
Total Activity:	14.36	Ci
A2 Limit Fraction:	2.136	A2s