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Dose Rate Calculations for the Removal of the

Mixer Pump from Tank 101 SY

December, 1994

R. A. Schwarz

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1.0 SUMMARY

Plans are currently being made for the removal of the mixer pump in tank 101 SY. Because the pump is contaminated with radioactive waste, it is essential that those involved in the pump removal operation have an indication of the expected dose rates when the pump is removed. Calculations were made to determine the dose rates for removing the pump, inserting the pump into a shipping container and filling the shipping container with either steel or lead shot for shielding.

Gamma ray detectors will be used to measure the dose rates at 1 foot intervals as the pump is pulled from the tank. The measured dose rates will be used to predict the dose rates outside the shipping container for determining the shielding required to reduce the dose rates to less than 100 mrem/hr. The worst case scenario (Reference 1) consists of a thin 3 mm film on the outside of the pump and 68 gallons of waste inside the pump. Given these conditions, the maximum dose rate outside the shipping container with no additional shielding present is 4.4 R/h. When shielded with steel shot, the maximum dose rate is 1.1 R/hr and with lead shot, the maximum dose rate is 73 mrem/hr. Thus, the worst case scenario can be adequately shielded to less than 100 mrem/hr with lead shot.

In the worst case scenario, the location of the source mass is defined with an internal component and an external component. However, when the pump is pulled, it will not be known where the actual waste mass is located. To account for this, the waste is assumed to be in the worst case location. When this conservatism is applied to the worst case scenario, the dose rates outside the shipping container exceed 100 mrem/hr even with lead shot shielding. For these conditions, lead blankets will be required to reduce the dose rates to less than 100 mrem/hr.

2.0 SOURCE

Table 1 lists the isotopic composition of the source obtained from Reference 1. These isotopic concentrations were used in the ORIGEN2 computer code to calculate the photon source term shown in Table 2. 90 % of the gamma ray source is from ^{137}Cs which decays to $^{137\text{m}}\text{Ba}$ which emits gamma rays with an energy of 0.662 MeV. The source regions were modeled with a density of 1.74 g/cc. The effects from Brehmsstrahlung were considered negligible, and were left out of the analysis to increase computational efficiency.

In the worst case scenario, the source (Reference 1) consists of 68 gallons internal to the pump and thin 3 mm film on the outside of the pump. In addition to these defined sources, another source was simulated extending from the top of the film region to the top of the riser to account for any contamination that may exist on the upper part of the pump. Dose rate calculations for the removal of the pump also included the dose rate contribution from the tank. Separate calculations were made for each of these source terms to determine how much each source contributes to the total dose rate.

2.1 TANK SOURCE

Figure 1 shows a plot of the MCNP geometry of the 101 SY tank with the mixer pump inserted. The tank source was modeled as a cylinder 600 cm (19' 8") in radius with a depth of 90 cm (2' 11") centered around the 42 in. riser in which the pump is inserted. The total volume of the tank source region is $1.018\text{E}+8$ cc with a total source strength of $2.5613\text{E}+15$ photons/sec. Even though there is waste beyond this source region, it will not contribute to the dose rates at the top of the riser due to attenuation in the waste. The source sampling was optimized both radially and axially to improve the efficiency of the monte carlo calculation. The nine source cells for this optimization are shown in Figure 1 centered radially around the pump. The waste was not modeled in the region between the outside of the pump and the inside radius of the 42 in. riser because it will not contribute to the dose rate at the top of the riser and would create unnecessary complications in the model.

2.2 EXTERNAL FILM SOURCE

A thin film of waste is assumed to be present on the outside surface of the pump. The thin film in this calculational model extends to 953.8 cm (31' 3.5") above the bottom of the pump. This film was modeled as 1 mm thick with a volume of $4.737\text{E}+4$ cc for a total photon source strength of $1.192\text{E}+12$ photons/sec/cc. Because the worst case film thickness is 3 mm, the calculated dose rates were multiplied by a factor of three. The total volume of a 3 mm thick film is 37.6 gallons with a mass of 247 kg.

2.3 INTERNAL PUMP SOURCE

Figure 2 shows the regions of the pump where the internal source was modeled. The calculational source region is shown in yellow and consists of a total volume of 68 gallons. The internal source was modeled such that the legs of the pump are filled with 55 gallons of waste at a density of 1.74 g/cc. Because the worst case scenario (Reference 1) calls for 68 gallons of waste inside the pump region, the remaining 13 gallons were spread homogeneously throughout the remaining pump volume. This was done by reducing the density of the source in this remaining region from 1.74 g/cc to 0.366 g/cc. The volume of the waste for the internal source region is $2.574\text{E}+5$ cc for a total photon source strength of $6.475\text{E}+12$ photons/sec/cc. The total mass of the waste in the internal source region is 448 kg.

2.4 UPPER SIMULATED SOURCE

To assure that the dose rates calculated by this analysis are conservative for all axial elevations, a small source was created to extend from the top of the thin film layer to the detector location. Even though this source presumably does not exist, placing it in the model allows small amounts of contamination within this region to be conservatively included. This source was modeled such that the shipping container will not require any additional shielding to reduce the dose rates below 100 mrem/hr.

The entire source length is 18 feet long and the top of the source will be even with the detectors when the pump is pulled a foot out of the riser. The source was modeled with a radius of 53 cm and was superimposed over the existing geometry. The source was normalized such that the dose rate outside the shipping container with no shielding present will be around 50 mrem/hr. The source region was assigned a photon strength of $2.00\text{E}+10$ photons/sec/cc and a total mass of 1.4 kg.

3.0 GEOMETRY

The geometry for these calculations consists of a detailed model of the 101 SY tank and a detailed model of the mixer pump. The 101-SY tank geometry was taken from an MCNP model created by Brit Hey (Reference 2). The bottom of the pump is located 2 ft. above the bottom of the tank. The tank was modeled with an inside diameter of 1143 cm (37' 6") and an inside height of 1426 cm (46' 9").

3.1 PUMP GEOMETRY

Figures 3 through 9 show the three dimensional geometry used for modeling the pump. The views start at the bottom of the pump and sequence through to the top of the pump. For each figure there is a plot of the pump as modeled and a cut away view of the same section of pump showing the modeling of the internals. For these plots, blue represents the internal waste, magenta represents the external film, and grey represents steel. Figure 3 shows the lower region of the pump with the outlet nozzle and dummy legs. Figure 4 shows the upper region of the nozzle and dummy legs. Figure 5 shows the pump region and Figures 6 through 9 show the upper regions of the pump.

3.2 DETECTOR GEOMETRY

Included in this calculational model are four gamma ray detectors that will be used to monitor the dose rates as the pump is removed from the tank. Two detectors will be low range (2 R/hr range, 1 mrem/hr resolution) Eberline model RO-7 ion chambers and the other two will be medium range (200 R/hr range, 100 mrem/hr resolution) Eberline model RO-7 detectors. Figure 10 shows the configuration of these detectors. The two low range detectors will be collimated with three inches of steel above and below the detector. The collimation will enable a determination of the axial waste mass inside the pump as it is pulled. The collimators are designed to determine the waste present within a 1 foot region of the pump. The two medium range detectors will not be shielded.

3.3 SHIPPING CONTAINER GEOMETRY

Once the pump is removed from the tank, it will be placed inside a shipping container on a truck. the shipping container will be filled with lead and steel shot to reduce the dose rates outside the shipping container to acceptable levels. A shot loading platform will be used to fill the outer shell of the shipping container with either steel or lead shot. Figure 11

shows a view of the pump fully inserted inside the shipping container and located underneath the shot loading platform.

4.0 CALCULATIONS

The MCNP (Reference 3) computer code was used to calculate the dose rates. MCNP is a three dimensional particle transport code that can accurately account for the transport of particles (in this case photons) from scattering events. Table 3 lists the calculations that were made for different locations and shielding configurations for the pump

For all the cases in Table 3, the film and internal pump dose rate calculations are identical except for the source. For those calculations where the tank dose rate is calculated, there have also been changes made to the importances and a dxtran sphere (Reference 3) is included to increase the calculational efficiency. This dxtran sphere is located near the bottom of the riser.

4.1 CONTOUR PLOT CALCULATIONS

The first sequence of calculations shown in Table 3, beginning with files "tank_0," "film_0," and "cell_0," were for calculating the dose rate contour plots for the pump removal process. The pump was moved in steps of three feet each for a total of 21 steps to show the pump rising up 60 feet from its initial position.

Another sequence of calculations was then made to show the contour plots for inserting the pump into the shipping container. These files are shown in Table 3 beginning with "iccask0" and "ifcask0." Contour plots were then created showing the shipping container and pump being lowered onto the truck. These files are shown in Table 3 beginning with "ictruck0" and "iftruck0."

Another series of calculations were then made to show contour plots for filling the shipping container with either steel shot or lead shot. Because there are 24 compartments in the shipping container, 48 calculations were made, one to show the compartment under the shot loading platform prior to inserting the shot, and one to show the dose rates after the shot is loaded. The files for loading the shipping container with steel shot begin with "icshot0" and "ifshot0." The files for loading the shipping container with lead shot begin with "icpbshot0" and "ifpbshot0."

4.2 DETECTOR CALCULATIONS

Another series of calculations were made to determine the dose rate at the detectors for each foot the pump is pulled. The initial input files for these sequences are "idtank_0," "idfilm_0," and "idcell_0." These calculations were used to correlate the amount of source mass within the pump to the detector dose rate. The input files for these cases are very similar to the ones for creating the contour plots except the dose rate is only calculated within the detector regions.

Appendix A contains the MCNP input listing for input file "idtank_0" which has the pump fully inserted in the tank with the gamma ray source inside the tank waste and no source in the pump region. Appendix B contains the MCNP source description for the internal gamma ray source taken from the file "idcell_0." Appendix C contains the MCNP source description for the film gamma ray source taken from the file "idfilm_0". Appendix D contains the MCNP source description for the simulated gamma ray source taken from the file "idfake_0."

4.3 SHOT LOADING CALCULATIONS

Dose rates were also calculated for inserting the pump into the shipping container, and filling of the shipping container with a combination of lead and steel shot. For these calculations, the pump was modeled using an MCNP universe to facilitate moving the pump using transformations. Calculations were made for the different source and shielding configurations identified in Table 3. Appendix E contains the input listing for the internal source calculation after the pump has been inserted in the shipping container (input file "icpdc"). Appendix F contains the external film source description for the same geometry (input file "ifpdc").

All of the files used for these calculations are stored in cfs in the directory /w97555/101sy.

5.0 GENERATION OF INPUT FILES

To efficiently generate the hundreds of input files required for performing these calculations, it was necessary to devise a system that would take an initial input file and modify it for a sequence of geometry and source movements. A master input file and a control file were created for each sequence. A C program then reads the master input file and modifies it, using instructions from the control file, to generate the input files. The master input file has flags indicating the variables to be modified for each step of the sequence. The control file provides an initial value for each variable and the amount that variable will be changed for each step in the sequence.

For every sequence of calculations, the master input file is called "inpmaster" and the control file is called "inpdat." Each sequence also has a controlling C program called "makeinp.c" that is used to generate the input files using the "inpmaster" and "inpdat" files.

6.0 DETECTOR DOSE RATES

To determine the amount of source mass inside the shipping container contributing to the dose rate, it is necessary to determine a correlation between the mass of the source in the worst case calculation and the calculated detector dose rate. To do this, the contribution to the shielded detectors from each of the different source terms was calculated for each foot the pump is pulled. A separate calculation was made to determine the internal and external film source mass over each foot of the pump as it is pulled. By dividing this mass by the corresponding dose rate, a factor can be determined to predict the number of grams/mrem/hr of source over each foot of the pump.

When the pump is actually removed these factors can be used to estimate the actual amount of source mass present in the pump using the measured dose rate readings from the shielded detectors.

6.1 SHIELDED DETECTOR DOSE RATES

Table 4 lists the average dose rates calculated at the shielded detectors for each of the source terms. The 1 sigma statistical uncertainty calculated by MCNP is also included for each dose rate. The dose rate is tabulated for every foot the pump is pulled. The simulated upper source will start contributing immediately to the dose rate, however, the dose rate from the film will not start contributing more than 1 mrem/hr until the pump is pulled 15 feet, the internal source will start contributing at 25 feet. The end of the table lists the maximum dose rate for each source. The maximum total dose rate from all contributions is 1792 mrem/hr.

6.2 UNSHIELDED DETECTOR DOSE RATES

Table 5 lists the average dose rates calculated at the unshielded detectors. The maximum dose rate at these detectors is expected to be 8,871 mrem/hr. Because there is no shielding around this detector, the film source will start contributing more than 1 mrem/hr after the pump is pulled 11 feet and the internal source will start contributing at 21 feet. The maximum tank contribution is 1272 mrem/hr which is substantially higher than the maximum 87 mrem/hr for the shielded detectors. This proves that the shielded detectors are effective in shielding out the majority of the dose rate from the tank.

Table 5 indicates that the dose rates outside the blast shield will be 15.9 mrem/hr prior to removing the pump. Dose rates taken after the pump was initially inserted were 15 mrem/hr at contact with the pump. This indicates that the calculated values are in good agreement with measured dose rate values.

Figure 12 shows a comparison of the average shielded and unshielded dose rates calculated for the 68 gallon internal source. Also included in this plot is the maximum calculated dose rate expected while the pump is being pulled. Figure 13 shows comparison of the 3 mm film dose rates calculated for the two detector types. The spikes in the plot are caused by the film on the pump seals. Figure 14 shows a comparison of the tank dose rates calculated for the two detector types. At 18 feet the dose rate decreases due to the presence of the pump in the riser which will shield out the tank source. Figure 15 shows a comparison of the dose rates for the upper simulated source. Figure 16 shows the total dose rate at the unshielded detector and the source terms that contribute to the total dose rate. Figure 17 shows the total dose rate at the shielded detector and its components. Figure 18 shows a comparison between the total shielded and unshielded dose rates.

6.3 DETERMINATION OF SOURCE MASS FROM DETECTOR MEASUREMENTS

To determine the amount of source mass inside the pump from the measured dose rates and the calculated shielded detector dose rates given in Table 4, it is

necessary to calculate the internal and external source mass present in the worst case model for each foot of the pump as it is pulled out of the riser. Table 6 lists the mass present in the worst case model for the internal source, the external film source, and the simulated upper source. Figure 19 shows a plot of the mass calculated per foot for the worst case model.

The mass in table 6 is divided by the dose rate to determine a factor with units of grams/mrem/hr. The factors for the internal source and the film source are graphed in Figure 20. The factor can then be multiplied by the actual measured dose rates to determine the number of grams present in the pump. Since it will not be known if the mass is inside or outside the pump, the highest factor will be used to conservatively determine the mass present in the pump. On the average, the mass per dose conversion factors for the internal source are 2 times higher than those for the external film source. This means that twice as much waste must be located inside the pump as outside the pump to produce the same dose rate. Thus, the conservative assumption is to calculate the mass assuming the dose rate is typically from the internal pump source to maximize the waste mass. By using the maximum factors, the mass for the worst case scenario is overestimated by 29 %.

7.0 SHIPPING CONTAINER SHIELDING CALCULATIONS

The shipping container into which the pump will be inserted contains a hollow 2 in. region into which either lead or steel shot will be poured to act as a shield. To determine the type of shielding material, if any, required for each compartment, a calculation was made for three different shipping container shielding configurations: no shielding, steel shot, and lead shot. For these calculations, a density of 6.84 g/cc (60 % full density) was used for the lead shot and a density of 4.1 g/cc (52 % full density) was used for the steel shot. A lower packing density was used for steel shot because experimental measurement of the shot currently available predict this lower value, no experimental data was provided for the lead shot.

7.1 EXPECTED SHIELDING CONFIGURATION

Dose rates calculated radially beyond the shipping container for the worst case scenario are given in Table 7 for a container filled with no shot, steel shot, or lead shot. The dose rate is tabulated at one foot intervals that correspond to the same intervals used when pulling the pump. Included in this table is the average shielded detector results from Table 4. The dose rates were calculated at 2 inches from the surface of the shipping container to simulate the actual location of a dose rate detection instrument.

The dose rates in Table 7 are shown graphically in Figures 21 through 23 for the three different shielding configurations. The compartments of the shipping container are superimposed on these plots with the different shielding materials represented by different shading patterns.

From Table 7 it can be seen that the maximum dose rate with no shielding present is 4.36 R/hr, with steel shot the maximum dose rate is 1.12 R/hr and with lead shot the maximum dose rate is 73 mrem/hr. Thus for the worst case

conditions the dose rate outside the shipping container can be reduced to less than 100 mrem/hr using lead shot.

7.2 CONSERVATIVE SHIELDING CONFIGURATION

Because it will not be known if the source is from waste inside the pump or outside the pump, it is necessary to assume that all of the waste is in the most conservative position by using the maximum mass per dose conversion factors from Table 6. Table 8 lists the dose rates calculated for the three different shielding configurations after the maximum multiplier of 1.69 (bottom of Table 8) has been applied. With this factor included, the maximum dose rate outside the shipping container with no shielding is 7.4 R/hr, the maximum dose rate with steel shot is 1.9 R/hr and the maximum dose with lead shot is 124 mrem/hr. When the conservative mass per dose conversion factors are applied, lead blankets with a thickness of 0.635 cm (0.25 in.) with a density of 11.4 g/cc are required to reduce these dose rates to less than 100 mrem/hr.

With the information from table 8 it is possible to determine the minimum shielding material required for each compartment for different source term conditions. Table 9 lists the minimum shielding required for seven different source terms consisting of a conservative 119 gallon internal source case and the worst case scenario at 100%, 70%, 50%, 5% and 1%. Lead blankets will be required for the 119 gallon case and the 100% case to bring the maximum expected dose rates to less than 100 mrem/hr at the surface of the shipping container.

Calculations were made to verify these final shielding configurations. Table 10 lists the resulting dose rates calculated for the shielding configurations provided in Table 9. All of the dose rates fall below the required 100 mrem/hr dose rate at the surface of the shipping container. Figures 24 through 30 show plots of the dose rates outside the shipping container for the final configurations. A plot of the shipping container is superimposed over the dose rate plot to indicate the required shielding.

8.0 UNCERTAINTY EVALUATION

These dose rate calculations are very complex and attempt to take into account a number of different variables. However, the main source of uncertainty will be the mass and location of the source material. As shown in section 7.0, by making a conservative assumption on the location of the source, the dose rates outside the shipping container for the worst case causes an overestimation of the expected dose rate by approximately 70 %.

These calculations are conservative because: (1) they use the worst case internal source term of 68 gallons, (2) a 3 mm external film source and (3) a conservative source mass (29%) is inferred from the detector readings for the worst case source.

Other smaller sources of uncertainty include:

1. Small differences between the calculational model and the actual pump.
2. Small differences in densities and material composition.
3. MCNP calculated statistical uncertainties.
4. Differences in the isotopic source composition.
5. Variations in the measurements.
6. Actual position of measurement instruments relative to positions in the calculations.

9.0 PROCEDURE TO DETERMINE CONTAINER SHIELDING FROM MEASURED VALUES

Table 11 lists the dose rate at the shielded detector that corresponds to each of the different source intensities given in Table 9. Figure 31 shows a graph of this information. As the pump is pulled from the tank, a dose rate measurement will be made at the collimated detectors for each foot the pump is pulled. There is a column in Table 11 where the measured dose rate can be entered. As each measurement is made, it can be compared to the numbers in Table 11 to determine the minimum source configuration with a dose rate larger than the measured dose rate. Once all of the measurements have been made, the minimum case which covers all measured data points will determine the required shielding configuration.

From Table 4 it can be seen that the worst case shielded detector reading is 1792 mrem/hr. Thus if the measured dose rate remains below 2000 mrem/hr, the shielding configurations provided in Table 9 can be used to determine the correct shielding configuration. If the dose rate exceeds 2000 mrem/hr, steps should be taken to further clean the pump. If the pump can not be cleaned enough to reduce the dose rates, the 100% shielding configuration from Table 9 should be used and lead blankets added until the dose rates outside the shipping container are reduced to less than 100 mrem/hr. The application of this method can be seen by comparing the 119 gallon case and the 100 % worst case source (68 gallon) in Table 9. The only difference between these two cases is additional blankets are required for the 119 gallon case.

Because of the conservative nature of these calculations, dose rate measurements should be made to determine if lead blankets are required before they are placed on the shipping container.

Table 12 shows an example of how Table 11 might be filled out for a fictitious pump pull. For each foot the maximum measured dose rate is entered, this dose rate is then compared to the dose rates for each of the different cases and the minimum value that exceeds the measured dose rate is circled. Notice that the circled values cover several cases. Once all of the values have been entered, the maximum case with a circled number is used to determine the shielding configuration. In this example the shielding configuration corresponding to 70 % is used, even though only a few values fall in this range.

10.0 CONTOUR PLOTS OF DOSE RATES

Contour plots of the dose rates were created by using MCNP to calculate the dose rate at up to 2,000 dose point locations using the point detector tally in MCNP. The PV-Wave (Reference 4) visualization package was then used to create contour plots of the dose rates calculated by MCNP.

Figure 32 shows a contour plot of the dose rates for the worst case source after the pump has been pulled 30 feet. Figure 33 shows a contour plot of the dose rates with the pump placed inside the shipping container. Figure 34 shows a contour plot of the dose rates with the shipping container filled with lead shot.

Figure 35 shows a contour plot of the dose rate above the shot loading platform at chest level for the worst case source term with the shipping container located in its worst case location. Notice that the dose rate above the shot loading platform varies from 20 mrem/hr to 200 mrem/hr depending on the distance away from the opening in the platform.

11.0 REFERENCES

1. R. F. Carlstrom, *Packaging Design Criteria Transfer and Disposal of Hydrogen Mitigation Mixer Pump*, WHC-SD-TP-PDC-019, July 1994.
2. Memo, Brit E. Hey to T. R. Benegas, *Dose Rate Calculations in Vicinity of Waste Tank 101-SY Mixer Pump and Shield Plug*, dated September 1, 1992.
3. L. L. Carter, *Certification of MCNP Version 4a for WHC Computer Platforms*, ECN-186708, WHC-SD-MP-SWD-30001, Rev. 6, January 1994.
4. Pv-Wave, Version 4.2, Visual Numerics, Inc.

Table 1. Source Composition

ISOTOPE	CURIES	Curies/gram*
Am 241	1.63e-01	2.29e-07
Pu 238	4.48e-04	6.29e-10
Pu 239	8.97e-03	1.26e-08
Pu 240	2.12e-03	2.98e-09
Pu 241	1.78e-02	2.50e-08
Pu 242	9.92e-08	1.39e-13
Cm 243	1.85e-04	2.60e-10
Cm 244	3.22e-03	4.52e-09
Cm 242	8.02e-05	1.13e-10
Cs 137	2.56e+02	3.60e-04
Ba 137m	2.42e+02	3.40e-04
C 14	6.17e-04	8.67e-10
Sr 90	2.99e+01	4.20e-05
Y 90	2.99e+01	4.20e-05
Tc 99	2.40e-01	3.37e-07
I 129	9.42e-03	1.32e-08
Np 237	2.66e-02	3.74e-08
U 238	3.40e-05	4.78e-11
U 235	3.74e-06	5.26e-12
Se 79	2.14e-04	3.01e-10
Nb 94	2.99e-05	4.20e-11
Nb 93m	2.56e-03	3.60e-09
Co 60	3.33e-01	4.68e-07
Eu 154	2.38e+00	3.34e-06
Ni 59	8.58e-05	1.21e-10
Ni 63	1.37e-02	1.93e-08
U 236	2.53e-06	3.55e-12
TOTAL	561.00	7.88e-04

* Based on 1569 lb mass from Reference 1.

Table 2. Photon Source per Gram of Waste

Energy (MeV)	Photons/sec/gram
0.015	2.70e+05
0.025	4.15e+04
0.038	8.73e+05
0.058	4.45e+04
0.085	2.11e+04
0.125	6.18e+04
0.225	2.46e+04
0.375	7.83e+03
0.662*	1.30e+07
0.850	5.94e+04
1.250	9.90e+04
1.750	1.99e+03
2.250	1.93e-01
2.750	6.33e-04
3.500	6.72e-05
5.000	2.85e-05
7.000	3.26e-06
11.000	3.73e-07
TOTAL	1.45e+07

* Changed from 0.575 to 0.662 to accurately reflect the ^{137m}Ba gamma rays.

Table 3. List of MCNP Calculations

Description	File Names	Runs	Time (hours)	TOTAL (hours)
Tank source for pump pull	tank_0, ..., tank_20	21	2	42
Film source for pump pull	film_0, ..., film_20	21	2	42
Internal source for pump pull	cell_0, ..., cell_20	21	2	42
Detector tank source for pump pull	idtank_0, ..., idtank_63	64	4	256
Detector film source for pump pull	idfilm_0, ..., idfilm_63	64	2	128
Detector cell source for pump pull	idcell_0, ..., idcell_63	63	2	128
Detector simulated source for pump pull	idfake_0,...,idfake_20	21	2	42
Film source for shipping container insertion	ifcask0, ..., ifcask15	16	2	32
Cell source for shipping container insertion	iccask0, ..., iccask15	16	2	32
Film source for lowering shipping container	iftruck0, ..., iftruck9	10	2	20
Cell source for lowering shipping container	ictruck0, ..., ictruck9	10	2	20
Film source for lead shot load	ifpbshot0, ..., ifpbshot47	48	2	96
Cell source for lead shot load	icpbshot0, ..., icpbshot47	48	2	96
Film source for steel shot load	ifshot0, ..., ifshot47	48	2	96
Cell source for steel shot load	icshot0, ..., icshot47	48	2	96
Tank source for simulation	itank	1	20	20
Cell source for simulation	icell	1	14	14
Film source for simulation	ifilm	1	14	14
100 % source (internal, film, simulated)	icpdc,ifpdc,idpdc	3	2	6
119 gallon source (internal, film, simulated)	icmax,ifmax,idmax	3	2	6
70 % source (internal, film, simualate)	ic70, if70, id70	3	2	6
10 % source (internal, film, simualate)	ic10, if10, id10	3	2	6
5 % source (internal, film, simualate)	ic5, if5, id5	3	2	6
Lead shot (internal, film, simualate)	icpbsur, ifpbsur, ipbfake	3	2	6
Steel shot (internal, film, simualate)	icsur, ifsur, issfake	3	2	6
No shot (internal, film, simualate)	icvsur, ifvsur, ifake	3	2	6
TOTAL				1264

Table 4. Dose Rate (mrem/hr) at the Shielded Detectors

Distance Pulled (ft.)	Tank		Internal		Film		Upper		Total Dose Rate (mrem/hr)
	Dose Rate (mrem/hr)	Uncer.	Dose Rate (mrem/hr)	Uncer.	Dose Rate (mrem/hr)	Uncer.	Dose Rate (mrem/hr)	Uncer.	
0	0.01	(0.73)	0.00	(0.00)	0.00	(0.00)	1.26	(0.13)	1.27
1	3.32	(0.39)	0.00	(0.00)	0.00	(0.00)	3.50	(0.09)	6.81
2	4.51	(0.14)	0.00	(0.00)	0.00	(0.00)	2.79	(0.10)	7.30
3	6.48	(0.12)	0.00	(0.00)	0.00	(0.00)	4.86	(0.09)	11.34
4	9.29	(0.09)	0.00	(0.00)	0.00	(0.00)	4.93	(0.08)	14.22
5	10.58	(0.09)	0.00	(0.00)	0.00	(0.00)	4.64	(0.08)	15.22
6	15.76	(0.12)	0.00	(0.00)	0.00	(0.00)	6.92	(0.08)	22.68
7	13.11	(0.09)	0.00	(0.00)	0.00	(0.00)	8.45	(0.08)	21.56
8	12.80	(0.14)	0.00	(0.00)	0.00	(0.00)	7.04	(0.08)	19.84
9	12.01	(0.11)	0.00	(0.00)	0.00	(0.00)	7.47	(0.08)	19.48
10	11.00	(0.10)	0.00	(0.00)	0.10	(1.00)	5.93	(0.08)	17.04
11	11.92	(0.08)	0.00	(0.00)	0.19	(1.00)	7.55	(0.08)	19.66
12	13.86	(0.10)	0.00	(0.00)	0.00	(0.00)	7.89	(0.08)	21.75
13	9.26	(0.09)	0.00	(0.00)	0.30	(0.71)	7.34	(0.08)	16.90
14	8.86	(0.10)	0.00	(0.00)	0.54	(0.73)	7.94	(0.08)	17.34
15	12.64	(0.09)	0.00	(0.00)	1.83	(0.45)	7.42	(0.08)	21.90
16	12.12	(0.13)	0.00	(0.00)	4.25	(0.29)	7.21	(0.08)	23.59
17	7.01	(0.14)	0.00	(0.00)	12.70	(0.19)	6.70	(0.08)	26.41
18	3.58	(0.44)	0.00	(0.00)	40.56	(0.09)	6.92	(0.10)	51.06
19	2.12	(0.43)	0.00	(0.00)	172.62	(0.07)	1.82	(0.11)	176.56
20	1.52	(0.45)	0.00	(0.00)	337.20	(0.12)	0.00	(0.00)	338.72
21	2.90	(0.42)	0.00	(0.00)	803.10	(0.09)	0.00	(0.00)	806.00
22	4.54	(0.66)	0.58	(1.00)	494.40	(0.10)	0.00	(0.00)	499.52
23	0.70	(0.89)	0.70	(1.00)	629.70	(0.09)	0.00	(0.00)	631.10
24	0.05	(0.66)	0.36	(1.00)	599.40	(0.09)	0.00	(0.00)	599.80
25	0.51	(0.75)	13.48	(0.34)	355.20	(0.10)	0.00	(0.00)	369.19
26	1.49	(0.68)	59.72	(0.22)	391.80	(0.13)	0.00	(0.00)	453.01
27	2.66	(0.44)	477.50	(0.13)	438.30	(0.11)	0.00	(0.00)	918.46
28	8.13	(0.24)	1187.00	(0.09)	514.20	(0.10)	0.00	(0.00)	1709.33
29	13.10	(0.29)	1004.00	(0.11)	717.30	(0.08)	0.00	(0.00)	1734.40
30	6.94	(0.20)	1005.00	(0.10)	513.60	(0.08)	0.00	(0.00)	1525.54
31	7.16	(0.25)	786.90	(0.11)	384.90	(0.09)	0.00	(0.00)	1178.96
32	9.03	(0.39)	831.90	(0.11)	401.40	(0.08)	0.00	(0.00)	1242.33

33	3.82	(0.35)	1163.00	(0.09)	625.20	(0.08)	0.00	(0.00)	1792.02
34	15.98	(0.41)	832.80	(0.10)	466.50	(0.09)	0.00	(0.00)	1315.28
35	15.42	(0.35)	742.00	(0.10)	432.90	(0.08)	0.00	(0.00)	1190.32
36	12.14	(0.33)	593.80	(0.10)	744.90	(0.09)	0.00	(0.00)	1350.84
37	6.63	(0.25)	544.90	(0.11)	618.30	(0.09)	0.00	(0.00)	1169.83
38	6.42	(0.26)	531.70	(0.13)	722.40	(0.09)	0.00	(0.00)	1260.52
39	7.69	(0.21)	701.10	(0.12)	434.10	(0.10)	0.00	(0.00)	1142.89
40	25.01	(0.43)	746.40	(0.12)	342.60	(0.13)	0.00	(0.00)	1114.01
41	5.48	(0.25)	465.10	(0.11)	553.20	(0.09)	0.00	(0.00)	1023.78
42	5.67	(0.24)	608.10	(0.13)	591.90	(0.10)	0.00	(0.00)	1205.67
43	21.85	(0.68)	515.70	(0.12)	758.40	(0.08)	0.00	(0.00)	1295.95
44	7.43	(0.29)	610.60	(0.15)	460.80	(0.10)	0.00	(0.00)	1078.83
45	8.51	(0.27)	598.80	(0.13)	470.10	(0.09)	0.00	(0.00)	1077.41
46	16.39	(0.21)	428.80	(0.14)	632.40	(0.09)	0.00	(0.00)	1077.59
47	22.60	(0.20)	495.70	(0.13)	559.20	(0.08)	0.00	(0.00)	1077.50
48	24.40	(0.14)	495.80	(0.14)	596.10	(0.09)	0.00	(0.00)	1116.30
49	86.66	(0.26)	570.50	(0.14)	459.30	(0.10)	0.00	(0.00)	1116.46
50	63.46	(0.20)	128.80	(0.30)	565.80	(0.10)	0.00	(0.00)	758.06
51	46.55	(0.21)	28.21	(0.35)	136.80	(0.10)	0.00	(0.00)	211.56
52	45.78	(0.21)	18.84	(0.35)	87.21	(0.14)	0.00	(0.00)	151.83
53	48.64	(0.20)	11.57	(0.43)	72.03	(0.14)	0.00	(0.00)	132.24
54	46.19	(0.20)	9.49	(0.38)	53.37	(0.17)	0.00	(0.00)	109.05
55	49.95	(0.20)	5.56	(0.62)	41.61	(0.19)	0.00	(0.00)	97.12
56	46.00	(0.20)	6.36	(0.42)	30.75	(0.21)	0.00	(0.00)	83.11
57	45.98	(0.20)	9.47	(0.52)	30.99	(0.23)	0.00	(0.00)	86.44
58	46.27	(0.21)	2.16	(1.00)	30.21	(0.26)	0.00	(0.00)	78.64
59	47.29	(0.20)	4.38	(0.80)	21.20	(0.33)	0.00	(0.00)	72.87
60	46.91	(0.20)	1.06	(0.75)	19.42	(0.32)	0.00	(0.00)	67.39
61	47.21	(0.20)	7.07	(0.54)	23.28	(0.25)	0.00	(0.00)	77.56
62	47.05	(0.21)	3.49	(1.00)	14.72	(0.37)	0.00	(0.00)	65.26
63	47.47	(0.22)	4.86	(0.80)	8.21	(0.54)	0.00	(0.00)	60.54
Max	86.66		1187.00		803.10		8.45		1792.02

Table 5. Dose Rate (mrem/hr) at the Unshielded Detectors

Distance Pulled (ft.)	Tank		Internal		Film		Upper		Total Dose Rate (mrem/hr)
	Dose Rate (mrem/hr)	Uncer.	Dose Rate (mrem/hr)	Uncer.	Dose Rate (mrem/hr)	Uncer.	Dose Rate (mrem/hr)	Uncer.	
0	7.76	(0.46)	0.00	(0.00)	0.00	(0.00)	8.09	(0.09)	15.85
1	36.72	(0.24)	0.00	(0.00)	0.00	(0.00)	11.89	(0.07)	48.61
2	96.28	(0.12)	0.00	(0.00)	0.00	(0.00)	14.31	(0.07)	110.59
3	140.80	(0.11)	0.00	(0.00)	0.00	(0.00)	21.76	(0.06)	162.56
4	272.80	(0.07)	0.00	(0.00)	0.01	(1.00)	26.25	(0.05)	299.06
5	189.40	(0.07)	0.00	(0.00)	0.00	(0.00)	29.28	(0.05)	218.68
6	233.60	(0.07)	0.00	(0.00)	0.30	(1.00)	34.04	(0.05)	267.94
7	231.00	(0.07)	0.00	(0.00)	0.00	(0.00)	37.51	(0.05)	268.51
8	276.00	(0.07)	0.00	(0.00)	0.84	(1.00)	42.53	(0.05)	319.37
9	206.00	(0.07)	0.00	(0.00)	0.71	(0.72)	38.61	(0.05)	245.32
10	192.30	(0.07)	0.00	(0.00)	0.00	(0.00)	42.49	(0.05)	234.79
11	262.30	(0.07)	0.00	(0.00)	1.44	(1.00)	42.77	(0.05)	306.51
12	276.10	(0.07)	0.00	(0.00)	3.86	(0.60)	43.22	(0.05)	323.18
13	274.30	(0.06)	0.00	(0.00)	2.40	(0.67)	43.37	(0.05)	320.07
14	150.90	(0.07)	0.00	(0.00)	10.67	(0.40)	42.93	(0.05)	204.50
15	193.80	(0.07)	0.00	(0.00)	18.41	(0.24)	42.85	(0.05)	255.06
16	209.90	(0.08)	0.00	(0.00)	112.56	(0.13)	41.51	(0.05)	363.97
17	221.10	(0.08)	0.00	(0.00)	327.60	(0.09)	38.95	(0.05)	587.65
18	45.54	(0.38)	5.39	(1.00)	723.60	(0.05)	27.23	(0.06)	801.76
19	42.03	(0.43)	0.00	(0.00)	1355.70	(0.04)	16.86	(0.07)	1414.59
20	18.69	(0.68)	0.00	(0.00)	2083.50	(0.07)	0.00	(0.00)	2102.19
21	76.84	(0.29)	6.97	(1.00)	3093.00	(0.06)	0.00	(0.00)	3176.81
22	23.94	(0.41)	8.46	(1.00)	3195.00	(0.06)	0.00	(0.00)	3227.40
23	22.38	(0.60)	56.26	(0.72)	3543.00	(0.06)	0.00	(0.00)	3621.64
24	11.45	(0.68)	42.94	(0.44)	3312.00	(0.06)	0.00	(0.00)	3366.39
25	7.05	(0.71)	404.80	(0.16)	2907.60	(0.06)	0.00	(0.00)	3319.45
26	10.89	(0.49)	1205.00	(0.11)	2142.60	(0.07)	0.00	(0.00)	3358.49
27	53.97	(0.44)	2637.00	(0.08)	2832.90	(0.06)	0.00	(0.00)	5523.87
28	259.10	(0.43)	4196.00	(0.07)	3063.00	(0.06)	0.00	(0.00)	7518.10
29	235.20	(0.18)	4605.00	(0.07)	3786.00	(0.05)	0.00	(0.00)	8626.20
30	468.10	(0.18)	4846.00	(0.06)	3195.00	(0.05)	0.00	(0.00)	8509.10
31	251.00	(0.18)	4144.00	(0.07)	3537.00	(0.05)	0.00	(0.00)	7932.00
32	159.00	(0.21)	4377.00	(0.07)	3327.00	(0.05)	0.00	(0.00)	7863.00

33	162.40	(0.33)	5169.00	(0.06)	3540.00	(0.05)	0.00	(0.00)	8871.40
34	206.10	(0.36)	4784.00	(0.06)	3705.00	(0.05)	0.00	(0.00)	8695.10
35	299.30	(0.24)	3909.00	(0.07)	3318.00	(0.05)	0.00	(0.00)	7526.30
36	183.00	(0.25)	3868.00	(0.07)	3990.00	(0.06)	0.00	(0.00)	8041.00
37	132.80	(0.27)	3234.00	(0.08)	4083.00	(0.05)	0.00	(0.00)	7449.80
38	91.49	(0.18)	3383.00	(0.07)	3765.00	(0.06)	0.00	(0.00)	7239.49
39	170.00	(0.24)	3149.00	(0.08)	3087.00	(0.06)	0.00	(0.00)	6406.00
40	240.60	(0.21)	3199.00	(0.07)	3822.00	(0.06)	0.00	(0.00)	7261.60
41	241.40	(0.25)	3411.00	(0.07)	3363.00	(0.06)	0.00	(0.00)	7015.40
42	222.60	(0.17)	3302.00	(0.08)	4119.00	(0.06)	0.00	(0.00)	7643.60
43	131.20	(0.19)	3391.00	(0.08)	3177.00	(0.05)	0.00	(0.00)	6699.20
44	236.90	(0.24)	2936.00	(0.08)	3174.00	(0.05)	0.00	(0.00)	6346.90
45	286.70	(0.22)	3281.00	(0.08)	3177.00	(0.05)	0.00	(0.00)	6744.70
46	289.10	(0.17)	3410.00	(0.08)	3297.00	(0.05)	0.00	(0.00)	6996.10
47	573.10	(0.15)	2994.00	(0.08)	3975.00	(0.05)	0.00	(0.00)	7542.10
48	991.60	(0.14)	3255.00	(0.08)	3450.00	(0.05)	0.00	(0.00)	7696.60
49	1247.00	(0.10)	2134.00	(0.09)	3042.00	(0.06)	0.00	(0.00)	6423.00
50	1200.00	(0.11)	1428.00	(0.10)	2346.60	(0.07)	0.00	(0.00)	4974.60
51	1165.00	(0.11)	500.70	(0.17)	1763.70	(0.07)	0.00	(0.00)	3429.40
52	1260.00	(0.10)	327.00	(0.22)	1131.90	(0.09)	0.00	(0.00)	2718.90
53	1272.00	(0.10)	136.80	(0.28)	694.80	(0.10)	0.00	(0.00)	2103.60
54	1239.00	(0.10)	96.59	(0.26)	505.50	(0.12)	0.00	(0.00)	1841.09
55	1196.00	(0.10)	92.97	(0.31)	365.40	(0.15)	0.00	(0.00)	1654.37
56	1205.00	(0.10)	50.10	(0.57)	254.25	(0.16)	0.00	(0.00)	1509.35
57	1205.00	(0.10)	54.87	(0.42)	239.22	(0.17)	0.00	(0.00)	1499.09
58	1223.00	(0.11)	42.57	(0.43)	142.14	(0.20)	0.00	(0.00)	1407.71
59	1249.00	(0.10)	50.93	(0.46)	115.86	(0.26)	0.00	(0.00)	1415.79
60	1251.00	(0.10)	18.05	(0.76)	73.83	(0.28)	0.00	(0.00)	1342.88
61	1244.00	(0.10)	9.67	(0.71)	108.57	(0.29)	0.00	(0.00)	1362.24
62	1241.00	(0.11)	25.54	(0.52)	73.53	(0.29)	0.00	(0.00)	1340.07
63	1263.00	(0.11)	15.42	(0.78)	31.47	(0.38)	0.00	(0.00)	1309.89
Max	1272.00		5169.00		4119.00		43.37		8871.40

Table 6. Mass per Dose Conversion Factors

Distance Pulled (ft.)	Internal Source Factor			External Film Factor			Upper Source Factor		
	Dose Rate (mrem/hr)	Mass (grams)	Factor (grams/ mrem/hr)	Dose Rate (mrem/hr)	Mass (grams)	Factor (grams/ mrem/hr)	Dose Rate (mrem/hr)	Mass (grams)	Factor (grams/ mrem/hr)
0	0.00	0.00	0.00	0.00	0.00	0.00	1.26	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	3.50	76.63	21.93
2	0.00	0.00	0.00	0.00	0.00	0.00	2.79	76.63	27.47
3	0.00	0.00	0.00	0.00	0.00	0.00	4.86	76.63	15.78
4	0.00	0.00	0.00	0.00	0.00	0.00	4.93	76.63	15.54
5	0.00	0.00	0.00	0.00	0.00	0.00	4.64	76.63	16.50
6	0.00	0.00	0.00	0.00	0.00	0.00	6.92	76.63	11.07
7	0.00	0.00	0.00	0.00	0.00	0.00	8.45	76.63	9.07
8	0.00	0.00	0.00	0.00	0.00	0.00	7.04	76.63	10.88
9	0.00	0.00	0.00	0.00	0.00	0.00	7.47	76.63	10.27
10	0.00	0.00	0.00	0.10	0.00	0.00	5.93	76.63	12.92
11	0.00	0.00	0.00	0.19	0.00	0.00	7.55	76.63	10.15
12	0.00	0.00	0.00	0.00	0.00	0.00	7.89	76.63	9.71
13	0.00	0.00	0.00	0.30	0.00	0.00	7.34	76.63	10.43
14	0.00	0.00	0.00	0.54	0.00	0.00	7.94	76.63	9.65
15	0.00	0.00	0.00	1.83	0.00	0.00	7.42	76.63	10.32
16	0.00	0.00	0.00	4.25	0.00	0.00	7.21	76.63	6.68
17	0.00	0.00	0.00	12.70	0.00	0.00	6.70	76.63	3.95
18	0.00	0.00	0.00	40.56	0.00	0.00	6.92	76.63	1.61
19	0.00	0.00	0.00	172.62	1650.56	9.56	1.82	0.00	0.00
20	0.00	0.00	0.00	337.20	2041.54	6.05	0.00	0.00	0.00
21	0.00	0.00	0.00	803.10	13107.42	16.32	0.00	0.00	0.00
22	0.58	0.00	0.00	494.40	7694.28	15.56	0.00	0.00	0.00
23	0.70	0.00	0.00	629.70	7595.10	12.06	0.00	8.06	0.00
24	0.36	0.00	0.00	599.40	15080.58	25.16	0.00	0.00	0.00
25	13.48	0.00	0.00	355.20	3975.03	11.19	0.00	0.00	0.00
26	59.72	0.00	0.00	391.80	4858.78	12.40	0.00	0.00	0.00
27	477.50	10130.88	21.22	438.30	7276.68	16.60	0.00	0.00	0.00
28	1187.00	37222.20	31.36	514.20	4508.51	8.77	0.00	0.00	0.00
29	1004.00	22826.40	22.74	717.30	15910.56	22.18	0.00	0.00	0.00
30	1005.00	35072.46	34.90	513.60	9453.42	18.41	0.00	0.00	0.00
31	786.90	8654.76	11.00	384.90	5501.88	14.29	0.00	0.00	0.00
32	831.90	17835.00	21.44	401.40	6916.50	17.23	0.00	0.00	0.00

33	1163.00	17852.40	15.35	625.20	13018.68	20.82	0.00	0.00	0.00
34	832.80	17922.00	21.52	466.50	3476.00	7.45	0.00	0.00	0.00
35	742.00	23142.00	31.19	432.90	4384.80	10.13	0.00	0.00	0.00
36	593.80	20131.80	33.90	744.90	13540.68	18.18	0.00	0.00	0.00
37	544.90	17922.00	32.89	618.30	5058.70	8.18	0.00	0.00	0.00
38	531.70	17922.00	33.71	722.40	14887.44	20.61	0.00	0.00	0.00
39	701.10	17939.40	25.59	434.10	3393.00	7.82	0.00	0.00	0.00
40	746.40	17939.40	24.03	342.60	3388.82	9.89	0.00	0.00	0.00
41	465.10	17922.00	38.53	553.20	12627.18	22.83	0.00	0.00	0.00
42	608.10	17922.00	29.47	591.90	4432.30	7.49	0.00	0.00	0.00
43	515.70	17939.40	34.79	758.40	13618.98	17.96	0.00	0.00	0.00
44	610.60	17922.00	29.35	460.80	3391.96	7.36	0.00	0.00	0.00
45	598.80	17922.00	29.93	470.10	3390.91	7.21	0.00	0.00	0.00
46	428.80	17939.40	41.84	632.40	13373.64	21.15	0.00	0.00	0.00
47	495.70	17939.40	36.19	559.20	4674.51	8.36	0.00	0.00	0.00
48	495.80	17922.00	36.15	596.10	12642.84	21.21	0.00	0.00	0.00
49	570.50	20671.20	36.23	459.30	3522.46	7.67	0.00	0.00	0.00
50	128.80	2046.24	15.89	565.80	11494.44	20.32	0.00	0.00	0.00
51	28.21	0.00	0.00	136.80	0.00	0.00	0.00	0.00	0.00
52	18.84	0.00	0.00	87.21	0.00	0.00	0.00	0.00	0.00
53	11.57	0.00	0.00	72.03	0.00	0.00	0.00	0.00	0.00
54	9.49	0.00	0.00	53.37	0.00	0.00	0.00	0.00	0.00
55	5.56	0.00	0.00	41.61	0.00	0.00	0.00	0.00	0.00
56	6.36	0.00	0.00	30.75	0.00	0.00	0.00	0.00	0.00
57	9.47	0.00	0.00	30.99	0.00	0.00	0.00	0.00	0.00
58	2.16	0.00	0.00	30.21	0.00	0.00	0.00	0.00	0.00
59	4.38	0.00	0.00	21.20	0.00	0.00	0.00	0.00	0.00
60	1.06	0.00	0.00	19.42	0.00	0.00	0.00	0.00	0.00
61	7.07	0.00	0.00	23.28	0.00	0.00	0.00	0.00	0.00
62	3.49	0.00	0.00	14.72	0.00	0.00	0.00	0.00	0.00
63	4.86	0.00	0.00	8.21	0.00	0.00	0.00	0.00	0.00
Total		4.49e+05			2.50e+05			1.39e+03	

Table 7. Expected Shipping container Dose Rates at Each Detector Point

Distance Pulled (ft.)	Dose Rate (mrem/hr)			
	Shielded Detector	No Shot	Steel Shot	Lead Shot
0	1.27	6.16	3.37	2.08
1	6.81	8.65	2.38	0.16
2	7.30	10.97	2.74	0.17
3	11.34	17.58	4.09	0.27
4	14.22	18.94	4.83	0.30
5	15.22	21.91	5.38	0.33
6	22.68	24.10	6.19	0.41
7	21.56	26.98	7.22	0.45
8	19.84	27.24	7.13	0.44
9	19.48	28.54	7.54	0.45
10	17.04	33.76	8.18	0.48
11	19.66	39.16	8.31	0.52
12	21.75	41.12	9.08	0.49
13	16.90	55.93	9.75	0.50
14	17.34	71.45	11.91	0.58
15	21.90	99.30	16.74	0.60
16	23.59	161.00	30.14	0.69
17	26.41	243.75	52.31	1.43
18	51.06	467.53	93.71	5.63
19	176.56	871.69	219.37	13.28
20	338.72	1294.74	346.84	25.34
21	806.00	1585.97	432.97	33.67
22	499.52	1658.21	442.74	31.89
23	631.10	1712.01	451.66	31.31
24	599.80	1671.53	420.82	32.41
25	369.19	1549.53	383.36	23.56
26	453.01	1707.93	408.63	24.93
27	918.46	2475.30	593.14	40.45
28	1709.33	3266.26	854.11	60.02
29	1734.40	3821.15	983.21	73.47
30	1525.54	3568.84	932.71	63.34
31	1178.96	3354.64	850.40	51.92
32	1242.33	3338.52	844.91	49.59
33	1792.02	3676.72	947.80	57.87

34	1315.28	4362.12	1122.70	72.19
35	1190.32	4128.01	1071.40	66.90
36	1350.84	4257.92	1069.80	66.57
37	1169.83	4134.11	1114.50	71.70
38	1260.52	4082.91	1059.60	67.85
39	1142.89	4091.81	1063.10	70.33
40	1114.01	3947.40	1037.50	63.70
41	1023.78	3967.01	1059.50	68.40
42	1205.67	4117.41	1118.30	69.76
43	1295.95	4030.30	1100.40	70.62
44	1078.83	4052.30	1026.50	69.77
45	1077.41	4071.30	1058.80	69.63
46	1077.59	4124.00	1086.00	72.73
47	1077.50	4014.10	1072.80	73.22
48	1116.30	3707.50	978.70	70.33
49	1116.46	3148.10	845.30	54.26
50	758.06	2219.80	602.10	39.36
51	211.56	1370.40	318.46	19.24
52	151.83	496.90	100.78	6.01
53	132.24	52.26	14.79	7.28
54	109.05	33.12	12.67	8.07
55	97.12	23.05	10.51	7.53
56	83.11	23.61	9.33	6.81
57	86.44	14.63	7.57	5.61
58	78.64	13.24	6.96	4.98
59	72.87	12.18	5.45	5.26
60	67.39	9.26	5.09	4.15
61	77.56	8.97	4.40	3.33
62	65.26	8.90	3.51	2.93
63	60.54	6.39	3.06	2.66
Max	1792.02	4362.12	1122.70	73.47

Table 8. Maximum Shipping container Dose Rates at Each Detector Point

Distance Pulled (ft.)	Mass (grams)	Detector Dose (mrem/hr)	Max Factor (grams/mrem/hr)	Multiplier (Max Mass/Model Mass)	Max Dose Rate (mrem/hr)			Comp. No.	Shot Load
					No Shot	Steel Shot	Lead Shot		
0	0.00	1.26	0.00	1.00	10.41	5.70	3.52	24	No Shot
1	76.63	3.50	21.93	1.00	14.61	4.01	0.26	23	No Shot
2	76.63	2.79	27.47	1.00	18.53	4.63	0.28	23	No Shot
3	76.63	4.86	15.78	1.00	29.67	6.91	0.46	22	No Shot
4	76.63	4.93	15.54	1.00	31.97	8.16	0.51	21	No Shot
5	76.63	4.64	16.50	1.00	36.99	9.08	0.55	21	No Shot
6	76.63	6.92	11.07	1.00	40.69	10.45	0.70	21	No Shot
7	76.63	8.45	9.07	1.00	45.55	12.18	0.77	20	No Shot
8	76.63	7.04	10.88	1.00	45.99	12.04	0.75	20	No Shot
9	76.63	7.47	10.27	1.00	48.18	12.72	0.77	19	No Shot
10	76.63	6.04	12.92	1.02	56.99	13.81	0.81	19	No Shot
11	76.63	7.74	10.15	1.03	66.11	14.02	0.87	19	No Shot
12	76.63	7.89	9.71	1.00	69.42	15.32	0.83	18	No Shot
13	76.63	7.64	10.43	1.04	94.42	16.45	0.85	18	Steel Shot
14	76.63	8.48	9.65	1.07	120.62	20.11	0.98	17	Steel Shot
15	76.63	9.26	10.32	1.25	167.64	28.26	1.01	17	Steel Shot
16	76.63	11.47	6.68	1.00	271.81	50.88	1.16	17	Steel Shot
17	76.63	19.40	3.95	1.00	411.49	88.31	2.42	16	Steel Shot
18	76.63	47.48	1.61	1.00	789.29	158.20	9.51	16	Lead Shot
19	1650.56	174.44	9.56	1.01	1471.59	370.34	22.42	16	Lead Shot
20	2041.54	337.20	6.05	1.00	2185.79	585.54	42.78	15	Lead Shot
21	13107.42	803.10	16.32	1.00	2677.44	730.94	56.83	15	Lead Shot
22	7694.28	494.98	15.56	1.00	2799.40	747.43	53.84	14	Lead Shot
23	7603.16	630.40	12.06	1.00	2890.22	762.50	52.85	14	Lead Shot
24	15080.58	599.76	25.16	1.00	2821.87	710.43	54.71	14	Lead Shot
25	3975.03	368.68	11.19	1.04	2615.93	647.19	39.77	13	Lead Shot
26	4858.78	451.52	12.40	1.15	2883.33	689.84	42.08	13	Lead Shot
27	17407.56	915.80	21.22	1.12	4178.81	1001.34	68.28	13	Lead Shot
28	41730.71	1701.20	31.36	1.28	5514.11	1441.91	101.32	12	Lead Shot*
29	38736.96	1721.30	22.74	1.01	6450.87	1659.85	124.03	11	Lead Shot*
30	44525.88	1518.60	34.90	1.19	6024.93	1574.60	106.94	11	Lead Shot*
31	14156.64	1171.80	14.29	1.18	5663.31	1435.66	87.64	10	Lead Shot
32	24751.50	1233.30	21.44	1.07	5636.10	1426.37	83.72	10	Lead Shot

33	30871.08	1788.20	20.82	1.21	6207.05	1600.08	97.70	10	Lead Shot
34	21398.00	1299.30	21.52	1.31	7364.15	1895.35	121.87	9	Lead Shot
35	27526.80	1174.90	31.19	1.33	6968.91	1808.74	112.94	9	Lead Shot
36	33672.48	1338.70	33.90	1.35	7188.23	1806.04	112.38	8	Lead Shot
37	22980.70	1163.20	32.89	1.66	6979.22	1881.50	121.04	8	Lead Shot
38	32809.44	1254.10	33.71	1.29	6892.78	1788.82	114.54	8	Lead Shot
39	21332.40	1135.20	25.59	1.36	6907.81	1794.73	118.73	7	Lead Shot
40	21328.22	1089.00	24.03	1.23	6664.02	1751.51	107.53	7	Lead Shot
41	30549.18	1018.30	38.53	1.28	6697.11	1788.65	115.47	7	Lead Shot
42	22354.30	1200.00	29.47	1.58	6951.02	1887.92	117.77	6	Lead Shot
43	31558.38	1274.10	34.79	1.40	6803.97	1857.70	119.22	6	Lead Shot
44	21313.96	1071.40	29.35	1.48	6841.11	1732.94	117.79	5	Lead Shot
45	21312.91	1068.90	29.93	1.50	6873.19	1787.47	117.55	5	Lead Shot
46	31313.04	1061.20	41.84	1.42	6962.15	1833.39	122.78	5	Lead Shot
47	22613.91	1054.90	36.19	1.69	6776.62	1811.10	123.61	4	Lead Shot
48	30564.84	1091.90	36.15	1.29	6259.01	1652.24	118.73	3	Lead Shot
49	24193.66	1029.80	36.23	1.54	5314.63	1427.04	91.61	3	Lead Shot
50	13540.68	694.60	20.32	1.04	3747.48	1016.47	66.44	2	Lead Shot
51	0.00	165.01	0.00	1.00	2313.52	537.63	32.49	2	Lead Shot
52	0.00	106.05	0.00	1.00	838.87	170.14	10.15	1	Lead Shot
53	0.00	83.60	0.00	1.00	88.23	24.96	12.30	NA	NA
54	0.00	62.86	0.00	1.00	55.92	21.39	13.63	NA	NA
55	0.00	47.17	0.00	1.00	38.92	17.74	12.71	NA	NA
56	0.00	37.11	0.00	1.00	39.85	15.75	11.50	NA	NA
57	0.00	40.46	0.00	1.00	24.70	12.79	9.47	NA	NA
58	0.00	32.37	0.00	1.00	22.36	11.74	8.42	NA	NA
59	0.00	25.58	0.00	1.00	20.56	9.20	8.89	NA	NA
60	0.00	20.48	0.00	1.00	15.63	8.60	7.01	NA	NA
61	0.00	30.35	0.00	1.00	15.15	7.43	5.62	NA	NA
62	0.00	18.21	0.00	1.00	15.02	5.92	4.94	NA	NA
63	0.00	13.07	0.00	1.00	10.78	5.16	4.50	NA	NA
Max		1788.20	41.84	1.69	7364.15	1895.35	124.03		

Table 9. Shipping Container Shielding Configuration for Different Source Terms

Comp. No.	119 gallon	Expected Worst Case Source					
		100 %	70 %	50 %	10 %	5 %	1 %
1	Lead Shot	Lead Shot	Steel Shot	Steel Shot	No Shot	No Shot	No Shot
2	Lead Shot	Lead Shot	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
3	Lead Shot*	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
4	Lead Shot*	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
5	Lead Shot*	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
6	Lead Shot*	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Lead Shot	No Shot
7	Lead Shot*	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
8	Lead Shot*	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
9	Lead Shot*	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
10	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
11	Lead Shot**	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
12	Lead Shot**	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
13	Lead Shot*	Lead Shot	Lead Shot	Lead Shot	Lead Shot	Steel Shot	No Shot
14	Lead Shot	Lead Shot	Lead Shot	Lead Shot	Steel Shot	Steel Shot	No Shot
15	Lead Shot	Lead Shot	Lead Shot	Lead Shot	Steel Shot	Steel Shot	No Shot
16	Lead Shot	Lead Shot	Lead Shot	Lead Shot	No Shot	No Shot	No Shot
17	Steel Shot	Steel Shot	Steel Shot	Steel Shot	No Shot	No Shot	No Shot
18	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot
19	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot
20	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot
21	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot
22	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot
23	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot
24	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot	No Shot

* 0.25 in. Lead Blanket

** 0.5 in. Lead Blanket (2 X 0.25 in.)

Table 10. Shipping Container Dose Rates Calculated for Different Source Terms

Distance Pulled (ft.)	Comp. No.	119 Gallon	Dose Rate from Percentage of Expected Worst Case Source (mrem/hr)					
			100 %	70 %	50 %	10 %	5 %	1 %
0	24	11.07	10.73	7.60	5.43	2.06	0.55	0.10
1	23	14.65	14.41	10.12	7.23	2.75	0.70	0.15
2	23	18.11	18.11	12.67	9.05	3.49	0.90	0.19
3	22	26.37	26.32	18.37	13.12	5.04	1.35	0.30
4	21	32.18	31.69	22.17	15.83	6.17	1.64	0.32
5	21	35.61	35.00	24.54	17.53	6.73	1.77	0.37
6	21	40.71	40.92	28.64	20.46	7.75	2.00	0.41
7	20	45.58	45.16	31.77	22.70	8.47	2.32	0.46
8	20	48.54	46.63	32.71	23.36	8.67	2.31	0.46
9	19	52.69	50.36	35.46	25.33	9.33	2.60	0.48
10	19	58.40	56.83	40.04	28.60	10.07	2.84	0.57
11	19	64.83	62.95	43.82	31.30	10.96	3.29	0.66
12	18	68.35	65.65	46.43	33.16	11.40	3.51	0.69
13	18	72.63	69.60	50.87	36.33	12.78	4.16	0.94
14	17	32.04	31.67	30.66	21.90	15.23	5.50	1.21
15	17	2.13	2.08	17.24	12.32	19.88	7.90	1.68
16	17	1.89	1.99	22.14	15.81	28.58	12.47	2.72
17	16	3.70	3.75	5.71	4.08	46.71	21.20	4.11
18	16	8.75	8.86	6.33	4.52	78.19	37.22	7.89
19	16	22.21	22.33	15.82	11.30	86.60	44.50	14.72
20	15	41.43	41.34	28.99	20.71	58.61	29.35	21.86
21	15	55.35	55.35	38.54	27.53	74.75	37.50	26.77
22	14	51.85	51.61	36.19	25.85	75.22	37.55	27.99
23	14	54.50	54.26	38.04	27.17	73.48	37.30	28.90
24	14	53.27	53.07	37.07	26.48	68.31	36.62	28.22
25	13	22.26	41.62	29.46	21.04	12.28	33.05	26.16
26	13	29.63	42.57	30.35	21.68	4.96	34.50	28.83
27	13	57.24	53.01	49.80	35.57	7.45	51.85	41.79
28	12	64.04	42.70	72.36	51.69	10.49	73.93	55.14
29	11	59.84	48.60	84.10	60.07	12.18	84.82	64.51
30	11	50.63	46.43	75.87	54.19	10.90	78.23	60.25
31	10	52.21	80.11	62.01	44.29	8.96	69.59	56.63
32	10	44.21	86.61	61.32	43.80	8.90	69.11	56.36
33	10	45.07	80.28	70.61	50.44	10.17	77.71	62.07

34	9	48.57	50.96	80.66	57.61	11.52	93.41	73.64
35	9	44.80	47.65	77.89	55.64	11.15	90.46	69.69
36	8	50.89	50.32	83.17	59.41	11.73	92.16	71.88
37	8	51.82	51.37	83.39	59.57	11.88	93.34	69.79
38	8	49.73	48.49	83.08	59.35	11.91	92.00	68.93
39	7	49.10	49.99	80.86	57.76	11.58	88.88	69.08
40	7	46.68	46.15	75.79	54.13	10.81	86.02	66.64
41	7	47.76	49.79	81.53	58.24	11.56	52.49	66.97
42	6	52.71	52.07	85.06	60.76	12.22	8.61	69.51
43	6	50.90	51.01	84.45	60.32	12.06	8.98	68.04
44	5	49.79	50.47	80.20	57.29	11.52	67.24	68.41
45	5	50.29	48.84	79.77	56.98	11.51	87.15	68.73
46	5	52.73	51.83	85.77	61.27	12.39	89.44	69.62
47	4	52.73	51.62	86.15	61.54	12.40	93.00	67.77
48	3	46.96	47.71	78.84	56.31	11.34	82.92	62.59
49	3	58.60	57.97	68.19	48.70	9.92	72.41	53.15
50	2	66.09	65.85	47.91	34.22	7.00	50.99	37.47
51	2	30.74	31.27	65.48	46.77	23.88	35.15	23.14
52	1	9.58	9.33	91.70	65.50	63.95	34.30	8.39
53	NA	11.89	11.85	11.10	7.93	3.42	2.24	0.88
54	NA	13.71	13.47	10.47	7.48	2.08	1.29	0.56
55	NA	12.60	12.30	9.37	6.69	1.68	1.11	0.39
56	NA	11.36	11.04	8.25	5.90	1.46	0.91	0.40
57	NA	9.84	9.47	7.23	5.16	1.12	0.75	0.25
58	NA	8.38	8.39	6.14	4.39	1.01	0.62	0.22
59	NA	7.51	8.68	6.21	4.44	0.97	0.53	0.21
60	NA	8.09	7.02	5.11	3.65	0.87	0.48	0.16
61	NA	5.45	5.84	4.09	2.92	0.67	0.38	0.15
62	NA	5.03	4.28	3.36	2.40	0.52	0.31	0.15
63	NA	5.09	4.57	3.41	2.43	0.53	0.28	0.11
Max		72.63	86.61	91.70	65.50	86.60	93.41	73.64

Table 11. Shielded Detector Readings Corresponding to Different Source Terms

Distance Pulled (ft.)	Measured Dose Rate (mrem/hr)	Dose Rate (mrem/hr) from Percentage of Expected Worst Case Source					
		100 %	70 %	50 %	10 %	5 %	1 %
0		1.27	0.89	0.64	0.13	0.07	0.02
1		6.81	5.76	5.06	3.66	3.49	3.35
2		7.30	6.46	5.90	4.79	4.65	4.54
3		11.34	9.88	8.91	6.97	6.73	6.53
4		14.22	12.74	11.76	9.78	9.54	9.34
5		15.22	13.83	12.90	11.04	10.81	10.63
6		22.68	20.60	19.22	16.45	16.11	15.83
7		21.56	19.03	17.34	13.96	13.53	13.19
8		19.84	17.73	16.32	13.50	13.15	12.87
9		19.48	17.24	15.74	12.76	12.38	12.08
10		17.04	15.22	14.02	11.60	11.30	11.06
11		19.66	17.34	15.79	12.69	12.31	12.00
12		21.75	19.38	17.81	14.65	14.25	13.94
13		16.90	14.61	13.08	10.02	9.64	9.33
14		17.34	14.79	13.10	9.71	9.28	8.94
15		21.90	19.12	17.27	13.57	13.10	12.73
16		23.59	20.15	17.85	13.27	12.69	12.23
17		26.41	20.59	16.71	8.95	7.98	7.20
18		51.06	36.81	27.32	8.33	5.95	4.05
19		176.56	124.23	89.34	19.56	10.84	3.86
20		338.72	237.56	170.12	35.24	18.38	4.89
21		806.00	565.07	404.45	83.21	43.05	10.93
22		499.52	351.02	252.03	54.04	29.29	9.49
23		631.10	441.98	315.90	63.74	32.22	7.01
24		599.80	419.88	299.93	60.02	30.04	6.05
25		369.19	258.59	184.85	37.38	18.94	4.20
26		453.01	317.56	227.25	46.65	24.07	6.01
27		918.46	643.72	460.56	94.24	48.45	11.82
28		1709.33	1198.97	858.73	178.25	93.19	25.14
29		1734.40	1218.01	873.75	185.23	99.17	30.31
30		1525.54	1069.96	766.24	158.80	82.87	22.12
31		1178.96	827.42	593.06	124.34	65.75	18.88
32		1242.33	872.34	625.68	132.36	70.69	21.36
33		1792.02	1255.56	897.92	182.64	93.23	21.71

34		1315.28	925.49	665.63	145.91	80.95	28.97
35		1190.32	837.85	602.87	132.91	74.17	27.17
36		1350.84	949.23	681.49	146.01	79.08	25.53
37		1169.83	820.87	588.23	122.95	64.79	18.26
38		1260.52	884.29	633.47	131.83	69.12	18.96
39		1142.89	802.33	575.29	121.21	64.45	19.05
40		1114.01	787.31	569.51	133.91	79.46	35.90
41		1023.78	718.29	514.63	107.31	56.39	15.66
42		1205.67	845.67	605.67	125.67	65.67	17.67
43		1295.95	913.72	658.90	149.26	85.56	34.59
44		1078.83	757.41	543.13	114.57	61.00	18.15
45		1077.41	756.74	542.96	115.40	61.95	19.20
46		1077.59	759.23	546.99	122.51	69.45	27.00
47		1077.50	761.03	550.05	128.09	75.35	33.15
48		1116.30	788.73	570.35	133.59	79.00	35.32
49		1116.46	807.52	601.56	189.64	138.15	96.96
50		758.06	549.68	410.76	132.92	98.19	70.41
51		211.56	162.06	129.06	63.05	54.80	48.20
52		151.83	120.02	98.81	56.39	51.08	46.84
53		132.24	107.16	90.44	57.00	52.82	49.48
54		109.05	90.19	77.62	52.48	49.33	46.82
55		97.12	82.97	73.54	54.67	52.31	50.42
56		83.11	71.98	64.56	49.71	47.86	46.37
57		86.44	74.30	66.21	50.03	48.00	46.38
58		78.64	68.93	62.45	49.51	47.89	46.59
59		72.87	65.19	60.08	49.85	48.57	47.55
60		67.39	61.24	57.15	48.96	47.93	47.11
61		77.56	68.46	62.39	50.25	48.73	47.51
62		65.26	59.80	56.16	48.87	47.96	47.23
63		60.54	56.62	54.00	48.78	48.12	47.60
Max		1792.02	1255.56	897.92	189.64	138.15	96.96

Table 12. Demonstration of Method for Determining Shielding Configuration

Distance Pulled (ft.)	Measured Dose Rate (mrem/hr)	Dose Rate (mrem/hr) from Percentage of Expected Worst Case Source					
		100 %	70 %	50 %	10 %	5 %	1 %
0	.800	1.27	0.89	0.64	0.13	0.07	0.02
1	5.00	6.81	5.76	5.06	3.66	3.49	3.35
2	4.50	7.30	6.46	5.90	4.79	4.65	4.54
3	8.90	11.34	9.88	8.91	6.97	6.73	6.53
4	11.00	14.22	12.74	11.76	9.78	9.54	9.34
5	12.00	15.22	13.83	12.90	11.04	10.81	10.63
6	18.00	22.68	20.60	19.22	16.45	16.11	15.83
7	13.50	21.56	19.03	17.34	13.96	13.53	13.19
8	13.40	19.84	17.73	16.32	13.50	13.15	12.87
9	12.30	19.48	17.24	15.74	12.76	12.38	12.08
10	11.20	17.04	15.22	14.02	11.60	11.30	11.06
11	15.00	19.66	17.34	15.79	12.69	12.31	12.00
12	16.00	21.75	19.38	17.81	14.65	14.25	13.94
13	14.00	16.90	14.61	13.08	10.02	9.64	9.33
14	14.50	17.34	14.79	13.10	9.71	9.28	8.94
15	17.00	21.90	19.12	17.27	13.57	13.10	12.73
16	17.50	23.59	20.15	17.85	13.27	12.69	12.23
17	10.00	26.41	20.59	16.71	8.95	7.98	7.20
18	25.00	51.06	36.81	27.32	8.33	5.95	4.05
19	80.00	176.56	124.23	89.34	19.56	10.84	3.86
20	160.00	338.72	237.56	170.12	35.24	18.38	4.89
21	550.00	806.00	565.07	404.45	83.21	43.05	10.93
22	350.00	499.52	351.02	252.03	54.04	29.29	9.49
23	440.00	631.10	441.98	315.90	63.74	32.22	7.01
24	200.00	599.80	419.88	299.93	60.02	30.04	6.05
25	150.00	369.19	258.59	184.85	37.38	18.94	4.20
26	250.00	453.01	317.56	227.25	46.65	24.07	6.01
27	400.00	918.46	643.72	460.56	94.24	48.45	11.82
28	850.00	1709.33	1198.97	858.73	178.25	93.19	25.14
29	870.00	1734.40	1218.01	873.75	185.23	99.17	30.31
30	700.00	1525.54	1069.96	766.26	158.80	82.87	22.12
31	826.55	1178.96	827.42	593.06	124.34	65.75	18.88
32	871.36	1242.33	872.34	625.68	132.36	70.69	21.36
33	895.14	1792.02	1255.56	897.92	182.64	93.23	21.71

34	925.00	1315.28	925.49	665.63	145.91	80.95	28.97
35	600.78	1190.32	837.85	602.87	132.91	74.17	27.17
36	681.32	1350.84	949.23	681.49	146.01	79.08	25.53
37	810.00	1169.83	820.87	588.23	122.95	64.79	18.26
38	630.00	1260.52	884.29	633.47	131.83	69.12	18.96
39	500.00	1142.89	802.33	575.29	121.21	64.45	19.05
40	560.00	1114.01	787.31	569.51	133.91	79.46	35.90
41	512.00	1023.78	718.29	514.63	107.31	56.39	15.66
42	602.33	1205.67	845.67	605.67	125.67	65.67	17.67
43	644.00	1295.95	913.72	658.90	149.26	85.56	34.59
44	750.21	1078.83	757.41	543.13	114.57	61.00	18.15
45	510.18	1077.41	756.74	542.96	115.40	61.95	19.20
46	512.64	1077.59	759.23	546.99	122.51	69.45	27.00
47	600.00	1077.50	761.03	550.05	128.09	75.35	33.15
48	450.00	1116.30	788.73	570.35	133.59	79.00	35.32
49	703.56	1116.46	807.52	601.56	189.64	138.15	96.96
50	350.78	758.06	549.68	410.76	132.92	98.19	70.41
51	115.27	211.56	162.06	129.06	63.05	54.80	48.20
52	55.00	151.83	120.02	98.81	56.39	51.08	46.84
53	36.24	132.24	107.16	90.44	57.00	52.82	49.48
54	68.95	109.05	90.19	77.62	52.48	49.33	46.82
55	70.07	97.12	82.97	73.54	54.67	52.31	50.42
56	58.93	83.11	71.98	64.56	49.71	47.86	46.37
57	58.03	86.44	74.30	66.21	50.03	48.00	46.38
58	58.69	78.64	68.93	62.45	49.51	47.89	46.59
59	59.77	72.87	65.19	60.08	49.85	48.57	47.55
60	56.49	67.39	61.24	57.15	48.96	47.93	47.11
61	49.86	77.56	68.46	62.39	50.25	48.73	47.51
62	54.59	65.26	59.80	56.16	48.87	47.96	47.23
63	51.11	60.54	56.62	54.00	48.78	48.12	47.60
Max		1792.02	1255.56	897.92	189.64	138.15	96.96

Figure 1. MCNP Geometry Showing the Mixer Pump Inside Tank 101 SY

Figure 2. Internal Source Inside the Mixer Pump

Figure 3. MCNP Pump Geometry part 1

Figure 4. MCNP Pump Geometry part 2

Figure 5. MCNP Pump Geometry part 3

Figure 6. MCNP Pump Geometry part 4

Figure 7. MCNP Pump Geometry part 5

Figure 8. MCNP Pump Geometry part 6

Figure 9. MCNP Pump Geometry part 7

Figure 10. MCNP Model of the Detector Arrangement

11/22/94 12:38:34
PUMP model

Figure 11. Shipping Container Located Under Shot Loading Platform

probid = 11/22/94 12:35:00
basis:
(0.000000, 1.000000, 0.000000)
(0.000000, 0.000000, 1.000000)
origin:
(0.00, 0.00, 300.00)
extent = (300.00, 300.00)

Figure 12. Detector Dose Rates from the 68 Gallon Internal Source

Figure 13. Detector Dose Rates from the 3 mm External Film Source

Figure 15. Detector Dose Rates from the Upper Simulated Source

Figure 17. Total Shielded Detector Dose Rate

Figure 19. Source Mass Over a 1 Foot Region Centered Around the Detector

Figure 24. 119 Gallon Internal Source With 1.64 Factor Applied

Figure 25. Worst Case Source with 1.64 Factor Applied

Figure 27. 50 % Worst Case with 1.64 Factor Applied

Figure 28. 10 % Worst Case Source with 1.64 Factor Applied

Figure 29. 5 % Worst Case Source with 1.64 Factor Applied

Figure 30. 1 % Worst Case Source with 1.64 Factor Applied

Figure 31. Shielded Detector Dose Rates for Different Source Intensities

Figure 32. Dose Rate (mrem/hr) for Worst Case Source with the Pump Pulled 30 Ft.

100

Figure 35. Dose Rate (mrem/hr) at 55 in. above the Shot Loading Platform

Figure 34. Dose Rate (mrem/hr) with Shipping Container Filled with Lead Shot

Figure 35. Dose Rate (mrem/hr) at 5.5 in. above the Shot Loading Platform

APPENDIX A MCNP Input File for the Tank Source (file idtank_0)

```

SOURCE gamma dets mvd out 6.5 in, 2 in Fe shld, cell src
1 1 -1.7400 -9 7 -5 -14
3 1 -1.7400 -7 11 -10
4 3 -7.8600 (((-12 13 -8 )(9 :5 ))(-9 :3 ))(7 :10 :-11 )
5 3 -7.8600 (-6 -9 8 -14 )(9 :5 )
2 1 -1.7400 9 -3 7 1
6 3 -7.8600 (9 8 -4 1 )(3 )
7 1 -1.7400 -204 202 -15 14
8 3 -7.8600 -204 203 15 -16 14
9 1 -1.7400 -21 24 -23
10 1 -1.7400 25 21 -19 -14
11 1 -1.7400 -25 21 -18 1
12 3 -7.8600 (((-22 27 -26 )(21 :-24 :23 ))(-25 :19 ))(25 :18 )
13 3 -7.8600 (-25 22 -17 1 )(18 )
14 3 -7.8600 (25 22 -20 -14 )(19 )
15 1 -1.7400 211 209 -28 14
16 3 -7.8600 -29 28 211 210 14
17 0 -30 38 -37
18 3 -7.8600 (((39 -40 -31 )(30 :37 :-38 ))(34 :36 ))(-36 :32 )
19 3 -7.8600 41 -42 -33
20 0 36 30 -32 42
21 3 -7.8600 (36 31 -33 42 )(32 )
22 3 -7.8600 44 -43 -35
23 3 -7.8600 (-36 31 -35 -44 )(34 )
24 0 -36 30 -34 -44
25 0 -49 53 -52
26 3 -7.8600 (((-50 -55 54 )(-53 :49 :52 ))(-51 :47 ))(51 :45 )
27 3 -7.8600 44 -43 -48
28 0 -44 51 49 -47
29 3 -7.8600 (51 50 -48 -44 )(47 )
30 0 -51 49 -45 42
31 3 -7.8600 (-51 50 -46 42 )(45 )
32 3 -7.8600 41 -42 -46
33 3 -7.8600 156 -57 58 -59
34 3 -7.8600 60 -56 61 -62
35 3 -7.8600 -64 57 -63 98 103 106 107 101 104 105 109 108
37 3 -7.8600 76 -73 -71 75
38 3 -7.8600 78 -77 -74 75
39 3 -7.8600 66 -79 -80 241
40 3 -7.8600 -66 -81 82 83
41 3 -7.8600 -86 79 -84 85
42 3 -7.8600 -88 -87 75 73
43 3 -7.8600 -78 89 -87 75
44 3 -7.8600 -66 -91 90 77
45 3 -7.8600 -78 -91 93 94
46 0 ((-66 -90 59 77 )(87 :88 :-73 :-75 ))(-75 :73 :-76 :71 )
47 0 95 -60 -96
48 3 -7.8600 -62 97 96 -60
49 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 99 -100
50 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 110 -111
51 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 112 -113
52 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 114 -115
53 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 116 -117
54 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 118 -119
56 0 114 -58 -118 243 259 245 247 253 249 255 257 251 #52 #35 #53
57 3 -7.8600 122 -123 -124
58 0 -45 -41 123
59 0 -41 123 -32
60 3 -7.8600 -41 123 32 -33
61 3 -7.8600 -41 123 45 -46
62 6 -1.0000 (122 -123 124 -125 )(500 :-375 )
63 1 -1.7400 -127 130 129 -1
64 3 -7.8600 129 128 -1 -126 127
65 1 -1.7400 -130 133 -132

```

66 3 -7.8600 ((-128 -128 -132 131)(132 :130 :-133))(127 :-129)
67 1 -1.7400 129 137 -134 -1
68 1 -1.7400 138 -137 -140
69 3 -7.8600 -135 136 129 134 -1
70 3 -7.8600 ((-136 138 -139)(140 :137))(134 :-129)
71 3 -7.8600 -59 58 -156 155
72 3 -7.8600 -59 -155 58 56
73 3 -7.8600 58 -59 159 -97
74 3 -7.8600 161 -160 -158 157 -162
75 3 -7.8600 163 -162 -159 -161
76 3 -7.8600 -164 165 -166
77 3 -7.8600 -165 157 -166 167
78 3 -7.8600 168 -169 166 -170
79 3 -7.8600 (-157 171 167 -172):(-168 166 157 -161)
80 3 -7.8600 -171 -173 167 2 #95
81 1 -0.3660 (173 -184 -2 179 182 -180)(192 :188 :-189)
83 3 -7.8600 -172 184 -181 183 -2 178
84 3 -7.8600 (180 -181 -184 167 -2 178)(188 :192 :-189)
85 3 -7.8600 (-184 167 -182 183 178 -2)(188 :192 :-189)
86 3 -7.8600 -184 173 182 -180 -179 178
88 1 -0.3660 -187 -192 190 194
89 3 -7.8600 187 -188 -192 195
90 3 -7.8600 (189 -190 -192 191)
91 3 -7.8600 192 -193 -188 189 -183
92 3 -7.8600 -193 192 189 -188 181
94 1 -0.3660 -184 173 -177 2 #95
82 3 -7.8600 -176 177 -172 173
93 3 -7.8600 (-171 187 -195):(-187 190 -194)
95 3 -7.8 (((((2 -196 195 -172)(439:441))(-437:428))
(172:457:-458:-167))(443:441))(438:-437)
96 3 -7.8600 -186 185 195 -197
97 0 ((-165 -167 196)(-185 :197 :186))(171 :195)
98 0 -199 -200 164
99 3 -7.8600 (-201 -198 -201 164)(199 :200)
100 0 (((-161 168 -163 -159)(201 :198))(166 :164))(169 :170)
101 1 -1.7400 (-202 -205 206 -2)(-204 :430)
102 3 -7.8600 -172 184 -177 2 #95
103 3 -7.8600 (((-203 207 -208 -2)(202 :-206 :205))(15 :204))
(430 :-204)
104 1 -1.7400 (-212 -209 213 -2)(211 :432)
105 3 -7.8600 (((-434 -210 215 -2)(212 :209 :-213))(-211 :28))
(211 :432)
106 3 -7.8600 142 -141 -124 33 17 4 46
107 3 -7.8600 144 -143 -124 33 17 4 46
108 3 -7.8600 146 -145 -124 33 17 4 46
109 3 -7.8600 148 -147 -124 33 17 4 46
110 3 -7.8600 149 -150 -124 33 17 4 46
111 3 -7.8600 58 -59 217 -216
112 3 -7.8600 35 20 6 48 -124 151 -152
113 6 -1.0000 (-125 124 151 -152 20 35 6 48)(-375 :500)
114 6 -1.0000 (142 -141 -125 124)(-375 :500)
115 6 -1.0000 (144 -143 -125 124)(-375 :500)
116 6 -1.0000 (146 -145 -125 124)(-375 :500)
117 6 -1.0000 (148 -147 -125 124)(-375 :500)
118 6 -1.0000 (149 -150 -125 124)(-375 :500)
119 3 -7.8600 ((((((153 -154 -124 195)(-167 :181 :172 :-183))
(-167 :181 :-183 :172))(433 :211))(-204 :431))(-207 :203))
(210 :434)
120 3 -7.8600 (167 -173 -2 178 182 -180)(188 :192 :-189)
121 6 -1.0000 (124 -125 153 -154)(-375 :500)
122 3 -7.8600 ((((-124 59 218 -219)(290 :335 :-289 :-293))
(293 :290 :-289))(-265 :-264 :263 :-345))(265 :263 :-264 :-345)
123 3 -7.8600 -124 59 -221 220
124 3 -7.8600 -124 -223 222 59
125 3 -7.8600 -124 59 224 -225
126 3 -7.8600 -124 226 -227 59
127 3 -7.8600 -124 59 228 -229
128 3 -7.8600 -124 59 230 -231
129 3 -7.8600 -124 59 -233 232

130 6 -1.0000 (((((-125 124 218 -219)(290 :335 :-289 :-293))
(290 :-289 :293 :-337))(-265 :-264 :263 :344))
(265 :-264 :263 :-345))(-375 :500)
131 6 -1.0000 (220 -221 124 -125)(-375 :500)
132 6 -1.0000 (222 -223 124 -125)(-375 :500)
133 6 -1.0000 (224 -225 124 -125)(-375 :500)
134 6 -1.0000 (226 -227 124 -125)(-375 :500)
135 6 -1.0000 (228 -229 124 -125)(-375 :500)
136 6 -1.0000 (230 -231 124 -125)(-375 :500)
137 6 -1.0000 (232 -233 124 -125)(-375 :500)
138 3 -7.8600 235 -236 -238 237
139 3 -7.8600 -235 234 59 -239
140 3 -7.8600 240 -234 -239 79
141 3 -7.8600 -243 242 -63 60
142 3 -7.8600 258 -259 60 -63
143 3 -7.8600 246 -247 -63 60
144 3 -7.8600 -245 244 -63 60
145 3 -7.8600 -63 252 -253 60
146 3 -7.8600 248 -249 -63 60
147 3 -7.8600 250 -251 -63 60
148 3 -7.8600 -255 254 -63 60
149 3 -7.8600 256 -257 -63 60
150 0 -63 -256 60
151 0 -63 -254 60
152 0 -258 -63 60
153 0 -63 -242 60
154 0 -63 -246 60
155 0 -244 -63 60
156 0 -63 -250 60
157 0 -63 -248 60
158 0 -252 -63 60
159 3 -7.8600 -261 260 -262 -263 264 59 265
160 3 -7.8600 264 -263 59 -265 -267 266 268
161 3 -7.8600 264 -263 -262 269 -270 265 59
162 3 -7.8600 -272 271 268 -265 59 264 -263
163 3 -7.8600 -274 273 -262 264 -263 59 265
164 3 -7.8600 275 -276 268 -265 264 -263 59
165 3 -7.8600 277 -278 -291 59 289 -290 293
166 3 -7.8600 -279 280 292 -290 289 59 -293
167 3 -7.8600 281 -282 -291 -290 289 59 293
168 3 -7.8600 -284 283 292 -290 289 59 -293
169 3 -7.8600 -286 285 -291 -290 289 59 293
170 3 -7.8600 -288 287 292 289 -290 59 -293
171 3 -7.8600 -124 33 4 17 46 297 -296
172 6 -1.0000 (124 -125 297 -296)(-375 :500)
173 3 -7.8600 -294 -299 295 298 4 264 -263
174 3 -7.8600 -302 300 -301 298 4 264 -263
175 3 -7.8600 264 -263 4 -302 298 -304 303
176 3 -7.8600 17 -308 -306 307 305 264 -263
177 3 -7.8600 17 -263 264 309 -310 307 -308
178 3 -7.8600 -312 311 313 17 -263 264 -308
179 3 -7.8600 -315 314 -318 320 33 -290 289
180 3 -7.8600 -321 316 319 46 -290 289 -317
181 3 -7.8600 -324 320 -323 322 33 -290 289
182 3 -7.8600 -321 -327 325 326 46 -290 289
183 3 -7.8600 320 33 -329 328 -324 289 -290
184 3 -7.8600 -331 330 325 -321 46 289 -290
185 3 -7.8600 -189 332 -333 191
186 3 -7.8600 ((-334 59 -335 336 293 -290 289)(-97 :56 :62))
(159 :162 :160)
188 0 (-95 -58 159)(-97 :-96)
189 0 -56 -61 60 -61 255 257 259 251 249 243 247 253 245
190 3 -7.8600 ((-339 337 338 -293 59 -290 289)(-97 :56 :62))
(159 :162 :160)
191 3 -7.8600 ((-340 -344 265 59 341 264 -263)(-97 :62 :56))
(159 :162 :160)
192 3 -7.8600 ((-343 345 342 -265 59 264 -263)(56 :62 :-97))
(159 :162 :160)
193 1 -1.7400 (346 -122 -125)(500 :-375)

194 1 -1.7400 (123 -347 -125 46 46 33)(500 :-375)
195 1 -1.7400 (125 -348 -347 346)(500 :-375)
196 1 -1.7400 (-349 350 -132 128)(-129 :126)
197 1 -1.7400 -131 350 -128
198 1 -1.7400 -351 126 -1 349 129
199 1 -1.7400 (-352 136 138 -354)(-129 :135)
200 1 -1.7400 135 -353 -1 352 129
201 1 -1.7400 -354 139 -136
202 1 -1.7400 17 -355 1 -148 #106 #176 #107 #108 #177
203 1 -1.7400 -357 4 1 -148 #106 #107 #108 #175 #174
204 1 -1.7400 -358 46 347 50 -51 -148 #106 #107 #108 #182 #184
205 1 -1.7400 347 33 -356 -148 #106 #107 #108 #183 #181
206 1 -1.7400 17 -355 418 -25 147 #109 #171 #178 #110
207 1 -1.7400 412 9 -357 4 147 #109 #110 #173 #171
208 1 -1.7400 -358 46 347 424 -51 147 #110 #171 #180
209 1 -1.7400 33 -356 421 36 147 #179 #110 #171
210 1 -1.7400 (125 -348 -360 359)(-375 :500)
211 1 -1.7400 (141 -360 -125 355 356 357 358)(-375 :500)
212 1 -1.7400 (-125 355 356 357 358 -142 359)(-375 :500)
213 1 -1.7400 (-348 125 363 -362)(-375 :500)
214 1 -1.7400 (-125 355 356 357 358 143 -362)(-375 :500)
215 1 -1.7400 (-125 355 356 357 358 -144 363)(-375 :500)
216 1 -1.7400 (-348 125 -366 365)(-375 :500)
217 1 -1.7400 (-125 355 356 357 358 365 -146)(-375 :500)
218 1 -1.7400 (-125 355 356 357 358 145 -366)(-375 :500)
219 1 -1.7400 (368 -367 125 -348)(-375 :500)
220 1 -1.7400 (-125 355 356 357 358 -148 368)(-375 :500)
221 1 -1.7400 (-125 355 356 357 358 147 -367)(-375 :500)
222 1 -1.7400 (-370 369 125 -348)(-375 :500)
223 1 -1.7400 (-125 355 356 357 358 -297 369)(-375 :500)
224 1 -1.7400 (-125 355 356 357 358 296 -370)(-375 :500)
225 1 -1.7400 (371 -372 -348 125)(-375 :500)
226 1 -1.7400 (-125 355 356 357 358 -149 371)(-375 :500)
227 1 -1.7400 (-125 355 356 357 358 150 -372)(-375 :500)
228 1 -1.7400 355 -308 -376 377 378 -374 373 #176
230 0 (((((((346 -375 -359)(347 :348))(349 :132 :-350))
(351 :1 :-129))(357 :-1))(352 :-138 :354))(353 :1 :-129))
(355 :-1))(358))(356)
231 1 -1.7400 373 -374 357 -380 298 -379 381 #175
232 1 -1.7400 -382 384 383 -321 358 385 -386 #184
233 1 -1.7400 320 356 -387 389 -388 385 -386 #183
234 0 (((((-375 359 -363 356 355 358 357)(348 :360))
(-320 :388 :387 :-389 :-320 :-385 :386))(-373 :374 :380 :379 :-381
:-298))(374 :-373 :376 :-377 :-378 :308))(386 :-385 :382 :-383
:-384 :321)
235 0 (-375 363 -365 355 356 357 358)(348 :362)
236 1 -1.7400 -380 391 -390 298 357 373 -374 #174
237 1 -1.7400 355 373 -374 393 -392 377 -308 #177
238 1 -1.7400 -388 320 -394 397 356 385 -386 #181
239 1 -1.7400 -321 -395 383 396 358 385 -386 #182
240 0 (((((-365 -375 -368 358 355 356 357)(348 :366))
(-385 :386 :395 :-383 :-396 :321))(-385 :386 :394 :388 :-397 :-320
) (374 :-373 :390 :380 :-298 :-391))(374 :-373 :392 :-377 :-393
:308)
241 0 (-375 368 -369 356 355 357 358)(348 :367)
242 1 -1.7400 -398 -399 400 298 357 373 -374 #173
244 1 -1.7400 -401 403 402 355 373 -374 -308 #178
246 1 -1.7400 -404 406 -405 320 356 385 -386 #179
243 1 -1.7400 -321 409 408 358 385 -386 -407 #180
245 0 (((((-375 369 -371 32 356 355 357 358)(348 :370))
(404 :405 :-406 :-385 :386 :-320))(-385 :386 :407 :-408 :-409 :321
) (398 :399 :-400 :374 :-373 :-298))(374 :-373 :308 :401 :-402
:-403)
247 1 -1.7400 (-348 125 -410 411)(-375 :500)
248 1 -1.7400 ((8 -412 414 -413)(6 :9))(-9 :4)
249 1 -1.7400 -8 414 -13
250 1 -1.7400 12 -413 -8
251 1 -1.7400 (-415 6 412 -9 -14)(152 :-151)
252 1 -1.7400 ((-418 22 -416 417)(20 :-25))(25 :17)

253 1 -1.7400 -22 -416 26
254 1 -1.7400 -27 417 -22
255 1 -1.7400 (-419 20 25 418 -14)(152 :-151)
256 1 -1.7400 ((31 -421 420 -422)(35 :36))(33 :-36)
257 1 -1.7400 -39 420 -31
258 1 -1.7400 -422 40 -31
259 1 -1.7400 (-423 35 421 -36 -43)(152 :-151)
260 1 -1.7400 ((-424 50 -425 426)(48 :-51))(46 :51)
261 1 -1.7400 426 -54 -50
262 1 -1.7400 -425 55 -50
263 1 -1.7400 (-427 48 424 51 -43)(152 :-151)
264 1 -1.7400 (152 -410 419 34 423 415 427 -125)(-375 :500)
265 1 -1.7400 (419 34 423 415 427 -125 411 -151)(-375 :500)
266 0 ((((((((((((-375 371 -411)(-426 :424 :425))(51 :358))
(-51 :427))(422 :421 :-420))(-36 :356))(36 :423))
(418 :416 :-417))(25 :355))(-25 :419))(412 :-414 :413))
(-9 :357))(9 :415))(372 :348))
267 1 -1.7400 204 -430 -2
268 3 -7.8600 430 -431 -2 204 203
269 1 -1.7400 -2 -432 -211
270 3 -7.8600 432 -433 -211 -2 210
271 1 -1.7400 -204 428 16 -435 14
272 1 -1.7400 211 210 -436 29 14
273 1 -1.7400 (((203 -428 -429 437 -2)(16 :204))(-204 :431))
(-153 :154)
274 1 -1.7400 -429 208 -203
275 1 -1.7400 (-207 437 -203 -2)(-153 :154 :207)
276 1 -1.7400 (-438 431 -2 204 428)(-153 :154)
277 1 -1.7400 (((-439 210 440 -441 -2)(436 :-211))(211 :433))
(-153 :154)
278 1 -1.7400 -215 440 -210
279 1 -1.7400 (434 -441 -210 -2)(-153 :154)
280 1 -1.7400 (-442 195 188 -2)(-153 :154)
281 1 -1.7400 (433 -443 -2 -211 439)(-153 :154)
282 1 -1.7400 (-445 193 -444 446)(-183 :181)
283 1 -1.7400 ((-444 188 442 -193)(-167 :181 :-183))
(-167 :-183 :181)
284 1 -1.7400 -189 332 -447 333
285 1 -1.7400 -190 332 -191 448
286 1 -1.7400 ((446 -189 -193 447)(-167 :-183 :181))
(-167 :180 :-183)
287 1 -1.7400 -449 59 -216 217
288 1 -1.7400 -58 450 -216 217
289 1 -1.7400 (-452 451 125 -348)(-375 :500)
290 1 -1.7400 (((((-125 154 -452 442)(211 :443))(439 :441))
(-204 :438))(428 :-437))(454 :-458 :457 :-455))(-375 :500)
291 1 -1.7400 -176 2 -454 172
292 1 -1.7400 (-454 172 458 -457 -2 178)(154 :-153)
293 1 -1.7400 ((-183 458 -172 455 178 -2)(154 :-153))
(444 :445 :-446)
294 1 -1.7400 ((181 -457 -172 455 178 -2)(-153 :154))
(-446 :444 :445)
295 1 -1.7400 ((-167 455 -181 183 -2 178)(154 :-153))(444 :-446)
296 1 -1.7400 -454 458 -457 455 459 -178
297 1 -1.7400 (((((-125 451 -153 442)(211 :443))(439 :441))
(-204 :438))(428 :-437))(454 :-458 :457 :-455))(-375 :500)
298 0 -216 217 -450
299 0 -190 -448 332
300 0 (((((((((-375 411 -216)(427 :502))(423 :502))(449 :-217 :216))
(419 :14))(14 :415))(435 :-14))(436 :-14))(410 :348))
301 0 (((((((((-216 -375 -451)(-332 :447 :190))(445 :-446 :444))
(442 :-444))(436 :-211))(211 :443))(441 :439 :-440))(204 :435))
(438 :-204))(428 :429 :-437))(454 :-458 :-455 :457 :-459))
302 1 -1.7400 173 -461 460 -171
303 1 -1.7400 176 173 -460 -454
304 1 -1.7400 462 -171 461 -172
305 1 -1.7400 172 -463 -466 462
306 1 -1.7400 157 -466 -172 465
307 1 -1.7400 (160 -465 157 -162 -159) #186 #190 #191 #192

308 1 -1.7400 -159 -467 162 -465 #186 #190 #191 #192
309 1 -1.7400 (((((-468 59 159 -469)(56 :-97))(-220 :221))
(-218 :219))(263 :-264 :340 :344 :-341 :343 :-486 :-487))
(-289 :290 :-337 :-338 :339 :334 :335 :-336)
310 1 -1.7400 (221 -471 -125 468)(-375 :500)
311 1 -1.7400 (470 -220 -125 468)(-375 :500)
312 1 -1.7400 (470 -471 125 -348)(-375 :500)
313 1 -1.7400 -62 56 -473 468 #186 #190 #191 #192
314 1 -1.7400 -62 -97 474 468 #186 #190 #191 #192
315 1 -1.7400 ((-475 62 474 -473)(-289 :290))(263 :-264)
316 1 -1.7400 (((-476 -477 468 478 293 385 -386)(-474 :473 :475))
(159 :467 :465))(-489 :488) #186
317 1 -1.7400 (((-479 480 481 -293 468 385 -386)(-474 :473 :475))
(159 :467 :465))(-489 :488) #190
318 1 -1.7400 (((-482 -483 265 468 484 373 -374)(-474 :475 :473))
(159 :467 :465))(-489 :488) #191
319 1 -1.7400 (((-485 486 487 -265 468 373 -374)(473 :475 :-474))
(159 :467 :465))(-489 :488) #192
320 1 -1.7400 (((-375 :500)219 -488 -125 468)(-345 :344 :263 :-264))
(335 :-337 :-289 :290)
321 1 -1.7400 (((-375 :500)-218 489 -125 468)(344 :263 :-264 :-345))
(-289 :290 :-337 :335)
322 1 -1.7400 (-488 489 -348 125)(-375 :500)
323 0 (((((((((-375 451 -462)(503 :-437 :428))(503 :443 :211 :441))
(454 :460 :-503))(442 :503))(461 :462 :-177))(452 :348))
(454 :-458 :457 :-455 :503))(428 :-437))(-204 :438 :-437 :503))
(441 :439)
324 0 (((((((((-462 -489 -375)(463 :466))(465 :467 :159))(468 :-159))
(386 :477 :-385 :-293 :-478))(-385 :386 :-481 :-480 :293))
(-373 :374 :-486 :-487 :265))(374 :-373 :483 :-484 :-265)
325 0 (((((((((-489 -375 -470 468)(475 :-474 :473))(488 :348))
(374 :483 :-373 :482 :-265))(374 :-486 :-373 :485 :265))
(477 :386 :-385 :-480 :479 :476)
326 0 ((470 -375 -222 59)(469 :468))(348 :471)
327 0 (((222 -375 -224 59)(267 :-268 :-266 :261 :262 :-260 :-264 :263))
(278 :291 :-277 :-280 :279 :-292 :290 :-289))(223 :125)
328 0 (-375 224 -226 59)(125 :225)
329 0 (((-375 226 -228 59)(125 :227))(282 :291 :-281 :-283 :284 :-292
:290 :-289))(270 :262 :-269 :-271 :-268 :272 :-264 :263)
330 0 (-375 228 -230 59)(125 :229)
331 0 (((-375 230 -232 59)(125 :231))(-273 :262 :274 :276 :-268 :-275
:-264 :263))(286 :291 :-285 :-287 :-292 :288 :290 :-289)
332 0 (((((((((-375 232 -66 59)(125 :233))(-94 :91 :78 :-93))
(87 :78 :-75 :-89))(-78 :74 :77 :-75))(91 :-77 :66))
(81 :-82 :66 :-83)
333 0 (-234 -240 59 66)(-79 66 -241 59)
334 0 (((((((((-375 66 -63 59)(80 :79))(86 :84 :-85 :-79))(239 :235))
(236 :238 :-237))(64 :-57)
337 0 56 -58 -114 243 259 245 247 253 249 255 257 251 #49 #50 #51
338 0 114 -58 118 -63 243 259 245 247 253 249 255 257 251 #54 #35
339 0 (((((((((-346 375 -501 -66 -462)(347 :348))(348 :-359 :360))
(362 :348 :-363))(366 :348 :-365 -462))(367 :348 :-368))
(370 :348 :-369))(372 :348 :-371))(410 :348 :-411))
(452 :348 :-451))(-375:500)
340 0 ((375 66 -501 -63)(80 :79))(84 :86 :-85 :-79)
341 0 (((((((((-500 375 -501 -66 462)(488 :348 :-489))(471 :348 :-470))
(223 :125 :-222))(225 :125 :-224))(227 :125 :-226))
(229 :125 :-228))(231 :125 :-230))(233 :125 :-232))
342 1 -1.7400 43 -502 -427
343 1 -1.7400 43 -502 -423
344 1 -1.7400 (((((503 -2 442 -454)(439:441))(-437:428))
(454:457:-458:-455))(443:441))(438:-437)

c TANK CELLS BELOW

1000 4 -2.3500 1001 -1002 -1104
1001 3 -7.8000 1020 -1021 -1102 1001 (-1201 :1202 :-1205 :1206)
1002 4 -2.3500 1021 -1029 -1104 1001 (-1201 :1202 :-1205 :1206)
1003 3 -7.8000 1020 -1021 -1102 1001 1201 -1202 1205 -1206 1107 1109 1111
1004 4 -2.3500 (1021 -1029 -1104 1001 1201 -1202 1205 -1206 1107 1109
1111)

1005	4	-2.3500	(1029 -1039 1001 1201 -1202 1205 -1206 1107 1109 1111)
1006	3	-7.8000	(1003 -1636 1106 -1107)(375:-346)
1007	3	-7.8000	(1636 -1635 1106 -1107)(375:-346)
1008	3	-7.8000	(1635 -1324 1106 -1107)(375:-346)
c 1009	3	-7.8000	(1324 -1633 1106 -1412)(501:-500)
1009	3	-7.8000	(1324 -500 1106 -1412)(375:-346)
c 1010	2	-0.0012	(1411 -1412 -1634 1633)(501:63:-346)
1010	2	-0.0012	(1411 -1412 -1634 500)(501:63:-346)
1011	2	-0.0012	(1201 -1202 1205 -1206 1039 -1634 1412)
			(-1637:1645) (-1637:1638:1648)
			(2035:2055:2015) (2005:2040)
			(1652:-1651:-1662:1661:1663:-1664)
			(1671:-1679:1680) (1672:-1681:1682)
1012	2	-0.0012	(1039 -1324 1107 -1412)
1013	5	-1.4000	-1634 1001 -1080 (1104 :1029)(-1200 :1203 :-1204 :1207)
1014	2	-0.0012	1634 -1080 1081
1015	2	-0.0012	(1634 -1081 (1083 :1082))
1016	2	-0.0012	(1634 -1083 -1082 (-1200 :1203 :-1204 :1207 :1059))
			(501:63:-346)
			(-1412:1645:1643)
1017	2	-0.0012	(1201 -1202 -1206 1205 1634 -1059)(501:63:-346)
			(-1412:1645) (2035:2055:2015)
1018	3	-7.8000	1101 -1102 1002 -1020
1019	2	-0.0012	1102 -1103 1002 -1021
1020	3	-7.8000	1103 -1104 1002 -1021
1021	3	-7.8000	-1109 1108 1003 -1039
c 1022	2	-0.0012	-1108 1003 -1030
c 1023	4	-2.3500	-1108 1030 -1039
1024	3	-7.8000	-1111 1110 1003 -1039
1025	2	-0.0012	-1110 1003 -1030
1026	4	-2.3500	-1110 1030 -1039
1027	4	-2.3500	1200 -1201 1204 -1207 1029 -1059 1001
1028	4	-2.3500	1202 -1203 1204 -1207 1029 -1059 1001
1029	4	-2.3500	1201 -1202 1204 -1205 1029 -1059 1001
1030	4	-2.3500	1201 -1202 1206 -1207 1029 -1059 1001
1031	1	-1.7400	-1101 1002 -1632 1627 (1628 :-1631)
1032	2	-0.0012	(1632 -1020 -1101)(1107 :-1003)(1109 :-1003)
			(1111 :-1003)(375:-346)
c 1033	2	-0.0012	(-1411 1633 -1634)(375:63:-346)
1033	2	-0.0012	(-1411 500 -1634)(501:63:-346)
c 1034	2	-0.0012	(1003 -1633 -1106)(375:-346)
1034	2	-0.0012	(1003 -500 -1106)(375:-346)
c Source cells			
1035	1	-1.7400	(1629 -1632 -1626)(375:-346)
1036	1	-1.7400	1629 -1632 1626 -1627
1037	1	-1.7400	1629 -1632 1627 -1628
1038	1	-1.7400	(1630 -1629 -1626)(375:-346)
1039	1	-1.7400	1630 -1629 1626 -1627
1040	1	-1.7400	1630 -1629 1627 -1628
1041	1	-1.7400	(1631 -1630 -1626)(375:-346)
1042	1	-1.7400	1631 -1630 1626 -1627
1043	1	-1.7400	1631 -1630 1627 -1628
1044	1	-1.7400	(1002 -1631 -1626)(375:-346)
1045	1	-1.7400	1002 -1631 1626 -1627
1046	2	-0.0012	1412 -1644 1637 -1643
1047	3	-7.8	1637 -1638 1644 -1648
1048	3	-7.8	1638 -1643 1644 -1645
1049	3	-7.8	1668 -1666 1657 -1658 \$conduit
1050	3	-7.8	1667 -1665 1657 -1658 \$conduit
1051	0	1080 :-1001	
1052	0	1639 -1642	1645 1660 -1659 1665 1666 1657 -1658
1053	3	-7.8	1651 1645 -1690 -1659 1660 1657 -1658 \$ 3 in. steel
1054	3	-7.8	1690 1645 -1691 -1659 1660 1657 -1658 \$ 3 in. steel
1055	3	-7.8	1691 1645 -1692 -1659 1660 1657 -1658 \$ 3 in. steel
1056	3	-7.8	1692 1645 -1639 -1659 1660 1657 -1658 \$ 3 in. steel
1057	3	-7.8	1642 1645 -1652 -1659 1660 1657 -1658 \$ 3 in. steel
1058	3	-7.8	1651 1645 -1652 -1659 1660 1658 -1661
1059	3	-7.8	1651 1645 -1652 -1659 1660 1662 -1657
1060	3	-7.8	1651 -1652 1659 -1663 1662 -1661

1061 3 -7.8 1651 -1652 1664 -1660 1662 -1661
1062 0 -1668 1669 -1670 \$detector volume
1063 0 -1667 1669 -1670 \$detector volume
1064 3 -5.797 -1668 1657 -1669 \$detector plug (0.47 lbs = 213.19 grams)
1065 3 -4.82 -1668 1670 -1658 \$detector reducer (0.39 lbs = 176.9 grams)
1066 3 -5.797 -1667 1657 -1669 \$detector plug (0.47 lbs)
1067 3 -4.82 -1667 1670 -1658 \$detector reducer (0.39 lbs)
1068 0 -1673 1675 -1676 \$Detector volume
1069 0 -1674 1677 -1678 \$Detector volume
1070 3 -7.8 -1671 1673 1679 -1680
1071 3 -7.8 -1672 1674 1681 -1682
1072 3 -5.797 -1673 1679 -1675 \$detector plug (0.47 lbs = 213.19 grams)
1073 3 -4.82 -1673 1676 -1680 \$detector reducer (0.39 lbs = 176.9 grams)
1074 3 -5.797 -1674 1681 -1677 \$detector plug (0.47 lbs)
1075 3 -4.82 -1674 1678 -1682 \$detector reducer (0.39 lbs)

c Wand Interface

2000 2 -.0012 1003 -1039 -1108 \$ Air in 12" riser
2005 3 -7.8 1039 -2000 2025 -2040 \$ 3" plate
2006 3 -7.8 2000 -2001 2025 -2040 \$ 3" plate
2007 3 -7.8 2001 -2005 2025 -2040 \$ 3" plate
2010 2 -.0012 1039 -2015 -2020 \$ air in 6" pipe
2015 3 -7.8 1039 -2015 2020 -2025 \$ 6" pipe
2020 3 -4.68 2005 -2015 2025 -2026 \$ #8 Steel shot
2021 3 -4.68 2005 -2015 2026 -2027 \$ #8 Steel shot
2022 3 -4.68 2005 -2015 2027 -2030 -2050 \$ #8 Steel shot
2025 3 -7.8 2005 -2015 -2035 -2055 (2030:2050) \$ 14" pipe

c TANK SURFACES BELOW

1 7 pz 39.0520
2 7 pz 652.1450
3 7 c/z 20.0025 0.0000 7.3165
4 7 c/z 20.0025 0.0000 8.4137
5 7 c/z 43.0212 0.0000 7.3165
6 7 c/z 43.0212 0.0000 8.4137
7 1 c/z 31.5112 0.0000 7.3165
8 1 c/z 31.5112 0.0000 8.4137
9 1 px 31.5112
10 7 px 50.3403
11 7 px 12.6835
12 7 px 51.4350
13 7 px 11.5887
14 7 pz 565.7850
15 7 c/z 45.720 0.000 4.859
16 7 c/z 45.720 0.000 5.715
17 7 c/z -20.0025 0.0000 8.4137
18 7 c/z -20.0025 0.0000 7.3165
19 7 c/z -43.0212 0.0000 7.3165
20 7 c/z -43.0212 0.0000 8.4137
21 2 c/z -31.5112 0.0000 7.3165
22 2 c/z -31.5112 0.0000 8.4137
23 7 px -12.6835
24 7 px -50.3403
25 2 px -31.5112
26 7 px -11.5887
27 7 px -51.4350
28 7 c/z -45.720 0.000 4.859
29 7 c/z -45.720 0.000 5.715
30 3 c/z 0.0000 31.5112 7.3165
31 3 c/z 0.0000 31.5112 8.4137
32 7 c/z 0.0000 20.0025 7.3165
33 7 c/z 0.0000 20.0025 8.4137
34 7 c/z 0.0000 43.0212 7.3165
35 7 c/z 0.0000 43.0212 8.4137
36 3 py 31.5112
37 7 py 50.3403
38 7 py 12.6835
39 7 py 11.5887
40 7 py 51.4350
41 7 pz 60.9600

42	7	pz	62.2300		
43	7	pz	569.5950		
44	7	pz	568.3250		
45	7	c/z	0.0000	-20.0025	7.3165
46	7	c/z	0.0000	-20.0025	8.4137
47	7	c/z	0.0000	-43.0212	7.3165
48	7	c/z	0.0000	-43.0212	8.4137
49	4	c/z	0.0000	-31.5112	7.3165
50	4	c/z	0.0000	-31.5112	8.4137
51	4	py	-31.5112		
52	7	py	-12.6835		
53	7	py	-50.3403		
54	7	py	-51.4350		
55	7	py	-11.5887		
56	7	pz	839.7875		
57	7	pz	1756.4100		
58	7	cz	19.0500		
59	7	cz	20.3200		
60	7	pz	835.0250		
61	7	cz	17.7800		
62	7	cz	39.3700		
63	7	pz	1758.9500		
64	7	cz	50.8000		
66	7	pz	1471.9300		
71	7	cz	41.9100		
73	7	pz	1432.5600		
74	7	cz	51.4350		
75	7	cz	20.4787		
76	7	pz	1430.0200		
77	7	pz	1383.6650		
78	7	pz	1381.7600		
79	7	pz	1474.4700		
80	7	cz	55.8800		
81	7	cz	50.8000		
82	7	cz	49.5300		
83	7	pz	1449.0700		
84	7	cz	55.2450		
85	7	cz	52.7050		
86	7	pz	1489.7100		
87	7	cz	22.8600		
88	7	pz	1456.6900		
89	7	pz	1361.4400		
90	7	cz	42.5450		
91	7	cz	43.1800		
93	7	cz	41.9100		
94	7	pz	1352.5500		
95	7	pz	832.4850		
96	7	cz	15.0876		
97	7	pz	829.9450		
98	7	cz	3.8100		
99	7	pz	950.2775		
100	7	pz	951.5475		
101	7	c/z	-8.7986	-5.0800	3.1750
102	7	cz	18.669		
103	7	c/z	12.0985	6.9850	1.8250
104	7	c/z	8.7986	-5.0800	2.5400
105	7	c/z	0.0000	-10.1600	1.8250
106	7	c/z	0.0000	12.7000	2.5400
107	7	c/z	-12.0985	6.9850	2.5400
108	7	c/z	-6.9850	-12.0985	1.8250
109	7	c/z	6.9850	-12.0985	2.5400
110	7	pz	1059.4975		
111	7	pz	1060.7675		
112	7	pz	1171.2575		
113	7	pz	1172.5275		
114	7	pz	1281.7475		
115	7	pz	1283.0175		
116	7	pz	1392.2375		
117	7	pz	1393.5075		

118	7	pz	1502.7275				
119	7	pz	1503.9975				
122	7	pz	0.0000				
123	7	pz	1.2700				
124	7	cz	45.7200				
125	7	cz	55.8800				
126	7	k/z	20.0025	0.0000	-129.5400	0.0025	2.5400
127	7	k/z	20.0025	0.0000	-106.6800	0.0025	2.5400
128	7	k/x	127.0000	0.0000	17.7800	0.0051	0.0000
129	7	pz	17.7800				
130	7	k/x	109.2200	0.0000	17.7800	0.0051	0.0000
131	7	px	12.1920				
132	7	px	41.9100				
133	7	px	13.2893				
134	7	k/z	-20.0025	0.0000	-106.6800	0.0025	2.5400
135	7	k/z	-20.0025	0.0000	-129.5400	0.0025	2.5400
136	7	k/x	-127.0000	0.0000	17.7800	0.0051	2.5400
137	7	k/x	-109.2200	0.0000	17.7800	0.0051	0.0000
138	7	px	-41.9100				
139	7	px	-12.1920				
140	7	px	-13.2893				
141	7	pz	68.5800				
142	7	pz	68.1037				
143	7	pz	119.8562				
144	7	pz	119.3800				
145	7	pz	208.2800				
146	7	pz	207.8037				
147	7	pz	259.5562				
148	7	pz	259.0800				
149	7	pz	412.1150				
150	7	pz	412.5912				
151	7	pz	503.5550				
152	7	pz	504.0312				
153	7	pz	643.2550				
154	7	pz	643.7312				
155	7	pz	923.9250				
156	7	pz	1052.8300				
157	7	pz	718.5025				
158	7	pz	783.9075				
159	7	pz	791.5275				
160	7	cz	38.1000				
161	7	cz	37.1475				
162	7	kz	803.6560	2.7940	0.0000		
163	7	kz	802.8432	2.7940	0.0000		
164	7	pz	732.1550				
165	7	pz	730.8850				
166	7	cz	27.9400				
167	7	cz	26.9875				
168	7	pz	719.4550				
169	7	pz	721.3600				
170	7	cz	36.1950				
171	7	pz	715.6450				
172	7	cz	45.0850				
173	7	cz	28.8925				
176	7	pz	694.6900				
177	7	pz	693.4200				
178	7	pz	597.5350				
179	7	pz	598.8050				
180	7	px	15.2400				
181	7	px	16.5100				
182	7	px	-15.2400				
183	7	px	-16.5100				
184	7	cz	43.8150				
185	7	pz	674.3700				
186	7	pz	693.4200				
187	7	pz	621.0300				
188	7	pz	622.3000				
189	7	pz	605.1550				
190	7	pz	606.4250				

191 7 cz 13.3350
192 7 cz 35.5600
193 7 cz 36.8300
194 7 cz 2.5400
195 7 cz 4.4450
196 7 pz 655.9550
197 7 cz 17.1450
198 7 pz 751.8400
199 7 pz 750.5700
200 7 cz 13.3350
201 7 cz 14.6050
202 5 cz 4.8590
203 5 cz 5.7150
204 5 px 0.0000
205 7 px 50.5816
206 7 px 28.8900
207 7 px 28.0340
208 7 px 51.4604
209 6 cz 4.8590
210 6 cz 5.7150
211 6 px 0.0000
212 7 px -28.8900
213 7 px -50.5816
215 7 px -51.4604
216 7 pz 592.4550
217 7 pz 535.9400
218 7 pz 801.0525
219 7 pz 801.5287
220 7 pz 889.9525
221 7 pz 890.4356
222 7 pz 958.5325
223 7 pz 959.0087
224 7 pz 1029.6525
225 7 pz 1030.1287
226 7 pz 1095.6925
227 7 pz 1096.1687
228 7 pz 1161.7325
229 7 pz 1162.2087
230 7 pz 1232.8525
231 7 pz 1233.3287
232 7 pz 1298.8925
233 7 pz 1299.3687
234 7 pz 1479.5500
235 7 pz 1483.3600
236 7 pz 1487.1700
237 7 cz 21.9075
238 7 cz 34.2900
239 7 cz 40.9600
240 7 cz 33.3400
241 7 cz 34.2900
242 7 cz 3.1359
243 7 cz 3.4529
244 7 c/z 0.0000 12.7000 2.0447
245 7 c/z 0.0000 12.7000 2.2022
246 7 c/z -12.0985 6.9850 2.0447
247 7 c/z -12.0985 6.9850 2.2022
248 7 c/z 8.7986 -5.0800 2.0447
249 7 c/z 8.7986 -5.0800 2.2022
250 7 c/z 6.9850 -12.0985 2.0447
251 7 c/z 6.9850 -12.0985 2.2022
252 7 c/z 12.0985 6.9850 1.3310
253 7 c/z 12.0985 6.9850 1.4910
254 7 c/z 0.0000 -10.1600 1.3310
255 7 c/z 0.0000 -10.1600 1.4910
256 7 c/z -6.9850 -12.0985 1.3310
257 7 c/z -6.9850 -12.0985 1.4910
258 7 c/z -8.7986 -5.0800 2.6238
259 7 c/z -8.7986 -5.0800 3.0150
260 7 p -1.0000 0.0000 1.0000 941.7050

261	7	p	1.0000 0.0000 1.0000 1043.3050
262	7	px	45.0850
263	7	py	0.6350
264	7	py	-0.6350
265	7	px	0.0000
266	7	p	1.0000 0.0000 1.0000 941.7050
267	7	p	-1.0000 0.0000 1.0000 1043.3050
268	7	px	-45.0850
269	7	p	-1.0000 0.0000 1.0000 1078.8650
270	7	p	1.0000 0.0000 1.0000 1179.4236
271	7	p	1.0000 0.0000 1.0000 1078.8650
272	7	p	-1.0000 0.0000 1.0000 1179.4236
273	7	p	-1.0000 0.0000 1.0000 1215.0598
274	7	p	1.0000 0.0000 1.0000 1316.6598
275	7	p	1.0000 0.0000 1.0000 1215.0598
276	7	p	-1.0000 0.0000 1.0000 1316.6598
277	7	p	0.0000 -1.0000 1.0000 941.7050
278	7	p	0.0000 1.0000 1.0000 1043.3050
279	7	p	0.0000 -1.0000 1.0000 1043.3050
280	7	p	0.0000 1.0000 1.0000 941.7050
281	7	p	0.0000 -1.0000 1.0000 1078.8650
282	7	p	0.0000 1.0000 1.0000 1179.4236
283	7	p	0.0000 1.0000 1.0000 1078.8650
284	7	p	0.0000 -1.0000 1.0000 1179.4236
285	7	p	0.0000 -1.0000 1.0000 1215.0598
286	7	p	0.0000 1.0000 1.0000 1316.6598
287	7	p	0.0000 1.0000 1.0000 1215.0598
288	7	p	0.0000 -1.0000 1.0000 1316.6598
289	7	px	-0.6350
290	7	px	0.6350
291	7	py	45.0850
292	7	py	-45.0850
293	7	py	0.0000
294	7	p	1.0000 0.0000 1.0000 437.9912
295	7	p	-1.0000 0.0000 1.0000 326.5487
296	7	pz	352.4250
297	7	pz	351.9487
298	7	px	20.0025
299	7	px	50.0062
300	7	p	-1.0000 0.0000 1.0000 182.4037
301	7	p	1.0000 0.0000 1.0000 284.9562
302	7	px	38.8937
303	7	p	-1.0000 0.0000 1.0000 42.7037
304	7	p	1.0000 0.0000 1.0000 145.2562
305	7	p	1.0000 0.0000 1.0000 42.7037
306	7	p	-1.0000 0.0000 1.0000 145.2562
307	7	px	-38.8937
308	7	px	-20.0025
309	7	p	1.0000 0.0000 1.0000 182.4037
310	7	p	-1.0000 0.0000 1.0000 284.9562
311	7	p	1.0000 0.0000 1.0000 326.5487
312	7	p	-1.0000 0.0000 1.0000 437.9912
313	7	px	-50.0062
314	7	p	0.0000 -1.0000 1.0000 326.5487
315	7	p	0.0000 1.0000 1.0000 437.9912
316	7	p	0.0000 1.0000 1.0000 326.5487
317	7	p	0.0000 -1.0000 1.0000 437.9912
318	7	py	50.0062
319	7	py	-50.0062
320	7	py	20.0025
321	7	py	-20.0025
322	7	p	0.0000 -1.0000 1.0000 182.4037
323	7	p	0.0000 1.0000 1.0000 284.9562
324	7	py	38.8937
325	7	py	-38.8937
326	7	p	0.0000 1.0000 1.0000 182.4037
327	7	p	0.0000 -1.0000 1.0000 284.9562
328	7	p	0.0000 -1.0000 1.0000 42.7037
329	7	p	0.0000 1.0000 1.0000 145.2562

330 7 p 0.0000 1.0000 1.0000 42.7037
331 7 p 0.0000 -1.0000 1.0000 145.2562
332 7 pz 596.2650
333 7 cz 14.6050
334 7 p 0.0000 0.5799 1.0000 900.7475
335 7 py 49.5300
336 7 p 0.0000 -0.5800 1.0000 748.6650
337 7 py -49.5300
338 7 p 0.0000 0.5799 1.0000 748.6650
339 7 p 0.0000 -0.5799 1.0000 900.7475
340 7 p 0.5799 0.0000 1.0000 900.7475
341 7 p -0.5799 0.0000 1.0000 748.6650
342 7 p 0.5799 0.0000 1.0000 748.6650
343 7 p -0.5799 0.0000 1.0000 900.7475
344 7 px 49.5300
345 7 px -49.5300
346 7 pz -0.1000
347 7 pz 1.3700
348 7 cz 55.9800
349 7 k/x 128.0000 0.0000 17.7800 0.0051 0.0000
350 7 px 12.0920
351 7 k/z 20.0025 0.0000 -131.5400 0.0025 2.5400
352 7 k/x -128.0000 0.0000 17.7800 0.0051 0.0000
353 7 k/z -20.0025 0.0000 -131.5400 0.0025 2.5400
354 7 px -12.0920
355 7 c/z -20.0025 0.0000 8.5137
356 7 c/z 0.0000 20.0025 8.5137
357 7 c/z 20.0025 0.0000 8.5137
358 7 c/z 0.0000 -20.0025 8.5137
359 7 pz 68.0037
360 7 pz 68.6800
362 7 pz 119.9562
363 7 pz 119.2800
365 7 pz 207.7037
366 7 pz 208.3800
367 7 pz 259.6562
368 7 pz 258.9800
369 7 pz 351.8487
370 7 pz 352.5250
371 7 pz 412.0150
372 7 pz 412.6912
373 7 py -0.7350
374 7 py 0.7350
375 7 cz 53.3400
376 7 p -1.0000 0.0000 1.0000 145.3562
377 7 px -38.9937
378 7 p 1.0000 0.0000 1.0000 42.6037
379 7 p 1.0000 0.0000 1.0000 145.3562
380 7 px 38.9937
381 7 p -1.0000 0.0000 1.0000 42.6037
382 7 p 0.0000 -1.0000 1.0000 145.3562
383 7 py -38.9937
384 7 p 0.0000 1.0000 1.0000 42.6037
385 7 px -0.7350
386 7 px 0.7350
387 7 p 0.0000 1.0000 1.0000 145.3562
388 7 py 38.9937
389 7 p 0.0000 -1.0000 1.0000 42.6037
390 7 p 1.0000 0.0000 1.0000 285.0562
391 7 p -1.0000 0.0000 1.0000 182.3037
392 7 p -1.0000 0.0000 1.0000 285.0562
393 7 p 1.0000 0.0000 1.0000 182.3037
394 7 p 0.0000 1.0000 1.0000 285.0562
395 7 p 0.0000 -1.0000 1.0000 285.0562
396 7 p 0.0000 1.0000 1.0000 182.3037
397 7 p 0.0000 -1.0000 1.0000 182.3037
398 7 p 1.0000 0.0000 1.0000 438.0912
399 7 px 50.1062
400 7 p -1.0000 0.0000 1.0000 326.4487

401	7	p	-1.0000	0.0000	1.0000	438.0912
402	7	px	-50.1062			
403	7	p	1.0000	0.0000	1.0000	326.4487
404	7	p	0.0000	1.0000	1.0000	438.0912
405	7	py	50.1062			
406	7	p	0.0000	-1.0000	1.0000	326.4487
407	7	p	0.0000	-1.0000	1.0000	438.0912
408	7	py	-50.1062			
409	7	p	0.0000	1.0000	1.0000	326.4487
410	7	pz	504.1312			
411	7	pz	503.4550			
412	1	c/z	31.5112	0.0000	8.5137	
413	7	px	51.5350			
414	7	px	11.4887			
415	7	c/z	43.0212	0.0000	8.5137	
416	7	px	-11.4887			
417	7	px	-51.5350			
418	2	c/z	-31.5112	0.0000	8.5137	
419	7	c/z	-43.0212	0.0000	8.5137	
420	7	py	11.4887			
421	3	c/z	0.0000	31.5112	8.5137	
422	7	py	51.5350			
423	7	c/z	0.0000	43.0212	8.5137	
424	4	c/z	0.0000	-31.5112	8.5137	
425	7	py	-11.4887			
426	7	py	-51.5350			
427	7	c/z	0.0000	-43.0212	8.5137	
428	5	cz	5.8150			
429	7	px	51.5604			
430	7	c/z	36.2458	0.0000	7.3165	
431	7	c/z	36.2458	0.0000	8.4137	
432	7	c/z	-36.2458	0.0000	7.3165	
433	7	c/z	-36.2458	0.0000	8.4137	
434	7	px	-28.0340			
435	7	c/z	45.7200	0.0000	5.8150	
436	7	c/z	-45.7200	0.0000	5.8150	
437	7	px	27.9340			
438	7	c/z	36.2458	0.0000	8.5137	
439	6	cz	5.8150			
440	7	px	-51.5604			
441	7	px	-27.9340			
442	7	cz	4.5450			
443	7	c/z	-36.2458	0.0000	8.5137	
444	7	pz	622.4000			
445	7	cz	36.9300			
446	7	pz	605.0550			
447	7	cz	14.7050			
448	7	cz	13.2350			
449	7	cz	20.4200			
450	7	cz	18.9500			
451	7	pz	643.1550			
452	7	pz	643.8312			
454	7	cz	45.1850			
455	7	cz	26.8875			
457	7	px	16.6100			
458	7	px	-16.6100			
459	7	pz	597.4350			
460	7	pz	694.7900			
461	7	cz	28.9925			
462	7	pz	715.5450			
463	7	cz	45.1850			
465	7	cz	38.2000			
466	7	pz	718.6025			
467	7	kz	803.7560	2.7940	0.0000	
468	7	cz	20.4200			
469	7	pz	953.7700			
470	7	pz	889.8525			
471	7	pz	890.5356			
473	7	pz	839.8875			

474	7	pz	829.8450
475	7	cz	39.4700
476	7	p	0.0000 0.5799 1.0000 900.8475
477	7	py	49.6300
478	7	p	0.0000 -0.5800 1.0000 748.5650
479	7	p	0.0000 -0.5799 1.0000 900.8475
480	7	py	-49.6300
481	7	p	0.0000 0.5799 1.0000 748.5650
482	7	p	0.5799 0.0000 1.0000 900.8475
483	7	px	49.6300
484	7	p	-0.5799 0.0000 1.0000 748.5650
485	7	p	-0.5799 0.0000 1.0000 900.8475
486	7	px	-49.6300
487	7	p	0.5799 0.0000 1.0000 748.5650
488	7	pz	801.6287
489	7	pz	800.9525
500	8	pz	1533.0000
501	7	cz	58.4200
502	7	pz	569.6950
503	7	pz	652.0450
c Tank Surfaces			
1001	8	pz	-61.0000
1002	8	pz	0.0000
1003	8	pz	1418.0000
1020	8	sz	-892.0000 2318.0000
1021	8	sz	-892.0000 2318.9500
1029	8	sz	-892.0000 2357.0000
1030	8	pz	1476.1400
1039	8	pz	1506.6400
1050	8	pz	1648.0500
1051	8	pz	1655.5000
1052	8	pz	1663.0000
1053	8	pz	1670.5000
1054	8	pz	1678.0000
1055	8	pz	1685.5000
1059	8	pz	1693.0500
1080	8	so	25000.0000
1081	8	so	20000.0000
1082	8	pz	6000.0000
1083	8	cz	10100.0000
1101	8	cz	1143.0000
1102	8	cz	1145.5400
1103	8	cz	1221.5400
1104	8	cz	1267.5400
1106	8	c/z	0.0000 -121.92 53.3400
1107	8	c/z	0.0000 -121.92 54.2900
1108	8	c/z	0.0000 60.96 15.2500
1109	8	c/z	0.0000 60.96 16.2000
1110	8	c/z	0.0000 152.5000 10.2000
1111	8	c/z	0.0000 152.5000 11.1500
1200	8	px	-152.4000
1201	8	px	-121.920
1202	8	px	121.920
1203	8	px	152.4000
1204	8	py	-243.84
1205	8	py	-213.36
1206	8	py	213.36
1207	8	py	243.84
1301	8	pz	745.10
1302	8	pz	747.60
1303	8	pz	850.95
1304	8	pz	852.22
1305	8	pz	981.76
1306	8	pz	983.03
1307	8	pz	1093.52
1308	8	pz	1094.79
1309	8	pz	1205.28
1310	8	pz	1206.55
1311	8	pz	1317.04

1312	8	pz	1318.31		
1313	8	pz	1428.80		
1314	8	pz	1430.07		
1315	8	pz	1540.56		
1316	8	pz	1541.83		
1324	8	pz	1530.46		
1325	8	pz	1533.0000		
1330	8	pz	1696.23		
1334	8	pz	1813.23		
1335	8	pz	1815.77		
1401	8	c/z	0.0000	-121.92	19.0500
1402	8	c/z	0.0000	-121.92	20.3200
1406	8	c/z	0.0000	-121.92	41.9100
1407	8	c/z	0.0000	-121.92	21.9100
1408	8	c/z	0.0000	-121.92	34.2900
1409	8	c/z	0.0000	-121.92	33.3400
1410	8	c/z	0.0000	-121.92	40.9600
1411	8	c/z	0.0000	-121.92	66.0400
1412	8	c/z	0.0000	-121.92	80.0100
1415	8	c/z	0.0000	-121.92	21.5900
1418	8	c/z	0.0000	-121.92	39.3700
1419	8	c/z	0.0000	-121.92	25.4000
1420	8	c/z	-12.700	-121.92	2.045
1421	8	c/z	-12.700	-121.92	2.203
1422	8	c/z	-12.70	-121.92	2.54
1423	8	c/z	-6.990	-79.400	1.332
1424	8	c/z	-6.990	-79.400	1.491
1425	8	c/z	-6.990	-79.400	1.825
1426	8	c/z	5.080	-82.700	2.045
1427	8	c/z	5.080	-82.700	2.203
1428	8	c/z	5.08	-82.70	2.54
1429	8	c/z	12.100	-84.500	2.045
1430	8	c/z	12.100	-84.500	2.203
1431	8	c/z	12.10	-84.50	2.54
1432	8	c/z	10.200	-121.92	1.332
1433	8	c/z	10.20	-121.92	1.67
1434	8	c/z	10.200	-121.92	1.825
1435	8	c/z	12.100	-98.500	1.332
1436	8	c/z	12.10	-98.50	1.67
1437	8	c/z	12.100	-98.500	1.825
1438	8	c/z	5.080	-100.300	2.625
1439	8	c/z	5.080	-100.300	3.016
1440	8	c/z	5.080	-100.300	3.175
1441	8	c/z	-6.990	-103.600	2.045
1442	8	c/z	-6.990	-103.600	2.203
1443	8	c/z	-6.99	-103.60	2.54
1444	8	c/z	0.0000	-121.92	3.1360
1445	8	c/z	0.0000	-121.92	3.4530
1446	8	c/z	0.0000	-121.92	3.8100
1600	8	pz	1015.0000		
1601	8	pz	1011.0000		
1602	8	pz	1006.0000		
1603	8	pz	1001.0000		
1604	8	pz	996.0000		
1605	8	pz	971.0000		
1610	8	c/z	0.0000	-121.92	21.3200
1611	8	c/z	0.0000	-121.92	25.3200
1612	8	c/z	0.0000	-121.92	30.3200
1613	8	c/z	0.0000	-121.92	35.3200
1614	8	c/z	0.0000	-121.92	40.3200
1615	8	c/z	0.0000	-121.92	65.3200
1620	8	s	0.0000	-121.92	745.1000 21.3200
1621	8	s	0.0000	-121.92	745.1000 25.3200
1622	8	s	0.0000	-121.92	745.1000 30.3200
1623	8	s	0.0000	-121.92	745.1000 35.3200
1624	8	s	0.0000	-121.92	745.1000 40.3200
1625	8	s	0.0000	-121.92	745.1000 65.3200
1626	8	c/z	0.0000	-121.92	150.0000
1627	8	c/z	0.0000	-121.92	300.0000

```

1628      8 c/z 0.0000 -121.92 600.0000
1629      8 pz 986.0000
1630      8 pz 956.0000
1631      8 pz 926.0000
1632      8 pz 1016.0000
c 1633      8 pz 1533.0000
1634      8 pz 1662.0000
1635      8 pz 1457.5400
1636      8 pz 1431.2700
1637      pz 1564.75
1638      pz 1566.655
1639      pz 1581.895
1640      pz 1577.024
1641      pz 1581.113
1642      pz 1587.293
1643      pz 1694.766
1644      8 c/z 0 -121.92 83.02625
1645      8 c/z 0 -121.92 83.5025
1646      8 c/z 0 -121.92 104.2924
1647      8 c/z 0 -121.92 105.0290
1648      8 c/z 0 -121.92 87.3125
1649      8 c/z 0 -121.92 100.2030
1650      8 c/z 0 -121.92 99.72675
1651      pz 1574.275 $ bot to bot detector shield
1652      pz 1594.9125 $ top of top detector shield
1653      px -50
1654      px 50
1655      8 py -121.92
1656      8 c/z 0 -121.92 106
1657      py -134.62 $3 in. plate
1658      py -109.22 $3 in. plate
1659      px 107.9525 $3 in. plate
1660      px -107.9525 $3 in. plate
1661      py -108.744 $3/16 in. plate
1662      py -135.096 $3/16 in. plate
1663      px 108.5875 $0.25 in. plate
1664      px -108.5875 $0.25 in. plate
1665      c/y -102.4255 1584.594 2.413 $detector
1666      c/y 102.4255 1584.594 2.413 $detector
1667      c/y -102.4255 1584.594 2.0447 $detector
1668      c/y 102.4255 1584.594 2.0447 $detector
1669      py -131.82 $
1670      py -112.014 $
1671      10 c/y 0 1584.594 2.413 $detector
1672      11 c/y 0 1584.594 2.413 $detector
1673      10 c/y 0 1584.594 2.0447 $detector
1674      11 c/y 0 1584.594 2.0447 $detector
1675      10 py -9.9
1676      10 py 9.9
1677      11 py -9.9
1678      11 py 9.9
1679      10 py -12.7
1680      10 py 12.7
1681      11 py -12.7
1682      11 py 12.7
1690      pz 1576.18 $ bot to bot detector shield
1691      pz 1578.085 $ bot to bot detector shield
1692      pz 1579.99 $ bot to bot detector shield
c Wand Interface
2000      9 pz 2.54 $ Importance split
2001      9 pz 5.08 $ Importance split
2005      9 pz 7.62 $ Top of 3" plate
2010      9 pz 142.14 $
2015      9 pz 166.51
2020      9 cz 7.703 $ ID 6" Sch 40
2025      9 cz 8.414 $ OD 6" Sch 40
2026      9 cz 10.0 $ Importance split
2027      9 cz 15.0 $ Importance split
2030      9 cz 16.67 $ ID 14" Sch 40

```

2035 9 cz 17.78 \$ OD 14" Sch 40
 2040 9 cz 45.72 \$ OD of 3" plate
 2050 9 kz 411.4580 3.834105e-3 -1
 2055 9 kz 415.0417 4.244740e-3 -1

*tr1 31.5119 -121.92 553.47 -45 90 -135 90 0 90 45 90 -45
 *tr2 -31.5119 -121.92 553.47 45 90 -45 90 0 90 135 90 45
 *tr3 0 -90.4081 553.47 0 90 90 90 -45 -135 90 45 -45
 *tr4 0 -153.4319 553.47 0 90 90 90 45 -45 90 135 45
 *tr5 45.7200 -121.92 693.53 45 90 -45 90 0 90 135 90 45
 *tr6 -45.7200 -121.92 693.53 -45 90 -135 90 0 90 45 90 -45
 *tr7 0.0 -121.92 61.07 j j j j j j j j j
 *tr8 0.0 0.0 0.0 j j j j j j j j j
 *tr9 0 60.96 1506.64
 *tr11 -60.811 -61.11 0 45 135 90 -45 45 90 90 90 0
 *tr10 60.811 -61.11 0 -45 45 90 -135 -45 90 90 90 0

mode p
 phys:p 100 1 1
 cut:p j j 0 0
 c *****

IMPORTANCES

imp:p 1 336r \$ Pump cells
 c 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009
 0 1 0.3 1 1 1 1 1 4 4
 c 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019
 1 1 1 0.5 0 0 1 1 0 0
 c 1020 1021 1024 1025 1026 1027 1028 1029
 0 1 1 1 1 1 1 1
 c 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039
 1 4e-3 1 1 1 1 1 .25 .25
 c 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049
 .25 .0625 .0625 .0625 .0625 .0156 1 8 32 64
 c 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060
 8 0 64 8 16 32 64 8 8 8 8
 c 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070
 64 64 64 64 64 64 64 64 64 64
 c 1071 1072 1073 1074 1075
 64 64 64 64 64
 c 2000 2005 2006 2007 2010 2015 2020 2021 2022 2025
 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5

c *****

dd2 0.5 100
 dxt:p 0.0 -121.92 1418 19.05 54.29

contributions to dxtran sphere

dxcl:p 0 336r
 c 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009
 0 0.2 0 0 0 0 0 0 0 0
 c 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019
 0 0 0 0 0 0 0 0 0 0
 c 1020 1021 1024 1025 1026 1027 1028 1029
 0 0 r r r 0 0 0
 c 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039
 0 0 0 0 0 1 1 1 1 1
 c 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049
 1 1 1 1 0 0 0 0 0 0
 c 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060
 0 0 0 0 0 0 0 0 0 0 0
 c 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070
 0 0 0 0 0 0 0 0 0 0
 c 1071 1072 1073 1074 1075
 0 0 0 0 0
 c 2000 2005 2006 2007 2010 2015 2020 2021 2022 2025
 0 0 0 0 0 0 0 0 0 0

c *****

pd0 1 336r
 c 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009
 0 0.5 0.5 0.5 0.5 0.5 1 1 1 1
 c 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019
 1 1 1 0.5 0 0 1 1 0 0

```

c      1020 1021 1024 1025 1026 1027 1028 1029
      0 0.5 r r r 1 1 1
c      1030 1031 1032 1033 1034 1035 1036 1037 1038 1039
      1 0 1 1 1 0.5 0.2 0 .5 .2
c      1040 1041 1042 1043 1044 1045 1046 1047 1048 1049
      0 .5 .2 0 0 0 0 1 1 1
c      1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060
      1 0 1 1 1 1 1 1 1 1 1
c      1061 1062 1063 1064 1065 1066 1067 1068 1069 1070
      1 1 1 1 1 1 1 1 1 1
c      1071 1072 1073 1074 1075
      1 1 1 1 1
c      2000 2005 2006 2007 2010 2015 2020 2021 2022 2025
      1 1 1 1 1 1 1 1 1 1
dd      0.2
c *****
c      SOURCE FROM SUPERNATE IN TANK
c      volume = (600^2)*pi*90 = 1.0179e8
c      1.0179e8*1.74=1.77e+5 Kg
c      1.77e+5*1.446E+07*1000 =2.5613E+15
sdef    cel=d1 axs=0 0 1 pos=0 -121.92 0 rad=fcel d2 ext=fcel d3 erg=d4
      wgt=2.5613E+15
#      si4 sp4
      l d
      0 0
      1.500E-02 2.699E+05
      2.500E-02 4.147E+04
      3.750E-02 8.726E+05
      5.750E-02 4.447E+04
      8.500E-02 2.107E+04
      1.250E-01 6.175E+04
      2.250E-01 2.458E+04
      3.750E-01 7.830E+03
      6.620E-01 1.296E+07
      8.500E-01 5.944E+04
      1.250E+00 9.904E+04
      1.750E+00 1.987E+03
      2.250E+00 1.927E-01
      2.750E+00 6.331E-04
      3.500E+00 6.718E-05
      5.000E+00 2.851E-05
      7.000E+00 3.260E-06
      1.100E+01 3.727E-07
c      TOTAL 1.446E+07
sc1     SAMPLE CELLS
si1     l 1035 1036 1037 1038 1039 1040 1041 1042 1043
sp1     2.25 6.75 27 2.25 6.75 27 2.25 6.75 27
sb1     2.25 6.75 27 .5625 1.6875 6.75 .140625 .421875 1.6875
sc2     SAMPLE RADIUS
ds2     s 21 22 23 21 22 23 21 22 23
si21    0 150
sp21    -21 1
si22    150 300
sp22    -21 1
si23    300 600
sp23    -21 1
sc3     SAMPLE EXTENT
ds3     s 31 31 31 32 32 32 33 33 33
si31    986 1016
sp31    -21 0
si32    956 986
sp32    -21 0
si33    926 956
sp33    -21 0
c *****
m1      1001.50 .4372 $H 101 SY Slurry
      6000.50 .0170 $C
      7014.50 .0579 $N
      8016.50 .3725 $O

```

```

11023.50 .0975 $Na
13027.50 .0113 $Al
15031.50 .0011 $P
17000.50 .0029 $Cl
19000.50 .0026 $K
m2 8016.50 .21 $O air number fraction
    7014.50 .79 $N
m3 26000.55 1.0 $Fe iron
m4 8016.50 -.4407 $O concrete weight fraction
    14000.50 -.2157 $Si
    20000.50 -.1306 $Ca
    26000.55 -.0788 $Fe
    13027.50 -.0607 $Al
    12000.50 -.0376 $Mg
    19000.50 -.0066 $K
    11023.50 -.0182 $Na
    22000.50 -.0049 $Ti
    1001.50 -.0031 $H
    25055.50 -.0013 $Mn
    15031.50 -.0009 $P
    16032.50 -.0009 $S
m5 14000.50 .2813 $Si hanford soil number fraction
    8016.50 .6556 $O
    13027.50 .0123 $Al
    26000.55 .0084 $Fe
    20000.50 .0149 $Ca
    12000.50 .0103 $Mg
    19000.50 .0022 $K
    11023.50 .0034 $Na
    1001.50 .0116 $H
m6 6000. 1 $ Rubber
m7 82000. 1 $ lead shielding for detectors
c Gamma flux to dose rate conversion factors (mrem/hr)/(p/cm**2/s)
de0 log .01 .015 .02 .03 .04 .05
    .06 .08 .10 .15 .20 .30
    .40 .50 .60 .80 1.0 1.5
    2.0 3.0 4.0 5.0 6.0 8.0
    10. 12.
df0 log 2.232e-5 5.652e-5 8.568e-5 1.184e-4 1.314e-4 1.382e-4
    1.440e-4 1.624e-4 1.919e-4 2.797e-4 3.708e-4 5.616e-4
    7.416e-4 9.144e-4 1.076e-3 1.379e-3 1.656e-3 2.246e-3
    2.758e-3 3.672e-3 4.500e-3 5.292e-3 6.012e-3 7.488e-3
    8.892e-3 1.040e-2
print 10 60 100 110 126 130 150
prdmp j -240 1 3
ctme 3700
fc4 Dose points inside detector region
f4:p 1062 1063 t
fc14 Dose points inside detector region
f14:p 1068 1069 t

```

APPENDIX B MCNP Internal Source Description (from file idcell_0)

```

c * 447.81*1.446E+07*1000 =6.4754E+12
c CELL SOURCE
sdef cel d1 erg d2 pos fcel d3 rad fcel d4 ext fcel d5 axs fcel d6
x fcel d7 y fcel d8 z fcel d9
wgt = 6.4754E+12 eff .001
# si2 sp2
l d
0 0
1.500E-02 2.699E+05
2.500E-02 4.147E+04
3.750E-02 8.726E+05
5.750E-02 4.447E+04
8.500E-02 2.107E+04
1.250E-01 6.175E+04
2.250E-01 2.458E+04
3.750E-01 7.830E+03
6.620E-01 1.296E+07
8.500E-01 5.944E+04
1.250E+00 9.904E+04
1.750E+00 1.987E+03
2.250E+00 1.927E-01
2.750E+00 6.331E-04
3.500E+00 6.718E-05
5.000E+00 2.851E-05
7.000E+00 3.260E-06
1.100E+01 3.727E-07
c TOTAL 1.446E+07
# si1 sp1
l d
c CELL SOURCES
68 3086.20
65 3086.20
67 2387.00
63 2369.00
11 65740.00
2 65280.00
9 8959.00
3 8957.00
10 16360.00
1 16440.00
15 4488.00
7 4526.00
104 1541.00
101 1550.00
269 1712.00
267 1715.00
94 28007.65
88 12141.96
81 9017.55
c UPPER/LOWER PLATE SOURCES
c 193 980.99
c 194 936.50
c 212 889.70
c 211 889.70
c 215 889.70
c 214 889.70
c 217 889.70
c 218 889.70
c 220 889.70
c 221 889.70
c 223 889.70
c 224 889.70
c 226 889.70
c 227 889.70

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c	265	890.00
c	264	890.00
c	297	806.70
c	290	805.50
c	321	834.90
c	320	834.90
c	311	849.99
c	310	849.99
c	c	OUTER PLATE SOURCES
c	195	0
c	210	0
c	213	0
c	216	0
c	219	0
c	222	0
c	225	0
c	247	0
c	289	0
c	322	0
c	312	0
c	c	PIPE SURFACE SOURCES
c	199	80.07
c	196	79.64
c	201	21.14
c	197	21.14
c	200	82.22
c	198	81.68
c	202	1114.00
c	203	1165.00
c	206	858.90
c	207	897.40
c	204	1373.00
c	205	1331.00
c	208	901.30
c	209	874.70
c	252	222.40
c	248	222.40
c	260	223.40
c	256	222.40
c	255	520.80
c	251	528.30
c	263	547.90
c	259	538.80
c	272	217.60
c	271	219.70
c	277	61.79
c	273	63.19
c	253	31.44
c	249	33.09
c	262	30.81
c	257	30.87
c	254	32.03
c	250	31.84
c	261	30.53
c	258	31.45
c	278	15.16
c	274	14.95
c	279	9.33
c	275	8.82
c	281	41.29
c	276	41.44
c	288	674.68
c	287	723.33
c	285	84.81
c	284	81.86
c	286	290.00
c	282	283.50
c	283	351.50
c	280	82.95

c	296	126.80	
c	295	255.40	
c	292	377.60	
c	291	1206.54	
c	303	379.16	
c	302	379.25	
c	304	374.51	
c	305	86.71	
c	306	180.14	
c	307	1480.00	
c	308	319.20	
c	309	1888.00	
c	314	346.10	
c	315	248.00	
c	313	346.10	
c	342	22.77	
c	343	22.77	
c	344	634.92	
c	c	FIN SURFACE SOURCES	
c	228	81.84	
c	231	81.84	
c	232	78.54	
c	233	77.27	
c	237	79.92	
c	236	81.84	
c	239	78.54	
c	238	77.27	
c	244	148.70	
c	242	153.40	
c	243	146.80	
c	246	145.70	
c	319	546.50	
c	318	561.90	
c	317	544.70	
c	316	543.50	
c	293	181.20	
c	294	180.30	
sc3	POSITION		
ds3	l	0 -121.92 78.85	\$68
		0 -121.92 78.85	\$65
		-20.0025 -121.92 61.07	\$67
		20.0025 -121.92 61.07	\$63
		-20.0025 -121.92 61.07	\$11
		20.0025 -121.92 61.07	\$2
		0 -121.92 477.397	\$9
		0 -121.92 477.397	\$3
		-43.0212 -121.92 61.07	\$10
		43.0212 -121.92 61.07	\$1
		-45.7200 -121.92 61.07	\$15
		45.7200 -121.92 61.07	\$7
		0 -121.92 739.25	\$104
		0 -121.92 739.25	\$101
		-36.2458 -121.92 61.07	\$269
		36.2458 -121.92 61.07	\$267
		0 -121.92 61.07	\$94
		0 -121.92 61.07	\$88
		0 -121.92 61.07	\$81
c	c	UPPER/LOWER PLATE SOURCES	
c	ds3	l	0 -121.92 61.07 \$193
c		0 -121.92 61.07	\$194
c		0 -121.92 61.07	\$212
c		0 -121.92 61.07	\$211
c		0 -121.92 61.07	\$215
c		0 -121.92 61.07	\$214
c		0 -121.92 61.07	\$217
c		0 -121.92 61.07	\$218
c		0 -121.92 61.07	\$220
c		0 -121.92 61.07	\$221
c		0 -121.92 61.07	\$223

c	0	-121.92	61.07	\$224
c	0	-121.92	61.07	\$226
c	0	-121.92	61.07	\$227
c	0	-121.92	61.07	\$265
c	0	-121.92	61.07	\$264
c	0	-121.92	61.07	\$297
c	0	-121.92	61.07	\$290
c	0	-121.92	61.07	\$321
c	0	-121.92	61.07	\$320
c	0	-121.92	61.07	\$311
c	0	-121.92	61.07	\$310
c	c	OUTER PLATE SOURCES		
c	0	-121.92	61.07	\$195
c	0	-121.92	61.07	\$210
c	0	-121.92	61.07	\$213
c	0	-121.92	61.07	\$216
c	0	-121.92	61.07	\$219
c	0	-121.92	61.07	\$222
c	0	-121.92	61.07	\$225
c	0	-121.92	61.07	\$247
c	0	-121.92	61.07	\$289
c	0	-121.92	61.07	\$322
c	0	-121.92	61.07	\$312
c	c	PIPE SURFACE SOURCES		
c	0	-121.92	78.85	\$199
c	0	-121.92	78.85	\$196
c	0	-121.92	78.85	\$201
c	0	-121.92	78.85	\$197
c	-20.0025	-121.92	61.07	\$200
c	20.0025	-121.92	61.07	\$198
c	-20.0025	-121.92	61.07	\$202
c	20.0025	-121.92	61.07	\$203
c	-20.0025	-121.92	61.07	\$206
c	20.0025	-121.92	61.07	\$207
c	0	-111.5025	61.07	\$204
c	0	-71.4975	61.07	\$205
c	0	-111.5025	61.07	\$208
c	0	-71.4975	61.07	\$209
c	0	-121.92	477.397	\$252
c	0	-121.92	477.397	\$248
c	0	-121.92	477.397	\$260
c	0	-121.92	477.397	\$256
c	-43.0212	-121.92	61.07	\$255 left source leg
c	43.0212	-121.92	61.07	\$251 right source leg
c	0	-134.5212	61.07	\$263 left dummy leg
c	0	-48.4788	61.07	\$259 right dummy leg
c	-45.7200	-121.92	61.07	\$272 left small leg
c	45.7200	-121.92	61.07	\$271 right small leg
c	0	-121.92	739.25	\$277 small slanted pipe
c	0	-121.92	739.25	\$273 small slanted pipe
c	0	-121.92	488.87	\$253 slanted end cap
c	0	-121.92	488.87	\$249 slanted end cap
c	0	-121.92	488.87	\$262 slanted end cap
c	0	-121.92	488.87	\$257 slanted end cap
c	0	-121.92	528.87	\$254 slanted top end cap
c	0	-121.92	528.87	\$250 slanted top end cap
c	0	-121.92	528.87	\$261 slanted top end cap
c	0	-121.92	528.87	\$258 slanted top end cap
c	0	-121.92	687.72	\$278 small slanted end cap
c	0	-121.92	687.72	\$274 small slanted end cap
c	0	-121.92	711.27	\$279 small slanted top end cap
c	0	-121.92	711.27	\$275 small slanted top end cap
c	-36.2458	-121.92	61.07	\$281 Short pipe
c	36.2458	-121.92	61.07	\$276 Short pipe
c	0	-121.92	61.07	\$288 Large open pipe
c	0	-121.92	61.07	\$287 Large open pipe
c	0	-121.92	61.07	\$285 INLET
c	0	-121.92	61.07	\$284 INLET
c	0	-121.92	61.07	\$286 INLET

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c      0 -121.92 61.07      $282 INLET
c      0 -121.92 61.07      $283 INLET
c      0 -121.92 61.07      $280 ROD
c      0 -121.92 61.07      $296 Inlet cavity film
c      0 -121.92 61.07      $295 inner Inlet cavity film
c      0 -121.92 61.07      $292 inner Inlet cavity film
c      0 -121.92 61.07      $291 pump film
c      0 -121.92 61.07      $303 pump film
c      0 -121.92 61.07      $302 pump film
c      0 -121.92 61.07      $304 pump case film
c      0 -121.92 61.07      $305 pump case film
c      0 -121.92 61.07      $306 pump case film
c      0 -121.92 61.07      $307 pump case film
c      0 -121.92 61.07      $308 cone pump case film
c      0 -121.92 61.07      $309 UPPER LARGE PIPE film
c      0 -121.92 61.07      $314 flange film
c      0 -121.92 61.07      $315 flange film
c      0 -121.92 61.07      $313 flange film
c      0 -134.5212 61.07      $342 left dummy leg cap
c      0 -48.4788 61.07      $343 right dummy leg cap
c      0 -121.92 61.07      $344 below pump
c      c      FIN SURFACE SOURCES
c      0 0 0      $228 lower fin
c      0 0 0      $231 lower fin
c      0 0 0      $232 lower fin
c      0 0 0      $233 lower fin
c      0 0 0      $237 mid fin
c      0 0 0      $236 mid fin
c      0 0 0      $239 mid fin
c      0 0 0      $238 mid fin
c      0 0 0      $244 upper fin
c      0 0 0      $242 upper fin
c      0 0 0      $243 upper fin
c      0 0 0      $246 upper fin
c      0 0 0      $319 pump fin
c      0 0 0      $318 pump fin
c      0 0 0      $317 pump fin
c      0 0 0      $316 pump fin
c      0 0 0      $293 pump side
c      0 0 0      $294 pump side
sc4    RADIUS*****
c      68 65 67 63 11 2 9 3 10 1
ds4    s 20 20 21 21 21 21 22 22 21 21
c      15 7 104 101 269 267 94 88 81
c      23 23 24 24 21 21 25 26 25
c      c      UPPER/LOWER PLATE SOURCES
c      c      193 194 212 211 215 214 217 218 220 221
c      ds4 s 200 200 200 200 200 200 200 200 200 200
c      c      223 224 226 227 265 264 297 290 321 320
c      c      200 200 200 200 200 200 200 200 200 200
c      c      311 310
c      c      200 200
c      c      OUTER PLATE SOURCES
c      c      195 210 213 216 219 222 225 247 289 322 312
c      c      201 201 201 201 201 201 201 201 201 201
c      c      PIPE SURFACE SOURCES
c      c      199 196 210 197 200 198 202 203 206 207
c      c      202 202 203 203 204 204 205 205 205 205
c      c      204 205 208 209 252 248 260 256 255 251
c      c      205 205 205 205 206 206 206 206 205 205
c      c      263 259 272 271 277 273 253 249 262 257
c      c      205 205 207 207 208 208 209 209 209 209
c      c      254 250 261 258 278 274 279 275 281 276
c      c      209 209 209 209 210 210 210 210 205 205
c      c      288 287 285 284 286 282 283 280 296 295
c      c      211 212 213 214 215 216 217 218 219 220
c      c      292 291 303 302 304 305 306 307 308 309
c      c      221 221 222 223 224 225 226 227 228 212
c      c      314 315 313 342 343 344

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c      229 230 229 205 205 231
c      c      FIN SURFACE SOURCES
c      c      228 231 232 233 237 236 239 238 244 242
c      c      0 0 0 0 0 0 0 0 0 0
c      c      243 246 319 318 317 316 293 294
c      c      0 0 0 0 0 0 0 0 0
sc5    EXTENT*****
c      68 65 67 63 11 2 9 3 10 1
ds5    s 30 31 32 32 33 33 90 90 36 36
c      15 7 104 101 269 267 94 88 81
c      37 37 38 38 40 40 41 42 43
c      c      UPPER/LOWER PLATE SOURCES
c      c      193 194 212 211 215 214 217 218 220 221
ds5    s 50 51 52 53 54 55 56 57 58 59
c      c      223 224 226 227 265 264 297 290 321 320
c      c      60 61 62 63 64 65 66 67 68 69
c      c      311 310
c      c      70 71
c      c      OUTER PLATE SOURCES
c      c      195 210 213 216 219 222 225 247 289 322 312
c      c      72 73 74 75 76 77 78 79 80 81 82
c      c      PIPE SURFACE SOURCES
c      c      199 196 201 197 200 198 202 203 206 207
c      c      83 84 85 86 32 32 87 87 88 88
c      c      204 205 208 209 252 248 260 256 255 251
c      c      89 89 88 88 90 90 90 90 36 36
c      c      263 259 272 271 277 273 253 249 262 257
c      c      91 91 37 37 38 38 92 93 92 93
c      c      254 250 261 258 278 274 279 275 281 276
c      c      94 95 94 95 96 97 98 99 100 100
c      c      288 287 285 284 286 282 283 280 296 295
c      c      101 101 102 103 104 105 106 107 108 109
c      c      292 291 303 302 304 305 306 307 308 309
c      c      109 110 111 112 113 114 115 116 117 118
c      c      314 315 313 342 343 344
c      c      119 120 121 122 122 123
c      c      FIN SURFACE SOURCES
c      c      228 231 232 233 237 236 239 238 244 242
c      c      0 0 0 0 0 0 0 0 0 0
c      c      243 246 319 318 317 316 293 294
c      c      0 0 0 0 0 0 0 0 0
sc6    AXIS*****
c      68 65 67 63 11 2 9 3 10 1
ds6    s 11 11 13 13 13 13 14 15 13 13
c      15 7 104 101 269 267 94 88 81
c      13 13 18 19 13 13 13 13 13
c      c      UPPER/LOWER PLATE SOURCES
c      c      193 194 212 211 215 214 217 218 220 221
ds6    s 13 13 13 13 13 13 13 13 13 13
c      c      223 224 226 227 265 264 297 290 321 320
c      c      13 13 13 13 13 13 13 13 13 13
c      c      311 310
c      c      13 13
c      c      OUTER PLATE SOURCES
c      c      195 210 213 216 219 222 225 247 289 322 312
c      c      13 13 13 13 13 13 13 13 13 13
c      c      PIPE SURFACE SOURCES
c      c      199 196 201 197 200 198 202 203 206 207
c      c      11 11 11 11 13 13 13 13 13 13
c      c      204 205 208 209 252 248 260 256 255 251
c      c      13 13 13 13 14 15 16 17 13 13
c      c      263 259 272 271 277 273 253 249 262 257
c      c      13 13 13 13 18 19 11 11 12 12
c      c      254 250 261 258 278 274 279 275 281 276
c      c      11 11 12 12 11 11 11 11 13 13
c      c      288 287 285 284 286 282 283 280 296 295
c      c      13 13 13 13 13 13 13 13 13 13
c      c      292 291 303 302 304 305 306 307 308 309
c      c      13 13 13 13 13 13 13 13 13 13

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c      c      314 315 313 342 343 344
c      c      13 13 13 13 13 13
c      c      FIN SURFACE SOURCES
c      c      228 231 232 233 237 236 239 238 244 242
c      c      0 0 0 0 0 0 0 0 0 0
c      c      243 246 319 318 317 316 293 294
c      c      0 0 0 0 0 0 0 0 0 0
sc7      X*****
c      68 65 67 63 11 2 9 3 10 1
ds7      s 0 0 0 0 0 0 0 0 0 0
c      15 7 104 101 269 267 94 88 81
c      0 0 0 0 0 0 0 0 0 0
c      c      UPPER/LOWER PLATE SOURCES
c      c      193 194 212 211 215 214 217 218 220 221
c      ds7 s 0 0 0 0 0 0 0 0 0 0
c      c      223 224 226 227 265 264 297 290 321 320
c      c      0 0 0 0 0 0 0 0 0 0
c      c      311 310
c      c      0 0
c      c      OUTER PLATE SOURCES
c      c      195 210 213 216 219 222 225 247 289 322 312
c      c      0 0 0 0 0 0 0 0 0 0 0
c      c      PIPE SURFACE SOURCES
c      c      199 196 201 197 200 198 202 203 206 207
c      c      0 0 0 0 0 0 0 0 0 0
c      c      204 205 208 209 252 248 260 256 255 251
c      c      0 0 0 0 0 0 0 0 0 0
c      c      263 259 272 271 277 273 253 249 262 257
c      c      0 0 0 0 0 0 0 0 0 0
c      c      254 250 261 258 278 274 279 275 281 276
c      c      0 0 0 0 0 0 0 0 0 0
c      c      288 287 285 284 286 282 283 280 296 295
c      c      0 0 0 0 0 0 0 0 0 0
c      c      292 291 303 302 304 305 306 307 75 309
c      c      0 0 0 0 0 0 0 0 0 0
c      c      314 315 313 342 343 344
c      c      0 0 0 0 0 0
c      c      FIN SURFACE SOURCES
c      c      228 231 232 233 237 236 239 238 244 242
c      c      300 301 302 302 300 301 302 302 303 304
c      c      243 246 319 318 317 316 293 294
c      c      302 302 305 306 302 302 307 308
sc8      Y*****
c      68 65 67 63 11 2 9 3 10 1
ds8      s 0 0 0 0 0 0 0 0 0 0
c      15 7 104 101 269 267 94 88 81
c      0 0 0 0 0 0 0 0 0 0
c      c      UPPER/LOWER PLATE SOURCES
c      c      193 194 212 211 215 214 217 218 220 221
c      ds8 s 0 0 0 0 0 0 0 0 0 0
c      c      223 224 226 227 265 264 297 290 321 320
c      c      0 0 0 0 0 0 0 0 0 0
c      c      311 310
c      c      0 0
c      c      OUTER PLATE SOURCES
c      c      195 210 213 216 219 222 225 247 289 322 312
c      c      0 0 0 0 0 0 0 0 0 0 0
c      c      PIPE SURFACE SOURCES
c      c      199 196 201 197 200 198 202 203 206 207
c      c      0 0 0 0 0 0 0 0 0 0
c      c      204 205 208 209 252 248 260 256 255 251
c      c      0 0 0 0 0 0 0 0 0 0
c      c      263 259 272 271 277 273 253 249 262 257
c      c      0 0 0 0 0 0 0 0 0 0
c      c      254 250 261 258 278 274 279 275 281 276
c      c      0 0 0 0 0 0 0 0 0 0
c      c      288 287 285 284 286 282 283 280 296 295
c      c      0 0 0 0 0 0 0 0 0 0
c      c      292 291 303 302 304 305 306 307 75 309

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c          0  0  0  0  0  0  0  0  0  0
c c      314 315 313 342 343 344
c          0  0  0  0  0  0
c c      FIN SURFACE SOURCES
c c      228 231 232 233 237 236 239 238 244 242
c c      400 400 401 402 400 400 401 402 400 400
c c      243 246 319 318 317 316 293 294
c c      403 404 400 400 405 406 407 407
sc9      Z*****
c      68 65 67 63 11 2 9 3 10 1
ds9 s    0  0  0  0  0  0  0  0  0  0
c      15 7 104 101 269 267 94 88 81
c          0  0  0  0  0  0  0  0  0
c c      UPPER/LOWER PLATE SOURCES
c c      193 194 212 211 215 214 217 218 220 221
c ds9 s    0  0  0  0  0  0  0  0  0  0
c c      223 224 226 227 265 264 297 290 321 320
c c          0  0  0  0  0  0  0  0  0  0
c c      311 310
c c          0  0
c c      OUTER PLATE SOURCES
c c      195 210 213 216 219 222 225 247 289 322 312
c c          0  0  0  0  0  0  0  0  0  0  0
c c      PIPE SURFACE SOURCES
c c      199 196 201 197 200 198 202 203 206 207
c c          0  0  0  0  0  0  0  0  0  0
c c      204 205 208 209 252 248 260 256 255 251
c c          0  0  0  0  0  0  0  0  0  0
c c      263 259 272 271 277 273 253 249 262 257
c c          0  0  0  0  0  0  0  0  0  0
c c      254 250 261 258 278 274 279 275 281 276
c c          0  0  0  0  0  0  0  0  0  0
c c      288 287 285 284 286 282 283 280 296 295
c c          0  0  0  0  0  0  0  0  0  0
c c      292 291 303 302 304 305 306 307 75 309
c c          0  0  0  0  0  0  0  0  0  0
c c      314 315 313 342 343 344
c c          0  0  0  0  0  0
c c      FIN SURFACE SOURCES
c c      228 231 232 233 237 236 239 238 244 242
c c      500 500 500 500 501 501 501 501 502 502
c c      243 246 319 318 317 316 293 294
c c      502 502 503 503 503 503 504 504
sc20 Cone Radius
si20 0 7
sp20 -21 1
sc21 Pipe Radius
si21 0 7.3165
sp21 -21 1
sc22 Slant Pipe Radius
si22 0 7.317
sp22 -21 1
sc23 Small Pipe Radius
si23 0 4.859
sp23 -21 1
sc24 Upper Slant Pipe Radius
si24 0 4.86
sp24 -21 1
sc25 INLET LEG Source Radius
si25 28.8925 43.815
sp25 -21 1
sc26 INLET Source Radius
si26 0 35.56
sp26 -21 1
sc200 PLATE Source Radius
si200 0 55.88
sp200 -21 1
sc201 OUTER PLATE Source Radius
si201 55.88 55.98

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sp201 -21 1
sc202 NOZZLE FILM Source Radius
si202 6.02 8.32
sp202 -21 1
sc203 END NOZZLE FILM Source Radius
si203 0 8.22
sp203 -21 1
sc204 PIPE CONE FILM Source Radius
si204 7 8.6025
sp204 -21 1
sc205 PIPE FILM Source Radius
si205 8.4137 8.5137
sp205 -21 1
sc206 SLANTED PIPE FILM Source Radius
si206 8.4136 8.5138
sp206 -21 1
sc207 SMALL PIPE FILM Source Radius
si207 5.715 5.815
sp207 -21 1
sc208 SMALL SLANTED PIPE FILM Source Radius
si208 5.714 5.816
sp208 -21 1
sc209 LARGE SLANTED PIPE END CAP FILM Source Radius
si209 12.2
sp209 -21 1
sc210 SMALL SLANTED PIPE END CAP FILM Source Radius
si210 8.4
sp210 -21 1
sc211 large open pipe film Source Radius
si211 18.95 19.05
sp211 -21 1
sc212 large open pipe film Source Radius
si212 20.32 20.42
sp212 -21 1
sc213 inlet film Source Radius
si213 13.235 13.335
sp213 -21 1
sc214 inlet film Source Radius
si214 14.605 14.705
sp214 -21 1
sc215 inlet film Source Radius
si215 14.705 36.83
sp215 -21 1
sc216 inlet film Source Radius
si216 36.83 36.93
sp216 -21 1
sc217 inlet film Source Radius
si217 4.545 36.83
sp217 -21 1
sc218 rod film Source Radius
si218 4.445 4.545
sp218 -21 1
sc219 inlet cavity film Source Radius
si219 26.8875 45.185
sp219 -21 1
sc220 inlet cavity film Source Radius
si220 26.8875 26.9875
sp220 -21 1
sc221 inlet cavity film Source Radius
si221 45.085 45.185
sp221 -21 1
sc222 pump film Source Radius
si222 28.8925 45.185
sp222 -21 1
sc223 pump film Source Radius
si223 28.8925 28.9925
sp223 -21 1
sc224 pump case film Source Radius
si224 28.9925 45.085

sp224 -21 1
sc225 pump case film Source Radius
si225 45.085 45.185
sp225 -21 1
sc226 pump case film Source Radius
si226 38.2 45.085
sp226 -21 1
sc227 pump case film Source Radius
si227 38.1 38.2
sp227 -21 1
sc228 pump case film Source Radius
si228 18.8 38.2
sp228 -21 1
sc229 flange film Source Radius
si229 20.42 39.37
sp229 -21 1
sc230 flange film Source Radius
si230 39.37 39.47
sp230 -21 1
sc231 pump bottom
si231 4.545 45.185
sp231 -21 1
c EXTENT CARDS
sc30 Cone Extent
si30 -41.91 -13.2893
sp30 -21 0
sc31 Cone Extent
si31 13.2893 41.91
sp31 -21 0
sc32 Pipe Extent
si32 17.78 39.052
sp32 -21 0
sc33 Pipe Extent
si33- 39.052 433.5
sp33 -21 0
sc34 Slant Pipe Extent
si34 -50.3403 -12.6835
sp34 -21 0
sc35 Slant Pipe Extent
si35 12.6853 50.3403
sp35 -21 0
sc36 Upper Pipe Extent
si36 462 565.785
sp36 -21 0
sc37 Small Pipe Extent
si37 565.785 630.5
sp37 -21 0
sc38 Upper Slant Pipe Extent
si38 20 90
sp38 -21 0
sc39 Upper Slant Pipe Extent
si39 28.89 50.5816
sp39 -21 0
sc40 Upper Pipe Extent
si40 633.5 652.145
sp40 -21 0
sc41 INLET UPPER RING Source Extent
si41 652.145 693.42
sp41- -21 0
sc42 INLET Source Extent
si42 606.425 621.03
sp42 -21 0
sc43 INLET LEG Source Extent
si43 598.805 652.145
sp43 -21 0
c PLATE SOURCES
sc50 PLATE Source Extent
si50 -0.1 0
sp50 -21 0

sc51 PLATE Source Extent
si51 1.27 1.37
sp51 -21 0
sc52 PLATE Source Extent
si52 68.0037 68.1037
sp52 -21 0
sc53 PLATE Source Extent
si53 68.58 68.68
sp53 -21 0
sc54 PLATE Source Extent
si54 119.28 119.38
sp54 -21 0
sc55 PLATE Source Extent
si55 119.8562 119.9562
sp55 -21 0
sc56 PLATE Source Extent
si56 207.7037 207.8037
sp56 -21 0
sc57 PLATE Source Extent
si57 208.28 208.38
sp57 -21 0
sc58 PLATE Source Extent
si58 258.98 259.08
sp58 -21 0
sc59 PLATE Source Extent
si59 259.5562 259.6562
sp59 -21 0
sc60 PLATE Source Extent
si60 351.8487 351.9487
sp60 -21 0
sc61 PLATE Source Extent
si61 352.425 352.525
sp61 -21 0
sc62 PLATE Source Extent
si62 412.015 412.115
sp62 -21 0
sc63 PLATE Source Extent
si63 412.5912 412.6912
sp63 -21 0
sc64 PLATE Source Extent
si64 503.455 503.555
sp64 -21 0
sc65 PLATE Source Extent
si65 504.0312 504.1312
sp65 -21 0
sc66 PLATE Source Extent
si66 643.155 643.255
sp66 -21 0
sc67 PLATE Source Extent
si67 643.7312 643.8312
sp67 -21 0
sc68 PLATE Source Extent
si68 800.9525 801.0525
sp68 -21 0
sc69 PLATE Source Extent
si69 801.5287 801.6287
sp69 -21 0
sc70 PLATE Source Extent
si70 889.8525 889.9525
sp70 -21 0
sc71 PLATE Source Extent
si71 890.4356 890.5356
sp71 -21 0
c PLATE OUTER SOURCES
sc72 OUTER PLATE Source Extent
si72 -0.1 1.37
sp72 -21 0
sc73 OUTER PLATE Source Extent
si73 68.0037 68.68

sp73 -21 0
sc74 OUTER PLATE Source Extent
si74 119.28 119.9562
sp74 -21 0
sc75 OUTER PLATE Source Extent
si75 207.7037 208.38
sp75 -21 0
sc76 OUTER PLATE Source Extent
si76 258.98 259.6562
sp76 -21 0
sc77 OUTER PLATE Source Extent
si77 351.8487 352.525
sp77 -21 0
sc78 OUTER PLATE Source Extent
si78 412.015 412.6912
sp78 -21 0
sc79 OUTER PLATE Source Extent
si79 503.455 504.1312
sp79 -21 0
sc80 OUTER PLATE Source Extent
si80 643.155 643.8312
sp80 -21 0
sc81 OUTER PLATE Source Extent
si81 800.9525 801.6287
sp81 -21 0
sc82 OUTER PLATE Source Extent
si82 889.8525 890.5356
sp82 -21 0
c PIPE FILM SOURCES
sc83 THIN FILM Cone Extent
si83 -41.91 -12.0920
sp83 -21 0
sc84 THIN FILM Cone Extent
si84 12.0920 41.91
sp84 -21 0
sc85 THIN FILM END Cone Extent
si85 -12.192 -12.092
sp85 -21 0
sc86 THIN FILM END Cone Extent
si86 12.092 12.192
sp86 -21 0
sc87 LOWER SOURCE Pipe Extent
si87 39.052 259.08
sp87 -21 0
sc88 UPPER SOURCE Pipe Extent
si88 259.5562 433.5
sp88 -21 0
sc89 LOWER DUMMY Pipe Extent
si89 1.27 259.08
sp89 -21 0
sc90 SLANTED PIPE FILM Extent
si90 0 90
sp90 -21 0
sc91 Upper Pipe Extent
si91 462 569.595
sp91 -21 0
sc92 Slanted end cap Extent
si92 -11.5887 -11.4887
sp92 -21 0
sc93 Slanted end cap Extent
si93 11.4887 11.5887
sp93 -21 0
sc94 Slanted upper end cap Extent
si94 -51.535 -51.435
sp94 -21 0
sc95 Slanted upper end cap Extent
si95 51.435 51.535
sp95 -21 0
sc96 SMALL Slanted end cap Extent

si96 -51.5604 -51.4604
sp96 -21 0
sc97 SMALL Slanted end cap Extent
si97 51.4604 51.5604
sp97 -21 0
sc98 SMALL Slanted top top top end cap Extent
si98 -28.034 -27.934
sp98 -21 0
sc99 SMALL Slanted top top top end cap Extent
si99 27.934 28.034
sp99 -21 0
sc100 short pipe
si100 630 652.145
sp100 -21 0
sc101 large open pipe
si101 535.94 592.455
sp101 -21 0
sc102 INLET film
si102 596.265 606.425
sp102 -21 0
sc103 INLET film
si103 596.265 605.155
sp103 -21 0
sc104 INLET film
si104 605.055 605.155
sp104 -21 0
sc105 INLET film
si105 605.055 622.4
sp105 -21 0
sc106 INLET film
si106 622.3 622.4
sp106 -21 0
sc107 rod film
si107 622.3 652.145
sp107 -21 0
sc108 inlet cavity film
si108 597.435 597.535
sp108 -21 0
sc109 inlet cavity film
si109 597.535 652.145
sp109 -21 0
sc110 pump film
si110 652.145 694.69
sp110 -21 0
sc111 pump film
si111 694.69 694.79
sp111 -21 0
sc112 pump film
si112 694.79 715.645
sp112 -21 0
sc113 pump case film
si113 715.545 715.645
sp113 -21 0
sc114 pump case film
si114 715.545 718.6025
sp114 -21 0
sc115 pump case film
si115 718.5025 718.6025
sp115 -21 0
sc116 pump case film
si116 718.5025 782
sp116 -21 0
sc117 pump case film
si117 780.5 791.5275
sp117 -21 0
sc118 UPPER LARGE PIPE film
si118 791.5275 953.77
sp118 -21 0
sc119 flange film

si119 829.845 829.945
sp119 -21 0
sc120 flange film
si120 829.845 839.8875
sp120 -21 0
sc121 flange film
si121 839.7875 839.8875
sp121 -21 0
sc122 dummy cap
si122 569.595 569.695
sp122 -21 0
sc123 pump bottom
si123 652.045 652.145
sp123 -21 0
c AXIS
sc11 X Axis
si11 l 1 0 0
sp11 1
sc12 Y Axis
si12 l 0 1 0
sp12 1
sc13 Z Axis
si13 l 0 0 1
sp13 1
sc14 Axis -X & Z
si14 l -.7071068 0 .7071068
sp14 1
sc15 Axis X & Z
si15 l .7071068 0 .7071068
sp15 1
sc16 Axis -Y & Z
si16 l 0 -.7071068 .7071068
sp16 1
sc17 Axis Y & Z
si17 l 0 .7071068 .7071068
sp17 1
sc18 Axis -X & -Z
si18 l -.7071068 0 -.7071068
sp18 1
sc19 Axis X & -Z
si19 l .7071068 0 -.7071068
sp19 1
c X EXTENT
sc300 lower fin
si300 -39 -28.4
sp300 0 1
sc301 lower fin
si301 28.4 39
sp301 0 1
sc302 lower fin
si302 -.735 .735
sp302 0 1
sc303 upper fin
si303 -50.1062 -28.4
sp303 0 1
sc304 upper fin
si304 28.4 50.1062
sp304 0 1
sc305 pump fin
si305 -49.63 -20
sp305 0 1
sc306 pump fin
si306 20 49.63
sp306 0 1
sc307 pump side
si307 -16.61 -16.51
sp307 0 1
sc308 pump side
si308 16.51 16.61

sp308 0 1
c Y EXTENT
sc400 lower fin
si400 -92.235 -90.765
sp400 0 1
sc401 lower fin
si401 -130.5 -119.9
sp401 0 1
sc402 lower fin
si402 -63.1 -52.5
sp402 0 1
sc403 upper fin
si403 -141.6062 -119.9
sp403 0 1
sc404 upper fin
si404 -63.1 -41.3938
sp404 0 1
sc405 pump fin
si405 -141.13 -111.5
sp405 0 1
sc406 pump fin
si406 -71.5 -41.87
sp406 0 1
sc407 pump side
si407 -133.5 -49.5
sp407 0 1
c Z EXTENT
sc500 lower fin
si500 132.07 178.07
sp500 0 1
sc501 mid fin
si501 272.2 317.67
sp501 0 1
sc502 upper fin
si502 415.97 470.77
sp502 0 1
sc503 pump fin
si503 831.57 950.07
sp503 0 1
sc504 pump side
si504 658.605 713.215
sp504 0 1

APPENDIX C MCNP Film Source Description (from file idfilm_0)

```

c      82.43*1.446E+07*1000 =1.1919E+12
c FILM SOURCE
sdef   cel d1 erg d2 pos fcel d3 rad fcel d4 ext fcel d5 axs fcel d6
      x fcel d7 y fcel d8 z fcel d9
      wgt = 1.1919e+12 eff .001
#      si2    sp2
      l      d
      0      0
      1.500E-02 2.699E+05
      2.500E-02 4.147E+04
      3.750E-02 8.726E+05
      5.750E-02 4.447E+04
      8.500E-02 2.107E+04
      1.250E-01 6.175E+04
      2.250E-01 2.458E+04
      3.750E-01 7.830E+03
      6.620E-01 1.296E+07
      8.500E-01 5.944E+04
      1.250E+00 9.904E+04
      1.750E+00 1.987E+03
      2.250E+00 1.927E-01
      2.750E+00 6.331E-04
      3.500E+00 6.718E-05
      5.000E+00 2.851E-05
      7.000E+00 3.260E-06
      1.100E+01 3.727E-07
      TOTAL 1.446E+07
c      si1    sp1
#      l      d
c      c      CELL SOURCES
c      68 3086.20
c      65 3086.20
c      67 2387.00
c      63 2369.00
c      11 65740.00
c      2 65280.00
c      9 8959.00
c      3 8957.00
c      10 16360.00
c      1 16440.00
c      15 4488.00
c      7 4526.00
c      104 1541.00
c      101 1550.00
c      269 1712.00
c      267 1715.00
c      94 140688.00
c      88 57723.60
c      81 42870.00
c      UPPER/LOWER PLATE SOURCES
      193 980.99
      194 936.50
      212 889.70
      211 889.70
      215 889.70
      214 889.70
      217 889.70
      218 889.70
      220 889.70
      221 889.70
      223 889.70
      224 889.70
      226 889.70
      227 889.70

```

265 890.00
264 890.00
297 806.70
290 805.50
321 834.90
320 834.90
311 849.99
310 849.99

c OUTER PLATE SOURCES

195 0
210 0
213 0
216 0
219 0
222 0
225 0
247 0
289 0
322 0
312 0

c PIPE SURFACE SOURCES

199 80.07
196 79.64
201 21.14
197 21.14
200 82.22
198 81.68
202 1114.00
203 1165.00
206 858.90
207 897.40
204 1373.00
205 1331.00
208 901.30
209 874.70
252 222.40
248 222.40
260 223.40
256 222.40
255 520.80
251 528.30
263 547.90
259 538.80
272 217.60
271 219.70
277 61.79
273 63.19
253 31.44
249 33.09
262 30.81
257 30.87
254 32.03
250 31.84
261 30.53
258 31.45
278 15.16
274 14.95
279 9.33
275 8.82
281 41.29
276 41.44
288 674.68
287 723.33
285 84.81
284 81.86
286 290.00
282 283.50
283 351.50
280 82.95

296	126.80			
295	255.40			
292	377.60			
291	1206.54			
303	379.16			
302	379.25			
304	374.51			
305	86.71			
306	180.14			
307	1480.00			
308	319.20			
309	1888.00			
314	346.10			
315	248.00			
313	346.10			
342	22.77			
343	22.77			
344	461.62			
c	FIN SURFACE SOURCES			
228	81.84			
231	81.84			
232	78.54			
233	77.27			
237	79.92			
236	81.84			
239	78.54			
238	77.27			
244	148.70			
242	153.40			
243	146.80			
246	145.70			
319	546.50			
318	561.90			
317	544.70			
316	543.50			
293	181.20			
294	180.30			
sc3	POSITION			
c	ds3 l 0 -121.92 78.85			\$68
c	0 -121.92 78.85			\$65
c	-20.0025 -121.92 61.07			\$67
c	20.0025 -121.92 61.07			\$63
c	-20.0025 -121.92 61.07			\$11
c	20.0025 -121.92 61.07			\$2
c	0 -121.92 477.397			\$9
c	0 -121.92 477.397			\$3
c	-43.0212 -121.92 61.07			\$10
c	43.0212 -121.92 61.07			\$1
c	-45.7200 -121.92 61.07			\$15
c	45.7200 -121.92 61.07			\$7
c	0 -121.92 739.25			\$104
c	0 -121.92 739.25			\$101
c	-36.2458 -121.92 61.07			\$269
c	36.2458 -121.92 61.07			\$267
c	0 -121.92 61.07			\$94
c	0 -121.92 61.07			\$88
c	0 -121.92 61.07			\$81
c	UPPER/LOWER PLATE SOURCES			
ds3 l	0 -121.92 61.07			\$193
	0 -121.92 61.07			\$194
	0 -121.92 61.07			\$212
	0 -121.92 61.07			\$211
	0 -121.92 61.07			\$215
	0 -121.92 61.07			\$214
	0 -121.92 61.07			\$217
	0 -121.92 61.07			\$218
	0 -121.92 61.07			\$220
	0 -121.92 61.07			\$221
	0 -121.92 61.07			\$223

	0	-121.92	61.07	\$224
	0	-121.92	61.07	\$226
	0	-121.92	61.07	\$227
	0	-121.92	61.07	\$265
	0	-121.92	61.07	\$264
	0	-121.92	61.07	\$297
	0	-121.92	61.07	\$290
	0	-121.92	61.07	\$321
	0	-121.92	61.07	\$320
	0	-121.92	61.07	\$311
	0	-121.92	61.07	\$310
c	OUTER PLATE SOURCES			
	0	-121.92	61.07	\$195
	0	-121.92	61.07	\$210
	0	-121.92	61.07	\$213
	0	-121.92	61.07	\$216
	0	-121.92	61.07	\$219
	0	-121.92	61.07	\$222
	0	-121.92	61.07	\$225
	0	-121.92	61.07	\$247
	0	-121.92	61.07	\$289
	0	-121.92	61.07	\$322
	0	-121.92	61.07	\$312
c	PIPE SURFACE SOURCES			
	0	-121.92	78.85	\$199
	0	-121.92	78.85	\$196
	0	-121.92	78.85	\$201
	0	-121.92	78.85	\$197
	-20.0025	-121.92	61.07	\$200
	20.0025	-121.92	61.07	\$198
	-20.0025	-121.92	61.07	\$202
	20.0025	-121.92	61.07	\$203
	-20.0025	-121.92	61.07	\$206
	20.0025	-121.92	61.07	\$207
	0	-141.9225	61.07	\$204
	0	-101.9175	61.07	\$205
	0	-141.9225	61.07	\$208
	0	-101.9175	61.07	\$209
	0	-121.92	477.397	\$252
	0	-121.92	477.397	\$248
	0	-121.92	477.397	\$260
	0	-121.92	477.397	\$256
	-43.0212	-121.92	61.07	\$255 left source leg
	43.0212	-121.92	61.07	\$251 right source leg
	0	-164.9412	61.07	\$263 left dummy leg
	0	-78.8988	61.07	\$259 right dummy leg
	-45.7200	-121.92	61.07	\$272 left small leg
	45.7200	-121.92	61.07	\$271 right small leg
	0	-121.92	739.25	\$277 small slanted pipe
	0	-121.92	739.25	\$273 small slanted pipe
	0	-121.92	488.87	\$253 slanted end cap
	0	-121.92	488.87	\$249 slanted end cap
	0	-121.92	488.87	\$262 slanted end cap
	0	-121.92	488.87	\$257 slanted end cap
	0	-121.92	528.87	\$254 slanted top end cap
	0	-121.92	528.87	\$250 slanted top end cap
	0	-121.92	528.87	\$261 slanted top end cap
	0	-121.92	528.87	\$258 slanted top end cap
	0	-121.92	687.72	\$278 small slanted end cap
	0	-121.92	687.72	\$274 small slanted end cap
	0	-121.92	711.27	\$279 small slanted top end cap
	0	-121.92	711.27	\$275 small slanted top end cap
	-36.2458	-121.92	61.07	\$281 Short pipe
	36.2458	-121.92	61.07	\$276 Short pipe
	0	-121.92	61.07	\$288 Large open pipe
	0	-121.92	61.07	\$287 Large open pipe
	0	-121.92	61.07	\$285 INLET
	0	-121.92	61.07	\$284 INLET
	0	-121.92	61.07	\$286 INLET

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0 -121.92 61.07 $282 INLET
0 -121.92 61.07 $283 INLET
0 -121.92 61.07 $280 ROD
0 -121.92 61.07 $296 Inlet cavity film
0 -121.92 61.07 $295 inner Inlet cavity film
0 -121.92 61.07 $292 inner Inlet cavity film
0 -121.92 61.07 $291 pump film
0 -121.92 61.07 $303 pump film
0 -121.92 61.07 $302 pump film
0 -121.92 61.07 $304 pump case film
0 -121.92 61.07 $305 pump case film
0 -121.92 61.07 $306 pump case film
0 -121.92 61.07 $307 pump case film
0 -121.92 61.07 $308 cone pump case film
0 -121.92 61.07 $309 UPPER LARGE PIPE film
0 -121.92 61.07 $314 flange film
0 -121.92 61.07 $315 flange film
0 -121.92 61.07 $313 flange film
0 -164.9412 61.07 $342 left dummy leg cap
0 -78.8988 61.07 $343 right dummy leg cap
0 -121.92 61.07 $344 below pump
c FIN SURFACE SOURCES
0 0 0 $228 lower fin
0 0 0 $231 lower fin
0 0 0 $232 lower fin
0 0 0 $233 lower fin
0 0 0 $237 mid fin
0 0 0 $236 mid fin
0 0 0 $239 mid fin
0 0 0 $238 mid fin
0 0 0 $244 upper fin
0 0 0 $242 upper fin
0 0 0 $243 upper fin
0 0 0 $246 upper fin
0 0 0 $319 pump fin
0 0 0 $318 pump fin
0 0 0 $317 pump fin
0 0 0 $316 pump fin
0 0 0 $293 pump side
0 0 0 $294 pump side
sc4 RADIUS*****
c c 68 65 67 63 11 2 9 3 10 1
c ds4 s 20 20 21 21 21 21 22 22 21 21
c c 15 7 104 101 269 267 94 88 81
c c 23 23 24 24 21 21 25 26 25
c UPPER/LOWER PLATE SOURCES
c 193 194 212 211 215 214 217 218 220 221
ds4 s 200 200 200 200 200 200 200 200 200 200
c 223 224 226 227 265 264 297 290 321 320
c 200 200 200 200 200 200 200 200 200 200
c 311 310
c 200 200
c OUTER PLATE SOURCES
c 195 210 213 216 219 222 225 247 289 322 312
c 201 201 201 201 201 201 201 201 201 201
c PIPE SURFACE SOURCES
c 199 196 210 197 200 198 202 203 206 207
c 202 202 203 203 204 204 205 205 205 205
c 204 205 208 209 252 248 260 256 255 251
c 205 205 205 205 206 206 206 206 205 205
c 263 259 272 271 277 273 253 249 262 257
c 205 205 207 207 208 208 209 209 209 209
c 254 250 261 258 278 274 279 275 281 276
c 209 209 209 209 210 210 210 210 205 205
c 288 287 285 284 286 282 283 280 296 295
c 211 212 213 214 215 216 217 218 219 220
c 292 291 303 302 304 305 306 307 308 309
c 221 221 222 223 224 225 226 227 228 212
c 314 315 313 342 343 344

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229 230 229 205 205 231
c FIN SURFACE SOURCES
c 228 231 232 233 237 236 239 238 244 242
  0 0 0 0 0 0 0 0 0 0
c 243 246 319 318 317 316 293 294
  0 0 0 0 0 0 0 0
sc5 EXTENT*****
c 68 65 67 63 11 2 9 3 10 1
c ds5 s 30 31 32 32 33 33 90 90 36 36
c c 15 7 104 101 269 267 94 88 81
c 37 37 38 38 40 40 41 42 43
c UPPER/LOWER PLATE SOURCES
c 193 194 212 211 215 214 217 218 220 221
ds5 s 50 51 52 53 54 55 56 57 58 59
c 223 224 226 227 265 264 297 290 321 320
  60 61 62 63 64 65 66 67 68 69
c 311 310
  70 71
c OUTER PLATE SOURCES
c 195 210 213 216 219 222 225 247 289 322 312
  72 73 74 75 76 77 78 79 80 81 82
c PIPE SURFACE SOURCES
c 199 196 201 197 200 198 202 203 206 207
  83 84 85 86 32 32 87 87 88 88
c 204 205 208 209 252 248 260 256 255 251
  89 89 88 88 90 90 90 90 36 36
c 263 259 272 271 277 273 253 249 262 257
  91 91 37 37 38 38 92 93 92 93
c 254 250 261 258 278 274 279 275 281 276
  94 95 94 95 96 97 98 99 100 100
c 288 287 285 284 286 282 283 280 296 295
  101 101 102 103 104 105 106 107 108 109
c 292 291 303 302 304 305 306 307 308 309
  109 110 111 112 113 114 115 116 117 118
c 314 315 313 342 343 344
  119 120 121 122 122 123
c FIN SURFACE SOURCES
c 228 231 232 233 237 236 239 238 244 242
  0 0 0 0 0 0 0 0 0 0
c 243 246 319 318 317 316 293 294
  0 0 0 0 0 0 0 0
sc6 AXIS*****
c c 68 65 67 63 11 2 9 3 10 1
c ds6 s 11 11 13 13 13 13 14 15 13 13
c c 15 7 104 101 269 267 94 88 81
c 13 13 18 19 13 13 13 13 13
c UPPER/LOWER PLATE SOURCES
c 193 194 212 211 215 214 217 218 220 221
ds6 s 13 13 13 13 13 13 13 13 13 13
c 223 224 226 227 265 264 297 290 321 320
  13 13 13 13 13 13 13 13 13 13
c 311 310
  13 13
c OUTER PLATE SOURCES
c 195 210 213 216 219 222 225 247 289 322 312
  13 13 13 13 13 13 13 13 13 13 13
c PIPE SURFACE SOURCES
c 199 196 201 197 200 198 202 203 206 207
  11 11 11 11 13 13 13 13 13 13
c 204 205 208 209 252 248 260 256 255 251
  13 13 13 13 14 15 16 17 13 13
c 263 259 272 271 277 273 253 249 262 257
  13 13 13 13 18 19 11 11 12 12
c 254 250 261 258 278 274 279 275 281 276
  11 11 12 12 11 11 11 11 13 13
c 288 287 285 284 286 282 283 280 296 295
  13 13 13 13 13 13 13 13 13 13
c 292 291 303 302 304 305 306 307 308 309
  13 13 13 13 13 13 13 13 13 13
```

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c      314 315 313 342 343 344
      13 13 13 13 13 13
c      FIN SURFACE SOURCES
c      228 231 232 233 237 236 239 238 244 242
      0 0 0 0 0 0 0 0 0 0
c      243 246 319 318 317 316 293 294
      0 0 0 0 0 0 0 0
sc7    X*****
c      c      68 65 67 63 11 2 9 3 10 1
c      ds7 s 0 0 0 0 0 0 0 0 0 0
c      c      15 7 104 101 269 267 94 88 81
c      c      0 0 0 0 0 0 0 0 0
c      c      UPPER/LOWER PLATE SOURCES
c      c      193 194 212 211 215 214 217 218 220 221
ds7    s 0 0 0 0 0 0 0 0 0 0
c      223 224 226 227 265 264 297 290 321 320
      0 0 0 0 0 0 0 0 0 0
c      311 310
      0 0
c      OUTER PLATE SOURCES
c      195 210 213 216 219 222 225 247 289 322 312
      0 0 0 0 0 0 0 0 0 0
c      PIPE SURFACE SOURCES
c      199 196 201 197 200 198 202 203 206 207
      0 0 0 0 0 0 0 0 0 0
c      204 205 208 209 252 248 260 256 255 251
      0 0 0 0 0 0 0 0 0 0
c      263 259 272 271 277 273 253 249 262 257
      0 0 0 0 0 0 0 0 0 0
c      254 250 261 258 278 274 279 275 281 276
      0 0 0 0 0 0 0 0 0 0
c      288 287 285 284 286 282 283 280 296 295
      0 0 0 0 0 0 0 0 0 0
c      292 291 303 302 304 305 306 307 75 309
      0 0 0 0 0 0 0 0 0 0
c      314 315 313 342 343 344
      0 0 0 0 0 0
c      FIN SURFACE SOURCES
c      228 231 232 233 237 236 239 238 244 242
      300 301 302 302 300 301 302 302 303 304
c      243 246 319 318 317 316 293 294
      302 302 305 306 302 302 307 308
sc8    Y*****
c      c      68 65 67 63 11 2 9 3 10 1
c      ds8 s 0 0 0 0 0 0 0 0 0 0
c      c      15 7 104 101 269 267 94 88 81
c      c      0 0 0 0 0 0 0 0 0
c      c      UPPER/LOWER PLATE SOURCES
c      c      193 194 212 211 215 214 217 218 220 221
ds8    s 0 0 0 0 0 0 0 0 0 0
c      223 224 226 227 265 264 297 290 321 320
      0 0 0 0 0 0 0 0 0 0
c      311 310
      0 0
c      OUTER PLATE SOURCES
c      195 210 213 216 219 222 225 247 289 322 312
      0 0 0 0 0 0 0 0 0 0
c      PIPE SURFACE SOURCES
c      199 196 201 197 200 198 202 203 206 207
      0 0 0 0 0 0 0 0 0 0
c      204 205 208 209 252 248 260 256 255 251
      0 0 0 0 0 0 0 0 0 0
c      263 259 272 271 277 273 253 249 262 257
      0 0 0 0 0 0 0 0 0 0
c      254 250 261 258 278 274 279 275 281 276
      0 0 0 0 0 0 0 0 0 0
c      288 287 285 284 286 282 283 280 296 295
      0 0 0 0 0 0 0 0 0 0
c      292 291 303 302 304 305 306 307 75 309
      0 0 0 0 0 0 0 0 0 0

```

```

      0  0  0  0  0  0  0  0  0  0
c    314 315 313 342 343 344
      0  0  0  0  0  0
c    FIN SURFACE SOURCES
c    228 231 232 233 237 236 239 238 244 242
      400 400 401 402 400 400 401 402 400 400
c    243 246 319 318 317 316 293 294
      403 404 400 400 405 406 407 407
sc9  Z*****
c    c      68 65 67 63 11 2 9 3 10 1
c    ds9 s    0 0 0 0 0 0 0 0 0 0
c    c      15 7 104 101 269 267 94 88 81
c    c      0 0 0 0 0 0 0 0 0 0
c    UPPER/LOWER PLATE SOURCES
c    193 194 212 211 215 214 217 218 220 221
ds9 s    0 0 0 0 0 0 0 0 0 0
c    223 224 226 227 265 264 297 290 321 320
      0 0 0 0 0 0 0 0 0 0
c    311 310
      0 0
c    OUTER PLATE SOURCES
c    195 210 213 216 219 222 225 247 289 322 312
      0 0 0 0 0 0 0 0 0 0
c    PIPE SURFACE SOURCES
c    199 196 201 197 200 198 202 203 206 207
      0 0 0 0 0 0 0 0 0 0
c    204 205 208 209 252 248 260 256 255 251
      0 0 0 0 0 0 0 0 0 0
c    263 259 272 271 277 273 253 249 262 257
      0 0 0 0 0 0 0 0 0 0
c    254 250 261 258 278 274 279 275 281 276
      0 0 0 0 0 0 0 0 0 0
c    288 287 285 284 286 282 283 280 296 295
      0 0 0 0 0 0 0 0 0 0
c    292 291 303 302 304 305 306 307 75 309
      0 0 0 0 0 0 0 0 0 0
c    314 315 313 342 343 344
      0 0 0 0 0 0
c    FIN SURFACE SOURCES
c    228 231 232 233 237 236 239 238 244 242
      500 500 500 500 501 501 501 501 502 502
c    243 246 319 318 317 316 293 294
      502 502 503 503 503 504 504
sc20 Cone Radius
si20 0 7
sp20 -21 1
sc21 Pipe Radius
si21 0 7.3165
sp21 -21 1
sc22 Slant Pipe Radius
si22 0 7.317
sp22 -21 1
sc23 Small Pipe Radius
si23 0 4.859
sp23 -21 1
sc24 Upper Slant Pipe Radius
si24 0 4.86
sp24 -21 1
sc25 INLET LEG Source Radius
si25 28.8925 43.815
sp25 -21 1
sc26 INLET Source Radius
si26 0 35.56
sp26 -21 1
sc200 PLATE Source Radius
si200 0 55.88
sp200 -21 1
sc201 OUTER PLATE Source Radius
si201 55.88 55.98

```

sp201 -21 1
sc202 NOZZLE FILM Source Radius
si202 6.02 8.32
sp202 -21 1
sc203 END NOZZLE FILM Source Radius
si203 0 8.22
sp203 -21 1
sc204 PIPE CONE FILM Source Radius
si204 7 8.6025
sp204 -21 1
sc205 PIPE FILM Source Radius
si205 8.4137 8.5137
sp205 -21 1
sc206 SLANTED PIPE FILM Source Radius
si206 8.4136 8.5138
sp206 -21 1
sc207 SMALL PIPE FILM Source Radius
si207 5.715 5.815
sp207 -21 1
sc208 SMALL SLANTED PIPE FILM Source Radius
si208 5.714 5.816
sp208 -21 1
sc209 LARGE SLANTED PIPE END CAP FILM Source Radius
si209 12.2
sp209 -21 1
sc210 SMALL SLANTED PIPE END CAP FILM Source Radius
si210 8.4
sp210 -21 1
sc211 large open pipe film Source Radius
si211 18.95 19.05
sp211 -21 1
sc212 large open pipe film Source Radius
si212 20.32 20.42
sp212 -21 1
sc213 inlet film Source Radius
si213 13.235 13.335
sp213 -21 1
sc214 inlet film Source Radius
si214 14.605 14.705
sp214 -21 1
sc215 inlet film Source Radius
si215 14.705 36.83
sp215 -21 1
sc216 inlet film Source Radius
si216 36.83 36.93
sp216 -21 1
sc217 inlet film Source Radius
si217 4.545 36.83
sp217 -21 1
sc218 rod film Source Radius
si218 4.445 4.545
sp218 -21 1
sc219 inlet cavity film Source Radius
si219 26.8875 45.185
sp219 -21 1
sc220 inlet cavity film Source Radius
si220 26.8875 26.9875
sp220 -21 1
sc221 inlet cavity film Source Radius
si221 45.085 45.185
sp221 -21 1
sc222 pump film Source Radius
si222 28.8925 45.185
sp222 -21 1
sc223 pump film Source Radius
si223 28.8925 28.9925
sp223 -21 1
sc224 pump case film Source Radius
si224 28.9925 45.085

sp224 -21 1
sc225 pump case film Source Radius
si225 45.085 45.185
sp225 -21 1
sc226 pump case film Source Radius
si226 38.2 45.085
sp226 -21 1
sc227 pump case film Source Radius
si227 38.1 38.2
sp227 -21 1
sc228 pump case film Source Radius
si228 18.8 38.2
sp228 -21 1
sc229 flange film Source Radius
si229 20.42 39.37
sp229 -21 1
sc230 flange film Source Radius
si230 39.37 39.47
sp230 -21 1
sc231 pump bottom
si231 4.545 45.185
sp231 -21 1
c EXTENT CARDS
sc30 Cone Extent
si30 -41.91 -13.2893
sp30 -21 0
sc31 Cone Extent
si31 13.2893 41.91
sp31 -21 0
sc32 Pipe Extent
si32 17.78 39.052
sp32 -21 0
sc33 Pipe Extent
si33 39.052 433.5
sp33 -21 0
sc34 Slant Pipe Extent
si34 -50.3403 -12.6835
sp34 -21 0
sc35 Slant Pipe Extent
si35 12.6853 50.3403
sp35 -21 0
sc36 Upper Pipe Extent
si36 462 565.785
sp36 -21 0
sc37 Small Pipe Extent
si37 565.785 630.5
sp37 -21 0
sc38 Upper Slant Pipe Extent
si38 20 90
sp38 -21 0
sc39 Upper Slant Pipe Extent
si39 28.89 50.5816
sp39 -21 0
sc40 Upper Pipe Extent
si40 633.5 652.145
sp40 -21 0
sc41 INLET UPPER RING Source Extent
si41 652.145 693.42
sp41 -21 0
sc42 INLET Source Extent
si42 606.425 621.03
sp42 -21 0
sc43 INLET LEG Source Extent
si43 598.805 652.145
sp43 -21 0
c PLATE SOURCES
sc50 PLATE Source Extent
si50 -0.1 0
sp50 -21 0

sc51 PLATE Source Extent
si51 1.27 1.37
sp51 -21 0
sc52 PLATE Source Extent
si52 68.0037 68.1037
sp52 -21 0
sc53 PLATE Source Extent
si53 68.58 68.68
sp53 -21 0
sc54 PLATE Source Extent
si54 119.28 119.38
sp54 -21 0
sc55 PLATE Source Extent
si55 119.8562 119.9562
sp55 -21 0
sc56 PLATE Source Extent
si56 207.7037 207.8037
sp56 -21 0
sc57 PLATE Source Extent
si57 208.28 208.38
sp57 -21 0
sc58 PLATE Source Extent
si58 258.98 259.08
sp58 -21 0
sc59 PLATE Source Extent
si59 259.5562 259.6562
sp59 -21 0
sc60 PLATE Source Extent
si60 351.8487 351.9487
sp60 -21 0
sc61 PLATE Source Extent
si61 352.425 352.525
sp61 -21 0
sc62 PLATE Source Extent
si62 412.015 412.115
sp62 -21 0
sc63 PLATE Source Extent
si63 412.5912 412.6912
sp63 -21 0
sc64 PLATE Source Extent
si64 503.455 503.555
sp64 -21 0
sc65 PLATE Source Extent
si65 504.0312 504.1312
sp65 -21 0
sc66 PLATE Source Extent
si66 643.155 643.255
sp66 -21 0
sc67 PLATE Source Extent
si67 643.7312 643.8312
sp67 -21 0
sc68 PLATE Source Extent
si68 800.9525 801.0525
sp68 -21 0
sc69 PLATE Source Extent
si69 801.5287 801.6287
sp69 -21 0
sc70 PLATE Source Extent
si70 889.8525 889.9525
sp70 -21 0
sc71 PLATE Source Extent
si71 890.4356 890.5356
sp71 -21 0
c PLATE OUTER SOURCES
sc72 OUTER PLATE Source Extent
si72 -0.1 1.37
sp72 -21 0
sc73 OUTER PLATE Source Extent
si73 68.0037 68.68

sp73 -21 0
sc74 OUTER PLATE Source Extent
si74 119.28 119.9562
sp74 -21 0
sc75 OUTER PLATE Source Extent
si75 207.7037 208.38
sp75 -21 0
sc76 OUTER PLATE Source Extent
si76 258.98 259.6562
sp76 -21 0
sc77 OUTER PLATE Source Extent
si77 351.8487 352.525
sp77 -21 0
sc78 OUTER PLATE Source Extent
si78 412.015 412.6912
sp78 -21 0
sc79 OUTER PLATE Source Extent
si79 503.455 504.1312
sp79 -21 0
sc80 OUTER PLATE Source Extent
si80 643.155 643.8312
sp80 -21 0
sc81 OUTER PLATE Source Extent
si81 800.9525 801.6287
sp81 -21 0
sc82 OUTER PLATE Source Extent
si82 889.8525 890.5356
sp82 -21 0
c PIPE FILM SOURCES
sc83 THIN FILM Cone Extent
si83 -41.91 -12.0920
sp83 -21 0
sc84 THIN FILM Cone Extent
si84 12.0920 41.91
sp84 -21 0
sc85 THIN FILM END Cone Extent
si85 -12.192 -12.092
sp85 -21 0
sc86 THIN FILM END Cone Extent
si86 12.092 12.192
sp86 -21 0
sc87 LOWER SOURCE Pipe Extent
si87 39.052 259.08
sp87 -21 0
sc88 UPPER SOURCE Pipe Extent
si88 259.5562 433.5
sp88 -21 0
sc89 LOWER DUMMY Pipe Extent
si89 1.27 259.08
sp89 -21 0
sc90 SLANTED PIPE FILM Extent
si90 0 90
sp90 -21 0
sc91 Upper Pipe Extent
si91 462 569.595
sp91 -21 0
sc92 Slanted end cap Extent
si92 -11.5887 -11.4887
sp92 -21 0
sc93 Slanted end cap Extent
si93 11.4887 11.5887
sp93 -21 0
sc94 Slanted upper end cap Extent
si94 -51.535 -51.435
sp94 -21 0
sc95 Slanted upper end cap Extent
si95 51.435 51.535
sp95 -21 0
sc96 SMALL Slanted end cap Extent

si96 -51.5604 -51.4604
sp96 -21 0
sc97 SMALL Slanted end cap Extent
si97 51.4604 51.5604
sp97 -21 0
sc98 SMALL Slanted top top top end cap Extent
si98 -28.034 -27.934
sp98 -21 0
sc99 SMALL Slanted top top top end cap Extent
si99 27.934 28.034
sp99 -21 0
sc100 short pipe
si100 630 652.145
sp100 -21 0
sc101 large open pipe
si101 535.94 592.455
sp101 -21 0
sc102 INLET film
si102 596.265 606.425
sp102 -21 0
sc103 INLET film
si103 596.265 605.155
sp103 -21 0
sc104 INLET film
si104 605.055 605.155
sp104 -21 0
sc105 INLET film
si105 605.055 622.4
sp105 -21 0
sc106 INLET film
si106 622.3 622.4
sp106 -21 0
sc107 rod film
si107 622.3 652.145
sp107 -21 0
sc108 inlet cavity film
si108 597.435 597.535
sp108 -21 0
sc109 inlet cavity film
si109 597.535 652.145
sp109 -21 0
sc110 pump film
si110 652.145 694.69
sp110 -21 0
sc111 pump film
si111 694.69 694.79
sp111 -21 0
sc112 pump film
si112 694.79 715.645
sp112 -21 0
sc113 pump case film
si113 715.545 715.645
sp113 -21 0
sc114 pump case film
si114 715.545 718.6025
sp114 -21 0
sc115 pump case film
si115 718.5025 718.6025
sp115 -21 0
sc116 pump case film
si116 718.5025 782
sp116 -21 0
sc117 pump case film
si117 780.5 791.5275
sp117 -21 0
sc118 UPPER LARGE PIPE film
si118 791.5275 953.77
sp118 -21 0
sc119 flange film

si119 829.845 829.945
sp119 -21 0
sc120 flange film
si120 829.845 839.8875
sp120 -21 0
sc121 flange film
si121 839.7875 839.8875
sp121 -21 0
sc122 dummy cap
si122 569.595 569.695
sp122 -21 0
sc123 pump bottom
si123 652.045 652.145
sp123 -21 0
c AXIS
sc11 X Axis
si11 l 1 0 0
sp11 1
sc12 Y Axis
si12 l 0 1 0
sp12 1
sc13 Z Axis
si13 l 0 0 1
sp13 1
sc14 Axis -X & Z
si14 l -.7071068 0 .7071068
sp14 1
sc15 Axis X & Z
si15 l .7071068 0 .7071068
sp15 1
sc16 Axis -Y & Z
si16 l 0 -.7071068 .7071068
sp16 1
sc17 Axis Y & Z
si17 l 0 .7071068 .7071068
sp17 1
sc18 Axis -X & -Z
si18 l -.7071068 0 -.7071068
sp18 1
sc19 Axis X & -Z
si19 l .7071068 0 -.7071068
sp19 1
c X EXTENT
sc300 lower fin
si300 -39 -28.4
sp300 0 1
sc301 lower fin
si301 28.4 39
sp301 0 1
sc302 lower fin
si302 -.735 .735
sp302 0 1
sc303 upper fin
si303 -50.1062 -28.4
sp303 0 1
sc304 upper fin
si304 28.4 50.1062
sp304 0 1
sc305 pump fin
si305 -49.63 -20
sp305 0 1
sc306 pump fin
si306 20 49.63
sp306 0 1
sc307 pump side
si307 -16.61 -16.51
sp307 0 1
sc308 pump side
si308 16.51 16.61

sp308 0 1
c Y EXTENT
sc400 lower fin
si400 -122.655 -121.185
sp400 0 1
sc401 lower fin
si401 -160.92 -150.32
sp401 0 1
sc402 lower fin
si402 -93.52 -82.92
sp402 0 1
sc403 upper fin
si403 -172.0262 -150.32
sp403 0 1
sc404 upper fin
si404 -93.52 -71.8138
sp404 0 1
sc405 pump fin
si405 -171.55 -141.92
sp405 0 1
sc406 pump fin
si406 -101.92 -72.29
sp406 0 1
sc407 pump side
si407 -163.92 -79.92
sp407 0 1
c Z EXTENT
sc500 lower fin
si500 132.07 178.07
sp500 0 1
sc501 mid fin
si501 272.2 317.67
sp501 0 1
sc502 upper fin
si502 415.97 470.77
sp502 0 1
sc503 pump fin
si503 831.57 950.07
sp503 0 1
sc504 pump side
si504 658.605 713.215
sp504 0 1

APPENDIX D
MCNP Simulated Source Description (from file idfake_0)

```
c SIMULATED SOURCE
sdef erg d2 pos 0 -121.92 1358.06 rad d4 ext d5 axs 0 0 1
      wgt = 2.0E+10
#      si2      sp2
      l        d
      0        0
      1.500E-02 2.699E+05
      2.500E-02 4.147E+04
      3.750E-02 8.726E+05
      5.750E-02 4.447E+04
      8.500E-02 2.107E+04
      1.250E-01 6.175E+04
      2.250E-01 2.458E+04
      3.750E-01 7.830E+03
      6.620E-01 1.296E+07
      8.500E-01 5.944E+04
      1.250E+00 9.904E+04
      1.750E+00 1.987E+03
      2.250E+00 1.927E-01
      2.750E+00 6.331E-04
      3.500E+00 6.718E-05
      5.000E+00 2.851E-05
      7.000E+00 3.260E-06
      1.100E+01 3.727E-07
c      TOTAL 1.446E+07
sc4 Radius
si4 0 53
sp4 -21 1
sc5 Extent
si5 -337.35 211.29
sp5 -21 0
```

APPENDIX E

MCNP Input for the Internal Source Shipping Container Calculation (file icpdc)

```

PDC src PUMP model
1 1 -1.7400 -9 7 -5 -14 u=1
3 1 -1.7400 -7 11 -10 u=1
4 3 -7.8600 (((-12 13 -8 )(9 :5 ))(-9 :3 ))(7 :10 :-11 ) u=1
5 3 -7.8600 (-6 -9 8 -14 )(9 :5 ) u=1
2 1 -1.7400 9 -3 7 1 u=1
6 3 -7.8600 (9 8 -4 1 )(3 ) u=1
7 1 -1.7400 -204 202 -15 14 u=1
8 3 -7.8600 -204 203 15 -16 14 u=1
9 1 -1.7400 -21 24 -23 u=1
10 1 -1.7400 25 21 -19 -14 u=1
11 1 -1.7400 -25 21 -18 1 u=1
12 3 -7.8600 (((-22 27 -26 )(21 :-24 :23 ))(-25 :19 ))(25 :18 ) u=1
13 3 -7.8600 (-25 22 -17 1 )(18 ) u=1
14 3 -7.8600 (25 22 -20 -14 )(19 ) u=1
15 1 -1.7400 211 209 -28 14 u=1
16 3 -7.8600 -29 28 211 210 14 u=1
17 0 -30 38 -37 u=1
18 3 -7.8600 (((39 -40 -31 )(30 :37 :-38 ))(34 :36 ))(-36 :32 ) u=1
19 3 -7.8600 41 -42 -33 u=1
20 0 36 30 -32 42 u=1
21 3 -7.8600 (36 31 -33 42 )(32 ) u=1
22 3 -7.8600 44 -43 -35 u=1
23 3 -7.8600 (-36 31 -35 -44 )(34 ) u=1
24 0 -36 30 -34 -44 u=1
25 0 -49 53 -52 u=1
26 3 -7.8600 (((-50 -55 54 )(-53 :49 :52 ))(-51 :47 ))(51 :45 ) u=1
27 3 -7.8600 44 -43 -48 u=1
28 0 -44 51 49 -47 u=1
29 3 -7.8600 (51 50 -48 -44 )(47 ) u=1
30 0 -51 49 -45 42 u=1
31 3 -7.8600 (-51 50 -46 42 )(45 ) u=1
32 3 -7.8600 41 -42 -46 u=1
33 3 -7.8600 156 -57 58 -59 u=1
34 3 -7.8600 60 -56 61 -62 u=1
35 3 -7.8600 -64 57 -63 98 103 106 107 101 104 105 109 108 u=1
37 3 -7.8600 76 -73 -71 75 u=1
38 3 -7.8600 78 -77 -74 75 u=1
39 3 -7.8600 66 -79 -80 241 u=1
40 3 -7.8600 -66 -81 82 83 u=1
41 3 -7.8600 -86 79 -84 85 u=1
42 3 -7.8600 -88 -87 75 73 u=1
43 3 -7.8600 -78 89 -87 75 u=1
44 3 -7.8600 -66 -91 90 77 u=1
45 3 -7.8600 -78 -91 93 94 u=1
46 0 ((-66 -90 59 77 )(87 :88 :-73 :-75 ))(-75 :73 :-76 :71 ) u=1
47 0 95 -60 -96 u=1
48 3 -7.8600 -62 97 96 -60 u=1
49 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 99 -100 u=1
50 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 110 -111 u=1
51 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 112 -113 u=1
52 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 114 -115 u=1
53 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 116 -117 u=1
54 3 -7.8600 98 -102 108 105 109 104 101 107 106 103 118 -119 u=1
56 0 114 -58 -118 243 259 245 247 253 249 255 257 251 #52 #35 #53 u=1
57 3 -7.8600 122 -123 -124 u=1
58 0 -45 -41 123 u=1
59 0 -41 123 -32 u=1
60 3 -7.8600 -41 123 32 -33 u=1
61 3 -7.8600 -41 123 45 -46 u=1
62 6 -1.0000 (122 -123 124 -125 )(500 :-375 ) u=1
63 1 -1.7400 -127 130 129 -1 u=1
64 3 -7.8600 129 128 -1 -126 127 u=1
65 1 -1.7400 -130 133 -132 u=1

```

66	3	-7.8600	((-128 -128 -132 131)(132 :130 :-133))(127 :-129)	u=1
67	1	-1.7400	129 137 -134 -1	u=1
68	1	-1.7400	138 -137 -140	u=1
69	3	-7.8600	-135 136 129 134 -1	u=1
70	3	-7.8600	((-136 138 -139)(140 :137))(134 :-129)	u=1
71	3	-7.8600	-59 58 -156 155	u=1
72	3	-7.8600	-59 -155 58 56	u=1
73	3	-7.8600	58 -59 159 -97	u=1
74	3	-7.8600	161 -160 -158 157 -162	u=1
75	3	-7.8600	163 -162 -159 -161	u=1
76	3	-7.8600	-164 165 -166	u=1
77	3	-7.8600	-165 157 -166 167	u=1
78	3	-7.8600	168 -169 166 -170	u=1
79	3	-7.8600	(-157 171 167 -172):(-168 166 157 -161)	u=1
80	3	-7.8600	-171 -173 167 2 #95	u=1
81	1	-0.3660	(173 -184 -2 179 182 -180)(192 :188 :-189)	u=1
83	3	-7.8600	-172 184 -181 183 -2 178	u=1
84	3	-7.8600	(180 -181 -184 167 -2 178)(188 :192 :-189)	u=1
85	3	-7.8600	(-184 167 -182 183 178 -2)(188 :192 :-189)	u=1
86	3	-7.8600	-184 173 182 -180 -179 178	u=1
88	1	-0.3660	-187 -192 190 194	u=1
89	3	-7.8600	187 -188 -192 195	u=1
90	3	-7.8600	(189 -190 -192 191)	u=1
91	3	-7.8600	192 -193 -188 189 -183	u=1
92	3	-7.8600	-193 192 189 -188 181	u=1
94	1	-0.3660	-184 173 -177 2 #95	u=1
82	3	-7.8600	-176 177 -172 173	u=1
93	3	-7.8600	(-171 187 -195):(-187 190 -194)	u=1
95	3	-7.8	((((-2 -196 195 -172)(439:441))(-437:428)) (172:457:-458:-167))(443:441))(438:-437)	u=1
96	3	-7.8600	-186 185 195 -197	u=1
97	0		(((-165 -167 196)(-185 :197 :186))(171 :195)	u=1
98	0		-199 -200 164	u=1
99	3	-7.8600	(-201 -198 -201 164)(199 :200)	u=1
100	0		((((-161 168 -163 -159)(201 :198))(166 :164))(169 :170)	u=1
101	1	-1.7400	(-202 -205 206 -2)(-204 :430)	u=1
102	3	-7.8600	-172 184 -177 2 #95	u=1
103	3	-7.8600	((((-203 207 -208 -2)(202 :-206 :205))(15 :204)) (430 :-204))	u=1
104	1	-1.7400	(-212 -209 213 -2)(211 :432)	u=1
105	3	-7.8600	((((-434 -210 215 -2)(212 :209 :-213))(-211 :28)) (211 :432))	u=1
106	3	-7.8600	142 -141 -124 33 17 4 46	u=1
107	3	-7.8600	144 -143 -124 33 17 4 46	u=1
108	3	-7.8600	146 -145 -124 33 17 4 46	u=1
109	3	-7.8600	148 -147 -124 33 17 4 46	u=1
110	3	-7.8600	149 -150 -124 33 17 4 46	u=1
111	3	-7.8600	58 -59 217 -216	u=1
112	3	-7.8600	35 20 6 48 -124 151 -152	u=1
113	6	-1.0000	(-125 124 151 -152 20 35 6 48)(-375 :500)	u=1
114	6	-1.0000	(142 -141 -125 124)(-375 :500)	u=1
115	6	-1.0000	(144 -143 -125 124)(-375 :500)	u=1
116	6	-1.0000	(146 -145 -125 124)(-375 :500)	u=1
117	6	-1.0000	(148 -147 -125 124)(-375 :500)	u=1
118	6	-1.0000	(149 -150 -125 124)(-375 :500)	u=1
119	3	-7.8600	(((((153 -154 -124 195)(-167 :181 :172 :-183)) (-167 :181 :-183 :172))(433 :211))(-204 :431))(-207 :203)) (210 :434))	u=1
120	3	-7.8600	(167 -173 -2 178 182 -180)(188 :192 :-189)	u=1
121	6	-1.0000	(124 -125 153 -154)(-375 :500)	u=1
122	3	-7.8600	((((-124 59 218 -219)(290 :335 :-289 :-293)) (293 :290 :-289))(-265 :-264 :263 :-345))(265 :263 :-264 :-345))	u=1
123	3	-7.8600	-124 59 -221 220	u=1
124	3	-7.8600	-124 -223 222 59	u=1
125	3	-7.8600	-124 59 224 -225	u=1
126	3	-7.8600	-124 226 -227 59	u=1
127	3	-7.8600	-124 59 228 -229	u=1
128	3	-7.8600	-124 59 230 -231	u=1
129	3	-7.8600	-124 59 -233 232	u=1

130	6	-1.0000	(((((-125 124 218 -219)(290 :335 :-289 :-293))	
			(290 :-289 :293 :-337))(-265 :-264 :263 :344))	
			(265 :-264 :263 :-345))(-375 :500)	u=1
131	6	-1.0000	(220 -221 124 -125)(-375 :500)	u=1
132	6	-1.0000	(222 -223 124 -125)(-375 :500)	u=1
133	6	-1.0000	(224 -225 124 -125)(-375 :500)	u=1
134	6	-1.0000	(226 -227 124 -125)(-375 :500)	u=1
135	6	-1.0000	(228 -229 124 -125)(-375 :500)	u=1
136	6	-1.0000	(230 -231 124 -125)(-375 :500)	u=1
137	6	-1.0000	(232 -233 124 -125)(-375 :500)	u=1
138	3	-7.8600	235 -236 -238 237	u=1
139	3	-7.8600	-235 234 59 -239	u=1
140	3	-7.8600	240 -234 -239 79	u=1
141	3	-7.8600	-243 242 -63 60	u=1
142	3	-7.8600	258 -259 60 -63	u=1
143	3	-7.8600	246 -247 -63 60	u=1
144	3	-7.8600	-245 244 -63 60	u=1
145	3	-7.8600	-63 252 -253 60	u=1
146	3	-7.8600	248 -249 -63 60	u=1
147	3	-7.8600	250 -251 -63 60	u=1
148	3	-7.8600	-255 254 -63 60	u=1
149	3	-7.8600	256 -257 -63 60	u=1
150	0	-63 -256 60		u=1
151	0	-63 -254 60		u=1
152	0	-258 -63 60		u=1
153	0	-63 -242 60		u=1
154	0	-63 -246 60		u=1
155	0	-244 -63 60		u=1
156	0	-63 -250 60		u=1
157	0	-63 -248 60		u=1
158	0	-252 -63 60		u=1
159	3	-7.8600	-261 260 -262 -263 264 59 265	u=1
160	3	-7.8600	264 -263 59 -265 -267 266 268	u=1
161	3	-7.8600	264 -263 -262 269 -270 265 59	u=1
162	3	-7.8600	-272 271 268 -265 59 264 -263	u=1
163	3	-7.8600	-274 273 -262 264 -263 59 265	u=1
164	3	-7.8600	275 -276 268 -265 264 -263 59	u=1
165	3	-7.8600	277 -278 -291 59 289 -290 293	u=1
166	3	-7.8600	-279 280 292 -290 289 59 -293	u=1
167	3	-7.8600	281 -282 -291 -290 289 59 293	u=1
168	3	-7.8600	-284 283 292 -290 289 59 -293	u=1
169	3	-7.8600	-286 285 -291 -290 289 59 293	u=1
170	3	-7.8600	-288 287 292 289 -290 59 -293	u=1
171	3	-7.8600	-124 33 4 17 46 297 -296	u=1
172	6	-1.0000	(124 -125 297 -296)(-375 :500)	u=1
173	3	-7.8600	-294 -299 295 298 4 264 -263	u=1
174	3	-7.8600	-302 300 -301 298 4 264 -263	u=1
175	3	-7.8600	264 -263 4 -302 298 -304 303	u=1
176	3	-7.8600	17 -308 -306 307 305 264 -263	u=1
177	3	-7.8600	17 -263 264 309 -310 307 -308	u=1
178	3	-7.8600	-312 311 313 17 -263 264 -308	u=1
179	3	-7.8600	-315 314 -318 320 33 -290 289	u=1
180	3	-7.8600	-321 316 319 46 -290 289 -317	u=1
181	3	-7.8600	-324 320 -323 322 33 -290 289	u=1
182	3	-7.8600	-321 -327 325 326 46 -290 289	u=1
183	3	-7.8600	320 33 -329 328 -324 289 -290	u=1
184	3	-7.8600	-331 330 325 -321 46 289 -290	u=1
185	3	-7.8600	-189 332 -333 191	u=1
186	3	-7.8600	((-334 59 -335 336 293 -290 289)(-97 :56 :62))	
			(159 :162 :160)	u=1
188	0	(-95 -58 159)(-97 :-96)		u=1
189	0	-56 -61 60 -61 255 257 259 251 249 243 247 253 245		u=1
190	3	-7.8600	((-339 337 338 -293 59 -290 289)(-97 :56 :62))	
			(159 :162 :160)	u=1
191	3	-7.8600	((-340 -344 265 59 341 264 -263)(-97 :62 :56))	
			(159 :162 :160)	u=1
192	3	-7.8600	((-343 345 342 -265 59 264 -263)(56 :62 :-97))	
			(159 :162 :160)	u=1
193	1	-1.7400	(346 -122 -125)(500 :-375)	u=1

194	1	-1.7400	(123 -347 -125 46 46 33)(500 :-375)	u=1
195	1	-1.7400	(125 -348 -347 346)(500 :-375)	u=1
196	1	-1.7400	(-349 350 -132 128)(-129 :126)	u=1
197	1	-1.7400	-131 350 -128	u=1
198	1	-1.7400	-351 126 -1 349 129	u=1
199	1	-1.7400	(-352 136 138 -354)(-129 :135)	u=1
200	1	-1.7400	135 -353 -1 352 129	u=1
201	1	-1.7400	-354 139 -136	u=1
202	1	-1.7400	17 -355 1 -148 #106 #176 #107 #108 #177	u=1
203	1	-1.7400	-357 4 1 -148 #106 #107 #108 #175 #174	u=1
204	1	-1.7400	-358 46 347 50 -51 -148 #106 #107 #108 #182 #184	u=1
205	1	-1.7400	347 33 -356 -148 #106 #107 #108 #183 #181	u=1
206	1	-1.7400	17 -355 418 -25 147 #109 #171 #178 #110	u=1
207	1	-1.7400	412 9 -357 4 147 #109 #110 #173 #171	u=1
208	1	-1.7400	-358 46 347 424 -51 147 #110 #171 #180	u=1
209	1	-1.7400	33 -356 421 36 147 #179 #110 #171	u=1
210	1	-1.7400	(125 -348 -360 359)(-375 :500)	u=1
211	1	-1.7400	(141 -360 -125 355 356 357 358)(-375 :500)	u=1
212	1	-1.7400	(-125 355 356 357 358 -142 359)(-375 :500)	u=1
213	1	-1.7400	(-348 125 363 -362)(-375 :500)	u=1
214	1	-1.7400	(-125 355 356 357 358 143 -362)(-375 :500)	u=1
215	1	-1.7400	(-125 355 356 357 358 -144 363)(-375 :500)	u=1
216	1	-1.7400	(-348 125 -366 365)(-375 :500)	u=1
217	1	-1.7400	(-125 355 356 357 358 365 -146)(-375 :500)	u=1
218	1	-1.7400	(-125 355 356 357 358 145 -366)(-375 :500)	u=1
219	1	-1.7400	(368 -367 125 -348)(-375 :500)	u=1
220	1	-1.7400	(-125 355 356 357 358 -148 368)(-375 :500)	u=1
221	1	-1.7400	(-125 355 356 357 358 147 -367)(-375 :500)	u=1
222	1	-1.7400	(-370 369 125 -348)(-375 :500)	u=1
223	1	-1.7400	(-125 355 356 357 358 -297 369)(-375 :500)	u=1
224	1	-1.7400	(-125 355 356 357 358 296 -370)(-375 :500)	u=1
225	1	-1.7400	(371 -372 -348 125)(-375 :500)	u=1
226	1	-1.7400	(-125 355 356 357 358 -149 371)(-375 :500)	u=1
227	1	-1.7400	(-125 355 356 357 358 150 -372)(-375 :500)	u=1
228	1	-1.7400	355 -308 -376 377 378 -374 373 #176	u=1
230	0		(((((346 -375 -359)(347 :348))(349 :132 :-350)) (351 :1 :-129))(357 :-1))(352 :-138 :354))(353 :1 :-129)) (355 :-1))(358))(356))	u=1
231	1	-1.7400	373 -374 357 -380 298 -379 381 #175	u=1
232	1	-1.7400	-382 384 383 -321 358 385 -386 #184	u=1
233	1	-1.7400	320 356 -387 389 -388 385 -386 #183	u=1
234	0		(((((375 359 -363 356 355 358 357)(348 :360)) (-320 :388 :387 :-389 :-320 :-385 :386))(-373 :374 :380 :379:-381 :-298))(374 :-373 :376 :-377 :-378 :308))(386 :-385 :382 :-383 :-384 :321))	u=1
235	0		(-375 363 -365 355 356 357 358)(348 :362)	u=1
236	1	-1.7400	-380 391 -390 298 357 373 -374 #174	u=1
237	1	-1.7400	355 373 -374 393 -392 377 -308 #177	u=1
238	1	-1.7400	-388 320 -394 397 356 385 -386 #181	u=1
239	1	-1.7400	-321 -395 383 396 358 385 -386 #182	u=1
240	0		(((((365 -375 -368 358 355 356 357)(348 :366)) (-385 :386 :395 :-383 :-396 :321))(-385 :386 :394 :388 : -397 :-320))(374 :-373 :390 :380 :-298 :-391))(374 :-373 :392 :-377 :-393 :308))	u=1
241	0		(-375 368 -369 356 355 357 358)(348 :367)	u=1
242	1	-1.7400	-398 -399 400 298 357 373 -374 #173	u=1
244	1	-1.7400	-401 403 402 355 373 -374 -308 #178	u=1
246	1	-1.7400	-404 406 -405 320 356 385 -386 #179	u=1
243	1	-1.7400	-321 409 408 358 385 -386 -407 #180	u=1
245	0		(((((375 369 -371 32 356 355 357 358)(348 :370)) (404 :405 :-406 :-385 :386 :-320))(-385 :386 :407 :-408 : -409 :321))(398 :399 :-400 :374 :-373 :-298))(374 :-373 :308 :401 :-402 :-403))	u=1
247	1	-1.7400	(-348 125 -410 411)(-375 :500)	u=1
248	1	-1.7400	((8 -412 414 -413)(6 :9))(-9 :4)	u=1
249	1	-1.7400	-8 414 -13	u=1
250	1	-1.7400	12 -413 -8	u=1
251	1	-1.7400	(-415 6 412 -9 -14)(152 :-151)	u=1
252	1	-1.7400	((-418 22 -416 417)(20 :-25))(25 :17)	u=1

253	1	-1.7400	-22 -416 26	u=1
254	1	-1.7400	-27 417 -22	u=1
255	1	-1.7400	(-419 20 25 418 -14)(152 :-151)	u=1
256	1	-1.7400	((31 -421 420 -422)(35 :36))(33 :-36)	u=1
257	1	-1.7400	-39 420 -31	u=1
258	1	-1.7400	-422 40 -31	u=1
259	1	-1.7400	(-423 35 421 -36 -43)(152 :-151)	u=1
260	1	-1.7400	((-424 50 -425 426)(48 :-51))(46 :51)	u=1
261	1	-1.7400	426 -54 -50	u=1
262	1	-1.7400	-425 55 -50	u=1
263	1	-1.7400	(-427 48 424 51 -43)(152 :-151)	u=1
264	1	-1.7400	(152 -410 419 34 423 415 427 -125)(-375 :500)	u=1
265	1	-1.7400	(419 34 423 415 427 -125 411 -151)(-375 :500)	u=1
266	0		(((((((((-375 371 -411)(-426 :424 :425))(51 :358))	
			(-51 :427))(422 :421 :-420))(-36 :356))(36 :423))	
			(418 :416 :-417))(25 :355))(-25 :419))(412 :-414 :413))	
			(-9 :357))(9 :415))(372 :348)	u=1
267	1	-1.7400	204 -430 -2	u=1
268	3	-7.8600	430 -431 -2 204 203	u=1
269	1	-1.7400	-2 -432 -211	u=1
270	3	-7.8600	432 -433 -211 -2 210	u=1
271	1	-1.7400	-204 428 16 -435 14	u=1
272	1	-1.7400	211 210 -436 29 14	u=1
273	1	-1.7400	((203 -428 -429 437 -2)(16 :204))(-204 :431))	
			(-153 :154)	u=1
274	1	-1.7400	-429 208 -203	u=1
275	1	-1.7400	(-207 437 -203 -2)(-153 :154 :207)	u=1
276	1	-1.7400	(-438 431 -2 204 428)(-153 :154)	u=1
277	1	-1.7400	((-439 210 440 -441 -2)(436 :-211))(211 :433))	
			(-153 :154)	u=1
278	1	-1.7400	-215 440 -210	u=1
279	1	-1.7400	(434 -441 -210 -2)(-153 :154)	u=1
280	1	-1.7400	(-442 195 188 -2)(-153 :154)	u=1
281	1	-1.7400	(433 -443 -2 -211 439)(-153 :154)	u=1
282	1	-1.7400	(-445 193 -444 446)(-183 :181)	u=1
283	1	-1.7400	((-444 188 442 -193)(-167 :181 :-183))	
			(-167 :-183 :181)	u=1
284	1	-1.7400	-189 332 -447 333	u=1
285	1	-1.7400	-190 332 -191 448	u=1
286	1	-1.7400	((446 -189 -193 447)(-167 :-183 :181))	
			(-167 :180 :-183)	u=1
287	1	-1.7400	-449 59 -216 217	u=1
288	1	-1.7400	-58 450 -216 217	u=1
289	1	-1.7400	(-452 451 125 -348)(-375 :500)	u=1
290	1	-1.7400	((((((-125 154 -452 442)(211 :443))(439 :441))	
			(-204 :438))(428 :-437))(454 :-458 :457 :-455))(-375 :500)	u=1
291	1	-1.7400	-176 2 -454 172	u=1
292	1	-1.7400	(-454 172 458 -457 -2 178)(154 :-153)	u=1
293	1	-1.7400	((-183 458 -172 455 178 -2)(154 :-153))	
			(444 :445 :-446)	u=1
294	1	-1.7400	((181 -457 -172 455 178 -2)(-153 :154))	
			(-446 :444 :445)	u=1
295	1	-1.7400	((-167 455 -181 183 -2 178)(154 :-153))(444 :-446)	u=1
296	1	-1.7400	-454 458 -457 455 459 -178	u=1
297	1	-1.7400	((((((-125 451 -153 442)(211 :443))(439 :441))	
			(-204 :438))(428 :-437))(454 :-458 :457 :-455))(-375 :500)	u=1
298	0	-216 217 -450		u=1
299	0	-190 -448 332		u=1
300	0		(((((((((-375 411 -216)(427 :502))(423 :502))(449 :-217 :216))	
			(419 :14))(14 :415))(435 :-14))(436 :-14))(410 :348)	u=1
301	0		(((((((((216 -375 -451)(-332 :447 :190))(445 :-446 :444))	
			(442 :-444))(436 :-211))(211 :443))(441 :439 :-440))	
			(204 :435))(438 :-204))(428 :429 :-437))(454 :-458 :-455 :457	
			:-459)	u=1
302	1	-1.7400	173 -461 460 -171	u=1
303	1	-1.7400	176 173 -460 -454	u=1
304	1	-1.7400	462 -171 461 -172	u=1
305	1	-1.7400	172 -463 -466 462	u=1
306	1	-1.7400	157 -466 -172 465	u=1

```
307 1 -1.7400 (160 -465 157 -162 -159 ) #186 #190 #191 #192 u=1
308 1 -1.7400 -159 -467 162 -465 #186 #190 #191 #192 u=1
309 1 -1.7400 (((((-468 59 159 -469 )(56 :-97 ))(-220 :221 ))
(-218 :219 ))(263 :-264 :340 :344 :-341 :343 :-486 :-487 ))
(-289 :290 :-337 :-338 :339 :334 :335 :-336 )) u=1
310 1 -1.7400 (221 -471 -125 468 )(-375 :500 ) u=1
311 1 -1.7400 (470 -220 -125 468 )(-375 :500 ) u=1
312 1 -1.7400 (470 -471 125 -348 )(-375 :500 ) u=1
313 1 -1.7400 -62 56 -473 468 #186 #190 #191 #192 u=1
314 1 -1.7400 -62 -97 474 468 #186 #190 #191 #192 u=1
315 1 -1.7400 ((-475 62 474 -473 )(-289 :290 ))(263 :-264 ) u=1
316 1 -1.7400 (((-476 -477 468 478 293 385 -386 )(-474 :473 :475 ))
(159 :467 :465 ))(-489 :488 ) #186 u=1
317 1 -1.7400 (((-479 480 481 -293 468 385 -386 )(-474 :473 :475 ))
(159 :467 :465 ))(-489 :488 ) #190 u=1
318 1 -1.7400 (((-482 -483 265 468 484 373 -374 )(-474 :475 :473 ))
(159 :467 :465 ))(-489 :488 ) #191 u=1
319 1 -1.7400 (((-485 486 487 -265 468 373 -374 )(473 :475 :-474 ))
(159 :467 :465 ))(-489 :488 ) #192 u=1
320 1 -1.7400 (((-375 :500 )219 -488 -125 468 )(-345 :344 :
263 :-264 ))(335 :-337 :-289 :290 ) u=1
321 1 -1.7400 (((-375 :500 )-218 489 -125 468 )
(344 :263 :-264 :-345 ))(-289 :290 :-337 :335 ) u=1
322 1 -1.7400 (-488 489 -348 125 )(-375 :500 ) u=1
323 0 (((((((((-375 451 -462 )(503 :-437 :428 ))(503 :443 :211 :441 ))
(454 :460 :-503 ))(442 :503 ))(461 :462 :-177 ))(452 :348 ))
(454 :-458 :457 :-455 :503 ))(428 :-437 ))(-204 :438 :-437 :503 ))
(441 :439 ) u=1
324 0 (((((((462 -489 -375 )(463 :466 ))(465 :467 :159 ))(468 :-159 ))
(386 :477 :-385 :-293 :-478 ))(-385 :386 :-481 :-480 :293 ))
(-373 :374 :-486 :-487 :265 ))(374 :-373 :483 :-484 :-265 ) u=1
325 0 (((((((489 -375 -470 468 )(475 :-474 :473 ))(488 :348 ))
(374 :483 :-373 :482 :-265 ))(374 :-486 :-373 :485 :265 ))
(477 :386 :-385 :-480 :479 :476 ) u=1
326 0 ((470 -375 -222 59 )(469 :468 ))(348 :471 ) u=1
327 0 (((222 -375 -224 59 )(267 :-268 :-266 :261 :262 :-260 :
-264 :263 ))(278 :291 :-277 :-280 :279 :-292 :290 :-289 ))
(223 :125 ) u=1
328 0 (-375 224 -226 59 )(125 :225 ) u=1
329 0 ((((-375 226 -228 59 )(125 :227 ))(282 :291 :-281 :-283 :284 :-292
:290 :-289 ))(270 :262 :-269 :-271 :-268 :272 :-264 :263 ) u=1
330 0 (-375 228 -230 59 )(125 :229 ) u=1
331 0 ((((-375 230 -232 59 )(125 :231 ))(-273 :262 :274 :276 :-268 :-275
:-264 :263 ))(286 :291 :-285 :-287 :-292 :288 :290 :-289 ) u=1
332 0 ((((((((-375 232 -66 59 )(125 :233 ))(-94 :91 :78 :-93 ))
(87 :78 :-75 :-89 ))(-78 :74 :77 :-75 ))(91 :-77 :66 ))
(81 :-82 :66 :-83 ) u=1
333 0 (-234 -240 59 66 )(-79 66 -241 59 ) u=1
334 0 (((((-375 66 -63 59 )(80 :79 ))(86 :84 :-85 :-79 ))(239 :235 ))
(236 :238 :-237 ))(64 :-57 ) u=1
c 335 0 ((-491 492 -493 )(-346 :500 :375 ))(501 :-500 :63) u=1
335 0 375 : 63 : -346 u=1 $ best guess as to what above meant
337 0 56 -58 -114 243 259 245 247 253 249 255 257 251 #49 #50 #51 u=1
338 0 114 -58 118 -63 243 259 245 247 253 249 255 257 251 #54 #35 u=1
c 339 0 (((((((500 375 -501 -66 -462 )(347 :348 ))(348 :-359 :360 ))
(362 :348 :-363 ))(366 :348 :-365 -462 ))(367 :348 :-368 ))
(370 :348 :-369 ))(372 :348 :-371 ))(410 :348 :-411 ))
(452 :348 :-451 ) u=1
c 340 0 ((375 66 -501 -63 )(80 :79 ))(84 :86 :-85 :-79 ) u=1
c 341 0 (((((((500 375 -501 -66 462 )(488 :348 :-489 ))(471 :348
:-470 ))
(223 :125 :-222 ))(225 :125 :-224 ))(227 :125 :-226 ))
(229 :125 :-228 ))(231 :125 :-230 ))(233 :125 :-232 )) u=1
c 342 1 -1.7400 43 -502 -427 u=1
343 1 -1.7400 43 -502 -423 u=1
344 1 -1.7400 (((((503 -2 442 -454 )(439 :441 ))(-437 :428 ))
(454 :457 :-458 :-455 ))(443 :441 ))(438 :-437 ) u=1
345 0 (-606 :663) -614 615 -613 u=2 $ outside cask
346 0 -602 -603 601 fill=1 trcl=7 u=2 $ movable universe
```

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347 0 607 -640 668 -639 u=2 $ FILLED void
348 0 640 -608 668 -639 u=2 $ FILLED void
350 3 -7.8600 #346 604 -613 -607 u=2 $ cask inner steel
351 0 607 639 -613 -608 u=2 $ cask void
352 3 -7.8600 (608:-605) 606 -613 -609 u=2 $ cask outer steel
353 3 -7.8600 609 -610 611 -612 u=2 $ cask steel added
354 0 609 -610 606 -611 u=2 $ cask outside air gap
355 0 609 -610 612 -613 u=2 $ cask outside air gap
356 0 613 -614 -616 #346 u=2 $ outside cask
357 0 -615:614:616 u=2 $ outside universe 2
358 0 -626 627 -628 fill=2 trcl=8
359 0 -122 -491 $ DIRT, PARTICLE ignored
360 0 122 -491 (641:-642:643) #362 #361 #368 #369 #370 $ AIR around universe 2
(-631:632:-633:634:-629:630)
361 3 -7.8600 619 -620 621 -622 617 -618 trcl=9 $ TRUCK
362 3 -7.8600 618 -625 621 -622 623 -624 #358 trcl=9 $ SHIELD
363 3 -7.8600 (-637:638:-635:636)631 -632 633 -634 629 -630 $ PLATFORM
364 0 637 -638 635 -636 629 -630 $ PLATFORM
365 0 605 -604 -607 u=2 $ void in bottom of cask
366 0 491 $ outside world
367 0 -641 642 -643 #358 #362 $ AIR around universe 2
368 3 -7.8600 630 -650 652 -653 656 -654 $ SHIELD
369 3 -7.8600 630 -650 652 -653 655 -657 $ SHIELD
370 3 -7.8600 630 -650 652 -651 654 -655 $ SHIELD
371 7 -6.84 607 -640 605 -660 u=2 $ FILLED lead
372 7 -6.84 640 -608 605 -660 u=2 $ FILLED lead
373 7 -6.84 607 -640 660 -661 u=2 $ FILLED lead
374 7 -6.84 640 -608 660 -661 u=2 $ FILLED lead
375 7 -6.84 607 -640 661 -662 u=2 $ FILLED lead
376 7 -6.84 640 -608 661 -662 u=2 $ FILLED lead
377 3 -4.1 607 -640 662 -668 u=2 $ FILLED steel
378 3 -4.1 640 -608 662 -668 u=2 $ FILLED steel
379 0 610 -663 606 -664 u=2 $ Lead Blanket
380 7 -11.4 610 -663 664 -665 u=2 $ Lead Blanket
381 0 610 -663 665 -666 u=2 $ Lead Blanket
382 0 610 -663 666 -667 u=2 $ Lead Blanket
383 0 610 -663 667 -613 u=2 $ Lead Blanket

```

```

1 pz 39.0520
2 pz 652.1450
3 c/z 20.0025 0.0000 7.3165
4 c/z 20.0025 0.0000 8.4137
5 c/z 43.0212 0.0000 7.3165
6 c/z 43.0212 0.0000 8.4137
7 1 c/z 31.5112 0.0000 7.3165
8 1 c/z 31.5112 0.0000 8.4137
9 1 px 31.5112
10 px 50.3403
11 px 12.6835
12 px 51.4350
13 px 11.5887
14 pz 565.7850
15 c/z 45.720 0.000 4.859
16 c/z 45.720 0.000 5.715
17 c/z -20.0025 0.0000 8.4137
18 c/z -20.0025 0.0000 7.3165
19 c/z -43.0212 0.0000 7.3165
20 c/z -43.0212 0.0000 8.4137
21 2 c/z -31.5112 0.0000 7.3165
22 2 c/z -31.5112 0.0000 8.4137
23 px -12.6835
24 px -50.3403
25 2 px -31.5112
26 px -11.5887
27 px -51.4350
28 c/z -45.720 0.000 4.859
29 c/z -45.720 0.000 5.715
30 3 c/z 0.0000 31.5112 7.3165
31 3 c/z 0.0000 31.5112 8.4137

```

32	c/z	0.0000	20.0025	7.3165
33	c/z	0.0000	20.0025	8.4137
34	c/z	0.0000	43.0212	7.3165
35	c/z	0.0000	43.0212	8.4137
36	3 py	31.5112		
37	py	50.3403		
38	py	12.6835		
39	py	11.5887		
40	py	51.4350		
41	pz	60.9600		
42	pz	62.2300		
43	pz	569.5950		
44	pz	568.3250		
45	c/z	0.0000	-20.0025	7.3165
46	c/z	0.0000	-20.0025	8.4137
47	c/z	0.0000	-43.0212	7.3165
48	c/z	0.0000	-43.0212	8.4137
49	4 c/z	0.0000	-31.5112	7.3165
50	4 c/z	0.0000	-31.5112	8.4137
51	4 py	-31.5112		
52	py	-12.6835		
53	py	-50.3403		
54	py	-51.4350		
55	py	-11.5887		
56	pz	839.7875		
57	pz	1756.4100		
58	cz	19.0500		
59	cz	20.3200		
60	pz	835.0250		
61	cz	17.7800		
62	cz	39.3700		
63	pz	1758.9500		
64	cz	50.8000		
66	pz	1471.9300		
71	cz	41.9100		
73	pz	1432.5600		
74	cz	51.4350		
75	cz	20.4787		
76	pz	1430.0200		
77	pz	1383.6650		
78	pz	1381.7600		
79	pz	1474.4700		
80	cz	55.8800		
81	cz	50.8000		
82	cz	49.5300		
83	pz	1449.0700		
84	cz	55.2450		
85	cz	52.7050		
86	pz	1489.7100		
87	cz	22.8600		
88	pz	1456.6900		
89	pz	1361.4400		
90	cz	42.5450		
91	cz	43.1800		
93	cz	41.9100		
94	pz	1352.5500		
95	pz	832.4850		
96	cz	15.0876		
97	pz	829.9450		
98	cz	3.8100		
99	pz	950.2775		
100	pz	951.5475		
101	c/z	-8.7986	-5.0800	3.1750
102	cz	18.669		
103	c/z	12.0985	6.9850	1.8250
104	c/z	8.7986	-5.0800	2.5400
105	c/z	0.0000	-10.1600	1.8250
106	c/z	0.0000	12.7000	2.5400
107	c/z	-12.0985	6.9850	2.5400

108	c/z	-6.9850	-12.0985	1.8250		
109	c/z	6.9850	-12.0985	2.5400		
110	pz	1059.4975				
111	pz	1060.7675				
112	pz	1171.2575				
113	pz	1172.5275				
114	pz	1281.7475				
115	pz	1283.0175				
116	pz	1392.2375				
117	pz	1393.5075				
118	pz	1502.7275				
119	pz	1503.9975				
122	pz	0.0000				
123	pz	1.2700				
124	cz	45.7200				
125	cz	55.8800				
126	k/z	20.0025	0.0000	-129.5400	0.0025	2.5400
127	k/z	20.0025	0.0000	-106.6800	0.0025	2.5400
128	k/x	127.0000	0.0000	17.7800	0.0051	0.0000
129	pz	17.7800				
130	k/x	109.2200	0.0000	17.7800	0.0051	0.0000
131	px	12.1920				
132	px	41.9100				
133	px	13.2893				
134	k/z	-20.0025	0.0000	-106.6800	0.0025	2.5400
135	k/z	-20.0025	0.0000	-129.5400	0.0025	2.5400
136	k/x	-127.0000	0.0000	17.7800	0.0051	2.5400
137	k/x	-109.2200	0.0000	17.7800	0.0051	0.0000
138	px	-41.9100				
139	px	-12.1920				
140	px	-13.2893				
141	pz	68.5800				
142	pz	68.1037				
143	pz	119.8562				
144	pz	119.3800				
145	pz	208.2800				
146	pz	207.8037				
147	pz	259.5562				
148	pz	259.0800				
149	pz	412.1150				
150	pz	412.5912				
151	pz	503.5550				
152	pz	504.0312				
153	pz	643.2550				
154	pz	643.7312				
155	pz	923.9250				
156	pz	1052.8300				
157	pz	718.5025				
158	pz	783.9075				
159	pz	791.5275				
160	cz	38.1000				
161	cz	37.1475				
162	kz	803.6560	2.7940	0.0000		
163	kz	802.8432	2.7940	0.0000		
164	pz	732.1550				
165	pz	730.8850				
166	cz	27.9400				
167	cz	26.9875				
168	pz	719.4550				
169	pz	721.3600				
170	cz	36.1950				
171	pz	715.6450				
172	cz	45.0850				
173	cz	28.8925				
176	pz	694.6900				
177	pz	693.4200				
178	pz	597.5350				
179	pz	598.8050				
180	px	15.2400				

181		px	16.5100
182		px	-15.2400
183		px	-16.5100
184		cz	43.8150
185		pz	674.3700
186		pz	693.4200
187		pz	621.0300
188		pz	622.3000
189		pz	605.1550
190		pz	606.4250
191		cz	13.3350
192		cz	35.5600
193		cz	36.8300
194		cz	2.5400
195		cz	4.4450
196		pz	655.9550
197		cz	17.1450
198		pz	751.8400
199		pz	750.5700
200		cz	13.3350
201		cz	14.6050
202	5	cz	4.8590
203	5	cz	5.7150
204	5	px	0.0000
205		px	50.5816
206		px	28.8900
207		px	28.0340
208		px	51.4604
209	6	cz	4.8590
210	6	cz	5.7150
211	6	px	0.0000
212		px	-28.8900
213		px	-50.5816
215		px	-51.4604
216		pz	592.4550
217		pz	535.9400
218		pz	801.0525
219		pz	801.5287
220		pz	889.9525
221		pz	890.4356
222		pz	958.5325
223		pz	959.0087
224		pz	1029.6525
225		pz	1030.1287
226		pz	1095.6925
227		pz	1096.1687
228		pz	1161.7325
229		pz	1162.2087
230		pz	1232.8525
231		pz	1233.3287
232		pz	1298.8925
233		pz	1299.3687
234		pz	1479.5500
235		pz	1483.3600
236		pz	1487.1700
237		cz	21.9075
238		cz	34.2900
239		cz	40.9600
240		cz	33.3400
241		cz	34.2900
242		cz	3.1359
243		cz	3.4529
244		c/z	0.0000 12.7000 2.0447
245		c/z	0.0000 12.7000 2.2022
246		c/z	-12.0985 6.9850 2.0447
247		c/z	-12.0985 6.9850 2.2022
248		c/z	8.7986 -5.0800 2.0447
249		c/z	8.7986 -5.0800 2.2022
250		c/z	6.9850 -12.0985 2.0447

251	c/z	6.9850	-12.0985	2.2022
252	c/z	12.0985	6.9850	1.3310
253	c/z	12.0985	6.9850	1.4910
254	c/z	0.0000	-10.1600	1.3310
255	c/z	0.0000	-10.1600	1.4910
256	c/z	-6.9850	-12.0985	1.3310
257	c/z	-6.9850	-12.0985	1.4910
258	c/z	-8.7986	-5.0800	2.6238
259	c/z	-8.7986	-5.0800	3.0150
260	p	-1.0000	0.0000	1.0000 941.7050
261	p	1.0000	0.0000	1.0000 1043.3050
262	px	45.0850		
263	py	0.6350		
264	py	-0.6350		
265	px	0.0000		
266	p	1.0000	0.0000	1.0000 941.7050
267	p	-1.0000	0.0000	1.0000 1043.3050
268	px	-45.0850		
269	p	-1.0000	0.0000	1.0000 1078.8650
270	p	1.0000	0.0000	1.0000 1179.4236
271	p	1.0000	0.0000	1.0000 1078.8650
272	p	-1.0000	0.0000	1.0000 1179.4236
273	p	-1.0000	0.0000	1.0000 1215.0598
274	p	1.0000	0.0000	1.0000 1316.6598
275	p	1.0000	0.0000	1.0000 1215.0598
276	p	-1.0000	0.0000	1.0000 1316.6598
277	p	0.0000	-1.0000	1.0000 941.7050
278	p	0.0000	1.0000	1.0000 1043.3050
279	p	0.0000	-1.0000	1.0000 1043.3050
280	p	0.0000	1.0000	1.0000 941.7050
281	p	0.0000	-1.0000	1.0000 1078.8650
282	p	0.0000	1.0000	1.0000 1179.4236
283	p	0.0000	1.0000	1.0000 1078.8650
284	p	0.0000	-1.0000	1.0000 1179.4236
285	p	0.0000	-1.0000	1.0000 1215.0598
286	p	0.0000	1.0000	1.0000 1316.6598
287	p	0.0000	1.0000	1.0000 1215.0598
288	p	0.0000	-1.0000	1.0000 1316.6598
289	px	-0.6350		
290	px	0.6350		
291	py	45.0850		
292	py	-45.0850		
293	py	0.0000		
294	p	1.0000	0.0000	1.0000 437.9912
295	p	-1.0000	0.0000	1.0000 326.5487
296	pz	352.4250		
297	pz	351.9487		
298	px	20.0025		
299	px	50.0062		
300	p	-1.0000	0.0000	1.0000 182.4037
301	p	1.0000	0.0000	1.0000 284.9562
302	px	38.8937		
303	p	-1.0000	0.0000	1.0000 42.7037
304	p	1.0000	0.0000	1.0000 145.2562
305	p	1.0000	0.0000	1.0000 42.7037
306	p	-1.0000	0.0000	1.0000 145.2562
307	px	-38.8937		
308	px	-20.0025		
309	p	1.0000	0.0000	1.0000 182.4037
310	p	-1.0000	0.0000	1.0000 284.9562
311	p	1.0000	0.0000	1.0000 326.5487
312	p	-1.0000	0.0000	1.0000 437.9912
313	px	-50.0062		
314	p	0.0000	-1.0000	1.0000 326.5487
315	p	0.0000	1.0000	1.0000 437.9912
316	p	0.0000	1.0000	1.0000 326.5487
317	p	0.0000	-1.0000	1.0000 437.9912
318	py	50.0062		
319	py	-50.0062		

320 py 20.0025
321 py -20.0025
322 p 0.0000 -1.0000 1.0000 182.4037
323 p 0.0000 1.0000 1.0000 284.9562
324 py 38.8937
325 py -38.8937
326 p 0.0000 1.0000 1.0000 182.4037
327 p 0.0000 -1.0000 1.0000 284.9562
328 p 0.0000 -1.0000 1.0000 42.7037
329 p 0.0000 1.0000 1.0000 145.2562
330 p 0.0000 1.0000 1.0000 42.7037
331 p 0.0000 -1.0000 1.0000 145.2562
332 pz 596.2650
333 cz 14.6050
334 p 0.0000 0.5799 1.0000 900.7475
335 py 49.5300
336 p 0.0000 -0.5800 1.0000 748.6650
337 py -49.5300
338 p 0.0000 0.5799 1.0000 748.6650
339 p 0.0000 -0.5799 1.0000 900.7475
340 p 0.5799 0.0000 1.0000 900.7475
341 p -0.5799 0.0000 1.0000 748.6650
342 p 0.5799 0.0000 1.0000 748.6650
343 p -0.5799 0.0000 1.0000 900.7475
344 px 49.5300
345 px -49.5300
346 pz -0.1000
347 pz 1.3700
348 cz 55.9800
349 k/x 128.0000 0.0000 17.7800 0.0051 0.0000
350 px 12.0920
351 k/z 20.0025 0.0000 -131.5400 0.0025 2.5400
352 k/x -128.0000 0.0000 17.7800 0.0051 0.0000
353 k/z -20.0025 0.0000 -131.5400 0.0025 2.5400
354 px -12.0920
355 c/z -20.0025 0.0000 8.5137
356 c/z 0.0000 20.0025 8.5137
357 c/z 20.0025 0.0000 8.5137
358 c/z 0.0000 -20.0025 8.5137
359 pz 68.0037
360 pz 68.6800
362 pz 119.9562
363 pz 119.2800
365 pz 207.7037
366 pz 208.3800
367 pz 259.6562
368 pz 258.9800
369 pz 351.8487
370 pz 352.5250
371 pz 412.0150
372 pz 412.6912
373 py -0.7350
374 py 0.7350
c 375 cz 53.3400
375 cz 57.3400
376 p -1.0000 0.0000 1.0000 145.3562
377 px -38.9937
378 p 1.0000 0.0000 1.0000 42.6037
379 p 1.0000 0.0000 1.0000 145.3562
380 px 38.9937
381 p -1.0000 0.0000 1.0000 42.6037
382 p 0.0000 -1.0000 1.0000 145.3562
383 py -38.9937
384 p 0.0000 1.0000 1.0000 42.6037
385 px -0.7350
386 px 0.7350
387 p 0.0000 1.0000 1.0000 145.3562
388 py 38.9937
389 p 0.0000 -1.0000 1.0000 42.6037

390 p 1.0000 0.0000 1.0000 285.0562
391 p -1.0000 0.0000 1.0000 182.3037
392 p -1.0000 0.0000 1.0000 285.0562
393 p 1.0000 0.0000 1.0000 182.3037
394 p 0.0000 1.0000 1.0000 285.0562
395 p 0.0000 -1.0000 1.0000 285.0562
396 p 0.0000 1.0000 1.0000 182.3037
397 p 0.0000 -1.0000 1.0000 182.3037
398 p 1.0000 0.0000 1.0000 438.0912
399 px 50.1062
400 p -1.0000 0.0000 1.0000 326.4487
401 p -1.0000 0.0000 1.0000 438.0912
402 px -50.1062
403 p 1.0000 0.0000 1.0000 326.4487
404 p 0.0000 1.0000 1.0000 438.0912
405 py 50.1062
406 p 0.0000 -1.0000 1.0000 326.4487
407 p 0.0000 -1.0000 1.0000 438.0912
408 py -50.1062
409 p 0.0000 1.0000 1.0000 326.4487
410 pz 504.1312
411 pz 503.4550
412 1 c/z 31.5112 0.0000 8.5137
413 px 51.5350
414 px 11.4887
415 c/z 43.0212 0.0000 8.5137
416 px -11.4887
417 px -51.5350
418 2 c/z -31.5112 0.0000 8.5137
419 c/z -43.0212 0.0000 8.5137
420 py 11.4887
421 3 c/z 0.0000 31.5112 8.5137
422 py 51.5350
423 c/z 0.0000 43.0212 8.5137
424 4 c/z 0.0000 -31.5112 8.5137
425 py -11.4887
426 py -51.5350
427 c/z 0.0000 -43.0212 8.5137
428 5 cz 5.8150
429 px 51.5604
430 c/z 36.2458 0.0000 7.3165
431 c/z 36.2458 0.0000 8.4137
432 c/z -36.2458 0.0000 7.3165
433 c/z -36.2458 0.0000 8.4137
434 px -28.0340
435 c/z 45.7200 0.0000 5.8150
436 c/z -45.7200 0.0000 5.8150
437 px 27.9340
438 c/z 36.2458 0.0000 8.5137
439 6 cz 5.8150
440 px -51.5604
441 px -27.9340
442 cz 4.5450
443 c/z -36.2458 0.0000 8.5137
444 pz 622.4000
445 cz 36.9300
446 pz 605.0550
447 cz 14.7050
448 cz 13.2350
449 cz 20.4200
450 cz 18.9500
451 pz 643.1550
452 pz 643.8312
454 cz 45.1850
455 cz 26.8875
457 px 16.6100
458 px -16.6100
459 pz 597.4350
460 pz 694.7900

461	cz	28.9925	
462	pz	715.5450	
463	cz	45.1850	
465	cz	38.2000	
466	pz	718.6025	
467	kz	803.7560	2.7940 0.0000
468	cz	20.4200	
469	pz	953.7700	
470	pz	889.8525	
471	pz	890.5356	
473	pz	839.8875	
474	pz	829.8450	
475	cz	39.4700	
476	p	0.0000	0.5799 1.0000 900.8475
477	py	49.6300	
478	p	0.0000	-0.5800 1.0000 748.5650
479	p	0.0000	-0.5799 1.0000 900.8475
480	py	-49.6300	
481	p	0.0000	0.5799 1.0000 748.5650
482	p	0.5799	0.0000 1.0000 900.8475
483	px	49.6300	
484	p	-0.5799	0.0000 1.0000 748.5650
485	p	-0.5799	0.0000 1.0000 900.8475
486	px	-49.6300	
487	p	0.5799	0.0000 1.0000 748.5650
488	pz	801.6287	
489	pz	800.9525	
491	so	40000.000	
492	pz	-1200	
493	pz	2900	
500	pz	0.2000	
501	cz	58.4200	
502	pz	569.6950	
503	pz	652.0450	
601	pz	-52.07	
602	cz	80.01	
603	pz	2000.	
604	pz	-57.15	
605	pz	-58.42	\$ Steel Bottom
606	pz	-63.5	
607	cz	81.28	
608	cz	86.36	
609	cz	87.1538	
610	cz	87.63	
611	pz	511.175	
612	pz	855.345	
613	pz	1525.905	
614	cz	89	\$ fill surface
615	pz	-64	\$ fill surface
616	pz	2500	\$ fill surface
617	pz	196.85	\$ truck
618	pz	198.12	\$ truck
619	py	-311.785	\$ truck
620	py	2299.208	\$ truck
621	px	-167.64	\$ truck
622	px	167.64	\$ truck
623	py	1525.905	\$ shield
624	py	1528.445	\$ shield
625	pz	411.48	\$ shield
626	cz	89.1	\$ trans surface
627	pz	-64.1	\$ trans surface
628	pz	2500.1	\$ trans surface
629	pz	454	\$ platform
630	pz	459.08	\$ platform
631	px	-160.02	\$ platform
632	px	160.02	\$ platform
633	py	-160.02	\$ platform
634	py	160.02	\$ platform
635	px	-30.48	\$ platform

636	px	30.48	\$ platform
637	py	-30.48	\$ platform
638	py	30.48	\$ platform
639	pz	1525.8	
640	cz	83.76	
641	c/y	0 305.105 92.71	
642	py	-2000	
643	py	5000	
650	pz	520.04	\$ platform
651	py	-31.75	\$ platform
652	py	-36.86	\$ platform
653	py	35.53	\$ platform
654	px	-31.75	\$ platform
655	px	31.75	\$ platform
656	px	-36.86	\$ platform
657	px	36.86	\$ platform
660	pz	-36.19	\$ lead Top (lead Bottom)
661	pz	25.4	\$ lead Top (lead Bottom)
662	pz	1095.38	\$ lead Top
663	cz	88.265	\$ Lead Blanket
664	pz	87.00	\$ Lead Blanket
665	pz	511.18	\$ Lead Blanket
666	pz	695.33	\$ Lead Blanket
667	pz	775.34	\$ Lead Blanket
668	pz	1095.38	\$ Steel Top
700	py	-1925.16	
701	py	-1894.68	
702	py	-1864.20	
703	py	-1833.72	
704	py	-1803.24	
705	py	-1772.76	
706	py	-1742.28	
707	py	-1711.80	
708	py	-1681.32	
709	py	-1650.84	
710	py	-1620.36	
711	py	-1589.88	
712	py	-1559.40	
713	py	-1528.92	
714	py	-1498.44	
715	py	-1467.96	
716	py	-1437.48	
717	py	-1407.00	
718	py	-1376.52	
719	py	-1346.04	
720	py	-1315.56	
721	py	-1285.08	
722	py	-1254.60	
723	py	-1224.12	
724	py	-1193.64	
725	py	-1163.16	
726	py	-1132.68	
727	py	-1102.20	
728	py	-1071.72	
729	py	-1041.24	
730	py	-1010.76	
731	py	-980.28	
732	py	-949.80	
733	py	-919.32	
734	py	-888.84	
735	py	-858.36	
736	py	-827.88	
737	py	-797.40	
738	py	-766.92	
739	py	-736.44	
740	py	-705.96	
741	py	-675.48	
742	py	-645.00	
743	py	-614.52	

744 py -584.04
 745 py -553.56
 746 py -523.08
 747 py -492.60
 748 py -462.12
 749 py -431.64
 750 py -401.16
 751 py -370.68
 752 py -340.20
 753 py -309.72
 754 py -279.24
 755 py -248.76
 756 py -218.28
 757 py -187.80
 758 py -157.32
 759 py -126.84
 760 py -96.36
 761 py -65.88
 762 py -35.40
 763 py -4.92
 764 py 25.56

*tr1 31.5119 0 492.4030 -45 90 -135 90 0 90 45 90 -45
 *tr2 -31.5119 0 492.4030 45 90 -45 90 0 90 135 90 45
 *tr3 0 31.5119 492.4030 0 90 90 90 -45 -135 90 45 -45
 *tr4 0 -31.5119 492.4030 0 90 90 90 45 -45 90 135 45
 *tr5 45.7200 0 632.4600 45 90 -45 90 0 90 135 90 45
 *tr6 -45.7200 0 632.4600 -45 90 -135 90 0 90 45 90 -45

tr7 0 0 0 1 0 0 0 1 0 0 0 1 1 \$ pump
 tr8 0 -1513.2 305.105 1 0 0 0 0 -1 0 1 0 1 \$ cask
 tr9 0 -1513.2 0 1 0 0 0 1 0 0 0 1 1 \$ truck

mode p
 phys:p 10 1 1

c 447.81*1.446E+07*1000 =6.4753E+12

sdef cel d1 erg d2 pos fcel d3 rad fcel d4 ext fcel d5 axs fcel d6
 x fcel d7 y fcel d8 z fcel d9
 wgt = 6.4753E+12 eff .001

si2 sp2
 l d

0 0
 1.500E-02 2.699E+05
 2.500E-02 4.147E+04
 3.750E-02 8.726E+05
 5.750E-02 4.447E+04
 8.500E-02 2.107E+04
 1.250E-01 6.175E+04
 2.250E-01 2.458E+04
 3.750E-01 7.830E+03
 6.620E-01 1.296E+07
 8.500E-01 5.944E+04
 1.250E+00 9.904E+04
 1.750E+00 1.987E+03
 2.250E+00 1.927E-01
 2.750E+00 6.331E-04
 3.500E+00 6.718E-05
 5.000E+00 2.851E-05
 7.000E+00 3.260E-06
 1.100E+01 3.727E-07
 c TOTAL 1.446E+07

si1 sp1
 l d

c CELL SOURCES (cell 346 in filled w/ universe 1)
 358:346:68 3086.20
 358:346:65 3086.20
 358:346:67 2387.00
 358:346:63 2369.00
 358:346:11 65740.00
 358:346:2 65280.00
 358:346:9 8959.00

358:346:3	8957.00
358:346:10	16360.00
358:346:1	16440.00
358:346:15	4488.00
358:346:7	4526.00
358:346:104	1541.00
358:346:101	1550.00
358:346:269	1712.00
358:346:267	1715.00
358:346:94	28007.65
358:346:88	12141.96
358:346:81	9017.55

c
sc3 POSITION

ds3	l	0	0	17.78	\$68
		0	0	17.78	\$65
		-20.0025	0	0	\$67
		20.0025	0	0	\$63
		-20.0025	0	0	\$11
		20.0025	0	0	\$2
		0	0	416.32753	\$9
		0	0	416.32753	\$3
		-43.0212	0	0	\$10
		43.0212	0	0	\$1
		-45.7200	0	0	\$15
		45.7200	0	0	\$7
		0	0	678.18	\$104
		0	0	678.18	\$101
		-36.2458	0	0	\$269
		36.2458	0	0	\$267
		0	0	0	\$94
		0	0	0	\$88
		0	0	0	\$81

sc4 RADIUS*****

c	68	65	67	63	11	2	9	3	10	1	
ds4	s	20	20	21	21	21	21	22	22	21	21
c	15	7	104	101	269	267	94	88	81		
		23	23	24	24	21	21	25	26	25	

sc5 EXTENT*****

c	68	65	67	63	11	2	9	3	10	1	
ds5	s	30	31	32	32	33	33	90	90	36	36
c	15	7	104	101	269	267	94	88	81		
		37	37	38	38	40	40	41	42	43	

sc6 AXIS*****

c	68	65	67	63	11	2	9	3	10	1	
ds6	s	11	11	13	13	13	13	14	15	13	13
c	15	7	104	101	269	267	94	88	81		
		13	13	18	19	13	13	13	13	13	

sc7 X*****

c	68	65	67	63	11	2	9	3	10	1	
ds7	s	0	0	0	0	0	0	0	0	0	0
c	15	7	104	101	269	267	94	88	81		
		0	0	0	0	0	0	0	0	0	

sc8 Y*****

c	68	65	67	63	11	2	9	3	10	1	
ds8	s	0	0	0	0	0	0	0	0	0	0
c	15	7	104	101	269	267	94	88	81		
		0	0	0	0	0	0	0	0	0	

sc9 Z*****

c	68	65	67	63	11	2	9	3	10	1	
ds9	s	0	0	0	0	0	0	0	0	0	0
c	15	7	104	101	269	267	94	88	81		
		0	0	0	0	0	0	0	0	0	

sc20 Cone Radius

si20	0	7
sp20	-21	1

sc21 Pipe Radius

si21	0	7.3165
sp21	-21	1

sc22 Slant Pipe Radius
si22 0 7.317
sp22 -21 1
sc23 Small Pipe Radius
si23 0 4.859
sp23 -21 1
sc24 Upper Slant Pipe Radius
si24 0 4.86
sp24 -21 1
sc25 INLET LEG Source Radius
si25 28.8925 43.815
sp25 -21 1
sc26 INLET Source Radius
si26 0 35.56
sp26 -21 1
sc200 PLATE Source Radius
si200 0 55.88
sp200 -21 1
sc201 OUTER PLATE Source Radius
si201 55.88 55.98
sp201 -21 1
sc202 NOZZLE FILM Source Radius
si202 6.02 8.32
sp202 -21 1
sc203 END NOZZLE FILM Source Radius
si203 0 8.22
sp203 -21 1
sc204 PIPE CONE FILM Source Radius
si204 7 8.6025
sp204 -21 1
sc205 PIPE FILM Source Radius
si205 8.4137 8.5137
sp205 -21 1
sc206 SLANTED PIPE FILM Source Radius
si206 8.4136 8.5138
sp206 -21 1
sc207 SMALL PIPE FILM Source Radius
si207 5.715 5.815
sp207 -21 1
sc208 SMALL SLANTED PIPE FILM Source Radius
si208 5.714 5.816
sp208 -21 1
sc209 LARGE SLANTED PIPE END CAP FILM Source Radius
si209 12.2
sp209 -21 1
sc210 SMALL SLANTED PIPE END CAP FILM Source Radius
si210 8.4
sp210 -21 1
sc211 large open pipe film Source Radius
si211 18.95 19.05
sp211 -21 1
sc212 large open pipe film Source Radius
si212 20.32 20.42
sp212 -21 1
sc213 inlet film Source Radius
si213 13.235 13.335
sp213 -21 1
sc214 inlet film Source Radius
si214 14.605 14.705
sp214 -21 1
sc215 inlet film Source Radius
si215 14.705 36.83
sp215 -21 1
sc216 inlet film Source Radius
si216 36.83 36.93
sp216 -21 1
sc217 inlet film Source Radius
si217 4.545 36.83
sp217 -21 1

sc218 rod film Source Radius
si218 4.445 4.545
sp218 -21 1
sc219 inlet cavity film Source Radius
si219 26.8875 45.185
sp219 -21 1
sc220 inlet cavity film Source Radius
si220 26.8875 26.9875
sp220 -21 1
sc221 inlet cavity film Source Radius
si221 45.085 45.185
sp221 -21 1
sc222 pump film Source Radius
si222 28.8925 45.185
sp222 -21 1
sc223 pump film Source Radius
si223 28.8925 28.9925
sp223 -21 1
sc224 pump case film Source Radius
si224 28.9925 45.085
sp224 -21 1
sc225 pump case film Source Radius
si225 45.085 45.185
sp225 -21 1
sc226 pump case film Source Radius
si226 38.2 45.085
sp226 -21 1
sc227 pump case film Source Radius
si227 38.1 38.2
sp227 -21 1
sc228 pump case film Source Radius
si228 18.8 38.2
sp228 -21 1
sc229 flange film Source Radius
si229 20.42 39.37
sp229 -21 1
sc230 flange film Source Radius
si230 39.37 39.47
sp230 -21 1
sc231 pump bottom
si231 4.545 45.185
sp231 -21 1
c EXTENT CARDS
sc30 Cone Extent
si30 -41.91 -13.2893
sp30 -21 0
sc31 Cone Extent
si31 13.2893 41.91
sp31 -21 0
sc32 Pipe Extent
si32 17.78 39.052
sp32 -21 0
sc33 Pipe Extent
si33 39.052 433.5
sp33 -21 0
sc34 Slant Pipe Extent
si34 -50.3403 -12.6835
sp34 -21 0
sc35 Slant Pipe Extent
si35 12.6853 50.3403
sp35 -21 0
sc36 Upper Pipe Extent
si36 462 565.785
sp36 -21 0
sc37 Small Pipe Extent
si37 565.785 630.5
sp37 -21 0
sc38 Upper Slant Pipe Extent
si38 20 90

sp38 -21 0
sc39 Upper Slant Pipe Extent
si39 28.89 50.5816
sp39 -21 0
sc40 Upper Pipe Extent
si40 633.5 652.145
sp40 -21 0
sc41 INLET UPPER RING Source Extent
si41 652.145 693.42
sp41 -21 0
sc42 INLET Source Extent
si42 606.425 621.03
sp42 -21 0
sc43 INLET LEG Source Extent
si43 598.805 652.145
sp43 -21 0
c PLATE SOURCES
sc50 PLATE Source Extent
si50 -0.1 0
sp50 -21 0
sc51 PLATE Source Extent
si51 1.27 1.37
sp51 -21 0
sc52 PLATE Source Extent
si52 68.0037 68.1037
sp52 -21 0
sc53 PLATE Source Extent
si53 68.58 68.68
sp53 -21 0
sc54 PLATE Source Extent
si54 119.28 119.38
sp54 -21 0
sc55 PLATE Source Extent
si55 119.8562 119.9562
sp55 -21 0
sc56 PLATE Source Extent
si56 207.7037 207.8037
sp56 -21 0
sc57 PLATE Source Extent
si57 208.28 208.38
sp57 -21 0
sc58 PLATE Source Extent
si58 258.98 259.08
sp58 -21 0
sc59 PLATE Source Extent
si59 259.5562 259.6562
sp59 -21 0
sc60 PLATE Source Extent
si60 351.8487 351.9487
sp60 -21 0
sc61 PLATE Source Extent
si61 352.425 352.525
sp61 -21 0
sc62 PLATE Source Extent
si62 412.015 412.115
sp62 -21 0
sc63 PLATE Source Extent
si63 412.5912 412.6912
sp63 -21 0
sc64 PLATE Source Extent
si64 503.455 503.555
sp64 -21 0
sc65 PLATE Source Extent
si65 504.0312 504.1312
sp65 -21 0
sc66 PLATE Source Extent
si66 643.155 643.255
sp66 -21 0
sc67 PLATE Source Extent

si67 643.7312 643.8312
sp67 -21 0
sc68 PLATE Source Extent
si68 800.9525 801.0525
sp68 -21 0
sc69 PLATE Source Extent
si69 801.5287 801.6287
sp69 -21 0
sc70 PLATE Source Extent
si70 889.8525 889.9525
sp70 -21 0
sc71 PLATE Source Extent
si71 890.4356 890.5356
sp71 -21 0
c PLATE OUTER SOURCES
sc72 OUTER PLATE Source Extent
si72 -0.1 1.37
sp72 -21 0
sc73 OUTER PLATE Source Extent
si73 68.0037 68.68
sp73 -21 0
sc74 OUTER PLATE Source Extent
si74 119.28 119.9562
sp74 -21 0
sc75 OUTER PLATE Source Extent
si75 207.7037 208.38
sp75 -21 0
sc76 OUTER PLATE Source Extent
si76 258.98 259.6562
sp76 -21 0
sc77 OUTER PLATE Source Extent
si77 351.8487 352.525
sp77 -21 0
sc78 OUTER PLATE Source Extent
si78 412.015 412.6912
sp78 -21 0
sc79 OUTER PLATE Source Extent
si79 503.455 504.1312
sp79 -21 0
sc80 OUTER PLATE Source Extent
si80 643.155 643.8312
sp80 -21 0
sc81 OUTER PLATE Source Extent
si81 800.9525 801.6287
sp81 -21 0
sc82 OUTER PLATE Source Extent
si82 889.8525 890.5356
sp82 -21 0
c PIPE FILM SOURCES
sc83 THIN FILM Cone Extent
si83 -41.91 -12.0920
sp83 -21 0
sc84 THIN FILM Cone Extent
si84 12.0920 41.91
sp84 -21 0
sc85 THIN FILM END Cone Extent
si85 -12.192 -12.092
sp85 -21 0
sc86 THIN FILM END Cone Extent
si86 12.092 12.192
sp86 -21 0
sc87 LOWER SOURCE Pipe Extent
si87 39.052 259.08
sp87 -21 0
sc88 UPPER SOURCE Pipe Extent
si88 259.5562 433.5
sp88 -21 0
sc89 LOWER DUMMY Pipe Extent
si89 1.27 259.08

sp89 -21 0
sc90 SLANTED PIPE FILM Extent
si90 0 90
sp90 -21 0
sc91 Upper Pipe Extent
si91 462 569.595
sp91 -21 0
sc92 Slanted end cap Extent
si92 -11.5887 -11.4887
sp92 -21 0
sc93 Slanted end cap Extent
si93 11.4887 11.5887
sp93 -21 0
sc94 Slanted upper end cap Extent
si94 -51.535 -51.435
sp94 -21 0
sc95 Slanted upper end cap Extent
si95 51.435 51.535
sp95 -21 0
sc96 SMALL Slanted end cap Extent
si96 -51.5604 -51.4604
sp96 -21 0
sc97 SMALL Slanted end cap Extent
si97 51.4604 51.5604
sp97 -21 0
sc98 SMALL Slanted top top top end cap Extent
si98 -28.034 -27.934
sp98 -21 0
sc99 SMALL Slanted top top top end cap Extent
si99 27.934 28.034
sp99 -21 0
sc100 short pipe
si100 630 652.145
sp100 -21 0
sc101 large open pipe
si101 535.94 592.455
sp101 -21 0
sc102 INLET film
si102 596.265 606.425
sp102 -21 0
sc103 INLET film
si103 596.265 605.155
sp103 -21 0
sc104 INLET film
si104 605.055 605.155
sp104 -21 0
sc105 INLET film
si105 605.055 622.4
sp105 -21 0
sc106 INLET film
si106 622.3 622.4
sp106 -21 0
sc107 rod film
si107 622.3 652.145
sp107 -21 0
sc108 inlet cavity film
si108 597.435 597.535
sp108 -21 0
sc109 inlet cavity film
si109 597.535 652.145
sp109 -21 0
sc110 pump film
si110 652.145 694.69
sp110 -21 0
sc111 pump film
si111 694.69 694.79
sp111 -21 0
sc112 pump film
si112 694.79 715.645

sp112 -21 0
sc113 pump case film
si113 715.545 715.645
sp113 -21 0
sc114 pump case film
si114 715.545 718.6025
sp114 -21 0
sc115 pump case film
si115 718.5025 718.6025
sp115 -21 0
sc116 pump case film
si116 718.5025 782
sp116 -21 0
sc117 pump case film
si117 780.5 791.5275
sp117 -21 0
sc118 UPPER LARGE PIPE film
si118 791.5275 953.77
sp118 -21 0
sc119 flange film
si119 829.845 829.945
sp119 -21 0
sc120 flange film
si120 829.845 839.8875
sp120 -21 0
sc121 flange film
si121 839.7875 839.8875
sp121 -21 0
sc122 dummy cap
si122 569.595 569.695
sp122 -21 0
sc123 pump bottom
si123 652.045 652.145
sp123 -21 0
c AXIS
sc11 X Axis
si11 1 1 0 0
sp11 1
sc12 Y Axis
si12 1 0 1 0
sp12 1
sc13 Z Axis
si13 1 0 0 1
sp13 1
sc14 Axis -X & Z
si14 1 -.7071068 0 .7071068
sp14 1
sc15 Axis X & Z
si15 1 .7071068 0 .7071068
sp15 1
sc16 Axis -Y & Z
si16 1 0 -.7071068 .7071068
sp16 1
sc17 Axis Y & Z
si17 1 0 .7071068 .7071068
sp17 1
sc18 Axis -X & -Z
si18 1 -.7071068 0 -.7071068
sp18 1
sc19 Axis X & -Z
si19 1 .7071068 0 -.7071068
sp19 1
c X EXTENT
sc300 lower fin
si300 -39 -28.4
sp300 0 1
sc301 lower fin
si301 28.4 39
sp301 0 1

```

sc302 lower fin
si302 -.735 .735
sp302 0 1
sc303 upper fin
si303 -50.1062 -28.4
sp303 0 1
sc304 upper fin
si304 28.4 50.1062
sp304 0 1
sc305 pump fin
si305 -49.63 -20
sp305 0 1
sc306 pump fin
si306 20 49.63
sp306 0 1
sc307 pump side
si307 -16.61 -16.51
sp307 0 1
sc308 pump side
si308 16.51 16.61
sp308 0 1
c Y EXTENT
sc400 lower fin
si400 -.735 .735
sp400 0 1
sc401 lower fin
si401 -39 -28.4
sp401 0 1
sc402 lower fin
si402 28.4 39
sp402 0 1
sc403 upper fin
si403 -50.1062 -28.4
sp403 0 1
sc404 upper fin
si404 28.4 50.1062
sp404 0 1
sc405 pump fin
si405 -49.63 -20
sp405 0 1
sc406 pump fin
si406 20 49.63
sp406 0 1
sc407 pump side
si407 -42 42
sp407 0 1
c Z EXTENT
sc500 lower fin
si500 71 117
sp500 0 1
sc501 mid fin
si501 210.5 256.6
sp501 0 1
sc502 upper fin
si502 354.9 409.7
sp502 0 1
sc503 pump fin
si503 770.5 889
sp503 0 1
sc504 pump side
si504 597.535 652.145
sp504 0 1
imp:p 1 336r 8 32 2 1 64 128 1 6r 128 3r 1 0 1 1 1 1
      8 32 8 32 8 32 8 32
      256 256 256 256 256
pd0 . 1 336r 1 1 1 .1 1 1 .1 11r 0 .1 1 1 1
      1 1 1 1 1 1 1
      1 1 1 1 1
m1 1001.50 .4372 $H 101 SY Slurry

```

```

6000.50 .0170 $C
7014.50 .0579 $N
8016.50 .3725 $O
11023.50 .0975 $Na
13027.50 .0113 $Al
15031.50 .0011 $P
17000.50 .0029 $Cl
19000.50 .0026 $K
m2      8016.50 .21 $O air number fraction
        7014.50 .79 $N
m3      26000.55 1.0 $Fe iron
m4      8016.50 -.4407 $O concrete weight fraction
        14000.50 -.2157 $Si
        20000.50 -.1306 $Ca
        26000.55 -.0788 $Fe
        13027.50 -.0607 $Al
        12000.50 -.0376 $Mg
        19000.50 -.0066 $K
        11023.50 -.0182 $Na
        22000.50 -.0049 $Ti
        1001.50 -.0031 $H
        25055.50 -.0013 $Mn
        15031.50 -.0009 $P
        16032.50 -.0009 $S
m5      14000.50 .2813 $Si hanford soil number fraction
        8016.50 .6556 $O
        13027.50 .0123 $Al
        26000.55 .0084 $Fe
        20000.50 .0149 $Ca
        12000.50 .0103 $Mg
        19000.50 .0022 $K
        11023.50 .0034 $Na
        1001.50 .0116 $H
m6      6000.50 1.0 $ RUBBER
m7      82000.50 -1.0 $LEAD
de0     log .01 .015 .02 .03 .04 .05
          .06 .08 .10 .15 .20 .30
          .40 .50 .60 .80 1.0 1.5
          2.0 3.0 4.0 5.0 6.0 8.0
          10. 12.
df0     log 2.232e-5 5.652e-5 8.568e-5 1.184e-4 1.314e-4 1.382e-4
          1.440e-4 1.624e-4 1.919e-4 2.797e-4 3.708e-4 5.616e-4
          7.416e-4 9.144e-4 1.076e-3 1.379e-3 1.656e-3 2.246e-3
          2.758e-3 3.672e-3 4.500e-3 5.292e-3 6.012e-3 7.488e-3
          8.892e-3 1.040e-2
prdm p j -240 1 3
ctme 120
c idum -1
fc2 Dose point on surface 641
f2:p 641
fs2 -700 -701 -702 -703 -704 -705 -706 -707 -708 -709
    -710 -711 -712 -713 -714 -715 -716 -717 -718 -719
    -720 -721 -722 -723 -724 -725 -726 -727 -728 -729
    -730 -731 -732 -733 -734 -735 -736 -737 -738 -739
    -740 -741 -742 -743 -744 -745 -746 -747 -748 -749
    -750 -751 -752 -753 -754 -755 -756 -757 -758 -759
    -760 -761 -762 -763 -764
sd2 17755 17755 17755 17755 17755 17755 17755 17755 17755 17755
    17755 17755 17755 17755 17755 17755 17755 17755 17755 17755
    17755 17755 17755 17755 17755 17755 17755 17755 17755 17755
    17755 17755 17755 17755 17755 17755 17755 17755 17755 17755
    17755 17755 17755 17755 17755 17755 17755 17755 17755 17755

```

APPENDIX F

MCNP Film Source Shipping Container Calculation (file ifpdc)

c 82.43*1.446E+07*1000 =1.192E+12
 sdef cel d1 erg d2 pos fcel d3 rad fcel d4 ext fcel d5 axs fcel d6
 x fcel d7 y fcel d8 z fcel d9
 wgt = 1.192E+12 eff .001

si2 sp2
 l d
 0 0
 1.500E-02 2.699E+05
 2.500E-02 4.147E+04
 3.750E-02 8.726E+05
 5.750E-02 4.447E+04
 8.500E-02 2.107E+04
 1.250E-01 6.175E+04
 2.250E-01 2.458E+04
 3.750E-01 7.830E+03
 6.620E-01 1.296E+07
 8.500E-01 5.944E+04
 1.250E+00 9.904E+04
 1.750E+00 1.987E+03
 2.250E+00 1.927E-01
 2.750E+00 6.331E-04
 3.500E+00 6.718E-05
 5.000E+00 2.851E-05
 7.000E+00 3.260E-06
 1.100E+01 3.727E-07
 TOTAL 1.446E+07

c
 # si1 sp1
 l d

c UPPER/LOWER PLATE SOURCES

358:346:193 980.99
 358:346:194 936.50
 358:346:212 889.70
 358:346:211 889.70
 358:346:215 889.70
 358:346:214 889.70
 358:346:217 889.70
 358:346:218 889.70
 358:346:220 889.70
 358:346:221 889.70
 358:346:223 889.70
 358:346:224 889.70
 358:346:226 889.70
 358:346:227 889.70
 358:346:265 890.00
 358:346:264 890.00
 358:346:297 806.70
 358:346:290 805.50
 358:346:321 834.90
 358:346:320 834.90
 358:346:311 849.99
 358:346:310 849.99

c OUTER PLATE SOURCES

358:346:195 51.66
 358:346:210 23.77
 358:346:213 23.76
 358:346:216 23.77
 358:346:219 23.76
 358:346:222 23.77
 358:346:225 23.77
 358:346:247 23.76
 358:346:289 23.76
 358:346:322 23.76
 358:346:312 24.01

c PIPE SURFACE SOURCES

358:346:199 80.07
358:346:196 79.64
358:346:201 21.14
358:346:197 21.14
358:346:200 82.22
358:346:198 81.68
358:346:202 1114.00
358:346:203 1165.00
358:346:206 858.90
358:346:207 897.40
358:346:204 1373.00
358:346:205 1331.00
358:346:208 901.30
358:346:209 874.70
358:346:252 222.40
358:346:248 222.40
358:346:260 223.40
358:346:256 222.40
358:346:255 520.80
358:346:251 528.30
358:346:263 547.90
358:346:259 538.80
358:346:272 217.60
358:346:271 219.70
358:346:277 61.79
358:346:273 63.19
358:346:253 31.44
358:346:249 33.09
358:346:262 30.81
358:346:257 30.87
358:346:254 32.03
358:346:250 31.84
358:346:261 30.53
358:346:258 31.45
358:346:278 15.16
358:346:274 14.95
358:346:279 9.33
358:346:275 8.82
358:346:281 41.29
358:346:276 41.44
358:346:288 674.68
358:346:287 723.33
358:346:285 84.81
358:346:284 81.86
358:346:286 290.00
358:346:282 283.50
358:346:283 351.50
358:346:280 82.95
358:346:296 126.80
358:346:295 255.40
358:346:292 377.60
358:346:291 1206.54
358:346:303 379.16
358:346:302 379.25
358:346:304 374.51
358:346:305 86.71
358:346:306 180.14
358:346:307 1480.00
358:346:308 319.20
358:346:309 1888.00
358:346:314 346.10
358:346:315 248.00
358:346:313 346.10
358:346:342 22.77
358:346:343 22.77
358:346:344 461.62
c FIN SURFACE SOURCES
358:346:228 81.84
358:346:231 81.84

	358:346:232	78.54	
	358:346:233	77.27	
	358:346:237	79.92	
	358:346:236	81.84	
	358:346:239	78.54	
	358:346:238	77.27	
	358:346:244	148.70	
	358:346:242	153.40	
	358:346:243	146.80	
	358:346:246	145.70	
	358:346:319	546.50	
	358:346:318	561.90	
	358:346:317	544.70	
	358:346:316	543.50	
	358:346:293	181.20	
	358:346:294	180.30	
sc3	POSITION		
c	UPPER/LOWER PLATE SOURCES		
ds3	l	0 0 0	\$193
		0 0 0	\$194
		0 0 0	\$212
		0 0 0	\$211
		0 0 0	\$215
		0 0 0	\$214
		0 0 0	\$217
		0 0 0	\$218
		0 0 0	\$220
		0 0 0	\$221
		0 0 0	\$223
		0 0 0	\$224
		0 0 0	\$226
		0 0 0	\$227
		0 0 0	\$265
		0 0 0	\$264
		0 0 0	\$297
		0 0 0	\$290
		0 0 0	\$321
		0 0 0	\$320
		0 0 0	\$311
		0 0 0	\$310
c	OUTER PLATE SOURCES		
		0 0 0	\$195
		0 0 0	\$210
		0 0 0	\$213
		0 0 0	\$216
		0 0 0	\$219
		0 0 0	\$222
		0 0 0	\$225
		0 0 0	\$247
		0 0 0	\$289
		0 0 0	\$322
		0 0 0	\$312
c	PIPE SURFACE SOURCES		
		0 0 17.78	\$199
		0 0 17.78	\$196
		0 0 17.78	\$201
		0 0 17.78	\$197
		-20.0025 0 0	\$200
		20.0025 0 0	\$198
		-20.0025 0 0	\$202
		20.0025 0 0	\$203
		-20.0025 0 0	\$206
		20.0025 0 0	\$207
		0 -20.0025 0	\$204
		0 20.0025 0	\$205
		0 -20.0025 0	\$208
		0 20.0025 0	\$209
		0 0 416.32753	\$252
		0 0 416.32753	\$248

0	0	416.32753	\$260
0	0	416.32753	\$256
-43.0212	0	0	\$255 left source leg
43.0212	0	0	\$251 right source leg
0	-43.0212	0	\$263 left dummy leg
0	43.0212	0	\$259 right dummy leg
-45.7200	0	0	\$272 left small leg
45.7200	0	0	\$271 right small leg
0	0	678.18	\$277 small slanted pipe
0	0	678.18	\$273 small slanted pipe
0	0	427.8	\$253 slanted end cap
0	0	427.8	\$249 slanted end cap
0	0	427.8	\$262 slanted end cap
0	0	427.8	\$257 slanted end cap
0	0	467.8	\$254 slanted top end cap
0	0	467.8	\$250 slanted top end cap
0	0	467.8	\$261 slanted top end cap
0	0	467.8	\$258 slanted top end cap
0	0	626.65	\$278 small slanted end cap
0	0	626.65	\$274 small slanted end cap
0	0	650.2	\$279 small slanted top end cap
0	0	650.2	\$275 small slanted top end cap
-36.2458	0	0	\$281 Short pipe
36.2458	0	0	\$276 Short pipe
0	0	0	\$288 Large open pipe
0	0	0	\$287 Large open pipe
0	0	0	\$285 INLET
0	0	0	\$284 INLET
0	0	0	\$286 INLET
0	0	0	\$282 INLET
0	0	0	\$283 INLET
0	0	0	\$280 ROD
0	0	0	\$296 Inlet cavity film
0	0	0	\$295 inner Inlet cavity film
0	0	0	\$292 inner Inlet cavity film
0	0	0	\$291 pump film
0	0	0	\$303 pump film
0	0	0	\$302 pump film
0	0	0	\$304 pump case film
0	0	0	\$305 pump case film
0	0	0	\$306 pump case film
0	0	0	\$307 pump case film
0	0	0	\$308 cone pump case film
0	0	0	\$309 UPPER LARGE PIPE film
0	0	0	\$314 flange film
0	0	0	\$315 flange film
0	0	0	\$313 flange film
0	-43.0212	0	\$342 left dummy leg cap
0	43.0212	0	\$343 right dummy leg cap
0	0	0	\$344 below pump
c	FIN	SURFACE SOURCES	
0	0	0	\$228 lower fin
0	0	0	\$231 lower fin
0	0	0	\$232 lower fin
0	0	0	\$233 lower fin
0	0	0	\$237 mid fin
0	0	0	\$236 mid fin
0	0	0	\$239 mid fin
0	0	0	\$238 mid fin
0	0	0	\$244 upper fin
0	0	0	\$242 upper fin
0	0	0	\$243 upper fin
0	0	0	\$246 upper fin
0	0	0	\$319 pump fin
0	0	0	\$318 pump fin
0	0	0	\$317 pump fin
0	0	0	\$316 pump fin
0	0	0	\$293 pump side
0	0	0	\$294 pump side

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sc4  RADIUS*****
c    UPPER/LOWER PLATE SOURCES
c    193 194 212 211 215 214 217 218 220 221
ds4  s 200 200 200 200 200 200 200 200 200 200
c    223 224 226 227 265 264 297 290 321 320
c    200 200 200 200 200 200 200 200 200 200
c    311 310
c    200 200
c    OUTER PLATE SOURCES
c    195 210 213 216 219 222 225 247 289 322 312
c    201 201 201 201 201 201 201 201 201 201 201
c    PIPE SURFACE SOURCES
c    199 196 210 197 200 198 202 203 206 207
c    202 202 203 203 204 204 205 205 205 205
c    204 205 208 209 252 248 260 256 255 251
c    205 205 205 205 206 206 206 206 205 205
c    263 259 272 271 277 273 253 249 262 257
c    205 205 207 207 208 208 209 209 209 209
c    254 250 261 258 278 274 279 275 281 276
c    209 209 209 209 210 210 210 210 205 205
c    288 287 285 284 286 282 283 280 296 295
c    211 212 213 214 215 216 217 218 219 220
c    292 291 303 302 304 305 306 307 308 309
c    221 221 222 223 224 225 226 227 228 212
c    314 315 313 342 343 344
c    229 230 229 205 205 231
c    FIN SURFACE SOURCES
c    228 231 232 233 237 236 239 238 244 242
c    0 0 0 0 0 0 0 0 0 0
c    243 246 319 318 317 316 293 294
c    0 0 0 0 0 0 0 0
sc5  EXTENT*****
c    UPPER/LOWER PLATE SOURCES
c    193 194 212 211 215 214 217 218 220 221
ds5  s 50 51 52 53 54 55 56 57 58 59
c    223 224 226 227 265 264 297 290 321 320
c    60 61 62 63 64 65 66 67 68 69
c    311 310
c    70 71
c    OUTER PLATE SOURCES
c    195 210 213 216 219 222 225 247 289 322 312
c    72 73 74 75 76 77 78 79 80 81 82
c    PIPE SURFACE SOURCES
c    199 196 201 197 200 198 202 203 206 207
c    83 84 85 86 32 32 87 87 88 88
c    204 205 208 209 252 248 260 256 255 251
c    89 89 88 88 90 90 90 90 36 36
c    263 259 272 271 277 273 253 249 262 257
c    91 91 37 37 38 38 92 93 92 93
c    254 250 261 258 278 274 279 275 281 276
c    94 95 94 95 96 97 98 99 100 100
c    288 287 285 284 286 282 283 280 296 295
c    101 101 102 103 104 105 106 107 108 109
c    292 291 303 302 304 305 306 307 308 309
c    109 110 111 112 113 114 115 116 117 118
c    314 315 313 342 343 344
c    119 120 121 122 122 123
c    FIN SURFACE SOURCES
c    228 231 232 233 237 236 239 238 244 242
c    0 0 0 0 0 0 0 0 0 0
c    243 246 319 318 317 316 293 294
c    0 0 0 0 0 0 0 0
sc6  AXIS*****
c    UPPER/LOWER PLATE SOURCES
c    193 194 212 211 215 214 217 218 220 221
ds6  s 13 13 13 13 13 13 13 13 13 13
c    223 224 226 227 265 264 297 290 321 320
c    13 13 13 13 13 13 13 13 13 13
c    311 310

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      13 13
c      OUTER PLATE SOURCES
c      195 210 213 216 219 222 225 247 289 322 312
      13 13 13 13 13 13 13 13 13 13 13
c      PIPE SURFACE SOURCES
c      199 196 201 197 200 198 202 203 206 207
      11 11 11 11 13 13 13 13 13 13
c      204 205 208 209 252 248 260 256 255 251
      13 13 13 13 14 15 16 17 13 13
c      263 259 272 271 277 273 253 249 262 257
      13 13 13 13 18 19 11 11 12 12
c      254 250 261 258 278 274 279 275 281 276
      11 11 12 12 11 11 11 11 13 13
c      288 287 285 284 286 282 283 280 296 295
      13 13 13 13 13 13 13 13 13 13
c      292 291 303 302 304 305 306 307 308 309
      13 13 13 13 13 13 13 13 13 13
c      314 315 313 342 343 344
      13 13 13 13 13 13
c      FIN SURFACE SOURCES
c      228 231 232 233 237 236 239 238 244 242
      0 0 0 0 0 0 0 0 0 0
c      243 246 319 318 317 316 293 294
      0 0 0 0 0 0 0 0
sc7  X*****
c      UPPER/LOWER PLATE SOURCES
c      193 194 212 211 215 214 217 218 220 221
ds7 s 0 0 0 0 0 0 0 0 0 0
c      223 224 226 227 265 264 297 290 321 320
      0 0 0 0 0 0 0 0 0 0
c      311 310
      0 0
c      OUTER PLATE SOURCES
c      195 210 213 216 219 222 225 247 289 322 312
      0 0 0 0 0 0 0 0 0 0 0
c      PIPE SURFACE SOURCES
c      199 196 201 197 200 198 202 203 206 207
      0 0 0 0 0 0 0 0 0 0
c      204 205 208 209 252 248 260 256 255 251
      0 0 0 0 0 0 0 0 0 0
c      263 259 272 271 277 273 253 249 262 257
      0 0 0 0 0 0 0 0 0 0
c      254 250 261 258 278 274 279 275 281 276
      0 0 0 0 0 0 0 0 0 0
c      288 287 285 284 286 282 283 280 296 295
      0 0 0 0 0 0 0 0 0 0
c      292 291 303 302 304 305 306 307 75 309
      0 0 0 0 0 0 0 0 0 0
c      314 315 313 342 343 344
      0 0 0 0 0 0
c      FIN SURFACE SOURCES
c      228 231 232 233 237 236 239 238 244 242
      300 301 302 302 300 301 302 302 303 304
c      243 246 319 318 317 316 293 294
      302 302 305 306 302 302 307 308
sc8 Y*****
c      UPPER/LOWER PLATE SOURCES
c      193 194 212 211 215 214 217 218 220 221
ds8 s 0 0 0 0 0 0 0 0 0 0
c      223 224 226 227 265 264 297 290 321 320
      0 0 0 0 0 0 0 0 0 0
c      311 310
      0 0
c      OUTER PLATE SOURCES
c      195 210 213 216 219 222 225 247 289 322 312
      0 0 0 0 0 0 0 0 0 0 0
c      PIPE SURFACE SOURCES
c      199 196 201 197 200 198 202 203 206 207
      0 0 0 0 0 0 0 0 0 0

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c      204 205 208 209 252 248 260 256 255 251
      0 0 0 0 0 0 0 0 0 0
c      263 259 272 271 277 273 253 249 262 257
      0 0 0 0 0 0 0 0 0 0
c      254 250 261 258 278 274 279 275 281 276
      0 0 0 0 0 0 0 0 0 0
c      288 287 285 284 286 282 283 280 296 295
      0 0 0 0 0 0 0 0 0 0
c      292 291 303 302 304 305 306 307 75 309
      0 0 0 0 0 0 0 0 0 0
c      314 315 313 342 343 344
      0 0 0 0 0 0
c      FIN SURFACE SOURCES
c      228 231 232 233 237 236 239 238 244 242
      400 400 401 402 400 400 401 402 400 400
c      243 246 319 318 317 316 293 294
      403 404 400 400 405 406 407 407
sc9    Z*****
c      UPPER/LOWER PLATE SOURCES
c      193 194 212 211 215 214 217 218 220 221
ds9    s 0 0 0 0 0 0 0 0 0 0
c      223 224 226 227 265 264 297 290 321 320
      0 0 0 0 0 0 0 0 0 0
c      311 310
      0 0
c      OUTER PLATE SOURCES
c      195 210 213 216 219 222 225 247 289 322 312
      0 0 0 0 0 0 0 0 0 0
c      PIPE SURFACE SOURCES
c      199 196 201 197 200 198 202 203 206 207
      0 0 0 0 0 0 0 0 0 0
c      204 205 208 209 252 248 260 256 255 251
      0 0 0 0 0 0 0 0 0 0
c      263 259 272 271 277 273 253 249 262 257
      0 0 0 0 0 0 0 0 0 0
c      254 250 261 258 278 274 279 275 281 276
      0 0 0 0 0 0 0 0 0 0
c      288 287 285 284 286 282 283 280 296 295
      0 0 0 0 0 0 0 0 0 0
c      292 291 303 302 304 305 306 307 75 309
      0 0 0 0 0 0 0 0 0 0
c      314 315 313 342 343 344
      0 0 0 0 0 0
c      FIN SURFACE SOURCES
c      228 231 232 233 237 236 239 238 244 242
      500 500 500 500 501 501 501 501 502 502
c      243 246 319 318 317 316 293 294
      502 502 503 503 503 503 504 504
sc20   Cone Radius
si20   0 7
sp20   -21 1
sc21   Pipe Radius
si21   0 7.3165
sp21   -21 1
sc22   Slant Pipe Radius
si22   0 7.317
sp22   -21 1
sc23   Small Pipe Radius
si23   0 4.859
sp23   -21 1
sc24   Upper Slant Pipe Radius
si24   0 4.86
sp24   -21 1
sc25   INLET LEG Source Radius
si25   28.8925 43.815
sp25   -21 1
sc26   INLET Source Radius
si26   0 35.56
sp26   -21 1

```

sc200 PLATE Source Radius
si200 0 55.88
sp200 -21 1
sc201 OUTER PLATE Source Radius
si201 55.88 55.98
sp201 -21 1
sc202 NOZZLE FILM Source Radius
si202 6.02 8.32
sp202 -21 1
sc203 END NOZZLE FILM Source Radius
si203 0 8.22
sp203 -21 1
sc204 PIPE CONE FILM Source Radius
si204 7 8.6025
sp204 -21 1
sc205 PIPE FILM Source Radius
si205 8.4137 8.5137
sp205 -21 1
sc206 SLANTED PIPE FILM Source Radius
si206 8.4136 8.5138
sp206 -21 1
sc207 SMALL PIPE FILM Source Radius
si207 5.715 5.815
sp207 -21 1
sc208 SMALL SLANTED PIPE FILM Source Radius
si208 5.714 5.816
sp208 -21 1
sc209 LARGE SLANTED PIPE END CAP FILM Source Radius
si209 12.2
sp209 -21 1
sc210 SMALL SLANTED PIPE END CAP FILM Source Radius
si210 8.4
sp210 -21 1
sc211 large open pipe film Source Radius
si211 18.95 19.05
sp211 -21 1
sc212 large open pipe film Source Radius
si212 20.32 20.42
sp212 -21 1
sc213 inlet film Source Radius
si213 13.235 13.335
sp213 -21 1
sc214 inlet film Source Radius
si214 14.605 14.705
sp214 -21 1
sc215 inlet film Source Radius
si215 14.705 36.83
sp215 -21 1
sc216 inlet film Source Radius
si216 36.83 36.93
sp216 -21 1
sc217 inlet film Source Radius
si217 4.545 36.83
sp217 -21 1
sc218 rod film Source Radius
si218 4.445 4.545
sp218 -21 1
sc219 inlet cavity film Source Radius
si219 26.8875 45.185
sp219 -21 1
sc220 inlet cavity film Source Radius
si220 26.8875 26.9875
sp220 -21 1
sc221 inlet cavity film Source Radius
si221 45.085 45.185
sp221 -21 1
sc222 pump film Source Radius
si222 28.8925 45.185
sp222 -21 1

sc223 pump film Source Radius
si223 28.8925 28.9925
sp223 -21 1
sc224 pump case film Source Radius
si224 28.9925 45.085
sp224 -21 1
sc225 pump case film Source Radius
si225 45.085 45.185
sp225 -21 1
sc226 pump case film Source Radius
si226 38.2 45.085
sp226 -21 1
sc227 pump case film Source Radius
si227 38.1 38.2
sp227 -21 1
sc228 pump case film Source Radius
si228 18.8 38.2
sp228 -21 1
sc229 flange film Source Radius
si229 20.42 39.37
sp229 -21 1
sc230 flange film Source Radius
si230 39.37 39.47
sp230 -21 1
sc231 pump bottom
si231 4.545 45.185
sp231 -21 1
c EXTENT CARDS
sc30 Cone Extent
si30 -41.91 -13.2893
sp30 -21 0
sc31 Cone Extent
si31 13.2893 41.91
sp31 -21 0
sc32 Pipe Extent
si32 17.78 39.052
sp32 -21 0
sc33 Pipe Extent
si33 39.052 433.5
sp33 -21 0
sc34 Slant Pipe Extent
si34 -50.3403 -12.6835
sp34 -21 0
sc35 Slant Pipe Extent
si35 12.6853 50.3403
sp35 -21 0
sc36 Upper Pipe Extent
si36 462 565.785
sp36 -21 0
sc37 Small Pipe Extent
si37 565.785 630.5
sp37 -21 0
sc38 Upper Slant Pipe Extent
si38 20 90
sp38 -21 0
sc39 Upper Slant Pipe Extent
si39 28.89 50.5816
sp39 -21 0
sc40 Upper Pipe Extent
si40 633.5 652.145
sp40 -21 0
sc41 INLET UPPER RING Source Extent
si41 652.145 693.42
sp41 -21 0
sc42 INLET Source Extent
si42 606.425 621.03
sp42 -21 0
sc43 INLET LEG Source Extent
si43 598.805 652.145

sp43 -21 0
c PLATE SOURCES
sc50 PLATE Source Extent
si50 -0.1 0
sp50 -21 0
sc51 PLATE Source Extent
si51 1.27 1.37
sp51 -21 0
sc52 PLATE Source Extent
si52 68.0037 68.1037
sp52 -21 0
sc53 PLATE Source Extent
si53 68.58 68.68
sp53 -21 0
sc54 PLATE Source Extent
si54 119.28 119.38
sp54 -21 0
sc55 PLATE Source Extent
si55 119.8562 119.9562
sp55 -21 0
sc56 PLATE Source Extent
si56 207.7037 207.8037
sp56 -21 0
sc57 PLATE Source Extent
si57 208.28 208.38
sp57 -21 0
sc58 PLATE Source Extent
si58 258.98 259.08
sp58 -21 0
sc59 PLATE Source Extent
si59 259.5562 259.6562
sp59 -21 0
sc60 PLATE Source Extent
si60 351.8487 351.9487
sp60 -21 0
sc61 PLATE Source Extent
si61 352.425 352.525
sp61 -21 0
sc62 PLATE Source Extent
si62 412.015 412.115
sp62 -21 0
sc63 PLATE Source Extent
si63 412.5912 412.6912
sp63 -21 0
sc64 PLATE Source Extent
si64 503.455 503.555
sp64 -21 0
sc65 PLATE Source Extent
si65 504.0312 504.1312
sp65 -21 0
sc66 PLATE Source Extent
si66 643.155 643.255
sp66 -21 0
sc67 PLATE Source Extent
si67 643.7312 643.8312
sp67 -21 0
sc68 PLATE Source Extent
si68 800.9525 801.0525
sp68 -21 0
sc69 PLATE Source Extent
si69 801.5287 801.6287
sp69 -21 0
sc70 PLATE Source Extent
si70 889.8525 889.9525
sp70 -21 0
sc71 PLATE Source Extent
si71 890.4356 890.5356
sp71 -21 0
c PLATE OUTER SOURCES

sc72 OUTER PLATE Source Extent
si72 -0.1 1.37
sp72 -21 0
sc73 OUTER PLATE Source Extent
si73 68.0037 68.68
sp73 -21 0
sc74 OUTER PLATE Source Extent
si74 119.28 119.9562
sp74 -21 0
sc75 OUTER PLATE Source Extent
si75 207.7037 208.38
sp75 -21 0
sc76 OUTER PLATE Source Extent
si76 258.98 259.6562
sp76 -21 0
sc77 OUTER PLATE Source Extent
si77 351.8487 352.525
sp77 -21 0
sc78 OUTER PLATE Source Extent
si78 412.015 412.6912
sp78 -21 0
sc79 OUTER PLATE Source Extent
si79 503.455 504.1312
sp79 -21 0
sc80 OUTER PLATE Source Extent
si80 643.155 643.8312
sp80 -21 0
sc81 OUTER PLATE Source Extent
si81 800.9525 801.6287
sp81 -21 0
sc82 OUTER PLATE Source Extent
si82 889.8525 890.5356
sp82 -21 0
c PIPE FILM SOURCES
sc83 THIN FILM Cone Extent
si83 -41.91 -12.0920
sp83 -21 0
sc84 THIN FILM Cone Extent
si84 12.0920 41.91
sp84 -21 0
sc85 THIN FILM END Cone Extent
si85 -12.192 -12.092
sp85 -21 0
sc86 THIN FILM END Cone Extent
si86 12.092 12.192
sp86 -21 0
sc87 LOWER SOURCE Pipe Extent
si87 39.052 259.08
sp87 -21 0
sc88 UPPER SOURCE Pipe Extent
si88 259.5562 433.5
sp88 -21 0
sc89 LOWER DUMMY Pipe Extent
si89 1.27 259.08
sp89 -21 0
sc90 SLANTED PIPE FILM Extent
si90 0 90
sp90 -21 0
sc91 Upper Pipe Extent
si91 462 569.595
sp91 -21 0
sc92 Slanted end cap Extent
si92 -11.5887 -11.4887
sp92 -21 0
sc93 Slanted end cap Extent
si93 11.4887 11.5887
sp93 -21 0
sc94 Slanted upper end cap Extent
si94 -51.535 -51.435

sp94 -21 0
sc95 Slanted upper end cap Extent
si95 51.435 51.535
sp95 -21 0
sc96 SMALL Slanted end cap Extent
si96 -51.5604 -51.4604
sp96 -21 0
sc97 SMALL Slanted end cap Extent
si97 51.4604 51.5604
sp97 -21 0
sc98 SMALL Slanted top top top end cap Extent
si98 -28.034 -27.934
sp98 -21 0
sc99 SMALL Slanted top top top end cap Extent
si99 27.934 28.034
sp99 -21 0
sc100 short pipe
si100 630 652.145
sp100 -21 0
sc101 large open pipe
si101 535.94 592.455
sp101 -21 0
sc102 INLET film
si102 596.265 606.425
sp102 -21 0
sc103 INLET film
si103 596.265 605.155
sp103 -21 0
sc104 INLET film
si104 605.055 605.155
sp104 -21 0
sc105 INLET film
si105 605.055 622.4
sp105 -21 0
sc106 INLET film
si106 622.3 622.4
sp106 -21 0
sc107 rod film
si107 622.3 652.145
sp107 -21 0
sc108 inlet cavity film
si108 597.435 597.535
sp108 -21 0
sc109 inlet cavity film
si109 597.535 652.145
sp109 -21 0
sc110 pump film
si110 652.145 694.69
sp110 -21 0
sc111 pump film
si111 694.69 694.79
sp111 -21 0
sc112 pump film
si112 694.79 715.645
sp112 -21 0
sc113 pump case film
si113 715.545 715.645
sp113 -21 0
sc114 pump case film
si114 715.545 718.6025
sp114 -21 0
sc115 pump case film
si115 718.5025 718.6025
sp115 -21 0
sc116 pump case film
si116 718.5025 782
sp116 -21 0
sc117 pump case film
si117 780.5 791.5275

sp117 -21 0
sc118 UPPER LARGE PIPE film
si118 791.5275 953.77
sp118 -21 0
sc119 flange film
si119 829.845 829.945
sp119 -21 0
sc120 flange film
si120 829.845 839.8875
sp120 -21 0
sc121 flange film
si121 839.7875 839.8875
sp121 -21 0
sc122 dummy cap
si122 569.595 569.695
sp122 -21 0
sc123 pump bottom
si123 652.045 652.145
sp123 -21 0
c AXIS
sc11 X Axis
si11 1 1 0 0
sp11 1
sc12 Y Axis
si12 1 0 1 0
sp12 1
sc13 Z Axis
si13 1 0 0 1
sp13 1
sc14 Axis -X & Z
si14 1 -.7071068 0 .7071068
sp14 1
sc15 Axis X & Z
si15 1 .7071068 0 .7071068
sp15 1
sc16 Axis -Y & Z
si16 1 0 -.7071068 .7071068
sp16 1
sc17 Axis Y & Z
si17 1 0 .7071068 .7071068
sp17 1
sc18 Axis -X & -Z
si18 1 -.7071068 0 -.7071068
sp18 1
sc19 Axis X & -Z
si19 1 .7071068 0 -.7071068
sp19 1
c X EXTENT
sc300 lower fin
si300 -39 -28.4
sp300 0 1
sc301 lower fin
si301 28.4 39
sp301 0 1
sc302 lower fin
si302 -.735 .735
sp302 0 1
sc303 upper fin
si303 -50.1062 -28.4
sp303 0 1
sc304 upper fin
si304 28.4 50.1062
sp304 0 1
sc305 pump fin
si305 -49.63 -20
sp305 0 1
sc306 pump fin
si306 20 49.63
sp306 0 1

sc307 pump side
si307 -16.61 -16.51
sp307 0 1
sc308 pump side
si308 16.51 16.61
sp308 0 1
c Y EXTENT
sc400 lower fin
si400 -.735 .735
sp400 0 1
sc401 lower fin
si401 -39 -28.4
sp401 0 1
sc402 lower fin
si402 28.4 39
sp402 0 1
sc403 upper fin
si403 -50.1062 -28.4
sp403 0 1
sc404 upper fin
si404 28.4 50.1062
sp404 0 1
sc405 pump fin
si405 -49.63 -20
sp405 0 1
sc406 pump fin
si406 20 49.63
sp406 0 1
sc407 pump side
si407 -42 42
sp407 0 1
c Z EXTENT
sc500 lower fin
si500 71 117
sp500 0 1
sc501 mid fin
si501 210.5 256.6
sp501 0 1
sc502 upper fin
si502 354.9 409.7
sp502 0 1
sc503 pump fin
si503 770.5 889
sp503 0 1
sc504 pump side
si504 597.535 652.145
sp504 0 1