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Metallic Fuel Benchmark Simulations Based on the X430 Experiments

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OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE US DEPARTMENT OF ENERGY

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Reactor and Nuclear Systems Division

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ACRONYMS

BOC	beginning of cycle
CTE	coefficient of thermal expansion
EBR-II	Experimental Breeder Reactor II
EFPD	effective full-power day
EOC	end of cycle
FGR	fission gas release
IFR	Integral Fast Reactor
INL	Idaho National Laboratory
LHGR	linear heat generation rate
ORNL	Oak Ridge National Laboratory
PIE	postirradiation examination

ABSTRACT

To gauge the accuracy of current BISON metallic fuel performance models and identify models that require further development, Oak Ridge National Laboratory has developed benchmark problems based on two pins of the X430 experiment. These benchmarks recreate the experimental conditions of the X430 series of experiments with as much accuracy as possible given the available data. The benchmarks were implemented in the BISON nuclear fuel performance code and the simulation results were compared with the experimental results to quantify the simulation accuracy.

Findings in this work were consistent with previous benchmark problems. The temperature profiles, burnup, and fission gas behavior were all as accurate as can reasonably be expected. The cladding radial growth was accurate enough to not affect the results of other measurements. The fuel axial growth was accurate for U-Zr fuel but not for U-Pu-Zr fuel, which appears to be caused by a lack of U-Pu-Zr data. Swelling correlations have not been developed for U-Pu-Zr fuel because there were not enough data on this fuel type, so BISON used the U-Zr correlations. Finally, recommendations were made for near-term BISON development.

1. INTRODUCTION

To guide the development of metallic fuel performance models in BISON, Oak Ridge National Laboratory (ORNL) is developing metallic fuel benchmark problems based on past experiments. As part of that process, this work presents two benchmarks based on pins of the X430 series of experiments.

A *benchmark problem* is a simulation designed to recreate an experiment so that the simulation results can be compared against experimental results and designed to quantify the accuracy of the computational models. Previously, ORNL created a benchmark problem for uranium-19 wt% plutonium-10 wt% zirconium (U-Pu-Zr) fuel pins in the Integral Fast Reactor (IFR)-1 experiment [1, 2]. In this current work, two models were developed based on two pins in the X430 series of experiments [3]. One pin was U-Pu-Zr like in the IFR-1 benchmark. The other pin was uranium-10 wt% zirconium (U-Zr). By developing BISON models of two fuel types in the same experiment, the results from the two different fuels could be directly compared.

The X430 experiment series was irradiated in Experimental Breeder Reactor II (EBR-II). The series was designed to test the behavior of large-diameter fuel for the IFR [3] and was irradiated in three separate experiments. The X430 experiment ran from 1987 to early 1988, at which time the subassembly was removed and examined. Some pins were replaced so they could undergo destructive examination. The subassembly was rebuilt and placed back in EBR-II for the X430A experiment, which ran from late 1988 to early 1990. Again, some pins were removed and replaced. The subassembly was irradiated a third time in the X430B experiment from 1990 to 1992. Of the 37 pins, 14 remained in place for all three experiments, as shown in Figure 1. Nine were U-Zr pins on the outer edge of the subassembly. Five were interior U-Pu-Zr pins.

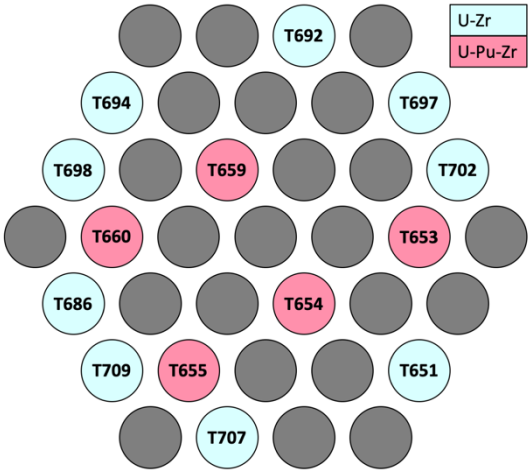

Figure 1. X430 series subassembly pin diagram [3]. The pins that stayed in the same position for all three experiments are labeled and colored according to fuel composition. The gray circles represent pins that were moved or replaced between experiments.

BISON is a fuel performance code under active development led by Idaho National Laboratory (INL). As such, this work is not meant to validate BISON metallic fuel models. The purpose of this work is to evaluate the models as they stand and point to areas in which improvements can be made in the near future. If any models are changed as a result of further development, these benchmark problems can be used to quantify any improvements and test new or modified models as they are developed.

2. X430 BENCHMARK PROBLEMS

The X430 report [3] includes pin-specific measurements for all the pins in the X430 experiment series. As such, specific pins could be simulated with reasonable accuracy. Two pins were chosen to be used as the basis for benchmark problems in this work: T651 (U-Zr) and T654 (U-Pu-Zr), both of which are identified in Figure 1. Once both benchmark problems were developed and simulated, their results could be directly compared to see how fuel composition affects BISON predictions.

2.1 PIN GEOMETRY

As part of the same subassembly, the two benchmark problems had identical dimensional design specifications. The fuel slugs were 343 mm long with a 5.72 mm diameter. The pins were 756 mm long, with the fuel slugs inside HT-9 stainless steel cladding [4] with a 6.55 mm inner diameter and a 7.37 mm outer diameter. The full dimensions are shown in Figure 2. Each pin was wrapped in a 1.4 mm diameter HT-9 helical wire, which acted as a spacer for the pins and a turbulence generator for the coolant.

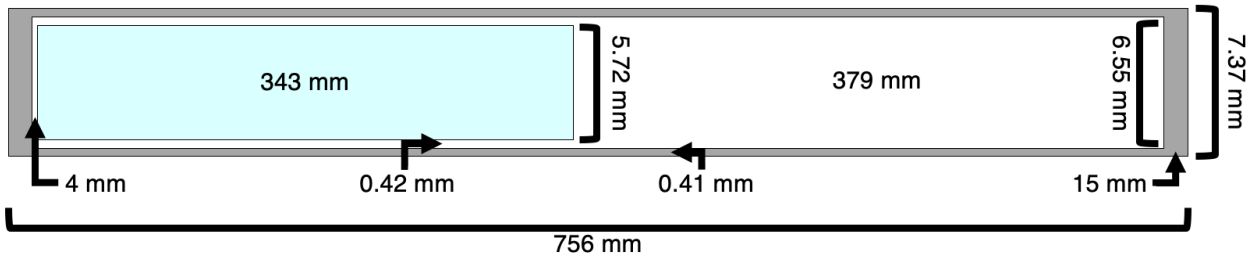

Figure 2. Fuel pin geometry for the X430 experiments (not to scale).

The largest source of uncertainty in the fuel dimensions was in the end plugs, which could have several different configurations. The bottom typically had a latching mechanism to hold it in place in the subassembly [5, 6]. The tops could be rounded [7] or have features to facilitate handling during loading and hot cell examinations [5, 6]. However, BISON's internal mesh generator uses flat endcaps [8] by default. Since the X430 report [3] does not specify the pin end plug geometry and dimensions, this work assumed 15 mm thick flat endcaps. Since they affect the interior volume of the cladding, the endcaps could affect the calculated plenum pressure, but they were not expected to significantly impact the simulation results. Quantitative assessments confirmed that reasonable variations in end plug modeling choices in BISON did not significantly impact most simulation results currently being assessed, though this may need to be investigated further in the future if analyses try to assess performance or behavior of welds around the end plug.

2.2 LINEAR HEAT GENERATION RATE PROFILE

Among the most important input parameters for a fuel performance simulation was the linear heat generation rate (LHGR) of the fuel pins. The LHGR comprises two components: the average LHGR, $\overline{LHGR}(t)$, and the axial peaking factor, $p(t,z)$:

$$LHGR(t,z) = \overline{LHGR}(t)p(t,z), \tag{1}$$

where t is the time in seconds, and z is the axial position along the pin in meters. The peaking factor represents the deviation from the average LHGR and so has the requirement

$$\frac{1}{L}\int_{z_0}^{z_0+\mathrm{L}} p(z,t)dz = 1, \tag{2}$$

where z_0 is the axial position of the pin bottom, and L is the pin length. $\overline{LHGR}(t)$ was approximated using the power history information available in the X430 report [3]. Each of the three experiments was irradiated through multiple EBR-II operating cycles. For each cycle, the X430 report [3] recorded the subassembly power. Since the X430 report did not calculate individual pin LHGRs, the subassembly power was divided by 37 to calculate the average pin power, then divided by the fuel slug length of 0.3429 m to determine the average pin LHGR [W m^{-1}]. This may cause significant error in the pin-specific simulations.

The length of each cycle was determined by dividing the total subassembly energy of each cycle (MW days) by an average operating power of EBR-II of 61.8 MW, which was estimated based on the EBR-II run data included in the X430 report [3]. This yielded the number of effective full-power days (EFPD).

Along with the LHGR, the coolant inlet mass flux was a necessary parameter for BISON simulations. This was calculated as

$$j_c(t) = \frac{\dot{V(t)}\rho}{A}, \quad (3)$$

where j_c is the coolant mass flux, $\dot{V(t)}$ is the coolant volumetric flow rate in the subassembly, ρ is the coolant density, and A is the cross-sectional area of the coolant channel. The coolant volumetric flow rate was recorded in the X430 report [3] as 3.56×10^{-3} m^3 s^{-1}. The Na density was calculated according to Fink and Leibowitz [9] at an inlet temperature of 371°C [10] as 864.4 kg m^{-3}. The area was approximated by subtracting the pin and spacing wire cross-sectional areas from the internal dimensions of the hexagonal subassembly [6]. This resulted in a coolant area of 1,118 mm^2. The cycle time, average LHGR, and coolant mass flux for each EBR-II cycle are shown in

Table 1.

Table 1. Experiment and cycle information for the X430 experiment.

Experiment	EBR-II cycle	Cycle length (EFPD)	LHGR (W m^{-1})	Coolant flux (kg m^{-2} s^{-1})
X430	144A	94.90	44,225.3	2,699.1
	145A	64.90	43,106.1	2,724.0
	146A	7.07	41,403.6	2,697.2
	146B	79.63	41,119.9	2,781.0
	147A	49.55	38,881.4	2,721.1
	148A	7.65	38,353.3	2,696.9
	148B	74.64	39,472.5	2,785.4
X430A	150A	1.94	33,490.2	2,793.7
	150B	77.25	36,863.6	2,803.5
	151A	30.28	37,123.7	2,814.2
	151B	18.79	32,717.8	2,799.6
	152A	0.83	38,534.6	2,840.1
	152B	5.81	38,432.1	2,839.6
	152C	34.50	36,784.8	2,873.7
	152D	9.37	36,036.0	2,855.7
X430B	155A	44.76	35,153.3	2,826.4
	155B	20.73	35,153.3	2,826.4
	156B	95.45	35,271.5	2,788.4
	157A	1.47	33,663.6	2,780.6
	157C	4.17	34,459.7	2,771.8
	157D	21.91	34,640.9	2,781.5
	157H	2.85	34,428.1	2,817.1
	157J	32.01	34,026.2	2,807.4
	158A	53.43	33,624.2	2,777.1
	158B	0.31	33,624.2	2,777.1
	160A	53.75	33,718.8	2,746.4
	160B	5.83	34,057.7	2,765.9
	160C	4.56	34,057.7	2,765.9
	161A	31.28	34,215.3	2,777.1

$\overline{LHGR}(t)$ and $j_c(t)$ were constant during each cycle with a 1 hour transition time placed between cycles. This was more physically accurate and less stressful for the numerical solver in BISON than instantaneous jumps from one set of values to another. There was also a 1 hour startup period at the beginning of each experiment to go from zero power to operating power and coolant temperature. Three hours were added to the end of each experiment for a power ramp-down and cooldown. In the first hour, the average LHGR ramped down to zero power. In the second hour, the coolant inlet temperature reduced to a postirradiation examination (PIE) temperature of 305 K [3]. The third hour let the system reach thermal equilibrium so that PIE measurement conditions could be achieved. Figure 3 shows $\overline{LHGR}(t)$ and $j_c(t)$ for the entire benchmark problem.

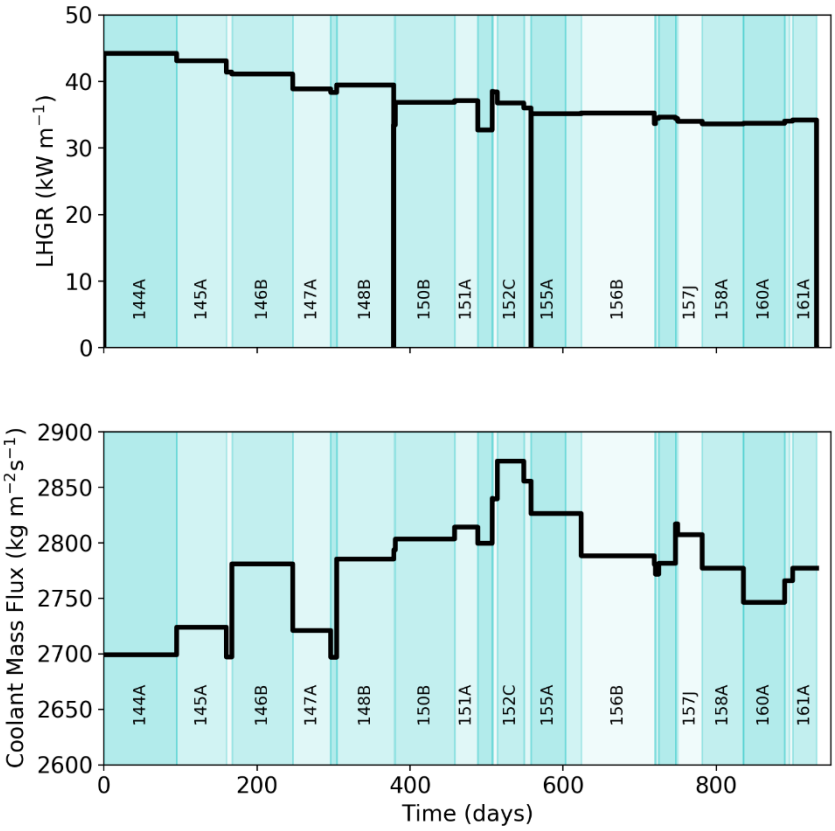

Figure 3. LHGR and coolant inlet mass flux used for the benchmark problem. Several cycles are labeled for reference.

The X430 report [3] did not contain enough pin-specific information to calculate $\overline{LHGR}(t)$ and $j_c(t)$ for individual pins, so the information in Table 1 and Figure 3 was derived based on the assumption that the power was evenly distributed radially among all the pins within this subassembly. However, there were enough pin-specific measurements to make separate $p(t,z)$ functions. At the beginning of cycle (BOC) of the first cycle of each experiment and the end of cycle (EOC) of the last cycle of X430B, the X430 report [3] calculated the LHGR for each pin at multiple axial positions. These were converted into peaking factors by approximating an average LHGR at each time. **Table 2** shows the peaking factors for both pins at the times and positions from the X430 report [3]. $p(t,z)$ was calculated by linearly interpolating between the axial points at each time, then linearly interpolating between times. This formulation satisfies Eq. (2).

Table 2. Axial peaking factors for pins T651 (U-Zr) and T654 (U-Pu-Zr) at several axial positions and times. The peaking factor of each pin was derived by linearly interpolating these points.

Δz	X430 BOC		X430A BOC		X430B BOC		X430B EOC	
(mm)	U-Zr	U-Pu-Zr	U-Zr	U-Pu-Zr	U-Zr	U-Pu-Zr	U-Zr	U-Pu-Zr
0.0	0.914	0.888	0.940	0.906	0.935	0.896	0.915	0.895
3.4	0.923	0.898	0.945	0.914	0.942	0.905	0.922	0.903
34.3	1.003	0.988	0.997	0.986	1.001	0.985	0.983	0.975
68.6	1.061	1.063	1.048	1.049	1.050	1.044	1.043	1.037
102.9	1.104	1.115	1.089	1.101	1.089	1.094	1.074	1.088
137.2	1.119	1.130	1.099	1.111	1.099	1.114	1.094	1.109
171.5	1.104	1.115	1.089	1.101	1.089	1.104	1.094	1.098
205.7	1.068	1.078	1.058	1.069	1.060	1.074	1.064	1.078
240.0	1.003	1.003	1.007	1.018	1.001	1.014	1.023	1.016
274.3	0.915	0.913	0.925	0.924	0.932	0.935	0.942	0.944
308.6	0.814	0.808	0.843	0.831	0.844	0.835	0.851	0.842
342.9	0.705	0.681	0.750	0.716	0.736	0.706	0.750	0.729

2.3 MATERIAL INPUT PARAMETERS

Many of the material-specific models, such as fission gas release (FGR) and swelling, were calculated internally by BISON without the need for material-specific inputs. However, some parameters were required from the user. Tables 3–6 give the necessary material-specific values for U-Zr fuel, U-Pu-Zr fuel, HT-9 cladding, and liquid Na coolant. If taken directly from the literature, then references are included. Values that were not taken from the literature are explained in more detail as follows.

Table 3. Physical parameters and modeling assumptions for U-Zr fuel slug.

Parameter	Value	Reference
Anisotropic swelling factor	0.5	
Atom fraction of Zr	0.225	[11]
CTE*	16.6×10^{-6} K^{-1}	[11]
Density	16,310 kg m^{-3}	[11]
Energy per fission	3.2×10^{-11} J	[12]
Fast flux factor	5.67×10^{14} n J^{-1} m^{-1}	
Friction coefficient	0.2	

*coefficient of thermal expansion

Table 4. Physical parameters and modeling assumptions for U-Pu-Zr fuel slug.

Parameter	Value	Reference
Anisotropic swelling factor	0.5	
Atom fraction of Pu	0.160	[11]
Atom fraction of Zr	0.226	[11]
CTE	17.3×10^{-6} K^{-1}	[11]
Density	15,800 kg m^{-3}	[11]
Energy per fission	3.2×10^{-11} J	[12]
Fast flux factor	5.76×10^{14} n J^{-1} m^{-1}	
Friction coefficient	0.2	

Table 5. Physical parameters of HT-9 cladding.

Parameter	Value	Reference
CTE	1.28×10^{-5} K^{-1}	[4]
Density	7,770.3 kg m^{-3}	[4]
Poisson's ratio	0.2668	[4]
Young's modulus	1.726×10^{11} Pa	[4]

Table 6. Physical parameters of liquid Na.

Parameter	Value	Reference
Coolant inlet temperature	644.15 K	[3]
Coolant pressure	347,702.6 Pa	[10]
Gap thermal conductivity	63.9 W m^{-1} K^{-1}	[9]
Plenum initial pressure	91,193 Pa	

The thermal expansion model needs more discussion before continuing since the same issue was found in both the metallic fuel and HT-9 cladding. The metallic fuels handbooks [4, 11] provided nonlinear thermal expansion equations, but BISON used a linear thermal expansion model:

$$\frac{\Delta L}{L} = \alpha(T - T_0), \tag{4}$$

where L is the original length, ΔL is the displacement, T_0 is the stress-free temperature (the temperature corresponding to L), T is the current temperature, and α is the CTE. To use the BISON model, linear fits were applied to the nonlinear equations. The CTEs given in Tables 3–5 were the slopes of those fits. Then, to maintain the room temperature dimensions of the fuel, every material's stress-free temperature was set to 295 K.

Table 3 lists the parameters for the U-Zr fuel in pin T651. Most values were taken from the literature. The anisotropic swelling factor is a fitting parameter that determines how much swelling occurs in the radial and axial directions. Swelling factor values of -1, 0, and 1 correspond to 100% axial swelling, isotropic swelling, and 100% radial swelling, respectively. Since swelling occurs preferentially in the radial direction [7], a value of 0.5 was assumed.

The fast flux factor is the ratio of fast neutron flux (n m^{-2} s^{-1}) to LHGR (W m^{-1}). To determine the factor, the final fast neutron fluence of pin T651 (5.72×10^{27} n m^{-2}) was taken from the X430 report [3] and divided by the time integral of $\overline{LHGR}(t)$ (3.04×10^{12} J m^{-1}). The fast neutron flux at any time and axial position is the fast flux factor multiplied by $LHGR(t, z)$.

The friction coefficient is another fitting parameter that controls the fuel/cladding friction behavior of BISON's contact model. The value was not known exactly for the current fuels, but previous work showed that the simulation results are insensitive to the value [2]. A value of 0.2 was assumed for this work.

Table 4 lists the parameters for the U-Pu-Zr fuel pin T654. The anisotropic swelling factor and friction coefficient were assumed to be the same values as for U-Zr fuel. The fast flux factor was calculated in a similar manner as U-Zr fuel but with the T654 fast neutron fluence (1.75×10^{27} n m^{-2}).

Table 5 lists the parameters for the HT-9 cladding. All values are taken from Hofman et al. [4]. Table 6 lists the input parameters for the liquid Na used as a coolant and bonding agent between the fuel and cladding. The plenum initial pressure was unknown, so a value of 0.9 atm was assumed based upon the pin assembly having been performed in a glove box that was kept pressurized to slightly below the air pressure (nominally atmospheric or slightly sub-atmospheric pressure) in the surrounding room.

BISON also required inputs to control the FGR model. The values used in this work were provided by Casagranda [13] for U-Pu-Zr fuel. FGR is discussed further in Section 2.4.

2.4 COMPARABLE EXPERIMENTAL VALUES

To directly compare the BISON simulation results with the experimental results, it was important to identify experimental measurements and calculations that could be replicated by BISON. The pin diameter and fuel slug width were measured at hot cell temperatures during nondestructive examinations at the end of each experiment. The coolant outlet temperature was measured during each cycle and used to approximate a peak cladding temperature. The burnup was also calculated at the end of each cycle. These five measurements could be directly replicated by BISON.

Additionally, the U-Pu-Zr pins underwent destructive examination at the end of experiment X430B to measure plenum pressure and calculate FGR. Since plenum pressure was the directly measured value and comparisons have already been made between BISON and experimental FGR values [2], this work compared the simulated and experimental plenum pressure at the end of experiment X430B for the U-Pu-Zr pin. Plenum pressure was not measured for any of the U-Zr pins in X430.

3. BISON SIMULATIONS

Three simulations were performed. All simulations were performed using the latest BISON version of as of April 3, 2020: git commit `575b08bb2d8b20f1ade75cb8cff094844b5e481e`. Raw simulation outputs are provided in Appendix A. The U-Zr pin and the U-Pu-Zr pin were both simulated using the parameters listed in Section 2. The input files developed and used are provided in Appendix B. Then, two parameters of the U-Pu-Zr model were tuned to better match the experimental dimensional changes. This is explained in more detail in Section 3.4. Side-by-side comparisons of the mesh results are shown in Figure 4. At each time shown, the three pins are shown side by side. The temperature can be seen in the color of the mesh, and the displacements are seen through mesh deformation.

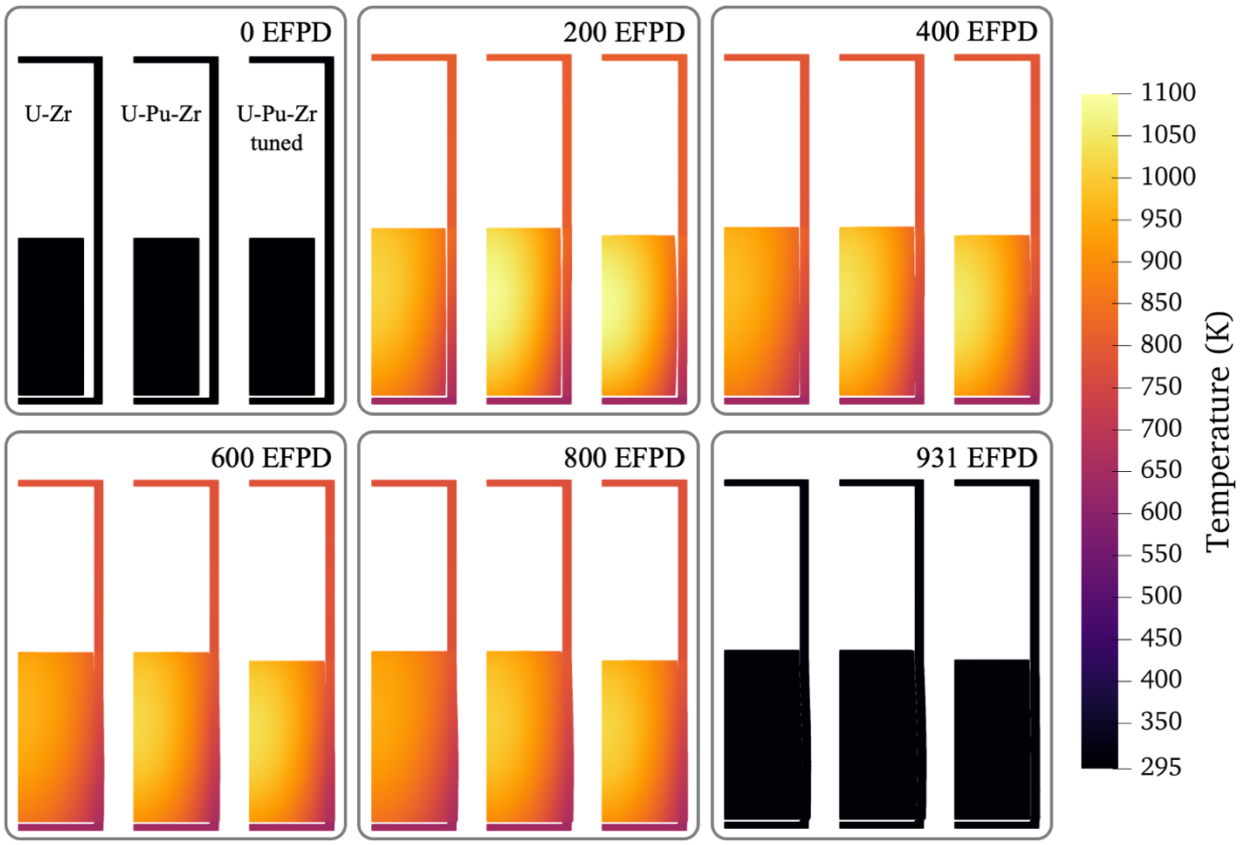

Figure 4. Mesh results of the three simulations of the X430 experiment series. The axial direction was compressed by a factor of 50 to make the results easier to view. The three simulations were compared side by side at six different times. At each time, the left mesh was the U-Zr pin, the center mesh was the U-Pu-Zr pin, and the right mesh was the tuned U-Pu-Zr pin.

3.1 SIMULATION SETUP

The simulation used a 2D R-Z axisymmetric mesh, which was more computationally efficient than a full 3D mesh. Two mesh blocks interacted: the fuel slug and the cladding. The plenum was the space between the blocks. The primary differential equation variables of the simulation were temperature, radial displacement, and axial displacement. Every other quantity was determined via auxiliary variables or postprocessing.

The initial conditions were a uniform temperature of 295 K and zero displacements. The temperature boundary conditions included zero-flux at the centerline and heat convection models that transported heat from the fuel slug to the cladding and coolant. The radial displacement boundary condition was zero displacement at the centerline. The axial displacement boundary conditions were zero displacement at the bottom edge of each mesh block.

3.2 U-ZR RESULTS

Five comparisons between the U-Zr simulation results and pin T651's experimental results are shown in Figure 5. The burnup was very accurate. The coolant outlet temperature and peak cladding temperature both had an offset bias throughout the simulation. On average, the bias was 35 K. The cladding radial growth was accurate during experiments X430 and X430A, but predictions were significantly higher than

experimental data by the end of X430B. The X430B radial growth was 0.6% (0.02 mm) at X430B EOC, and the simulated growth was 2.7% (0.10 mm) at the same point.

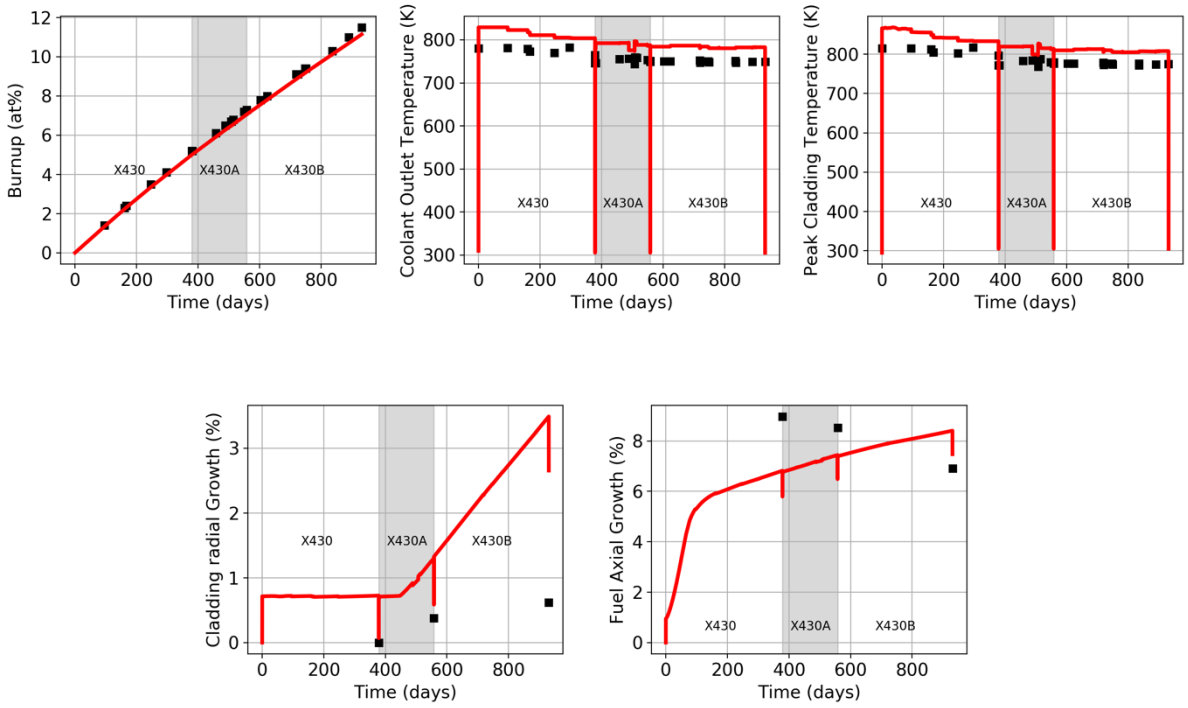

Figure 5. Simulation results of the U-Zr pin (red) compared with experimental results for pin T651 (black). Shaded background denotes the experiment.

According to the X430 report [3], all the pins had their peak axial growth after experiment X430. During experiments X430A and X430B, the slugs maintained their length or shrunk axially, as reflected in Figure 5. However, BISON predicted positive fuel growth throughout. The simulation under-predicted fuel growth in experiments X430 and X430A but was reasonably accurate by experiment X430B. The final experimental axial growth was 6.9% (24 mm), and the simulated growth was 7.4% (26 mm).

3.3 U-PU-ZR RESULTS

Six comparisons between the U-Pu-Zr simulation and the experimental results of pin T654 are shown in Figure 6. Once again, burnup was very accurate. The coolant outlet temperature and peak cladding temperature were also very accurate; no bias showed in this pin between simulation and experimental results. On average, the simulated coolant and cladding temperatures were 4 and 3 K cooler than the respective experimental temperatures.

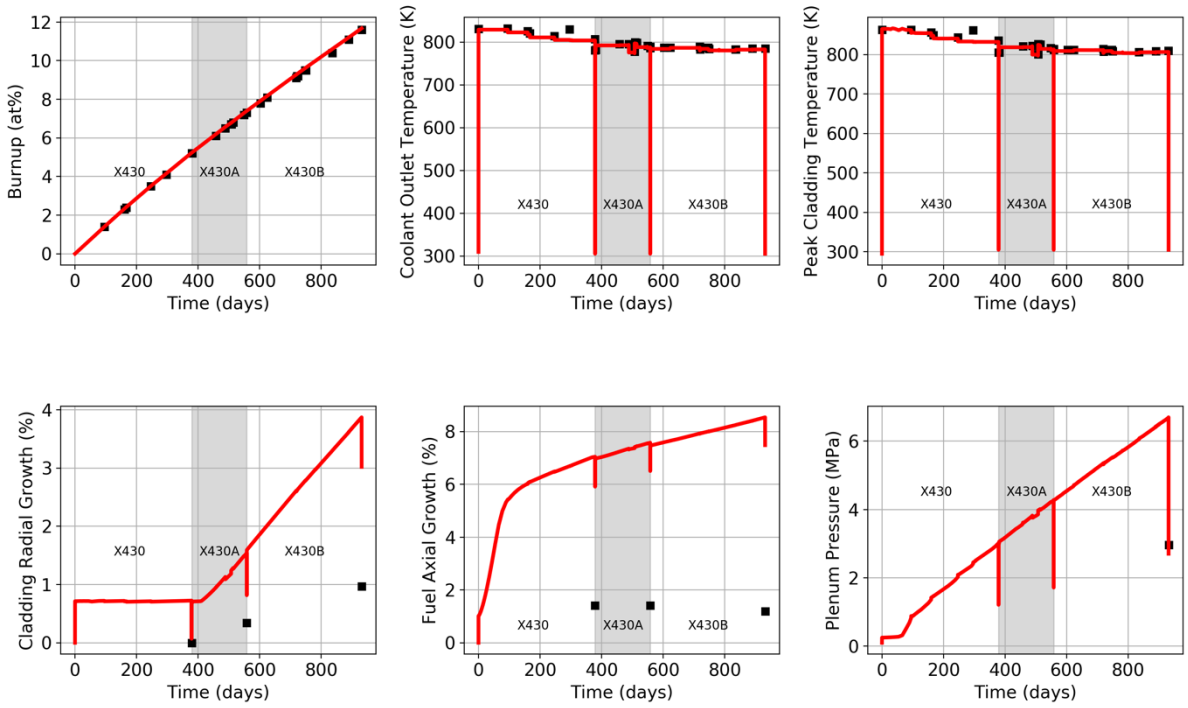

Figure 6. Simulation results of the U-Pu-Zr pin (red) compared with experimental results of pin T654 (black). Shaded background denotes the experiment.

The simulated and experimental cladding radial growths were once again very different. The experimental radial growth was 1.0% (0.04 mm), and the simulated radial growth was 3.0% (0.11 mm). The simulated fuel axial growth was about the same as for the U-Zr simulation: 7.5% (26 mm). However, the experimental fuel axial growth was much smaller in U-Pu-Zr pins at only 1.2% (4 mm).

The simulated plenum pressure was a relatively good match. The experimental pressure was 3.0 MPa, and the simulated pressure was 2.7 MPa.

3.4 U-PU-ZR SIMULATION TUNING

It was worth investigating whether the U-Pu-Zr simulation could be tuned to bring the cladding radial growth and fuel axial growth into better agreement with the experimental results without affecting the accuracy of the temperature, burnup, and plenum pressure. To do this, two parameters were chosen: the anisotropy factor and a coefficient applied to the gaseous and solid swelling of U-Pu-Zr. This tuning is meant to help isolate models that may be contributing to the inaccuracy of the U-Pu-Zr simulation. It is not meant to provide parameters that can be used to improve other simulations.

The parameter values that gave the best fit to the experimental data were an anisotropy factor of 0.948 and a swelling multiplier of 0.324. In other words, the overall swelling was reduced by 68%, but 97% of the swelling occurred in the radial direction.

The results of the tuned U-Pu-Zr simulation are shown in Figure 7. The burnup and temperatures were not affected. The cladding radial growth was much more accurate during the entire simulation, reaching 1.0%. The fuel axial growth was still continuously increasing rather than peaking at X430, but the final

value was more accurate at 1.3%. The plenum pressure was slightly lower (2.5 MPa), probably as a result of the reduced fuel volume.

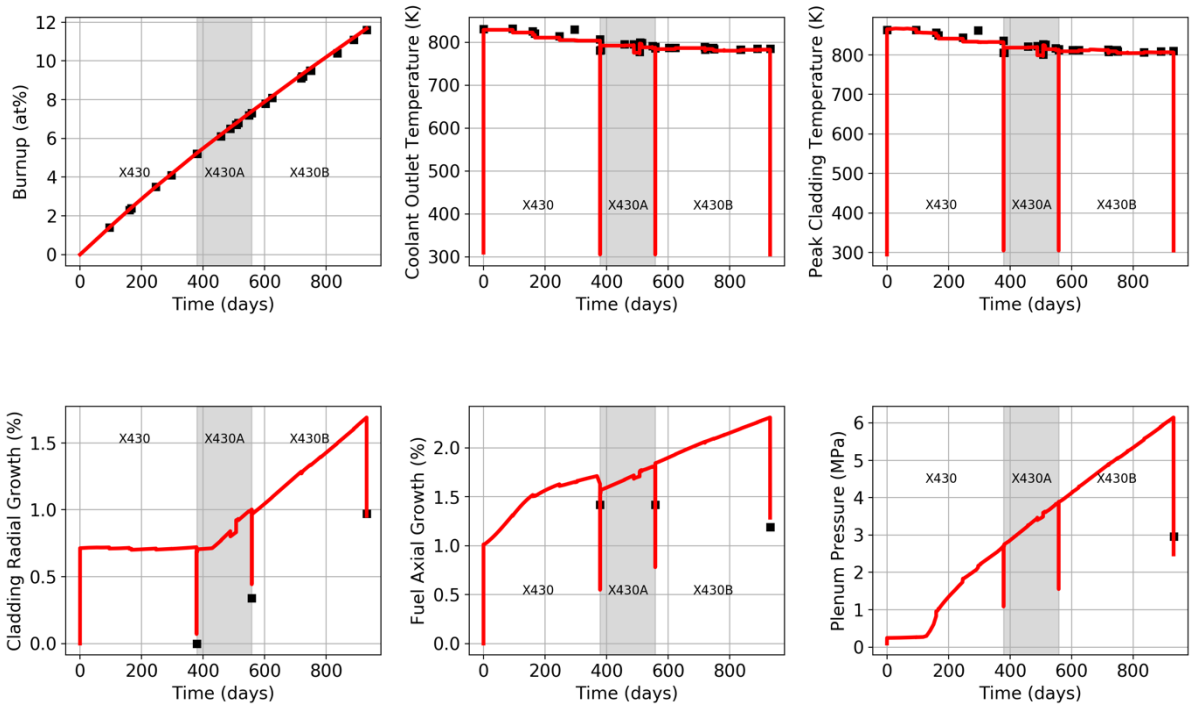

Figure 7. Simulation results of the tuned U-Pu-Zr pin (red) compared with experimental results of pin T654 (black). Shaded background denotes the experiment.

3.5 DISCUSSION

The U-Pu-Zr temperature profile was as accurate as could be expected. On the other hand, the U-Zr temperature was consistently too high. The U-Zr temperature bias did not appear to be a problem with the LHGR function; if the fuel were producing less fission heat than BISON assumed, then the simulated burnup would be inaccurate. The more likely cause is that the edges of the subassembly had higher coolant flow. The flat-to-flat distance of the experimental subassembly was 56.4 mm [6], but a tightly packed hexagon of fuel pins with wire spacers of the dimensions in Section 2.1 would have a flat-to-flat distance of 55.9 mm. Therefore, each edge had up to 0.3 mm of additional coolant channel. Combine this extra space with the fact that edge pins have additional coolant flow even in a tightly packed subassembly, and an edge pin has a 20% larger coolant channel. The coolant channel model in BISON could be adjusted to increase the flow by increasing the rod pitch from 8.788 to 9.645 mm. Doing so decreased the temperatures by 53 K so that they were 18 K colder than the experiment temperatures. This somewhat dramatic drop in temperature showed that the benchmark coolant channel boundary condition can be modified to account for edge pin coolant flow, but it will be more complicated than a simple linear scaling.

Swelling and growth behavior of the U-Zr and U-Pu-Zr simulations were very similar despite the different compositions and different experimental behaviors. This is problematic because U-Pu-Zr is known to exhibit less axial elongation and more radial growth than U-Zr [14]. However, this appears to be due to a lack of experimental data more than a bug or problem with code development. The BISON

models were based on correlations developed as part of the IFR program [4, 8]. Those correlations did not distinguish between U-Zr and U-Pu-Zr because there were not enough data to make separate correlations [4]. Since no US fast reactor has been in use since the IFR program ended, very little new data have been collected since then.

The margin of error of experimental fuel axial growth can be rather large [15]. Metallic fuels often developed a "fluff" on the top of the slug that made accurate measurements from neutron radiography difficult [16]. This could contribute to the axial shrinkage in the U-Zr pin experimental data either through measurement error or as more fuel is consumed by fluff. It could also contribute to the differences between simulated and experimental results.

The U-Pu-Zr growth behavior was significantly improved by reducing the overall swelling by 68% and increasing the swelling anisotropy. However, it is not recommended to use these adjustments in other simulations because it has not been established whether these adjustments will improve other U-Pu-Zr simulations. More work is needed to generate generalized swelling parameters for U-Pu-Zr fuel.

Compared with the IFR-1 benchmark [2], which also used U-Pu-Zr fuel, the temperature profiles in this work were more accurate. This was likely due partly to better experimental data or better documentation of the experimental inputs, operating conditions, and PIE results. In the IFR-1 benchmark, complete datasets were unavailable for individual pins, so averages were used. Also, the coolant mass flux and peaking factors could not be adjusted over time. These factors compounded, resulting in a temperature bias of more than 40 K. Interestingly, BISON underpredicted cladding radial growth for IFR-1 while overpredicting it here for X430. This suggests that the tuning parameters developed here might not improve the accuracy of other simulations since decreasing the cladding radial growth of the IFR-1 benchmark problem would increase the error.

4. CONCLUSIONS AND FUTURE WORK

BISON accurately predicted burnup and plenum pressure for two pins in the X430 experiment. It also accurately predicted the temperature profiles of interior fuel pins, but corrections must be as accurate for edge pins. The relative error of BISON cladding radial growth predictions was quite large, but it was less than 0.1 mm in absolute terms. This amount of error does not appear to impact the simulation results discussed in this work, so it cannot be recommended as a priority for immediate improvement. However, the cladding radial growth likely has a significant effect on cladding stress and cladding failure probability. To quantify these effects, additional benchmark problems based on experiments that measured cladding stress will be needed.

The BISON prediction of fuel axial growth was reasonably accurate for U-Zr fuel but significantly inaccurate for U-Pu-Zr fuel. BISON did not appear to distinguish between U-Zr and U-Pu-Zr in its swelling models. The necessary correlations to do so have not been calculated, and there might not be enough experimental data to do so. Future work should focus on determining what improvements can be made given the existing data and in gathering more data to develop better correlations.

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APPENDIX A. FULL SIMULATION RESULTS

PIN T651 FULL RESULTS

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
0		295	295	295	0	2.45E-05		0	0	8.80E-06	1.57E-05	0	0	0	0	
100	307.664386	308.726431	314.56793	307.620231	0	2.45E-05	0	3.30E-10	0	8.80E-06	1.57E-05	5.90E-07	9.07E-05	2.25E-09	0.00016015	95069.9375
225	323.519746	325.916282	338.750723	323.416899	0	2.45E-05	0	1.67E-09	0	8.81E-06	1.57E-05	1.37E-06	0.00020348	1.14E-08	0.00037205	99914.5699
381.25	343.380123	347.416257	368.553316	343.190372	0	2.45E-05	0	4.79E-09	0	8.82E-06	1.57E-05	2.35E-06	0.00034351	3.28E-08	0.00063881	105972.416
576.5625	368.27283	374.322073	405.17448	367.950715	2.72E-67	2.45E-05	0	1.10E-08	0	8.84E-06	1.57E-05	3.59E-06	0.00051709	7.49E-08	0.00097319	113549.334
820.703125	399.496533	408.016856	450.033914	398.969487	5.27E-58	2.46E-05	0	2.22E-08	0	8.85E-06	1.57E-05	5.13E-06	0.00073191	1.52E-07	0.00139262	123026.583
1125.87891	438.69497	450.259778	504.814055	437.851242	5.32E-49	2.46E-05	0	4.18E-08	0	8.87E-06	1.57E-05	7.07E-06	0.00099741	2.86E-07	0.00191915	134882.859
1507.34863	487.948765	503.279574	571.528373	486.626966	4.24E-40	2.47E-05	0	7.49E-08	0	8.90E-06	1.58E-05	9.51E-06	0.00132518	5.12E-07	0.0025808	149718.467
1984.18579	549.885009	569.987335	652.686438	547.878479	2.32E-31	2.47E-05	0	1.30E-07	0	8.93E-06	1.58E-05	1.26E-05	0.00172973	8.88E-07	0.00341357	168288.842
2580.23224	627.795717	654.09879	751.48133	624.899785	5.29E-23	2.48E-05	0	2.20E-07	0	8.97E-06	1.58E-05	1.65E-05	0.00222846	1.50E-06	0.00446356	191545.12
3325.2903	725.734468	760.667229	871.949986	721.893221	4.17E-15	2.49E-05	0	3.65E-07	0	9.02E-06	1.59E-05	2.14E-05	0.00284404	2.49E-06	0.00578982	220681.41
3600	761.937266	800.106795	915.756788	757.844007	3.63E-13	2.49E-05	0	4.27E-07	0	9.04E-06	1.59E-05	2.32E-05	0.00307114	2.92E-06	0.00628135	231438.647
4345.05806	761.937266	800.112068	915.757668	757.848361	1.34E-12	2.49E-05	0	6.04E-07	0	9.04E-06	1.59E-05	2.32E-05	0.00307093	4.13E-06	0.00628141	231440.144
5276.38063	761.937266	800.112464	915.755698	757.848578	2.55E-12	2.49E-05	0	8.25E-07	0	9.04E-06	1.59E-05	2.32E-05	0.00307087	5.64E-06	0.00628142	231440.513
6440.53385	761.937266	800.112559	915.754896	757.848844	4.07E-12	2.49E-05	0	1.10E-06	0	9.04E-06	1.59E-05	2.32E-05	0.00307096	7.53E-06	0.00628143	231441.054
7895.72538	761.937266	800.112275	915.75501	757.849177	5.97E-12	2.49E-05	0	1.45E-06	0	9.04E-06	1.59E-05	2.32E-05	0.0030712	9.89E-06	0.00628144	231441.802
9714.71478	761.937266	800.112817	915.757391	757.849641	8.34E-12	2.49E-05	0	1.88E-06	0	9.04E-06	1.59E-05	2.32E-05	0.00307163	1.28E-05	0.00628146	231441.933
11988.4515	761.937266	800.11218	915.759322	757.850211	1.13E-11	2.49E-05	0	2.42E-06	0	9.04E-06	1.59E-05	2.32E-05	0.00307227	1.65E-05	0.00628148	231443.003
14830.6225	761.937266	800.111092	915.762733	757.850963	1.50E-11	2.49E-05	0	3.09E-06	0	9.04E-06	1.59E-05	2.32E-05	0.00307317	2.12E-05	0.00628151	231444.431
18383.3362	761.937266	800.109464	915.767991	757.851963	1.96E-11	2.49E-05	0	3.94E-06	0	9.04E-06	1.59E-05	2.32E-05	0.0030744	2.69E-05	0.00628154	231446.349
22824.2283	761.937266	800.107224	915.775627	757.853301	2.54E-11	2.49E-05	0	4.99E-06	0	9.04E-06	1.59E-05	2.32E-05	0.00307604	3.41E-05	0.00628158	231448.918
28375.3434	761.937266	800.104263	915.786421	757.8551	3.25E-11	2.49E-05	0	6.31E-06	0	9.04E-06	1.59E-05	2.32E-05	0.00307822	4.31E-05	0.00628163	231452.361
35314.2373	761.937266	800.100435	915.801512	757.857526	4.15E-11	2.49E-05	0	7.96E-06	0	9.04E-06	1.59E-05	2.32E-05	0.00308112	5.44E-05	0.00628169	231456.981
43987.8547	761.937266	800.095548	915.822525	757.86081	5.26E-11	2.49E-05	0	1.00E-05	0	9.04E-06	1.59E-05	2.32E-05	0.00308497	6.85E-05	0.00628176	231463.192
54829.8764	761.937266	800.089371	915.851755	757.865263	6.64E-11	2.49E-05	0	1.26E-05	0	9.04E-06	1.59E-05	2.32E-05	0.00309009	8.61E-05	0.00628186	231471.563
68382.4035	761.937266	800.081656	915.892412	757.871319	8.36E-11	2.49E-05	0	1.58E-05	0	9.04E-06	1.59E-05	2.32E-05	0.00309693	0.00010807	0.00628198	231482.872
85323.0625	761.937266	800.072193	915.948981	757.879572	1.05E-10	2.49E-05	0	1.98E-05	0	9.04E-06	1.59E-05	2.32E-05	0.00310608	0.00013557	0.00628214	231498.188
106498.886	761.937266	800.060917	916.027717	757.890849	1.31E-10	2.49E-05	0	2.49E-05	0	9.04E-06	1.59E-05	2.32E-05	0.00311837	0.00016994	0.00628234	231518.981
132968.666	761.937266	800.012407	916.128344	757.905106	1.64E-10	2.49E-05	0	3.11E-05	0	9.04E-06	1.59E-05	2.32E-05	0.00313486	0.0002129	0.00628248	231579.036
166055.89	761.937266	799.993227	916.277839	757.925953	2.04E-10	2.49E-05	0	3.90E-05	0	9.05E-06	1.59E-05	2.32E-05	0.00315716	0.00026661	0.00628281	231629.204
207414.921	761.937266	799.97926	916.486283	757.954703	2.53E-10	2.49E-05	0	4.88E-05	0	9.05E-06	1.59E-05	2.32E-05	0.00318732	0.00033374	0.00628326	231697.979
259113.709	761.937266	799.975046	916.777446	757.994315	3.13E-10	2.49E-05	0	6.11E-05	0	9.06E-06	1.58E-05	2.32E-05	0.00322821	0.00041766	0.0062839	231792.353
323737.195	761.937266	799.997175	917.183456	758.049068	3.86E-10	2.49E-05	0	7.64E-05	0	9.06E-06	1.58E-05	2.32E-05	0.00328379	0.00052255	0.00628482	231922.164
404516.551	761.937266	800.097161	917.750535	758.125415	4.75E-10	2.49E-05	0	9.56E-05	0	9.07E-06	1.58E-05	2.32E-05	0.00335952	0.00065366	0.00628623	232101.282
505490.747	761.937266	800.368071	918.545691	758.232468	5.84E-10	2.49E-05	0	0.00011959	0	9.09E-06	1.58E-05	2.32E-05	0.00346292	0.00081756	0.00628853	232349.154
631708.492	761.937266	800.447653	919.660464	758.380895	7.16E-10	2.49E-05	0	0.00014956	0	9.11E-06	1.58E-05	2.32E-05	0.00360438	0.00102243	0.00629084	232692.462
789480.673	761.937266	800.322076	921.229365	758.588972	8.71E-10	2.49E-05	0	0.00018702	0	9.14E-06	1.58E-05	2.32E-05	0.00379829	0.00127851	0.00629337	233169.971
986695.899	761.937266	801.506693	923.169337	758.906462	1.02E-09	2.49E-05	0	0.00023385	0	9.18E-06	1.57E-05	2.33E-05	0.00406431	0.00159862	0.0062894	233843.301
1233214.93	761.937266	800.099733	925.176923	758.890161	1.19E-09	2.49E-05	0	0.00029238	0	9.23E-06	1.57E-05	2.32E-05	0.00442422	0.00199875	0.00629387	234639.694
1541363.72	761.937266	799.93368	927.999061	758.779953	1.40E-09	2.49E-05	0	0.00036555	0	9.31E-06	1.56E-05	2.33E-05	0.0049168	0.00249892	0.00630002	235728.019
1926549.71	761.937266	800.62031	931.968256	758.69557	1.60E-09	2.49E-05	0	0.00045701	0	9.41E-06	1.55E-05	2.33E-05	0.00559282	0.00312413	0.00630178	237284.184
2408032.2	761.937266	801.413193	937.564383	758.544274	1.80E-09	2.49E-05	0	0.00057133	0	9.56E-06	1.54E-05	2.33E-05	0.00651832	0.00390564	0.00630595	239485.513
3009885.31	761.937266	799.293945	945.513081	758.241071	2.08E-09	2.49E-05	0	0.00071423	0	9.76E-06	1.51E-05	2.33E-05	0.00777887	0.00488253	0.00630957	242615.977
3762201.69	761.937266	801.063059	956.67972	757.947336	2.93E-09	2.49E-05	0	0.00089286	0	1.00E-05	1.49E-05	2.33E-05	0.00949038	0.00610364	0.00631633	247221.378
4702597.17	761.937266	802.174079	972.24509	756.501321	2.94E-09	2.49E-05	0	0.00111614	0	1.05E-05	1.45E-05	2.33E-05	0.01176845	0.00763003	0.00627189	253654.73
5702597.17	761.937266	800.896843	987.816975	755.450589	2.95E-09	2.49E-05	19.6523767	0.00135358	0.00026601	1.09E-05	1.40E-05	2.33E-05	0.01421281	0.00925317	0.00623906	261088.677
6702597.17	761.937266	801.887494	997.387273	756.743728	3.00E-09	2.49E-05	44.0882291	0.00159101	0.00070145	1.12E-05	1.37E-05	2.33E-05	0.0161813	0.0108763	0.00631955	390258.291
7702597.17	761.937266	797.428062	1003.00893	756.643653	3.94E-09	2.49E-05	55.2015531	0.00182845	0.00100933	1.14E-05	1.35E-05	2.34E-05	0.01750768	0.01249944	0.00634877	600132.069
8203212	761.937266	797.567918	1004.61275	756.621718	4.67E-09	2.49E-05	58.1876039	0.00194731	0.00113309	1.15E-05	1.34E-05	2.35E-05	0.01796328	0.013312	0.0063582	748086.921
8206812	757.872748	792.552363	995.987724	752.925032	4.67E-09	2.49E-05	58.1949386	0.00194816	0.00113373	1.15E-05	1.34E-05	2.33E-05	0.01793191	0.01331777	0.00630028	802288.656
8707426.83	757.872748	792.172201	996.338603	752.878316	5.06E-09	2.49E-05	60.1442509	0.00206401	0.00124138	1.16E-05	1.34E-05	2.33E-05	0.01820483	0.01410977	0.00630411	804844.636
9333195.37	757.872748	794.051783	997.674854	752.875748	5.57E-09	2.49E-05	61.9798785	0.00220883	0.00136903	1.16E-05	1.33E-05	2.33E-05	0.0186384	0.01509978	0.00631106	859761.135

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
10115406	757.872748	791.774686	998.938093	752.785972	6.24E-09	2.49E-05	63.2526286	0.00238986	0.00151165	1.17E-05	1.32E-05	2.33E-05	0.01909755	0.01633728	0.00632004	924894.097
11093169.4	757.872748	791.597036	999.962767	752.700368	7.11E-09	2.49E-05	64.5022451	0.00261614	0.00168747	1.18E-05	1.31E-05	2.34E-05	0.01956368	0.01788416	0.00633129	997800.878
12093169.4	757.872748	791.457541	1000.52884	752.643878	8.06E-09	2.49E-05	65.5748534	0.00284756	0.00186729	1.18E-05	1.31E-05	2.34E-05	0.01994026	0.01946622	0.00634398	1086102.77
13093169.4	757.872748	792.314917	1000.79694	752.701031	9.12E-09	2.49E-05	66.4862201	0.00307899	0.00204711	1.19E-05	1.30E-05	2.35E-05	0.02025332	0.02104828	0.00635729	1176229.15
13814423	757.872748	791.994846	1000.86484	752.668844	9.95E-09	2.49E-05	67.062878	0.00324591	0.0021768	1.19E-05	1.30E-05	2.35E-05	0.02044355	0.02218934	0.00636838	1265072.34
13818023	754.438177	787.19797	989.131475	749.19701	9.95E-09	2.49E-05	67.0655537	0.00324673	0.00217744	1.19E-05	1.30E-05	2.33E-05	0.02040368	0.02219493	0.0063155	1321169.59
14428975	754.438177	787.244587	989.050306	749.181237	1.03E-08	2.49E-05	67.4925204	0.00338253	0.00228296	1.19E-05	1.30E-05	2.33E-05	0.02051167	0.02312332	0.00632185	1322882.43
14432575	750.349057	782.82645	985.009182	745.865165	1.03E-08	2.49E-05	67.4949264	0.00338333	0.00228358	1.19E-05	1.30E-05	2.31E-05	0.02049383	0.02312877	0.00626869	1367502.18
14437075	750.349057	782.826429	985.009143	745.865137	1.03E-08	2.49E-05	67.497922	0.00338432	0.00228435	1.19E-05	1.30E-05	2.31E-05	0.02049474	0.02313556	0.00626875	1367797.79
14442700	750.349057	782.827578	985.008722	745.865027	1.03E-08	2.49E-05	67.501664	0.00338557	0.00228531	1.19E-05	1.30E-05	2.31E-05	0.02049575	0.02314405	0.00626882	1368176.64
14449731.3	750.349057	782.828854	985.008047	745.86489	1.03E-08	2.49E-05	67.5063377	0.00338712	0.00228652	1.19E-05	1.30E-05	2.31E-05	0.02049698	0.02315466	0.00626892	1368650.26
14458520.3	750.349057	782.830413	985.007132	745.864721	1.04E-08	2.49E-05	67.5121738	0.00338906	0.00228803	1.19E-05	1.30E-05	2.31E-05	0.02049851	0.02316792	0.00626903	1369242.31
14469506.6	750.349057	782.832377	985.005955	745.864509	1.04E-08	2.49E-05	67.5194595	0.00339148	0.00228991	1.19E-05	1.30E-05	2.31E-05	0.0205004	0.0231845	0.00626918	1369982.4
14483239.6	750.349057	782.834883	985.004472	745.864245	1.04E-08	2.49E-05	67.528552	0.00339452	0.00229227	1.19E-05	1.30E-05	2.31E-05	0.02050277	0.02320523	0.00626936	1370907.54
14500405.7	750.349057	782.838101	985.002613	745.863916	1.04E-08	2.49E-05	67.5398948	0.00339831	0.00229521	1.19E-05	1.30E-05	2.31E-05	0.02050574	0.02323113	0.00626959	1372064.03
14521863.4	750.349057	782.842262	985.000292	745.863504	1.04E-08	2.49E-05	67.5540378	0.00340304	0.00229889	1.19E-05	1.30E-05	2.31E-05	0.02050944	0.02326352	0.00626987	1373509.71
14548685.5	750.349057	782.854479	984.993789	745.862351	1.04E-08	2.49E-05	67.5716613	0.00340896	0.00230349	1.19E-05	1.30E-05	2.31E-05	0.02051406	0.023304	0.00627023	1375380.46
14582213.1	750.349057	782.863457	984.98929	745.861549	1.04E-08	2.49E-05	67.5936048	0.00341637	0.00230924	1.19E-05	1.30E-05	2.31E-05	0.02051987	0.0233546	0.00627068	1377656.13
14624122.6	750.349057	782.87449	984.98413	745.860628	1.04E-08	2.49E-05	67.6209007	0.00342562	0.00231643	1.19E-05	1.30E-05	2.31E-05	0.02052716	0.02341784	0.00627123	1380501.55
14676509.5	750.349057	782.890897	984.977002	745.859367	1.04E-08	2.49E-05	67.654814	0.00343718	0.00232542	1.19E-05	1.30E-05	2.31E-05	0.02053628	0.0234969	0.00627193	1384058.9
14741993.1	750.349057	782.913588	984.968025	745.857789	1.05E-08	2.49E-05	67.696886	0.00345164	0.00233665	1.19E-05	1.30E-05	2.31E-05	0.0205477	0.02359573	0.00627281	1388506.78
14823847.6	750.349057	782.944678	984.957021	745.855864	1.05E-08	2.49E-05	67.748983	0.00346971	0.00235069	1.19E-05	1.30E-05	2.31E-05	0.02056202	0.02371926	0.0062739	1394068.83
14926165.8	750.349057	782.987044	984.943312	745.853474	1.05E-08	2.49E-05	67.8133461	0.0034923	0.00236824	1.19E-05	1.30E-05	2.31E-05	0.02057994	0.02387368	0.00627527	1401025.25
15054063.5	750.349057	782.966235	984.926169	745.850052	1.06E-08	2.49E-05	67.8926385	0.00352053	0.00239018	1.19E-05	1.30E-05	2.32E-05	0.02060261	0.02406669	0.006277	1409727.34
15213935.6	750.349057	782.890773	984.904852	745.845482	1.06E-08	2.49E-05	67.9899832	0.00355583	0.00241761	1.19E-05	1.30E-05	2.32E-05	0.02063151	0.02430797	0.00627915	1420617.21
15413775.7	750.349057	782.781988	984.87825	745.839628	1.07E-08	2.49E-05	68.1089799	0.00359994	0.00245189	1.19E-05	1.30E-05	2.32E-05	0.02066827	0.02460956	0.00628183	1434247.88
15663575.9	750.349057	782.628564	984.845086	745.832135	1.08E-08	2.49E-05	68.2536862	0.00365509	0.00249473	1.19E-05	1.30E-05	2.32E-05	0.02071524	0.02498655	0.00628519	1451313.85
15975826.1	750.349057	782.456702	984.803767	745.822743	1.09E-08	2.49E-05	68.4285422	0.00372402	0.0025483	1.19E-05	1.30E-05	2.32E-05	0.02077531	0.02545778	0.00628937	1472687.07
16366138.9	750.349057	782.284461	984.752282	745.811192	1.11E-08	2.49E-05	68.6382149	0.00381019	0.00261525	1.20E-05	1.29E-05	2.32E-05	0.02085211	0.02604683	0.00629462	1499462.64
16854029.9	750.349057	782.158649	984.688116	745.797219	1.13E-08	2.49E-05	68.8873364	0.0039179	0.00269894	1.20E-05	1.29E-05	2.32E-05	0.02094961	0.02678314	0.00630125	1533014.13
17463893.6	750.349057	782.022529	984.607999	745.779804	1.16E-08	2.49E-05	69.1801162	0.00405254	0.00280355	1.20E-05	1.29E-05	2.33E-05	0.0210721	0.02770352	0.00630965	1575059.82
18226223.3	750.349057	782.022045	984.50846	745.759671	1.19E-08	2.49E-05	69.5198248	0.00422083	0.00293431	1.20E-05	1.29E-05	2.33E-05	0.02122449	0.028854	0.00632034	1627766.2
19179135.3	750.349057	782.248142	984.420086	745.735777	1.24E-08	2.49E-05	69.9081737	0.0044312	0.00309777	1.20E-05	1.29E-05	2.34E-05	0.02141332	0.0302921	0.00633394	1693861.19
20179135.3	750.349057	782.475616	984.320572	745.71182	1.29E-08	2.49E-05	70.2779431	0.00465196	0.0032693	1.21E-05	1.28E-05	2.34E-05	0.02160578	0.03180126	0.00634923	1776063.91
21179135.3	750.349057	782.091694	984.214318	745.68464	1.34E-08	2.49E-05	70.6142069	0.00487273	0.00344084	1.21E-05	1.28E-05	2.35E-05	0.0217927	0.03331042	0.0063653	1862386.75
21312419	750.349057	782.074077	984.203765	745.681271	1.35E-08	2.49E-05	70.656738	0.00490215	0.0034637	1.21E-05	1.28E-05	2.35E-05	0.02181708	0.03351157	0.00637067	1945774.34
21314262.2	748.525721	779.379724	976.53732	743.730988	1.35E-08	2.49E-05	70.6573145	0.00490255	0.00346401	1.21E-05	1.28E-05	2.34E-05	0.02179075	0.03351431	0.00634022	1951516.02
21316019	746.750018	776.776042	969.165527	741.84272	1.35E-08	2.49E-05	70.6578487	0.00490292	0.0034643	1.21E-05	1.28E-05	2.33E-05	0.02176628	0.03351686	0.00631026	1946530.95
21317862.2	746.750018	776.776064	969.165404	741.842694	1.35E-08	2.49E-05	70.6584013	0.00490331	0.0034646	1.21E-05	1.28E-05	2.33E-05	0.02176806	0.03351949	0.00631028	1946668.88
21320166.2	746.750018	776.774571	969.166047	741.84263	1.35E-08	2.49E-05	70.6590919	0.00490379	0.00346497	1.21E-05	1.28E-05	2.33E-05	0.0217693	0.03352277	0.00631032	1946818.16
21323046.2	746.750018	776.773536	969.16633	741.842566	1.35E-08	2.49E-05	70.659955	0.00490439	0.00346544	1.21E-05	1.28E-05	2.33E-05	0.0217703	0.03352688	0.00631036	1947005.05
21326646.2	746.750018	776.772698	969.166326	741.842495	1.35E-08	2.49E-05	70.6610335	0.00490514	0.00346602	1.21E-05	1.28E-05	2.33E-05	0.02177119	0.03353202	0.00631042	1947238.84
21331146.2	746.750018	776.771936	969.166092	741.842412	1.35E-08	2.49E-05	70.6623813	0.00490608	0.00346675	1.21E-05	1.28E-05	2.33E-05	0.02177209	0.03353844	0.00631048	1947531.16
21336771.2	746.750018	776.771163	969.165658	741.842313	1.35E-08	2.49E-05	70.6640652	0.00490726	0.00346767	1.21E-05	1.28E-05	2.33E-05	0.02177308	0.03354647	0.00631057	1947896.62
21343802.5	746.750018	776.770305	969.16504	741.84219	1.35E-08	2.49E-05	70.666169	0.00490872	0.00346881	1.21E-05	1.28E-05	2.33E-05	0.02177426	0.0335565	0.00631067	1948353.47
21352591.5	746.750018	776.7693	969.164229	741.842039	1.35E-08	2.49E-05	70.668797	0.00491056	0.00347023	1.21E-05	1.28E-05	2.33E-05	0.02177569	0.03356904	0.0063108	1948924.57
21363577.8	746.750018	776.76809	969.163198	741.84185	1.35E-08	2.49E-05	70.6720792	0.00491285	0.00347201	1.21E-05	1.28E-05	2.33E-05	0.02177748	0.03358472	0.00631097	1949638.46
21377310.8	746.750018	776.766623	969.161903	741.841615	1.35E-08	2.49E-05	70.6761776	0.00491572	0.00347424	1.21E-05	1.28E-05	2.33E-05	0.02177971	0.03360432	0.00631117	1950530.86
21394476.9	746.750018	776.764848	969.160283	741.841322	1.35E-08	2.49E-05	70.681294	0.0049193	0.00347703	1.21E-05	1.28E-05	2.33E-05	0.02178249	0.03362882	0.00631143	1951646.4
21415934.6	746.750018	776.762717	969.158258	741.840955	1.35E-08	2.49E-05	70.687679	0.00492378	0.00348051	1.21E-05	1.28E-05	2.33E-05	0.02178597	0.03365944	0.00631175	1953040.9
21442756.7	746.750018	776.760189	969.155727	741.840499	1.36E-08	2.49E-05	70.6956438	0.00492938	0.00348486	1.21E-05	1.28E-05	2.33E-05	0.02179031	0.03369771	0.00631215	1954784.14
21476284.3	746.750018	776.757238	969.152563	741.839929	1.36E-08	2.49E-05	70.7055746	0.00493638	0.0034903	1.21E-05	1.28E-05	2.33E-05	0.02179575	0.03374555	0.00631266	1956963.36
21518193.8	746.750018	776.753874	969.148608	741.83922	1.36E-08	2.49E-05	70.7179484	0.00494513	0.00349709	1.21E-05	1.28E-05	2.33E-05	0.02180254	0.03380536	0.00631328	1959687.67
21570580.7	746.750018	776.750175	969.143667	741.838337	1.36E-08	2.49E-05	70.7333543	0.00495606	0.00350559	1.21E-05	1.28E-05	2.33E-05	0.02181102	0.03388012	0.00631407	1963093.48
21636064.3	746.750018	776.746441	969.137491	741.837221	1.36E-08	2.49E-05	70.7525163	0.00496973	0.00351621	1.21E-05	1.28E-05	2.33E-05	0.02182163	0.03397356	0.00631506	1967351.38

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
21717918.8	746.750018	776.74306	969.129775	741.835826	1.36E-08	2.49E-05	70.7763211	0.00498682	0.00352949	1.21E-05	1.28E-05	2.33E-05	0.02183489	0.03409037	0.00631629	1972674.77
21820237	746.750018	776.740772	969.120133	741.834099	1.37E-08	2.49E-05	70.8058487	0.00500818	0.00354608	1.21E-05	1.28E-05	2.33E-05	0.02185146	0.03423638	0.00631783	1979330.67
21948134.7	746.750018	776.740961	969.108087	741.831963	1.37E-08	2.49E-05	70.8424058	0.00503488	0.00356683	1.21E-05	1.28E-05	2.33E-05	0.02187217	0.03441889	0.00631977	1987653.12
22108006.8	746.750018	776.760204	969.074322	741.826059	1.37E-08	2.49E-05	70.8875607	0.00506825	0.00359276	1.21E-05	1.28E-05	2.33E-05	0.02189799	0.03464703	0.00632223	1998585.6
22307846.9	746.750018	776.790277	969.050878	741.822041	1.38E-08	2.49E-05	70.9431748	0.00510996	0.00362517	1.21E-05	1.28E-05	2.33E-05	0.02193032	0.0349322	0.00632528	2011736.64
22557647.1	746.750018	776.84825	969.021611	741.817129	1.39E-08	2.49E-05	71.0114285	0.00516211	0.00366569	1.21E-05	1.28E-05	2.33E-05	0.02197073	0.03528867	0.00632916	2028187.87
22869897.3	746.750018	776.952732	968.985083	741.811175	1.40E-08	2.49E-05	71.0948307	0.00522729	0.00371633	1.21E-05	1.28E-05	2.33E-05	0.02202122	0.03573425	0.00633406	2048771.39
23260210.1	746.750018	777.005511	968.939513	741.803336	1.41E-08	2.49E-05	71.1962034	0.00530877	0.00377964	1.21E-05	1.28E-05	2.34E-05	0.02208429	0.03629123	0.00634024	2074529.3
23748101.1	746.750018	776.836396	968.882801	741.792368	1.43E-08	2.49E-05	71.3186259	0.00541061	0.00385877	1.21E-05	1.28E-05	2.34E-05	0.02216307	0.03698745	0.00634803	2106769.62
24357964.8	746.750018	776.625866	968.81236	741.778723	1.45E-08	2.49E-05	71.4653219	0.00553792	0.00395769	1.21E-05	1.28E-05	2.34E-05	0.02226144	0.03785773	0.00635788	2147142.71
25120294.5	746.750018	776.561968	968.724771	741.850914	1.48E-08	2.49E-05	71.6394723	0.00569705	0.00408134	1.22E-05	1.27E-05	2.35E-05	0.022385	0.03894558	0.00637053	2198034.98
25596874	746.750018	776.552081	968.670149	741.840016	1.49E-08	2.49E-05	71.7434871	0.00579654	0.00415864	1.22E-05	1.27E-05	2.35E-05	0.02246165	0.03962566	0.00638	2259655.39
25600474	746.260781	775.669269	965.316762	741.214322	1.49E-08	2.49E-05	71.744254	0.00579728	0.00415922	1.22E-05	1.27E-05	2.35E-05	0.02245125	0.03963076	0.00637211	2295025.26
26077053.5	746.260781	775.661752	965.264207	741.204096	1.51E-08	2.49E-05	71.843391	0.00589541	0.00423547	1.22E-05	1.27E-05	2.35E-05	0.02252783	0.04030161	0.0063789	2297104.19
26261755	746.260781	775.659447	965.243487	741.199942	1.52E-08	2.49E-05	71.8809305	0.00593345	0.00426502	1.22E-05	1.27E-05	2.35E-05	0.02255719	0.0405616	0.00638323	2334729.6
26265355	745.89865	776.094503	971.503058	741.436241	1.52E-08	2.49E-05	71.881668	0.0059342	0.0042656	1.22E-05	1.27E-05	2.35E-05	0.02257723	0.04056674	0.00638614	2350226.12
26450056.5	745.89865	776.092376	971.479778	741.431738	1.52E-08	2.49E-05	71.9197941	0.00597334	0.00429601	1.22E-05	1.27E-05	2.35E-05	0.02260604	0.04083432	0.00638891	2351245.48
26680933.3	745.89865	776.089911	971.452083	741.425903	1.53E-08	2.49E-05	71.9667548	0.00602227	0.00433403	1.22E-05	1.27E-05	2.35E-05	0.02264377	0.04116879	0.00639304	2366912.51
26969529.3	745.89865	776.087868	971.417401	741.418841	1.54E-08	2.49E-05	72.0243933	0.00608343	0.00438155	1.22E-05	1.27E-05	2.35E-05	0.02269097	0.04158688	0.00639824	2386514.81
27330274.4	745.89865	776.086394	971.374087	741.410093	1.56E-08	2.49E-05	72.094832	0.00615988	0.00444095	1.22E-05	1.27E-05	2.36E-05	0.02275009	0.04210949	0.00640477	2411046.76
27781205.7	745.89865	776.086772	971.331467	741.399011	1.58E-08	2.49E-05	72.1804593	0.00625544	0.0045152	1.22E-05	1.27E-05	2.36E-05	0.02282455	0.04276276	0.00641301	2441764.78
28344869.8	745.89865	776.076053	971.2825	741.385279	1.60E-08	2.49E-05	72.2838833	0.00637489	0.00460802	1.22E-05	1.27E-05	2.36E-05	0.02291819	0.04357934	0.00642344	2480242.26
29049450	745.89865	776.05807	971.217141	741.367915	1.63E-08	2.49E-05	72.4078376	0.0065242	0.00472403	1.23E-05	1.27E-05	2.37E-05	0.02303534	0.04460006	0.00643666	2528452.27
29930175.2	745.89865	776.03977	971.129982	741.349819	1.67E-08	2.49E-05	72.5550237	0.00671084	0.00486906	1.23E-05	1.26E-05	2.37E-05	0.02318185	0.04587597	0.00645347	2588908.04
30930175.2	745.89865	776.02257	971.025059	741.327754	1.72E-08	2.49E-05	72.7125215	0.00692276	0.00503372	1.23E-05	1.26E-05	2.38E-05	0.0233479	0.04732467	0.00647329	2664267.25
31930175.2	745.89865	776.011519	970.916241	741.305115	1.77E-08	2.49E-05	72.8606631	0.00713468	0.00519838	1.23E-05	1.26E-05	2.39E-05	0.02351364	0.04877337	0.00649404	2749493.36
32714598	745.89865	776.004036	970.831616	741.289418	1.81E-08	2.49E-05	72.9708498	0.00730092	0.00532754	1.23E-05	1.26E-05	2.39E-05	0.0236435	0.04990976	0.00651171	2833954.42
32718198	644.15	644.166545	644.152511	644.150781	1.81E-08	2.48E-05	72.9710968	0.0073013	0.00532784	1.22E-05	1.26E-05	1.86E-05	0.02233897	0.04991237	0.00511744	2509753.83
32721798	305	305.051632	305.004328	305.00224	1.81E-08	2.45E-05	72.9710968	0.0073013	0.00532784	1.20E-05	1.25E-05	2.41E-06	0.02028851	0.04991237	0.00071222	1199833.43
32725398	305	305.051632	305.004328	305.00224	1.81E-08	2.45E-05	72.9710968	0.0073013	0.00532784	1.20E-05	1.25E-05	2.41E-06	0.02028851	0.04991237	0.00071222	1199833.43
32728998	730.114707	755.520902	926.306421	726.262716	1.81E-08	2.49E-05	72.9713064	0.00730162	0.00532809	1.23E-05	1.26E-05	2.30E-05	0.02341412	0.04991458	0.00627401	2837631.43
32732598	730.114707	755.524374	926.310271	726.266384	1.81E-08	2.49E-05	72.9717256	0.00730227	0.00532859	1.23E-05	1.26E-05	2.30E-05	0.02341156	0.04991901	0.00627406	2837776.65
32737098	730.114707	755.524129	926.308646	726.266347	1.81E-08	2.49E-05	72.9722495	0.00730308	0.00532922	1.23E-05	1.26E-05	2.30E-05	0.02341032	0.04992454	0.00627414	2838036.49
32742723	730.114707	755.524126	926.308637	726.266348	1.81E-08	2.49E-05	72.9729041	0.00730409	0.00533001	1.23E-05	1.26E-05	2.30E-05	0.02341012	0.04993145	0.00627424	2838338.05
32749754.3	730.114707	755.523992	926.307477	726.266275	1.81E-08	2.49E-05	72.9737221	0.00730536	0.00533099	1.23E-05	1.26E-05	2.30E-05	0.02341066	0.0499401	0.00627436	2838738.51
32758543.3	730.114707	755.523922	926.306535	726.266171	1.81E-08	2.49E-05	72.9747443	0.00730694	0.00533222	1.23E-05	1.26E-05	2.30E-05	0.02341175	0.0499509	0.00627452	2839238.77
32769529.6	730.114707	755.523885	926.305613	726.266033	1.81E-08	2.49E-05	72.9760214	0.00730891	0.00533375	1.23E-05	1.26E-05	2.30E-05	0.02341329	0.0499644	0.00627471	2839864.09
32783262.6	730.114707	755.523861	926.304571	726.265856	1.81E-08	2.49E-05	72.9776168	0.00731138	0.00533567	1.23E-05	1.26E-05	2.30E-05	0.02341529	0.04998128	0.00627496	2840645.78
32800428.7	730.114707	755.52384	926.303309	726.265634	1.81E-08	2.49E-05	72.9796095	0.00731447	0.00533807	1.23E-05	1.26E-05	2.30E-05	0.02341781	0.05000238	0.00627526	2841622.94
32821886.4	730.114707	755.523819	926.301743	726.265355	1.81E-08	2.49E-05	72.982098	0.00731832	0.00534107	1.23E-05	1.26E-05	2.30E-05	0.02342096	0.05002876	0.00627564	2842844.44
32848708.5	730.114707	755.523798	926.29979	726.265005	1.81E-08	2.49E-05	72.985205	0.00732315	0.00534481	1.23E-05	1.26E-05	2.30E-05	0.02342491	0.05006172	0.00627612	2844371.39
32882236.1	730.114707	755.523779	926.297349	726.264567	1.81E-08	2.49E-05	72.989083	0.00732918	0.0053495	1.23E-05	1.26E-05	2.30E-05	0.02342984	0.05010293	0.00627672	2846280.21
32896765	729.812123	755.21347	926.108736	726.028475	1.81E-08	2.49E-05	72.9907615	0.00733179	0.00535153	1.23E-05	1.26E-05	2.30E-05	0.02343095	0.05012079	0.00627316	2847829.91
32900365	738.505875	766.536618	951.298421	734.336528	1.81E-08	2.49E-05	72.9911981	0.00733247	0.00535206	1.23E-05	1.26E-05	2.35E-05	0.02352203	0.05012544	0.0064062	2882046.45
32914893.9	738.505875	766.536717	951.298585	734.3366	1.81E-08	2.49E-05	72.993044	0.00733534	0.00535429	1.23E-05	1.26E-05	2.35E-05	0.02352029	0.0501451	0.00640646	2882302.6
32933055.1	738.505875	766.536261	951.294903	734.336407	1.81E-08	2.49E-05	72.9953493	0.00733894	0.00535708	1.23E-05	1.26E-05	2.35E-05	0.02352241	0.05016967	0.00640681	2883455.39
32955756.6	738.505875	766.536065	951.292633	734.336061	1.81E-08	2.49E-05	72.9982277	0.00734343	0.00536057	1.23E-05	1.26E-05	2.35E-05	0.02352582	0.05020038	0.00640726	2884894.4
32984133.4	738.505875	766.535884	951.290201	734.335606	1.81E-08	2.49E-05	73.0018208	0.00734905	0.00536494	1.23E-05	1.26E-05	2.35E-05	0.02353021	0.05023877	0.00640782	2886693.33
33019604.4	738.505875	766.535673	951.287224	734.335034	1.81E-08	2.49E-05	73.0063044	0.00735607	0.00537039	1.23E-05	1.26E-05	2.35E-05	0.02353573	0.05028677	0.00640853	2888942.2
33063943.2	738.505875	766.53542	951.283513	734.334316	1.82E-08	2.49E-05	73.011897	0.00736484	0.00537721	1.23E-05	1.26E-05	2.35E-05	0.02354263	0.05034675	0.00640941	2891753.56
33119366.7	738.505875	766.535099	951.278877	734.333584	1.82E-08	2.49E-05	73.0188689	0.00737581	0.00538573	1.23E-05	1.26E-05	2.35E-05	0.02355125	0.05042174	0.00641051	2895268.86
33188646.1	738.505875	766.53471	951.273083	734.332755	1.82E-08	2.49E-05	73.0275548	0.00738952	0.00539639	1.23E-05	1.26E-05	2.35E-05	0.02356204	0.05051547	0.00641189	2899664.05
33275245.3	738.505875	766.534256	951.265815	734.331706	1.82E-08	2.49E-05	73.0383669	0.00740666	0.0054097	1.23E-05	1.26E-05	2.35E-05	0.02357551	0.05063263	0.00641362	2905159.06
33383494.3	738.505875	766.533736	951.256717	734.330375	1.82E-08	2.49E-05	73.0518118	0.00742809	0.00542635	1.23E-05	1.26E-05	2.35E-05	0.02359236	0.05077909	0.00641578	2912029.42
33518805.6	738.505875	766.53316	951.245351	734.328679	1.82E-08	2.49E-05	73.0685093	0.00745487	0.00544716	1.23E-05	1.26E-05	2.36E-05	0.02361341	0.05096216	0.00641849	2920619.88

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
33687944.7	738.505875	766.531944	951.213491	734.324274	1.83E-08	2.49E-05	73.0892132	0.00748834	0.00547317	1.24E-05	1.26E-05	2.36E-05	0.02363966	0.051191	0.00642193	2932148.44
33899368.5	738.505875	766.531372	951.191372	734.321259	1.83E-08	2.49E-05	73.1148343	0.00753018	0.00550568	1.24E-05	1.26E-05	2.36E-05	0.02367252	0.05147704	0.00642621	2945784.67
34163648.3	738.505875	766.531002	951.163761	734.31742	1.83E-08	2.49E-05	73.146463	0.00758249	0.00554632	1.24E-05	1.25E-05	2.36E-05	0.02371359	0.0518346	0.00643158	2962842.33
34493998.1	738.505875	766.530966	951.129307	734.311941	1.84E-08	2.49E-05	73.1853904	0.00764787	0.00559712	1.24E-05	1.25E-05	2.36E-05	0.0237649	0.05228155	0.00643834	2984181.39
34906935.3	738.505875	766.530506	951.086323	734.304819	1.85E-08	2.49E-05	73.2331237	0.00772959	0.00566062	1.24E-05	1.25E-05	2.36E-05	0.02382901	0.05284023	0.00644685	3010884.96
35423106.8	738.505875	766.524329	951.032766	734.341457	1.86E-08	2.49E-05	73.2913894	0.00783175	0.00574	1.24E-05	1.25E-05	2.37E-05	0.02390933	0.05353858	0.00645759	3044500.37
36068321.2	738.505875	766.511101	950.966042	734.329222	1.87E-08	2.49E-05	73.3621183	0.00795945	0.00583922	1.24E-05	1.25E-05	2.37E-05	0.02400936	0.05441153	0.00647117	3086359.14
36874839.2	738.505875	766.500008	950.882845	734.313163	1.88E-08	2.49E-05	73.4474006	0.00811907	0.00596324	1.24E-05	1.25E-05	2.38E-05	0.0241343	0.05550271	0.0064884	3138797.4
37874839.2	738.505875	766.499907	950.788277	734.292479	1.90E-08	2.49E-05	73.5485965	0.00831698	0.00611702	1.24E-05	1.25E-05	2.38E-05	0.02432509	0.05685566	0.00651068	3204474.96
38874839.2	738.505875	766.491404	950.679752	734.273486	1.92E-08	2.49E-05	73.6450881	0.00851489	0.0062708	1.25E-05	1.25E-05	2.41E-05	0.0244675	0.05820861	0.00671205	3284312.86
39574695	738.144449	766.105673	950.38635	733.979691	1.94E-08	2.49E-05	73.7099928	0.0086534	0.00637842	1.25E-05	1.24E-05	2.54E-05	0.02456805	0.05915547	0.00713667	3361319.76
39578295	738.81262	766.976263	952.302886	734.618272	1.94E-08	2.49E-05	73.7103225	0.00865412	0.00637898	1.25E-05	1.24E-05	2.55E-05	0.02457427	0.05916036	0.00716141	3417047.2
40278150.8	738.81262	766.962261	952.229827	734.60666	1.96E-08	2.49E-05	73.7736083	0.00879361	0.00648736	1.25E-05	1.24E-05	2.69E-05	0.02467819	0.06011391	0.00761784	3420053.41
41152970.5	738.81262	768.111861	952.02256	734.648589	1.98E-08	2.49E-05	73.8499472	0.00896796	0.00662284	1.25E-05	1.24E-05	2.88E-05	0.02480894	0.06130585	0.00822915	3476635.49
41221690	738.81262	767.982437	952.001788	734.646809	1.98E-08	2.49E-05	73.8558182	0.00898166	0.00663348	1.25E-05	1.24E-05	2.90E-05	0.02481814	0.06139948	0.00827773	3543418.52
41290409.4	738.81262	767.854184	951.978606	734.645034	1.98E-08	2.49E-05	73.8616714	0.00899536	0.00664412	1.25E-05	1.24E-05	2.92E-05	0.02482749	0.06149311	0.00832616	3548857.72
41376308.8	738.81262	767.68823	951.948727	734.642768	1.98E-08	2.49E-05	73.8689629	0.00901248	0.00665742	1.25E-05	1.24E-05	2.93E-05	0.02483984	0.06161015	0.00838712	3554359.52
41483683	738.81262	767.493218	951.911438	734.63998	1.99E-08	2.49E-05	73.8780384	0.00903388	0.00667405	1.25E-05	1.24E-05	2.96E-05	0.02485555	0.06175645	0.00846389	3561236.22
41617900.7	738.81262	767.267745	951.865094	734.636584	1.99E-08	2.49E-05	73.8893224	0.00906063	0.00669484	1.25E-05	1.24E-05	2.99E-05	0.02487534	0.06193932	0.00856077	3569833.9
41785672.9	738.81262	767.014464	951.807153	734.632477	2.28E-08	2.49E-05	73.9033341	0.00909407	0.00672082	1.25E-05	1.24E-05	3.03E-05	0.02490045	0.06216791	0.00868321	3580577.79
41995388.1	738.81262	766.933049	951.735376	734.627561	3.48E-08	2.49E-05	73.9207045	0.00913587	0.0067533	1.25E-05	1.24E-05	3.07E-05	0.02493205	0.06245364	0.00883825	3593998.81
42194062	739.310003	767.440227	951.969224	735.010075	5.21E-08	2.49E-05	73.9370144	0.00917546	0.00678406	1.25E-05	1.24E-05	3.12E-05	0.02496341	0.06272433	0.00899009	3612400.45
42197662	727.940399	752.65564	919.149236	724.155418	5.21E-08	2.49E-05	73.9372912	0.00917614	0.00678459	1.25E-05	1.24E-05	3.00E-05	0.02486344	0.06272895	0.0086203	3574364.01
42396335.9	727.940399	752.654131	919.136955	724.151077	5.26E-08	2.49E-05	73.951547	0.00921104	0.0068117	1.25E-05	1.24E-05	3.03E-05	0.02491348	0.06296752	0.00872455	3575322.5
42644678.4	727.940399	752.651768	919.109357	724.147042	5.37E-08	2.49E-05	73.9692157	0.00925466	0.0068456	1.25E-05	1.24E-05	3.08E-05	0.02494755	0.06326572	0.00888996	3589145.62
42893020.8	727.940399	752.648758	919.05484	724.143482	5.58E-08	2.49E-05	73.9867185	0.00929828	0.00687949	1.25E-05	1.24E-05	3.13E-05	0.02497362	0.06356393	0.00905711	3606088.83
43203448.9	727.940399	752.645749	918.977697	724.138991	6.09E-08	2.49E-05	74.0083674	0.00935281	0.00692186	1.25E-05	1.24E-05	3.20E-05	0.02501006	0.06393669	0.00926955	3623163.6
43513876.9	727.940399	752.643455	918.899409	724.134586	7.01E-08	2.49E-05	74.0297654	0.00940734	0.00696423	1.25E-05	1.24E-05	3.27E-05	0.02504809	0.06430945	0.0094841	3644374.49
43820808	726.737506	751.408976	918.088277	723.194957	8.43E-08	2.49E-05	74.0506799	0.00946125	0.00700612	1.25E-05	1.24E-05	3.33E-05	0.02508203	0.06467801	0.00969031	3661003.74
43824408	741.534973	770.70979	961.158465	737.357601	1.09E-07	2.50E-05	74.0509454	0.00946194	0.00700666	1.26E-05	1.24E-05	3.50E-05	0.02520791	0.06468272	0.0102113	3752607.56
43895709	741.552252	770.727682	961.161717	737.37002	7.05E-07	2.50E-05	74.0566254	0.00947669	0.00701812	1.26E-05	1.24E-05	3.53E-05	0.02521281	0.06478356	0.01029755	3753152.8
43899309	741.29119	770.386901	960.410987	737.120036	7.32E-07	2.50E-05	74.0569113	0.00947744	0.0070187	1.26E-05	1.24E-05	3.53E-05	0.02521136	0.06478864	0.01029304	3757579.01
43903809	741.29119	770.386924	960.408698	737.119951	7.68E-07	2.50E-05	74.0572682	0.00947836	0.00701942	1.26E-05	1.24E-05	3.53E-05	0.02521252	0.06479499	0.0102968	3757882.14
43909434	741.29119	770.38694	960.405894	737.119848	8.12E-07	2.50E-05	74.0577142	0.00947952	0.00702032	1.26E-05	1.24E-05	3.53E-05	0.025214	0.06480292	0.01030141	3758258.94
43916465.3	741.29119	770.386975	960.400059	737.119719	8.67E-07	2.50E-05	74.0582715	0.00948098	0.00702145	1.26E-05	1.24E-05	3.53E-05	0.02521581	0.06481284	0.01030703	3758732.06
43925254.3	741.29119	770.387008	960.391459	737.119558	9.36E-07	2.50E-05	74.058968	0.00948279	0.00702286	1.26E-05	1.24E-05	3.53E-05	0.02521806	0.06482524	0.01031399	3759321.83
43936240.6	741.29119	770.387035	960.38039	737.119357	1.02E-06	2.50E-05	74.0598382	0.00948506	0.00702462	1.26E-05	1.24E-05	3.54E-05	0.02522088	0.06484073	0.01032271	3760058.51
43949973.6	741.29119	770.387077	960.363212	737.119107	1.13E-06	2.50E-05	74.0609253	0.00948789	0.00702682	1.26E-05	1.24E-05	3.54E-05	0.02522431	0.06486011	0.01033368	3760979.87
43967139.7	741.29119	770.387127	960.340684	737.118799	1.27E-06	2.50E-05	74.0622833	0.00949143	0.00702957	1.26E-05	1.24E-05	3.54E-05	0.02522851	0.06488432	0.0103475	3762132.45
43988597.4	741.29119	770.387128	960.316989	737.118421	1.45E-06	2.50E-05	74.0639794	0.00949586	0.00703301	1.26E-05	1.24E-05	3.55E-05	0.02523345	0.06491458	0.01036491	3763565.18
44015419.5	741.29119	770.38713	960.288118	737.117955	1.67E-06	2.50E-05	74.0660973	0.00950139	0.00703731	1.26E-05	1.24E-05	3.56E-05	0.02523936	0.06495242	0.01038681	3765356.25
44048947.1	741.29119	770.387097	960.259144	737.11738	1.94E-06	2.50E-05	74.0687412	0.00950831	0.00704269	1.26E-05	1.24E-05	3.57E-05	0.02524636	0.06499971	0.01041435	3767594.09
44090856.6	741.29119	770.386895	960.238121	737.116674	2.30E-06	2.50E-05	74.0720406	0.00951696	0.00704941	1.26E-05	1.24E-05	3.58E-05	0.02525409	0.06505882	0.01044895	3770374.91
44143243.5	741.29119	770.386573	960.219995	737.115802	2.74E-06	2.50E-05	74.0761565	0.00952777	0.0070578	1.26E-05	1.24E-05	3.59E-05	0.02526308	0.06513272	0.01049242	3773845.71
44208727.1	741.29119	770.386173	960.199714	737.114732	3.31E-06	2.50E-05	74.0812883	0.00954128	0.0070683	1.26E-05	1.24E-05	3.61E-05	0.02527409	0.06522508	0.010547	3778182.82
44290581.6	741.29119	770.385537	960.185094	737.113418	4.05E-06	2.50E-05	74.0876825	0.00955817	0.00708143	1.26E-05	1.24E-05	3.63E-05	0.02528685	0.06534054	0.01061552	3783591.01
44372436.1	741.29119	770.384987	960.166454	737.112114	4.80E-06	2.50E-05	74.0940543	0.00957506	0.00709455	1.26E-05	1.24E-05	3.65E-05	0.02529993	0.065456	0.01068431	3790297.54
44401212	740.12978	769.192658	959.45876	736.207686	5.04E-06	2.50E-05	74.0962889	0.00958099	0.00709916	1.26E-05	1.24E-05	3.65E-05	0.02530089	0.06549658	0.01070111	3792365.79
44404812	735.985891	763.770708	947.422262	732.232369	5.05E-06	2.50E-05	74.0965623	0.00958172	0.00709973	1.26E-05	1.24E-05	3.61E-05	0.02526745	0.06550155	0.01056764	3774431.71
44433587.9	735.985891	763.771275	947.368369	732.231898	5.11E-06	2.50E-05	74.0986982	0.0095874	0.00710414	1.26E-05	1.24E-05	3.61E-05	0.02528035	0.0655404	0.01058329	3774838.18
44469557.7	735.985891	763.771833	947.332873	732.231429	5.19E-06	2.50E-05	74.1013646	0.00959451	0.00710966	1.26E-05	1.24E-05	3.62E-05	0.02529091	0.06558896	0.01061125	3777158.58
44514520	735.985891	763.772138	947.31175	732.230828	5.29E-06	2.50E-05	74.104692	0.00960339	0.00711656	1.26E-05	1.24E-05	3.63E-05	0.02530098	0.06564967	0.01064738	3780033.07
44570722.8	735.985891	763.771503	947.312216	732.230004	5.42E-06	2.50E-05	74.1088426	0.00961449	0.00712519	1.26E-05	1.24E-05	3.65E-05	0.02530743	0.06572554	0.01069277	3783549.33
44640976.4	735.985891	763.770512	947.326647	732.228973	5.60E-06	2.50E-05	74.1140174	0.00962836	0.00713597	1.26E-05	1.24E-05	3.66E-05	0.0253144	0.06582039	0.01074966	3787922.77
44728793.3	735.985891	763.769467	947.336217	732.227712	5.83E-06	2.50E-05	74.120465	0.0096457	0.00714944	1.26E-05	1.24E-05	3.68E-05	0.02532414	0.06593895	0.01082097	3793400.34

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
44838564.5	735.985891	763.76845	947.335053	732.225844	6.15E-06	2.50E-05	74.128492	0.00966738	0.00716629	1.26E-05	1.24E-05	3.71E-05	0.02533778	0.06608714	0.01091036	3800262.82
44975778.5	735.985891	763.767458	947.319074	732.22295	6.58E-06	2.50E-05	74.1384752	0.00969448	0.00718734	1.26E-05	1.24E-05	3.75E-05	0.02535583	0.06627239	0.01102246	3808854.61
45147296	735.985891	763.766374	947.29356	732.219423	7.18E-06	2.50E-05	74.150876	0.00972835	0.00721366	1.26E-05	1.24E-05	3.79E-05	0.02537894	0.06650395	0.01116306	3819598.37
45361692.9	735.985891	763.765263	947.257142	732.214976	8.04E-06	2.50E-05	74.166256	0.0097707	0.00724656	1.26E-05	1.24E-05	3.84E-05	0.02540837	0.0667934	0.01133943	3833035.7
45629689	735.985891	763.764147	947.208849	732.208933	9.28E-06	2.50E-05	74.1852947	0.00982362	0.00728768	1.26E-05	1.24E-05	3.91E-05	0.02544531	0.06715521	0.01156079	3849834.26
45897685.1	735.985891	763.763176	947.16206	732.202989	1.07E-05	2.50E-05	74.2041293	0.00987655	0.00732881	1.26E-05	1.24E-05	3.98E-05	0.02548201	0.06751702	0.01178305	3870673.95
46165681.2	735.985891	763.761317	947.115687	732.19712	1.24E-05	2.50E-05	74.2227631	0.00992948	0.00736993	1.26E-05	1.24E-05	4.05E-05	0.02551859	0.06787883	0.01200616	3891515.57
46433677.3	735.985891	763.759708	947.072066	732.191408	1.43E-05	2.50E-05	74.2411993	0.0099824	0.00741105	1.26E-05	1.24E-05	4.12E-05	0.02555448	0.06824064	0.01223009	3912351.19
46701673.4	735.985891	763.754973	947.030402	732.185842	1.65E-05	2.50E-05	74.2594411	0.01003533	0.00745218	1.26E-05	1.24E-05	4.18E-05	0.02558964	0.06860245	0.01245481	3933181.55
46969669.5	735.985891	763.7486	946.991303	732.180383	1.89E-05	2.50E-05	74.2774914	0.01008825	0.0074933	1.26E-05	1.24E-05	4.25E-05	0.02562444	0.06896426	0.01268028	3954004.35
47237665.5	735.985891	763.74253	946.951111	732.175024	2.16E-05	2.50E-05	74.2953534	0.01014118	0.00753443	1.26E-05	1.24E-05	4.32E-05	0.02565957	0.06932607	0.01290644	3974837.8
47385472	736.569009	764.337615	947.281982	732.625891	2.33E-05	2.50E-05	74.3051252	0.01017037	0.00755711	1.26E-05	1.24E-05	4.36E-05	0.02568069	0.06952562	0.01303523	3997794.79
47389072	734.674123	761.863547	941.78243	730.811689	2.33E-05	2.50E-05	74.30536	0.01017108	0.00755765	1.26E-05	1.24E-05	4.34E-05	0.0256662	0.06953043	0.01297592	3999203.33
47536878.5	734.674123	761.860625	941.756776	730.808867	2.42E-05	2.50E-05	74.3148773	0.01019967	0.00757987	1.26E-05	1.24E-05	4.38E-05	0.02568825	0.06972591	0.01309376	3999820.44
47721636.5	734.674123	761.856981	941.730092	730.805565	2.55E-05	2.50E-05	74.3266992	0.01023542	0.00760765	1.26E-05	1.24E-05	4.43E-05	0.02570913	0.06997027	0.01324656	4011102.39
47952584.1	734.674123	761.852782	941.700021	730.801442	2.74E-05	2.50E-05	74.3413609	0.0102801	0.00764236	1.26E-05	1.24E-05	4.48E-05	0.02573721	0.07027572	0.01343822	4025236.02
48198548	735.6194	762.817995	942.24029	731.531944	2.98E-05	2.50E-05	74.3568363	0.01032768	0.00767934	1.26E-05	1.24E-05	4.55E-05	0.02577106	0.07060102	0.01364908	4046755.48
48199031.2	723.263894	746.737432	906.12223	719.731084	2.98E-05	2.50E-05	74.3568646	0.01032777	0.00767941	1.26E-05	1.24E-05	4.42E-05	0.02565349	0.07060162	0.01326097	4000312.43
48199514.4	710.930879	730.708219	868.982721	707.952933	2.98E-05	2.50E-05	74.3568887	0.01032785	0.00767946	1.26E-05	1.24E-05	4.29E-05	0.0255359	0.07060213	0.01286761	3935632.57
48200118.3	695.547884	710.741933	821.012802	693.263309	2.98E-05	2.50E-05	74.3569132	0.01032792	0.00767952	1.26E-05	1.24E-05	4.12E-05	0.02538317	0.07060265	0.01235819	3854718.76
48200873.3	676.374052	685.886305	758.300275	674.951269	2.98E-05	2.49E-05	74.3569349	0.01032799	0.00767958	1.26E-05	1.24E-05	3.90E-05	0.02517139	0.0706031	0.01170971	3753288.48
48201628.3	657.264812	661.129958	692.071823	656.691901	2.98E-05	2.49E-05	74.3569467	0.01032803	0.0076796	1.25E-05	1.24E-05	3.70E-05	0.02490285	0.07060335	0.01112793	3650411.07
48202148	644.15	644.16477	644.152377	644.150703	2.98E-05	2.49E-05	74.3569491	0.01032803	0.00767961	1.25E-05	1.24E-05	3.65E-05	0.02470597	0.0706034	0.01096485	3578781.25
48202903	573.02509	573.079705	573.029716	573.027724	2.98E-05	2.48E-05	74.3569491	0.01032803	0.00767961	1.25E-05	1.23E-05	3.29E-05	0.02427197	0.0706034	0.009997	3190192.54
48203846.7	484.118952	484.172439	484.12347	484.121442	2.98E-05	2.47E-05	74.3569491	0.01032803	0.00767961	1.24E-05	1.23E-05	2.85E-05	0.0237305	0.0706034	0.00881228	2702052.01
48205026.3	372.98628	373.038793	372.99068	372.988612	2.98E-05	2.46E-05	74.3569491	0.01032803	0.00767961	1.24E-05	1.23E-05	2.31E-05	0.02305479	0.0706034	0.00735994	2088279.34
48205748	305	305.051622	305.004316	305.002233	2.98E-05	2.46E-05	74.3569491	0.01032803	0.00767961	1.23E-05	1.22E-05	1.98E-05	0.02264203	0.0706034	0.00647257	1710899.12
48206927.6	305	305.051622	305.004316	305.002233	2.98E-05	2.46E-05	74.3569491	0.01032803	0.00767961	1.23E-05	1.22E-05	1.98E-05	0.02264203	0.0706034	0.00647257	1710899.12
48208402.2	305	305.051622	305.004316	305.002233	2.98E-05	2.46E-05	74.3569491	0.01032803	0.00767961	1.23E-05	1.22E-05	1.98E-05	0.02264203	0.0706034	0.00647257	1710899.12
48209348	305	305.051622	305.004316	305.002233	2.98E-05	2.46E-05	74.3569491	0.01032803	0.00767961	1.23E-05	1.22E-05	1.98E-05	0.02264203	0.0706034	0.00647257	1710899.12
48210822.6	478.604011	489.256824	589.165528	477.369555	2.98E-05	2.47E-05	74.3569675	0.01032809	0.00767965	1.25E-05	1.23E-05	2.80E-05	0.02401779	0.07060379	0.00870709	2672187.53
48211305.7	536.135624	550.207304	672.561807	534.281512	2.98E-05	2.48E-05	74.3569816	0.01032813	0.00767969	1.25E-05	1.23E-05	3.21E-05	0.02441959	0.07060409	0.00988493	2985968.75
48211788.9	593.934884	611.482411	752.67364	591.416359	2.98E-05	2.49E-05	74.3569996	0.01032819	0.00767973	1.25E-05	1.23E-05	3.60E-05	0.02480993	0.07060447	0.01098656	3299692.73
48212392.9	666.484041	688.559294	849.529391	663.150745	2.98E-05	2.49E-05	74.3570277	0.01032828	0.0076798	1.26E-05	1.23E-05	4.09E-05	0.02527446	0.07060506	0.01237704	3691804.4
48212948	733.362872	759.869589	935.746573	729.375637	2.98E-05	2.50E-05	74.357059	0.01032837	0.00767987	1.26E-05	1.24E-05	4.57E-05	0.02566414	0.07060572	0.01374214	4051726.46
48213552	733.362872	759.873784	935.751859	729.379588	2.98E-05	2.50E-05	74.3570959	0.01032849	0.00767996	1.26E-05	1.24E-05	4.59E-05	0.02564988	0.0706065	0.01378931	4051788.69
48214307	733.362872	759.873868	935.752001	729.379748	2.99E-05	2.50E-05	74.357142	0.01032863	0.00768007	1.26E-05	1.24E-05	4.60E-05	0.02564058	0.07060748	0.0138206	4051831.83
48215250.7	733.362872	759.873934	935.752229	729.379865	2.99E-05	2.50E-05	74.3571997	0.01032881	0.00768021	1.26E-05	1.24E-05	4.61E-05	0.0256335	0.0706087	0.01384486	4051887
48216430.3	733.362872	759.873981	935.752486	729.379953	3.00E-05	2.50E-05	74.3572717	0.01032903	0.00768038	1.26E-05	1.24E-05	4.61E-05	0.0256277	0.07061022	0.0138651	4051958.2
48217904.9	733.362872	759.874009	935.7527	729.380019	3.01E-05	2.50E-05	74.3573618	0.01032931	0.0076806	1.26E-05	1.24E-05	4.62E-05	0.02562282	0.07061212	0.01388273	4052048.03
48219748.1	733.362872	759.874017	935.752823	729.380063	3.03E-05	2.50E-05	74.3574744	0.01032966	0.00768087	1.26E-05	1.24E-05	4.63E-05	0.02561874	0.0706145	0.01389846	4052159.02
48222052.1	733.362872	759.874004	935.752875	729.380086	3.05E-05	2.50E-05	74.3576151	0.01033009	0.00768121	1.26E-05	1.24E-05	4.63E-05	0.02561549	0.07061747	0.0139119	4052299.07
48224932.1	733.362872	759.873967	935.752765	729.380079	3.07E-05	2.50E-05	74.3577909	0.01033063	0.00768163	1.26E-05	1.24E-05	4.63E-05	0.02561311	0.07062119	0.01392356	4052471.54
48228532.1	733.362872	759.873905	935.752503	729.380045	3.11E-05	2.50E-05	74.3580107	0.01033131	0.00768216	1.26E-05	1.24E-05	4.64E-05	0.02561158	0.07062583	0.01393325	4052686.72
48233032.1	733.362872	759.873815	935.752103	729.379984	3.15E-05	2.50E-05	74.3582854	0.01033216	0.00768282	1.26E-05	1.24E-05	4.64E-05	0.02561082	0.07063164	0.01394153	4052954.35
48238657.1	733.362872	759.873696	935.751518	729.379889	3.20E-05	2.50E-05	74.3586287	0.01033322	0.00768364	1.26E-05	1.24E-05	4.64E-05	0.02561078	0.07063889	0.01394897	4053289.33
48245688.3	733.362872	759.873541	935.750731	729.379762	3.26E-05	2.50E-05	74.3590578	0.01033455	0.00768467	1.26E-05	1.24E-05	4.64E-05	0.02561125	0.07064797	0.01395638	4053707.63
48254477.4	733.362872	759.873345	935.749723	729.379599	3.34E-05	2.50E-05	74.359594	0.01033621	0.00768596	1.26E-05	1.24E-05	4.65E-05	0.0256121	0.0706593	0.01396452	4054229.78
48265463.7	733.362872	759.8731	935.748453	729.379395	3.45E-05	2.50E-05	74.3602639	0.01033828	0.00768757	1.26E-05	1.24E-05	4.65E-05	0.02561331	0.07067348	0.01397412	4054882.63
48279196.6	733.362872	759.872793	935.746869	729.379138	3.57E-05	2.50E-05	74.361101	0.01034088	0.00768959	1.26E-05	1.24E-05	4.65E-05	0.02561486	0.0706912	0.01398585	4055698.82
48296362.8	733.362872	759.872411	935.744906	729.378817	3.73E-05	2.50E-05	74.3621467	0.01034411	0.00769211	1.26E-05	1.24E-05	4.66E-05	0.02561688	0.07071334	0.01400042	4056720.4
48317820.4	733.362872	759.871936	935.742487	729.378416	3.93E-05	2.50E-05	74.363453	0.01034816	0.00769525	1.26E-05	1.24E-05	4.66E-05	0.0256194	0.07074103	0.01401857	4057997.15
48344642.5	733.362872	759.871345	935.739522	729.377914	4.19E-05	2.50E-05	74.3650844	0.01035323	0.00769919	1.26E-05	1.24E-05	4.67E-05	0.02562261	0.07077563	0.01404125	4059593.61
48378170.1	733.362872	759.870613	935.735896	729.377284	4.52E-05	2.50E-05	74.3671213	0.01035955	0.0077041	1.26E-05	1.24E-05	4.68E-05	0.02562671	0.07081889	0.01406959	4061590.82
48420079.7	733.362872	759.869706	935.731456	729.376496	4.91E-05	2.50E-05	74.3696641	0.01036746	0.00771025	1.26E-05	1.24E-05	4.69E-05	0.02563188	0.07087296	0.01410501	4064088.56

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
48472466.6	733.362872	759.868582	935.725952	729.3755	5.44E-05	2.50E-05	74.3728371	0.01037735	0.00771793	1.26E-05	1.24E-05	4.70E-05	0.02563846	0.07094055	0.01414928	4067216.34
48537950.2	733.362872	759.867169	935.71903	729.374272	6.08E-05	2.50E-05	74.3767948	0.01038971	0.00772753	1.26E-05	1.24E-05	4.72E-05	0.0256467	0.07102504	0.01420461	4071121.8
48619804.7	733.362872	759.865427	935.710189	729.372763	6.86E-05	2.50E-05	74.3817287	0.01040516	0.00773954	1.26E-05	1.24E-05	4.74E-05	0.0256564	0.07113064	0.01427378	4075998.18
48722122.9	733.362872	759.863304	935.698931	729.370886	7.79E-05	2.50E-05	74.3878756	0.01042447	0.00775454	1.27E-05	1.24E-05	4.77E-05	0.02566866	0.07126265	0.01436021	4082097.4
48850020.5	733.362872	759.860736	935.684507	729.368552	8.90E-05	2.50E-05	74.3955272	0.01044861	0.0077733	1.27E-05	1.24E-05	4.80E-05	0.02568422	0.07142766	0.01446818	4089725.86
48977918.2	733.362872	759.858265	935.669858	729.366246	9.95E-05	2.50E-05	74.4031435	0.01047275	0.00779205	1.27E-05	1.24E-05	4.83E-05	0.02570003	0.07159267	0.01457609	4099193.16
49137790.4	733.362872	759.855284	935.65105	729.363395	0.00011195	2.50E-05	74.4126147	0.01050292	0.0078155	1.27E-05	1.24E-05	4.87E-05	0.02571937	0.07179894	0.01471082	4108727.55
49297662.5	733.362872	759.852473	935.6318	729.360575	0.00012382	2.50E-05	74.4220316	0.01053309	0.00783894	1.27E-05	1.24E-05	4.91E-05	0.02573918	0.0720052	0.01484543	4120568.51
49457534.6	733.362872	759.849734	935.612406	729.35764	0.00013515	2.50E-05	74.4313948	0.01056326	0.00786238	1.27E-05	1.24E-05	4.95E-05	0.02575813	0.07221146	0.01497991	4132397.45
49657374.7	733.362872	759.846464	935.588344	729.353822	0.00014863	2.50E-05	74.4430238	0.01060098	0.00789169	1.27E-05	1.24E-05	5.01E-05	0.02578174	0.07246929	0.01514782	4144309.77
49907174.9	733.362872	759.84264	935.558833	729.34922	0.0001646	2.50E-05	74.4574441	0.01064812	0.00792832	1.27E-05	1.24E-05	5.07E-05	0.02581075	0.07279158	0.01535748	4159194.28
50156975.1	733.362872	759.838995	935.530284	729.344779	0.00017985	2.50E-05	74.4717374	0.01069527	0.00796495	1.27E-05	1.24E-05	5.13E-05	0.02583874	0.07311387	0.01556698	4177658.07
50406775.3	733.362872	759.83549	935.50287	729.34047	0.0001945	2.50E-05	74.4859051	0.01074241	0.00800158	1.27E-05	1.24E-05	5.20E-05	0.02586627	0.07343615	0.01577632	4196113.59
50656575.4	733.362872	759.832259	935.476404	729.336281	0.00020867	2.50E-05	74.4999491	0.01078956	0.00803822	1.27E-05	1.24E-05	5.26E-05	0.02589386	0.07375844	0.01598553	4214576.94
50906375.6	733.362872	759.829222	935.450569	729.33222	0.00022242	2.50E-05	74.5138709	0.0108367	0.00807485	1.27E-05	1.23E-05	5.32E-05	0.02592151	0.07408073	0.01619461	4233041.45
51156175.8	733.362872	759.826346	935.425356	729.328292	0.00023584	2.50E-05	74.527672	0.01088385	0.00811148	1.27E-05	1.23E-05	5.39E-05	0.02594876	0.07440302	0.01640359	4251499.78
51405976	733.362872	759.823831	935.400506	729.324273	0.00024897	2.51E-05	74.5413541	0.01093099	0.00814811	1.27E-05	1.23E-05	5.45E-05	0.02597731	0.0747253	0.01661247	4269972.14
51655776.2	733.362872	759.821449	935.37582	729.320071	0.00026186	2.51E-05	74.5549188	0.01097814	0.00818474	1.27E-05	1.23E-05	5.52E-05	0.026005	0.07504759	0.01682126	4288438.6
51968026.4	733.362872	759.819011	935.345121	729.314979	0.00027918	2.51E-05	74.5717115	0.01103707	0.00823053	1.27E-05	1.23E-05	5.59E-05	0.02604101	0.07545045	0.01708212	4307046.31
52079977	733.362872	759.818061	935.33406	729.3132	0.00028582	2.51E-05	74.5776886	0.0110582	0.00824695	1.27E-05	1.23E-05	5.62E-05	0.02605307	0.07559489	0.01717572	4329739.09
52083577	733.362872	759.818018	935.333696	729.31314	0.00028604	2.51E-05	74.5778805	0.01105888	0.00824748	1.27E-05	1.23E-05	5.62E-05	0.02605332	0.07559953	0.01717895	4337806.52
52195527.6	733.362872	759.817175	935.322718	729.311376	0.00029269	2.51E-05	74.5838341	0.01108001	0.00826389	1.27E-05	1.23E-05	5.65E-05	0.0260657	0.07574397	0.01727221	4338282.04
52335465.9	733.362872	759.816247	935.309045	729.309174	0.00030103	2.51E-05	74.5912442	0.01110642	0.00828441	1.27E-05	1.23E-05	5.69E-05	0.02608154	0.07592451	0.01738904	4346620.53
52475404.1	733.362872	759.815555	935.295446	729.307012	0.00030938	2.51E-05	74.5986191	0.01113283	0.00830494	1.27E-05	1.23E-05	5.72E-05	0.0260979	0.07610506	0.01750586	4356982.93
52650326.9	733.362872	759.814616	935.278479	729.304328	0.00031985	2.51E-05	74.6077888	0.01116584	0.00833059	1.27E-05	1.23E-05	5.77E-05	0.02611748	0.07633074	0.01765184	4367406.23
52868980.5	733.362872	759.813551	935.257346	729.301038	0.00033299	2.51E-05	74.6191748	0.01120711	0.00836265	1.27E-05	1.23E-05	5.83E-05	0.026142	0.07661284	0.01783427	4380430.66
53087634	733.362872	759.812781	935.236327	729.297799	0.00034619	2.51E-05	74.6304774	0.01124837	0.00839472	1.27E-05	1.23E-05	5.88E-05	0.02616631	0.07689494	0.01801667	4396611.68
53360950.9	733.362872	759.807677	935.21034	729.293794	0.00036279	2.51E-05	74.6444895	0.01129996	0.0084348	1.27E-05	1.23E-05	5.95E-05	0.02619565	0.07724757	0.01824459	4412880.93
53634267.8	733.362872	759.802257	935.184834	729.289878	0.0003795	2.51E-05	74.6583742	0.01135154	0.00847488	1.27E-05	1.23E-05	6.02E-05	0.0262241	0.0776002	0.01847246	4433073.37
53874489	734.587462	761.052909	935.906909	730.238863	0.00039624	2.51E-05	74.6704739	0.01139688	0.0085101	1.28E-05	1.23E-05	6.09E-05	0.02625318	0.07791013	0.01868082	4458824.81
53878089	734.893756	761.450282	936.782308	730.530396	0.00039651	2.51E-05	74.6706548	0.01139756	0.00851063	1.28E-05	1.23E-05	6.09E-05	0.02625587	0.07791478	0.01869384	4477916.34
54118310.2	734.893756	761.445034	936.760465	730.527046	0.0004163	2.51E-05	74.6826973	0.01144305	0.00854598	1.28E-05	1.23E-05	6.15E-05	0.02628153	0.07822575	0.01889553	4478631.74
54418586.7	734.893756	761.43859	936.733725	730.522859	0.00044319	2.51E-05	74.6976165	0.01149991	0.00859016	1.28E-05	1.23E-05	6.23E-05	0.02631435	0.07861446	0.0191467	4496603.29
54718863.3	734.893756	761.432323	936.707388	730.518289	0.00047019	2.51E-05	74.7123889	0.01155677	0.00863434	1.28E-05	1.23E-05	6.31E-05	0.02634806	0.07900318	0.01939777	4518939.15
55019139.8	734.893756	761.4262	936.681334	730.513933	0.00049728	2.51E-05	74.7270166	0.01161363	0.00867852	1.28E-05	1.23E-05	6.39E-05	0.02638044	0.07939189	0.01964871	4541257.82
55319416.3	734.893756	761.420326	936.655538	730.50793	0.00052446	2.51E-05	74.7415018	0.01167049	0.0087227	1.28E-05	1.23E-05	6.46E-05	0.02641237	0.0797806	0.01989953	4563563.01
55619692.8	734.893756	762.303001	936.630044	730.581894	0.00055174	2.51E-05	74.7558466	0.01172736	0.00876688	1.28E-05	1.23E-05	6.54E-05	0.02644539	0.08016932	0.02015022	4586377.91
55919969.4	734.893756	762.19889	936.604943	730.57594	0.00057909	2.51E-05	74.7700529	0.01178422	0.00881107	1.28E-05	1.23E-05	6.62E-05	0.02647758	0.08055803	0.02040079	4608691.38
56220245.9	734.893756	762.109587	936.580203	730.570099	0.00060649	2.51E-05	74.7841227	0.01184108	0.00885525	1.28E-05	1.23E-05	6.70E-05	0.02650929	0.08094674	0.02065122	4631004.34
56520522.4	734.893756	762.040327	936.555845	730.564483	0.00063577	2.51E-05	74.7980581	0.01189794	0.00889943	1.28E-05	1.23E-05	6.77E-05	0.02653863	0.08133546	0.02090153	4653275.52
56820798.9	734.893756	761.977389	936.531915	730.558882	0.00066803	2.51E-05	74.8118609	0.0119548	0.00894361	1.28E-05	1.23E-05	6.85E-05	0.02656932	0.08172417	0.0211517	4675575.58
57196144.6	734.893756	761.916011	936.502709	730.552073	0.0007087	2.51E-05	74.8289309	0.01202588	0.00899884	1.28E-05	1.23E-05	6.95E-05	0.02660749	0.08221006	0.0214642	4697998.86
57571490.3	734.893756	761.871538	936.474127	730.545367	0.00074966	2.51E-05	74.8458002	0.01209696	0.00905407	1.28E-05	1.23E-05	7.04E-05	0.02664622	0.08269595	0.02177651	4725878.18
57946835.9	734.893756	761.845248	936.446083	730.538808	0.00079088	2.51E-05	74.8624725	0.01216804	0.00910929	1.28E-05	1.23E-05	7.14E-05	0.02668451	0.08318184	0.0220886	4753755.27
58322181.6	734.893756	761.836667	936.41853	730.532403	0.00083231	2.52E-05	74.8789512	0.01223911	0.00916452	1.28E-05	1.23E-05	7.24E-05	0.02672219	0.08366774	0.02240048	4781624.21
58697527.2	734.893756	761.846132	936.39142	730.526082	0.00087392	2.52E-05	74.8952395	0.01231019	0.00921975	1.29E-05	1.23E-05	7.33E-05	0.02676007	0.08415363	0.02271212	4809499.05
59072872.9	734.893756	761.875505	936.364705	730.519816	0.00091565	2.52E-05	74.9113408	0.01238127	0.00927497	1.29E-05	1.23E-05	7.43E-05	0.0267986	0.08463952	0.02302353	4837385.74
59448218.5	734.893756	761.920518	936.33835	730.513692	0.00095746	2.52E-05	74.9272584	0.01245235	0.0093302	1.29E-05	1.23E-05	7.53E-05	0.02683494	0.08512541	0.02333471	4865242.07
59823564.2	734.893756	761.991271	936.312369	730.507635	0.0009993	2.52E-05	74.9429952	0.01252342	0.00938543	1.29E-05	1.23E-05	7.62E-05	0.02687329	0.0856113	0.02364565	4893134.56
60198909.8	734.893756	762.076536	936.286712	730.501695	0.00104112	2.52E-05	74.9585544	0.0125945	0.00944066	1.29E-05	1.23E-05	7.72E-05	0.02691041	0.08609719	0.02395635	4921006.45
60391086.8	734.893756	762.124319	936.273647	730.498697	0.00106499	2.52E-05	74.966453	0.01263089	0.00946893	1.29E-05	1.23E-05	7.77E-05	0.02692883	0.08634597	0.02411542	4948567.54
60631308	734.893756	762.060734	936.257464	730.494283	0.00109592	2.52E-05	74.9762624	0.01267638	0.00950428	1.29E-05	1.23E-05	7.83E-05	0.02695203	0.08665694	0.02431403	4962903.97
60871529.3	734.893756	762.010798	936.241418	730.489961	0.00112691	2.52E-05	74.9860016	0.01272187	0.00953962	1.29E-05	1.23E-05	7.89E-05	0.02697464	0.08696791	0.02451257	4980727.14
61111750.5	734.893756	761.971774	936.225517	730.485674	0.00115792	2.52E-05	74.9956715	0.01276736	0.00957497	1.29E-05	1.23E-05	7.95E-05	0.02699781	0.08727888	0.02471101	4998554.11
61351971.7	734.893756	761.909807	936.209762	730.481311	0.00118895	2.52E-05	75.0052727	0.01281285	0.00961031	1.29E-05	1.23E-05	8.02E-05	0.02702061	0.08758985	0.02490933	5016380.76

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
61592192.9	734.893756	761.842184	936.194158	730.476931	0.00121999	2.52E-05	75.0148059	0.01285834	0.00964566	1.29E-05	1.23E-05	8.08E-05	0.02704388	0.08790082	0.02510756	5034207.16
61892469.5	734.893756	761.761017	936.174876	730.471472	0.00125875	2.52E-05	75.026628	0.0129152	0.00968984	1.29E-05	1.23E-05	8.15E-05	0.02707315	0.08828954	0.02535516	5052139.78
62125235	735.150157	761.965537	936.315713	730.666662	0.00128972	2.52E-05	75.0357208	0.01295928	0.00972409	1.29E-05	1.23E-05	8.21E-05	0.02709674	0.08859085	0.02554884	5075656.56
62128835	730.972873	756.547581	924.37101	726.695099	0.00128983	2.52E-05	75.0358578	0.01295995	0.00972461	1.29E-05	1.23E-05	8.17E-05	0.0270655	0.08859541	0.02541672	5065536.42
62256058	731.250458	756.775625	924.532542	726.908326	0.00129383	2.52E-05	75.0405761	0.01298294	0.00974247	1.29E-05	1.23E-05	8.20E-05	0.02709487	0.08875259	0.0255066	5067622.7
62259658	733.325046	759.460834	930.462915	728.879339	0.00129405	2.52E-05	75.0407109	0.0129836	0.00974298	1.29E-05	1.23E-05	8.22E-05	0.02711096	0.08875709	0.02557155	5089975.34
62264158	733.325046	759.460724	930.462863	728.879354	0.00129435	2.52E-05	75.0408815	0.01298443	0.00974363	1.29E-05	1.23E-05	8.22E-05	0.02710999	0.08876279	0.02558215	5090122.5
62269783	733.325046	759.460335	930.462621	728.879279	0.00129473	2.52E-05	75.0410946	0.01298547	0.00974444	1.29E-05	1.23E-05	8.22E-05	0.02710971	0.0887699	0.02558822	5090444.21
62276814.3	733.325046	759.459661	930.462233	728.879174	0.0012952	2.52E-05	75.0413609	0.01298677	0.00974545	1.29E-05	1.23E-05	8.23E-05	0.02710977	0.08877879	0.02559446	5090846.97
62285603.3	733.325046	759.458546	930.461691	728.879039	0.00129579	2.52E-05	75.0416937	0.0129884	0.00974671	1.29E-05	1.23E-05	8.23E-05	0.02711017	0.08878991	0.02560195	5091350.68
62296589.6	733.325046	759.457233	930.461009	728.878872	0.00129653	2.52E-05	75.0421097	0.01299043	0.00974829	1.29E-05	1.23E-05	8.23E-05	0.02711076	0.0888038	0.02561094	5091982.76
62310322.6	733.325046	759.45559	930.460183	728.878661	0.00129746	2.52E-05	75.0426294	0.01299297	0.00975027	1.29E-05	1.23E-05	8.24E-05	0.02711157	0.08882117	0.02562198	5092773.12
62327488.7	733.325046	759.453349	930.459165	728.878394	0.00129863	2.52E-05	75.0432788	0.01299615	0.00975273	1.29E-05	1.23E-05	8.24E-05	0.02711261	0.08884288	0.0256357	5093764.03
62348946.4	733.325046	759.450511	930.457894	728.878059	0.00130009	2.52E-05	75.04409	0.01300012	0.00975582	1.29E-05	1.23E-05	8.25E-05	0.02711393	0.08887002	0.02565284	5095003.32
62375768.5	733.325046	759.446769	930.456304	728.877638	0.00130192	2.52E-05	75.0451034	0.01300508	0.00975967	1.29E-05	1.23E-05	8.25E-05	0.02711569	0.08890394	0.02567432	5096552.53
62409296.1	733.325046	759.441894	930.454318	728.877107	0.00130423	2.52E-05	75.0463691	0.01301128	0.00976449	1.29E-05	1.23E-05	8.26E-05	0.02711802	0.08894634	0.02570121	5098490.01
62451205.6	733.325046	759.435652	930.451838	728.876441	0.00130713	2.52E-05	75.0479495	0.01301903	0.00977052	1.29E-05	1.23E-05	8.27E-05	0.02712105	0.08899935	0.02573482	5100913.17
62503592.5	733.325046	759.426864	930.448739	728.875593	0.00131079	2.52E-05	75.0499223	0.01302873	0.00977805	1.29E-05	1.23E-05	8.28E-05	0.02712509	0.0890656	0.02577683	5103949.71
62569076.1	733.325046	759.415966	930.444867	728.874531	0.0013154	2.52E-05	75.0523842	0.01304084	0.00978746	1.29E-05	1.23E-05	8.30E-05	0.02713033	0.08914842	0.02582935	5107745.98
62620357	733.011845	759.085968	930.251173	728.630175	0.0013189	2.52E-05	75.054309	0.01305033	0.00979483	1.29E-05	1.23E-05	8.31E-05	0.02713349	0.08921328	0.02586829	5110801.06
62623957	733.482458	759.695299	931.596199	729.07753	0.00131919	2.52E-05	75.0544444	0.013051	0.00979535	1.29E-05	1.23E-05	8.32E-05	0.02713725	0.08921784	0.02588613	5117507.44
62675237.9	733.482458	759.687698	931.593198	729.076719	0.00132337	2.52E-05	75.0563762	0.01306053	0.00980276	1.29E-05	1.23E-05	8.33E-05	0.0271405	0.08928304	0.02592911	5117818.33
62739339	733.482458	759.676687	931.589351	729.07566	0.00132863	2.52E-05	75.0587871	0.01307246	0.00981203	1.29E-05	1.23E-05	8.35E-05	0.0271459	0.08936454	0.02598096	5121557.13
62819465.5	733.482458	759.661928	931.584531	729.074318	0.00133526	2.52E-05	75.0617945	0.01308736	0.00982361	1.29E-05	1.23E-05	8.37E-05	0.02715314	0.08946641	0.02604567	5126242.29
62919623.5	733.482458	759.643883	931.578496	729.072641	0.00134362	2.52E-05	75.0655441	0.01310598	0.00983808	1.29E-05	1.23E-05	8.39E-05	0.02716235	0.08959375	0.02612653	5132097.86
63044821	733.482458	759.621586	931.570943	729.070538	0.00135418	2.52E-05	75.0702162	0.01312927	0.00985617	1.29E-05	1.23E-05	8.42E-05	0.02717398	0.08975292	0.0262276	5139426.41
63201317.9	733.482458	759.596894	931.561514	729.067942	0.00137046	2.52E-05	75.0760331	0.01315837	0.00987879	1.29E-05	1.23E-05	8.46E-05	0.02718793	0.08995188	0.02635392	5148570.41
63396939.1	733.482458	759.568188	931.549787	729.064698	0.00139324	2.52E-05	75.0832681	0.01319476	0.00990705	1.29E-05	1.23E-05	8.51E-05	0.02720541	0.09020059	0.0265118	5159998.16
63641465.5	733.482458	759.534545	931.535271	729.060644	0.00142232	2.52E-05	75.0922559	0.01324023	0.00994239	1.29E-05	1.23E-05	8.57E-05	0.02722771	0.09051148	0.0267091	5174301.47
63885991.9	733.482458	759.50625	931.520918	729.056641	0.00146042	2.52E-05	75.1011822	0.01328571	0.00997772	1.30E-05	1.23E-05	8.64E-05	0.02724942	0.09082236	0.02690636	5192069.27
64130518.3	733.482458	759.481995	931.50673	729.052681	0.00150166	2.52E-05	75.1100476	0.01333119	0.01001306	1.30E-05	1.23E-05	8.70E-05	0.02727102	0.09113325	0.02710357	5209840.8
64436176.3	733.482458	759.457582	931.489244	729.047769	0.00155482	2.52E-05	75.1210446	0.01338803	0.01005723	1.30E-05	1.23E-05	8.77E-05	0.02729831	0.09152185	0.02734995	5227701.81
64516928	732.345558	758.285412	930.792704	728.162369	0.00156692	2.52E-05	75.1239344	0.01340305	0.0100689	1.30E-05	1.23E-05	8.79E-05	0.02730205	0.09162452	0.02740709	5243446.43
64520528	731.799948	757.576998	929.216877	727.642578	0.00156736	2.52E-05	75.1240626	0.01340372	0.01006942	1.30E-05	1.23E-05	8.79E-05	0.0272985	0.09162908	0.02739222	5245542.75
64601279.7	731.799948	757.572296	929.212273	727.64129	0.00157734	2.52E-05	75.1269279	0.01341864	0.01008101	1.30E-05	1.23E-05	8.81E-05	0.02730646	0.09173111	0.02745502	5245918.66
64702219.2	731.799948	757.567536	929.206673	727.639735	0.00159001	2.53E-05	75.1305006	0.0134373	0.01009551	1.30E-05	1.23E-05	8.83E-05	0.02731446	0.09185866	0.02753557	5251755.01
64766586	732.104937	757.877877	929.388888	727.875933	0.00159852	2.53E-05	75.1327736	0.0134492	0.01010476	1.30E-05	1.23E-05	8.85E-05	0.02732049	0.09193999	0.02758915	5260628.01
64770186	731.070994	756.536894	926.406134	726.891655	0.00159885	2.53E-05	75.1328999	0.01344986	0.01010527	1.30E-05	1.23E-05	8.84E-05	0.02731334	0.09194451	0.0275579	5258246.76
64834552.8	731.070994	756.534032	926.402482	726.890621	0.00160469	2.53E-05	75.1351422	0.01346162	0.01011441	1.30E-05	1.23E-05	8.85E-05	0.02732165	0.09202489	0.02760595	5258603.69
64915011.3	731.070994	756.531499	926.398179	726.889421	0.00161213	2.53E-05	75.1379396	0.01347632	0.01012583	1.30E-05	1.23E-05	8.87E-05	0.02732791	0.09212537	0.02766901	5263199.83
65015584.3	731.070994	756.528856	926.392825	726.887932	0.00162165	2.53E-05	75.1414277	0.01349469	0.0101401	1.30E-05	1.23E-05	8.90E-05	0.02733563	0.09225097	0.0277481	5268937.59
65141300.7	731.070994	756.526368	926.386162	726.886066	0.00163388	2.53E-05	75.1457746	0.01351766	0.01015795	1.30E-05	1.23E-05	8.93E-05	0.02734578	0.09240796	0.02784698	5276116.63
65298446.2	731.070994	756.508376	926.377877	726.883659	0.00164968	2.53E-05	75.1511875	0.01354636	0.01018025	1.30E-05	1.23E-05	8.97E-05	0.02735837	0.09260421	0.02797058	5285090.09
65494878	731.070994	756.48954	926.367586	726.880578	0.00167021	2.53E-05	75.1579214	0.01358225	0.01020813	1.30E-05	1.23E-05	9.01E-05	0.0273753	0.09284952	0.02812509	5296325.38
65691309.8	731.070994	756.4856	926.357357	726.877513	0.00169151	2.53E-05	75.1646198	0.01361813	0.01023602	1.30E-05	1.23E-05	9.06E-05	0.0273925	0.09309482	0.02827961	5310306.91
65887741.7	731.070994	756.481831	926.347189	726.874475	0.00171356	2.53E-05	75.171283	0.01365401	0.0102639	1.30E-05	1.23E-05	9.11E-05	0.02740937	0.09334013	0.02843412	5324288.54
66133281.4	731.070994	756.477344	926.33457	726.870714	0.00174225	2.53E-05	75.179563	0.01369887	0.01029875	1.30E-05	1.23E-05	9.17E-05	0.02743018	0.09364676	0.02862723	5338333.35
66440206.2	731.070994	756.47189	926.318928	726.866037	0.00177978	2.53E-05	75.189837	0.01375494	0.01034232	1.30E-05	1.23E-05	9.25E-05	0.027457	0.09403005	0.02886857	5355901.58
66823862.1	731.070994	756.46453	926.299563	726.860289	0.0018321	2.53E-05	75.2025622	0.01382502	0.01039677	1.30E-05	1.23E-05	9.34E-05	0.02748975	0.09450917	0.02917017	5377851
67207518	731.070994	756.455845	926.280366	726.854684	0.0018935	2.53E-05	75.2151591	0.01389511	0.01045123	1.30E-05	1.23E-05	9.43E-05	0.0275199	0.09498828	0.0294717	5405107.66
67535546	732.026076	757.424693	926.846584	727.592639	0.0019561	2.53E-05	75.2258292	0.01395503	0.01049779	1.30E-05	1.23E-05	9.52E-05	0.02754341	0.09539793	0.02973634	5437556.96
67539146	730.980605	756.072333	923.851649	726.59987	0.00195656	2.53E-05	75.2259451	0.01395569	0.0104983	1.30E-05	1.23E-05	9.51E-05	0.02753625	0.0954024	0.02970504	5453239.89
67867174	730.980605	756.063414	923.835633	726.595297	0.00200106	2.53E-05	75.2363985	0.0140149	0.01054431	1.30E-05	1.23E-05	9.58E-05	0.02756002	0.0958072	0.02995581	5453804.05
68277209.1	730.980605	756.051721	923.816084	726.589662	0.00206043	2.53E-05	75.2493417	0.01408892	0.01060182	1.30E-05	1.23E-05	9.68E-05	0.02758864	0.09631321	0.03027285	5476829.49
68687244.1	730.980605	756.050802	923.796733	726.583894	0.00212335	2.53E-05	75.2621496	0.01416294	0.01065934	1.30E-05	1.23E-05	9.78E-05	0.02761829	0.09681922	0.03058991	5505539.67

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
69097279.1	730.980605	756.045698	923.777593	726.578076	0.00218959	2.53E-05	75.2748244	0.01423696	0.01071685	1.30E-05	1.23E-05	9.88E-05	0.02764837	0.09732523	0.03090688	5534250.34
69507314.2	730.980605	756.049133	923.758666	726.572303	0.00225894	2.53E-05	75.287368	0.01431098	0.01077436	1.31E-05	1.23E-05	9.98E-05	0.02767862	0.09783123	0.03122373	5562962.2
69917349.2	730.980605	756.060827	923.739949	726.566567	0.00233119	2.53E-05	75.2997825	0.014385	0.01083188	1.31E-05	1.23E-05	0.0001008	0.02770898	0.09833724	0.03154044	5591676.74
70327384.2	730.980605	756.079387	923.721431	726.560884	0.00240613	2.53E-05	75.3120699	0.01445902	0.01088939	1.31E-05	1.23E-05	0.00010179	0.02773913	0.09884325	0.031857	5620377
70737419.3	730.980605	756.105947	923.703098	726.555285	0.00248354	2.53E-05	75.3242322	0.01453304	0.0109469	1.31E-05	1.23E-05	0.00010278	0.02776918	0.09934926	0.0321734	5649092.54
71147454.3	730.980605	756.139847	923.684933	726.549745	0.00256321	2.54E-05	75.3362712	0.01460706	0.01100442	1.31E-05	1.23E-05	0.00010377	0.0277998	0.09985526	0.03248962	5677813.79
71557489.3	730.980605	756.178323	923.666922	726.544233	0.00264492	2.54E-05	75.3481887	0.01468108	0.01106193	1.31E-05	1.23E-05	0.00010476	0.02782938	0.10036127	0.03280566	5706515.65
71967524.4	730.980605	756.219895	923.649048	726.53876	0.00273357	2.54E-05	75.3599868	0.0147551	0.01111944	1.31E-05	1.23E-05	0.00010575	0.02785792	0.10086728	0.0331215	5735190.59
72155534	730.980605	756.237083	923.640872	726.536279	0.00278033	2.54E-05	75.3653569	0.01478904	0.01114582	1.31E-05	1.23E-05	0.0001062	0.02786989	0.10109929	0.03326635	5763643.64
72159134	730.980605	756.237328	923.640707	726.53623	0.00278123	2.54E-05	75.3654595	0.01478969	0.01114632	1.31E-05	1.23E-05	0.00010621	0.02787004	0.10110374	0.03326945	5776624.87
72185697	731.958091	757.243224	924.23649	727.29572	0.00278897	2.54E-05	75.3662162	0.01479449	0.01115005	1.31E-05	1.23E-05	0.0001063	0.02787422	0.10113652	0.03329658	5782725.93
72189297	732.206885	757.564853	924.942719	727.531258	0.00279013	2.54E-05	75.3663188	0.01479514	0.01115055	1.31E-05	1.23E-05	0.00010633	0.02787612	0.10114097	0.03330753	5786384.62
72193797	732.206885	757.564829	924.942585	727.531205	0.00279157	2.54E-05	75.3664473	0.01479595	0.01115118	1.31E-05	1.23E-05	0.00010635	0.02787606	0.10114653	0.03331134	5786636.82
72199422	732.206885	757.564801	924.942379	727.531134	0.00279338	2.54E-05	75.3666079	0.01479697	0.01115198	1.31E-05	1.23E-05	0.00010636	0.02787611	0.1011535	0.03331589	5786951
72206453.3	732.206885	757.565393	924.942084	727.531041	0.00279564	2.54E-05	75.3668086	0.01479824	0.01115296	1.31E-05	1.23E-05	0.00010638	0.02787645	0.1011622	0.03332149	5787341.08
72215242.3	732.206885	757.565412	924.941707	727.530925	0.00279846	2.54E-05	75.3670594	0.01479984	0.0111542	1.31E-05	1.23E-05	0.0001064	0.02787668	0.10117307	0.03332836	5787834.44
72226228.6	732.206885	757.5665	924.941228	727.53078	0.002802	2.54E-05	75.3673729	0.01480182	0.01115575	1.31E-05	1.23E-05	0.00010643	0.02787731	0.10118667	0.03333686	5788448.57
72239961.6	732.206885	757.567622	924.940628	727.530598	0.00280642	2.54E-05	75.3677646	0.01480431	0.01115768	1.31E-05	1.23E-05	0.00010646	0.02787812	0.10120366	0.03334749	5789218.98
72257127.7	732.206885	757.56945	924.939878	727.530369	0.00281194	2.54E-05	75.3682541	0.01480742	0.01116009	1.31E-05	1.23E-05	0.0001065	0.02787925	0.10122491	0.03336076	5790185.07
72278585.4	732.206885	757.571807	924.938941	727.530084	0.00281885	2.54E-05	75.3688656	0.0148113	0.01116311	1.31E-05	1.23E-05	0.00010655	0.02788069	0.10125146	0.03337735	5791393.21
72305407.5	732.206885	757.574885	924.937769	727.529726	0.0028275	2.54E-05	75.3696296	0.01481616	0.01116688	1.31E-05	1.23E-05	0.00010662	0.02788255	0.10128466	0.03339808	5792904.95
72338935.1	732.206885	757.578953	924.936307	727.52928	0.00283831	2.54E-05	75.3705838	0.01482223	0.0111716	1.31E-05	1.23E-05	0.0001067	0.02788496	0.10132615	0.033424	5794795.1
72380844.6	732.206885	757.584117	924.934479	727.528722	0.0028528	2.54E-05	75.3717755	0.01482981	0.01117749	1.31E-05	1.23E-05	0.0001068	0.02788807	0.10137801	0.03345639	5797157.7
72433231.5	732.206885	757.591316	924.932198	727.528025	0.00287347	2.54E-05	75.3732635	0.0148393	0.01118486	1.31E-05	1.23E-05	0.00010693	0.02789198	0.10144284	0.03349687	5800117.42
72498715.1	732.206885	757.599935	924.929349	727.527154	0.00289936	2.54E-05	75.3751207	0.01485115	0.01119407	1.31E-05	1.23E-05	0.00010709	0.02789682	0.10152388	0.03354746	5803811.81
72580569.6	732.206885	757.610984	924.925794	727.526068	0.0029318	2.54E-05	75.3774381	0.01486597	0.01120559	1.31E-05	1.23E-05	0.00010729	0.02790291	0.10162518	0.0336107	5808430.73
72682887.8	732.206885	757.625132	924.921357	727.524712	0.00297249	2.54E-05	75.3803283	0.01488449	0.01121998	1.31E-05	1.23E-05	0.00010753	0.02791052	0.1017518	0.03368973	5814206.58
72810785.5	732.206885	757.643394	924.915822	727.523021	0.00302354	2.54E-05	75.383931	0.01490765	0.01123797	1.31E-05	1.23E-05	0.00010784	0.02792011	0.10191008	0.03378849	5821425.49
72970657.6	732.206885	757.666424	924.908923	727.520899	0.00308765	2.54E-05	75.3884187	0.01493659	0.01126046	1.31E-05	1.23E-05	0.00010823	0.02793199	0.10210792	0.03391191	5830445.09
73170497.7	732.206885	757.69747	924.900333	727.518244	0.00316822	2.54E-05	75.3940039	0.01497276	0.01128857	1.31E-05	1.23E-05	0.00010871	0.02794688	0.10235523	0.03406612	5841732.52
73370337.9	732.206885	757.729527	924.891773	727.515597	0.00324922	2.54E-05	75.3995621	0.01500894	0.01131668	1.31E-05	1.23E-05	0.0001092	0.02796196	0.10260254	0.03422029	5855788.69
73570178	732.206885	757.762475	924.883245	727.512963	0.00333781	2.54E-05	75.4050937	0.01504512	0.01134479	1.31E-05	1.23E-05	0.00010968	0.027977	0.10284985	0.0343744	5869843.27
73819978.2	732.206885	757.80284	924.872629	727.50968	0.00346186	2.54E-05	75.4119708	0.01509034	0.01137992	1.31E-05	1.23E-05	0.00011028	0.02799531	0.10315898	0.03456693	5883942.8
74132228.4	732.206885	757.826288	924.85942	727.505443	0.00361857	2.54E-05	75.4205095	0.01514687	0.01142384	1.31E-05	1.23E-05	0.00011104	0.02801802	0.1035454	0.03480745	5901564.26
74444478.6	732.206885	757.850435	924.84627	727.501223	0.00377684	2.54E-05	75.4289846	0.01520339	0.01146776	1.32E-05	1.23E-05	0.00011179	0.02804007	0.10393182	0.03504786	5923498.9
74834791.4	732.206885	757.89374	924.829933	727.496009	0.003977	2.54E-05	75.4394904	0.01527405	0.01152267	1.32E-05	1.23E-05	0.00011274	0.02806864	0.10441485	0.03534819	5945520.31
75225104.2	732.206885	757.883101	924.813682	727.490541	0.0041889	2.54E-05	75.4498994	0.01534471	0.01157757	1.32E-05	1.23E-05	0.00011368	0.02809732	0.10489787	0.0356484	5972965.49
75615417	732.206885	757.79657	924.797498	727.484677	0.00442974	2.54E-05	75.4602129	0.01541537	0.01163247	1.32E-05	1.23E-05	0.00011462	0.02812632	0.1053809	0.03594845	6000415.69
76005729.8	732.206885	757.714052	924.781384	727.478695	0.00467325	2.54E-05	75.4704324	0.01548602	0.01168737	1.32E-05	1.23E-05	0.00011556	0.02815571	0.10586392	0.03624833	6027866.31
76396042.6	732.206885	757.642664	924.765331	727.47281	0.00495542	2.54E-05	75.480559	0.01555668	0.01174227	1.32E-05	1.23E-05	0.00011651	0.02818381	0.10634694	0.03654809	6055299.85
76786355.3	732.206885	757.581243	924.749337	727.467028	0.00524303	2.55E-05	75.490594	0.01562734	0.01179717	1.32E-05	1.23E-05	0.00011745	0.02821135	0.10682997	0.03684767	6082705.24
76833647	731.581701	756.932548	924.365655	726.980371	0.00527433	2.55E-05	75.4918038	0.0156359	0.01180382	1.32E-05	1.23E-05	0.00011755	0.02821306	0.10688849	0.03687954	6105890.47
76837247	732.466704	758.076834	926.887967	727.81868	0.00527769	2.55E-05	75.4918963	0.01563656	0.01180433	1.32E-05	1.23E-05	0.00011765	0.02821961	0.10689297	0.03691097	6116023.7
76884538.7	732.466704	758.071606	926.886584	727.818037	0.0053223	2.55E-05	75.4931167	0.0156452	0.01181105	1.32E-05	1.23E-05	0.00011778	0.02822085	0.10695208	0.03695259	6116293.13
76943653.2	732.466704	758.063159	926.884575	727.817155	0.00537831	2.55E-05	75.4946403	0.01565601	0.01181945	1.32E-05	1.23E-05	0.00011792	0.02822477	0.10702598	0.03700012	6119657.4
77017546.5	732.466704	758.052388	926.881901	727.816044	0.00544845	2.55E-05	75.4965419	0.01566952	0.01182995	1.32E-05	1.23E-05	0.00011811	0.02823024	0.10711834	0.0370583	6123860.93
77109913	732.466704	758.037896	926.878373	727.814633	0.00554049	2.55E-05	75.4989143	0.01568641	0.01184307	1.32E-05	1.23E-05	0.00011833	0.02823737	0.10723379	0.03713047	6129134.38
77225371.2	732.466704	758.020721	926.873792	727.81288	0.00566375	2.55E-05	75.5018727	0.01570752	0.01185947	1.32E-05	1.23E-05	0.00011862	0.02824623	0.10737811	0.0372204	6135724.27
77340548	732.466704	758.004522	926.869131	727.811142	0.00578637	2.55E-05	75.5048159	0.01572858	0.01187584	1.32E-05	1.23E-05	0.0001189	0.02825503	0.10752208	0.03730998	6143929.22
77344148	732.466704	758.004308	926.868982	727.811093	0.0057902	2.55E-05	75.5049077	0.01572924	0.01187635	1.32E-05	1.23E-05	0.00011891	0.02825519	0.10752658	0.037313	6152005.01
77459324.8	732.466704	757.988553	926.864273	727.809357	0.00591248	2.55E-05	75.5078428	0.0157503	0.01189271	1.32E-05	1.23E-05	0.00011919	0.028264	0.10767055	0.03740229	6152371.84
77603295.9	732.466704	757.970627	926.858347	727.807201	0.00606478	2.55E-05	75.5115006	0.01577663	0.01191317	1.32E-05	1.23E-05	0.00011954	0.02827488	0.10785051	0.03751411	6160574.16
77738400	732.108004	757.585692	926.633919	727.526321	0.00619834	2.55E-05	75.5149221	0.01580133	0.01193236	1.32E-05	1.23E-05	0.00011986	0.02828435	0.10801938	0.03761626	6168525.95
77742000	732.517917	758.115575	927.804175	727.91479	0.00620255	2.55E-05	75.5150133	0.01580199	0.01193288	1.32E-05	1.23E-05	0.00011992	0.02828763	0.10802389	0.03763298	6181201.77
77877104.1	732.517917	758.100427	927.799181	727.912778	0.00636191	2.55E-05	75.5184396	0.01582681	0.01195216	1.32E-05	1.23E-05	0.00012025	0.02829697	0.10819355	0.03774057	6181574.81

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
78045984.3	732.517917	758.082537	927.792376	727.910247	0.00655964	2.55E-05	75.5227073	0.01585783	0.01197626	1.32E-05	1.23E-05	0.00012067	0.02830955	0.10840562	0.03787321	6191248.39
78257084.5	732.517917	758.06226	927.78372	727.907099	0.00680471	2.55E-05	75.5280186	0.01589661	0.01200639	1.32E-05	1.23E-05	0.00012119	0.02832531	0.10867071	0.03803851	6203337.27
78520959.7	732.517917	758.039322	927.77287	727.903176	0.00710835	2.55E-05	75.5346213	0.01594508	0.01204406	1.32E-05	1.23E-05	0.00012184	0.02834527	0.10900208	0.03824476	6218456.19
78850803.8	732.517917	758.01469	927.759314	727.898296	0.00748406	2.55E-05	75.5428185	0.01600567	0.01209114	1.32E-05	1.23E-05	0.00012265	0.02837046	0.10941628	0.03850218	6237355.68
79263108.9	732.517917	757.990108	927.742433	727.892234	0.00794861	2.55E-05	75.5529782	0.01608141	0.01214998	1.32E-05	1.23E-05	0.00012366	0.02840259	0.10993403	0.03882348	6260986.64
79675414	732.517917	757.972644	927.725667	727.886213	0.00843752	2.55E-05	75.5630425	0.01615715	0.01220883	1.33E-05	1.23E-05	0.00012467	0.02843494	0.11045179	0.03914439	6290434.93
80087719.1	732.517917	757.962314	927.709396	727.880242	0.00893907	2.55E-05	75.573013	0.01623289	0.01226768	1.33E-05	1.22E-05	0.00012568	0.02846739	0.11096954	0.03946495	6319888.9
80444447	732.517917	757.959181	927.695986	727.875112	0.00937104	2.55E-05	75.5815647	0.01629842	0.0123186	1.33E-05	1.22E-05	0.00012656	0.02849552	0.1114175	0.03974207	6349292.21
80444694.4	726.404853	750.066418	910.138081	722.084287	0.00937107	2.55E-05	75.5815704	0.01629846	0.01231863	1.33E-05	1.22E-05	0.00012594	0.02844417	0.1114178	0.03955469	6325180.01
80444941.8	720.297227	742.184182	892.341577	716.298846	0.00937107	2.55E-05	75.5815757	0.0162985	0.01231866	1.33E-05	1.22E-05	0.00012534	0.028393	0.11141808	0.03936902	6275805.41
80445189.2	714.19517	734.313447	874.301151	710.51904	0.00937107	2.55E-05	75.5815806	0.01629854	0.01231869	1.32E-05	1.22E-05	0.00012472	0.02834233	0.11141834	0.03917739	6226408.18
80445498.4	706.575632	724.491076	851.390364	703.302259	0.00937107	2.55E-05	75.5815861	0.01629858	0.01231873	1.32E-05	1.22E-05	0.0001239	0.02827941	0.11141863	0.03892774	6164770.45
80445885	697.064121	712.237626	822.158542	694.293679	0.00937107	2.55E-05	75.5815922	0.01629863	0.01231876	1.32E-05	1.22E-05	0.00012285	0.02819941	0.11141895	0.03861044	6087677.99
80446132.3	690.984489	704.409342	803.085066	688.53533	0.00937107	2.55E-05	75.5815955	0.01629865	0.01231878	1.32E-05	1.22E-05	0.00012216	0.02814635	0.11141912	0.0384032	6038371.06
80446379.7	684.911043	696.591667	783.711002	682.782506	0.00937107	2.54E-05	75.5815985	0.01629867	0.0123188	1.32E-05	1.22E-05	0.00012147	0.02809127	0.11141928	0.03819656	5989016.6
80446627.1	678.843905	688.784417	764.022918	677.03514	0.00937107	2.54E-05	75.581601	0.01629869	0.01231881	1.32E-05	1.22E-05	0.00012078	0.02803356	0.11141941	0.03798877	5939639.55
80446660.3	678.030075	687.737332	761.355753	676.264152	0.00937107	2.54E-05	75.5816013	0.0162987	0.01231882	1.32E-05	1.22E-05	0.00012069	0.02802564	0.11141943	0.03796051	5933018.01
80446693.5	677.21636	686.690434	758.682606	675.493263	0.00937107	2.54E-05	75.5816016	0.0162987	0.01231882	1.32E-05	1.22E-05	0.00012059	0.02801765	0.11141944	0.03793254	5926384.48
80446714.8	676.695644	686.020518	756.968653	674.999943	0.00937107	2.54E-05	75.5816018	0.0162987	0.01231882	1.32E-05	1.22E-05	0.00012053	0.02801251	0.11141945	0.03791447	5922142
80446736	676.174975	685.350677	755.252225	674.506666	0.00937107	2.54E-05	75.581602	0.0162987	0.01231882	1.32E-05	1.22E-05	0.00012047	0.02800733	0.11141946	0.0378966	5917894.06
80446749.6	675.841772	684.922022	754.15242	674.190987	0.00937107	2.54E-05	75.5816021	0.0162987	0.01231882	1.32E-05	1.22E-05	0.00012043	0.02800401	0.11141947	0.037885	5915178.96
80446763.2	675.508589	684.493394	753.051593	673.875326	0.00937107	2.54E-05	75.5816022	0.0162987	0.01231882	1.32E-05	1.22E-05	0.00012039	0.02800068	0.11141947	0.03787359	5912458.79
80446776.8	675.175426	684.0648	751.949753	673.559682	0.00937107	2.54E-05	75.5816023	0.0162987	0.01231882	1.32E-05	1.22E-05	0.00012036	0.02799731	0.11141948	0.0378621	5909739.78
80446793.8	674.758999	683.529102	750.57102	673.165148	0.00937107	2.54E-05	75.5816025	0.01629871	0.01231882	1.32E-05	1.22E-05	0.00012031	0.02799312	0.11141949	0.03784771	5906341.81
80446810.8	674.342603	682.993457	749.190689	672.770641	0.00937107	2.54E-05	75.5816026	0.01629871	0.01231882	1.32E-05	1.22E-05	0.00012026	0.02798887	0.1114195	0.03783347	5902939.01
80446821.7	674.076126	682.650666	748.306442	672.518169	0.00937107	2.54E-05	75.5816027	0.01629871	0.01231882	1.32E-05	1.22E-05	0.00012023	0.02798617	0.1114195	0.03782413	5900766.92
80446827.3	673.939694	682.475167	747.853454	672.388907	0.00937107	2.54E-05	75.5816027	0.01629871	0.01231882	1.32E-05	1.22E-05	0.00012021	0.02798477	0.1114195	0.03781941	5899652.78
80446830.1	673.869843	682.385305	747.621457	672.322726	0.00937107	2.54E-05	75.5816028	0.01629871	0.01231882	1.32E-05	1.22E-05	0.00012021	0.02798409	0.1114195	0.03781701	5899085.06
80446833	673.799992	682.295461	747.38941	672.256547	0.00937107	2.54E-05	75.5816028	0.01629871	0.01231882	1.32E-05	1.22E-05	0.0001202	0.02798334	0.1114195	0.03781459	5898511.5
80446836.6	673.712679	682.183149	747.099289	672.173823	0.00937107	2.54E-05	75.5816028	0.01629871	0.01231883	1.32E-05	1.22E-05	0.00012019	0.02798244	0.11141951	0.03781157	5897798.04
80446837.7	673.684069	682.146342	747.004205	672.146716	0.00937107	2.54E-05	75.5816028	0.01629871	0.01231883	1.32E-05	1.22E-05	0.00012018	0.02798217	0.11141951	0.03781059	5897566.05

PIN T654 FULL RESULTS

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
0		295	295	295	0	2.45E-05		0	0	8.80E-06	1.57E-05	0	0	0	0	
100	309.333714	310.330309	322.569249	308.870699	0	2.45E-05	0	3.30E-10	0	8.81E-06	1.57E-05	6.67E-07	0.00011878	2.36E-09	0.00018117	95462.2265
225	327.292835	329.527787	354.264964	326.243437	0	2.45E-05	0	1.67E-09	0	8.82E-06	1.57E-05	1.54E-06	0.00026069	1.20E-08	0.00041832	100798.676
381.25	349.81139	353.558426	390.975152	348.007682	0	2.45E-05	0	4.79E-09	0	8.83E-06	1.57E-05	2.65E-06	0.0004306	3.43E-08	0.00071767	107474.772
576.5625	378.073328	383.671394	433.910347	375.289788	1.30E-65	2.45E-05	0	1.10E-08	0	8.85E-06	1.57E-05	4.03E-06	0.00063487	7.85E-08	0.00109336	115830.056
820.703125	413.582692	421.457765	484.495689	409.513858	9.62E-56	2.46E-05	0	2.22E-08	0	8.86E-06	1.57E-05	5.77E-06	0.0008816	1.59E-07	0.00156539	126291.038
1125.87891	458.252644	468.921381	544.629676	452.484989	4.04E-46	2.46E-05	0	4.18E-08	0	8.89E-06	1.57E-05	7.96E-06	0.00118125	2.99E-07	0.00215902	139394.405
1507.34863	514.514727	528.717646	616.822925	506.499013	7.97E-37	2.47E-05	0	7.49E-08	0	8.92E-06	1.58E-05	1.07E-05	0.00154746	5.37E-07	0.002907	155816.901
1984.18579	585.443117	604.178281	704.694678	574.481649	6.63E-28	2.47E-05	0	1.30E-07	0	8.95E-06	1.58E-05	1.42E-05	0.00199792	9.30E-07	0.00385112	176411.582
2580.23224	674.870048	699.796883	812.777778	660.160349	1.70E-19	2.48E-05	0	2.19E-07	0	8.99E-06	1.58E-05	1.86E-05	0.00254924	1.57E-06	0.00504493	202251.071
3325.2903	787.424599	820.130515	947.637561	768.222791	1.05E-11	2.49E-05	0	3.65E-07	0	9.05E-06	1.59E-05	2.42E-05	0.0032325	2.61E-06	0.00655167	234662.44
3600	829.01858	864.981118	997.786367	808.288223	8.24E-10	2.50E-05	0	4.27E-07	0	9.07E-06	1.59E-05	2.63E-05	0.00347441	3.06E-06	0.00711122	246629.517
4345.05806	829.01858	864.986553	997.792253	808.294376	3.03E-09	2.50E-05	0	6.04E-07	0	9.07E-06	1.59E-05	2.63E-05	0.00347067	4.33E-06	0.0071113	246632.002
5276.38063	829.01858	864.986701	997.79236	808.295114	5.79E-09	2.50E-05	0	8.25E-07	0	9.07E-06	1.59E-05	2.63E-05	0.00346938	5.91E-06	0.00711132	246632.789
6440.53385	829.01858	864.987076	997.792893	808.295678	9.24E-09	2.50E-05	0	1.10E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346883	7.89E-06	0.00711133	246633.629
7895.72538	829.01858	864.987616	997.793998	808.296214	1.35E-08	2.50E-05	0	1.45E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346871	1.04E-05	0.00711135	246634.635
9714.71478	829.01858	864.988338	997.795893	808.296788	1.89E-08	2.50E-05	0	1.88E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346895	1.35E-05	0.00711136	246635.895
11988.4515	829.01858	864.989047	997.799894	808.29749	2.56E-08	2.50E-05	0	2.42E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346957	1.73E-05	0.00711139	246636.099
14830.6225	829.01858	864.990186	997.804261	808.29834	3.40E-08	2.50E-05	0	3.09E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00347051	2.22E-05	0.00711141	246637.788
18383.3362	829.01858	864.991714	997.810777	808.299447	4.44E-08	2.50E-05	0	3.94E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00347182	2.82E-05	0.00711145	246639.998
22824.2283	829.01858	864.993782	997.8202	808.300919	5.75E-08	2.50E-05	0	4.99E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00347358	3.58E-05	0.00711149	246642.938
28375.3434	829.01858	864.996595	997.833571	808.3029	7.37E-08	2.50E-05	0	6.31E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00347591	4.52E-05	0.00711155	246646.867
35314.2373	829.01858	865.000442	997.852353	808.305578	9.39E-08	2.50E-05	0	7.96E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00347899	5.70E-05	0.00711163	246652.142
43987.8547	829.01858	865.008149	997.876473	808.308957	1.19E-07	2.50E-05	0	1.00E-05	0	9.07E-06	1.59E-05	2.63E-05	0.0034831	7.18E-05	0.00711173	246667.24
54829.8764	829.01858	865.016799	997.912275	808.313787	1.50E-07	2.50E-05	0	1.26E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00348859	9.02E-05	0.00711185	246679.625
68382.4035	829.01858	865.029221	997.962171	808.32036	1.89E-07	2.50E-05	0	1.58E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00349592	0.00011325	0.00711202	246696.41
85323.0625	829.01858	865.047813	998.031719	808.329335	2.37E-07	2.50E-05	0	1.98E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00350575	0.00014206	0.00711224	246719.215
106498.886	829.01858	865.075215	998.128679	808.34162	2.96E-07	2.50E-05	0	2.49E-05	0	9.08E-06	1.59E-05	2.63E-05	0.00351895	0.00017808	0.00711253	246750.27
132968.666	829.01858	865.116358	998.263893	808.358478	3.70E-07	2.50E-05	0	3.11E-05	0	9.08E-06	1.59E-05	2.63E-05	0.00353674	0.0002231	0.00711293	246792.657
166055.89	829.01858	865.180108	998.452481	808.381679	4.60E-07	2.50E-05	0	3.90E-05	0	9.08E-06	1.59E-05	2.63E-05	0.00356076	0.00027938	0.00711348	246850.58
207414.921	829.01858	865.2809	998.715998	808.413703	5.71E-07	2.50E-05	0	4.88E-05	0	9.09E-06	1.59E-05	2.63E-05	0.00359328	0.00034972	0.00711425	246930.07
259113.709	829.01858	865.446434	999.084431	808.458091	7.07E-07	2.50E-05	0	6.11E-05	0	9.09E-06	1.59E-05	2.63E-05	0.00363741	0.00043766	0.00711535	247039.334
323737.195	829.01858	865.532418	999.599108	808.518836	8.72E-07	2.50E-05	0	7.64E-05	0	9.10E-06	1.59E-05	2.63E-05	0.00369742	0.00054757	0.00711647	247189.573
404516.551	829.01858	865.390529	1000.3205	808.601891	1.07E-06	2.50E-05	0	9.56E-05	0	9.11E-06	1.58E-05	2.63E-05	0.00377919	0.00068497	0.00711724	247396.552
505490.747	829.01858	865.276303	1001.33357	808.718356	1.30E-06	2.50E-05	0	0.00011956	0	9.13E-06	1.58E-05	2.63E-05	0.00389087	0.00085671	0.00711853	247683.25
631708.492	829.01858	865.327954	1002.76783	808.883035	1.58E-06	2.50E-05	0	0.00014952	0	9.15E-06	1.58E-05	2.63E-05	0.00404373	0.00107139	0.00712083	248081.805
789480.673	829.01858	865.829276	1004.80111	809.184517	1.84E-06	2.50E-05	0	0.00018697	0	9.18E-06	1.58E-05	2.63E-05	0.00425367	0.00133974	0.00711522	248658.235
986695.899	829.01858	864.921167	1006.88736	809.213926	2.14E-06	2.50E-05	0	0.00023378	0	9.23E-06	1.57E-05	2.63E-05	0.00453714	0.00167518	0.0071183	249339.879
1233214.93	829.01858	865.192919	1009.87159	809.146906	2.49E-06	2.50E-05	0	0.00029229	0	9.28E-06	1.57E-05	2.63E-05	0.00492437	0.00209448	0.00712558	250258.835
1541363.72	829.01858	865.433121	1014.09233	809.02708	2.86E-06	2.50E-05	0	0.00036544	0	9.37E-06	1.56E-05	2.64E-05	0.00545496	0.0026186	0.00712785	251542.152
1926549.71	829.01858	865.228091	1020.04807	808.917446	3.20E-06	2.50E-05	0	0.00045687	0	9.48E-06	1.55E-05	2.63E-05	0.00618288	0.00327375	0.00712809	253376.685
2408032.2	829.01858	864.357416	1028.4575	808.745014	3.52E-06	2.50E-05	0	0.00057115	0	9.64E-06	1.53E-05	2.64E-05	0.00717979	0.00409269	0.00713195	255991.221
3009885.31	829.01858	866.817134	1040.38775	808.536663	4.17E-06	2.50E-05	0	0.00071401	0	9.87E-06	1.51E-05	2.64E-05	0.00854232	0.00511637	0.00714044	259782.226

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
3762201.69	829.01858	865.330163	1057.40318	808.210596	5.37E-06	2.50E-05	0	0.00089258	0	1.02E-05	1.48E-05	2.64E-05	0.01040058	0.00639596	0.00714374	265349.599
4702597.17	829.01858	861.885934	1081.29123	805.673291	5.37E-06	2.50E-05	6.0147857	0.0011158	6.71E-05	1.06E-05	1.43E-05	2.61E-05	0.01284855	0.00799545	0.00703064	272776.6
5702597.17	829.01858	865.844456	1100.78783	806.014066	5.38E-06	2.50E-05	30.8542347	0.00135316	0.00041751	1.11E-05	1.39E-05	2.63E-05	0.01532219	0.00969632	0.00707936	313917.696
6702597.17	829.01858	862.875704	1111.8551	807.066575	7.05E-06	2.50E-05	49.2070695	0.00159053	0.00078265	1.14E-05	1.36E-05	2.65E-05	0.01710555	0.01139719	0.00716469	494888.762
7702597.17	829.01858	862.766648	1117.86239	806.910534	8.83E-06	2.50E-05	57.9624698	0.00182789	0.00105949	1.16E-05	1.34E-05	2.65E-05	0.01821914	0.01309807	0.0071786	685286.539
8203212	829.01858	862.352796	1119.43175	806.838689	9.80E-06	2.50E-05	60.2729211	0.00194672	0.00117334	1.17E-05	1.33E-05	2.65E-05	0.01858686	0.01394955	0.00718836	828056.393
8206812	822.624548	855.042225	1107.62737	801.386485	9.80E-06	2.50E-05	60.2799815	0.00194756	0.00117399	1.16E-05	1.33E-05	2.62E-05	0.01854713	0.01395559	0.00710112	879491.447
8707426.83	822.624548	856.324389	1107.69869	801.425666	1.02E-05	2.50E-05	61.7644391	0.00206338	0.00127444	1.17E-05	1.33E-05	2.62E-05	0.01876393	0.01478553	0.00710563	881786.319
9333195.37	822.624548	854.757108	1108.68057	801.355701	1.07E-05	2.50E-05	63.0280362	0.00220816	0.00139176	1.17E-05	1.32E-05	2.63E-05	0.01909591	0.01582294	0.00711311	936080.739
10115406	822.624548	854.621139	1109.87629	801.289869	1.14E-05	2.50E-05	64.1393966	0.00238913	0.00153237	1.18E-05	1.32E-05	2.63E-05	0.01947152	0.01711971	0.00712268	999865.503
11093169.4	822.624548	854.51427	1110.88041	801.221016	1.22E-05	2.50E-05	65.3123127	0.00261534	0.00170814	1.19E-05	1.31E-05	2.63E-05	0.01986708	0.01874068	0.00713508	1076145.13
12093169.4	822.624548	854.382726	1111.39349	801.175918	1.31E-05	2.50E-05	66.3190851	0.0028467	0.0018879	1.19E-05	1.30E-05	2.64E-05	0.02019783	0.02039851	0.00714898	1169961.88
13093169.4	822.624548	854.614524	1111.58759	801.227266	1.46E-05	2.50E-05	67.1745128	0.00307805	0.00206767	1.20E-05	1.30E-05	2.64E-05	0.0204814	0.02205633	0.00716373	1265772.54
13814423	822.624548	854.562001	1111.60426	801.199867	1.58E-05	2.50E-05	67.715776	0.00324492	0.00219732	1.20E-05	1.30E-05	2.65E-05	0.02066194	0.02325205	0.00717598	1360395.88
13818023	817.221601	847.79938	1096.01786	796.247806	1.58E-05	2.50E-05	67.7182874	0.00324574	0.00219796	1.20E-05	1.30E-05	2.62E-05	0.02060891	0.0232579	0.00709856	1417923.53
13860007.3	817.221601	847.799457	1096.01536	796.24721	1.59E-05	2.50E-05	67.7468972	0.00325507	0.00220521	1.20E-05	1.30E-05	2.62E-05	0.02069768	0.02332475	0.00709905	1418350.5
13901991.6	817.221601	847.802902	1096.00851	796.246352	1.59E-05	2.50E-05	67.7753434	0.0032644	0.00221246	1.20E-05	1.30E-05	2.62E-05	0.0207387	0.02339161	0.00709969	1422155.69
13954472	817.221601	847.812137	1095.99957	796.245187	1.60E-05	2.50E-05	67.8106733	0.00327606	0.00222152	1.20E-05	1.30E-05	2.62E-05	0.02076564	0.02347517	0.00710044	1425988.81
14020072.5	817.221601	847.826964	1095.98835	796.243701	1.60E-05	2.50E-05	67.8544835	0.00329064	0.00223284	1.20E-05	1.30E-05	2.62E-05	0.02078909	0.02357963	0.00710139	1430781.21
14102073	817.221601	847.850527	1095.97432	796.24185	1.61E-05	2.50E-05	67.9087034	0.00330886	0.002247	1.20E-05	1.30E-05	2.62E-05	0.02081334	0.02371021	0.00710257	1436773.32
14204573.8	817.221601	847.886624	1095.95679	796.239559	1.62E-05	2.50E-05	67.9756443	0.00333164	0.0022647	1.20E-05	1.30E-05	2.62E-05	0.02084012	0.02387342	0.00710406	1444266.13
14332699.7	817.221601	847.940765	1095.93496	796.236749	1.63E-05	2.50E-05	68.0580441	0.00336011	0.00228682	1.20E-05	1.30E-05	2.62E-05	0.02087094	0.02407744	0.00710592	1453637.63
14428975	817.221601	847.987897	1095.9187	796.234683	1.64E-05	2.50E-05	68.1190472	0.0033815	0.00230345	1.20E-05	1.30E-05	2.62E-05	0.02089319	0.02423075	0.00710752	1465187.29
14432575	810.789189	841.227361	1090.04484	791.14738	1.64E-05	2.49E-05	68.1213056	0.0033823	0.00230407	1.20E-05	1.30E-05	2.59E-05	0.020866	0.02423646	0.00702289	1464495.4
14528850.3	810.789189	841.276518	1090.02953	791.145318	1.64E-05	2.49E-05	68.1811034	0.00340355	0.00232058	1.20E-05	1.30E-05	2.59E-05	0.02088681	0.02438871	0.007024	1465068.55
14649194.4	810.789189	841.293911	1090.00944	791.142575	1.65E-05	2.49E-05	68.2548088	0.00343011	0.00234121	1.20E-05	1.30E-05	2.59E-05	0.02091259	0.02457903	0.00702572	1473767.82
14799624.6	810.789189	841.235707	1089.98439	791.13871	1.65E-05	2.49E-05	68.3453509	0.00346331	0.00236701	1.20E-05	1.30E-05	2.59E-05	0.0209443	0.02481693	0.00702788	1484648.5
14987662.3	810.789189	841.168059	1089.95305	791.13387	1.66E-05	2.49E-05	68.4561163	0.0035048	0.00239925	1.20E-05	1.30E-05	2.59E-05	0.02098335	0.0251143	0.00703059	1498260.13
15222709.4	810.789189	841.068488	1089.91397	791.127707	1.67E-05	2.49E-05	68.5909381	0.00355668	0.00243956	1.20E-05	1.29E-05	2.60E-05	0.02103157	0.02548601	0.00703399	1515290.29
15516518.3	810.789189	840.958476	1089.86531	791.119948	1.68E-05	2.49E-05	68.754034	0.00362152	0.00248994	1.20E-05	1.29E-05	2.60E-05	0.02109121	0.02595065	0.00703823	1536605.1
15883779.4	810.789189	840.842622	1089.80473	791.110196	1.70E-05	2.49E-05	68.9498707	0.00370257	0.00255292	1.20E-05	1.29E-05	2.60E-05	0.02116529	0.02653145	0.00704357	1563295.71
16342855.8	810.789189	840.826471	1089.7293	791.098135	1.72E-05	2.49E-05	69.1829302	0.00380389	0.00263164	1.20E-05	1.29E-05	2.60E-05	0.02125749	0.02725746	0.00705032	1596732.5
16916701.4	810.789189	840.816199	1089.63506	791.082745	1.75E-05	2.49E-05	69.4573585	0.00393054	0.00273005	1.20E-05	1.29E-05	2.60E-05	0.02137245	0.02816496	0.00705886	1638636.17
17634008.2	810.789189	840.815574	1089.5173	791.063976	1.78E-05	2.49E-05	69.7764876	0.00408884	0.00285305	1.21E-05	1.29E-05	2.61E-05	0.02151553	0.02929934	0.00706973	1691173.61
18530641.9	810.789189	840.794705	1089.37079	791.040138	1.83E-05	2.50E-05	70.1422528	0.00428673	0.00300681	1.21E-05	1.29E-05	2.61E-05	0.02169419	0.03071731	0.00708355	1757067.52
19530641.9	810.789189	841.024022	1089.20737	791.01384	1.88E-05	2.50E-05	70.5123019	0.00450742	0.00317829	1.21E-05	1.28E-05	2.62E-05	0.02189249	0.03229875	0.00709996	1839310.34
20530641.9	810.789189	840.725746	1089.04182	790.984851	1.94E-05	2.50E-05	70.8478052	0.00472812	0.00334977	1.21E-05	1.28E-05	2.62E-05	0.02208633	0.03388019	0.00711737	1930921.61
21312419	810.789189	840.720042	1088.91177	790.966361	1.99E-05	2.50E-05	71.0890478	0.00490066	0.00348383	1.22E-05	1.28E-05	2.63E-05	0.02223781	0.03511652	0.00713229	2022000.92
21312902.2	810.043394	839.749178	1086.28276	790.254248	1.99E-05	2.50E-05	71.0891911	0.00490076	0.00348391	1.22E-05	1.28E-05	2.63E-05	0.02222823	0.03511728	0.00712384	2088956.52
21313385.4	809.293313	838.774098	1083.64931	789.538816	1.99E-05	2.50E-05	71.0893334	0.00490087	0.00348399	1.22E-05	1.28E-05	2.62E-05	0.02221902	0.03511804	0.00711232	2087047.03
21313989.3	808.34963	837.549368	1080.35086	788.639883	1.99E-05	2.50E-05	71.0895097	0.004901	0.0034841	1.22E-05	1.28E-05	2.62E-05	0.02220796	0.03511898	0.00709784	2084636.5
21314744.3	807.160416	836.009062	1076.21709	787.508878	1.99E-05	2.49E-05	71.0897278	0.00490116	0.00348422	1.22E-05	1.28E-05	2.61E-05	0.02219451	0.03512014	0.00707961	2081603.44
21315688	805.658678	834.067363	1071.03271	786.083486	1.99E-05	2.49E-05	71.0899968	0.00490136	0.00348438	1.22E-05	1.28E-05	2.60E-05	0.02217797	0.03512156	0.00705664	2077780.97
21316019	805.127969	833.382559	1069.20961	785.580509	1.99E-05	2.49E-05	71.0900902	0.00490143	0.00348443	1.22E-05	1.28E-05	2.60E-05	0.02217219	0.03512206	0.00704852	2076488.54
21316962.7	805.127969	833.382786	1069.21076	785.580453	1.99E-05	2.49E-05	71.0903558	0.00490163	0.00348458	1.22E-05	1.28E-05	2.60E-05	0.02217344	0.03512347	0.00704854	2076516.96
21318142.4	805.127969	833.382976	1069.21166	785.580438	1.99E-05	2.49E-05	71.0906877	0.00490187	0.00348477	1.22E-05	1.28E-05	2.60E-05	0.02217428	0.03512524	0.00704856	2076597.8

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
21319616.9	805.127969	833.383109	1069.21232	785.580414	1.99E-05	2.49E-05	71.0911026	0.00490218	0.00348501	1.22E-05	1.28E-05	2.60E-05	0.02217492	0.03512744	0.00704858	2076699.65
21321460.1	805.127969	833.383203	1069.21278	785.580382	1.99E-05	2.49E-05	71.0916211	0.00490256	0.00348531	1.22E-05	1.28E-05	2.60E-05	0.02217545	0.0351302	0.00704861	2076827.53
21323764.1	805.127969	833.383271	1069.21303	785.58034	1.99E-05	2.49E-05	71.0922692	0.00490305	0.00348569	1.22E-05	1.28E-05	2.60E-05	0.02217594	0.03513364	0.00704865	2076987.81
21326644.1	805.127969	833.383326	1069.21303	785.580286	1.99E-05	2.49E-05	71.093079	0.00490365	0.00348615	1.22E-05	1.28E-05	2.60E-05	0.02217647	0.03513795	0.0070487	2077188.46
21330244.1	805.127969	833.383379	1069.21278	785.580217	1.99E-05	2.49E-05	71.0940911	0.0049044	0.00348674	1.22E-05	1.28E-05	2.60E-05	0.02217709	0.03514333	0.00704876	2077439.52
21334744.1	805.127969	833.38344	1069.21227	785.58013	1.99E-05	2.49E-05	71.0953557	0.00490534	0.00348747	1.22E-05	1.28E-05	2.60E-05	0.02217787	0.03515006	0.00704883	2077753.49
21340369.1	805.127969	833.383516	1069.21151	785.58002	1.99E-05	2.49E-05	71.0969358	0.00490651	0.00348838	1.22E-05	1.28E-05	2.60E-05	0.02217885	0.03515847	0.00704892	2078146.07
21347400.4	805.127969	833.383614	1069.21049	785.579883	1.99E-05	2.49E-05	71.0989099	0.00490798	0.00348952	1.22E-05	1.28E-05	2.60E-05	0.02218009	0.03516899	0.00704904	2078636.86
21356189.4	805.127969	833.383739	1069.20917	785.579711	1.99E-05	2.49E-05	71.1013758	0.00490981	0.00349094	1.22E-05	1.28E-05	2.60E-05	0.02218164	0.03518213	0.00704918	2079250.39
21367175.8	805.127969	833.383899	1069.20751	785.579497	1.99E-05	2.49E-05	71.1044556	0.0049121	0.00349273	1.22E-05	1.28E-05	2.60E-05	0.02218358	0.03519856	0.00704936	2080017.34
21380908.7	805.127969	833.384099	1069.20543	785.57923	1.99E-05	2.49E-05	71.1083013	0.00491497	0.00349495	1.22E-05	1.28E-05	2.60E-05	0.02218601	0.03521909	0.00704959	2080976.08
21398074.8	805.127969	833.383964	1069.20282	785.578894	1.99E-05	2.49E-05	71.1131022	0.00491855	0.00349774	1.22E-05	1.28E-05	2.60E-05	0.02218906	0.03524476	0.00704987	2082174.56
21419532.5	805.127969	833.383804	1069.19961	785.578478	1.99E-05	2.49E-05	71.1190934	0.00492303	0.00350121	1.22E-05	1.28E-05	2.60E-05	0.02219283	0.03527685	0.00705022	2083672.62
21446354.6	805.127969	833.383621	1069.19556	785.577958	1.99E-05	2.49E-05	71.1265671	0.00492863	0.00350556	1.22E-05	1.28E-05	2.60E-05	0.02219754	0.03531696	0.00705066	2085545.5
21479882.2	805.127969	833.383415	1069.19049	785.577309	1.99E-05	2.49E-05	71.1358855	0.00493562	0.003511	1.22E-05	1.28E-05	2.60E-05	0.02220343	0.03536709	0.00705121	2087886.85
21521791.7	805.127969	833.383191	1069.18415	785.576503	1.99E-05	2.49E-05	71.1474963	0.00494437	0.0035178	1.22E-05	1.28E-05	2.60E-05	0.0222108	0.03542976	0.0070519	2090813.92
21574178.6	805.127969	833.382963	1069.17623	785.575501	2.00E-05	2.49E-05	71.1619522	0.0049553	0.00352629	1.22E-05	1.28E-05	2.60E-05	0.02222002	0.0355081	0.00705277	2094473.37
21639662.2	805.127969	833.382756	1069.16634	785.574259	2.00E-05	2.49E-05	71.1799326	0.00496897	0.00353691	1.22E-05	1.28E-05	2.60E-05	0.02223155	0.03560602	0.00705385	2099048.63
21721516.7	805.127969	833.382662	1069.15397	785.572717	2.00E-05	2.49E-05	71.2022695	0.00498605	0.00355018	1.22E-05	1.28E-05	2.60E-05	0.02224597	0.03572842	0.0070552	2104769.19
21823834.9	805.127969	833.382776	1069.13852	785.570809	2.00E-05	2.49E-05	71.2299764	0.0050074	0.00356677	1.22E-05	1.28E-05	2.60E-05	0.022264	0.03588142	0.00705689	2111922.19
21951732.6	805.127969	833.383165	1069.11923	785.568467	2.01E-05	2.49E-05	71.2642795	0.00503409	0.00358751	1.22E-05	1.28E-05	2.60E-05	0.02228655	0.03607267	0.00705902	2120867.08
22111604.7	805.127969	833.385292	1069.09512	785.565604	2.01E-05	2.49E-05	71.3066501	0.00506745	0.00361343	1.22E-05	1.28E-05	2.60E-05	0.02231475	0.03631174	0.00706169	2132053.88
22311444.8	805.127969	833.489992	1069.06503	785.562101	2.02E-05	2.49E-05	71.3588353	0.00510916	0.00364583	1.22E-05	1.28E-05	2.60E-05	0.02235002	0.03661057	0.00706504	2146046.22
22561245	805.127969	833.503262	1069.02749	785.55712	2.02E-05	2.49E-05	71.4228809	0.00516129	0.00368634	1.22E-05	1.28E-05	2.61E-05	0.0223941	0.03698411	0.00706925	2163548.38
22873495.3	805.127969	833.411048	1068.98077	785.550352	2.03E-05	2.49E-05	71.5011413	0.00522645	0.00373697	1.22E-05	1.28E-05	2.61E-05	0.02244922	0.03745103	0.00707455	2185445.56
23263808	805.127969	833.400037	1068.92251	785.541741	2.05E-05	2.49E-05	71.5962647	0.0053079	0.00380026	1.22E-05	1.28E-05	2.61E-05	0.02251982	0.03803469	0.00708132	2212849.47
23751699	805.127969	833.403553	1068.84993	785.610036	2.06E-05	2.49E-05	71.7111408	0.00540971	0.00387937	1.22E-05	1.27E-05	2.61E-05	0.02260777	0.03876425	0.00708992	2247406.14
24361562.7	805.127969	833.385582	1068.75955	785.599519	2.08E-05	2.50E-05	71.8487949	0.00553698	0.00397825	1.22E-05	1.27E-05	2.62E-05	0.02271629	0.03967621	0.00710076	2290387.4
25123892.4	805.127969	833.374139	1068.64615	785.585855	2.11E-05	2.50E-05	72.0122125	0.00569606	0.00410186	1.22E-05	1.27E-05	2.62E-05	0.02285143	0.04081616	0.00711459	2344239.2
25596874	805.127969	833.373075	1068.575	785.576171	2.12E-05	2.50E-05	72.1090931	0.00579477	0.00417855	1.23E-05	1.27E-05	2.62E-05	0.02293512	0.04152343	0.00712481	2409725.38
25597817.7	804.927561	833.071358	1067.44321	785.358455	2.12E-05	2.50E-05	72.1092828	0.00579496	0.00417871	1.23E-05	1.27E-05	2.62E-05	0.0229312	0.04152484	0.00712317	2448432.19
25598761.4	804.726218	832.768716	1066.31064	785.14	2.12E-05	2.50E-05	72.1094717	0.00579516	0.00417886	1.23E-05	1.27E-05	2.62E-05	0.02292736	0.04152625	0.00711975	2447786.85
25599941.1	804.473214	832.389124	1064.89356	784.8659	2.12E-05	2.50E-05	72.109707	0.0057954	0.00417905	1.23E-05	1.27E-05	2.62E-05	0.02292272	0.04152799	0.00711546	2446956.73
25600474	804.358432	832.217175	1064.25279	784.741694	2.12E-05	2.50E-05	72.1098129	0.00579551	0.00417913	1.23E-05	1.27E-05	2.62E-05	0.02292065	0.04152878	0.00711352	2446642.43
25601653.6	804.358432	832.217169	1064.25275	784.741687	2.12E-05	2.50E-05	72.1100471	0.00579576	0.00417932	1.23E-05	1.27E-05	2.62E-05	0.02292094	0.04153052	0.00711354	2446686.22
25603128.2	804.358432	832.2172	1064.25322	784.741664	2.12E-05	2.50E-05	72.1103399	0.00579606	0.00417956	1.23E-05	1.27E-05	2.62E-05	0.0229212	0.0415327	0.00711357	2446787.34
25604971.4	804.358432	832.217215	1064.25349	784.741635	2.12E-05	2.50E-05	72.1107057	0.00579644	0.00417985	1.23E-05	1.27E-05	2.62E-05	0.02292148	0.04153541	0.0071136	2446914.18
25607275.4	804.358432	832.217223	1064.2536	784.741599	2.13E-05	2.50E-05	72.111163	0.00579691	0.00418022	1.23E-05	1.27E-05	2.62E-05	0.02292183	0.04153881	0.00711364	2447072.99
25610155.4	804.358432	832.217226	1064.25356	784.741553	2.13E-05	2.50E-05	72.1117345	0.00579751	0.00418068	1.23E-05	1.27E-05	2.62E-05	0.02292229	0.04154306	0.0071137	2447271.7
25613755.4	804.358432	832.217227	1064.25334	784.741494	2.13E-05	2.50E-05	72.1124487	0.00579825	0.00418126	1.23E-05	1.27E-05	2.62E-05	0.02292288	0.04154837	0.00711376	2447520.23
25618255.4	804.358432	832.21723	1064.25296	784.741419	2.13E-05	2.50E-05	72.1133413	0.00579917	0.00418198	1.23E-05	1.27E-05	2.62E-05	0.02292364	0.04155501	0.00711385	2447830.98
25623880.4	804.358432	832.217235	1064.25238	784.741326	2.13E-05	2.50E-05	72.1144565	0.00580033	0.00418288	1.23E-05	1.27E-05	2.62E-05	0.02292461	0.04156331	0.00711395	2448219.5
25630911.7	804.358432	832.217243	1064.2516	784.741208	2.13E-05	2.50E-05	72.1158499	0.00580178	0.004184	1.23E-05	1.27E-05	2.62E-05	0.02292582	0.04157368	0.00711408	2448705.2
25639700.7	804.358432	832.21727	1064.24933	784.740876	2.13E-05	2.50E-05	72.1175907	0.00580359	0.00418541	1.23E-05	1.27E-05	2.62E-05	0.02292735	0.04158664	0.00711424	2449349.06
25650687	804.358432	832.217292	1064.24773	784.740645	2.13E-05	2.50E-05	72.1197652	0.00580585	0.00418717	1.23E-05	1.27E-05	2.62E-05	0.02292925	0.04160285	0.00711445	2450117.22
25664420	804.358432	832.217322	1064.24572	784.740355	2.13E-05	2.50E-05	72.1224809	0.00580868	0.00418936	1.23E-05	1.27E-05	2.62E-05	0.02293164	0.0416231	0.0071147	2451077.48

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
25681586.1	804.358432	832.217362	1064.24321	784.739991	2.13E-05	2.50E-05	72.1258718	0.00581221	0.00419211	1.23E-05	1.27E-05	2.62E-05	0.02293462	0.04164842	0.00711502	2452277.87
25703043.8	804.358432	832.217415	1064.24008	784.739534	2.13E-05	2.50E-05	72.1301047	0.00581663	0.00419554	1.23E-05	1.27E-05	2.62E-05	0.02293835	0.04168007	0.00711542	2453778.44
25729865.9	804.358432	832.217493	1064.23617	784.738961	2.13E-05	2.50E-05	72.1353868	0.00582215	0.00419983	1.23E-05	1.27E-05	2.62E-05	0.02294301	0.04171964	0.00711591	2455654.3
25763393.5	804.358432	832.217602	1064.23124	784.738228	2.13E-05	2.50E-05	72.1419752	0.00582905	0.00420519	1.23E-05	1.27E-05	2.62E-05	0.02294883	0.04176909	0.00711653	2457999.32
25805303	804.358432	832.217775	1064.22512	784.737313	2.13E-05	2.50E-05	72.150189	0.00583768	0.0042119	1.23E-05	1.27E-05	2.62E-05	0.0229561	0.04183091	0.00711731	2460930.97
25857689.9	804.358432	832.218036	1064.21746	784.736156	2.13E-05	2.50E-05	72.160422	0.00584846	0.00422027	1.23E-05	1.27E-05	2.62E-05	0.02296519	0.04190818	0.00711828	2464596.07
25923173.5	804.358432	832.218424	1064.20788	784.734837	2.14E-05	2.50E-05	72.1731604	0.00586194	0.00423075	1.23E-05	1.27E-05	2.62E-05	0.02297655	0.04200477	0.0071195	2469178.76
26005028	804.358432	832.219022	1064.19592	784.733201	2.14E-05	2.50E-05	72.1890012	0.00587879	0.00424384	1.23E-05	1.27E-05	2.62E-05	0.02299075	0.04212551	0.00712103	2474908.61
26107346.2	804.358432	832.219951	1064.18097	784.731119	2.14E-05	2.50E-05	72.208675	0.00589985	0.00426021	1.23E-05	1.27E-05	2.62E-05	0.0230085	0.04227644	0.00712294	2482073.04
26235243.9	804.358432	832.2214	1064.1623	784.728466	2.15E-05	2.50E-05	72.2330706	0.00592618	0.00428066	1.23E-05	1.27E-05	2.62E-05	0.02303067	0.04246509	0.00712534	2491031.9
26261755	804.358432	832.221733	1064.15846	784.727919	2.15E-05	2.50E-05	72.2381003	0.00593164	0.0042849	1.23E-05	1.27E-05	2.62E-05	0.02303527	0.0425042	0.00712625	2501661.11
26265355	803.788828	832.438689	1071.99888	784.800964	2.15E-05	2.50E-05	72.2387925	0.00593239	0.00428549	1.23E-05	1.27E-05	2.62E-05	0.02305882	0.04250958	0.00712566	2504671.37
26291866.1	803.788828	832.439071	1071.99137	784.800344	2.15E-05	2.50E-05	72.2439581	0.00593801	0.00428985	1.23E-05	1.27E-05	2.62E-05	0.0230636	0.04254983	0.0071261	2505093.05
26325005	803.788828	832.439637	1071.98582	784.799588	2.15E-05	2.50E-05	72.2504012	0.00594503	0.00429531	1.23E-05	1.27E-05	2.62E-05	0.02306962	0.04260014	0.00712675	2507484.95
26366428.7	803.788828	832.44038	1071.97934	784.798642	2.15E-05	2.50E-05	72.2584339	0.0059538	0.00430212	1.23E-05	1.27E-05	2.62E-05	0.02307709	0.04266302	0.00712755	2510474.79
26418208.2	803.788828	832.441363	1071.97129	784.79745	2.15E-05	2.50E-05	72.2684414	0.00596477	0.00431065	1.23E-05	1.27E-05	2.62E-05	0.02308642	0.04274163	0.00712856	2514212.62
26482932.7	803.788828	832.442678	1071.96123	784.795944	2.15E-05	2.50E-05	72.2808991	0.00597848	0.0043213	1.23E-05	1.27E-05	2.62E-05	0.02309808	0.04283988	0.00712983	2518885.8
26563838.2	803.788828	832.444459	1071.94866	784.794038	2.16E-05	2.50E-05	72.2963912	0.00599562	0.00433462	1.23E-05	1.27E-05	2.63E-05	0.02311264	0.04296271	0.00713141	2524728.68
26664970.2	803.788828	832.44693	1071.93296	784.791808	2.16E-05	2.50E-05	72.3156322	0.00601705	0.00435127	1.23E-05	1.27E-05	2.63E-05	0.02313085	0.04311623	0.0071334	2532035.14
26791385.1	803.788828	832.443454	1071.91333	784.788951	2.17E-05	2.50E-05	72.3394915	0.00604383	0.00437208	1.23E-05	1.27E-05	2.63E-05	0.0231536	0.04330814	0.00713587	2541171.77
26949403.7	803.788828	832.439557	1071.88882	784.785305	2.17E-05	2.50E-05	72.36902	0.00607731	0.00439809	1.23E-05	1.27E-05	2.63E-05	0.02318205	0.04354803	0.00713897	2552598.46
27146927	803.788828	832.434256	1071.85822	784.780635	2.18E-05	2.50E-05	72.4054763	0.00611915	0.0044306	1.23E-05	1.27E-05	2.63E-05	0.02321762	0.04384788	0.00714287	2566890.91
27393831.2	803.788828	832.426824	1071.81999	784.774609	2.19E-05	2.50E-05	72.4503514	0.00617146	0.00447125	1.23E-05	1.27E-05	2.63E-05	0.0232621	0.0442227	0.00714777	2584771.89
27702461.3	803.788828	832.418248	1071.77231	784.766912	2.20E-05	2.50E-05	72.5053867	0.00623685	0.00452205	1.23E-05	1.26E-05	2.63E-05	0.02331774	0.04469123	0.00715393	2607147.61
28088249	803.788828	832.40934	1071.71299	784.757957	2.21E-05	2.50E-05	72.5725791	0.00631858	0.00458555	1.23E-05	1.26E-05	2.64E-05	0.02338734	0.04527689	0.00716171	2635159.72
28570483.7	803.788828	832.401513	1071.64119	784.748058	2.23E-05	2.50E-05	72.6541641	0.00642074	0.00466494	1.23E-05	1.26E-05	2.64E-05	0.02347444	0.04600896	0.00717155	2670242.09
29173277	803.788828	832.392473	1071.56709	784.733922	2.26E-05	2.50E-05	72.7525656	0.00654845	0.00476416	1.23E-05	1.26E-05	2.64E-05	0.02358353	0.04692405	0.00718401	2714188.02
29926768.6	803.788828	832.385801	1071.47385	784.714576	2.29E-05	2.50E-05	72.8702987	0.00670808	0.0048882	1.24E-05	1.26E-05	2.65E-05	0.02371981	0.04806791	0.00719985	2769254.99
30868633.2	803.788828	832.383018	1071.35051	784.688773	2.33E-05	2.50E-05	73.009813	0.00690761	0.00504324	1.24E-05	1.26E-05	2.65E-05	0.02389	0.04949774	0.00722009	2838301
31868633.2	803.788828	832.388572	1071.21322	784.665542	2.38E-05	2.50E-05	73.1493793	0.00711947	0.00520785	1.24E-05	1.26E-05	2.66E-05	0.02407329	0.05101582	0.00724272	2924027.77
32714598	803.788828	832.379643	1071.13234	784.649569	2.42E-05	2.50E-05	73.2611212	0.00729869	0.0053471	1.24E-05	1.25E-05	2.67E-05	0.02415056	0.05230007	0.00726286	3014216.38
32718198	644.15	644.175397	644.152564	644.150739	2.42E-05	2.48E-05	73.2613531	0.00729907	0.0053474	1.23E-05	1.26E-05	1.88E-05	0.02239831	0.0523028	0.00516244	2525579.1
32721798	305	305.051386	305.006481	305.00218	2.42E-05	2.45E-05	73.2613531	0.00729907	0.0053474	1.20E-05	1.25E-05	2.54E-06	0.02026117	0.0523028	0.00075586	1206544.39
32725398	305	305.051386	305.006481	305.00218	2.42E-05	2.45E-05	73.2613531	0.00729907	0.0053474	1.20E-05	1.25E-05	2.54E-06	0.02026117	0.0523028	0.00075586	1206544.39
32728998	778.966356	802.973121	1012.40014	762.831162	2.42E-05	2.49E-05	73.2615498	0.0072994	0.00534765	1.24E-05	1.25E-05	2.54E-05	0.02383103	0.05230512	0.00690817	2999950.98
32732598	778.966356	802.976508	1012.40386	762.835131	2.42E-05	2.49E-05	73.2619433	0.00730004	0.00534815	1.24E-05	1.25E-05	2.54E-05	0.02382429	0.05230975	0.00690827	3000114.74
32737098	778.966356	802.975923	1012.40175	762.835108	2.42E-05	2.49E-05	73.262435	0.00730085	0.00534878	1.24E-05	1.25E-05	2.54E-05	0.02382115	0.05231555	0.00690834	3000392.86
32742723	778.966356	802.975637	1012.40007	762.835042	2.42E-05	2.49E-05	73.2630494	0.00730186	0.00534957	1.24E-05	1.25E-05	2.54E-05	0.02382013	0.05232279	0.00690845	3000737.97
32749754.3	778.966356	802.975617	1012.40016	762.835045	2.42E-05	2.49E-05	73.2638173	0.00730313	0.00535055	1.24E-05	1.25E-05	2.54E-05	0.02382044	0.05233185	0.00690857	3001135.15
32758543.3	778.966356	802.97551	1012.39865	762.83494	2.42E-05	2.49E-05	73.2647767	0.00730471	0.00535178	1.24E-05	1.25E-05	2.54E-05	0.02382149	0.05234317	0.00690873	3001664.71
32769529.6	778.966356	802.975471	1012.39731	762.834804	2.42E-05	2.49E-05	73.2659754	0.00730668	0.00535331	1.24E-05	1.25E-05	2.54E-05	0.0238231	0.05235732	0.00690893	3002325.67
32783262.6	778.966356	802.975465	1012.39593	762.834629	2.42E-05	2.49E-05	73.2674728	0.00730915	0.00535523	1.24E-05	1.25E-05	2.54E-05	0.02382521	0.05237501	0.00690918	3003151.56
32800428.7	778.966356	802.975474	1012.39436	762.834409	2.42E-05	2.49E-05	73.2693433	0.00731224	0.00535763	1.24E-05	1.25E-05	2.54E-05	0.02382788	0.05239712	0.0069095	3004183.84
32821886.4	778.966356	802.975492	1012.39246	762.834133	2.42E-05	2.49E-05	73.271679	0.00731609	0.00536062	1.24E-05	1.25E-05	2.54E-05	0.02383121	0.05242476	0.00690989	3005474.2
32848708.5	778.966356	802.975519	1012.39011	762.833785	2.42E-05	2.49E-05	73.2745953	0.00732091	0.00536437	1.24E-05	1.25E-05	2.54E-05	0.02383538	0.0524593	0.00691038	3007087.23
32882236.1	778.966356	802.975558	1012.38717	762.833349	2.42E-05	2.49E-05	73.2782352	0.00732694	0.00536905	1.24E-05	1.25E-05	2.54E-05	0.02384057	0.05250249	0.00691099	3009103.64

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
32896765	778.490606	802.493883	1012.099	762.466483	2.42E-05	2.49E-05	73.2798107	0.00732955	0.00537108	1.24E-05	1.25E-05	2.54E-05	0.0238412	0.0525212	0.00690516	3010288.37
32900365	792.161446	818.71412	1045.20885	774.512827	2.42E-05	2.49E-05	73.2802206	0.00733023	0.00537161	1.24E-05	1.25E-05	2.61E-05	0.02395703	0.05252607	0.00710278	3059542.68
32914893.9	792.161446	818.713856	1045.20092	774.512687	2.42E-05	2.49E-05	73.2819531	0.00733311	0.00537384	1.24E-05	1.25E-05	2.61E-05	0.02395712	0.05254667	0.00710315	3059899.97
32933055.1	792.161446	818.713468	1045.19815	774.512373	2.42E-05	2.49E-05	73.2841169	0.0073367	0.00537664	1.24E-05	1.25E-05	2.61E-05	0.02395771	0.05257242	0.00710326	3061138.57
32955756.6	792.161446	818.713058	1045.19679	774.511994	2.42E-05	2.49E-05	73.2868187	0.00734119	0.00538013	1.24E-05	1.25E-05	2.61E-05	0.02395811	0.0526046	0.00710364	3062687.97
32984133.4	792.161446	818.712574	1045.19534	774.511524	2.42E-05	2.49E-05	73.2901912	0.00734681	0.00538449	1.24E-05	1.25E-05	2.61E-05	0.02395846	0.05264483	0.0071042	3064625.37
33019604.4	792.161446	818.71197	1045.19362	774.510936	2.43E-05	2.49E-05	73.2943997	0.00735382	0.00538994	1.24E-05	1.25E-05	2.61E-05	0.02395885	0.05269512	0.00710493	3067047.57
33063943.2	792.161446	818.711215	1045.19148	774.510203	2.43E-05	2.49E-05	73.2996489	0.0073626	0.00539676	1.24E-05	1.25E-05	2.61E-05	0.02395934	0.05275798	0.00710585	3070075.74
33119366.7	792.161446	818.710281	1045.18897	774.509287	2.43E-05	2.49E-05	73.306193	0.00737356	0.00540528	1.24E-05	1.25E-05	2.61E-05	0.02396193	0.05283656	0.00710713	3073861.07
33188646.1	792.161446	818.709351	1045.17775	774.508054	2.43E-05	2.49E-05	73.3143457	0.00738727	0.00541593	1.24E-05	1.25E-05	2.61E-05	0.02396495	0.05293478	0.00710858	3078590.34
33275245.3	792.161446	818.70877	1045.16971	774.506522	2.43E-05	2.49E-05	73.3244941	0.0074044	0.00542924	1.24E-05	1.25E-05	2.61E-05	0.02397196	0.05305756	0.00711039	3084498.57
33383494.3	792.161446	818.708276	1045.16006	774.504602	2.43E-05	2.49E-05	73.3371138	0.00742582	0.00544588	1.24E-05	1.25E-05	2.61E-05	0.02398188	0.05321103	0.00711266	3091872.99
33518805.6	792.161446	818.707926	1045.14841	774.502178	2.43E-05	2.49E-05	73.3527865	0.00745259	0.00546668	1.24E-05	1.25E-05	2.61E-05	0.02399516	0.05340286	0.0071155	3101087.45
33687944.7	792.161446	818.707697	1045.13416	774.499126	2.43E-05	2.49E-05	73.3722196	0.00748606	0.00549269	1.24E-05	1.25E-05	2.61E-05	0.02401235	0.05364266	0.00711907	3112598.99
33899368.5	792.161446	818.707599	1045.11663	774.495342	2.43E-05	2.49E-05	73.3962681	0.00752789	0.00552519	1.24E-05	1.25E-05	2.62E-05	0.02403453	0.05394241	0.00712355	3126962.24
34163648.3	792.161446	818.707955	1045.09545	774.490574	2.44E-05	2.49E-05	73.4259554	0.00758018	0.00556582	1.24E-05	1.25E-05	2.62E-05	0.02406377	0.05431709	0.00712917	3144881.8
34427928.2	792.161446	818.708875	1045.07512	774.48669	2.44E-05	2.50E-05	73.455236	0.00763246	0.00560644	1.24E-05	1.25E-05	2.62E-05	0.0240947	0.05469177	0.00713502	3166959.18
34692208	792.161446	818.708905	1045.05544	774.482803	2.44E-05	2.50E-05	73.4841181	0.00768475	0.00564707	1.25E-05	1.25E-05	2.62E-05	0.02412684	0.05506645	0.0071409	3189022.57
34956487.8	792.161446	818.709551	1045.03621	774.47887	2.45E-05	2.50E-05	73.5126098	0.00773704	0.0056877	1.25E-05	1.25E-05	2.62E-05	0.02415974	0.05544113	0.00714682	3211066.16
35220767.6	792.161446	818.706714	1045.01737	774.474869	2.45E-05	2.50E-05	73.540719	0.00778933	0.00572833	1.25E-05	1.25E-05	2.63E-05	0.02419324	0.05581581	0.00724817	3233088.13
35485047.4	792.161446	818.70043	1044.99998	774.5114	2.45E-05	2.50E-05	73.5684534	0.00784162	0.00576896	1.25E-05	1.25E-05	2.64E-05	0.02422615	0.0561905	0.00739463	3255246.23
35749327.2	792.161446	818.694553	1044.97949	774.507567	2.46E-05	2.50E-05	73.5958203	0.00789391	0.00580958	1.25E-05	1.25E-05	2.69E-05	0.02425983	0.05656518	0.00754674	3277211.85
36013607.1	792.161446	818.689175	1044.92458	774.503816	2.46E-05	2.50E-05	73.622827	0.00794619	0.00585021	1.25E-05	1.25E-05	2.74E-05	0.02429389	0.05693986	0.00770655	3299150.1
36277886.9	792.161446	818.684547	1044.82896	774.500127	2.46E-05	2.50E-05	73.6494807	0.00799848	0.00589084	1.25E-05	1.25E-05	2.79E-05	0.02432975	0.05731454	0.00787217	3321084.8
36542166.7	792.161446	818.680709	1044.71598	774.496325	2.47E-05	2.50E-05	73.6757881	0.00805077	0.00593147	1.25E-05	1.25E-05	2.84E-05	0.02436669	0.05768922	0.00804168	3343007.9
36806446.5	792.161446	818.67769	1044.60034	774.492388	2.47E-05	2.50E-05	73.701756	0.00810306	0.0059721	1.25E-05	1.25E-05	2.89E-05	0.0244041	0.0580639	0.00821455	3364920.71
37070726.3	792.161446	818.675556	1044.48591	774.488338	2.47E-05	2.50E-05	73.727391	0.00815535	0.00601272	1.25E-05	1.25E-05	2.94E-05	0.02444185	0.05843859	0.00839046	3386830.21
37335006.1	792.161446	818.67411	1044.3731	774.484152	2.48E-05	2.50E-05	73.7526993	0.00820764	0.00605335	1.25E-05	1.25E-05	3.00E-05	0.02447992	0.05881327	0.00856914	3408716.76
37599286	792.161446	818.673363	1044.26321	774.479848	2.48E-05	2.50E-05	73.7776872	0.00825992	0.00609398	1.25E-05	1.25E-05	3.05E-05	0.02451814	0.05918795	0.00875075	3430577.46
37929635.7	792.161446	818.673656	1044.13185	774.474618	2.48E-05	2.50E-05	73.8084806	0.00832528	0.00614477	1.25E-05	1.25E-05	3.12E-05	0.0245665	0.0596563	0.00898193	3452643.39
38342572.9	792.161446	818.67569	1043.97852	774.467867	2.49E-05	2.50E-05	73.8462991	0.00840699	0.00620825	1.25E-05	1.24E-05	3.21E-05	0.02462819	0.06024174	0.009277	3480121.62
38755510.2	792.161446	818.67938	1043.85552	774.46086	2.50E-05	2.50E-05	73.8833896	0.00848869	0.00627173	1.25E-05	1.24E-05	3.31E-05	0.02469021	0.06082718	0.00958112	3514040.64
39271681.7	792.161446	818.685741	1043.70521	774.452138	2.50E-05	2.50E-05	73.9287607	0.00859081	0.00635108	1.25E-05	1.24E-05	3.43E-05	0.02476913	0.06155898	0.00997162	3548245.21
39574695	791.593043	818.103286	1043.29055	774.009164	2.51E-05	2.50E-05	73.9548963	0.00865076	0.00639766	1.26E-05	1.24E-05	3.50E-05	0.02481101	0.06198858	0.01020039	3588129.47
39578295	792.643859	819.350508	1045.82895	774.935415	2.51E-05	2.50E-05	73.9552057	0.00865148	0.00639822	1.26E-05	1.24E-05	3.51E-05	0.02481825	0.0619937	0.01022983	3616463.52
39881308.3	792.643859	819.344551	1045.75592	774.929799	2.51E-05	2.50E-05	73.9811579	0.00871185	0.00644513	1.26E-05	1.24E-05	3.58E-05	0.02486301	0.06242633	0.01046903	3617535.43
40184321.7	792.643859	819.337762	1045.67221	774.924136	2.52E-05	2.50E-05	74.0067528	0.00877223	0.00649204	1.26E-05	1.24E-05	3.65E-05	0.02490916	0.06285895	0.01070931	3642627.4
40487335	792.643859	819.331466	1045.59701	774.91842	3.15E-05	2.50E-05	74.0319979	0.0088326	0.00653895	1.26E-05	1.24E-05	3.73E-05	0.02495326	0.06329158	0.01095217	3667696.92
40790348.3	792.643859	819.325718	1045.51582	774.913422	4.46E-05	2.50E-05	74.0569001	0.00889298	0.00658586	1.26E-05	1.24E-05	3.80E-05	0.02499825	0.06372421	0.01119746	3692792.37
41093361.7	792.643859	819.320651	1045.44636	774.908355	6.15E-05	2.50E-05	74.0814666	0.00895335	0.00663277	1.26E-05	1.24E-05	3.88E-05	0.02504266	0.06415683	0.01144502	3717864.17
41396375	792.643859	819.316379	1045.37728	774.903046	8.34E-05	2.50E-05	74.1057039	0.00901373	0.00667969	1.26E-05	1.24E-05	3.96E-05	0.02508584	0.06458946	0.01169474	3742928.61
41699388.3	792.643859	819.31303	1045.30604	774.897525	0.00011102	2.50E-05	74.1296187	0.0090741	0.0067266	1.26E-05	1.24E-05	4.03E-05	0.02513031	0.06502209	0.01194647	3768009.51
42002401.7	792.643859	820.742994	1045.23091	774.944852	0.00014554	2.50E-05	74.1532173	0.00913448	0.00677351	1.26E-05	1.24E-05	4.11E-05	0.02517427	0.06545472	0.01220008	3793360.87
42194062	793.426091	821.618239	1045.65926	775.5439	0.00017216	2.50E-05	74.1679834	0.00917267	0.00680318	1.26E-05	1.24E-05	4.16E-05	0.02520205	0.06572836	0.01236606	3820997.45
42197662	775.547815	800.14779	1002.55392	759.797226	0.00017216	2.50E-05	74.1682432	0.00917334	0.00680371	1.26E-05	1.24E-05	4.01E-05	0.02508516	0.06573319	0.01190698	3760017.57
42389322.3	775.547815	800.26691	1002.42951	759.794601	0.00017243	2.50E-05	74.1811534	0.009207	0.00682986	1.26E-05	1.24E-05	4.05E-05	0.02513342	0.06597436	0.01201912	3760866.52

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
42580982.7	775.547815	800.296822	1002.38575	759.792046	0.00017279	2.50E-05	74.1939696	0.00924065	0.00685601	1.26E-05	1.24E-05	4.09E-05	0.0251571	0.06621553	0.01215452	3774630.39
42772643	775.547815	800.134807	1002.38168	759.78873	0.00017328	2.50E-05	74.2066927	0.00927431	0.00688216	1.26E-05	1.24E-05	4.13E-05	0.02517283	0.06645669	0.01229145	3788291.86
43012218.5	775.547815	799.984823	1002.37785	759.784856	0.00017414	2.50E-05	74.2224673	0.00931638	0.00691485	1.26E-05	1.24E-05	4.18E-05	0.02518985	0.06675815	0.01246403	3801957.16
43311687.7	775.547815	799.738359	1002.36464	759.779651	0.00017573	2.50E-05	74.2419864	0.00936896	0.00695571	1.26E-05	1.24E-05	4.25E-05	0.0252167	0.06713497	0.01268173	3819105.14
43611157	775.547815	799.485643	1002.3416	759.774378	0.00017805	2.50E-05	74.2612876	0.00942155	0.00699657	1.26E-05	1.24E-05	4.32E-05	0.02524652	0.0675118	0.01290151	3840454.76
43820808	773.656685	797.41357	1001.19124	758.315586	0.00017983	2.50E-05	74.2746722	0.00945837	0.00702517	1.26E-05	1.24E-05	4.36E-05	0.02526082	0.0677756	0.01304585	3854496.26
43824408	796.925405	824.923329	1057.73744	778.842331	0.00019353	2.51E-05	74.2749215	0.00945905	0.00702571	1.26E-05	1.24E-05	4.57E-05	0.02540301	0.06778053	0.01366791	3971460.74
43895709	796.952581	824.740554	1057.73454	778.860827	0.00057956	2.51E-05	74.2802528	0.0094738	0.00703716	1.26E-05	1.24E-05	4.60E-05	0.02541892	0.0678862	0.01376149	3972131.87
43899309	796.541987	824.243174	1056.74606	778.498338	0.00059795	2.51E-05	74.2805212	0.00947455	0.00703774	1.26E-05	1.24E-05	4.59E-05	0.02541764	0.06789153	0.01375527	3976323.61
43903809	796.541987	824.226705	1056.74511	778.498137	0.00062091	2.51E-05	74.2808561	0.00947547	0.00703846	1.26E-05	1.24E-05	4.60E-05	0.02541953	0.06789818	0.01375927	3976654.05
43909434	796.541987	824.208363	1056.74394	778.497908	0.00064958	2.51E-05	74.2812748	0.00947663	0.00703936	1.26E-05	1.24E-05	4.60E-05	0.02542184	0.0679065	0.01376437	3977061.17
43916465.3	796.541987	824.187584	1056.74246	778.497635	0.00068673	2.51E-05	74.2817979	0.00947808	0.00704049	1.26E-05	1.24E-05	4.60E-05	0.02542464	0.06791689	0.0137708	3977566.99
43925254.3	796.541987	824.161496	1056.74056	778.497292	0.00073336	2.51E-05	74.2824516	0.0094799	0.0070419	1.27E-05	1.24E-05	4.60E-05	0.0254279	0.06792988	0.01377882	3978202.52
43936240.6	796.541987	824.161675	1056.73806	778.496891	0.00079168	2.51E-05	74.2832684	0.00948216	0.00704366	1.27E-05	1.24E-05	4.60E-05	0.02543172	0.06794612	0.01378885	3978988.82
43949973.6	796.541987	824.162224	1056.73469	778.496417	0.00086463	2.51E-05	74.2842888	0.009485	0.00704586	1.27E-05	1.24E-05	4.61E-05	0.025436	0.06796642	0.01380137	3979968.47
43967139.7	796.541987	824.162821	1056.72996	778.495857	0.0009559	2.51E-05	74.2855634	0.00948854	0.00704861	1.27E-05	1.24E-05	4.61E-05	0.02544082	0.06799179	0.01381701	3981186.79
43988597.4	796.541987	824.163417	1056.72323	778.495204	0.00107013	2.51E-05	74.2871554	0.00949296	0.00705205	1.27E-05	1.24E-05	4.62E-05	0.0254462	0.0680235	0.01383657	3982697.91
44015419.5	796.541987	824.164095	1056.71375	778.494418	0.00121315	2.51E-05	74.2891433	0.0094985	0.00705635	1.27E-05	1.24E-05	4.63E-05	0.02545231	0.06806315	0.01386106	3984583.5
44048947.1	796.541987	824.164768	1056.70094	778.493492	0.00139228	2.51E-05	74.2916249	0.00950541	0.00706172	1.27E-05	1.24E-05	4.64E-05	0.02545901	0.06811271	0.01389175	3986930.42
44090856.6	796.541987	824.165401	1056.6846	778.492398	0.00161659	2.51E-05	74.2947218	0.00951406	0.00706844	1.27E-05	1.24E-05	4.65E-05	0.02546615	0.06817465	0.01393023	3989850.39
44143243.5	796.541987	824.165662	1056.6649	778.491029	0.00189721	2.51E-05	74.2985851	0.00952486	0.00707684	1.27E-05	1.24E-05	4.66E-05	0.02547569	0.06825208	0.0139785	3993501.2
44208727.1	796.541987	824.165529	1056.64158	778.489337	0.00224725	2.51E-05	74.3034019	0.00953837	0.00708733	1.27E-05	1.24E-05	4.68E-05	0.02548735	0.06834887	0.01403906	3998064.98
44290581.6	796.541987	824.165487	1056.61419	778.487259	0.00268154	2.51E-05	74.3094037	0.00955525	0.00710045	1.27E-05	1.24E-05	4.70E-05	0.02550174	0.06846986	0.014115	4003769.03
44392899.8	795.27503	822.880061	1055.82698	777.508954	0.00315632	2.51E-05	74.3168762	0.00957636	0.00711685	1.27E-05	1.24E-05	4.73E-05	0.02551551	0.06862109	0.0142028	4006047.71
44401212	794.715373	822.312242	1055.49074	777.077686	0.00319289	2.51E-05	74.3174818	0.00957807	0.00711818	1.27E-05	1.24E-05	4.73E-05	0.02551537	0.06863338	0.01420736	4012474.35
44404812	788.198453	814.554418	1039.63074	771.319194	0.00319559	2.51E-05	74.3177384	0.0095788	0.00711875	1.27E-05	1.24E-05	4.68E-05	0.02547584	0.06863859	0.01404407	3984117.35
44413124.2	788.198453	814.554753	1039.62934	771.318831	0.00320167	2.51E-05	74.3183178	0.00958044	0.00712002	1.27E-05	1.24E-05	4.68E-05	0.02548212	0.06865034	0.01404557	3984462.82
44423514.5	788.198453	814.55525	1039.62708	771.318483	0.00320922	2.51E-05	74.3190417	0.00958249	0.00712162	1.27E-05	1.24E-05	4.68E-05	0.02548749	0.06866504	0.01405288	3985190.43
44436502.4	788.198453	814.555803	1039.62321	771.318076	0.00321867	2.51E-05	74.3199461	0.00958506	0.00712361	1.27E-05	1.24E-05	4.68E-05	0.02549322	0.06868342	0.01406356	3986092.01
44452737.2	788.198453	814.556346	1039.61676	771.317612	0.00323053	2.51E-05	74.3210761	0.00958826	0.0071261	1.27E-05	1.24E-05	4.69E-05	0.02549965	0.06870639	0.0140775	3987203.95
44473030.7	788.198453	814.556935	1039.60585	771.317071	0.00324543	2.51E-05	74.3224874	0.00959227	0.00712921	1.27E-05	1.24E-05	4.69E-05	0.02550591	0.0687351	0.01409513	3988587.92
44498397.6	788.198453	814.557369	1039.59013	771.316476	0.00326418	2.51E-05	74.3242499	0.00959728	0.0071331	1.27E-05	1.24E-05	4.70E-05	0.02551197	0.06877098	0.01411722	3990293.24
44530106.3	788.198453	814.55757	1039.57103	771.315804	0.0032878	2.51E-05	74.3264504	0.00960354	0.00713797	1.27E-05	1.24E-05	4.71E-05	0.02551753	0.06881584	0.01414488	3992401.2
44569742.1	788.198453	814.557407	1039.55111	771.315032	0.00331756	2.51E-05	74.3291971	0.00961136	0.00714405	1.27E-05	1.24E-05	4.72E-05	0.02552202	0.06887191	0.0141795	3995004.23
44619286.8	788.198453	814.556623	1039.53258	771.314164	0.00335507	2.51E-05	74.3326241	0.00962114	0.00715165	1.27E-05	1.24E-05	4.73E-05	0.02552467	0.06894201	0.01422283	3998214.04
44650995.5	788.198453	814.556175	1039.5228	771.313605	0.00337918	2.51E-05	74.3348137	0.0096274	0.00715651	1.27E-05	1.24E-05	4.74E-05	0.02552664	0.06898686	0.01425061	4002187.34
44682704.1	788.198453	814.555808	1039.51467	771.313035	0.00340336	2.51E-05	74.3370005	0.00963366	0.00716138	1.27E-05	1.24E-05	4.75E-05	0.02552889	0.06903172	0.01427839	4004751.39
44722339.9	788.198453	814.555415	1039.50631	771.312313	0.00343366	2.51E-05	74.33973	0.00964149	0.00716746	1.27E-05	1.24E-05	4.76E-05	0.02553227	0.0690878	0.01431313	4007330.39
44771884.7	788.198453	814.555033	1039.49768	771.311397	0.00347159	2.51E-05	74.3431356	0.00965127	0.00717506	1.27E-05	1.24E-05	4.77E-05	0.02553696	0.06915789	0.0143566	4010562.04
44833815.6	788.198453	814.554713	1039.48855	771.31023	0.00351907	2.51E-05	74.347383	0.0096635	0.00718456	1.27E-05	1.24E-05	4.79E-05	0.02554358	0.0692455	0.01441097	4014608.18
44911229.3	788.198453	814.554423	1039.47834	771.308763	0.00357861	2.51E-05	74.3526771	0.00967878	0.00719643	1.27E-05	1.24E-05	4.81E-05	0.02555218	0.06935502	0.01447898	4019673.65
45007996.4	788.198453	814.554171	1039.46609	771.306936	0.0036537	2.51E-05	74.3592713	0.00969789	0.00721128	1.27E-05	1.24E-05	4.84E-05	0.02556329	0.06949192	0.01456404	4026007.69
45128955.3	788.198453	814.554127	1039.45053	771.304639	0.00374944	2.51E-05	74.3674775	0.00972177	0.00722983	1.27E-05	1.24E-05	4.87E-05	0.0255782	0.06966304	0.01467041	4033936.81
45280153.9	788.198453	814.554343	1039.4298	771.301793	0.0038737	2.51E-05	74.3776789	0.00975162	0.00725303	1.27E-05	1.24E-05	4.91E-05	0.02559738	0.06987694	0.01480343	4043857.59
45431352.4	788.198453	814.5548	1039.4079	771.298981	0.00400396	2.51E-05	74.3878179	0.00978147	0.00727622	1.27E-05	1.24E-05	4.95E-05	0.02561737	0.07009085	0.01493654	4056181.6
45582551	788.198453	814.555284	1039.38486	771.296213	0.00414142	2.51E-05	74.3978953	0.00981132	0.00729942	1.27E-05	1.24E-05	4.99E-05	0.02563718	0.07030475	0.01506972	4068506.85

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
45733749.6	788.198453	814.556036	1039.36104	771.293489	0.00428707	2.51E-05	74.4079115	0.00984117	0.00732261	1.27E-05	1.24E-05	5.03E-05	0.02565712	0.07051865	0.01520301	4080839.18
45884948.2	788.198453	814.556891	1039.33669	771.290803	0.00444172	2.51E-05	74.4178671	0.00987102	0.0073458	1.27E-05	1.24E-05	5.07E-05	0.02567711	0.07073256	0.01533641	4093168.92
46036146.8	788.198453	814.557954	1039.31196	771.288164	0.00460605	2.51E-05	74.4277627	0.00990087	0.007369	1.27E-05	1.24E-05	5.11E-05	0.02569729	0.07094646	0.01546995	4105502.37
46187345.4	788.198453	814.55931	1039.28676	771.285578	0.00478062	2.51E-05	74.4375988	0.00993072	0.00739219	1.27E-05	1.24E-05	5.15E-05	0.02571815	0.07116036	0.01560362	4117846.56
46338544	788.198453	814.560923	1039.2609	771.283035	0.00496584	2.51E-05	74.447376	0.00996058	0.00741539	1.27E-05	1.24E-05	5.19E-05	0.02573953	0.07137427	0.01573744	4130199.67
46489742.6	788.198453	814.562415	1039.23468	771.280529	0.00516205	2.51E-05	74.4570947	0.00999043	0.00743858	1.27E-05	1.24E-05	5.24E-05	0.02576011	0.07158817	0.0158714	4142543.27
46640941.1	788.198453	814.564037	1039.2083	771.277304	0.00536944	2.51E-05	74.4667555	0.01002028	0.00746178	1.27E-05	1.24E-05	5.28E-05	0.02578082	0.07180207	0.0160055	4154885.73
46792139.7	788.198453	814.564738	1039.18173	771.273598	0.00558815	2.51E-05	74.476359	0.01005013	0.00748497	1.27E-05	1.24E-05	5.32E-05	0.02580207	0.07201597	0.01613974	4167233.73
46943338.3	788.198453	814.565363	1039.15538	771.270097	0.00581827	2.51E-05	74.4859055	0.01007998	0.00750816	1.27E-05	1.24E-05	5.36E-05	0.02582176	0.07222988	0.0162741	4179561.09
47094536.9	788.198453	814.566429	1039.1295	771.266694	0.00605986	2.51E-05	74.4953957	0.01010983	0.00753136	1.27E-05	1.24E-05	5.40E-05	0.02584147	0.07244378	0.01640858	4191887.22
47245735.5	788.198453	814.565372	1039.10414	771.263417	0.006313	2.51E-05	74.50483	0.01013968	0.00755455	1.27E-05	1.24E-05	5.44E-05	0.02586093	0.07265768	0.01654317	4204212.67
47385472	789.115457	815.491725	1039.62847	771.966445	0.00657925	2.51E-05	74.5134998	0.01016727	0.00757599	1.27E-05	1.24E-05	5.48E-05	0.0258824	0.07285537	0.01667308	4220243.93
47389072	786.135636	811.949614	1032.39071	769.337046	0.00658231	2.51E-05	74.5137203	0.01016797	0.00757654	1.27E-05	1.24E-05	5.46E-05	0.0258654	0.07286041	0.01660054	4217327.4
47528808.5	786.135636	811.946256	1032.36931	769.334042	0.00670673	2.51E-05	74.522167	0.010195	0.00759753	1.27E-05	1.24E-05	5.49E-05	0.02588652	0.07305408	0.01671702	4217921.97
47703479.1	786.135636	811.942553	1032.34201	769.330588	0.0068755	2.51E-05	74.5326626	0.01022878	0.00762378	1.27E-05	1.24E-05	5.54E-05	0.02590566	0.07329615	0.01686798	4229092.23
47878149.8	786.135636	811.939022	1032.3155	769.327088	0.007058	2.51E-05	74.5430891	0.01026257	0.00765003	1.27E-05	1.24E-05	5.59E-05	0.02592632	0.07353823	0.01701933	4242993.6
48052820.4	786.135636	811.935784	1032.28969	769.323567	0.00725466	2.51E-05	74.5534472	0.01029635	0.00767628	1.27E-05	1.24E-05	5.63E-05	0.02594777	0.07378031	0.01717091	4256905.61
48198548	787.622121	813.44014	1033.15663	770.465003	0.00745558	2.51E-05	74.562037	0.01032453	0.00769818	1.27E-05	1.24E-05	5.67E-05	0.02597045	0.07398228	0.01730631	4276888.44
48202148	644.15	644.173178	644.15362	644.150985	0.00745558	2.50E-05	74.5621428	0.01032488	0.00769845	1.26E-05	1.24E-05	4.68E-05	0.02444731	0.07398477	0.01435522	3585815.06
48205748	305	305.051372	305.006476	305.002172	0.00745558	2.46E-05	74.5621428	0.01032488	0.00769845	1.24E-05	1.23E-05	3.00E-05	0.02229807	0.07398477	0.00984811	1713096.81
48209348	305	305.051372	305.006476	305.002172	0.00745558	2.46E-05	74.5621428	0.01032488	0.00769845	1.24E-05	1.23E-05	3.00E-05	0.02229807	0.07398477	0.00984811	1713096.81
48210291.7	428.101999	434.55237	537.972754	424.311369	0.00745558	2.47E-05	74.5621499	0.01032491	0.00769847	1.25E-05	1.23E-05	3.52E-05	0.02339187	0.07398494	0.01124634	2382828.44
48210539.1	460.719893	469.211658	587.731971	455.832723	0.00745558	2.48E-05	74.5621541	0.01032492	0.00769848	1.25E-05	1.23E-05	3.66E-05	0.02364416	0.07398504	0.01161654	2558864.31
48210665.8	477.474612	486.876597	612.418898	472.002615	0.00745558	2.48E-05	74.5621567	0.01032493	0.00769849	1.25E-05	1.23E-05	3.74E-05	0.02376055	0.0739851	0.01182097	2648871.72
48210792.4	494.265014	504.513607	636.681527	488.197447	0.00745558	2.48E-05	74.5621595	0.01032494	0.0076985	1.25E-05	1.23E-05	3.85E-05	0.02388025	0.07398517	0.01214374	2738561.65
48210919.1	511.090063	522.059897	660.579604	504.41673	0.00745558	2.48E-05	74.5621625	0.01032495	0.0076985	1.25E-05	1.23E-05	3.96E-05	0.02399786	0.07398524	0.01246368	2828409.44
48211045.8	527.948602	539.655369	684.166792	520.661004	0.00745558	2.48E-05	74.5621658	0.01032496	0.00769851	1.25E-05	1.23E-05	4.07E-05	0.02411374	0.07398531	0.01278162	2918245.08
48211172.4	544.839355	557.296008	707.634978	536.930042	0.00745558	2.49E-05	74.5621693	0.01032497	0.00769852	1.26E-05	1.23E-05	4.18E-05	0.02422815	0.0739854	0.01309786	3008074.49
48211330.8	565.995987	579.406562	736.704743	557.300794	0.00745558	2.49E-05	74.5621741	0.01032499	0.00769853	1.26E-05	1.23E-05	4.32E-05	0.0243694	0.07398551	0.01349157	3120358.19
48211489.1	587.19788	601.579109	765.496897	577.709227	0.00745558	2.49E-05	74.5621793	0.010325	0.00769855	1.26E-05	1.23E-05	4.45E-05	0.02450919	0.07398563	0.01388341	3232654.94
48211647.4	608.441901	623.896087	794.067374	598.154599	0.00745558	2.49E-05	74.5621849	0.01032502	0.00769856	1.26E-05	1.23E-05	4.59E-05	0.02464759	0.07398577	0.01427462	3344953.28
48211805.7	629.724713	646.269364	822.457473	618.635992	0.00745558	2.49E-05	74.5621909	0.01032504	0.00769858	1.26E-05	1.23E-05	4.73E-05	0.02478453	0.07398591	0.01466673	3457257.61
48211964.1	651.042791	668.696258	850.699009	639.152344	0.00745558	2.50E-05	74.5621973	0.01032506	0.00769859	1.26E-05	1.23E-05	4.87E-05	0.02491925	0.07398606	0.01506476	3569562.28
48212122.4	672.392437	691.175787	878.827111	659.702424	0.00745558	2.50E-05	74.5622041	0.01032508	0.00769861	1.27E-05	1.23E-05	5.01E-05	0.02505051	0.07398622	0.01547189	3681863.47
48212280.7	693.769792	713.706486	906.871015	680.284825	0.00745558	2.50E-05	74.5622113	0.01032511	0.00769863	1.27E-05	1.23E-05	5.16E-05	0.02517708	0.07398639	0.01588934	3794157.03
48212478.6	720.524345	741.938901	941.845088	706.055837	0.00745558	2.50E-05	74.5622209	0.01032514	0.00769865	1.27E-05	1.24E-05	5.35E-05	0.02532666	0.07398661	0.01642901	3934490.14
48212676.6	747.307834	770.243526	976.78261	731.871362	0.00745558	2.51E-05	74.5622311	0.01032517	0.00769868	1.27E-05	1.24E-05	5.54E-05	0.02546625	0.07398685	0.0169814	4074770.99
48212874.5	774.111888	798.61424	1011.71033	757.727248	0.00745628	2.51E-05	74.5622419	0.01032521	0.00769871	1.27E-05	1.24E-05	5.73E-05	0.02559905	0.07398711	0.0175196	4214971.37
48212948	784.07371	809.169778	1024.68942	767.342609	0.00745825	2.51E-05	74.562246	0.01032522	0.00769872	1.27E-05	1.24E-05	5.80E-05	0.02564737	0.07398721	0.01771783	4267028.01
48213145.9	784.07371	809.174348	1024.69994	767.34683	0.00746427	2.51E-05	74.5622574	0.01032526	0.00769875	1.27E-05	1.24E-05	5.81E-05	0.0256353	0.07398747	0.01775164	4267045
48213393.3	784.07371	809.174374	1024.70285	767.346964	0.00747244	2.51E-05	74.5622716	0.01032531	0.00769878	1.27E-05	1.24E-05	5.82E-05	0.02562693	0.07398781	0.01777433	4267061.65
48213702.5	784.07371	809.174401	1024.7051	767.347065	0.00748327	2.51E-05	74.5622893	0.01032536	0.00769883	1.27E-05	1.24E-05	5.83E-05	0.02562038	0.07398823	0.01779172	4267084.76
48214089.1	784.07371	809.174426	1024.70695	767.347143	0.00749748	2.51E-05	74.5623115	0.01032544	0.00769888	1.27E-05	1.24E-05	5.83E-05	0.02561495	0.07398875	0.01780629	4267115.11
48214572.3	784.07371	809.174448	1024.70848	767.347214	0.00751601	2.51E-05	74.5623392	0.01032553	0.00769896	1.27E-05	1.24E-05	5.84E-05	0.02561029	0.0739894	0.01781942	4267143.47
48215176.3	784.07371	809.174466	1024.7097	767.347268	0.00753999	2.51E-05	74.5623738	0.01032564	0.00769904	1.27E-05	1.24E-05	5.84E-05	0.02560622	0.07399022	0.01783079	4267185.04
48215931.2	784.07371	809.174478	1024.71066	767.347316	0.00757096	2.51E-05	74.5624171	0.01032578	0.00769915	1.27E-05	1.24E-05	5.85E-05	0.02560262	0.07399124	0.01784163	4267232.93

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
48216874.9	784.07371	809.174482	1024.71134	767.347353	0.00761077	2.51E-05	74.5624712	0.01032596	0.00769929	1.27E-05	1.24E-05	5.85E-05	0.0255994	0.07399252	0.01785162	4267292.44
48218054.6	784.07371	809.174477	1024.71178	767.347376	0.00766158	2.51E-05	74.5625388	0.01032619	0.00769947	1.27E-05	1.24E-05	5.85E-05	0.02559656	0.07399411	0.01786037	4267370.32
48219529.2	784.07371	809.174464	1024.71196	767.34739	0.00772648	2.51E-05	74.5626233	0.01032646	0.00769968	1.27E-05	1.24E-05	5.86E-05	0.02559413	0.0739961	0.01786928	4267460.99
48221372.4	784.07371	809.174442	1024.7119	767.347391	0.0078088	2.51E-05	74.562729	0.01032681	0.00769995	1.27E-05	1.24E-05	5.86E-05	0.02559211	0.0739986	0.0178769	4267576.38
48223676.4	784.07371	809.174415	1024.71162	767.347374	0.00791274	2.51E-05	74.5628611	0.01032725	0.00770029	1.27E-05	1.24E-05	5.86E-05	0.02559058	0.07400171	0.01788371	4267720.73
48226556.4	784.07371	809.174381	1024.71114	767.347338	0.00804344	2.51E-05	74.5630261	0.01032779	0.00770071	1.27E-05	1.24E-05	5.86E-05	0.02558957	0.07400561	0.01788974	4267901.04
48230156.4	784.07371	809.174353	1024.71046	767.347282	0.00820713	2.51E-05	74.5632324	0.01032847	0.00770124	1.27E-05	1.24E-05	5.87E-05	0.02558912	0.07401047	0.01789523	4268125.88
48234656.4	784.07371	809.174323	1024.70961	767.3472	0.0084115	2.51E-05	74.5634902	0.01032932	0.0077019	1.27E-05	1.24E-05	5.87E-05	0.02558916	0.07401656	0.01790054	4268407.57
48240281.4	784.07371	809.174301	1024.70856	767.347091	0.00866596	2.51E-05	74.5638125	0.01033038	0.00770272	1.27E-05	1.24E-05	5.87E-05	0.02558966	0.07402416	0.01790615	4268759.34
48247312.6	784.07371	809.174292	1024.70728	767.346956	0.00898204	2.51E-05	74.5642151	0.01033171	0.00770376	1.27E-05	1.24E-05	5.87E-05	0.02559044	0.07403367	0.01791256	4269197.89
48256101.7	784.07371	809.17428	1024.7057	767.346788	0.0093737	2.51E-05	74.5647184	0.01033336	0.00770504	1.27E-05	1.24E-05	5.87E-05	0.02559159	0.07404555	0.01792025	4269745.66
48267088	784.07371	809.174277	1024.70376	767.346577	0.00985773	2.51E-05	74.5653472	0.01033544	0.00770665	1.27E-05	1.24E-05	5.88E-05	0.02559303	0.0740604	0.01792976	4270431.29
48280820.9	784.07371	809.174297	1024.70136	767.34631	0.0104541	2.51E-05	74.5661328	0.01033803	0.00770867	1.27E-05	1.24E-05	5.88E-05	0.02559493	0.07407897	0.01794169	4271289.69
48297987	784.07371	809.174313	1024.69839	767.345981	0.01118612	2.51E-05	74.5671143	0.01034127	0.00771118	1.27E-05	1.24E-05	5.88E-05	0.02559721	0.07410218	0.0179567	4272361.73
48319444.7	784.07371	809.174323	1024.69473	767.345575	0.01208048	2.51E-05	74.5683403	0.01034532	0.00771433	1.27E-05	1.24E-05	5.89E-05	0.02559995	0.07413119	0.01797562	4273700.88
48346266.8	784.07371	809.174326	1024.69022	767.345072	0.01316689	2.51E-05	74.5698715	0.01035038	0.00771826	1.27E-05	1.24E-05	5.90E-05	0.02560325	0.07416745	0.0179994	4275373.85
48379794.4	784.07371	809.174345	1024.6847	767.344442	0.01447732	2.51E-05	74.5717833	0.0103567	0.00772318	1.27E-05	1.24E-05	5.91E-05	0.02560729	0.07421278	0.0180293	4277465.02
48421703.9	784.07371	809.174359	1024.67797	767.343663	0.01604479	2.51E-05	74.5741698	0.01036461	0.00772932	1.27E-05	1.24E-05	5.92E-05	0.02561227	0.07426944	0.01806684	4280077.49
48474090.8	784.07371	809.174427	1024.66979	767.342694	0.01790053	2.51E-05	74.5771479	0.01037449	0.007737	1.27E-05	1.24E-05	5.93E-05	0.02561843	0.07434026	0.01811389	4283346.57
48539574.4	784.07371	809.174519	1024.65991	767.341488	0.02007159	2.51E-05	74.5808625	0.01038685	0.0077466	1.27E-05	1.24E-05	5.95E-05	0.02562633	0.0744288	0.01817283	4287430.54
48621429	784.07371	809.174536	1024.64796	767.340019	0.02257656	2.51E-05	74.5854933	0.01040229	0.0077586	1.27E-05	1.24E-05	5.97E-05	0.02563558	0.07453946	0.01824656	4292526.17
48703283.5	784.07371	809.174804	1024.63635	767.338542	0.02489553	2.51E-05	74.5901104	0.01041774	0.0077706	1.27E-05	1.24E-05	6.00E-05	0.02564561	0.07465013	0.01832031	4298871.46
48745193	784.07371	809.174861	1024.63047	767.337798	0.02603791	2.51E-05	74.592469	0.01042564	0.00777674	1.27E-05	1.24E-05	6.01E-05	0.02565004	0.07470679	0.01835808	4305131.73
48797579.9	784.07371	809.174822	1024.62325	767.336882	0.02739987	2.51E-05	74.5954123	0.01043553	0.00778442	1.27E-05	1.24E-05	6.02E-05	0.02565529	0.07477761	0.01840525	4308385.58
48863063.5	784.07371	809.174834	1024.61438	767.335736	0.02900758	2.51E-05	74.5990836	0.01044788	0.00779402	1.27E-05	1.24E-05	6.04E-05	0.02566256	0.07486614	0.01846417	4312455.2
48944918	784.07371	809.175236	1024.60351	767.334287	0.03088393	2.51E-05	74.6036605	0.01046332	0.00780602	1.27E-05	1.24E-05	6.06E-05	0.02567261	0.07497681	0.01853776	4317566.78
49026772.6	784.07371	809.175503	1024.59282	767.332865	0.03264102	2.51E-05	74.6082239	0.01047877	0.00781802	1.27E-05	1.24E-05	6.08E-05	0.02568206	0.07508747	0.01861129	4323908.97
49108627.1	784.07371	809.175806	1024.58227	767.331454	0.03429113	2.51E-05	74.6127739	0.01049421	0.00783002	1.27E-05	1.24E-05	6.11E-05	0.0256919	0.07519814	0.01868474	4330243.12
49210945.2	784.07371	809.176314	1024.56926	767.329707	0.03620589	2.51E-05	74.6184426	0.01051352	0.00784502	1.27E-05	1.24E-05	6.14E-05	0.0257041	0.07533647	0.01877641	4336627.79
49237767.3	784.07371	809.176454	1024.56584	767.329249	0.03669846	2.51E-05	74.6199252	0.01051858	0.00784895	1.28E-05	1.24E-05	6.14E-05	0.0257072	0.07537273	0.01880048	4344407.67
49264589.4	784.07371	809.176579	1024.56245	767.328794	0.03718182	2.51E-05	74.6214063	0.01052364	0.00785289	1.28E-05	1.24E-05	6.15E-05	0.0257103	0.07540899	0.0188245	4346484.57
49298117	784.07371	809.176726	1024.55821	767.328228	0.03777215	2.51E-05	74.6232558	0.01052996	0.0078578	1.28E-05	1.24E-05	6.16E-05	0.02571416	0.07545432	0.01885451	4348573.92
49340026.6	784.07371	809.176956	1024.55294	767.327521	0.03848942	2.51E-05	74.6255644	0.01053787	0.00786395	1.28E-05	1.24E-05	6.17E-05	0.02571915	0.07551098	0.01889199	4351184.01
49392413.4	784.07371	809.177231	1024.54638	767.326651	0.03935561	2.51E-05	74.6284454	0.01054776	0.00787163	1.28E-05	1.24E-05	6.18E-05	0.02572476	0.07558181	0.0189388	4354450.05
49444800.3	784.07371	809.177372	1024.53984	767.325793	0.04019339	2.51E-05	74.631321	0.01055764	0.00787931	1.28E-05	1.24E-05	6.20E-05	0.02573037	0.07565263	0.01898559	4358497.14
49510284	784.07371	809.177826	1024.5317	767.324725	0.04119925	2.51E-05	74.6349079	0.01056999	0.00788891	1.28E-05	1.24E-05	6.22E-05	0.02573828	0.07574117	0.01904401	4362579.57
49552193.5	784.07371	809.178137	1024.52651	767.324041	0.04182708	2.51E-05	74.6371991	0.0105779	0.00789505	1.28E-05	1.24E-05	6.23E-05	0.02574329	0.07579783	0.0190814	4367607.92
49594103	784.07371	809.178302	1024.52134	767.32337	0.04243972	2.51E-05	74.6394869	0.01058581	0.00790119	1.28E-05	1.24E-05	6.24E-05	0.02574774	0.07585449	0.01911876	4370846.77
49646489.9	784.07371	809.17859	1024.5149	767.322529	0.04318298	2.51E-05	74.6423418	0.01059569	0.00790887	1.28E-05	1.24E-05	6.25E-05	0.02575353	0.07592531	0.01916541	4374107.46
49711973.5	784.07371	809.178992	1024.5069	767.321484	0.04407922	2.51E-05	74.645903	0.01060805	0.00791847	1.28E-05	1.24E-05	6.27E-05	0.02576102	0.07601384	0.01922367	4378186.08
49793828	784.07371	809.179719	1024.49697	767.320185	0.04515243	2.51E-05	74.6503428	0.01062349	0.00793047	1.28E-05	1.24E-05	6.29E-05	0.02577104	0.07612451	0.01929643	4383291.88
49875682.6	784.07371	809.180337	1024.48708	767.318897	0.04618256	2.51E-05	74.6547698	0.01063893	0.00794247	1.28E-05	1.24E-05	6.32E-05	0.02578059	0.07623517	0.01936911	4389631.8
49957537.1	784.07371	809.180994	1024.47725	767.317613	0.04717314	2.51E-05	74.6591839	0.01065438	0.00795447	1.28E-05	1.24E-05	6.34E-05	0.02579031	0.07634584	0.01944172	4395969
50039391.6	784.07371	809.181631	1024.46745	767.316257	0.04812733	2.51E-05	74.6635853	0.01066982	0.00796647	1.28E-05	1.24E-05	6.36E-05	0.02579968	0.0764565	0.01951426	4402305.2
50121246.1	784.07371	809.182348	1024.45768	767.314395	0.04904796	2.51E-05	74.6679739	0.01068527	0.00797847	1.28E-05	1.24E-05	6.38E-05	0.02580943	0.07656717	0.01958673	4408641.41
50203100.6	784.07371	809.18305	1024.44793	767.312546	0.0499376	2.51E-05	74.6723498	0.01070071	0.00799047	1.28E-05	1.24E-05	6.41E-05	0.02581935	0.07667783	0.01965913	4414980.93

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
50284955.2	784.07371	809.183217	1024.4382	767.31071	0.05079857	2.51E-05	74.6767132	0.01071615	0.00800247	1.28E-05	1.24E-05	6.43E-05	0.02582941	0.0767885	0.01973146	4421323.04
50366809.7	784.07371	809.183278	1024.42848	767.308962	0.05163295	2.51E-05	74.681064	0.0107316	0.00801447	1.28E-05	1.24E-05	6.45E-05	0.02583831	0.07689916	0.01980373	4427653.66
50469127.8	784.07371	809.183634	1024.41636	767.306766	0.05263782	2.51E-05	74.6864849	0.0107509	0.00802947	1.28E-05	1.24E-05	6.48E-05	0.02585034	0.07703749	0.01989397	4434024
50597025.5	784.07371	809.184363	1024.40126	767.304055	0.05384035	2.51E-05	74.6932337	0.01077503	0.00804822	1.28E-05	1.24E-05	6.51E-05	0.02586546	0.07721041	0.02000662	4441992.03
50678880.1	784.07371	809.184745	1024.39162	767.302404	0.05458985	2.51E-05	74.6975371	0.01079048	0.00806022	1.28E-05	1.24E-05	6.53E-05	0.02587425	0.07732107	0.02007869	4451795.41
50760734.6	784.07371	809.185099	1024.38201	767.300821	0.05532042	2.52E-05	74.7018282	0.01080592	0.00807222	1.28E-05	1.24E-05	6.56E-05	0.02588255	0.07743174	0.02015069	4458112.01
50802644.1	784.07371	809.184736	1024.3771	767.300015	0.05568976	2.52E-05	74.7040205	0.01081383	0.00807836	1.28E-05	1.24E-05	6.57E-05	0.02588653	0.0774884	0.02018756	4464361.82
50844553.6	784.07371	809.183806	1024.37221	767.299205	0.0560545	2.52E-05	74.7062095	0.01082173	0.00808451	1.28E-05	1.24E-05	6.58E-05	0.02589071	0.07754506	0.0202244	4467592.62
50896940.5	784.07371	809.182642	1024.36613	767.298164	0.05650345	2.52E-05	74.7089414	0.01083162	0.00809219	1.28E-05	1.24E-05	6.59E-05	0.02589631	0.07761588	0.02027042	4470847.32
50923762.6	784.07371	809.182051	1024.36302	767.297632	0.05673157	2.52E-05	74.7103382	0.01083668	0.00809612	1.28E-05	1.24E-05	6.60E-05	0.0258993	0.07765214	0.02029399	4474851.27
50957290.2	784.07371	809.181319	1024.35915	767.296964	0.05701402	2.52E-05	74.7120824	0.01084301	0.00810103	1.28E-05	1.24E-05	6.61E-05	0.02590299	0.07769747	0.02032343	4476935.64
50999199.7	784.07371	809.180421	1024.35433	767.296132	0.05736298	2.52E-05	74.7142597	0.01085091	0.00810718	1.28E-05	1.24E-05	6.62E-05	0.0259077	0.07775413	0.02036022	4479538.26
51051586.6	784.07371	809.179306	1024.34835	767.295076	0.05779301	2.52E-05	74.7169769	0.0108608	0.00811486	1.28E-05	1.24E-05	6.64E-05	0.02591369	0.07782496	0.02040617	4482799.05
51103973.5	784.07371	809.178214	1024.34241	767.294012	0.05821715	2.52E-05	74.7196892	0.01087068	0.00812254	1.28E-05	1.24E-05	6.65E-05	0.02591979	0.07789578	0.02045212	4486855.38
51130795.6	784.07371	809.17766	1024.33938	767.29348	0.05843283	2.52E-05	74.7210759	0.01087574	0.00812647	1.28E-05	1.24E-05	6.66E-05	0.02592295	0.07793205	0.02047566	4490859.01
51164323.2	784.07371	809.176975	1024.3356	767.292793	0.05870012	2.52E-05	74.7228076	0.01088207	0.00813139	1.28E-05	1.24E-05	6.67E-05	0.02592699	0.07797738	0.02050505	4492950.05
51206232.7	784.07371	809.17614	1024.33091	767.291954	0.05903075	2.52E-05	74.7249693	0.01088997	0.00813753	1.28E-05	1.24E-05	6.68E-05	0.02593177	0.07803404	0.02054178	4495557.72
51233054.8	784.07371	809.175613	1024.32791	767.29141	0.05924096	2.52E-05	74.7263512	0.01089503	0.00814146	1.28E-05	1.24E-05	6.68E-05	0.02593505	0.0780703	0.02056529	4498774.52
51259876.9	784.07371	809.175094	1024.32493	767.290866	0.05944982	2.52E-05	74.7277318	0.01090009	0.00814539	1.28E-05	1.24E-05	6.69E-05	0.02593826	0.07810656	0.0205888	4500851.21
51293404.5	784.07371	809.174531	1024.3212	767.290221	0.05970879	2.52E-05	74.7294557	0.01090642	0.00815031	1.28E-05	1.24E-05	6.70E-05	0.02594163	0.07815189	0.02061816	4502930.72
51335314	784.07371	809.173842	1024.31657	767.289419	0.06002934	2.52E-05	74.7316078	0.01091433	0.00815645	1.28E-05	1.24E-05	6.71E-05	0.02594585	0.07820855	0.02065486	4505528.54
51387700.9	784.07371	809.172975	1024.3108	767.2884	0.06042527	2.52E-05	74.7342935	0.01092421	0.00816413	1.28E-05	1.24E-05	6.73E-05	0.02595119	0.07827938	0.02070071	4508783.26
51414523	784.07371	809.172526	1024.30785	767.287896	0.0606268	2.52E-05	74.7356667	0.01092927	0.00816806	1.28E-05	1.24E-05	6.73E-05	0.02595388	0.07831564	0.0207242	4512780.53
51448050.6	784.07371	809.171944	1024.30417	767.287255	0.06087685	2.52E-05	74.7373815	0.0109356	0.00817298	1.28E-05	1.24E-05	6.74E-05	0.02595722	0.07836097	0.02075354	4514857.9
51489960.2	784.07371	809.171227	1024.29959	767.286463	0.0611866	2.52E-05	74.7395221	0.01094351	0.00817912	1.28E-05	1.24E-05	6.75E-05	0.02596116	0.07841763	0.02079019	4517454.39
51542347.1	784.07371	809.170337	1024.29388	767.285465	0.06156956	2.52E-05	74.7421935	0.01095339	0.0081868	1.28E-05	1.24E-05	6.77E-05	0.02596653	0.07848845	0.02083601	4520701.46
51607830.7	784.07371	809.169264	1024.28678	767.284193	0.06204195	2.52E-05	74.7455261	0.01096574	0.0081964	1.28E-05	1.24E-05	6.79E-05	0.02597364	0.07857698	0.02089325	4524769.82
51673314.3	784.07371	809.168231	1024.27973	767.282921	0.06250838	2.52E-05	74.7488511	0.0109781	0.008206	1.28E-05	1.24E-05	6.80E-05	0.02598091	0.07866552	0.02095048	4529827.35
51755168.8	784.07371	809.167138	1024.27098	767.281332	0.06308259	2.52E-05	74.7529969	0.01099354	0.008218	1.28E-05	1.24E-05	6.83E-05	0.02599015	0.07877618	0.02102198	4534913.97
51857487	784.07371	809.16591	1024.26015	767.27936	0.06378757	2.52E-05	74.7581627	0.01101285	0.008233	1.28E-05	1.24E-05	6.85E-05	0.02600143	0.07891451	0.0211113	4541268.01
51985384.7	784.07371	809.164501	1024.24676	767.276882	0.0646506	2.52E-05	74.7645947	0.01103698	0.00825175	1.28E-05	1.24E-05	6.89E-05	0.02601598	0.07908743	0.0212229	4549218.25
52079977	784.07371	809.163551	1024.23692	767.27504	0.06527978	2.52E-05	74.7693336	0.01105483	0.00826562	1.28E-05	1.24E-05	6.91E-05	0.02602704	0.07921531	0.02130543	4559053.26
52083577	784.07371	809.16351	1024.23654	767.274971	0.06530372	2.52E-05	74.7695137	0.0110555	0.00826615	1.28E-05	1.24E-05	6.91E-05	0.02602747	0.07922018	0.02130862	4566211.14
52178169.3	784.07371	809.162616	1024.22677	767.273144	0.06592396	2.52E-05	74.7742367	0.01107335	0.00828001	1.28E-05	1.24E-05	6.94E-05	0.02603846	0.07934806	0.02139105	4566645.85
52272761.7	784.07371	809.161783	1024.21703	767.271322	0.06653619	2.52E-05	74.7789446	0.0110912	0.00829388	1.28E-05	1.24E-05	6.96E-05	0.02604971	0.07947595	0.02147349	4573960.7
52367354	784.07371	809.161035	1024.20732	767.269495	0.06714093	2.52E-05	74.7836374	0.01110905	0.00830775	1.28E-05	1.24E-05	6.99E-05	0.02606098	0.07960384	0.02155591	4581280.97
52461946.4	784.07371	809.160356	1024.19763	767.267671	0.06773869	2.52E-05	74.7883151	0.01112689	0.00832162	1.28E-05	1.24E-05	7.02E-05	0.02607223	0.07973172	0.02163829	4588603.27
52556538.7	784.07371	809.159498	1024.18794	767.265885	0.06841363	2.52E-05	74.7929778	0.01114474	0.00833548	1.28E-05	1.24E-05	7.04E-05	0.0260832	0.07985961	0.02172065	4595914.14
52674779.1	784.07371	809.157873	1024.17584	767.26369	0.06927034	2.52E-05	74.7987853	0.01116705	0.00835282	1.28E-05	1.24E-05	7.07E-05	0.02609582	0.08001947	0.02182355	4603253.84
52793019.5	784.07371	809.155912	1024.16376	767.261543	0.07012018	2.52E-05	74.8045696	0.01118936	0.00837015	1.28E-05	1.24E-05	7.10E-05	0.02610727	0.08017932	0.02192642	4612363.78
52911260	784.07371	809.153773	1024.15172	767.259437	0.07096372	2.52E-05	74.8103308	0.01121167	0.00838748	1.28E-05	1.24E-05	7.14E-05	0.02611808	0.08033918	0.02202926	4621454.28
53029500.4	784.07371	809.151764	1024.13976	767.257291	0.07180147	2.52E-05	74.8160692	0.01123398	0.00840482	1.28E-05	1.24E-05	7.17E-05	0.02612987	0.08049904	0.02213206	4630561.45
53177300.9	784.07371	809.148754	1024.12501	767.254613	0.07284041	2.52E-05	74.8232103	0.01126186	0.00842649	1.28E-05	1.24E-05	7.21E-05	0.02614488	0.08069886	0.0222605	4639712.89
53362051.6	784.07371	809.144687	1024.10691	767.251298	0.07412799	2.52E-05	74.832087	0.01129672	0.00845357	1.28E-05	1.24E-05	7.26E-05	0.02616279	0.08094864	0.02242097	4651141.74
53546802.2	784.07371	809.140573	1024.08916	767.247955	0.07540643	2.52E-05	74.840909	0.01133158	0.00848065	1.28E-05	1.24E-05	7.31E-05	0.02618304	0.08119841	0.02258139	4665389.31
53731552.9	784.07371	809.136517	1024.07173	767.244669	0.07667733	2.52E-05	74.849677	0.01136643	0.00850774	1.28E-05	1.24E-05	7.36E-05	0.02620283	0.08144819	0.02274175	4679632.28

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
53874489	785.999361	811.084169	1025.20964	768.724221	0.07794518	2.52E-05	74.8564237	0.0113934	0.00852869	1.28E-05	1.24E-05	7.40E-05	0.02622307	0.08164144	0.02287721	4702540.49
53878089	786.481015	811.653931	1026.36094	769.147462	0.07798661	2.52E-05	74.8565935	0.01139408	0.00852922	1.28E-05	1.24E-05	7.40E-05	0.02622611	0.08164631	0.02289246	4715890.28
54021025.1	786.481015	811.650813	1026.34753	769.144605	0.07962529	2.52E-05	74.8633301	0.01142114	0.00855025	1.29E-05	1.24E-05	7.44E-05	0.02624173	0.08184021	0.0230177	4716379.65
54163961.2	786.481015	811.647969	1026.33427	769.141779	0.08125508	2.52E-05	74.8700348	0.0114482	0.00857127	1.29E-05	1.24E-05	7.48E-05	0.0262577	0.0820341	0.02314228	4727467.86
54306897.3	786.481015	811.644794	1026.32113	769.139051	0.08287724	2.52E-05	74.8767079	0.01147526	0.0085923	1.29E-05	1.24E-05	7.52E-05	0.02627258	0.082228	0.0232668	4738539.06
54449833.4	786.481015	811.641612	1026.30811	769.136384	0.08449302	2.52E-05	74.8833496	0.01150232	0.00861332	1.29E-05	1.24E-05	7.56E-05	0.02628678	0.08242189	0.02339127	4749594.05
54592769.4	786.481015	811.638947	1026.2952	769.133668	0.08610353	2.52E-05	74.8899602	0.01152938	0.00863435	1.29E-05	1.24E-05	7.60E-05	0.02630237	0.08261579	0.02351569	4760680.72
54735705.5	786.481015	811.636373	1026.28239	769.131007	0.08770976	2.52E-05	74.8965397	0.01155643	0.00865537	1.29E-05	1.24E-05	7.63E-05	0.02631806	0.08280968	0.02364007	4771761.31
54808888.8	786.481015	811.634941	1026.27586	769.12968	0.0885314	2.52E-05	74.8998966	0.01157029	0.00866613	1.29E-05	1.24E-05	7.65E-05	0.02632516	0.08290896	0.02370379	4782732.01
54900367.9	786.481015	811.633203	1026.26773	769.128044	0.08955695	2.52E-05	74.9040813	0.01158761	0.00867959	1.29E-05	1.24E-05	7.68E-05	0.02633374	0.08303305	0.02378334	4788406.85
55014716.8	786.481015	811.631093	1026.25765	769.126029	0.09083698	2.52E-05	74.9092947	0.01160925	0.00869641	1.29E-05	1.24E-05	7.71E-05	0.02634395	0.08318816	0.02388276	4795488.47
55157652.9	786.481015	811.62847	1026.24515	769.123506	0.09243482	2.52E-05	74.9157842	0.01163631	0.00871743	1.29E-05	1.24E-05	7.75E-05	0.0263576	0.08338206	0.024007	4804352.85
55195122.7	786.481015	811.627413	1026.24186	769.122837	0.09285378	2.52E-05	74.9174803	0.01164341	0.00872295	1.29E-05	1.24E-05	7.76E-05	0.02636152	0.08343289	0.02403963	4815278.4
55232592.5	786.481015	811.626664	1026.2386	769.122173	0.0932726	2.52E-05	74.9191744	0.0116505	0.00872846	1.29E-05	1.24E-05	7.77E-05	0.02636549	0.08348372	0.02407219	4818176
55279429.8	786.481015	811.625893	1026.23453	769.121341	0.09379592	2.52E-05	74.9212892	0.01165937	0.00873535	1.29E-05	1.24E-05	7.78E-05	0.02637026	0.08354725	0.02411289	4821089.9
55337976.4	786.481015	811.624814	1026.22947	769.120314	0.09444981	2.52E-05	74.9239281	0.01167045	0.00874396	1.29E-05	1.24E-05	7.80E-05	0.0263765	0.08362667	0.02416375	4824728.64
55411159.7	786.481015	811.623272	1026.22318	769.11905	0.09526683	2.52E-05	74.9272197	0.0116843	0.00875472	1.29E-05	1.24E-05	7.82E-05	0.02638438	0.08372595	0.02422732	4829278.94
55484343	786.481015	811.622041	1026.21692	769.117798	0.09608366	2.52E-05	74.9305035	0.01169816	0.00876549	1.29E-05	1.23E-05	7.84E-05	0.02639243	0.08382522	0.02429089	4834948.6
55557526.3	786.481015	811.620609	1026.21069	769.116546	0.09690038	2.52E-05	74.9337795	0.01171201	0.00877625	1.29E-05	1.23E-05	7.86E-05	0.02640046	0.08392449	0.02435444	4840619.55
55630709.6	786.481015	811.619275	1026.20449	769.115308	0.09792934	2.52E-05	74.9370478	0.01172587	0.00878702	1.29E-05	1.23E-05	7.88E-05	0.02640858	0.08402377	0.02441799	4846290.18
55703892.8	786.481015	811.617948	1026.19833	769.114076	0.1000323	2.52E-05	74.9403084	0.01173972	0.00879778	1.29E-05	1.23E-05	7.90E-05	0.02641687	0.08412304	0.02448153	4851961.89
55795371.9	786.481015	811.616349	1026.19067	769.11255	0.10270146	2.52E-05	74.9443733	0.01175704	0.00881124	1.29E-05	1.23E-05	7.92E-05	0.02642702	0.08424713	0.02456092	4857658.96
55886851	786.481015	811.614803	1026.18306	769.111042	0.10541186	2.52E-05	74.9484263	0.01177436	0.00882469	1.29E-05	1.23E-05	7.95E-05	0.02643695	0.08437123	0.02464031	4864743.02
55978330.1	786.481015	811.613271	1026.17548	769.109554	0.10816388	2.52E-05	74.9524674	0.01179167	0.00883815	1.29E-05	1.23E-05	7.97E-05	0.02644646	0.08449532	0.02471969	4871820.89
56069809.2	786.481015	811.611607	1026.16794	769.108047	0.11095779	2.52E-05	74.9564966	0.01180899	0.00885161	1.29E-05	1.23E-05	7.99E-05	0.02645697	0.08461941	0.02479905	4878910.9
56161288.3	786.481015	811.610018	1026.16042	769.106381	0.11379371	2.52E-05	74.960514	0.01182631	0.00886506	1.29E-05	1.23E-05	8.02E-05	0.02646732	0.08474351	0.0248784	4885996.8
56252767.4	786.481015	811.60845	1026.15293	769.104708	0.11667164	2.52E-05	74.9645196	0.01184363	0.00887852	1.29E-05	1.23E-05	8.04E-05	0.02647778	0.0848676	0.02495773	4893090.25
56344246.5	786.481015	811.607009	1026.14547	769.103048	0.11959145	2.52E-05	74.9685136	0.01186094	0.00889197	1.29E-05	1.23E-05	8.07E-05	0.02648826	0.08499169	0.02503705	4900182.88
56435725.6	786.481015	811.605601	1026.13802	769.101396	0.1225529	2.52E-05	74.9724959	0.01187826	0.00890543	1.29E-05	1.23E-05	8.09E-05	0.02649875	0.08511578	0.02511635	4907277.37
56482562.9	786.481015	811.604939	1026.13421	769.100562	0.12408041	2.52E-05	74.9745304	0.01188713	0.00891232	1.29E-05	1.23E-05	8.11E-05	0.02650389	0.08517932	0.02515698	4914304.99
56529400.2	786.481015	811.603972	1026.13041	769.099725	0.12561874	2.52E-05	74.9765618	0.01189599	0.00891921	1.29E-05	1.23E-05	8.12E-05	0.02650909	0.08524286	0.02519758	4917932.23
56587946.8	786.481015	811.60321	1026.12566	769.09868	0.12755834	2.52E-05	74.9790968	0.01190708	0.00892782	1.29E-05	1.23E-05	8.13E-05	0.02651571	0.08532227	0.02524831	4921581.86
56661130.1	786.481015	811.602056	1026.11974	769.097376	0.13000863	2.53E-05	74.9822589	0.01192093	0.00893858	1.29E-05	1.23E-05	8.15E-05	0.02652404	0.08542155	0.02531171	4926141.28
56752609.2	786.481015	811.60067	1026.11234	769.095756	0.13311116	2.53E-05	74.9862013	0.01193825	0.00895204	1.29E-05	1.23E-05	8.18E-05	0.02653448	0.08554564	0.02539096	4931838.93
56844088.3	786.481015	811.599193	1026.10495	769.094119	0.13625296	2.53E-05	74.9901322	0.01195557	0.0089655	1.29E-05	1.23E-05	8.20E-05	0.02654552	0.08566973	0.0254702	4938942.85
56935567.4	786.481015	811.597997	1026.09757	769.092504	0.13943324	2.53E-05	74.9940518	0.01197288	0.00897895	1.29E-05	1.23E-05	8.23E-05	0.02655621	0.08579383	0.02554943	4946042.64
57027046.5	786.481015	811.596607	1026.09019	769.090917	0.14265113	2.53E-05	74.9979601	0.0119902	0.00899241	1.29E-05	1.23E-05	8.25E-05	0.02656687	0.08591792	0.02562864	4953135.78
57118525.6	786.481015	811.595492	1026.08281	769.089331	0.14590568	2.53E-05	75.001857	0.01200752	0.00900586	1.29E-05	1.23E-05	8.28E-05	0.02657732	0.08604201	0.02570785	4960235.98
57210004.7	786.481015	811.594132	1026.07544	769.087741	0.14949899	2.53E-05	75.0057428	0.01202484	0.00901932	1.29E-05	1.23E-05	8.30E-05	0.02658822	0.08616611	0.02578704	4967336.41
57301483.8	786.481015	811.591596	1026.06806	769.086163	0.15335983	2.53E-05	75.0096174	0.01204216	0.00903277	1.29E-05	1.23E-05	8.33E-05	0.0265987	0.0862902	0.02586621	4974429.32
57415832.6	786.481015	811.587727	1026.05885	769.084174	0.15825865	2.53E-05	75.0144449	0.0120638	0.00904959	1.29E-05	1.23E-05	8.36E-05	0.02661212	0.08644531	0.02596515	4981568.24
57530181.5	786.481015	811.58395	1026.04962	769.08219	0.16322767	2.53E-05	75.0192552	0.01208545	0.00906641	1.29E-05	1.23E-05	8.39E-05	0.02662565	0.08660043	0.02606408	4990445.63
57588728.1	786.481015	811.582293	1026.04489	769.081208	0.16579051	2.53E-05	75.0217114	0.01209653	0.00907503	1.29E-05	1.23E-05	8.40E-05	0.02663224	0.08667985	0.02611475	4999237.61
57661911.4	786.481015	811.580098	1026.03899	769.079986	0.16902098	2.53E-05	75.0247754	0.01211039	0.00908579	1.29E-05	1.23E-05	8.42E-05	0.02664022	0.08677912	0.02617804	5003799.18
57735094.7	786.481015	811.577543	1026.03308	769.078767	0.17227774	2.53E-05	75.0278323	0.01212424	0.00909656	1.29E-05	1.23E-05	8.44E-05	0.0266488	0.0868784	0.02624133	5009472.16
57826573.8	786.481015	811.575062	1026.02569	769.077243	0.1763877	2.53E-05	75.0316436	0.01214156	0.00911001	1.29E-05	1.23E-05	8.47E-05	0.02665933	0.08700249	0.02632042	5015180.58

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
57873411.1	786.481015	811.573311	1026.0219	769.076456	0.17850258	2.53E-05	75.0335908	0.01215043	0.0091169	1.29E-05	1.23E-05	8.48E-05	0.02666483	0.08706603	0.02636094	5022220.5
57920248.4	786.481015	811.571871	1026.01811	769.075675	0.18062732	2.53E-05	75.0355352	0.01215929	0.00912379	1.29E-05	1.23E-05	8.49E-05	0.02667035	0.08712956	0.02640143	5025857.53
57978795	786.481015	811.57016	1026.01338	769.074702	0.18329804	2.53E-05	75.0379617	0.01217038	0.0091324	1.29E-05	1.23E-05	8.51E-05	0.02667716	0.08720898	0.02645203	5029510.7
58051978.3	786.481015	811.567844	1026.00746	769.073495	0.18665875	2.53E-05	75.0409886	0.01218423	0.00914317	1.29E-05	1.23E-05	8.53E-05	0.0266856	0.08730826	0.02651527	5034075.58
58143457.4	786.481015	811.565423	1026.00005	769.072004	0.19089296	2.53E-05	75.0447625	0.01220155	0.00915662	1.29E-05	1.23E-05	8.55E-05	0.02669624	0.08743235	0.02659431	5039785.32
58234936.5	786.481015	811.562713	1025.99264	769.070511	0.19515938	2.53E-05	75.0485257	0.01221886	0.00917008	1.29E-05	1.23E-05	8.58E-05	0.02670694	0.08755644	0.02667335	5046889.28
58326415.6	786.481015	811.560059	1025.98523	769.069018	0.19945648	2.53E-05	75.0522783	0.01223618	0.00918353	1.29E-05	1.23E-05	8.60E-05	0.02671761	0.08768053	0.02675237	5053993.49
58373252.9	786.481015	811.558439	1025.98143	769.068253	0.20166494	2.53E-05	75.0541955	0.01224505	0.00919042	1.29E-05	1.23E-05	8.61E-05	0.02672307	0.08774407	0.02679285	5061031.85
58431799.5	786.481015	811.556787	1025.97669	769.067298	0.20443718	2.53E-05	75.0565881	0.01225613	0.00919903	1.29E-05	1.23E-05	8.63E-05	0.02672989	0.08782349	0.02684341	5064686.43
58504982.8	786.481015	811.554467	1025.97076	769.066104	0.20791997	2.53E-05	75.0595728	0.01226999	0.0092098	1.29E-05	1.23E-05	8.65E-05	0.02673835	0.08792276	0.02690659	5069252.28
58596461.8	786.481015	811.551317	1025.96335	769.064599	0.21229943	2.53E-05	75.0632942	0.0122873	0.00922326	1.29E-05	1.23E-05	8.67E-05	0.02674954	0.08804686	0.02698556	5074973.96
58687940.9	786.481015	811.548351	1025.95593	769.063098	0.21670385	2.53E-05	75.0670052	0.01230462	0.00923671	1.29E-05	1.23E-05	8.70E-05	0.02676043	0.08817095	0.02706453	5082084.64
58779420	786.481015	811.545274	1025.9485	769.061598	0.22113179	2.53E-05	75.0707057	0.01232194	0.00925017	1.29E-05	1.23E-05	8.72E-05	0.02677132	0.08829504	0.02714348	5089186.82
58870899.1	786.481015	811.542171	1025.94108	769.060089	0.22558183	2.53E-05	75.0743958	0.01233926	0.00926362	1.30E-05	1.23E-05	8.75E-05	0.02678219	0.08841913	0.02722241	5096300.81
58962378.2	786.481015	811.539383	1025.93365	769.058586	0.23005248	2.53E-05	75.0780756	0.01235658	0.00927708	1.30E-05	1.23E-05	8.77E-05	0.02679273	0.08854323	0.02730133	5103401.33
59076727.1	786.481015	811.535621	1025.92436	769.056731	0.23566963	2.53E-05	75.0826608	0.01237822	0.0092939	1.30E-05	1.23E-05	8.80E-05	0.02680613	0.08869834	0.02739995	5110543.35
59191076	786.481015	811.531742	1025.91509	769.055026	0.24131353	2.53E-05	75.08723	0.01239987	0.00931072	1.30E-05	1.23E-05	8.83E-05	0.02681973	0.08885346	0.02749856	5119433.51
59305424.8	786.481015	811.52812	1025.90585	769.053344	0.24698148	2.53E-05	75.0917833	0.01242152	0.00932754	1.30E-05	1.23E-05	8.86E-05	0.0268333	0.08900857	0.02759714	5128326.77
59419773.7	786.481015	811.524686	1025.8966	769.051682	0.25267087	2.53E-05	75.0963208	0.01244316	0.00934436	1.30E-05	1.23E-05	8.90E-05	0.02684628	0.08916369	0.02769569	5137203.12
59478320.3	786.481015	811.522675	1025.89185	769.050848	0.2555899	2.53E-05	75.0986378	0.01245425	0.00935297	1.30E-05	1.23E-05	8.91E-05	0.02685316	0.08924311	0.02774618	5146009.75
59551503.6	786.481015	811.5203	1025.88593	769.049811	0.2592459	2.53E-05	75.1015284	0.0124681	0.00936373	1.30E-05	1.23E-05	8.93E-05	0.02686159	0.08934238	0.02780923	5150579.92
59642982.7	786.481015	811.517588	1025.87853	769.048528	0.26382603	2.53E-05	75.1051325	0.01248542	0.00937719	1.30E-05	1.23E-05	8.96E-05	0.02687217	0.08946648	0.02788802	5156299.01
59689820	786.481015	811.515969	1025.87473	769.047883	0.26617419	2.53E-05	75.106974	0.01249429	0.00938408	1.30E-05	1.23E-05	8.97E-05	0.02687792	0.08953001	0.02792839	5163345.2
59736657.3	786.481015	811.655446	1025.87093	769.118448	0.26852485	2.53E-05	75.1088128	0.01250315	0.00939097	1.30E-05	1.23E-05	8.98E-05	0.02688357	0.08959355	0.02796874	5167455.42
59795203.9	786.481015	811.648843	1025.86619	769.117473	0.27146652	2.53E-05	75.1111077	0.01251424	0.00939958	1.30E-05	1.23E-05	9.00E-05	0.0268903	0.08967297	0.02801915	5171110.61
59868387.2	786.481015	811.635139	1025.86026	769.11622	0.27514833	2.53E-05	75.1139707	0.01252809	0.00941035	1.30E-05	1.23E-05	9.02E-05	0.02689909	0.08977224	0.02808215	5175689.25
59959866.3	786.481015	811.619341	1025.85284	769.114662	0.27975715	2.53E-05	75.1175404	0.01254541	0.0094238	1.30E-05	1.23E-05	9.04E-05	0.02691	0.08989633	0.02816089	5181405.75
60006703.6	786.481015	811.611335	1025.84904	769.113858	0.28211908	2.53E-05	75.1193643	0.01255427	0.00943069	1.30E-05	1.23E-05	9.05E-05	0.02691581	0.08995987	0.02820123	5188455.85
60053540.9	786.481015	811.604318	1025.84524	769.113068	0.28448257	2.53E-05	75.1211856	0.01256314	0.00943758	1.30E-05	1.23E-05	9.07E-05	0.0269212	0.09002341	0.02824154	5192094.7
60112087.5	786.481015	811.595499	1025.8405	769.112072	0.28743894	2.53E-05	75.1234587	0.01257422	0.00944619	1.30E-05	1.23E-05	9.08E-05	0.02692819	0.09010282	0.02829192	5195758.74
60185270.8	786.481015	811.585591	1025.83456	769.110839	0.29113717	2.53E-05	75.1262944	0.01258808	0.00945696	1.30E-05	1.23E-05	9.10E-05	0.02693678	0.0902021	0.02835488	5200331.62
60276749.9	786.481015	811.573716	1025.82715	769.109294	0.29576354	2.53E-05	75.1298302	0.0126054	0.00947041	1.30E-05	1.23E-05	9.13E-05	0.02694789	0.09032619	0.02843356	5206051.42
60368229	786.481015	811.562868	1025.81973	769.10775	0.30039312	2.53E-05	75.1333563	0.01262271	0.00948387	1.30E-05	1.23E-05	9.15E-05	0.0269589	0.09045028	0.02851223	5213172.53
60459708.1	786.481015	811.553184	1025.81231	769.106212	0.30502508	2.53E-05	75.1368728	0.01264003	0.00949732	1.30E-05	1.23E-05	9.17E-05	0.0269699	0.09057438	0.02859089	5220290.85
60551187.2	786.481015	811.545269	1025.80488	769.104696	0.31003869	2.53E-05	75.1403796	0.01265735	0.00951078	1.30E-05	1.23E-05	9.20E-05	0.02698029	0.09069847	0.02866954	5227396.34
60642666.3	786.481015	811.537795	1025.79746	769.103176	0.31511973	2.53E-05	75.1438769	0.01267467	0.00952424	1.30E-05	1.23E-05	9.22E-05	0.02699105	0.09082256	0.02874816	5234509.57
60734145.4	786.481015	811.531011	1025.79003	769.101647	0.32020343	2.53E-05	75.1473646	0.01269198	0.00953769	1.30E-05	1.23E-05	9.25E-05	0.02700232	0.09094666	0.02882677	5241631.55
60825624.5	786.481015	811.525331	1025.7826	769.100128	0.32528878	2.53E-05	75.1508428	0.0127093	0.00955115	1.30E-05	1.23E-05	9.27E-05	0.02701337	0.09107075	0.02890536	5248750.64
60917103.6	786.481015	811.52081	1025.77517	769.098647	0.33037486	2.53E-05	75.1543116	0.01272662	0.0095646	1.30E-05	1.23E-05	9.30E-05	0.02702381	0.09119484	0.02898394	5255859.23
61008582.7	786.481015	811.516977	1025.76774	769.097172	0.33546077	2.53E-05	75.1577709	0.01274394	0.00957806	1.30E-05	1.23E-05	9.32E-05	0.02703453	0.09131893	0.0290625	5262976.42
61100061.7	786.481015	811.513988	1025.7603	769.095703	0.3405457	2.53E-05	75.1612208	0.01276125	0.00959151	1.30E-05	1.23E-05	9.35E-05	0.02704528	0.09144303	0.02914104	5270094.14
61191540.8	786.481015	811.511815	1025.75287	769.094239	0.34562891	2.53E-05	75.1646614	0.01277857	0.00960497	1.30E-05	1.23E-05	9.37E-05	0.02705633	0.09156712	0.02921956	5277210.57
61283019.9	786.481015	811.510459	1025.74543	769.092776	0.35070974	2.53E-05	75.1680927	0.01279589	0.00961843	1.30E-05	1.23E-05	9.40E-05	0.02706713	0.09169121	0.02929807	5284326.22
61374499	786.481015	811.509897	1025.73799	769.091313	0.3557876	2.53E-05	75.1715147	0.01281321	0.00963188	1.30E-05	1.23E-05	9.42E-05	0.02707798	0.09181531	0.02937656	5291444.43
61465978.1	786.481015	811.510155	1025.73056	769.089849	0.36102067	2.53E-05	75.1749274	0.01283052	0.00964534	1.30E-05	1.23E-05	9.44E-05	0.02708882	0.0919394	0.02945503	5298566.84
61557457.2	786.481015	811.511135	1025.72312	769.088393	0.36650371	2.53E-05	75.178331	0.01284784	0.00965879	1.30E-05	1.23E-05	9.47E-05	0.02709973	0.09206349	0.02953348	5305682.17

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
61648936.3	786.481015	811.513134	1025.71568	769.086935	0.37198501	2.53E-05	75.1817254	0.01286516	0.00967225	1.30E-05	1.23E-05	9.49E-05	0.02711093	0.09218758	0.02961192	5312811.12
61740415.4	786.481015	811.515577	1025.70825	769.085492	0.37746397	2.53E-05	75.1851107	0.01288248	0.00968571	1.30E-05	1.23E-05	9.52E-05	0.02712174	0.09231168	0.02969033	5319929.33
61831894.5	786.481015	811.519072	1025.70081	769.084051	0.38293998	2.53E-05	75.1884868	0.0128998	0.00969916	1.30E-05	1.23E-05	9.54E-05	0.02713295	0.09243577	0.02976873	5327050.72
61923373.6	786.481015	811.522923	1025.69337	769.082616	0.38841239	2.53E-05	75.191854	0.01291711	0.00971262	1.30E-05	1.23E-05	9.57E-05	0.02714358	0.09255986	0.02984712	5334168.07
62014852.7	786.481015	811.527764	1025.68594	769.081178	0.39388067	2.53E-05	75.1952121	0.01293443	0.00972607	1.30E-05	1.23E-05	9.59E-05	0.02715448	0.09268395	0.02992548	5341291.34
62106331.8	786.782841	811.83972	1025.85866	769.312052	0.39956671	2.53E-05	75.1985612	0.01295175	0.00973953	1.30E-05	1.23E-05	9.62E-05	0.02716598	0.09280805	0.03000565	5349961.42
62125235	786.884213	811.94417	1025.91762	769.38977	0.40075784	2.53E-05	75.1992521	0.01295533	0.00974231	1.30E-05	1.23E-05	9.62E-05	0.02716862	0.09283369	0.03002249	5357497.5
62128835	780.31567	804.184104	1010.22864	763.622501	0.40079059	2.53E-05	75.1993807	0.01295599	0.00974283	1.30E-05	1.23E-05	9.57E-05	0.0271333	0.09283846	0.02985988	5320021.15
62147738.2	780.31567	804.189	1010.22726	763.622111	0.40095824	2.53E-05	75.2000397	0.01295941	0.00974548	1.30E-05	1.23E-05	9.57E-05	0.02714349	0.09286294	0.02986681	5320384.45
62171367.2	780.31567	804.195672	1010.22557	763.621741	0.40116853	2.53E-05	75.200863	0.01296368	0.0097488	1.30E-05	1.23E-05	9.58E-05	0.02715171	0.09289353	0.02988409	5321881.05
62200903.4	780.31567	804.202021	1010.22347	763.621313	0.40143446	2.53E-05	75.2018914	0.01296901	0.00975294	1.30E-05	1.23E-05	9.58E-05	0.02715906	0.09293177	0.02990749	5323700.59
62237823.7	780.723644	804.622429	1010.46462	763.934702	0.40179121	2.53E-05	75.2031756	0.01297568	0.00975813	1.30E-05	1.23E-05	9.59E-05	0.02716697	0.09297957	0.02993949	5328051.64
62256058	780.752132	804.653545	1010.48035	763.956361	0.40196947	2.53E-05	75.2038094	0.01297898	0.00976069	1.30E-05	1.23E-05	9.60E-05	0.02716966	0.09300317	0.0299543	5330911.66
62259658	784.014229	808.50624	1018.26468	766.819148	0.40206209	2.53E-05	75.203936	0.01297964	0.0097612	1.30E-05	1.23E-05	9.63E-05	0.02718787	0.09300789	0.03003976	5351580.78
62277892.3	784.014229	808.506738	1018.26328	766.818943	0.40254084	2.53E-05	75.2045843	0.01298301	0.00976382	1.30E-05	1.23E-05	9.63E-05	0.0271871	0.09303206	0.03005892	5351857.46
62300685.1	784.014229	808.507221	1018.26152	766.818624	0.40314343	2.53E-05	75.2053943	0.01298723	0.00976709	1.30E-05	1.23E-05	9.64E-05	0.02718819	0.09306226	0.03007846	5353226.82
62329176.1	784.014229	808.507963	1018.25933	766.818218	0.40390081	2.53E-05	75.2064061	0.01299249	0.00977119	1.30E-05	1.23E-05	9.65E-05	0.02718999	0.09310002	0.03010217	5354939.46
62364789.9	784.014229	808.509105	1018.25661	766.817708	0.40485332	2.53E-05	75.2076696	0.01299908	0.00977631	1.30E-05	1.23E-05	9.65E-05	0.02719249	0.09314722	0.0301317	5357084.4
62409307.2	784.014229	808.510802	1018.25319	766.817066	0.40605234	2.53E-05	75.2092472	0.01300732	0.0097827	1.30E-05	1.23E-05	9.67E-05	0.02719588	0.09320622	0.0301686	5359766.26
62464953.8	784.014229	808.513912	1018.24891	766.816261	0.4075629	2.53E-05	75.2112164	0.01301761	0.0097907	1.30E-05	1.23E-05	9.68E-05	0.02720067	0.09327997	0.03021473	5363134.05
62534512	784.014229	808.518339	1018.24352	766.815254	0.40946688	2.53E-05	75.2136736	0.01303047	0.0098007	1.30E-05	1.23E-05	9.70E-05	0.02720699	0.09337215	0.03027239	5367344.12
62620357	783.521737	808.024409	1017.94268	766.435016	0.41168631	2.53E-05	75.2166994	0.01304635	0.00981303	1.30E-05	1.23E-05	9.72E-05	0.02721398	0.09348592	0.03034057	5370061.52
62623957	784.261754	808.899083	1019.70956	767.084692	0.41180203	2.53E-05	75.2168264	0.01304702	0.00981355	1.30E-05	1.23E-05	9.73E-05	0.02721833	0.09349071	0.03036224	5380854.95
62709802	784.261754	808.906394	1019.70273	767.083441	0.41458465	2.54E-05	75.2198604	0.01306298	0.00982595	1.30E-05	1.23E-05	9.75E-05	0.02722643	0.09360507	0.03043501	5381228.32
62817108.3	784.261754	808.917975	1019.69413	767.081853	0.41807818	2.54E-05	75.2236425	0.01308293	0.00984145	1.30E-05	1.23E-05	9.78E-05	0.02723836	0.09374803	0.03052466	5387799.08
62951241.1	784.261754	808.934035	1019.68335	767.079862	0.42247039	2.54E-05	75.2283539	0.01310787	0.00986083	1.30E-05	1.23E-05	9.81E-05	0.02725337	0.09392673	0.03063665	5396017.99
63085374	784.261754	808.951119	1019.67257	767.077881	0.42689482	2.54E-05	75.2330474	0.0131328	0.00988021	1.30E-05	1.23E-05	9.85E-05	0.02726839	0.09410544	0.03074864	5406236.19
63219506.8	784.261754	808.970642	1019.66183	767.075895	0.43135874	2.54E-05	75.2377231	0.01315774	0.00989959	1.30E-05	1.23E-05	9.88E-05	0.02728391	0.09428414	0.03086062	5416461.16
63353639.6	784.261754	808.991086	1019.65114	767.0739	0.4358688	2.54E-05	75.2423811	0.01318268	0.00991896	1.30E-05	1.23E-05	9.92E-05	0.02729891	0.09446284	0.03097259	5426689.07
63487772.5	784.261754	809.013229	1019.64051	767.071912	0.44043041	2.54E-05	75.2470215	0.01320762	0.00993834	1.30E-05	1.23E-05	9.95E-05	0.02731408	0.09464154	0.03108454	5436914.12
63621905.3	784.261754	809.03816	1019.62994	767.069925	0.44504743	2.54E-05	75.2516444	0.01323256	0.00995772	1.30E-05	1.23E-05	9.99E-05	0.02732971	0.09482024	0.03119649	5447147.74
63756038.1	784.261754	809.063821	1019.61943	767.067938	0.44972216	2.54E-05	75.25625	0.0132575	0.00997709	1.31E-05	1.23E-05	0.00010024	0.02734504	0.09499894	0.03130842	5457380.94
63890171	784.261754	809.089062	1019.60896	767.065942	0.45445572	2.54E-05	75.2608382	0.01328243	0.00999647	1.31E-05	1.23E-05	0.00010059	0.02736034	0.09517764	0.03142034	5467607.34
64024303.8	784.261754	809.115821	1019.59853	767.063943	0.45924814	2.54E-05	75.2654093	0.01330737	0.01001585	1.31E-05	1.23E-05	0.00010094	0.02737561	0.09535634	0.03153224	5477838.41
64158436.6	784.261754	809.145527	1019.58814	767.061941	0.46409861	2.54E-05	75.2699632	0.01333231	0.01003523	1.31E-05	1.23E-05	0.0001013	0.02739143	0.09553504	0.03164412	5488079.55
64292569.5	784.261754	809.176193	1019.57778	767.059948	0.46900574	2.54E-05	75.2745002	0.01335725	0.0100546	1.31E-05	1.23E-05	0.00010165	0.02740697	0.09571374	0.03175599	5498312.8
64460235.5	784.261754	809.215816	1019.56486	767.057449	0.47522312	2.54E-05	75.2801476	0.01338842	0.01007882	1.31E-05	1.23E-05	0.00010209	0.02742595	0.09593711	0.03189578	5508599.18
64516928	782.474049	807.413382	1018.49294	765.680771	0.47687687	2.54E-05	75.2820512	0.01339896	0.01008701	1.31E-05	1.23E-05	0.0001022	0.02742833	0.09601264	0.03193229	5511696.59
64520528	781.616134	806.398784	1016.42444	764.926481	0.47695827	2.54E-05	75.2821716	0.01339963	0.01008753	1.31E-05	1.23E-05	0.00010214	0.02742458	0.09601742	0.0319138	5510683.92
64577220.5	781.616134	806.412465	1016.42013	764.925641	0.47824226	2.54E-05	75.2840604	0.01341011	0.01009567	1.31E-05	1.23E-05	0.00010228	0.02743158	0.09609249	0.03195888	5511035.54
64648086.1	781.616134	806.403011	1016.4148	764.924491	0.47986526	2.54E-05	75.2864172	0.0134232	0.01010585	1.31E-05	1.23E-05	0.00010246	0.02743848	0.09618632	0.03201725	5515321.48
64736668.1	781.616134	806.379685	1016.40814	764.922978	0.48192313	2.54E-05	75.2893567	0.01343957	0.01011856	1.31E-05	1.23E-05	0.00010269	0.02744755	0.09630361	0.03209037	5520689.07
64766586	782.095695	806.859665	1016.69226	765.291545	0.48266967	2.54E-05	75.2903479	0.0134451	0.01012286	1.31E-05	1.23E-05	0.00010278	0.02745193	0.09634322	0.03211799	5529860.28
64770186	780.46995	804.929584	1012.77861	763.862886	0.48272476	2.54E-05	75.2904664	0.01344576	0.01012337	1.31E-05	1.23E-05	0.00010265	0.02744411	0.09634796	0.03207978	5522106.25
64800103.9	780.46995	804.91658	1012.77642	763.862283	0.48318161	2.54E-05	75.2914451	0.01345122	0.01012762	1.31E-05	1.23E-05	0.00010272	0.02745096	0.09638711	0.03210167	5522444.32
64837501.2	780.46995	804.908519	1012.77367	763.861667	0.4837573	2.54E-05	75.2926674	0.01345805	0.01013293	1.31E-05	1.23E-05	0.00010281	0.02745464	0.09643605	0.03213167	5524683.37

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
64884247.9	780.46995	804.900941	1012.77024	763.860938	0.4844854	2.54E-05	75.2941935	0.01346659	0.01013956	1.31E-05	1.23E-05	0.00010293	0.02745824	0.09649723	0.03216959	5527460.7
64942681.3	780.46995	804.890845	1012.76596	763.860016	0.48540891	2.54E-05	75.2960984	0.01347726	0.01014785	1.31E-05	1.23E-05	0.00010308	0.0274631	0.09657369	0.03221703	5530937.65
65015723	780.46995	804.879646	1012.76061	763.858868	0.486584	2.54E-05	75.2984753	0.0134906	0.01015822	1.31E-05	1.23E-05	0.00010327	0.02746921	0.09666928	0.03227635	5535281.71
65107025.2	780.46995	804.864312	1012.75393	763.857404	0.4880848	2.54E-05	75.3014399	0.01350727	0.01017117	1.31E-05	1.23E-05	0.0001035	0.02747791	0.09678876	0.03235051	5540727.65
65221152.9	780.46995	804.845056	1012.74558	763.855539	0.49001005	2.54E-05	75.3051353	0.01352812	0.01018737	1.31E-05	1.23E-05	0.00010379	0.02748952	0.09693811	0.03244322	5547553.76
65363812.4	780.46995	804.821998	1012.73515	763.853209	0.49249291	2.54E-05	75.3097386	0.01355417	0.01020761	1.31E-05	1.23E-05	0.00010415	0.02750442	0.09712479	0.03255912	5556087.09
65506472	780.46995	804.798499	1012.72475	763.850874	0.4950526	2.54E-05	75.3143242	0.01358022	0.01022785	1.31E-05	1.23E-05	0.00010452	0.02751952	0.09731148	0.03267505	5566714.05
65649131.6	780.46995	804.773994	1012.71438	763.848516	0.49768969	2.54E-05	75.3188922	0.01360627	0.0102481	1.31E-05	1.23E-05	0.00010488	0.02753541	0.09749817	0.03279099	5577352.43
65791791.2	780.46995	804.750779	1012.70404	763.846168	0.50040485	2.54E-05	75.3234428	0.01363233	0.01026834	1.31E-05	1.23E-05	0.00010525	0.02755078	0.09768486	0.03290694	5587984.64
65934450.8	780.46995	804.727116	1012.69374	763.843808	0.50319863	2.54E-05	75.327976	0.01365838	0.01028858	1.31E-05	1.23E-05	0.00010561	0.02756642	0.09787154	0.0330229	5598620.67
66007492.6	780.46995	804.715175	1012.68847	763.842598	0.50465032	2.54E-05	75.3302903	0.01367172	0.01029895	1.31E-05	1.23E-05	0.0001058	0.0275745	0.09796713	0.03308231	5609160.91
66080534.3	780.46995	804.703145	1012.68321	763.841382	0.50612276	2.54E-05	75.3326001	0.01368506	0.01030931	1.31E-05	1.23E-05	0.00010599	0.02758276	0.09806271	0.03314168	5614610.9
66171836.4	780.46995	804.688357	1012.67666	763.839864	0.50799555	2.54E-05	75.3354811	0.01370173	0.01032227	1.31E-05	1.23E-05	0.00010622	0.02759294	0.09818219	0.03321589	5620085.14
66285964.1	780.46995	804.670167	1012.6685	763.837962	0.51038666	2.54E-05	75.3390724	0.01372258	0.01033846	1.31E-05	1.23E-05	0.00010651	0.02760565	0.09833154	0.03330865	5626929.53
66428623.7	780.46995	804.648177	1012.65832	763.835587	0.51345288	2.54E-05	75.3435463	0.01374863	0.0103587	1.31E-05	1.23E-05	0.00010688	0.02762149	0.09851823	0.03342461	5635482.64
66571283.3	780.46995	804.626336	1012.64816	763.833196	0.5165955	2.54E-05	75.3480032	0.01377468	0.01037895	1.31E-05	1.23E-05	0.00010724	0.02763764	0.09870492	0.03354058	5646131.89
66713942.9	780.46995	804.605355	1012.63802	763.830815	0.51981282	2.54E-05	75.3524433	0.01380073	0.01039919	1.31E-05	1.23E-05	0.00010761	0.02765373	0.0988916	0.03365655	5656776.85
66856602.5	780.46995	804.58522	1012.6279	763.82843	0.52310273	2.54E-05	75.3568666	0.01382679	0.01041943	1.31E-05	1.23E-05	0.00010797	0.02766974	0.09907829	0.03377252	5667423.39
66999262.1	780.46995	804.565913	1012.61779	763.826038	0.52646286	2.54E-05	75.3612734	0.01385284	0.01043968	1.31E-05	1.23E-05	0.00010834	0.02768586	0.09926498	0.03388849	5678071.65
67141921.7	780.46995	804.54742	1012.60769	763.823644	0.5298906	2.54E-05	75.3656635	0.01387889	0.01045992	1.31E-05	1.23E-05	0.0001087	0.02770202	0.09945167	0.03400445	5688722.8
67284581.3	780.46995	804.53006	1012.59759	763.821257	0.53338322	2.54E-05	75.3700373	0.01390495	0.01048016	1.31E-05	1.23E-05	0.00010907	0.02771825	0.09963835	0.03412063	5699369.63
67427240.9	780.46995	804.513645	1012.5875	763.818865	0.53693784	2.54E-05	75.3743946	0.013931	0.01050041	1.31E-05	1.23E-05	0.00010943	0.02773435	0.09982504	0.03423685	5710023.52
67535546	781.971694	806.026304	1013.47737	764.972642	0.54032584	2.54E-05	75.3776918	0.01395078	0.01051577	1.31E-05	1.23E-05	0.00010974	0.02775064	0.09996677	0.03433481	5728957.64
67539146	780.327827	804.0857	1009.54872	763.530609	0.5403943	2.54E-05	75.3778006	0.01395143	0.01051628	1.31E-05	1.23E-05	0.00010962	0.02774291	0.09997146	0.03429624	5726442.1
67647451.1	780.327827	804.074884	1009.54113	763.528799	0.54246697	2.54E-05	75.3810494	0.01397098	0.01053147	1.31E-05	1.23E-05	0.00010988	0.02775695	0.10011151	0.0343798	5726877.93
67782832.5	780.327827	804.063804	1009.53175	763.526651	0.54512136	2.54E-05	75.3850976	0.01399541	0.01055045	1.31E-05	1.23E-05	0.00011022	0.02777042	0.10028658	0.03448816	5734880.55
67952059.2	780.327827	804.050588	1009.52003	763.523937	0.54853678	2.54E-05	75.390138	0.01402595	0.01057418	1.31E-05	1.23E-05	0.00011065	0.02778838	0.10050542	0.03462379	5744898.22
68121286	780.327827	804.038841	1009.50832	763.521212	0.55204618	2.54E-05	75.3951565	0.01405649	0.01059791	1.31E-05	1.23E-05	0.00011107	0.02780685	0.10072426	0.03475946	5757372.26
68332819.4	780.327827	804.026692	1009.49368	763.517811	0.55657146	2.54E-05	75.401399	0.01409466	0.01062757	1.31E-05	1.23E-05	0.00011161	0.02783053	0.1009978	0.03492903	5769917.98
68544352.8	780.327827	804.018046	1009.47904	763.514421	0.56122959	2.54E-05	75.4076078	0.01413284	0.01065723	1.31E-05	1.23E-05	0.00011214	0.02785424	0.10127135	0.03509863	5785523.59
68755886.2	780.327827	804.013257	1009.46442	763.511037	0.56601408	2.54E-05	75.4137832	0.01417101	0.0106869	1.31E-05	1.23E-05	0.00011267	0.02787802	0.1015449	0.03526824	5801132.37
68967419.6	780.327827	803.979695	1009.44981	763.507509	0.57093646	2.55E-05	75.4199254	0.01420919	0.01071656	1.32E-05	1.23E-05	0.00011321	0.02790187	0.10181844	0.03543784	5816742.46
69178953	780.327827	803.944307	1009.43521	763.503964	0.57650247	2.55E-05	75.4260346	0.01424736	0.01074622	1.32E-05	1.23E-05	0.00011374	0.02792588	0.10209199	0.03560743	5832354.52
69390486.5	780.327827	803.915249	1009.42061	763.500435	0.58219159	2.55E-05	75.4321112	0.01428554	0.01077588	1.32E-05	1.23E-05	0.00011427	0.02794977	0.10236554	0.03577701	5847970.25
69602019.9	780.327827	803.910239	1009.40603	763.496931	0.58799538	2.55E-05	75.4381555	0.01432371	0.01080554	1.32E-05	1.23E-05	0.00011481	0.02797383	0.10263908	0.03594658	5863586.38
69813553.3	780.327827	803.905547	1009.39145	763.49344	0.59390498	2.55E-05	75.4441676	0.01436188	0.0108352	1.32E-05	1.23E-05	0.00011534	0.02799784	0.10291263	0.03611612	5879210.22
70025086.7	780.327827	803.900887	1009.37687	763.489995	0.59991213	2.55E-05	75.4501478	0.01440006	0.01086487	1.32E-05	1.23E-05	0.00011588	0.02802186	0.10318618	0.03628564	5894823.96
70236620.1	780.327827	803.896266	1009.36229	763.486556	0.60600862	2.55E-05	75.4560964	0.01443823	0.01089453	1.32E-05	1.23E-05	0.00011641	0.02804589	0.10345972	0.03645513	5910449.74
70448153.5	780.327827	803.89169	1009.34772	763.483149	0.61218655	2.55E-05	75.4620136	0.01447641	0.01092419	1.32E-05	1.23E-05	0.00011694	0.02807004	0.10373327	0.03662459	5926073.98
70659687	780.327827	803.887163	1009.33316	763.479767	0.61843846	2.55E-05	75.4678997	0.01451458	0.01095385	1.32E-05	1.23E-05	0.00011748	0.0280941	0.10400682	0.03679402	5941701.4
70871220.4	780.327827	803.889441	1009.31859	763.47644	0.62475773	2.55E-05	75.4737549	0.01455276	0.01098351	1.32E-05	1.23E-05	0.00011801	0.02811728	0.10428036	0.03696341	5957312.37
71082753.8	780.327827	803.887874	1009.30403	763.472981	0.63113863	2.55E-05	75.4795795	0.01459093	0.01101317	1.32E-05	1.23E-05	0.00011855	0.02814189	0.10455391	0.03713276	5972944.87
71191058.9	780.327827	803.880184	1009.29657	763.471182	0.63442241	2.55E-05	75.4825499	0.01461048	0.01102836	1.32E-05	1.23E-05	0.00011882	0.02815392	0.10469397	0.03721951	5988419.34
71299364	780.327827	803.873654	1009.28912	763.469372	0.63772054	2.55E-05	75.4855123	0.01463002	0.01104355	1.32E-05	1.23E-05	0.00011909	0.02816656	0.10483402	0.03730619	5996424.33
71434745.4	780.327827	803.871007	1009.27982	763.467129	0.64186364	2.55E-05	75.4892043	0.01465446	0.01106253	1.32E-05	1.23E-05	0.00011943	0.02818146	0.10500909	0.03741451	6004467.26
71570126.8	780.327827	803.868148	1009.27051	763.464893	0.64602633	2.55E-05	75.492884	0.01467889	0.01108151	1.32E-05	1.23E-05	0.00011978	0.02819693	0.10518416	0.03752282	6014469.05

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
71705508.2	780.327827	803.8654	1009.26121	763.462658	0.65020725	2.55E-05	75.4965514	0.01470332	0.0111005	1.32E-05	1.23E-05	0.00012012	0.02821246	0.10535923	0.03763112	6024476.16
71840889.6	780.327827	803.862562	1009.25191	763.460425	0.65440511	2.55E-05	75.5002067	0.01472775	0.01111948	1.32E-05	1.23E-05	0.00012046	0.02822788	0.1055343	0.0377394	6034480.88
72010116.3	780.327827	803.859194	1009.24029	763.457647	0.6596756	2.55E-05	75.5047588	0.01475829	0.01114321	1.32E-05	1.23E-05	0.00012089	0.02824707	0.10575314	0.03787469	6044539.44
72155534	780.327827	803.861585	1009.23031	763.455275	0.66422143	2.55E-05	75.5086554	0.01478453	0.0111636	1.32E-05	1.23E-05	0.00012125	0.02826329	0.10594119	0.03799096	6057002.45
72159134	780.327827	803.861547	1009.23005	763.455221	0.66433404	2.55E-05	75.5087517	0.01478518	0.01116411	1.32E-05	1.23E-05	0.00012126	0.02826348	0.10594584	0.03799389	6067531.16
72185697	781.864795	805.421669	1010.14781	764.637232	0.66539787	2.55E-05	75.5094619	0.01478998	0.01116783	1.32E-05	1.23E-05	0.00012136	0.02827035	0.10598019	0.038025	6076879.13
72189297	782.255999	805.881906	1011.07439	764.979637	0.6655674	2.55E-05	75.5095583	0.01479063	0.01116834	1.32E-05	1.23E-05	0.0001214	0.02827268	0.10598486	0.03803807	6081439.96
72193797	782.255999	805.881998	1011.07415	764.97957	0.66577824	2.55E-05	75.5096789	0.01479144	0.01116897	1.32E-05	1.23E-05	0.00012141	0.02827292	0.10599069	0.03804195	6081711.54
72199422	782.255999	805.882161	1011.07379	764.979478	0.66604102	2.55E-05	75.5098296	0.01479246	0.01116976	1.32E-05	1.23E-05	0.00012143	0.02827346	0.10599799	0.03804671	6082047.64
72206453.3	782.255999	805.882376	1011.07332	764.979362	0.66636838	2.55E-05	75.510018	0.01479373	0.01117075	1.32E-05	1.23E-05	0.00012145	0.02827429	0.10600711	0.03805247	6082467.95
72215242.3	782.255999	805.882752	1011.07272	764.97921	0.66677609	2.55E-05	75.5102534	0.01479532	0.01117199	1.32E-05	1.23E-05	0.00012147	0.0282754	0.1060185	0.03805957	6082996.87
72226228.6	782.255999	805.883192	1011.07197	764.979023	0.66728389	2.55E-05	75.5105477	0.01479731	0.01117353	1.32E-05	1.23E-05	0.0001215	0.02827684	0.10603275	0.03806842	6083655.07
72239961.6	782.255999	805.883803	1011.07103	764.978786	0.66791644	2.55E-05	75.5109153	0.0147998	0.01117546	1.32E-05	1.23E-05	0.00012153	0.02827864	0.10605056	0.03807946	6084479.69
72257127.7	782.255999	805.884556	1011.06986	764.978494	0.66870454	2.55E-05	75.5113748	0.0148029	0.01117788	1.32E-05	1.23E-05	0.00012158	0.02828088	0.10607282	0.03809325	6085509.65
72278585.4	782.255999	805.885487	1011.06838	764.978131	0.66968661	2.55E-05	75.5119487	0.01480679	0.01118089	1.32E-05	1.23E-05	0.00012163	0.0282837	0.10610065	0.03811049	6086795.3
72305407.5	782.255999	805.886686	1011.06654	764.97768	0.67091059	2.55E-05	75.5126658	0.01481164	0.01118466	1.32E-05	1.23E-05	0.0001217	0.02828708	0.10613543	0.03813203	6088402.11
72338935.1	782.255999	805.888328	1011.06424	764.977114	0.67243612	2.55E-05	75.5135615	0.01481771	0.01118938	1.32E-05	1.23E-05	0.00012178	0.02829127	0.10617891	0.03815896	6090412.46
72380844.6	782.255999	805.890262	1011.06135	764.976418	0.67433738	2.55E-05	75.5146801	0.01482529	0.01119527	1.32E-05	1.23E-05	0.00012189	0.02829634	0.10623326	0.03819261	6092917.96
72433231.5	782.255999	805.893186	1011.05773	764.975536	0.67670644	2.55E-05	75.5160767	0.01483477	0.01120264	1.32E-05	1.23E-05	0.00012202	0.02830275	0.10630119	0.03823467	6096059.75
72498715.1	782.255999	805.896879	1011.0532	764.974443	0.67965909	2.55E-05	75.5178199	0.01484662	0.01121185	1.32E-05	1.23E-05	0.00012219	0.02831047	0.10638611	0.03828724	6099979.09
72580569.6	782.255999	805.901502	1011.04754	764.973105	0.68333926	2.55E-05	75.5199951	0.01486144	0.01122336	1.32E-05	1.23E-05	0.0001224	0.02831998	0.10649226	0.03835294	6104863.36
72682887.8	782.255999	805.908595	1011.04046	764.971393	0.68792146	2.55E-05	75.5227079	0.01487995	0.01123774	1.32E-05	1.23E-05	0.00012266	0.02833184	0.10662495	0.03843505	6110990.37
72785205.9	782.255999	805.916406	1011.03337	764.969703	0.69248532	2.55E-05	75.525414	0.01489847	0.01125213	1.32E-05	1.23E-05	0.00012291	0.028344	0.10675763	0.03851715	6118598.41
72913103.6	782.255999	805.926916	1011.02451	764.967599	0.69815978	2.55E-05	75.5287872	0.01492162	0.01127012	1.32E-05	1.23E-05	0.00012324	0.028359	0.10692349	0.03861974	6126242.53
73041001.3	782.255999	805.936967	1011.01565	764.965539	0.70380638	2.55E-05	75.5321499	0.01494476	0.0112881	1.32E-05	1.23E-05	0.00012356	0.0283726	0.10708935	0.03872234	6135730.28
73200873.4	782.255999	805.954306	1011.00457	764.962883	0.71081834	2.55E-05	75.5363387	0.0149737	0.01131058	1.32E-05	1.23E-05	0.00012397	0.02839217	0.10729667	0.03885055	6145306.08
73360745.5	782.255999	805.971726	1010.99349	764.960311	0.71778648	2.55E-05	75.5405113	0.01500263	0.01133306	1.32E-05	1.23E-05	0.00012437	0.02841085	0.10750399	0.03897871	6157194.49
73520617.7	782.255999	805.989252	1010.98241	764.957767	0.72470848	2.55E-05	75.5446679	0.01503156	0.01135554	1.32E-05	1.23E-05	0.00012478	0.02842887	0.10771131	0.03910687	6169066.61
73680489.8	782.255999	806.00769	1010.97133	764.955225	0.73158748	2.55E-05	75.5488085	0.01506049	0.01137802	1.32E-05	1.23E-05	0.00012518	0.02844678	0.10791863	0.039235	6180940.26
73840361.9	782.255999	806.029945	1010.96026	764.952638	0.73842648	2.55E-05	75.5529332	0.01508943	0.0114005	1.32E-05	1.23E-05	0.00012558	0.02846579	0.10812596	0.03936313	6192841.2
74000234	782.255999	806.052018	1010.9492	764.950068	0.74522722	2.55E-05	75.5570421	0.01511836	0.01142298	1.33E-05	1.23E-05	0.00012599	0.02848445	0.10833328	0.03949126	6204728.16
74160106.1	782.255999	806.07371	1010.93814	764.947516	0.75199309	2.55E-05	75.5611354	0.01514729	0.01144547	1.33E-05	1.23E-05	0.00012639	0.02850218	0.1085406	0.03961932	6216606.89
74319978.2	782.255999	806.096575	1010.9271	764.944961	0.7587246	2.55E-05	75.565213	0.01517622	0.01146795	1.33E-05	1.23E-05	0.0001268	0.02852059	0.10874792	0.03974731	6228487.48
74479850.3	782.255999	806.118036	1010.91607	764.942336	0.7654236	2.55E-05	75.5692751	0.01520516	0.01149043	1.33E-05	1.23E-05	0.0001272	0.02853975	0.10895525	0.0398753	6240393.85
74639722.5	782.255999	806.138678	1010.90505	764.939733	0.77208969	2.55E-05	75.5733218	0.01523409	0.01151291	1.33E-05	1.23E-05	0.00012761	0.02855854	0.10916257	0.04000321	6252285.65
74799594.6	782.255999	806.165849	1010.89404	764.937159	0.77872415	2.55E-05	75.5773532	0.01526302	0.01153539	1.33E-05	1.23E-05	0.00012801	0.02857721	0.10936989	0.04013109	6264180.13
74959466.7	782.255999	806.199642	1010.88304	764.934608	0.785328	2.56E-05	75.5813692	0.01529195	0.01155787	1.33E-05	1.23E-05	0.00012841	0.02859587	0.10957721	0.04025894	6276079.83
75119338.8	782.255999	806.149616	1010.87204	764.93165	0.79189979	2.56E-05	75.5853702	0.01532089	0.01158035	1.33E-05	1.23E-05	0.00012882	0.02861451	0.10978453	0.0403867	6287971.49
75279210.9	782.255999	806.083119	1010.86105	764.928612	0.79844021	2.56E-05	75.589356	0.01534982	0.01160283	1.33E-05	1.23E-05	0.00012922	0.02863307	0.10999186	0.04051449	6299859.64
75439083	782.255999	806.03646	1010.85007	764.926121	0.80494949	2.56E-05	75.5933268	0.01537875	0.01162531	1.33E-05	1.23E-05	0.00012963	0.02865112	0.11019918	0.04064221	6311744.9
75598955.2	782.255999	805.991669	1010.8391	764.923655	0.8114287	2.56E-05	75.5972828	0.01540769	0.01164779	1.33E-05	1.23E-05	0.00013003	0.02866997	0.1104065	0.04076992	6323653.27
75758827.3	782.255999	805.952088	1010.82813	764.92123	0.81787754	2.56E-05	75.6012238	0.01543662	0.01167027	1.33E-05	1.23E-05	0.00013043	0.02868856	0.11061382	0.04089759	6335549.39
75918699.4	782.255999	805.91765	1010.81716	764.918831	0.82429634	2.56E-05	75.6051502	0.01546555	0.01169275	1.33E-05	1.23E-05	0.00013084	0.02870663	0.11082114	0.0410252	6347439.04
76078571.5	782.255999	805.884649	1010.8062	764.916428	0.83068695	2.56E-05	75.6090619	0.01549448	0.01171523	1.33E-05	1.23E-05	0.00013124	0.02872544	0.11102847	0.04115273	6359349.34
76238443.6	782.255999	805.856163	1010.79526	764.914056	0.83705122	2.56E-05	75.612959	0.01552342	0.01173771	1.33E-05	1.23E-05	0.00013164	0.02874402	0.11123579	0.04128025	6371248.78
76398315.7	782.255999	805.830974	1010.78432	764.911695	0.84338899	2.56E-05	75.6168416	0.01555235	0.01176019	1.33E-05	1.23E-05	0.00013205	0.02876258	0.11144311	0.0414077	6383155.54

Time (s)	Coolant outlet temperature (K)	Peak Cladding Temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission Gas Release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
76558187.9	782.255999	805.810026	1010.77339	764.909367	0.84970084	2.56E-05	75.6207098	0.01558128	0.01178268	1.33E-05	1.23E-05	0.00013245	0.02878067	0.11165043	0.04153512	6395045.63
76718060	782.255999	805.79114	1010.76246	764.90704	0.85598797	2.56E-05	75.6245636	0.01561021	0.01180516	1.33E-05	1.23E-05	0.00013286	0.02879941	0.11185775	0.04166251	6406955.46
76833647	781.272965	804.788629	1010.16605	764.149111	0.85982523	2.56E-05	75.6273411	0.01563113	0.01182141	1.33E-05	1.23E-05	0.00013313	0.02881025	0.11200765	0.04174762	6412677.15
76837247	782.66454	806.427973	1013.47491	765.367531	0.86004882	2.56E-05	75.6274279	0.01563179	0.01182192	1.33E-05	1.23E-05	0.00013325	0.02881786	0.11201234	0.04180857	6431001.97
76952834	782.66454	806.425453	1013.46808	765.365862	0.86677264	2.56E-05	75.6302255	0.01565292	0.01183834	1.33E-05	1.23E-05	0.00013357	0.0288298	0.11216374	0.04189476	6431441.01
77097317.8	782.66454	806.421758	1013.45858	765.363725	0.87477111	2.56E-05	75.6337118	0.01567933	0.01185886	1.33E-05	1.23E-05	0.00013394	0.02884798	0.11235299	0.04200682	6440218.35
77241801.6	782.66454	806.418677	1013.44873	765.361614	0.88253495	2.56E-05	75.6371865	0.01570574	0.01187938	1.33E-05	1.23E-05	0.00013431	0.02886567	0.11254224	0.04212153	6451105.59
77340548	782.66454	806.416557	1013.44191	765.360175	0.88775789	2.56E-05	75.6395545	0.01572379	0.0118934	1.33E-05	1.23E-05	0.00013456	0.0288778	0.11267158	0.04220048	6461919.48
77344148	782.66454	806.416547	1013.44165	765.360118	0.88791093	2.56E-05	75.6396407	0.01572444	0.01189391	1.33E-05	1.23E-05	0.00013457	0.02887829	0.1126763	0.04220341	6469197.8
77442894.4	782.66454	806.414687	1013.43481	765.358699	0.89204988	2.56E-05	75.6420031	0.0157425	0.01190794	1.33E-05	1.23E-05	0.00013482	0.02888982	0.11280564	0.04228251	6469626.29
77566327.4	782.66454	806.412253	1013.42622	765.356926	0.89714472	2.56E-05	75.6449485	0.01576506	0.01192547	1.33E-05	1.23E-05	0.00013513	0.02890516	0.11296731	0.04238158	6477109.31
77720618.6	782.100518	805.838747	1013.07791	764.920774	0.90283479	2.56E-05	75.6486183	0.01579326	0.01194738	1.33E-05	1.23E-05	0.00013551	0.02892289	0.11316941	0.04250156	6482922.4
77738400	782.100518	805.83827	1013.07664	764.92052	0.90348975	2.56E-05	75.6490404	0.01579651	0.01194991	1.33E-05	1.23E-05	0.00013556	0.02892525	0.1131927	0.04251588	6494304.44
77742000	782.745069	806.598028	1014.61215	765.485059	0.90365458	2.56E-05	75.6491261	0.01579717	0.01195042	1.33E-05	1.23E-05	0.00013562	0.02892896	0.11319743	0.04253803	6500259.13
77759781.4	782.745069	806.597888	1014.61112	765.484821	0.90447599	2.56E-05	75.6495499	0.01580044	0.01195296	1.33E-05	1.23E-05	0.00013567	0.02893024	0.11322082	0.04255407	6500542.65
77782008.2	782.745069	806.597351	1014.60972	765.484505	0.90550442	2.56E-05	75.6500794	0.01580452	0.01195613	1.33E-05	1.23E-05	0.00013573	0.02893288	0.11325007	0.0425724	6501893.23
77809791.7	782.745069	806.596572	1014.6079	765.484106	0.90678693	2.56E-05	75.650741	0.01580962	0.01196009	1.33E-05	1.23E-05	0.0001358	0.02893655	0.11328663	0.04259475	6503588.23
77844521	782.745069	806.595699	1014.60558	765.483607	0.90838206	2.56E-05	75.6515673	0.015816	0.01196505	1.33E-05	1.23E-05	0.00013589	0.02894131	0.11333233	0.04262257	6505711.18
77887932.7	782.745069	806.594849	1014.60263	765.482982	0.91036207	2.56E-05	75.6525993	0.01582397	0.01197124	1.33E-05	1.23E-05	0.00013601	0.02894718	0.11338946	0.04265738	6508366.91
77942197.3	782.745069	806.593825	1014.59888	765.482209	0.91281575	2.56E-05	75.6538879	0.01583393	0.01197899	1.33E-05	1.23E-05	0.00013614	0.02895418	0.11346086	0.04270098	6511675.51
78010028	782.745069	806.592578	1014.59415	765.481246	0.91585135	2.56E-05	75.6554963	0.01584639	0.01198867	1.33E-05	1.23E-05	0.00013632	0.02896273	0.11355012	0.04275559	6515806.39
78094816.4	782.745069	806.59098	1014.58822	765.480049	0.91959965	2.56E-05	75.6575032	0.01586196	0.01200076	1.33E-05	1.23E-05	0.00013654	0.02897362	0.1136617	0.04282395	6520975.25
78200801.9	782.745069	806.597601	1014.58078	765.478557	0.92421712	2.56E-05	75.6600063	0.01588142	0.01201589	1.33E-05	1.23E-05	0.00013681	0.02898668	0.11380116	0.04290948	6527426.64
78333283.9	782.745069	806.609583	1014.57149	765.476701	0.92988895	2.56E-05	75.6631266	0.01590575	0.01203479	1.33E-05	1.23E-05	0.00013715	0.02900306	0.11397549	0.04301643	6535501.78
78465765.8	782.745069	806.623282	1014.5622	765.474863	0.9354676	2.56E-05	75.6662374	0.01593008	0.01205369	1.33E-05	1.23E-05	0.00013749	0.02901973	0.11414983	0.04312343	6545523.86
78631368.2	782.745069	806.645368	1014.5506	765.472572	0.94230337	2.56E-05	75.6701125	0.01596049	0.01207732	1.33E-05	1.23E-05	0.00013791	0.02904095	0.11436774	0.04325713	6555632.81
78796970.5	782.745069	806.669393	1014.539	765.470297	0.94616303	2.56E-05	75.6739728	0.0159909	0.01210095	1.34E-05	1.23E-05	0.00013833	0.02906117	0.11458566	0.04339081	6568168.43
78962572.9	782.745069	806.697186	1014.52741	765.468039	0.94995397	2.56E-05	75.6778186	0.01602132	0.01212458	1.34E-05	1.23E-05	0.00013876	0.0290819	0.11480357	0.04352444	6580706.66
79128175.3	782.745069	806.728618	1014.51582	765.465803	0.95368083	2.56E-05	75.6816497	0.01605173	0.01214821	1.34E-05	1.23E-05	0.00013918	0.02910241	0.11502149	0.04365802	6593242.18
79335178.3	782.745069	806.775088	1014.50137	765.463034	0.95824604	2.56E-05	75.6864183	0.01608974	0.01217775	1.34E-05	1.23E-05	0.00013971	0.02912872	0.11529388	0.04382491	6605868.26
79542181.3	782.745069	806.827036	1014.48691	765.460296	0.96272529	2.56E-05	75.6911644	0.01612775	0.01220728	1.34E-05	1.23E-05	0.00014024	0.02915465	0.11556627	0.04399175	6621547.17
79749184.3	782.745069	806.883769	1014.47247	765.457567	0.96712495	2.56E-05	75.6958881	0.01616577	0.01223682	1.34E-05	1.23E-05	0.00014077	0.02917989	0.11583867	0.0441585	6637221.26
79956187.2	782.745069	806.949496	1014.45804	765.454882	0.9714506	2.56E-05	75.7005897	0.01620378	0.01226636	1.34E-05	1.23E-05	0.0001413	0.02920613	0.11611106	0.04432515	6652919.87
80163190.2	782.745069	807.015593	1014.44362	765.452259	0.97570799	2.56E-05	75.7052693	0.01624179	0.01229589	1.34E-05	1.23E-05	0.00014183	0.02923165	0.11638346	0.04449172	6668590.99
80370193.2	782.745069	807.019866	1014.42923	765.449288	0.97990213	2.56E-05	75.7099271	0.01627981	0.01232543	1.34E-05	1.23E-05	0.00014236	0.02925702	0.11665585	0.04465821	6684274.9
80444447	782.745069	807.001861	1014.42405	765.44811	0.98139964	2.56E-05	75.7115925	0.01629344	0.01233603	1.34E-05	1.23E-05	0.00014255	0.02926631	0.11675356	0.04471799	6699718.53
80448047	644.15	644.172403	644.15337	644.150942	0.98139964	2.55E-05	75.7116329	0.01629377	0.01233628	1.32E-05	1.23E-05	0.00013356	0.0278167	0.11675593	0.04211477	5642757.09
80451647	305	305.051392	305.006402	305.002155	0.98139964	2.51E-05	75.7116329	0.01629377	0.01233628	1.30E-05	1.21E-05	0.00011122	0.02565196	0.11675593	0.03620498	2702908.27
80455247	305	305.051392	305.006402	305.002155	0.98139964	2.51E-05	75.7116329	0.01629377	0.01233628	1.30E-05	1.21E-05	0.00011122	0.02565196	0.11675593	0.03620498	2702908.27

TUNED PIN T654 FULL RESULTS

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
0		295	295	295	0	2.45E-05		0	0	8.80E-06	1.57E-05	0	0	0	0	
100	309.333714	310.330309	322.569249	308.870699	0	2.45E-05	0	3.30E-10	0	8.81E-06	1.57E-05	6.67E-07	0.00011878	2.36E-09	0.00018117	95462.2273
225	327.292835	329.527786	354.264971	326.243436	0	2.45E-05	0	1.67E-09	0	8.82E-06	1.57E-05	1.54E-06	0.00026069	1.20E-08	0.00041832	100798.673
381.25	349.81139	353.558427	390.975152	348.007682	0	2.45E-05	0	4.79E-09	0	8.83E-06	1.57E-05	2.65E-06	0.0004306	3.43E-08	0.00071767	107474.771
576.5625	378.073328	383.671396	433.910346	375.289787	1.30E-65	2.45E-05	0	1.10E-08	0	8.85E-06	1.57E-05	4.03E-06	0.00063486	7.85E-08	0.00109336	115830.056
820.703125	413.582692	421.457767	484.495688	409.513857	9.62E-56	2.46E-05	0	2.22E-08	0	8.86E-06	1.57E-05	5.77E-06	0.00088158	1.59E-07	0.00156539	126291.027
1125.87891	458.252644	468.921383	544.629671	452.484985	4.04E-46	2.46E-05	0	4.18E-08	0	8.89E-06	1.57E-05	7.96E-06	0.00118122	2.99E-07	0.00215902	139394.381
1507.34863	514.514727	528.717635	616.822905	506.499004	7.97E-37	2.47E-05	0	7.49E-08	0	8.92E-06	1.58E-05	1.07E-05	0.0015474	5.37E-07	0.002907	155816.852
1984.18579	585.443117	604.178198	704.694652	574.481626	6.63E-28	2.47E-05	0	1.30E-07	0	8.95E-06	1.58E-05	1.42E-05	0.00199782	9.30E-07	0.00385112	176411.644
2580.23224	674.870048	699.796488	812.777605	660.160291	1.70E-19	2.48E-05	0	2.19E-07	0	8.99E-06	1.58E-05	1.86E-05	0.00254906	1.57E-06	0.00504493	202250.864
3325.2903	787.424599	820.130514	947.637065	768.222657	1.05E-11	2.49E-05	0	3.65E-07	0	9.05E-06	1.59E-05	2.42E-05	0.00323218	2.61E-06	0.00655168	234662.009
3600	829.01858	864.98067	997.785682	808.288043	8.24E-10	2.50E-05	0	4.27E-07	0	9.07E-06	1.59E-05	2.63E-05	0.00347403	3.06E-06	0.00711122	246628.966
4345.05806	829.01858	864.985998	997.791167	808.294108	3.03E-09	2.50E-05	0	6.04E-07	0	9.07E-06	1.59E-05	2.63E-05	0.00347011	4.33E-06	0.0071113	246631.186
5276.38063	829.01858	864.985936	997.790687	808.29473	5.79E-09	2.50E-05	0	8.25E-07	0	9.07E-06	1.59E-05	2.63E-05	0.00346859	5.91E-06	0.00711132	246631.627
6440.53385	829.01858	864.986029	997.79039	808.29514	9.23E-09	2.50E-05	0	1.10E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346775	7.89E-06	0.00711133	246632.01
7895.72538	829.01858	864.986191	997.790326	808.295471	1.35E-08	2.50E-05	0	1.45E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346724	1.04E-05	0.00711134	246632.409
9714.71478	829.01858	864.986409	997.79058	808.295771	1.89E-08	2.50E-05	0	1.88E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346697	1.35E-05	0.00711136	246632.866
11988.4515	829.01858	864.986708	997.792035	808.296073	2.56E-08	2.50E-05	0	2.42E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346691	1.73E-05	0.00711138	246632.948
14830.6225	829.01858	864.987027	997.793118	808.296423	3.40E-08	2.50E-05	0	3.09E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346695	2.22E-05	0.00711141	246633.528
18383.3362	829.01858	864.987449	997.795045	808.29686	4.44E-08	2.50E-05	0	3.94E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346708	2.82E-05	0.00711144	246634.262
22824.2283	829.01858	864.988018	997.798066	808.297431	5.74E-08	2.50E-05	0	4.99E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346729	3.58E-05	0.00711148	246635.229
28375.3434	829.01858	864.988784	997.802515	808.298196	7.35E-08	2.50E-05	0	6.31E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346756	4.52E-05	0.00711153	246636.52
35314.2373	829.01858	864.989816	997.808869	808.299231	9.37E-08	2.50E-05	0	7.96E-06	0	9.07E-06	1.59E-05	2.63E-05	0.00346791	5.70E-05	0.0071116	246638.252
43987.8547	829.01858	864.991216	997.817813	808.300635	1.19E-07	2.50E-05	0	1.00E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00346834	7.18E-05	0.00711168	246640.587
54829.8764	829.01858	864.993121	997.830317	808.302545	1.50E-07	2.50E-05	0	1.26E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00346889	9.02E-05	0.00711179	246643.742
68382.4035	829.01858	864.99572	997.847767	808.305148	1.88E-07	2.50E-05	0	1.58E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00346959	0.00011325	0.00711192	246648.015
85323.0625	829.01858	864.999272	997.87211	808.308705	2.35E-07	2.50E-05	0	1.98E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00347046	0.00014206	0.00711209	246653.819
106498.886	829.01858	865.004377	997.904402	808.313431	2.94E-07	2.50E-05	0	2.49E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00347172	0.00017808	0.0071123	246670.406
132968.666	829.01858	865.011129	997.950941	808.320012	3.66E-07	2.50E-05	0	3.11E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00347334	0.0002231	0.00711258	246684.332
166055.89	829.01858	865.020411	998.015855	808.329045	4.53E-07	2.50E-05	0	3.90E-05	0	9.07E-06	1.59E-05	2.63E-05	0.00347545	0.00027938	0.00711293	246703.388
207414.921	829.01858	865.033196	998.106423	808.341467	5.60E-07	2.50E-05	0	4.88E-05	0	9.08E-06	1.59E-05	2.63E-05	0.0034782	0.00034972	0.00711337	246729.511
259113.709	829.01858	865.050854	998.232825	808.358585	6.88E-07	2.50E-05	0	6.11E-05	0	9.08E-06	1.59E-05	2.63E-05	0.00348178	0.00043766	0.00711394	246765.391
323737.195	829.01858	865.075343	998.409283	808.382211	8.42E-07	2.50E-05	0	7.64E-05	0	9.08E-06	1.59E-05	2.63E-05	0.00348647	0.00054757	0.00711468	246814.76
404516.551	829.01858	865.109387	998.656009	808.414896	1.02E-06	2.50E-05	0	9.56E-05	0	9.08E-06	1.59E-05	2.63E-05	0.00349262	0.00068497	0.00711562	246882.813
505490.747	829.01858	865.156876	999.001199	808.460212	1.24E-06	2.50E-05	0	0.00011956	0	9.09E-06	1.59E-05	2.63E-05	0.00350073	0.00085671	0.00711684	246976.792
631708.492	829.01858	865.228682	999.478816	808.522947	1.48E-06	2.50E-05	0	0.00014952	0	9.10E-06	1.59E-05	2.63E-05	0.00351156	0.00107139	0.00711845	247106.674
789480.673	829.01858	865.326301	1000.15348	808.610689	1.76E-06	2.50E-05	0	0.00018697	0	9.11E-06	1.58E-05	2.63E-05	0.00352593	0.00133974	0.00712053	247286.924
986695.899	829.01858	865.465593	1001.10175	808.73357	2.07E-06	2.50E-05	0	0.00023378	0	9.12E-06	1.58E-05	2.63E-05	0.00354505	0.00167518	0.00712326	247537.465
1233214.93	829.01858	865.666472	1002.44572	808.906565	2.41E-06	2.50E-05	0	0.00029229	0	9.14E-06	1.58E-05	2.63E-05	0.00357056	0.00209448	0.00712685	247886.71
1541363.72	829.01858	865.959835	1004.35519	809.104736	2.76E-06	2.50E-05	0	0.00036544	0	9.17E-06	1.58E-05	2.63E-05	0.00360414	0.0026186	0.00713162	248360.196
1926549.71	829.01858	866.392577	1006.25391	809.155607	3.11E-06	2.50E-05	0	0.00045687	0	9.20E-06	1.58E-05	2.64E-05	0.0036463	0.00327375	0.00713798	248950.677
2408032.2	829.01858	866.936532	1008.97275	809.108971	3.46E-06	2.50E-05	0	0.00057115	0	9.25E-06	1.57E-05	2.64E-05	0.00370113	0.00409269	0.00714612	249740.65
3009885.31	829.01858	866.709504	1012.8157	809.008524	3.72E-06	2.50E-05	0	0.00071401	0	9.32E-06	1.56E-05	2.64E-05	0.00377365	0.00511637	0.00715007	250840.818

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
3762201.69	829.01858	866.362031	1018.23623	808.869379	3.90E-06	2.50E-05	0	0.00089258	0	9.42E-06	1.55E-05	2.64E-05	0.00386981	0.00639596	0.00715484	252398.212
4702597.17	829.01858	866.027605	1025.89488	808.678753	4.00E-06	2.50E-05	0	0.0011158	0	9.56E-06	1.54E-05	2.65E-05	0.00399652	0.00799545	0.007161	254620.47
5702597.17	829.01858	866.824777	1035.04676	808.576555	4.02E-06	2.50E-05	0	0.00135316	0	9.73E-06	1.52E-05	2.64E-05	0.00413863	0.00969632	0.00715815	257356.652
6702597.17	829.01858	865.928052	1045.29938	808.335765	4.03E-06	2.50E-05	0	0.00159053	0	9.91E-06	1.50E-05	2.64E-05	0.00428369	0.01139719	0.00716446	260404.381
7702597.17	829.01858	865.079629	1056.65464	808.080981	4.03E-06	2.50E-05	0	0.00182789	0	1.01E-05	1.48E-05	2.65E-05	0.00443168	0.01309807	0.00717031	263817.795
8203212	829.01858	864.677904	1062.67296	807.948882	4.03E-06	2.50E-05	0	0.00194672	0	1.02E-05	1.47E-05	2.65E-05	0.00450739	0.01394955	0.00717282	265663.512
8206812	822.624548	857.371637	1052.08118	802.467559	4.03E-06	2.50E-05	0	0.00194756	0	1.02E-05	1.47E-05	2.62E-05	0.00447599	0.01395559	0.00708335	263883.775
8707426.83	822.624548	857.060527	1057.05195	802.358543	4.03E-06	2.50E-05	0	0.00206338	0	1.03E-05	1.46E-05	2.62E-05	0.00456248	0.01478553	0.00708594	265482.04
9333195.37	822.624548	856.639799	1064.20967	802.204828	4.03E-06	2.50E-05	0	0.00220816	0	1.04E-05	1.45E-05	2.62E-05	0.00465721	0.01582294	0.00708891	267818.725
10115406	822.624548	856.274189	1072.62574	802.024089	4.03E-06	2.50E-05	2.18726569	0.00238913	5.23E-05	1.06E-05	1.44E-05	2.62E-05	0.00477098	0.01711971	0.00709442	270746.896
11093169.4	822.624548	856.150562	1081.83544	801.817104	4.03E-06	2.50E-05	12.73612	0.00261534	0.00033309	1.08E-05	1.42E-05	2.62E-05	0.0049044	0.01874068	0.00710168	298864.073
12093169.4	822.624548	855.756481	1089.57258	801.633539	4.03E-06	2.50E-05	24.050955	0.0028467	0.00068466	1.10E-05	1.40E-05	2.63E-05	0.00502787	0.02039851	0.00711302	436154.947
13093169.4	822.624548	855.196653	1095.82198	801.478903	4.03E-06	2.50E-05	36.8645772	0.00307805	0.00113471	1.11E-05	1.39E-05	2.63E-05	0.00513821	0.02205633	0.00712608	609831.439
13814423	822.624548	854.842435	1099.42122	801.386799	4.03E-06	2.50E-05	43.102821	0.00324492	0.00139865	1.12E-05	1.38E-05	2.64E-05	0.005209	0.02325205	0.00714031	831602.233
13815366.7	821.218269	853.067492	1095.44436	800.094437	4.03E-06	2.50E-05	43.103786	0.00324514	0.00139878	1.12E-05	1.38E-05	2.63E-05	0.00519501	0.0232536	0.00712475	957801.512
13816310.4	819.804866	851.295969	1091.45975	798.796681	4.03E-06	2.50E-05	43.1047408	0.00324535	0.0013989	1.12E-05	1.38E-05	2.62E-05	0.00518164	0.02325514	0.00710378	956290.286
13817490.1	818.028013	849.131466	1086.46704	797.167132	4.03E-06	2.50E-05	43.10592	0.00324562	0.00139905	1.12E-05	1.38E-05	2.61E-05	0.00516548	0.02325705	0.00707757	954376.353
13818023	817.221601	848.146387	1084.20674	796.428143	4.03E-06	2.50E-05	43.1064475	0.00324574	0.00139912	1.12E-05	1.38E-05	2.61E-05	0.00515824	0.0232579	0.00706568	953554.763
13819202.6	817.221601	848.145648	1084.20658	796.428094	4.03E-06	2.50E-05	43.1076115	0.003246	0.00139927	1.12E-05	1.38E-05	2.61E-05	0.00515882	0.02325978	0.00706569	953587.53
13820677.2	817.221601	848.143151	1084.20792	796.428077	4.03E-06	2.50E-05	43.1090662	0.00324633	0.00139946	1.12E-05	1.38E-05	2.61E-05	0.00515911	0.02326212	0.0070657	953659.772
13822520.4	817.221601	848.141904	1084.20883	796.428064	4.03E-06	2.50E-05	43.1108842	0.00324674	0.0013997	1.12E-05	1.38E-05	2.61E-05	0.00515924	0.02326506	0.00706572	953750.605
13824824.4	817.221601	848.14135	1084.20949	796.428051	4.03E-06	2.50E-05	43.1131561	0.00324725	0.00139999	1.12E-05	1.38E-05	2.61E-05	0.00515929	0.02326873	0.00706574	953864.463
13827704.4	817.221601	848.141142	1084.20992	796.428037	4.03E-06	2.50E-05	43.1159949	0.00324789	0.00140036	1.12E-05	1.38E-05	2.61E-05	0.00515932	0.02327331	0.00706578	954007.003
13831304.4	817.221601	848.141031	1084.21017	796.428017	4.03E-06	2.50E-05	43.1195418	0.00324869	0.00140082	1.12E-05	1.38E-05	2.61E-05	0.00515937	0.02327905	0.00706582	954185.331
13835804.4	817.221601	848.140845	1084.21023	796.427991	4.03E-06	2.50E-05	43.1239731	0.00324969	0.00140139	1.12E-05	1.38E-05	2.61E-05	0.00515945	0.02328621	0.00706587	954408.344
13841429.4	817.221601	848.14049	1084.21014	796.427956	4.03E-06	2.50E-05	43.1295083	0.00325094	0.00140211	1.12E-05	1.38E-05	2.61E-05	0.00515959	0.02329517	0.00706594	954687.177
13848460.7	817.221601	848.139932	1084.20993	796.427911	4.03E-06	2.50E-05	43.1364213	0.0032525	0.00140301	1.12E-05	1.38E-05	2.61E-05	0.00515978	0.02330637	0.00706602	955035.76
13857249.7	817.221601	848.13916	1084.20961	796.427853	4.03E-06	2.50E-05	43.1450532	0.00325445	0.00140414	1.12E-05	1.38E-05	2.61E-05	0.00516002	0.02332036	0.00706612	955471.514
13868236	817.221601	848.138154	1084.20918	796.427777	4.03E-06	2.50E-05	43.1558286	0.00325689	0.00140554	1.12E-05	1.38E-05	2.61E-05	0.00516033	0.02333785	0.00706625	956016.216
13881969	817.221601	848.136868	1084.20863	796.427683	4.03E-06	2.50E-05	43.1692751	0.00325995	0.0014073	1.12E-05	1.38E-05	2.61E-05	0.00516073	0.02335972	0.0070664	956697.129
13899135.1	817.221601	848.133219	1084.20709	796.427398	4.03E-06	2.50E-05	43.1860479	0.00326376	0.00140949	1.12E-05	1.38E-05	2.61E-05	0.00516121	0.02338706	0.0070666	957558.207
13920592.8	817.221601	848.130496	1084.20605	796.427163	4.03E-06	2.50E-05	43.2069589	0.00326853	0.00141223	1.12E-05	1.38E-05	2.61E-05	0.00516186	0.02342122	0.00706684	958627.887
13947414.9	817.221601	848.126892	1084.20479	796.426809	4.03E-06	2.50E-05	43.2330119	0.00327449	0.00141566	1.12E-05	1.38E-05	2.61E-05	0.00516273	0.02346394	0.00706715	959969.359
13980942.5	817.221601	848.118609	1084.20326	796.42619	4.03E-06	2.50E-05	43.2728413	0.00328194	0.00142019	1.12E-05	1.38E-05	2.61E-05	0.00516397	0.02351732	0.00706751	961659.04
14022852	817.221601	848.103766	1084.20146	796.425059	4.03E-06	2.50E-05	43.3429163	0.00329125	0.00142653	1.12E-05	1.38E-05	2.61E-05	0.00516592	0.02358406	0.00706794	963915.636
14075238.9	817.221601	848.079942	1084.20952	796.422954	4.03E-06	2.50E-05	43.5033755	0.00330289	0.00143687	1.12E-05	1.38E-05	2.61E-05	0.005169	0.02366748	0.00706846	967113.266
14140722.5	817.221601	848.047146	1084.25594	796.419374	4.03E-06	2.50E-05	43.878397	0.00331745	0.00145564	1.12E-05	1.38E-05	2.61E-05	0.00517344	0.02377175	0.00706914	972347.236
14222577	817.221601	848.0262	1084.39005	796.413899	4.03E-06	2.50E-05	44.4099367	0.00333564	0.00148135	1.12E-05	1.37E-05	2.61E-05	0.00517958	0.02390209	0.00707018	981785.024
14324895.2	817.221601	848.018237	1084.62762	796.406085	4.03E-06	2.50E-05	45.0600521	0.00335837	0.00151328	1.12E-05	1.37E-05	2.61E-05	0.00518738	0.02406502	0.00707157	994752.944
14428975	817.221601	848.010036	1084.92973	796.397399	4.03E-06	2.50E-05	45.7347598	0.0033815	0.00154652	1.12E-05	1.37E-05	2.61E-05	0.00519591	0.02423075	0.00707311	1010797.6
14429918.7	815.49668	846.19939	1083.42715	795.033943	4.03E-06	2.50E-05	45.7356661	0.00338171	0.00154665	1.12E-05	1.37E-05	2.60E-05	0.00518899	0.02423225	0.00705103	1025110.41
14430862.4	813.799662	844.417007	1081.94042	793.691883	4.03E-06	2.49E-05	45.7365707	0.00338192	0.00154677	1.12E-05	1.37E-05	2.59E-05	0.00518215	0.02423375	0.00702865	1023486.87
14432042.1	811.716609	842.22773	1080.10374	792.043684	4.03E-06	2.49E-05	45.7376991	0.00338218	0.00154693	1.12E-05	1.37E-05	2.58E-05	0.00517372	0.02423562	0.00700116	1021478.23
14432575	810.789189	841.252536	1079.28171	791.309561	4.03E-06	2.49E-05	45.7382079	0.0033823	0.001547	1.12E-05	1.37E-05	2.58E-05	0.00516996	0.02423646	0.00698893	1020631.81
14433754.6	810.789189	841.252482	1079.28166	791.309518	4.03E-06	2.49E-05	45.7393335	0.00338256	0.00154716	1.12E-05	1.37E-05	2.58E-05	0.00516996	0.02423833	0.00698894	1020665.79
14435229.2	810.789189	841.252457	1079.28189	791.309511	4.03E-06	2.49E-05	45.7407403	0.00338288	0.00154736	1.12E-05	1.37E-05	2.58E-05	0.00516996	0.02424066	0.00698896	1020741.59

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
14437072.4	810.789189	841.252427	1079.28204	791.309502	4.03E-06	2.49E-05	45.7424985	0.00338329	0.0015476	1.12E-05	1.37E-05	2.58E-05	0.00516996	0.02424357	0.00698898	1020836.41
14439376.4	810.789189	841.252413	1079.28212	791.309489	4.03E-06	2.49E-05	45.7446955	0.0033838	0.00154791	1.12E-05	1.37E-05	2.58E-05	0.00516999	0.02424722	0.00698901	1020954.97
14442256.4	810.789189	841.25243	1079.28213	791.309472	4.03E-06	2.49E-05	45.747441	0.00338444	0.00154829	1.12E-05	1.37E-05	2.58E-05	0.00517004	0.02425177	0.00698904	1021103.19
14445856.4	810.789189	841.25249	1079.28208	791.30945	4.03E-06	2.49E-05	45.7508713	0.00338523	0.00154877	1.12E-05	1.37E-05	2.58E-05	0.00517012	0.02425746	0.00698908	1021288.5
14450356.4	810.789189	841.252768	1079.28178	791.309387	4.03E-06	2.49E-05	45.7551569	0.00338622	0.00154937	1.12E-05	1.37E-05	2.58E-05	0.00517023	0.02426458	0.00698914	1021522.67
14455981.4	810.789189	841.253111	1079.28141	791.309316	4.03E-06	2.49E-05	45.7605104	0.00338746	0.00155012	1.12E-05	1.37E-05	2.58E-05	0.00517038	0.02427348	0.0069892	1021813.36
14463012.7	810.789189	841.253326	1079.28119	791.309265	4.03E-06	2.49E-05	45.7671968	0.00338902	0.00155106	1.12E-05	1.37E-05	2.58E-05	0.00517059	0.0242846	0.00698929	1022177.52
14471801.7	810.789189	841.253771	1079.28077	791.309157	4.03E-06	2.49E-05	45.7755461	0.00339096	0.00155223	1.12E-05	1.37E-05	2.58E-05	0.00517086	0.0242985	0.0069894	1022634.08
14482788	810.789189	841.254394	1079.28027	791.308992	4.03E-06	2.49E-05	45.7859694	0.00339338	0.00155369	1.12E-05	1.37E-05	2.58E-05	0.00517124	0.02431587	0.00698953	1023207.21
14496521	810.789189	841.255261	1079.27965	791.308738	4.03E-06	2.49E-05	45.8186116	0.00339641	0.00155619	1.12E-05	1.37E-05	2.58E-05	0.00517175	0.02433759	0.00698969	1023927.28
14513687.1	810.789189	841.256439	1079.27891	791.308358	4.03E-06	2.49E-05	45.8730385	0.0034002	0.00155978	1.12E-05	1.37E-05	2.58E-05	0.00517244	0.02436473	0.00698992	1025151.81
14535144.8	810.789189	841.258009	1079.27801	791.307798	4.03E-06	2.49E-05	45.9550978	0.00340494	0.00156474	1.12E-05	1.37E-05	2.58E-05	0.00517336	0.02439867	0.0069902	1026912.22
14561966.9	810.789189	841.259672	1079.27691	791.306977	4.03E-06	2.49E-05	46.056673	0.00341086	0.00157093	1.12E-05	1.37E-05	2.58E-05	0.00517456	0.02444109	0.00699057	1029353.84
14595494.5	810.789189	841.25603	1079.27559	791.305638	4.03E-06	2.49E-05	46.171488	0.00341825	0.00157826	1.12E-05	1.37E-05	2.58E-05	0.0051764	0.02449411	0.00699098	1032422.06
14637404	810.789189	841.251532	1079.27986	791.303334	4.03E-06	2.49E-05	46.386093	0.0034275	0.00158989	1.12E-05	1.37E-05	2.58E-05	0.00517913	0.02456039	0.00699148	1036119.08
14689790.9	810.789189	841.246646	1079.36371	791.299504	4.03E-06	2.49E-05	46.7205011	0.00343907	0.00160675	1.12E-05	1.37E-05	2.58E-05	0.00518303	0.02464323	0.00699216	1041996.58
14755274.5	810.789189	841.240658	1079.55576	791.29408	4.03E-06	2.49E-05	47.1035958	0.00345352	0.00162673	1.12E-05	1.37E-05	2.58E-05	0.00518823	0.02474679	0.00699307	1050515.56
14837129	810.789189	841.232122	1079.82059	791.287132	4.03E-06	2.49E-05	47.6161193	0.00347158	0.00165303	1.12E-05	1.37E-05	2.58E-05	0.00519456	0.02487624	0.00699417	1060660.44
14939447.2	810.789189	841.223296	1080.16722	791.278362	4.03E-06	2.49E-05	48.2215364	0.00349416	0.00168494	1.13E-05	1.37E-05	2.58E-05	0.00520252	0.02503805	0.0069956	1073999.96
15067344.9	810.789189	841.22836	1080.61249	791.267421	4.03E-06	2.49E-05	48.9220686	0.00352239	0.00172323	1.13E-05	1.37E-05	2.58E-05	0.00521251	0.02524031	0.00699742	1090238.44
15227217	810.789189	841.235155	1081.16763	791.253787	4.03E-06	2.49E-05	49.7997409	0.00355767	0.00177171	1.13E-05	1.37E-05	2.58E-05	0.00522505	0.02549314	0.0069997	1109805.17
15427057.1	810.789189	841.241629	1081.83384	791.237009	4.03E-06	2.49E-05	50.8141212	0.00360178	0.00183021	1.13E-05	1.37E-05	2.58E-05	0.0052402	0.02580917	0.00700257	1134601.98
15676857.3	810.789189	841.247441	1082.63438	791.216698	4.03E-06	2.49E-05	51.9912337	0.00365691	0.00190127	1.13E-05	1.36E-05	2.59E-05	0.0052585	0.02620422	0.00700615	1164616.26
15989107.5	810.789189	841.2523	1083.58687	791.192347	4.03E-06	2.49E-05	53.3138586	0.00372582	0.00198638	1.13E-05	1.36E-05	2.59E-05	0.00528079	0.02669802	0.00701064	1201180.38
16379420.3	810.789189	841.254676	1084.70537	791.163463	4.03E-06	2.49E-05	54.8623129	0.00381196	0.00209133	1.14E-05	1.36E-05	2.59E-05	0.00530777	0.02731528	0.00701628	1245133.84
16867311.3	810.789189	841.251662	1085.99689	791.129643	4.03E-06	2.49E-05	56.6141733	0.00391964	0.00221907	1.14E-05	1.35E-05	2.59E-05	0.00534021	0.02808685	0.00702342	1299449.09
17477175	810.789189	841.238945	1087.45613	791.09071	4.03E-06	2.49E-05	58.3930014	0.00405423	0.00236739	1.15E-05	1.35E-05	2.60E-05	0.00537892	0.02905131	0.00703248	1365732.66
18239504.7	810.789189	841.209749	1089.05885	791.046817	4.03E-06	2.49E-05	60.2655069	0.00422247	0.0025447	1.15E-05	1.34E-05	2.60E-05	0.00542471	0.03025689	0.00704404	1443091.27
19192416.7	810.789189	841.153704	1090.75497	790.998599	4.03E-06	2.50E-05	61.8898175	0.00443278	0.00274344	1.16E-05	1.34E-05	2.60E-05	0.00547834	0.03176387	0.00705889	1535800.96
20192416.7	810.789189	841.073985	1092.18922	790.955533	4.03E-06	2.50E-05	62.9669631	0.00465348	0.00293015	1.16E-05	1.33E-05	2.61E-05	0.00553047	0.03334531	0.00707536	1639145.4
21192416.7	810.789189	841.005561	1093.3267	790.918864	4.03E-06	2.50E-05	63.6974939	0.00487417	0.00310473	1.16E-05	1.33E-05	2.62E-05	0.00557897	0.03492675	0.00709228	1736363.48
21312419	810.789189	841.001457	1093.43426	790.915093	4.03E-06	2.50E-05	63.7731661	0.00490066	0.0031253	1.17E-05	1.33E-05	2.62E-05	0.00558437	0.03511652	0.00709765	1823177.07
21312666.4	810.407875	840.498473	1092.06842	790.55121	4.03E-06	2.50E-05	63.773321	0.00490071	0.00312535	1.17E-05	1.33E-05	2.62E-05	0.00557958	0.03511691	0.00709223	1832479.64
21312913.8	810.025442	839.99435	1090.70129	790.186422	4.03E-06	2.50E-05	63.7734753	0.00490077	0.00312539	1.17E-05	1.33E-05	2.61E-05	0.00557486	0.0351173	0.00708637	1831631.05
21313223	809.545821	839.362572	1088.99087	789.729228	4.03E-06	2.50E-05	63.7736673	0.00490083	0.00312544	1.16E-05	1.33E-05	2.61E-05	0.00556912	0.03511779	0.00707902	1830561.99
21313609.6	808.94381	838.570423	1086.85025	789.155831	4.03E-06	2.50E-05	63.773906	0.00490092	0.00312551	1.16E-05	1.33E-05	2.61E-05	0.0055622	0.03511839	0.0070698	1829220.97
21314092.7	808.187389	837.577453	1084.17026	788.436097	4.03E-06	2.49E-05	63.7742025	0.00490102	0.00312559	1.16E-05	1.33E-05	2.60E-05	0.00555377	0.03511914	0.00705822	1827537.48
21314696.7	807.235702	836.34252	1080.81353	787.531692	4.03E-06	2.49E-05	63.7745699	0.00490115	0.00312569	1.16E-05	1.33E-05	2.60E-05	0.00554343	0.03512006	0.00704373	1825421.86
21315451.7	806.036363	834.787625	1076.60685	786.393712	4.03E-06	2.49E-05	63.7750243	0.00490131	0.00312581	1.16E-05	1.33E-05	2.59E-05	0.00553069	0.03512121	0.00702548	1822759.7
21316019	805.127969	833.611578	1073.43774	785.533115	4.03E-06	2.49E-05	63.7753622	0.00490143	0.0031259	1.16E-05	1.33E-05	2.59E-05	0.00552117	0.03512206	0.00701168	1820770.47
21316774	805.127969	833.611653	1073.43748	785.533069	4.03E-06	2.49E-05	63.7758097	0.00490159	0.00312603	1.16E-05	1.33E-05	2.59E-05	0.00552211	0.03512319	0.00701169	1820815.53
21317717.7	805.127969	833.612116	1073.43873	785.533074	4.03E-06	2.49E-05	63.7763692	0.00490178	0.00312618	1.16E-05	1.33E-05	2.59E-05	0.00552276	0.0351246	0.0070117	1820874.56
21318897.3	805.127969	833.612422	1073.43971	785.533075	4.03E-06	2.49E-05	63.7770684	0.00490203	0.00312637	1.16E-05	1.33E-05	2.59E-05	0.00552321	0.03512636	0.00701172	1820949.25
21320371.9	805.127969	833.612624	1073.44053	785.533074	4.03E-06	2.49E-05	63.7779423	0.00490234	0.00312661	1.16E-05	1.33E-05	2.59E-05	0.00552352	0.03512857	0.00701175	1821043.21
21322215.1	805.127969	833.612752	1073.44121	785.533069	4.03E-06	2.49E-05	63.7790346	0.00490272	0.00312691	1.16E-05	1.33E-05	2.59E-05	0.00552371	0.03513133	0.00701177	1821161.13
21324519.1	805.127969	833.612821	1073.44177	785.533062	4.03E-06	2.49E-05	63.7803996	0.0049032	0.00312728	1.16E-05	1.33E-05	2.59E-05	0.00552382	0.03513477	0.00701181	1821308.91

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
21327399.1	805.127969	833.612847	1073.44219	785.53305	4.03E-06	2.49E-05	63.7821056	0.0049038	0.00312775	1.16E-05	1.33E-05	2.59E-05	0.00552389	0.03513908	0.00701186	1821493.95
21330999.1	805.127969	833.612845	1073.44245	785.533033	4.03E-06	2.49E-05	63.7842375	0.00490456	0.00312833	1.16E-05	1.33E-05	2.59E-05	0.00552395	0.03514446	0.00701191	1821725.51
21335499.1	805.127969	833.612832	1073.44255	785.533011	4.03E-06	2.49E-05	63.7869014	0.00490549	0.00312906	1.16E-05	1.33E-05	2.59E-05	0.00552404	0.03515119	0.00701198	1822015.13
21341124.1	805.127969	833.612818	1073.44251	785.532983	4.03E-06	2.49E-05	63.7902299	0.00490667	0.00312998	1.16E-05	1.33E-05	2.59E-05	0.00552416	0.0351596	0.00701207	1822377.3
21348155.4	805.127969	833.612807	1073.44233	785.532947	4.03E-06	2.49E-05	63.7943882	0.00490814	0.00313112	1.16E-05	1.33E-05	2.59E-05	0.00552433	0.03517012	0.00701219	1822830.09
21356944.4	805.127969	833.6128	1073.44205	785.532902	4.03E-06	2.49E-05	63.7995827	0.00490997	0.00313254	1.16E-05	1.33E-05	2.59E-05	0.00552454	0.03518326	0.00701232	1823396.14
21367930.7	805.127969	833.612796	1073.44166	785.532846	4.03E-06	2.49E-05	63.8060703	0.00491226	0.00313432	1.16E-05	1.33E-05	2.59E-05	0.00552482	0.03519969	0.0070125	1824103.73
21381663.7	805.127969	833.612793	1073.44116	785.532775	4.03E-06	2.49E-05	63.8141713	0.00491513	0.00313655	1.16E-05	1.33E-05	2.59E-05	0.00552517	0.03522022	0.00701272	1824988.24
21398829.8	805.127969	833.612791	1073.44053	785.532687	4.03E-06	2.49E-05	63.8242842	0.00491871	0.00313933	1.16E-05	1.33E-05	2.59E-05	0.0055256	0.03524589	0.00701299	1826093.89
21420287.5	805.127969	833.612789	1073.43974	785.532576	4.03E-06	2.49E-05	63.8369048	0.00492319	0.00314281	1.16E-05	1.33E-05	2.59E-05	0.00552615	0.03527798	0.00701333	1827475.98
21447109.6	805.127969	833.612784	1073.43874	785.532439	4.03E-06	2.49E-05	63.8526481	0.00492879	0.00314716	1.16E-05	1.33E-05	2.59E-05	0.00552684	0.03531809	0.00701375	1829203.62
21480637.2	805.127969	833.612775	1073.4375	785.532266	4.03E-06	2.49E-05	63.8722772	0.00493578	0.0031526	1.16E-05	1.33E-05	2.59E-05	0.0055277	0.03536822	0.00701429	1831363.23
21522546.7	805.127969	833.612757	1073.43595	785.532051	4.03E-06	2.49E-05	63.8967353	0.00494453	0.00315939	1.16E-05	1.33E-05	2.59E-05	0.00552877	0.03543089	0.00701495	1834062.82
21574933.6	805.127969	833.612723	1073.434	785.531775	4.03E-06	2.49E-05	63.9271866	0.00495546	0.00316789	1.16E-05	1.33E-05	2.59E-05	0.00553012	0.03550923	0.00701578	1837437.41
21640417.2	805.127969	833.612525	1073.42858	785.531004	4.03E-06	2.49E-05	63.9650623	0.00496913	0.0031785	1.16E-05	1.33E-05	2.59E-05	0.00553172	0.03560715	0.00701682	1841717.57
21722271.7	805.127969	833.612414	1073.42482	785.530443	4.03E-06	2.49E-05	64.012115	0.00498621	0.00319178	1.16E-05	1.33E-05	2.59E-05	0.00553375	0.03572955	0.00701813	1847010.91
21824589.9	805.127969	833.611991	1073.4201	785.529695	4.03E-06	2.49E-05	64.0704795	0.00500756	0.00320837	1.16E-05	1.33E-05	2.59E-05	0.00553631	0.03588255	0.00701976	1853634.12
21952487.6	805.127969	833.609848	1073.4144	785.528695	4.03E-06	2.49E-05	64.1427388	0.00503425	0.00322911	1.16E-05	1.33E-05	2.59E-05	0.00553962	0.0360738	0.0070218	1861932.11
22112359.7	805.127969	833.603296	1073.40724	785.527198	4.03E-06	2.49E-05	64.2319926	0.00506761	0.00325503	1.17E-05	1.33E-05	2.59E-05	0.00554407	0.03631287	0.00702434	1872345.16
22312199.8	805.127969	833.599433	1073.39838	785.524972	4.03E-06	2.49E-05	64.3419207	0.00510931	0.00328743	1.17E-05	1.33E-05	2.59E-05	0.00554992	0.0366117	0.00702753	1885430.85
22562000	805.127969	833.592957	1073.38741	785.521651	4.03E-06	2.49E-05	64.4768328	0.00516144	0.00332794	1.17E-05	1.33E-05	2.59E-05	0.00555796	0.03698524	0.0070316	1901895.41
22874250.2	805.127969	833.583654	1073.42298	785.516698	4.03E-06	2.49E-05	64.6416886	0.0052266	0.00337857	1.17E-05	1.33E-05	2.59E-05	0.00556866	0.03745216	0.0070367	1922627.17
23264563	805.127969	833.570815	1073.47972	785.509818	4.03E-06	2.49E-05	64.8420664	0.00530806	0.00344185	1.17E-05	1.33E-05	2.60E-05	0.00558242	0.03803581	0.00704314	1948686.63
23752454	805.127969	833.552185	1073.64669	785.500345	4.03E-06	2.49E-05	65.0840537	0.00540987	0.00352096	1.17E-05	1.33E-05	2.60E-05	0.00560002	0.03876538	0.00705129	1981449.41
24362317.7	805.127969	833.524476	1073.87676	785.488163	4.03E-06	2.49E-05	65.3740234	0.00553714	0.00361985	1.17E-05	1.33E-05	2.60E-05	0.00562176	0.03967734	0.00706164	2022538.94
25124647.4	805.127969	833.482654	1074.21402	785.47285	4.03E-06	2.49E-05	65.7182644	0.00569622	0.00374346	1.17E-05	1.32E-05	2.61E-05	0.005648	0.04081729	0.00707482	2074029.06
25596874	805.127969	833.453637	1074.41802	785.463779	4.03E-06	2.50E-05	65.9220247	0.00579477	0.00382003	1.17E-05	1.32E-05	2.61E-05	0.00566378	0.04152343	0.00708453	2136688.39
25597817.7	804.927561	833.15266	1073.25742	785.246476	4.03E-06	2.49E-05	65.9224243	0.00579496	0.00382018	1.17E-05	1.32E-05	2.61E-05	0.00565985	0.04152484	0.00708281	2173849.97
25598761.4	804.726218	832.850484	1072.09603	785.028437	4.03E-06	2.49E-05	65.9228224	0.00579516	0.00382033	1.17E-05	1.32E-05	2.61E-05	0.005656	0.04152625	0.00707941	2173284.64
25599941.1	804.473214	832.471173	1070.64298	784.754861	4.03E-06	2.49E-05	65.9233179	0.0057954	0.00382052	1.17E-05	1.32E-05	2.61E-05	0.00565136	0.04152799	0.00707515	2172555.68
25600474	804.358432	832.299244	1069.98595	784.630893	4.03E-06	2.49E-05	65.9235411	0.00579551	0.00382061	1.17E-05	1.32E-05	2.61E-05	0.00564929	0.04152878	0.00707322	2172284.78
25601653.6	804.358432	832.299235	1069.98591	784.630885	4.03E-06	2.49E-05	65.9240345	0.00579576	0.0038208	1.17E-05	1.32E-05	2.61E-05	0.00564941	0.04153052	0.00707324	2172326.84
25603128.2	804.358432	832.299234	1069.98652	784.63088	4.03E-06	2.49E-05	65.9246512	0.00579606	0.00382103	1.17E-05	1.32E-05	2.61E-05	0.00564946	0.0415327	0.00707327	2172420.5
25604971.4	804.358432	832.299226	1069.98696	784.630873	4.03E-06	2.49E-05	65.925422	0.00579644	0.00382133	1.17E-05	1.32E-05	2.61E-05	0.00564947	0.04153541	0.0070733	2172537.96
25607275.4	804.358432	832.299213	1069.98728	784.630863	4.03E-06	2.49E-05	65.9263853	0.00579691	0.0038217	1.17E-05	1.32E-05	2.61E-05	0.00564947	0.04153881	0.00707334	2172685.04
25610155.4	804.358432	832.299194	1069.98748	784.63085	4.03E-06	2.49E-05	65.9275892	0.00579751	0.00382216	1.17E-05	1.32E-05	2.61E-05	0.00564949	0.04154306	0.00707339	2172869.05
25613755.4	804.358432	832.29917	1069.98757	784.630833	4.03E-06	2.49E-05	65.9290938	0.00579825	0.00382273	1.17E-05	1.32E-05	2.61E-05	0.00564953	0.04154837	0.00707346	2173099.2
25618255.4	804.358432	832.29914	1069.98755	784.630811	4.03E-06	2.49E-05	65.930974	0.00579917	0.00382345	1.17E-05	1.32E-05	2.61E-05	0.00564961	0.04155501	0.00707354	2173386.98
25623880.4	804.358432	832.299102	1069.98742	784.630783	4.03E-06	2.49E-05	65.9333234	0.00580033	0.00382435	1.17E-05	1.32E-05	2.61E-05	0.00564973	0.04156331	0.00707364	2173746.77
25630911.7	804.358432	832.299056	1069.9872	784.630747	4.03E-06	2.49E-05	65.9362588	0.00580178	0.00382548	1.17E-05	1.32E-05	2.61E-05	0.00564989	0.04157368	0.00707377	2174196.56
25639700.7	804.358432	832.298998	1069.98689	784.630701	4.03E-06	2.49E-05	65.9399261	0.00580359	0.00382688	1.17E-05	1.32E-05	2.61E-05	0.00565009	0.04158664	0.00707392	2174758.82
25650687	804.358432	832.298834	1069.98594	784.630574	4.03E-06	2.49E-05	65.9445069	0.00580585	0.00382864	1.17E-05	1.32E-05	2.61E-05	0.00565034	0.04160285	0.00707412	2175473.37
25664420	804.358432	832.298718	1069.98529	784.630485	4.03E-06	2.49E-05	65.9502279	0.00580868	0.00383084	1.17E-05	1.32E-05	2.61E-05	0.00565065	0.0416231	0.00707437	2176354.87
25681586.1	804.358432	832.298572	1069.98447	784.630374	4.03E-06	2.49E-05	65.9573713	0.00581221	0.00383358	1.17E-05	1.32E-05	2.61E-05	0.00565104	0.04164842	0.00707468	2177456.77
25703043.8	804.358432	832.298415	1069.98351	784.630235	4.03E-06	2.49E-05	65.9662884	0.00581663	0.00383701	1.17E-05	1.32E-05	2.61E-05	0.00565153	0.04168007	0.00707506	2178834.23
25729865.9	804.358432	832.298212	1069.98226	784.630056	4.03E-06	2.49E-05	65.9774157	0.00582215	0.0038413	1.17E-05	1.32E-05	2.61E-05	0.00565214	0.04171964	0.00707554	2180556.75

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
25763393.5	804.358432	832.297837	1069.98069	784.629829	4.03E-06	2.49E-05	65.9912953	0.00582905	0.00384667	1.17E-05	1.32E-05	2.61E-05	0.00565291	0.04176909	0.00707615	2182711.75
25805303	804.358432	832.296837	1069.97873	784.629522	4.03E-06	2.49E-05	66.0085985	0.00583768	0.00385337	1.17E-05	1.32E-05	2.61E-05	0.0056539	0.04183091	0.0070769	2185409.51
25857689.9	804.358432	832.295165	1069.97631	784.629104	4.03E-06	2.49E-05	66.0301558	0.00584846	0.00386175	1.17E-05	1.32E-05	2.61E-05	0.00565518	0.04190818	0.00707783	2188790.12
25923173.5	804.358432	832.292358	1069.97336	784.628527	4.03E-06	2.49E-05	66.0569908	0.00586194	0.00387222	1.17E-05	1.32E-05	2.61E-05	0.00565684	0.04200477	0.00707901	2193029.87
26005028	804.358432	832.28805	1069.96967	784.627703	4.03E-06	2.49E-05	66.0903616	0.00587879	0.00388531	1.17E-05	1.32E-05	2.61E-05	0.00565906	0.04212551	0.00708047	2198351.81
26107346.2	804.358432	832.282055	1069.97522	784.626511	4.03E-06	2.49E-05	66.131807	0.00589985	0.00390168	1.17E-05	1.32E-05	2.61E-05	0.00566199	0.04227644	0.00708229	2205038.18
26235243.9	804.358432	832.274406	1069.98531	784.624857	4.03E-06	2.49E-05	66.1831995	0.00592618	0.00392214	1.17E-05	1.32E-05	2.61E-05	0.00566577	0.04246509	0.00708457	2213431.66
26261755	804.358432	832.27287	1069.99057	784.62451	4.03E-06	2.49E-05	66.1937953	0.00593164	0.00392638	1.17E-05	1.32E-05	2.61E-05	0.00566657	0.0425042	0.00708544	2223593.07
26265355	803.788828	832.455452	1078.62767	784.684348	4.03E-06	2.49E-05	66.1952535	0.00593239	0.00392696	1.17E-05	1.32E-05	2.61E-05	0.00569937	0.04250958	0.00708461	2228465.83
26291866.1	803.788828	832.455349	1078.63473	784.68389	4.03E-06	2.49E-05	66.2061354	0.00593801	0.00393132	1.17E-05	1.32E-05	2.61E-05	0.00569805	0.04254983	0.00708503	2228850.03
26325005	803.788828	832.453008	1078.64807	784.683311	4.03E-06	2.49E-05	66.2197088	0.00594503	0.00393678	1.17E-05	1.32E-05	2.61E-05	0.00569892	0.04260014	0.00708564	2231115.24
26366428.7	803.788828	832.449699	1078.66543	784.682546	4.03E-06	2.49E-05	66.2366305	0.0059538	0.0039436	1.18E-05	1.32E-05	2.61E-05	0.00570025	0.04266302	0.00708641	2233956.25
26418208.2	803.788828	832.445537	1078.68706	784.681614	4.03E-06	2.49E-05	66.2577127	0.00596477	0.00395212	1.18E-05	1.32E-05	2.61E-05	0.00570195	0.04274163	0.0070874	2237501.92
26482932.7	803.788828	832.440268	1078.7138	784.680453	4.03E-06	2.50E-05	66.2839566	0.00597848	0.00396278	1.18E-05	1.32E-05	2.61E-05	0.00570408	0.04283988	0.00708863	2241933.81
26563838.2	803.788828	832.433598	1078.74676	784.679009	4.03E-06	2.50E-05	66.3165926	0.00599562	0.00397609	1.18E-05	1.32E-05	2.61E-05	0.00570673	0.04296271	0.00709017	2247473.31
26664970.2	803.788828	832.425145	1078.78729	784.677214	4.03E-06	2.50E-05	66.3571262	0.00601705	0.00399274	1.18E-05	1.32E-05	2.61E-05	0.00571005	0.04311623	0.00709209	2254397.14
26791385.1	803.788828	832.414401	1078.83705	784.674985	4.03E-06	2.50E-05	66.4073891	0.00604383	0.00401355	1.18E-05	1.32E-05	2.61E-05	0.00571417	0.04330814	0.00709451	2263051.83
26949403.7	803.788828	832.400704	1078.8991	784.672224	4.03E-06	2.50E-05	66.4695947	0.00607731	0.00403956	1.18E-05	1.32E-05	2.61E-05	0.00571931	0.04354803	0.00709755	2273868.96
27146927	803.788828	832.383154	1078.97798	784.668817	4.03E-06	2.50E-05	66.5463946	0.00611915	0.00407208	1.18E-05	1.32E-05	2.62E-05	0.00572571	0.04384788	0.00710135	2287387.73
27393831.2	803.788828	832.360547	1079.07265	784.664626	4.03E-06	2.50E-05	66.6409298	0.00617146	0.00411272	1.18E-05	1.32E-05	2.62E-05	0.00573367	0.0442227	0.00710614	2304282.13
27702461.3	803.788828	832.331247	1079.18461	784.65949	4.04E-06	2.50E-05	66.7568689	0.00623685	0.00416352	1.18E-05	1.32E-05	2.62E-05	0.00574355	0.04469123	0.00711233	2325393.63
28088249	803.788828	832.292956	1079.31775	784.653219	4.04E-06	2.50E-05	66.8984186	0.00631858	0.00422703	1.18E-05	1.32E-05	2.62E-05	0.00575584	0.04527689	0.00712014	2351774.25
28570483.7	803.788828	832.772847	1079.47356	784.695902	4.04E-06	2.50E-05	67.070288	0.00642074	0.00430641	1.18E-05	1.32E-05	2.62E-05	0.00577197	0.04600896	0.00713012	2384921.56
29173277	803.788828	832.735614	1079.64982	784.686791	4.04E-06	2.50E-05	67.2775835	0.00654845	0.00440564	1.18E-05	1.31E-05	2.63E-05	0.0057908	0.04692405	0.00714262	2426095.04
29926768.6	803.788828	832.692105	1079.84394	784.675958	4.04E-06	2.50E-05	67.5256036	0.00670808	0.00452967	1.18E-05	1.31E-05	2.63E-05	0.00581397	0.04806791	0.00715851	2477520.86
30868633.2	803.788828	832.641922	1080.04354	784.663231	4.05E-06	2.50E-05	67.8195087	0.00690761	0.00468471	1.18E-05	1.31E-05	2.64E-05	0.0058424	0.04949774	0.00717881	2541739.93
31868633.2	803.788828	832.593239	1080.2045	784.650692	4.05E-06	2.50E-05	68.1135234	0.00711947	0.00484932	1.18E-05	1.31E-05	2.65E-05	0.00587216	0.05101582	0.00720145	2621445.88
32714598	803.788828	832.127532	1080.12197	784.597237	4.06E-06	2.50E-05	68.3489223	0.00729869	0.00498858	1.19E-05	1.31E-05	2.65E-05	0.00559329	0.05230007	0.00722123	2704761.78
32718198	644.15	644.175799	644.154096	644.151101	4.06E-06	2.48E-05	68.3494109	0.00729907	0.00498887	1.17E-05	1.31E-05	1.89E-05	0.00390501	0.0523028	0.005186	2271498.62
32721798	305	305.051386	305.006658	305.002179	4.06E-06	2.45E-05	68.3494109	0.00729907	0.00498887	1.15E-05	1.30E-05	2.62E-06	0.0018842	0.0523028	0.00077549	1085561.5
32725398	305	305.051386	305.006658	305.002179	4.06E-06	2.45E-05	68.3494109	0.00729907	0.00498887	1.15E-05	1.30E-05	2.62E-06	0.0018842	0.0523028	0.00077549	1085561.5
32728998	778.966356	802.498979	1020.37279	762.788336	4.06E-06	2.49E-05	68.3498253	0.0072994	0.00498912	1.18E-05	1.31E-05	2.52E-05	0.00528456	0.05230512	0.00687112	2696734.64
32732598	778.966356	802.49097	1020.37705	762.792204	4.06E-06	2.49E-05	68.3506541	0.00730004	0.00498963	1.18E-05	1.31E-05	2.52E-05	0.00527904	0.05230975	0.00687122	2696879.46
32737098	778.966356	802.483394	1020.37587	762.792195	4.06E-06	2.49E-05	68.3516899	0.00730085	0.00499026	1.18E-05	1.31E-05	2.52E-05	0.0052772	0.05231555	0.0068713	2697069.73
32742723	778.966356	802.480857	1020.37467	762.79215	4.06E-06	2.49E-05	68.3529844	0.00730186	0.00499104	1.18E-05	1.31E-05	2.52E-05	0.00527682	0.05232279	0.00687141	2697372.31
32749754.3	778.966356	802.4805	1020.37392	762.792098	4.06E-06	2.49E-05	68.3546019	0.00730313	0.00499202	1.18E-05	1.31E-05	2.52E-05	0.00527712	0.05233185	0.00687154	2697763.21
32758543.3	778.966356	802.481212	1020.37344	762.792048	4.06E-06	2.49E-05	68.3566231	0.00730471	0.00499325	1.18E-05	1.31E-05	2.52E-05	0.00527769	0.05234317	0.0068717	2698250.02
32769529.6	778.966356	802.482497	1020.37311	762.791994	4.06E-06	2.49E-05	68.3591483	0.00730668	0.00499479	1.18E-05	1.31E-05	2.52E-05	0.00527835	0.05235732	0.00687191	2698855.93
32783262.6	778.966356	802.484096	1020.37283	762.791932	4.06E-06	2.49E-05	68.3623029	0.00730915	0.0049967	1.18E-05	1.31E-05	2.52E-05	0.00527907	0.05237501	0.00687216	2699613
32800428.7	778.966356	802.486116	1020.37253	762.791855	4.06E-06	2.49E-05	68.3662431	0.00731224	0.0049991	1.18E-05	1.31E-05	2.52E-05	0.00527988	0.05239712	0.00687248	2700559.86
32821886.4	778.966356	802.488196	1020.3721	762.791759	4.06E-06	2.49E-05	68.3711638	0.00731609	0.0050021	1.18E-05	1.31E-05	2.52E-05	0.00528078	0.05242476	0.00687289	2701741
32848708.5	778.966356	802.490805	1020.37158	762.791638	4.06E-06	2.49E-05	68.3773073	0.00732091	0.00500584	1.18E-05	1.31E-05	2.52E-05	0.00528183	0.0524593	0.00687339	2703217.64
32882236.1	778.966356	802.493687	1020.37088	762.791486	4.06E-06	2.49E-05	68.3849753	0.00732694	0.00501053	1.18E-05	1.31E-05	2.52E-05	0.00528306	0.05250249	0.00687401	2705061.8
32896765	778.490606	802.01294	1020.10636	762.425415	4.06E-06	2.49E-05	68.3882942	0.00732955	0.00501256	1.18E-05	1.31E-05	2.52E-05	0.00528214	0.0525212	0.00686825	2706085.22
32898608.2	785.487562	810.340536	1037.41372	768.587866	4.06E-06	2.49E-05	68.388726	0.00732989	0.00501282	1.18E-05	1.31E-05	2.56E-05	0.00533557	0.05252364	0.00696803	2728880.16
32900365	792.161446	818.28	1053.81334	774.466995	4.06E-06	2.49E-05	68.3891576	0.00733023	0.00501308	1.18E-05	1.31E-05	2.59E-05	0.00538111	0.05252607	0.00706323	2749816.65

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
32902208.2	792.161446	818.275009	1053.81086	774.467117	4.06E-06	2.49E-05	68.3896208	0.0073306	0.00501337	1.18E-05	1.31E-05	2.59E-05	0.00537839	0.05252868	0.00706327	2749916.3
32904512.2	792.161446	818.273401	1053.80973	774.467135	4.06E-06	2.49E-05	68.3901998	0.00733105	0.00501372	1.18E-05	1.31E-05	2.59E-05	0.0053772	0.05253195	0.00706332	2750033.43
32907392.2	792.161446	818.273059	1053.80879	774.467126	4.06E-06	2.49E-05	68.3909233	0.00733162	0.00501416	1.18E-05	1.31E-05	2.59E-05	0.00537668	0.05253603	0.00706338	2750205.02
32910992.2	792.161446	818.273283	1053.80809	774.467107	4.06E-06	2.49E-05	68.3918276	0.00733233	0.00501472	1.18E-05	1.31E-05	2.59E-05	0.0053766	0.05254114	0.00706345	2750425.5
32915492.2	792.161446	818.273857	1053.80757	774.467082	4.06E-06	2.49E-05	68.3929577	0.00733322	0.00501541	1.18E-05	1.31E-05	2.60E-05	0.00537681	0.05254752	0.00706355	2750701.56
32921117.2	792.161446	818.274671	1053.8072	774.467051	4.06E-06	2.49E-05	68.39437	0.00733434	0.00501627	1.18E-05	1.31E-05	2.60E-05	0.0053772	0.05255549	0.00706367	2751046.84
32928148.5	792.161446	818.275705	1053.80691	774.467013	4.06E-06	2.49E-05	68.3961347	0.00733573	0.00501735	1.18E-05	1.31E-05	2.60E-05	0.00537771	0.05256546	0.00706382	2751478.76
32936937.5	792.161446	818.276922	1053.80665	774.466965	4.06E-06	2.49E-05	68.3983397	0.00733747	0.00501871	1.18E-05	1.31E-05	2.60E-05	0.00537834	0.05257792	0.007064	2752018.7
32947923.8	792.161446	818.278408	1053.80639	774.466906	4.06E-06	2.49E-05	68.4010944	0.00733964	0.00502039	1.18E-05	1.31E-05	2.60E-05	0.00537911	0.0525935	0.00706423	2752693.49
32961656.8	792.161446	818.280238	1053.80607	774.466833	4.06E-06	2.49E-05	68.4045355	0.00734236	0.00502251	1.18E-05	1.31E-05	2.60E-05	0.00538007	0.05261297	0.00706452	2753536.88
32978822.9	792.161446	818.282571	1053.8057	774.466741	4.06E-06	2.49E-05	68.4088334	0.00734575	0.00502514	1.18E-05	1.31E-05	2.60E-05	0.00538125	0.05263731	0.00706489	2754591.23
33000280.6	792.161446	818.285246	1053.8052	774.466627	4.06E-06	2.50E-05	68.4142	0.00735	0.00502844	1.18E-05	1.31E-05	2.60E-05	0.00538267	0.05266773	0.00706534	2755908.3
33027102.7	792.161446	818.288444	1053.80455	774.466483	4.06E-06	2.50E-05	68.4208997	0.00735531	0.00503257	1.18E-05	1.31E-05	2.60E-05	0.00538434	0.05270575	0.00706591	2757554.34
33060630.3	792.161446	818.292145	1053.80368	774.466303	4.06E-06	2.50E-05	68.4292607	0.00736194	0.00503772	1.18E-05	1.31E-05	2.60E-05	0.00538634	0.05275329	0.00706662	2759611.08
33102539.8	792.161446	818.29656	1053.80256	774.466078	4.06E-06	2.50E-05	68.4396908	0.00737023	0.00504416	1.18E-05	1.31E-05	2.60E-05	0.00538875	0.0528127	0.00706751	2762181.39
33154926.7	792.161446	818.301735	1053.80111	774.4658	4.06E-06	2.50E-05	68.4526954	0.0073806	0.00505222	1.18E-05	1.31E-05	2.60E-05	0.00539163	0.05288698	0.00706862	2765393.05
33220410.3	792.161446	818.308046	1053.79928	774.465452	4.06E-06	2.50E-05	68.4688999	0.00739355	0.00506228	1.18E-05	1.31E-05	2.60E-05	0.0053952	0.05297981	0.00707001	2769407.39
33302264.8	792.161446	818.315701	1053.79697	774.465015	4.06E-06	2.50E-05	68.4890758	0.00740975	0.00507487	1.18E-05	1.31E-05	2.60E-05	0.0053996	0.05309586	0.00707175	2774424.87
33404583	792.161446	818.324975	1053.79407	774.464467	4.06E-06	2.50E-05	68.5141721	0.00742999	0.0050906	1.18E-05	1.31E-05	2.60E-05	0.00540505	0.05324092	0.00707394	2780696.21
33532480.7	792.161446	818.336139	1053.79042	774.463783	4.06E-06	2.50E-05	68.5453507	0.0074553	0.00511026	1.19E-05	1.31E-05	2.60E-05	0.00541179	0.05342225	0.00707667	2788534.85
33692352.8	792.161446	818.349415	1053.78582	774.462923	4.06E-06	2.50E-05	68.5840277	0.00748693	0.00513484	1.19E-05	1.31E-05	2.60E-05	0.00542014	0.05364891	0.00708009	2798331.41
33892192.9	792.161446	818.364971	1053.78001	774.461847	4.06E-06	2.50E-05	68.6319167	0.00752647	0.00516556	1.19E-05	1.31E-05	2.60E-05	0.0054304	0.05393223	0.00708439	2810574.91
34141993.1	792.161446	818.383016	1053.77271	774.460488	4.06E-06	2.50E-05	68.691075	0.00757589	0.00520396	1.19E-05	1.31E-05	2.60E-05	0.00544315	0.05428639	0.00708979	2825875.92
34391793.3	792.161446	818.400289	1053.76557	774.459127	4.06E-06	2.50E-05	68.7494664	0.00762531	0.00524236	1.19E-05	1.31E-05	2.61E-05	0.00545622	0.05464054	0.00709538	2844953.75
34641593.5	792.161446	818.416328	1053.75858	774.457753	4.06E-06	2.50E-05	68.8071058	0.00767474	0.00528076	1.19E-05	1.31E-05	2.61E-05	0.00546963	0.05499469	0.00710101	2864033.17
34891393.6	792.161446	818.430872	1053.75167	774.456369	4.06E-06	2.50E-05	68.8640076	0.00772416	0.00531917	1.19E-05	1.31E-05	2.61E-05	0.00548316	0.05534884	0.00710667	2883113.67
35141193.8	792.161446	818.443729	1053.74478	774.454969	4.06E-06	2.50E-05	68.9201858	0.00777358	0.00535757	1.19E-05	1.31E-05	2.61E-05	0.00549673	0.055703	0.00711236	2902194.8
35390994	792.161446	818.454766	1053.73789	774.453563	4.06E-06	2.50E-05	68.9756542	0.00782301	0.00539597	1.19E-05	1.31E-05	2.61E-05	0.00551028	0.05605715	0.00711808	2921276.1
35640794.2	792.161446	818.463943	1053.73103	774.452141	4.06E-06	2.50E-05	69.0304261	0.00787243	0.00543437	1.19E-05	1.31E-05	2.61E-05	0.00552387	0.0564113	0.00712383	2940358.08
35890594.4	792.161446	818.470947	1053.72421	774.450703	4.06E-06	2.50E-05	69.0845146	0.00792186	0.00547278	1.19E-05	1.31E-05	2.62E-05	0.00553743	0.05676546	0.00712961	2959440.07
36140394.5	792.161446	818.475588	1053.71736	774.449231	4.06E-06	2.50E-05	69.1379323	0.00797128	0.00551118	1.19E-05	1.31E-05	2.62E-05	0.005551	0.05711961	0.00714913	2978522.43
36390194.7	792.161446	818.476729	1053.71053	774.447704	4.06E-06	2.50E-05	69.1906918	0.0080207	0.00554958	1.19E-05	1.31E-05	2.62E-05	0.00556457	0.05747376	0.00721224	2997606.49
36639994.9	792.161446	818.479372	1053.70361	774.446052	4.07E-06	2.50E-05	69.242805	0.00807013	0.00558798	1.19E-05	1.31E-05	2.62E-05	0.00557807	0.05782792	0.00727607	3016690.79
36889795.1	792.161446	818.498165	1053.69668	774.444476	4.07E-06	2.50E-05	69.2942838	0.00811955	0.00562638	1.19E-05	1.31E-05	2.62E-05	0.00559167	0.05818207	0.00734151	3035778.69
37139595.3	792.161446	818.51192	1053.68935	774.442891	4.07E-06	2.50E-05	69.3451397	0.00816897	0.00566479	1.19E-05	1.31E-05	2.63E-05	0.0056049	0.05853622	0.00740768	3054865.77
37389395.4	792.161446	818.523105	1053.68178	774.441268	4.07E-06	2.50E-05	69.3953839	0.0082184	0.00570319	1.19E-05	1.31E-05	2.65E-05	0.00561858	0.05889038	0.00747457	3073959.49
37639195.6	792.161446	818.532292	1053.67211	774.43964	4.07E-06	2.50E-05	69.4450274	0.00826782	0.00574159	1.19E-05	1.31E-05	2.67E-05	0.00563204	0.05924453	0.00754219	3093054.48
37888995.8	792.161446	818.537418	1053.65537	774.437983	4.07E-06	2.50E-05	69.4940809	0.00831724	0.00577999	1.19E-05	1.31E-05	2.69E-05	0.00564543	0.05959868	0.00761051	3112151.7
38138796	792.161446	818.540129	1053.62985	774.436337	4.07E-06	2.50E-05	69.5425549	0.00836667	0.00581839	1.19E-05	1.31E-05	2.71E-05	0.00565864	0.05995284	0.00767954	3131250.93
38388596.2	792.161446	818.540179	1053.59783	774.434665	4.07E-06	2.50E-05	69.5904596	0.00841609	0.0058568	1.19E-05	1.31E-05	2.73E-05	0.00567243	0.06030699	0.00774926	3150357.24
38638396.4	792.161446	818.537551	1053.56354	774.43297	4.07E-06	2.50E-05	69.6378049	0.00846551	0.0058952	1.19E-05	1.31E-05	2.75E-05	0.00568626	0.06066114	0.00781966	3169467.84
38888196.5	792.161446	818.532358	1053.5282	774.431259	4.07E-06	2.50E-05	69.6846006	0.00851494	0.0059336	1.19E-05	1.31E-05	2.78E-05	0.00570021	0.0610153	0.00789161	3188582.83
39137996.7	792.161446	818.523515	1053.49241	774.429513	4.07E-06	2.50E-05	69.7308561	0.00856436	0.005972	1.19E-05	1.31E-05	2.80E-05	0.00571414	0.06136945	0.00796454	3207701.13
39387796.9	792.161446	818.511769	1053.45653	774.427745	4.08E-06	2.50E-05	69.7765809	0.00861379	0.0060104	1.19E-05	1.31E-05	2.82E-05	0.00572799	0.0617236	0.0080382	3226822.55
39574695	791.593043	817.927281	1053.11436	773.989017	4.08E-06	2.50E-05	69.8104501	0.00865076	0.00603914	1.19E-05	1.31E-05	2.83E-05	0.00573661	0.06198858	0.00809053	3244095.51
39578295	792.643859	819.16476	1055.6924	774.914581	4.08E-06	2.50E-05	69.8111019	0.00865148	0.00603969	1.19E-05	1.31E-05	2.84E-05	0.00574444	0.0619937	0.00812624	3262142.38

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
39765193.1	792.643859	819.150448	1055.65489	774.913172	4.08E-06	2.50E-05	69.8449131	0.00868872	0.00606863	1.19E-05	1.31E-05	2.86E-05	0.00575541	0.06226054	0.0081838	3262595.07
39952091.2	792.643859	819.134568	1055.6266	774.911748	4.08E-06	2.50E-05	69.8784357	0.00872596	0.00609756	1.19E-05	1.31E-05	2.88E-05	0.00576637	0.06252739	0.00824118	3277026.39
40138989.3	792.643859	819.117057	1055.59944	774.910316	4.08E-06	2.50E-05	69.9116734	0.0087632	0.0061265	1.19E-05	1.31E-05	2.90E-05	0.00577708	0.06279423	0.00829892	3291457.29
40325887.4	792.643859	819.097802	1055.57272	774.908875	4.08E-06	2.50E-05	69.9446297	0.00880043	0.00615543	1.19E-05	1.31E-05	2.91E-05	0.0057876	0.06306107	0.00835691	3305888.34
40512785.5	792.643859	819.541739	1055.54641	774.953596	4.08E-06	2.50E-05	69.9773084	0.00883767	0.00618437	1.19E-05	1.31E-05	2.93E-05	0.00579854	0.06332792	0.00841507	3320560.03
40699683.6	792.643859	819.533101	1055.51998	774.952174	4.08E-06	2.50E-05	70.0097128	0.00887491	0.0062133	1.19E-05	1.31E-05	2.95E-05	0.00580901	0.06359476	0.00847345	3334994.43
40886581.7	792.643859	819.524405	1055.49378	774.950737	4.08E-06	2.50E-05	70.0418464	0.00891215	0.00624224	1.19E-05	1.31E-05	2.97E-05	0.00581947	0.0638616	0.00853248	3349430.23
41073479.8	792.643859	819.515891	1055.46739	774.94929	4.09E-06	2.50E-05	70.0737126	0.00894939	0.00627117	1.19E-05	1.31E-05	2.99E-05	0.00582999	0.06412845	0.00859163	3363868.49
41260378	792.643859	819.507417	1055.44151	774.947844	4.09E-06	2.50E-05	70.1053147	0.00898663	0.00630011	1.19E-05	1.31E-05	3.00E-05	0.00584046	0.06439529	0.00865122	3378307.7
41447276.1	792.643859	819.499049	1055.4152	774.946384	4.09E-06	2.50E-05	70.136656	0.00902387	0.00632904	1.19E-05	1.31E-05	3.02E-05	0.00585104	0.06466214	0.00871134	3392749.71
41634174.2	792.643859	819.490902	1055.38985	774.944932	4.09E-06	2.50E-05	70.1677397	0.00906111	0.00635798	1.19E-05	1.31E-05	3.04E-05	0.00586147	0.06492898	0.00877157	3407191.57
41821072.3	792.643859	819.482862	1055.36415	774.943468	4.09E-06	2.50E-05	70.1985689	0.00909835	0.00638691	1.19E-05	1.31E-05	3.06E-05	0.00587197	0.06519582	0.00883191	3421635.65
42007970.4	792.643859	819.47507	1055.33925	774.941999	4.09E-06	2.50E-05	70.2291468	0.00913559	0.00641584	1.19E-05	1.31E-05	3.07E-05	0.00588238	0.06546267	0.00889235	3436080.09
42194062	793.426091	820.256581	1055.7491	775.542347	4.11E-06	2.50E-05	70.259346	0.00917267	0.00644465	1.19E-05	1.31E-05	3.09E-05	0.0058954	0.06572836	0.00895993	3453210.04
42194188.7	792.796477	819.510232	1054.21052	774.987947	4.11E-06	2.50E-05	70.2593664	0.00917269	0.00644467	1.19E-05	1.31E-05	3.09E-05	0.00589088	0.06572854	0.00894656	3464985.28
42194315.3	792.166904	818.763863	1052.67224	774.433461	4.11E-06	2.50E-05	70.2593868	0.00917272	0.00644469	1.19E-05	1.31E-05	3.09E-05	0.00588636	0.06572872	0.00893277	3462558.42
42194473.7	791.379995	817.831041	1050.74907	773.740422	4.11E-06	2.50E-05	70.2594121	0.00917275	0.00644472	1.19E-05	1.31E-05	3.08E-05	0.00588082	0.06572894	0.00891531	3459518.61
42194671.6	790.39645	816.665212	1048.34344	772.874221	4.11E-06	2.50E-05	70.2594435	0.00917279	0.00644475	1.19E-05	1.31E-05	3.07E-05	0.00587406	0.06572922	0.00889266	3455721.36
42194919	789.16716	815.208238	1045.33367	771.791634	4.11E-06	2.50E-05	70.2594826	0.00917283	0.00644479	1.19E-05	1.31E-05	3.06E-05	0.00586575	0.06572956	0.00886424	3450969.17
42195228.2	787.630771	813.387519	1041.56719	770.438652	4.11E-06	2.50E-05	70.2595309	0.00917289	0.00644483	1.19E-05	1.31E-05	3.05E-05	0.00585551	0.06572999	0.00882825	3445026.93
42195614.7	785.710638	811.112449	1036.8523	768.74782	4.11E-06	2.50E-05	70.2595905	0.00917297	0.00644489	1.19E-05	1.31E-05	3.04E-05	0.00584278	0.06573052	0.00878261	3437596.82
42195862.1	784.481961	809.656897	1033.83076	767.665916	4.11E-06	2.50E-05	70.2596283	0.00917301	0.00644493	1.19E-05	1.31E-05	3.03E-05	0.00583463	0.06573085	0.00875201	3432862.47
42196109.5	783.253447	808.20173	1030.80604	766.584205	4.11E-06	2.50E-05	70.2596658	0.00917306	0.00644496	1.19E-05	1.31E-05	3.02E-05	0.00582649	0.06573118	0.00872355	3428096.63
42196418.8	781.718036	806.383325	1027.02058	765.232323	4.11E-06	2.50E-05	70.2597121	0.00917312	0.00644501	1.19E-05	1.31E-05	3.01E-05	0.00581628	0.06573159	0.00868746	3422135.09
42196805.3	779.799137	804.11122	1022.28148	763.542857	4.11E-06	2.50E-05	70.2597693	0.00917319	0.00644506	1.19E-05	1.31E-05	2.99E-05	0.00580344	0.0657321	0.00863964	3414700.16
42197288.5	777.401091	801.272478	1016.34601	761.431667	4.11E-06	2.50E-05	70.2598397	0.00917327	0.00644513	1.19E-05	1.31E-05	2.97E-05	0.00578724	0.06573272	0.00858074	3405386.33
42197662	775.547815	799.079181	1011.74874	759.800175	4.11E-06	2.50E-05	70.2598933	0.00917334	0.00644518	1.19E-05	1.31E-05	2.96E-05	0.00577456	0.06573319	0.00853486	3398192.64
42198145.2	775.547815	799.078505	1011.7493	759.800008	4.11E-06	2.50E-05	70.2599621	0.00917342	0.00644524	1.19E-05	1.31E-05	2.96E-05	0.00577653	0.0657338	0.00853102	3398212.41
42198749.2	775.547815	799.078091	1011.75013	759.799976	4.11E-06	2.50E-05	70.2600481	0.00917353	0.00644533	1.19E-05	1.31E-05	2.96E-05	0.00577821	0.06573456	0.00852688	3398246.28
42199504.1	775.547815	799.077714	1011.75089	759.799947	4.11E-06	2.50E-05	70.2601556	0.00917366	0.00644543	1.19E-05	1.31E-05	2.95E-05	0.00577974	0.06573551	0.00852341	3398285.75
42200447.9	775.547815	799.077368	1011.75158	759.79992	4.11E-06	2.50E-05	70.26029	0.00917383	0.00644556	1.19E-05	1.31E-05	2.95E-05	0.00578113	0.0657367	0.00852036	3398334.52
42201627.5	775.547815	799.07705	1011.75221	759.799894	4.11E-06	2.50E-05	70.260458	0.00917404	0.00644572	1.19E-05	1.31E-05	2.95E-05	0.00578239	0.06573818	0.00851745	3398397.48
42203102.1	775.547815	799.07676	1011.75278	759.799869	4.11E-06	2.50E-05	70.260668	0.0091743	0.00644592	1.19E-05	1.31E-05	2.95E-05	0.00578353	0.06574004	0.00851497	3398476.19
42204945.3	775.547815	799.076493	1011.75328	759.799846	4.11E-06	2.50E-05	70.2609304	0.00917462	0.00644617	1.19E-05	1.31E-05	2.95E-05	0.00578452	0.06574236	0.00851307	3398574.49
42207249.3	775.547815	799.076241	1011.75373	759.799822	4.11E-06	2.50E-05	70.2612585	0.00917502	0.00644649	1.19E-05	1.31E-05	2.95E-05	0.00578535	0.06574526	0.00851167	3398698.72
42210129.3	775.547815	799.076029	1011.75409	759.799799	4.11E-06	2.50E-05	70.2616685	0.00917553	0.00644688	1.19E-05	1.31E-05	2.95E-05	0.00578601	0.06574888	0.00851098	3398853.41
42213729.3	775.547815	799.075835	1011.75437	759.799776	4.11E-06	2.50E-05	70.2621809	0.00917616	0.00644737	1.19E-05	1.31E-05	2.95E-05	0.00578655	0.06575341	0.00851093	3399046.71
42218229.3	775.547815	799.075642	1011.75458	759.79975	4.11E-06	2.50E-05	70.2628214	0.00917695	0.00644799	1.19E-05	1.31E-05	2.95E-05	0.00578699	0.06575907	0.00851148	3399288.73
42223854.3	775.547815	799.075431	1011.75469	759.799719	4.11E-06	2.50E-05	70.2636218	0.00917794	0.00644875	1.19E-05	1.31E-05	2.95E-05	0.00578742	0.06576615	0.00851259	3399591.07
42230885.5	775.547815	799.075197	1011.75471	759.799681	4.11E-06	2.50E-05	70.2646221	0.00917917	0.00644971	1.19E-05	1.31E-05	2.95E-05	0.00578787	0.065775	0.00851418	3399969.01
42239674.6	775.547815	799.074918	1011.75465	759.799635	4.11E-06	2.50E-05	70.265872	0.00918072	0.00645091	1.19E-05	1.31E-05	2.95E-05	0.00578839	0.06578606	0.00851626	3400441.25
42250660.9	775.547815	799.074577	1011.75453	759.799578	4.11E-06	2.50E-05	70.2674339	0.00918265	0.00645241	1.19E-05	1.31E-05	2.95E-05	0.00578903	0.06579988	0.00851886	3401031.63
42264393.8	775.547815	799.074186	1011.75432	759.799508	4.11E-06	2.50E-05	70.2693853	0.00918506	0.00645428	1.19E-05	1.31E-05	2.95E-05	0.00578981	0.06581716	0.00852209	3401768.87
42281560	775.547815	799.073699	1011.75405	759.79942	4.11E-06	2.50E-05	70.2718231	0.00918807	0.00645663	1.19E-05	1.31E-05	2.95E-05	0.00579075	0.06583876	0.00852609	3402690.71
42303017.6	775.547815	799.073125	1011.75369	759.799311	4.11E-06	2.50E-05	70.2748681	0.00919184	0.00645955	1.19E-05	1.31E-05	2.96E-05	0.00579187	0.06586576	0.00853107	3403842.43
42329839.7	775.547815	799.072459	1011.75318	759.799178	4.11E-06	2.50E-05	70.2786709	0.00919655	0.00646321	1.19E-05	1.31E-05	2.96E-05	0.00579319	0.06589951	0.00853727	3405280.92

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
42363367.3	775.547815	799.07167	1011.7525	759.799013	4.11E-06	2.50E-05	70.2834189	0.00920244	0.00646779	1.19E-05	1.31E-05	2.96E-05	0.00579477	0.0659417	0.008545	3407077.69
42405276.8	775.547815	799.070704	1011.75163	759.798808	4.11E-06	2.50E-05	70.2893453	0.0092098	0.00647351	1.19E-05	1.31E-05	2.96E-05	0.00579667	0.06599444	0.00855465	3409323.59
42457663.7	775.547815	799.069528	1011.75052	759.798553	4.11E-06	2.50E-05	70.2967401	0.009219	0.00648065	1.19E-05	1.31E-05	2.97E-05	0.005799	0.06606035	0.00856671	3412129.75
42523147.4	775.547815	799.06808	1011.74912	759.798234	4.11E-06	2.50E-05	70.3059628	0.0092305	0.00648959	1.19E-05	1.31E-05	2.97E-05	0.00580188	0.06614275	0.00858179	3415636.89
42605001.9	775.547815	799.066351	1011.74729	759.79784	4.11E-06	2.50E-05	70.3174589	0.00924487	0.00650076	1.19E-05	1.31E-05	2.98E-05	0.00580535	0.06624575	0.00860065	3420018.57
42707320	775.547815	799.06414	1011.74508	759.797342	4.11E-06	2.50E-05	70.3317788	0.00926284	0.00651472	1.19E-05	1.31E-05	2.98E-05	0.00580983	0.0663745	0.00862426	3425496.46
42835217.7	775.547815	799.061446	1011.74228	759.796723	4.11E-06	2.50E-05	70.3496009	0.0092853	0.00653217	1.19E-05	1.31E-05	2.99E-05	0.00581538	0.06653543	0.00865385	3432342.15
42995089.8	775.547815	799.058099	1011.73881	759.795947	4.11E-06	2.50E-05	70.3717575	0.00931337	0.00655398	1.19E-05	1.31E-05	3.00E-05	0.00582233	0.0667366	0.00869091	3440898.2
43194930	775.547815	799.053909	1011.73457	759.79497	4.11E-06	2.50E-05	70.3992662	0.00934846	0.00658125	1.19E-05	1.31E-05	3.02E-05	0.00583126	0.06698806	0.00873742	3451592.85
43444730.2	775.547815	799.04879	1011.72927	759.793746	4.11E-06	2.50E-05	70.433363	0.00939233	0.00661533	1.19E-05	1.31E-05	3.04E-05	0.00584243	0.06730238	0.00879583	3464958.39
43694530.3	775.547815	799.043837	1011.72392	759.792519	4.11E-06	2.50E-05	70.4671428	0.00943619	0.00664941	1.19E-05	1.31E-05	3.06E-05	0.00585353	0.06761671	0.00885457	3481615.6
43820808	773.656685	797.127484	1010.66643	758.337023	4.11E-06	2.50E-05	70.4840998	0.00945837	0.00666664	1.19E-05	1.31E-05	3.06E-05	0.00585358	0.0677756	0.00887755	3491709.56
43821751.7	779.750737	804.355764	1025.93326	763.711291	4.11E-06	2.50E-05	70.4842292	0.00945854	0.00666678	1.19E-05	1.31E-05	3.11E-05	0.00589536	0.06777682	0.00902467	3524397.36
43822695.4	785.848929	811.594569	1041.12148	769.090351	4.11E-06	2.50E-05	70.4843644	0.00945871	0.00666691	1.19E-05	1.31E-05	3.16E-05	0.00593377	0.06777809	0.00917008	3548845.83
43823875.1	793.47727	820.634474	1060.01619	775.818016	4.11E-06	2.50E-05	70.4845418	0.00945895	0.00666709	1.19E-05	1.31E-05	3.25E-05	0.00598386	0.06777975	0.00946408	3580015
43824408	796.925405	824.70244	1068.67751	778.855066	4.11E-06	2.50E-05	70.4846249	0.00945905	0.00666718	1.19E-05	1.31E-05	3.39E-05	0.00601357	0.06778053	0.00985933	3595291.22
43825587.6	796.925405	824.702933	1068.67933	778.855301	4.11E-06	2.50E-05	70.484811	0.0094593	0.00666737	1.19E-05	1.31E-05	3.40E-05	0.00601355	0.06778228	0.00987305	3595241.67
43827062.2	796.925405	824.702695	1068.68042	778.855249	4.11E-06	2.50E-05	70.4850436	0.0094596	0.00666761	1.19E-05	1.31E-05	3.40E-05	0.00601441	0.06778447	0.00987126	3595345.5
43828905.4	796.925405	824.702249	1068.68136	778.855181	4.11E-06	2.50E-05	70.4853344	0.00945999	0.0066679	1.19E-05	1.31E-05	3.40E-05	0.00601574	0.0677872	0.00986871	3595475.18
43831209.4	796.925405	824.70168	1068.68196	778.855107	4.11E-06	2.50E-05	70.4856978	0.00946046	0.00666827	1.19E-05	1.31E-05	3.40E-05	0.00601737	0.06779061	0.0098652	3595635.97
43834089.4	796.925405	824.700969	1068.68214	778.855022	4.11E-06	2.50E-05	70.4861519	0.00946106	0.00666874	1.19E-05	1.31E-05	3.40E-05	0.00601927	0.06779488	0.00986074	3595836.74
43837689.4	796.925405	824.700116	1068.68176	778.854924	4.12E-06	2.50E-05	70.4867196	0.0094618	0.00666931	1.19E-05	1.31E-05	3.40E-05	0.00602136	0.06780022	0.00985552	3596085.58
43842189.4	796.925405	824.699194	1068.68044	778.854816	4.12E-06	2.50E-05	70.4874291	0.00946273	0.00667004	1.19E-05	1.31E-05	3.40E-05	0.00602374	0.06780689	0.00984991	3596393.42
43847814.4	796.925405	824.697985	1068.6767	778.854681	4.12E-06	2.50E-05	70.4883157	0.0094639	0.00667094	1.19E-05	1.31E-05	3.39E-05	0.00602639	0.06781522	0.00984438	3596780.98
43854845.7	796.925405	824.696668	1068.66903	778.85453	4.12E-06	2.50E-05	70.4894236	0.00946535	0.00667207	1.19E-05	1.31E-05	3.39E-05	0.00602934	0.06782564	0.00983929	3597260.09
43863634.7	796.925405	824.695112	1068.65422	778.854344	4.12E-06	2.50E-05	70.4908081	0.00946717	0.00667348	1.19E-05	1.31E-05	3.39E-05	0.00603265	0.06783867	0.00983499	3597858.95
43874621	796.925405	824.69344	1068.6319	778.854136	4.12E-06	2.50E-05	70.492538	0.00946944	0.00667525	1.19E-05	1.31E-05	3.39E-05	0.00603633	0.06785495	0.00983219	3598599.54
43888354	796.95141	824.718029	1068.61716	778.873896	4.12E-06	2.50E-05	70.4946991	0.00947228	0.00667746	1.19E-05	1.31E-05	3.39E-05	0.00604036	0.0678753	0.00983139	3599614.38
43895709	796.952581	824.718265	1068.59996	778.874668	4.12E-06	2.50E-05	70.4958561	0.0094738	0.00667864	1.19E-05	1.31E-05	3.39E-05	0.00604238	0.0678862	0.00983155	3600737.08
43899309	796.541987	824.229825	1067.57757	778.51231	4.12E-06	2.50E-05	70.4964214	0.00947455	0.00667922	1.19E-05	1.31E-05	3.39E-05	0.00604094	0.06789153	0.00982408	3599696.82
43906664	796.541987	824.228814	1067.55415	778.512178	4.12E-06	2.50E-05	70.4975747	0.00947606	0.00668039	1.19E-05	1.31E-05	3.39E-05	0.00604329	0.0679024	0.00982441	3600007.64
43915857.8	796.541987	824.22768	1067.52679	778.512028	4.13E-06	2.50E-05	70.4990159	0.00947796	0.00668187	1.19E-05	1.31E-05	3.39E-05	0.00604582	0.06791599	0.00982577	3600619.48
43927350.1	796.541987	824.226514	1067.50093	778.511863	4.13E-06	2.50E-05	70.5008164	0.00948033	0.00668371	1.19E-05	1.31E-05	3.39E-05	0.00604846	0.06793298	0.00982824	3601377.63
43941715.4	796.541987	824.225227	1067.47469	778.511669	4.13E-06	2.50E-05	70.5030659	0.00948329	0.00668601	1.19E-05	1.31E-05	3.39E-05	0.00605121	0.06795421	0.00983196	3602322.33
43959672.1	796.541987	824.223921	1067.4539	778.51145	4.13E-06	2.50E-05	70.5058757	0.009487	0.00668889	1.19E-05	1.31E-05	3.39E-05	0.00605395	0.06798075	0.00983721	3603496.42
43982117.9	796.541987	824.222606	1067.43915	778.511201	4.13E-06	2.50E-05	70.5093849	0.00949163	0.00669249	1.19E-05	1.31E-05	3.39E-05	0.00605673	0.06801393	0.00984432	3604956.58
44010175.1	796.541987	824.221184	1067.42766	778.510908	4.14E-06	2.50E-05	70.5137666	0.00949741	0.00669698	1.19E-05	1.31E-05	3.40E-05	0.00605966	0.0680554	0.00985349	3606775.59
44045246.7	796.541987	824.21959	1067.41787	778.510555	4.14E-06	2.50E-05	70.5192363	0.00950465	0.0067026	1.19E-05	1.31E-05	3.40E-05	0.00606286	0.06810724	0.00986468	3609046.47
44089086.1	796.541987	824.217856	1067.41153	778.510134	4.15E-06	2.50E-05	70.5260616	0.00951369	0.00670963	1.19E-05	1.31E-05	3.40E-05	0.00606629	0.06817203	0.00987831	3611879.1
44143885.5	796.541987	824.215805	1067.40464	778.509617	4.16E-06	2.50E-05	70.5345751	0.00952499	0.00671841	1.19E-05	1.31E-05	3.41E-05	0.00607033	0.06825303	0.00989499	3615416.75
44212384.6	796.541987	824.213585	1067.40122	778.509001	4.16E-06	2.50E-05	70.5451885	0.00953912	0.00672939	1.19E-05	1.31E-05	3.42E-05	0.00607463	0.06835428	0.00991598	3619830.47
44298008.6	796.541987	824.210569	1067.38912	778.508216	4.17E-06	2.50E-05	70.5584112	0.00955679	0.00674312	1.19E-05	1.31E-05	3.42E-05	0.00608058	0.06848084	0.00994202	3625353.15
44401212	794.715373	822.354627	1066.36148	777.100871	4.19E-06	2.50E-05	70.5742838	0.00957807	0.00675966	1.19E-05	1.31E-05	3.43E-05	0.00608184	0.06863338	0.00997243	3625917.01
44404812	788.198453	814.60224	1050.13521	771.342895	4.19E-06	2.50E-05	70.5748244	0.0095788	0.00676022	1.19E-05	1.31E-05	3.39E-05	0.00604068	0.06863859	0.00985026	3607645.24
44508015.4	788.198453	814.596577	1050.10185	771.341814	4.19E-06	2.50E-05	70.5899484	0.00959917	0.00677605	1.19E-05	1.31E-05	3.40E-05	0.00605541	0.06878459	0.0098731	3608091.6
44637019.7	788.198453	814.591212	1050.08318	771.340672	4.20E-06	2.50E-05	70.6087634	0.00962464	0.00679584	1.19E-05	1.31E-05	3.41E-05	0.00606777	0.06896709	0.00991004	3616038.31

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
44766024	788.198453	814.587255	1050.06678	771.339648	4.20E-06	2.50E-05	70.6274791	0.00965011	0.00681563	1.19E-05	1.31E-05	3.42E-05	0.00607658	0.0691496	0.00994603	3625890.32
44895028.2	788.198453	814.584341	1050.05298	771.338713	4.21E-06	2.50E-05	70.6460962	0.00967558	0.00683542	1.19E-05	1.31E-05	3.43E-05	0.00608267	0.0693321	0.00998169	3635713.27
45056283.6	788.198453	814.581093	1050.04117	771.337582	4.21E-06	2.50E-05	70.6692303	0.00970742	0.00686016	1.19E-05	1.31E-05	3.45E-05	0.0060893	0.06956023	0.01002611	3645548.05
45257852.8	788.198453	814.577667	1050.05357	771.336235	4.22E-06	2.50E-05	70.6979353	0.00974721	0.00689108	1.19E-05	1.30E-05	3.46E-05	0.00609609	0.0698454	0.01008158	3657813.41
45509814.2	788.198453	814.572633	1050.0482	771.334484	4.23E-06	2.50E-05	70.7334887	0.00979696	0.00692973	1.19E-05	1.30E-05	3.49E-05	0.0061067	0.07020185	0.0101506	3673165.75
45761775.7	788.198453	814.567265	1050.03277	771.332699	4.24E-06	2.50E-05	70.7686828	0.0098467	0.00696838	1.20E-05	1.30E-05	3.51E-05	0.00611837	0.0705583	0.01022166	3692326
46013737.2	788.198453	814.561797	1050.01421	771.330905	4.25E-06	2.50E-05	70.8035232	0.00989645	0.00700703	1.20E-05	1.30E-05	3.53E-05	0.00613046	0.07091476	0.01029856	3711490.3
46265698.7	788.198453	814.556235	1049.9936	771.329104	4.26E-06	2.50E-05	70.838015	0.00994619	0.00704569	1.20E-05	1.30E-05	3.55E-05	0.00614289	0.07127121	0.01037491	3730658.29
46517660.1	788.198453	814.550629	1049.97215	771.327311	4.27E-06	2.50E-05	70.8721636	0.00999594	0.00708434	1.20E-05	1.30E-05	3.57E-05	0.00615552	0.07162766	0.01045077	3749828.39
46769621.6	788.198453	814.545123	1049.9511	771.325524	4.28E-06	2.50E-05	70.9059739	0.01004568	0.00712299	1.20E-05	1.30E-05	3.59E-05	0.00616815	0.07198412	0.01052619	3768998.63
47021583.1	788.198453	814.53981	1049.92913	771.323748	4.30E-06	2.50E-05	70.9394511	0.01009543	0.00716164	1.20E-05	1.30E-05	3.61E-05	0.00618104	0.07234057	0.01060123	3788171.77
47273544.6	788.198453	814.534294	1049.90752	771.321962	4.31E-06	2.50E-05	70.9725999	0.01014517	0.00720029	1.20E-05	1.30E-05	3.64E-05	0.00619389	0.07269703	0.01067593	3807344.69
47385472	789.115457	815.461201	1050.40951	772.027086	4.31E-06	2.50E-05	70.9872214	0.01016727	0.00721746	1.20E-05	1.30E-05	3.65E-05	0.00620197	0.07285537	0.01071163	3829793.96
47389072	786.135636	811.922688	1042.9978	769.397194	4.31E-06	2.50E-05	70.9876859	0.01016797	0.00721801	1.20E-05	1.30E-05	3.63E-05	0.00618342	0.07286041	0.01064495	3825418.18
47500999.4	786.135636	811.918687	1042.93089	769.396272	4.32E-06	2.50E-05	71.0019462	0.01018962	0.00723483	1.20E-05	1.30E-05	3.63E-05	0.00619433	0.07301553	0.01067222	3825822.35
47640908.8	786.135636	811.914881	1042.91003	769.395363	4.32E-06	2.50E-05	71.0196867	0.01021668	0.00725585	1.20E-05	1.30E-05	3.65E-05	0.00620263	0.07320944	0.0107115	3834187.31
47780818.1	786.135636	811.912354	1042.92552	769.394592	4.33E-06	2.50E-05	71.0373335	0.01024374	0.00727688	1.20E-05	1.30E-05	3.66E-05	0.00620706	0.07340334	0.01075089	3844568.45
47955704.7	786.135636	811.908643	1042.93115	769.393618	4.33E-06	2.50E-05	71.0592613	0.01027757	0.00730316	1.20E-05	1.30E-05	3.67E-05	0.00621385	0.07364572	0.0108001	3854976.94
48174313	786.135636	811.903613	1042.9273	769.392385	4.34E-06	2.50E-05	71.0864688	0.01031985	0.00733601	1.20E-05	1.30E-05	3.69E-05	0.00622356	0.07394869	0.01086153	3867998.56
48198548	787.622121	813.409046	1043.75548	770.536352	4.34E-06	2.50E-05	71.0894714	0.01032453	0.00733966	1.20E-05	1.30E-05	3.69E-05	0.00622856	0.07398228	0.01087247	3889689.53
48202148	644.15	644.172793	644.152336	644.150643	4.34E-06	2.49E-05	71.0896942	0.01032488	0.00733993	1.18E-05	1.31E-05	3.28E-05	0.00470087	0.07398477	0.00960645	3246621.41
48205748	305	305.051372	305.006678	305.002174	4.34E-06	2.46E-05	71.0896942	0.01032488	0.00733993	1.16E-05	1.29E-05	1.63E-05	0.00267544	0.07398477	0.0051416	1552224.73
48209348	305	305.051372	305.006678	305.002174	4.34E-06	2.46E-05	71.0896942	0.01032488	0.00733993	1.16E-05	1.29E-05	1.63E-05	0.00267544	0.07398477	0.0051416	1552224.73
48212948	784.07371	809.158648	1035.05625	767.404845	4.34E-06	2.50E-05	71.0899117	0.01032522	0.00734019	1.20E-05	1.30E-05	3.67E-05	0.006288	0.07398721	0.01074533	3876908.91
48216548	784.07371	809.16367	1035.04574	767.408458	4.34E-06	2.50E-05	71.0903465	0.0103259	0.00734072	1.20E-05	1.30E-05	3.65E-05	0.0063049	0.07399207	0.01069961	3877006.29
48221048	784.07371	809.163889	1035.0369	767.407865	4.34E-06	2.50E-05	71.0908899	0.01032675	0.00734138	1.20E-05	1.30E-05	3.60E-05	0.00631192	0.07399816	0.01054415	3877819.91
48226673	784.07371	809.163882	1035.03242	767.407634	4.34E-06	2.50E-05	71.091569	0.01032781	0.0073422	1.20E-05	1.30E-05	3.58E-05	0.0063162	0.07400576	0.01049797	3878336.78
48233704.3	784.07371	809.163769	1035.03005	767.407548	4.34E-06	2.50E-05	71.0924178	0.01032914	0.00734323	1.20E-05	1.30E-05	3.57E-05	0.00631926	0.07401527	0.01048768	3878755.34
48242493.3	784.07371	809.163591	1035.02881	767.407476	4.34E-06	2.50E-05	71.0934784	0.0103308	0.00734452	1.20E-05	1.30E-05	3.56E-05	0.00632127	0.07402715	0.01048297	3879271.56
48253479.6	784.07371	809.163369	1035.02811	767.407405	4.34E-06	2.50E-05	71.0948037	0.01033287	0.00734613	1.20E-05	1.30E-05	3.56E-05	0.00632263	0.074042	0.01048239	3879911.4
48267212.6	784.07371	809.163097	1035.02761	767.407324	4.34E-06	2.50E-05	71.0964596	0.01033546	0.00734815	1.20E-05	1.30E-05	3.56E-05	0.00632371	0.07406057	0.01048451	3880708.46
48284378.7	784.07371	809.16277	1035.02707	767.40723	4.34E-06	2.50E-05	71.0985283	0.0103387	0.00735066	1.20E-05	1.30E-05	3.56E-05	0.00632474	0.07408378	0.01048824	3881703.68
48305836.4	784.07371	809.162367	1035.02641	767.407116	4.34E-06	2.50E-05	71.1011123	0.01034275	0.00735381	1.20E-05	1.30E-05	3.56E-05	0.00632587	0.07411279	0.0104933	3882947.99
48332658.5	784.07371	809.161874	1035.02553	767.406977	4.34E-06	2.50E-05	71.1043395	0.01034781	0.00735774	1.20E-05	1.30E-05	3.57E-05	0.00632719	0.07414905	0.01049966	3884502.96
48366186.1	784.07371	809.161207	1035.02433	767.406806	4.34E-06	2.50E-05	71.108369	0.01035413	0.00736266	1.20E-05	1.30E-05	3.57E-05	0.00632875	0.07419438	0.01050762	3886446.18
48408095.6	784.07371	809.160418	1035.0227	767.406596	4.34E-06	2.50E-05	71.1133991	0.01036204	0.0073688	1.20E-05	1.30E-05	3.57E-05	0.00633058	0.07425104	0.0105176	3888873.87
48460482.5	784.07371	809.159406	1035.02045	767.406332	4.35E-06	2.50E-05	71.1196758	0.01037193	0.00737648	1.20E-05	1.30E-05	3.58E-05	0.0063329	0.07432187	0.01053011	3891909.07
48525966.1	784.07371	809.15815	1035.0173	767.406004	4.35E-06	2.50E-05	71.1275049	0.01038428	0.00738608	1.20E-05	1.30E-05	3.58E-05	0.00633569	0.0744104	0.0105458	3895703.02
48607820.6	784.07371	809.156543	1035.01302	767.405589	4.35E-06	2.50E-05	71.1372652	0.01039972	0.00739808	1.20E-05	1.30E-05	3.59E-05	0.00633936	0.07452106	0.01056546	3900446.29
48710138.8	784.07371	809.154505	1035.00715	767.405069	4.35E-06	2.50E-05	71.1494248	0.01041903	0.00741308	1.20E-05	1.30E-05	3.60E-05	0.00634396	0.07465939	0.01059009	3906376.26
48838036.5	784.07371	809.151958	1034.99938	767.404419	4.36E-06	2.50E-05	71.1645611	0.01044316	0.00743183	1.20E-05	1.30E-05	3.61E-05	0.00634966	0.07483231	0.01062097	3913788.17
48997908.6	784.07371	809.14871	1034.98923	767.403602	4.36E-06	2.50E-05	71.1833834	0.01047332	0.00745527	1.20E-05	1.30E-05	3.62E-05	0.00635775	0.07504845	0.01065969	3923054.72
49197748.7	784.07371	809.144573	1034.97609	767.402571	4.36E-06	2.50E-05	71.2067593	0.01051103	0.00748456	1.20E-05	1.30E-05	3.63E-05	0.00636835	0.07531863	0.01070832	3934639.32
49397588.9	784.07371	809.140374	1034.96272	767.401528	4.37E-06	2.50E-05	71.2299682	0.01054873	0.00751386	1.20E-05	1.30E-05	3.65E-05	0.00637904	0.07558881	0.01075721	3949092.06
49597429	784.07371	809.136136	1034.94928	767.40048	4.37E-06	2.50E-05	71.2530117	0.01058644	0.00754315	1.20E-05	1.30E-05	3.67E-05	0.00638975	0.07585898	0.01080695	3963545.25
49797269.2	784.07371	809.131809	1034.93565	767.399423	4.38E-06	2.50E-05	71.2758917	0.01062414	0.00757245	1.20E-05	1.30E-05	3.68E-05	0.0064006	0.07612916	0.0108584	3978000.88

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
49997109.3	784.07371	809.127428	1034.92183	767.398359	4.39E-06	2.50E-05	71.2986098	0.01066184	0.00760175	1.20E-05	1.30E-05	3.70E-05	0.00641152	0.07639934	0.01091008	3992457.7
50196949.4	784.07371	809.123024	1034.90802	767.397294	4.39E-06	2.50E-05	71.3211678	0.01069955	0.00763104	1.20E-05	1.30E-05	3.71E-05	0.00642244	0.07666952	0.01096198	4006914.94
50396789.6	784.07371	809.118524	1034.89402	767.39622	4.40E-06	2.50E-05	71.3435674	0.01073725	0.00766034	1.20E-05	1.30E-05	3.73E-05	0.00643353	0.07693969	0.01101409	4021375.39
50596629.7	784.07371	809.114076	1034.8802	767.395144	4.40E-06	2.50E-05	71.3658103	0.01077496	0.00768964	1.20E-05	1.30E-05	3.75E-05	0.00644447	0.07720987	0.0110664	4035833.53
50796469.9	784.07371	809.109527	1034.86624	767.394056	4.41E-06	2.50E-05	71.387898	0.01081266	0.00771893	1.20E-05	1.30E-05	3.76E-05	0.00645557	0.07748005	0.01111889	4050295.17
50996310	784.07371	809.104936	1034.85216	767.392961	4.41E-06	2.50E-05	71.4098322	0.01085037	0.00774823	1.20E-05	1.30E-05	3.78E-05	0.00646676	0.07775023	0.01117156	4064758.36
51196150.2	784.07371	809.100418	1034.83832	767.391863	4.42E-06	2.50E-05	71.4316145	0.01088807	0.00777753	1.20E-05	1.30E-05	3.80E-05	0.00647774	0.0780204	0.01122439	4079219
51395990.3	784.07371	809.095802	1034.82441	767.390755	4.42E-06	2.50E-05	71.4532464	0.01092578	0.00780682	1.20E-05	1.30E-05	3.81E-05	0.00648892	0.07829058	0.01127736	4093682.9
51595830.5	784.07371	809.091208	1034.81056	767.389646	4.43E-06	2.50E-05	71.4747296	0.01096348	0.00783612	1.20E-05	1.30E-05	3.83E-05	0.00650006	0.07856076	0.01133048	4108146.96
51795670.6	784.07371	809.086634	1034.79683	767.388538	4.44E-06	2.50E-05	71.4960655	0.01100118	0.00786541	1.20E-05	1.30E-05	3.85E-05	0.00651112	0.07883094	0.01138372	4122610.07
51995510.7	784.07371	809.081981	1034.78296	767.387422	4.44E-06	2.50E-05	71.5172557	0.01103889	0.00789471	1.20E-05	1.30E-05	3.86E-05	0.00652234	0.07910112	0.01143707	4137077.11
52079977	784.07371	809.080012	1034.77708	767.386947	4.44E-06	2.50E-05	71.5261686	0.01105483	0.00790709	1.20E-05	1.30E-05	3.87E-05	0.00652714	0.07921531	0.01145971	4151469.96
52083577	784.07371	809.079968	1034.77683	767.386928	4.44E-06	2.50E-05	71.5265479	0.0110555	0.00790762	1.20E-05	1.30E-05	3.87E-05	0.00652727	0.07922018	0.01146077	4157531.99
52168043.3	784.07371	809.078041	1034.77104	767.386458	4.45E-06	2.50E-05	71.5354342	0.01107144	0.00792	1.20E-05	1.30E-05	3.88E-05	0.00653192	0.07933437	0.01148326	4157843.16
52273626.1	784.07371	809.075642	1034.76387	767.38587	4.45E-06	2.50E-05	71.546506	0.01109136	0.00793548	1.20E-05	1.30E-05	3.89E-05	0.00653771	0.07947712	0.01151152	4163969.83
52405604.6	784.07371	809.072612	1034.75503	767.385131	4.45E-06	2.50E-05	71.56029	0.01111626	0.00795483	1.20E-05	1.30E-05	3.90E-05	0.00654506	0.07965555	0.01154688	4171629.5
52570577.8	784.07371	809.06877	1034.74383	767.384202	4.46E-06	2.50E-05	71.5774335	0.01114739	0.00797901	1.20E-05	1.30E-05	3.91E-05	0.00655437	0.07987859	0.01159115	4181206.16
52735550.9	784.07371	809.064978	1034.7326	767.383271	4.46E-06	2.50E-05	71.5944814	0.01117851	0.0080032	1.20E-05	1.30E-05	3.92E-05	0.00656358	0.08010163	0.01163549	4193149.31
52941767.4	784.07371	809.060292	1034.71872	767.382104	4.47E-06	2.50E-05	71.6156583	0.01121742	0.00803343	1.20E-05	1.30E-05	3.94E-05	0.00657498	0.08038043	0.01169097	4205117.33
53147983.8	784.07371	809.055552	1034.70482	767.380928	4.48E-06	2.50E-05	71.6366888	0.01125633	0.00806366	1.20E-05	1.30E-05	3.96E-05	0.00658655	0.08065922	0.01174656	4220048.19
53354200.2	784.07371	809.050845	1034.69091	767.379749	4.48E-06	2.50E-05	71.6575744	0.01129524	0.00809389	1.20E-05	1.30E-05	3.98E-05	0.00659809	0.08093802	0.01180221	4234978.99
53560416.7	784.07371	809.04623	1034.6772	767.378574	4.49E-06	2.50E-05	71.6783167	0.01133414	0.00812412	1.20E-05	1.30E-05	3.99E-05	0.00660943	0.08121682	0.01185792	4249907.73
53766633.1	784.07371	809.04154	1034.66344	767.377391	4.50E-06	2.50E-05	71.698917	0.01137305	0.00815436	1.20E-05	1.30E-05	4.01E-05	0.00662098	0.08149562	0.01191369	4264839.88
53874489	785.999361	810.988625	1035.73281	768.8585	4.50E-06	2.50E-05	71.7096354	0.0113934	0.00817017	1.20E-05	1.30E-05	4.02E-05	0.00663185	0.08164144	0.01194997	4287677.79
53878089	786.481015	811.557678	1036.91203	769.282124	4.50E-06	2.50E-05	71.7099931	0.01139408	0.0081707	1.20E-05	1.30E-05	4.03E-05	0.00663495	0.08164631	0.01196231	4297746.72
53985944.9	786.481015	811.555139	1036.90499	769.281497	4.50E-06	2.50E-05	71.7207078	0.0114145	0.00818656	1.20E-05	1.30E-05	4.04E-05	0.00664088	0.08179262	0.01199268	4298077.01
54120764.7	786.481015	811.551868	1036.89592	769.280693	4.51E-06	2.50E-05	71.7340474	0.01144002	0.00820639	1.20E-05	1.30E-05	4.05E-05	0.00664891	0.0819755	0.01202958	4305956.79
54289289.5	786.481015	811.547908	1036.88416	769.279698	4.52E-06	2.50E-05	71.7506385	0.01147193	0.00823118	1.20E-05	1.30E-05	4.06E-05	0.00665865	0.08220411	0.01207568	4315803.95
54457814.3	786.481015	811.544019	1036.8722	769.27871	4.53E-06	2.50E-05	71.7671376	0.01150383	0.00825597	1.20E-05	1.30E-05	4.08E-05	0.00666824	0.08243272	0.01212182	4328082.51
54668470.3	786.481015	811.539374	1036.85757	769.277483	4.53E-06	2.50E-05	71.7876332	0.01154371	0.00828695	1.20E-05	1.30E-05	4.09E-05	0.00667977	0.08271848	0.01217948	4340383.22
54879126.2	786.481015	811.534679	1036.84311	769.276246	4.54E-06	2.50E-05	71.8079876	0.01158359	0.00831794	1.20E-05	1.30E-05	4.11E-05	0.00669148	0.08300423	0.01223718	4355728.89
55089782.2	786.481015	811.530096	1036.82899	769.275012	4.55E-06	2.50E-05	71.8282024	0.01162346	0.00834893	1.20E-05	1.30E-05	4.13E-05	0.00670305	0.08328999	0.01229489	4371072.22
55300438.2	786.481015	811.525578	1036.81512	769.273776	4.56E-06	2.50E-05	71.848279	0.01166334	0.00837991	1.20E-05	1.30E-05	4.15E-05	0.00671453	0.08357575	0.01235262	4386414.99
55511094.2	786.481015	811.521035	1036.80135	769.272532	4.57E-06	2.50E-05	71.8682187	0.01170322	0.0084109	1.20E-05	1.30E-05	4.17E-05	0.00672617	0.08386151	0.01241035	4401760.57
55721750.2	786.481015	811.5167	1036.78779	769.271296	4.58E-06	2.50E-05	71.888023	0.0117431	0.00844188	1.20E-05	1.30E-05	4.18E-05	0.00673757	0.08414727	0.01246808	4417103.18
55932406.2	786.481015	811.512564	1036.77438	769.270061	4.59E-06	2.50E-05	71.9076933	0.01178298	0.00847287	1.20E-05	1.30E-05	4.20E-05	0.00674903	0.08443302	0.01252582	4432447.24
56143062.1	786.481015	811.507809	1036.76098	769.268817	4.60E-06	2.50E-05	71.9272308	0.01182286	0.00850385	1.20E-05	1.30E-05	4.22E-05	0.00676063	0.08471878	0.01258356	4447793.75
56353718.1	786.481015	811.503339	1036.74767	769.267573	4.61E-06	2.50E-05	71.946637	0.01186274	0.00853484	1.20E-05	1.30E-05	4.24E-05	0.00677201	0.08500454	0.01264129	4463137.95
56564374.1	786.481015	811.499415	1036.7345	769.266331	4.62E-06	2.50E-05	71.9659132	0.01190262	0.00856583	1.20E-05	1.30E-05	4.26E-05	0.00678342	0.0852903	0.01269903	4478482.37
56775030.1	786.481015	811.495577	1036.72137	769.265084	4.63E-06	2.50E-05	71.9850606	0.01194249	0.00859681	1.20E-05	1.30E-05	4.27E-05	0.00679495	0.08557606	0.01275675	4493829.32
56985686.1	786.481015	813.771297	1036.7084	769.320247	4.65E-06	2.50E-05	72.0040806	0.01198237	0.0086278	1.20E-05	1.30E-05	4.29E-05	0.00680577	0.08586181	0.01281447	4509519.65
57196342.1	786.481015	813.772818	1036.69559	769.319125	4.66E-06	2.50E-05	72.0229744	0.01202225	0.00865878	1.20E-05	1.30E-05	4.31E-05	0.00681674	0.08614757	0.01287218	4524867.89
57406998.1	786.481015	813.780461	1036.6827	769.317973	4.68E-06	2.50E-05	72.0417433	0.01206213	0.00868977	1.20E-05	1.30E-05	4.33E-05	0.00682785	0.08643333	0.01292989	4540218.06
57617654	786.481015	813.786755	1036.66981	769.316824	4.69E-06	2.50E-05	72.0603884	0.01210201	0.00872075	1.20E-05	1.30E-05	4.35E-05	0.00683879	0.08671909	0.01298757	4555567.26
57828310	786.481015	813.652472	1036.65716	769.315024	4.71E-06	2.50E-05	72.0789111	0.01214189	0.00875174	1.20E-05	1.30E-05	4.37E-05	0.00684963	0.08700485	0.01304525	4570910.21
58038966	786.481015	813.518625	1036.64442	769.313225	4.73E-06	2.50E-05	72.0973125	0.01218177	0.00878273	1.20E-05	1.30E-05	4.38E-05	0.00686064	0.0872906	0.01310291	4586256.2

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
58249622	786.481015	813.390716	1036.63166	769.311453	4.74E-06	2.51E-05	72.1155939	0.01222165	0.00881371	1.20E-05	1.30E-05	4.40E-05	0.00687175	0.08757636	0.01316056	4601604.72
58460278	786.481015	813.271343	1036.61891	769.309711	4.76E-06	2.51E-05	72.1337563	0.01226152	0.0088447	1.20E-05	1.30E-05	4.42E-05	0.00688276	0.08786212	0.01321819	4616952.24
58670934	786.481015	813.162807	1036.60635	769.308027	4.77E-06	2.51E-05	72.151801	0.0123014	0.00887568	1.20E-05	1.30E-05	4.44E-05	0.00689356	0.08814788	0.01327581	4632297.21
58881590	786.481015	813.054475	1036.59376	769.306342	4.79E-06	2.51E-05	72.169729	0.01234128	0.00890667	1.20E-05	1.30E-05	4.46E-05	0.00690458	0.08843364	0.01333341	4647645.88
59092245.9	786.481015	812.952366	1036.58121	769.304691	4.80E-06	2.51E-05	72.1875416	0.01238116	0.00893765	1.20E-05	1.30E-05	4.47E-05	0.00691566	0.08871939	0.01339099	4662995.71
59302901.9	786.481015	812.859931	1036.56879	769.30309	4.82E-06	2.51E-05	72.2052398	0.01242104	0.00896864	1.20E-05	1.30E-05	4.49E-05	0.00692641	0.08900515	0.01344855	4678341.52
59513557.9	786.481015	812.7699	1036.55646	769.301498	4.83E-06	2.51E-05	72.2228247	0.01246092	0.00899963	1.20E-05	1.30E-05	4.51E-05	0.00693736	0.08929091	0.01350609	4693690.4
59724213.9	786.481015	812.684726	1036.54419	769.299931	4.85E-06	2.51E-05	72.2402974	0.0125008	0.00903061	1.20E-05	1.30E-05	4.53E-05	0.00694834	0.08957667	0.01356361	4709040.18
59934869.9	786.481015	812.606919	1036.53206	769.298411	4.87E-06	2.51E-05	72.2576589	0.01254067	0.0090616	1.20E-05	1.30E-05	4.55E-05	0.00695905	0.08986243	0.01362111	4724386.34
60145525.9	786.481015	812.530421	1036.51999	769.296889	4.88E-06	2.51E-05	72.2749105	0.01258055	0.00909258	1.20E-05	1.30E-05	4.56E-05	0.00696999	0.09014818	0.01367859	4739736.44
60356181.8	786.481015	812.458521	1036.50795	769.295393	4.90E-06	2.51E-05	72.2920529	0.01262043	0.00912357	1.20E-05	1.30E-05	4.58E-05	0.00698094	0.09043394	0.01373604	4755087.06
60566837.8	786.481015	812.393345	1036.49603	769.293939	4.91E-06	2.51E-05	72.3090874	0.01266031	0.00915456	1.20E-05	1.30E-05	4.60E-05	0.00699162	0.0907197	0.01379348	4770434.44
60777493.8	786.481015	812.329001	1036.48417	769.292485	4.93E-06	2.51E-05	72.326015	0.01270019	0.00918554	1.20E-05	1.30E-05	4.62E-05	0.00700253	0.09100546	0.01385089	4785785.51
60988149.8	786.481015	812.269431	1036.47235	769.291057	4.95E-06	2.51E-05	72.3428365	0.01274007	0.00921653	1.21E-05	1.30E-05	4.64E-05	0.00701335	0.09129122	0.01390827	4801135.79
61198805.8	786.481015	812.21425	1036.46063	769.289655	4.96E-06	2.51E-05	72.3595531	0.01277995	0.00924751	1.21E-05	1.30E-05	4.66E-05	0.00702405	0.09157697	0.01396563	4816484.72
61409461.8	786.481015	812.161026	1036.44896	769.288263	4.98E-06	2.51E-05	72.3761656	0.01281983	0.0092785	1.21E-05	1.30E-05	4.67E-05	0.00703492	0.09186273	0.01402297	4831836.7
61620117.8	786.481015	812.113459	1036.43742	769.286907	5.00E-06	2.51E-05	72.3926752	0.0128597	0.00930948	1.21E-05	1.30E-05	4.69E-05	0.00704555	0.09214849	0.01408028	4847185.55
61830773.7	786.481015	812.068122	1036.42596	769.285558	5.01E-06	2.51E-05	72.4090826	0.01289958	0.00934047	1.21E-05	1.30E-05	4.71E-05	0.00705625	0.09243425	0.01413757	4862535.63
62041429.7	786.481015	812.024806	1036.41453	769.284217	5.03E-06	2.51E-05	72.4253889	0.01293946	0.00937146	1.21E-05	1.30E-05	4.73E-05	0.00706713	0.09272001	0.01419483	4877889.18
62125235	786.884213	812.417844	1036.63573	769.593918	5.04E-06	2.51E-05	72.4318482	0.01295533	0.00938378	1.21E-05	1.30E-05	4.74E-05	0.00707229	0.09283369	0.01421918	4895073.85
62126178.7	785.161856	810.386314	1032.42919	768.079596	5.04E-06	2.51E-05	72.4319204	0.0129555	0.00938392	1.21E-05	1.30E-05	4.72E-05	0.00706208	0.09283496	0.01418016	4891722.7
62127122.4	783.439819	808.356997	1028.21651	766.565589	5.04E-06	2.51E-05	72.4319917	0.01295568	0.00938406	1.21E-05	1.30E-05	4.71E-05	0.00705241	0.09283622	0.01414022	4882351.1
62128302.1	781.287727	805.822322	1022.94176	764.673574	5.04E-06	2.51E-05	72.4320797	0.0129559	0.00938423	1.21E-05	1.30E-05	4.69E-05	0.00704065	0.09283777	0.01408764	4870636.6
62128835	780.31567	804.678042	1020.55561	763.819031	5.04E-06	2.51E-05	72.432119	0.01295599	0.0093843	1.21E-05	1.30E-05	4.69E-05	0.00703535	0.09283846	0.01406385	4865388.16
62130014.6	780.31567	804.67626	1020.55524	763.818943	5.04E-06	2.51E-05	72.4322056	0.01295621	0.00938447	1.21E-05	1.30E-05	4.69E-05	0.00703699	0.09283999	0.01406095	4865423.1
62131489.2	780.31567	804.674729	1020.55506	763.818911	5.04E-06	2.51E-05	72.4323139	0.01295647	0.00938467	1.21E-05	1.30E-05	4.68E-05	0.00703821	0.0928419	0.01405878	4865506.14
62133332.4	780.31567	804.673252	1020.55491	763.818881	5.04E-06	2.51E-05	72.4324493	0.01295681	0.00938493	1.21E-05	1.30E-05	4.68E-05	0.00703919	0.09284428	0.0140573	4865609.08
62135636.4	780.31567	804.671811	1020.55479	763.818853	5.04E-06	2.51E-05	72.4326186	0.01295722	0.00938526	1.21E-05	1.30E-05	4.68E-05	0.00704001	0.09284727	0.01405636	4865738.23
62138516.4	780.31567	804.670189	1020.55467	763.818824	5.04E-06	2.51E-05	72.4328301	0.01295774	0.00938566	1.21E-05	1.30E-05	4.68E-05	0.00704068	0.092851	0.01405596	4865900.24
62142116.4	780.31567	804.668655	1020.55454	763.818794	5.04E-06	2.51E-05	72.4330945	0.01295839	0.00938616	1.21E-05	1.30E-05	4.68E-05	0.00704127	0.09285566	0.01405611	4866101.92
62146616.4	780.31567	804.666787	1020.55437	763.81876	5.04E-06	2.51E-05	72.4334249	0.01295921	0.0093868	1.21E-05	1.30E-05	4.68E-05	0.00704183	0.09286148	0.01405676	4866354.08
62152241.4	780.31567	804.664762	1020.55414	763.81872	5.04E-06	2.51E-05	72.4338379	0.01296022	0.00938759	1.21E-05	1.30E-05	4.68E-05	0.00704241	0.09286877	0.0140579	4866668.7
62159272.7	780.31567	804.662084	1020.55383	763.818671	5.04E-06	2.51E-05	72.4343541	0.01296149	0.00938857	1.21E-05	1.30E-05	4.68E-05	0.00704306	0.09287787	0.0140595	4867062.26
62168061.7	780.31567	804.658782	1020.55339	763.818609	5.04E-06	2.51E-05	72.4349991	0.01296308	0.00938981	1.21E-05	1.30E-05	4.68E-05	0.00704383	0.09288925	0.01406161	4867554.56
62179048	780.31567	804.655274	1020.55278	763.818538	5.04E-06	2.51E-05	72.4358052	0.01296507	0.00939135	1.21E-05	1.30E-05	4.69E-05	0.00704476	0.09290347	0.01406427	4868167.64
62192781	780.31567	804.650422	1020.55183	763.818444	5.04E-06	2.51E-05	72.4368125	0.01296755	0.00939328	1.21E-05	1.30E-05	4.69E-05	0.00704587	0.09292125	0.01406761	4868936.16
62209947.1	780.31567	804.645439	1020.55044	763.818336	5.04E-06	2.51E-05	72.438071	0.01297065	0.00939569	1.21E-05	1.30E-05	4.69E-05	0.00704721	0.09294348	0.01407177	4869893.74
62231404.8	780.31567	804.639535	1020.54826	763.818203	5.04E-06	2.51E-05	72.4396433	0.01297452	0.0093987	1.21E-05	1.30E-05	4.69E-05	0.00704876	0.09297126	0.01407698	4871090.43
62256058	780.752132	805.076382	1020.79017	764.153811	5.04E-06	2.51E-05	72.4414486	0.01297898	0.00940216	1.21E-05	1.30E-05	4.69E-05	0.00705131	0.09300317	0.01408457	4874649.16
62259658	784.014229	808.913878	1028.76769	767.020437	5.04E-06	2.51E-05	72.4417152	0.01297964	0.00940267	1.21E-05	1.30E-05	4.72E-05	0.0070702	0.09300789	0.01416321	4894256.69
62284311.2	784.014229	808.906934	1028.76514	767.020322	5.04E-06	2.51E-05	72.4435618	0.0129842	0.00940621	1.21E-05	1.30E-05	4.72E-05	0.00707045	0.09304056	0.01417449	4894522.51
62315127.8	784.014229	808.898979	1028.76202	767.020122	5.04E-06	2.51E-05	72.4458681	0.0129899	0.00941064	1.21E-05	1.30E-05	4.72E-05	0.00707247	0.0930814	0.01418313	4896284.84
62353648.4	784.014229	808.889388	1028.75839	767.019873	5.05E-06	2.51E-05	72.4487482	0.01299702	0.00941618	1.21E-05	1.30E-05	4.73E-05	0.00707507	0.09313246	0.01419314	4898490.29
62401799.3	784.014229	808.879541	1028.75417	767.01958	5.05E-06	2.51E-05	72.4523439	0.01300593	0.0094231	1.21E-05	1.30E-05	4.73E-05	0.00707802	0.09319627	0.01420555	4901240.87
62461987.8	784.014229	808.87012	1028.74922	767.019237	5.05E-06	2.51E-05	72.4568316	0.01301706	0.00943175	1.21E-05	1.30E-05	4.74E-05	0.00708116	0.09327604	0.01422107	4904671.35
62537223.5	784.014229	808.860884	1028.74354	767.018831	5.06E-06	2.51E-05	72.4624304	0.01303097	0.00944256	1.21E-05	1.30E-05	4.74E-05	0.00708461	0.09337575	0.01424047	4908951.53

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
62620357	783.521737	808.353148	1028.46193	766.639505	5.06E-06	2.51E-05	72.468603	0.01304635	0.00945451	1.21E-05	1.30E-05	4.75E-05	0.00708699	0.09348592	0.01426009	4911947.75
62623957	784.261754	809.226052	1030.27284	767.290103	5.06E-06	2.51E-05	72.4688707	0.01304702	0.00945503	1.21E-05	1.30E-05	4.75E-05	0.0070912	0.09349071	0.01427749	4921897.25
62707090.5	784.261754	809.21876	1030.2678	767.289701	5.07E-06	2.51E-05	72.4750605	0.01306247	0.00946704	1.21E-05	1.30E-05	4.76E-05	0.00709402	0.09360146	0.01430159	4922154.46
62811007.3	784.261754	809.208582	1030.26217	767.289154	5.07E-06	2.51E-05	72.4827772	0.01308179	0.00948205	1.21E-05	1.30E-05	4.77E-05	0.00709834	0.09373991	0.01432882	4928085.93
62940903.3	784.261754	809.194558	1030.25597	767.288454	5.08E-06	2.51E-05	72.4923912	0.01310594	0.00950081	1.21E-05	1.30E-05	4.78E-05	0.00710412	0.09391296	0.01436279	4935507.32
63103273.4	784.261754	809.176969	1030.24894	767.287573	5.09E-06	2.51E-05	72.5043588	0.01313613	0.00952427	1.21E-05	1.30E-05	4.79E-05	0.0071116	0.09412928	0.01440526	4944787.08
63306236	784.261754	809.155898	1030.24061	767.28647	5.10E-06	2.51E-05	72.5192413	0.01317387	0.00955359	1.21E-05	1.30E-05	4.81E-05	0.00712107	0.09439968	0.01445836	4956387.87
63509198.5	784.261754	809.135533	1030.23236	767.285366	5.11E-06	2.51E-05	72.5340387	0.0132116	0.00958291	1.21E-05	1.30E-05	4.83E-05	0.00713082	0.09467008	0.0145115	4970867.18
63712161.1	784.261754	809.116213	1030.22399	767.28426	5.13E-06	2.51E-05	72.5487518	0.01324934	0.00961223	1.21E-05	1.30E-05	4.85E-05	0.00714078	0.09494048	0.01456465	4985350.35
63915123.7	784.261754	809.099325	1030.21546	767.283169	5.14E-06	2.51E-05	72.5633814	0.01328707	0.00964155	1.21E-05	1.30E-05	4.86E-05	0.00715052	0.09521088	0.01461781	4999829.96
64118086.2	784.261754	809.083553	1030.20677	767.282076	5.15E-06	2.51E-05	72.5779281	0.01332481	0.00967087	1.21E-05	1.30E-05	4.88E-05	0.00716051	0.09548128	0.01467097	5014313.79
64321048.8	784.261754	809.069363	1030.1979	767.280989	5.16E-06	2.51E-05	72.5923927	0.01336254	0.00970019	1.21E-05	1.30E-05	4.90E-05	0.00717061	0.09575168	0.01472414	5028799.88
64516928	782.474049	807.243416	1029.18749	765.904459	5.17E-06	2.51E-05	72.6062752	0.01339896	0.00972849	1.21E-05	1.30E-05	4.91E-05	0.00717675	0.09601264	0.01476862	5034566.69
64520528	781.616134	806.22733	1027.06657	765.149012	5.17E-06	2.51E-05	72.6065288	0.01339963	0.00972901	1.21E-05	1.30E-05	4.90E-05	0.00717246	0.09601742	0.01474904	5043559.53
64716407.2	781.616134	806.217645	1027.05775	765.147998	5.18E-06	2.51E-05	72.6202501	0.01343582	0.00975713	1.21E-05	1.30E-05	4.92E-05	0.00718269	0.09627678	0.01479773	5043927.36
64766586	782.095695	806.702907	1027.3242	765.516749	5.18E-06	2.51E-05	72.6237532	0.0134451	0.00976433	1.21E-05	1.30E-05	4.92E-05	0.00718556	0.09634322	0.01481244	5060045.45
64770186	780.46995	804.779263	1023.3114	764.085888	5.19E-06	2.51E-05	72.6240029	0.01344576	0.00976485	1.21E-05	1.30E-05	4.91E-05	0.00717697	0.09634796	0.01477416	5054333.27
64820364.8	780.46995	804.774741	1023.30899	764.085579	5.19E-06	2.51E-05	72.62746	0.01345492	0.00977197	1.21E-05	1.30E-05	4.91E-05	0.00718202	0.09641363	0.01478409	5054639.02
64883088.3	780.46995	804.770824	1023.3059	764.085246	5.19E-06	2.51E-05	72.6317749	0.01346638	0.00978087	1.21E-05	1.30E-05	4.92E-05	0.00718637	0.09649571	0.01479956	5058170.79
64961492.7	780.46995	804.768312	1023.3017	764.084871	5.19E-06	2.51E-05	72.6371581	0.0134807	0.00979199	1.21E-05	1.30E-05	4.93E-05	0.00719005	0.09659831	0.01481917	5062559.92
65059498.2	780.46995	804.766584	1023.29638	764.084431	5.20E-06	2.51E-05	72.643871	0.01349859	0.0098059	1.21E-05	1.30E-05	4.93E-05	0.00719351	0.09672656	0.01484371	5068026.11
65182005.1	780.46995	804.764314	1023.29012	764.083878	5.20E-06	2.51E-05	72.6522372	0.01352097	0.00982328	1.21E-05	1.30E-05	4.94E-05	0.00719807	0.09688688	0.01487442	5074857.68
65335138.6	780.46995	804.760912	1023.28299	764.083164	5.21E-06	2.51E-05	72.6626561	0.01354893	0.00984501	1.21E-05	1.30E-05	4.96E-05	0.00720469	0.09708727	0.01491286	5083412.47
65526555.6	780.46995	804.757073	1023.27488	764.082264	5.21E-06	2.51E-05	72.6756194	0.01358389	0.00987218	1.21E-05	1.30E-05	4.97E-05	0.00721343	0.09733776	0.01496098	5094113.41
65765826.8	780.46995	804.753528	1023.26535	764.081133	5.22E-06	2.51E-05	72.6917299	0.01362759	0.00990613	1.21E-05	1.30E-05	4.99E-05	0.00722477	0.09765088	0.01502122	5107496.52
66005098	780.46995	804.751783	1023.256	764.080007	5.23E-06	2.51E-05	72.7077375	0.01367128	0.00994008	1.21E-05	1.30E-05	5.01E-05	0.00723617	0.09796399	0.01508158	5124196.28
66244369.2	780.46995	804.751899	1023.24664	764.078887	5.24E-06	2.51E-05	72.7236431	0.01371498	0.00997403	1.21E-05	1.30E-05	5.03E-05	0.00724762	0.09827711	0.01514202	5140897.33
66483640.4	780.46995	804.75405	1023.23715	764.077772	5.25E-06	2.51E-05	72.7394477	0.01375868	0.01000798	1.21E-05	1.30E-05	5.05E-05	0.0072593	0.09859023	0.01520254	5157602.82
66722911.7	780.46995	804.758074	1023.22752	764.076665	5.26E-06	2.51E-05	72.7551521	0.01380237	0.01004194	1.21E-05	1.30E-05	5.07E-05	0.00727081	0.09890334	0.01526312	5174306.08
66962182.9	780.46995	804.764156	1023.21777	764.075564	5.27E-06	2.51E-05	72.7707575	0.01384607	0.01007589	1.21E-05	1.30E-05	5.09E-05	0.0072824	0.09921646	0.01532376	5191011.07
67201454.1	780.46995	804.77252	1023.20788	764.074469	5.28E-06	2.51E-05	72.7862647	0.01388977	0.01010984	1.21E-05	1.30E-05	5.11E-05	0.00729416	0.09952957	0.01538445	5207720.02
67440725.3	780.46995	804.782293	1023.19785	764.073376	5.29E-06	2.51E-05	72.8016746	0.01393346	0.01014379	1.21E-05	1.30E-05	5.13E-05	0.00730601	0.09984269	0.01544519	5224431.21
67535546	781.971694	806.310953	1024.03613	765.228283	5.29E-06	2.51E-05	72.8077547	0.01395078	0.01015725	1.21E-05	1.30E-05	5.14E-05	0.00731352	0.09996677	0.01547503	5248701.48
67539146	780.327827	804.364277	1020.00766	763.783611	5.30E-06	2.51E-05	72.8079839	0.01395143	0.01015776	1.21E-05	1.30E-05	5.13E-05	0.00730527	0.09997146	0.0154366	5245610.18
67633966.7	780.327827	804.373167	1020.00339	763.78314	5.30E-06	2.51E-05	72.8139767	0.01396854	0.01017105	1.21E-05	1.30E-05	5.14E-05	0.00731387	0.10009407	0.01545729	5245956.84
67752492.6	780.327827	804.379979	1019.99786	763.78262	5.30E-06	2.51E-05	72.8214472	0.01398993	0.01018767	1.21E-05	1.30E-05	5.14E-05	0.00732016	0.10024735	0.01548654	5252527.75
67871018.5	780.327827	804.383107	1019.99218	763.78212	5.31E-06	2.51E-05	72.8288949	0.01401132	0.01020429	1.21E-05	1.30E-05	5.15E-05	0.0073245	0.10040062	0.01551593	5260681.68
68019175.9	780.327827	804.3884	1019.98517	763.781491	5.31E-06	2.51E-05	72.8381726	0.01403806	0.01022507	1.21E-05	1.30E-05	5.17E-05	0.00733042	0.10059221	0.01555269	5268853.84
68204372.6	780.327827	804.39736	1019.97683	763.780698	5.32E-06	2.51E-05	72.8497201	0.01407148	0.01025104	1.21E-05	1.30E-05	5.18E-05	0.00733862	0.1008317	0.01559869	5279082.02
68435868.4	780.327827	804.411008	1019.96696	763.779708	5.33E-06	2.51E-05	72.8640775	0.01411326	0.0102835	1.21E-05	1.30E-05	5.20E-05	0.00734939	0.10113106	0.01565626	5291876.16
68667364.3	780.327827	804.426735	1019.95741	763.778718	5.34E-06	2.51E-05	72.8783503	0.01415504	0.01031596	1.21E-05	1.30E-05	5.22E-05	0.00736037	0.10143042	0.01571393	5307844.31
68898860.2	780.327827	804.444291	1019.948	763.777726	5.35E-06	2.51E-05	72.892539	0.01419681	0.01034842	1.21E-05	1.30E-05	5.24E-05	0.00737147	0.10172979	0.01577165	5323813.94
69130356.1	780.327827	804.462619	1019.93865	763.776744	5.36E-06	2.51E-05	72.9066445	0.01423859	0.01038088	1.21E-05	1.30E-05	5.26E-05	0.00738231	0.10202915	0.01582943	5339779.46
69361852	780.327827	804.483326	1019.92929	763.775767	5.37E-06	2.51E-05	72.9206674	0.01428037	0.01041334	1.21E-05	1.30E-05	5.28E-05	0.00739338	0.10232851	0.01588726	5355749.82
69593347.9	780.327827	804.505842	1019.91991	763.774797	5.38E-06	2.51E-05	72.9346085	0.01432215	0.0104458	1.21E-05	1.30E-05	5.30E-05	0.0074045	0.10262787	0.01594513	5371721.95
69824843.7	780.327827	804.529237	1019.91047	763.773834	5.39E-06	2.51E-05	72.9484686	0.01436392	0.01047826	1.21E-05	1.30E-05	5.31E-05	0.00741544	0.10292723	0.01600361	5387692.5

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
70056339.6	780.327827	804.555486	1019.90101	763.772875	5.40E-06	2.51E-05	72.9622482	0.0144057	0.01051072	1.21E-05	1.30E-05	5.33E-05	0.00742661	0.10322659	0.01606234	5403666.63
70287835.5	780.327827	804.582516	1019.89151	763.771921	5.41E-06	2.51E-05	72.9759482	0.01444748	0.01054318	1.21E-05	1.30E-05	5.35E-05	0.0074376	0.10352595	0.01612112	5419638.4
70519331.4	780.327827	804.610326	1019.88197	763.770973	5.42E-06	2.51E-05	72.9895691	0.01448925	0.01057564	1.21E-05	1.30E-05	5.37E-05	0.00744842	0.10382532	0.01617992	5435608.77
70750827.3	780.327827	804.642797	1019.87243	763.770035	5.43E-06	2.51E-05	73.0031117	0.01453103	0.0106081	1.21E-05	1.30E-05	5.39E-05	0.00745976	0.10412468	0.01623876	5451587.88
70982323.2	780.327827	804.675874	1019.86283	763.769104	5.44E-06	2.51E-05	73.0165767	0.01457281	0.01064057	1.21E-05	1.30E-05	5.41E-05	0.00747089	0.10442404	0.01629763	5467564.41
71213819	780.327827	804.709125	1019.85322	763.768179	5.45E-06	2.51E-05	73.0299647	0.01461459	0.01067303	1.21E-05	1.30E-05	5.43E-05	0.00748172	0.1047234	0.01635653	5483536.34
71445314.9	780.327827	804.745272	1019.84361	763.767263	5.46E-06	2.51E-05	73.0432764	0.01465636	0.01070549	1.21E-05	1.30E-05	5.45E-05	0.00749274	0.10502276	0.01641545	5499512.44
71676810.8	780.327827	804.783444	1019.834	763.766356	5.48E-06	2.51E-05	73.0565124	0.01469814	0.01073795	1.21E-05	1.30E-05	5.47E-05	0.00750379	0.10532212	0.01647439	5515489.46
71908306.7	780.327827	804.8239	1019.82437	763.765458	5.49E-06	2.51E-05	73.0696734	0.01473992	0.01077041	1.21E-05	1.30E-05	5.49E-05	0.00751489	0.10562148	0.01653335	5531468.19
72139802.6	780.327827	804.863919	1019.81475	763.764561	5.50E-06	2.51E-05	73.0827599	0.01478169	0.01080287	1.21E-05	1.30E-05	5.51E-05	0.00752564	0.10592085	0.01659233	5547441.39
72155534	780.327827	804.864591	1019.81408	763.764495	5.50E-06	2.51E-05	73.0836466	0.01478453	0.01080508	1.21E-05	1.30E-05	5.51E-05	0.00752611	0.10594119	0.01659655	5563295.93
72159134	780.327827	804.864759	1019.81393	763.76448	5.50E-06	2.51E-05	73.0838494	0.01478518	0.01080558	1.21E-05	1.30E-05	5.51E-05	0.0075262	0.10594584	0.01659743	5564374.47
72174865.4	781.864795	806.431747	1020.67627	764.946667	5.50E-06	2.51E-05	73.0847356	0.01478802	0.01080779	1.21E-05	1.30E-05	5.51E-05	0.00752963	0.10596619	0.01660798	5572932.63
72185697	781.864795	806.433546	1020.67604	764.946629	5.50E-06	2.51E-05	73.0853456	0.01478998	0.01080931	1.21E-05	1.30E-05	5.51E-05	0.00752998	0.10598019	0.01661091	5574016.92
72189297	782.255999	806.899758	1021.62643	765.289882	5.50E-06	2.51E-05	73.0855486	0.01479063	0.01080981	1.21E-05	1.30E-05	5.51E-05	0.00753201	0.10598486	0.01662137	5577199.39
72200128.6	782.255999	806.901958	1021.62609	765.289847	5.50E-06	2.51E-05	73.0861601	0.01479259	0.01081133	1.21E-05	1.30E-05	5.52E-05	0.00753225	0.1059989	0.01662481	5577451.25
72213668	782.255999	806.904949	1021.62554	765.289795	5.50E-06	2.51E-05	73.0869242	0.01479504	0.01081324	1.21E-05	1.30E-05	5.52E-05	0.00753284	0.10601646	0.01662849	5578204.94
72230592.3	782.255999	806.908795	1021.62482	765.28973	5.50E-06	2.51E-05	73.087879	0.0147981	0.01081562	1.21E-05	1.30E-05	5.52E-05	0.00753372	0.10603841	0.01663291	5579147.06
72251747.7	782.255999	806.914256	1021.62391	765.289648	5.50E-06	2.51E-05	73.0890719	0.01480193	0.01081859	1.21E-05	1.30E-05	5.52E-05	0.00753494	0.10606584	0.01663838	5580326.47
72278192	782.255999	806.921721	1021.62277	765.289547	5.51E-06	2.51E-05	73.0905622	0.01480671	0.01082231	1.21E-05	1.30E-05	5.52E-05	0.00753652	0.10610014	0.01664521	5581802.47
72311247.3	782.255999	806.931068	1021.62135	765.289422	5.51E-06	2.51E-05	73.0924238	0.0148127	0.01082696	1.21E-05	1.30E-05	5.53E-05	0.00753848	0.106143	0.01665374	5583647.64
72352566.5	782.255999	806.941115	1021.61958	765.28926	5.51E-06	2.51E-05	73.0947486	0.01482017	0.01083277	1.21E-05	1.30E-05	5.53E-05	0.00754084	0.10619658	0.0166644	5585951.52
72404215.4	782.255999	806.930896	1021.61738	765.288959	5.51E-06	2.51E-05	73.0976513	0.01482952	0.01084003	1.21E-05	1.30E-05	5.53E-05	0.00754355	0.10626356	0.01667772	5588827.2
72468776.5	782.255999	806.920334	1021.61463	765.288598	5.52E-06	2.51E-05	73.1012745	0.01484121	0.01084911	1.21E-05	1.30E-05	5.54E-05	0.00754671	0.10634729	0.01669437	5592416.6
72533337.7	782.255999	806.910439	1021.61188	765.288242	5.52E-06	2.51E-05	73.1048921	0.01485289	0.01085819	1.21E-05	1.30E-05	5.54E-05	0.00754971	0.10643101	0.01671102	5596893.87
72614039.2	782.255999	806.896015	1021.60844	765.287778	5.53E-06	2.51E-05	73.109406	0.01486749	0.01086954	1.21E-05	1.30E-05	5.55E-05	0.00755385	0.10653566	0.01673183	5601386.74
72694740.6	782.255999	806.883955	1021.60499	765.287334	5.53E-06	2.51E-05	73.1139111	0.0148821	0.01088088	1.21E-05	1.30E-05	5.56E-05	0.00755773	0.10664032	0.01675264	5606984.4
72795617.4	782.255999	806.868653	1021.60066	765.286772	5.54E-06	2.51E-05	73.11953	0.01490035	0.01089507	1.21E-05	1.30E-05	5.57E-05	0.00756273	0.10677113	0.01677863	5612596.11
72921713.4	782.255999	806.852607	1021.59524	765.286094	5.55E-06	2.51E-05	73.1265343	0.01492318	0.0109128	1.21E-05	1.30E-05	5.58E-05	0.00756853	0.10693465	0.01681118	5619603.29
73079333.5	782.255999	806.832293	1021.58844	765.285237	5.56E-06	2.51E-05	73.1352596	0.0149517	0.01093496	1.21E-05	1.30E-05	5.59E-05	0.00757612	0.10713906	0.01685209	5628368.71
73236953.5	782.255999	806.814853	1021.58165	765.2844	5.57E-06	2.51E-05	73.1439517	0.01498023	0.01095713	1.21E-05	1.30E-05	5.60E-05	0.0075834	0.10734346	0.016893	5639299.52
73394573.5	782.255999	806.799474	1021.57488	765.283573	5.58E-06	2.51E-05	73.1526108	0.01500875	0.01097929	1.21E-05	1.30E-05	5.62E-05	0.00759063	0.10754786	0.01693391	5650228.53
73552193.5	782.255999	806.783929	1021.56814	765.282739	5.59E-06	2.51E-05	73.161237	0.01503728	0.01100146	1.21E-05	1.30E-05	5.63E-05	0.0075983	0.10775226	0.01697481	5661165.02
73749218.5	782.255999	806.743259	1021.55977	765.281621	5.60E-06	2.51E-05	73.1719738	0.01507293	0.01102916	1.21E-05	1.30E-05	5.65E-05	0.00760733	0.10800776	0.0170259	5672116.29
73946243.6	782.255999	806.70363	1021.55146	765.280509	5.61E-06	2.51E-05	73.18266	0.01510859	0.01105687	1.21E-05	1.30E-05	5.66E-05	0.00761627	0.10826326	0.017077	5685777.55
74143268.6	782.255999	806.663759	1021.54321	765.279392	5.63E-06	2.51E-05	73.1932959	0.01514424	0.01108457	1.21E-05	1.30E-05	5.68E-05	0.00762529	0.10851877	0.0171281	5699439.67
74340293.6	782.255999	806.62145	1021.53503	765.278255	5.64E-06	2.51E-05	73.2038817	0.0151799	0.01111228	1.21E-05	1.30E-05	5.69E-05	0.00763468	0.10877427	0.01717918	5713107.95
74537318.6	782.255999	806.582273	1021.52688	765.277144	5.65E-06	2.51E-05	73.214418	0.01521556	0.01113998	1.21E-05	1.30E-05	5.71E-05	0.00764368	0.10902977	0.01723026	5726771.13
74734343.7	782.255999	806.540442	1021.51877	765.276011	5.67E-06	2.51E-05	73.224905	0.01525121	0.01116769	1.21E-05	1.30E-05	5.73E-05	0.00765312	0.10928527	0.01728132	5740441.02
74931368.7	782.255999	806.498406	1021.51067	765.274878	5.68E-06	2.51E-05	73.2353431	0.01528687	0.01119539	1.21E-05	1.30E-05	5.74E-05	0.00766267	0.10954077	0.01733238	5754110.78
75128393.7	782.255999	806.460348	1021.50255	765.273771	5.70E-06	2.51E-05	73.2457326	0.01532253	0.0112231	1.21E-05	1.30E-05	5.76E-05	0.00767151	0.10979628	0.01738343	5767776.53
75325418.7	782.255999	806.423193	1021.49446	765.272673	5.71E-06	2.51E-05	73.2560738	0.01535818	0.0112508	1.21E-05	1.30E-05	5.78E-05	0.00768052	0.11005178	0.01743448	5781440.08
75522443.8	782.255999	806.385343	1021.4864	765.27156	5.72E-06	2.51E-05	73.2663672	0.01539384	0.01127851	1.21E-05	1.30E-05	5.79E-05	0.00768959	0.11030728	0.01748552	5795105.64
75719468.8	782.255999	806.347465	1021.47837	765.270443	5.74E-06	2.51E-05	73.276613	0.0154295	0.01130621	1.21E-05	1.30E-05	5.81E-05	0.00769871	0.11056278	0.01753655	5808772.57
75916493.8	782.255999	806.309853	1021.47037	765.269328	5.75E-06	2.51E-05	73.2868115	0.01546515	0.01133392	1.21E-05	1.30E-05	5.83E-05	0.00770786	0.11081828	0.01758758	5822440.34
76113518.8	782.255999	806.272636	1021.46238	765.268216	5.77E-06	2.51E-05	73.2969631	0.01550081	0.01136162	1.21E-05	1.30E-05	5.84E-05	0.00771701	0.11107379	0.0176386	5836108.72

Time (s)	Coolant outlet temperature (K)	Peak cladding temperature (K)	Peak fuel temperature (K)	Average cladding internal temperature (K)	Peak cumulative damage factor	Cladding interior volume (m^3)	Fission gas release (%)	Fission gas produced (moles)	Fission gas released (moles)	Fuel volume (m^3)	Plenum gas volume (m^3)	Peak cladding radial growth (m)	Peak fuel axial growth (m)	Peak burnup (at%)	Peak cladding hoop strain	Plenum pressure (Pa)
76310543.9	782.255999	806.237461	1021.45442	765.26712	5.78E-06	2.51E-05	73.3070681	0.01553646	0.01138933	1.21E-05	1.30E-05	5.86E-05	0.00772591	0.11132929	0.01768962	5849773.07
76507568.9	782.255999	806.205288	1021.4465	765.266048	5.79E-06	2.51E-05	73.3171269	0.01557212	0.01141703	1.21E-05	1.30E-05	5.87E-05	0.00773444	0.11158479	0.01774063	5863431.28
76704593.9	782.255999	806.167207	1021.43863	765.264932	5.81E-06	2.51E-05	73.3271397	0.01560778	0.01144474	1.21E-05	1.30E-05	5.89E-05	0.00774388	0.11184029	0.01779163	5877104.9
76833647	781.272965	805.148335	1020.88102	764.508101	5.82E-06	2.51E-05	73.3336734	0.01563113	0.01146288	1.21E-05	1.30E-05	5.90E-05	0.00774857	0.11200765	0.01782022	5885127.04
76837247	782.66454	806.783956	1024.27665	765.729843	5.82E-06	2.51E-05	73.3338563	0.01563179	0.01146339	1.21E-05	1.30E-05	5.91E-05	0.007755	0.11201234	0.01785601	5903192.53
76966300.1	782.66454	806.758439	1024.2718	765.729114	5.83E-06	2.51E-05	73.3404353	0.01565538	0.01148172	1.21E-05	1.30E-05	5.92E-05	0.00776006	0.11218138	0.0178929	5903515.91
77127616.4	782.66454	806.722841	1024.26517	765.728143	5.84E-06	2.51E-05	73.3486312	0.01568486	0.01150463	1.22E-05	1.30E-05	5.94E-05	0.00776844	0.11239267	0.01793567	5912599.43
77288932.8	782.66454	806.690844	1024.25855	765.727197	5.85E-06	2.51E-05	73.3567964	0.01571435	0.01152755	1.22E-05	1.30E-05	5.95E-05	0.00777647	0.11260397	0.01797834	5923920.78
77340548	782.66454	806.681003	1024.25641	765.726897	5.86E-06	2.51E-05	73.3594025	0.01572379	0.01153488	1.22E-05	1.30E-05	5.96E-05	0.00777899	0.11267158	0.01799205	5935173.59
77344148	782.66454	806.68081	1024.25626	765.726879	5.86E-06	2.51E-05	73.3595842	0.01572444	0.01153539	1.22E-05	1.30E-05	5.96E-05	0.0077791	0.1126763	0.0179931	5938764.77
77395763.2	782.66454	806.671261	1024.25415	765.726583	5.86E-06	2.51E-05	73.3621869	0.01573388	0.01154272	1.22E-05	1.30E-05	5.96E-05	0.00778157	0.1127439	0.01800665	5939045.45
77460282.3	782.66454	806.660921	1024.25149	765.726223	5.87E-06	2.51E-05	73.365436	0.01574567	0.01155188	1.22E-05	1.30E-05	5.97E-05	0.00778435	0.11282841	0.0180237	5942670.01
77540931.1	782.66454	806.645825	1024.24818	765.725757	5.88E-06	2.51E-05	73.3694905	0.01576042	0.01156334	1.22E-05	1.30E-05	5.97E-05	0.0077883	0.11293405	0.018045	5947206.33
77621579.9	782.66454	806.630867	1024.24485	765.725292	5.88E-06	2.51E-05	73.3735374	0.01577516	0.01157479	1.22E-05	1.30E-05	5.98E-05	0.00779214	0.11303968	0.01806631	5952863.41
77702228.7	782.66454	806.616908	1024.24152	765.724834	5.89E-06	2.51E-05	73.3775767	0.0157899	0.01158625	1.22E-05	1.30E-05	5.99E-05	0.00779595	0.11314532	0.01808762	5958520.36
77738400	782.100518	806.037035	1023.92315	765.290744	5.89E-06	2.51E-05	73.3793859	0.01579651	0.01159138	1.22E-05	1.30E-05	5.99E-05	0.00779741	0.1131927	0.01809451	5960902.29
77742000	782.745069	806.793456	1025.49916	765.856887	5.89E-06	2.51E-05	73.3795663	0.01579717	0.0115919	1.22E-05	1.30E-05	5.99E-05	0.0078005	0.11319743	0.01811144	5967723.32
77778171.3	782.745069	806.788731	1025.49784	765.856702	5.89E-06	2.51E-05	73.3813822	0.01580381	0.01159706	1.22E-05	1.30E-05	6.00E-05	0.00780144	0.11324502	0.01812238	5967988.83
77823385.3	782.745069	806.781541	1025.49597	765.856447	5.90E-06	2.51E-05	73.3836499	0.01581212	0.01160351	1.22E-05	1.30E-05	6.00E-05	0.00780338	0.11330452	0.01813458	5970540.9
77879902.9	782.745069	806.771636	1025.49359	765.85612	5.90E-06	2.51E-05	73.3864813	0.0158225	0.01161157	1.22E-05	1.30E-05	6.01E-05	0.00780609	0.11337889	0.01814967	5973733.9
77950549.9	782.745069	806.758804	1025.49062	765.855707	5.91E-06	2.51E-05	73.3900152	0.01583547	0.01162165	1.22E-05	1.30E-05	6.01E-05	0.00780942	0.11347186	0.0181685	5977728.21
78021196.9	782.745069	806.747645	1025.48765	765.855308	5.92E-06	2.51E-05	73.3935433	0.01584844	0.01163173	1.22E-05	1.30E-05	6.02E-05	0.00781267	0.11356482	0.01818733	5982704.22
78109505.7	782.745069	806.733435	1025.48395	765.854806	5.92E-06	2.51E-05	73.3979454	0.01586466	0.01164433	1.22E-05	1.30E-05	6.03E-05	0.00781676	0.11368102	0.01821086	5987692.33
78197814.4	782.745069	806.717203	1025.48025	765.854288	5.93E-06	2.51E-05	73.4023385	0.01588088	0.01165693	1.22E-05	1.30E-05	6.03E-05	0.00782117	0.11379723	0.01823438	5993920.11
78286123.2	782.745069	806.704026	1025.47656	765.853794	5.94E-06	2.51E-05	73.4067226	0.01589709	0.01166953	1.22E-05	1.30E-05	6.04E-05	0.00782511	0.11391343	0.0182579	6000140
78396509.1	782.745069	806.685696	1025.47197	765.853163	5.95E-06	2.51E-05	73.4121902	0.01591736	0.01168529	1.22E-05	1.30E-05	6.05E-05	0.00783039	0.11405869	0.01828727	6006377.23
78506895.1	782.745069	806.667804	1025.46738	765.852534	5.96E-06	2.51E-05	73.4176439	0.01593764	0.01170104	1.22E-05	1.30E-05	6.06E-05	0.00783564	0.11420395	0.01831665	6014158.52
78617281	782.745069	806.651835	1025.46279	765.85192	5.97E-06	2.52E-05	73.4230837	0.01595791	0.01171679	1.22E-05	1.30E-05	6.07E-05	0.00784057	0.1143492	0.01834601	6021934.24
78755263.4	782.745069	806.632252	1025.45709	765.851157	5.98E-06	2.52E-05	73.4298641	0.01598325	0.01173648	1.22E-05	1.30E-05	6.08E-05	0.00784672	0.11453077	0.01838268	6029724.12
78893245.9	782.745069	806.612891	1025.4514	765.850396	5.99E-06	2.52E-05	73.436623	0.01600858	0.01175616	1.22E-05	1.30E-05	6.09E-05	0.00785283	0.11471234	0.01841934	6039442.99
79031228.3	782.745069	806.595105	1025.44575	765.849645	6.00E-06	2.52E-05	73.4433605	0.01603392	0.01177585	1.22E-05	1.30E-05	6.10E-05	0.00785885	0.11489391	0.0184561	6049159.32
79203706.3	782.745069	806.568365	1025.43873	765.848671	6.02E-06	2.52E-05	73.4517525	0.0160656	0.01180046	1.22E-05	1.30E-05	6.12E-05	0.00786718	0.11512088	0.0185022	6058907.68
79376184.3	782.745069	806.545107	1025.43174	765.847724	6.03E-06	2.52E-05	73.4601116	0.01609727	0.01182507	1.22E-05	1.30E-05	6.13E-05	0.007875	0.11534784	0.01854828	6071059.86
79548662.4	782.745069	806.521172	1025.42478	765.84677	6.05E-06	2.52E-05	73.4684377	0.01612894	0.01184968	1.22E-05	1.30E-05	6.15E-05	0.00788313	0.1155748	0.01859435	6083216.54
79721140.4	782.745069	806.49986	1025.41785	765.845835	6.06E-06	2.52E-05	73.4767313	0.01616062	0.01187429	1.22E-05	1.30E-05	6.16E-05	0.00789081	0.11580177	0.01864039	6095365.62
79893618.4	782.745069	806.478072	1025.41093	765.844893	6.08E-06	2.52E-05	73.4849924	0.01619229	0.0118989	1.22E-05	1.30E-05	6.18E-05	0.00789862	0.11602873	0.0186864	6107517.34
80066096.4	782.745069	806.457964	1025.40405	765.843965	6.10E-06	2.52E-05	73.4932212	0.01622396	0.01192351	1.22E-05	1.30E-05	6.19E-05	0.00790619	0.11625569	0.01873239	6119666.82
80238574.5	782.745069	806.436954	1025.39719	765.843026	6.11E-06	2.52E-05	73.501418	0.01625564	0.01194812	1.22E-05	1.30E-05	6.21E-05	0.00791422	0.11648265	0.01877836	6131821.44
80444447	782.745069	806.412916	1025.38904	765.841913	6.13E-06	2.52E-05	73.5111601	0.01629344	0.0119775	1.22E-05	1.30E-05	6.22E-05	0.00792366	0.11675356	0.01883317	6143994.53
80448047	644.15	644.172401	644.153569	644.150952	6.13E-06	2.51E-05	73.5112451	0.01629377	0.01197776	1.20E-05	1.30E-05	5.80E-05	0.00645238	0.11675593	0.01764659	5163920.2
80451647	305	305.051392	305.006649	305.002174	6.13E-06	2.47E-05	73.5112451	0.01629377	0.01197776	1.18E-05	1.28E-05	3.52E-05	0.00440858	0.11675593	0.01115273	2479257.78
80455247	305	305.051392	305.006649	305.002174	6.13E-06	2.47E-05	73.5112451	0.01629377	0.01197776	1.18E-05	1.28E-05	3.52E-05	0.00440858	0.11675593	0.01115273	2479257.78

APPENDIX B. BISON INPUT FILES

INPUT FILE FOR PIN T651

```
#     X430 BENCHMARK PROBLEM
#        PIN T651
#  Input file based on the X430 series of experiments performed in EBR-II from
#  1987 to 1992 to a peak burnup of about 11 at%. For a more complete
#  description of the experiment, see [Hayes et al., 1994]. For a more complete
#  description of development and results of this benchmark, see [Greenquist and
#  Powers, 2020].
#  Units are in standard SI: J, K, kg, m, Pa, s.

[GlobalParams]
   #  Parameters that are used in multiple blocks can be included here so that
   #  they only need to be specified one time.
   order = SECOND
   family = LAGRANGE
   elem_type = QUAD8
   density = 16310.0  # kg/m3 (UZr fuel) [Janney, 2018] pg. 50
   energy_per_fission = 3.2e-11  # [Shultis and Faw, 2008]
   volumetric_locking_correction = false
   displacements = 'disp_x disp_y'
   temperature = T
   X_Zr = 0.225  # 10wt%, [Janney, 2018] pg. 27
   X_Pu = 0.0
   dim = 2
[]

[Problem]
   #  Set up the coordinates and problem type
   coord_type = RZ
   type = AugmentedLagrangianContactProblem
   extra_tag_vectors = 'ref'
   reference_vector = 'ref'
   group_variables = 'T disp_x disp_y'
[]

[Mesh]
   #  The mesh must include a block for the UZr fuel and a block for the HT-9
   #  stainless steel cladding. See [Greenquist and Powers, 2020] pg. 3 and
   #  [Hayes et al., 1994] pg. 2 for complete geometry descriptions.
   type = MeshGeneratorMesh
   patch_size = 5
   patch_update_strategy = auto
   partitioner = centroid
   centroid_partitioner_direction = y
   # build cladding
   [./bottom_plug]
      type = GeneratedMeshGenerator
      xmin = 0.0
      xmax = 3.2766e-3
      nx = 5
      ymin = 0.0
      ymax = 15.0e-3
      ny = 4
   [../]
   [./bottom_corner]
      type = GeneratedMeshGenerator
      xmin = 3.2766e-3
      xmax = 3.683e-3
      nx = 8
      ymin = 0
      ymax = 15.0e-3
      ny = 4
   [../]
   [./bottom_corner_rename_side]
      type = SideSetsFromNormalsGenerator
      input = bottom_corner
      normals = '0 1 0'
```

```
67          new_boundary = new_side
68        [../]
69        [./combine_bottom_and_bottom_corner]
70          type = StitchedMeshGenerator
71          inputs = 'bottom_plug bottom_corner_rename_side'
72          stitch_boundaries_pairs = 'right left'
73        [../]
74        [./cladding_wall]
75          type = GeneratedMeshGenerator
76          xmin = 3.2766e-3
77          xmax = 3.683e-3
78          nx = 8
79          ymin = 15.0e-3
80          ymax = 740.65e-3
81          ny = 120
82        [../]
83        [./cladding_wall_rename_side]
84          type = SideSetsFromNormalsGenerator
85          input = cladding_wall
86          normals = '0 1 0'
87          new_boundary = new_side
88        [../]
89        [./combine_bottom_and_wall]
90          type = StitchedMeshGenerator
91          inputs = 'combine_bottom_and_bottom_corner cladding_wall_rename_side'
92          stitch_boundaries_pairs = '4 bottom'
93        [../]
94        [./top_corner]
95          type = GeneratedMeshGenerator
96          xmin = 3.2766e-3
97          xmax = 3.683e-3
98          nx = 8
99          ymin = 740.65e-3
100         ymax = 755.65e-3
101         ny = 4
102       [../]
103       [./top_corner_rename_side]
104         type = SideSetsFromNormalsGenerator
105         input = top_corner
106         normals = '-1 0 0'
107         new_boundary = new_side
108       [../]
109       [./combine_wall_and_top_corner]
110         type = StitchedMeshGenerator
111         inputs = 'combine_bottom_and_wall top_corner_rename_side'
112         stitch_boundaries_pairs = '4 bottom'
113       [../]
114       [./top_plug]
115         type = GeneratedMeshGenerator
116         xmin = 0
117         xmax = 3.2766e-3
118         nx = 5
119         ymin = 740.65e-3
120         ymax = 755.65e-3
121         ny = 4
122       [../]
123       [./cladding_all]
124         type = StitchedMeshGenerator
125         inputs = 'combine_wall_and_top_corner top_plug'
126         stitch_boundaries_pairs = '4 right'
127       [../]
128       # build fuel slug
129       [./fuel_slug]
130         type = GeneratedMeshGenerator
131         xmin = 0
132         xmax = 2.8575e-3
133         nx = 5
134         ymin = 19.0e-3
135         ymax = 361.9e-3
```

```
136         ny = 250
137       [../]
138       [./combine_fuel_cladding]
139         type = CombinerGenerator
140         inputs = 'cladding_all fuel_slug'
141       [../]
142       # name subdomains and boundaries
143       [./name_cladding]
144         type = SubdomainBoundingBoxGenerator
145         input = combine_fuel_cladding
146         bottom_left = '0.0 0.0 0'
147         top_right = '3.683e-3 755.65e-3 0'
148         block_id = 0
149         block_name = cladding
150       [../]
151       [./name_fuel]
152         type = SubdomainBoundingBoxGenerator
153         input = name_cladding
154         bottom_left = '0.0 19.0e-3 0'
155         top_right = '2.8575e-3 361.9e-3 0'
156         block_id = 1
157         block_name = fuel
158       [../]
159       [./name_centerline]
160         type = SideSetsFromNormalsGenerator
161         input = name_fuel
162         normals = '-1 0 0'
163         new_boundary = centerline
164         replace = true
165       [../]
166       [./name_slug_outer_surface]
167         type = SideSetsFromNormalsGenerator
168         input = name_centerline
169         normals = '1 0 0'
170         new_boundary = slug_outer_surface
171         replace = true
172       [../]
173       [./name_slug_ends]
174         type = SideSetsFromPointsGenerator
175         input = name_slug_outer_surface
176         points = '2.0e-3 19.0e-3 0
177                   2.0e-3 361.9e-3 0'
178         new_boundary = 'slug_bottom slug_top'
179         replace = true
180       [../]
181       [./name_cladding_inside]
182         type = SideSetsFromPointsGenerator
183         input = name_slug_ends
184         points = '2.0e-3 15.0e-3 0
185                   2.0e-3 740.65e-3 0
186                   3.2766e-3 500.0e-3 0'
187         new_boundary = 'cladding_inner_bottom cladding_inner_top
188                         cladding_inner_surface'
189         replace = true
190       [../]
191       [./name_cladding_outer_surface]
192         type = SideSetsFromPointsGenerator
193         input = name_cladding_inside
194         points = '2.0e-3 0.0 0
195                   2.0e-3 755.65e-3 0
196                   3.683e-3 500.0e-3 0'
197         new_boundary = 'cladding_outer_bottom cladding_outer_top
198                         cladding_outer_surface'
199         replace = true
200       [../]
201     []
202
203     [Variables]
204       #  Solution variables include T (temperature in K), disp_x (displacement in
```

```
    #  radial direction), and disp_y (displacement in axial direction). Only T is
    #  specified here. The others are generated by the [Modules/TensorMechanics]
    #  block.
    [./T]
      initial_condition = 295  # [Greenquist and Powers, 2020] pg. 9
    [../]
  []

  [AuxVariables]
    #  Variables that are not part of the system of coupled PDEs are specified
    #  here.
    [./creep_strain_mag]
      order = CONSTANT
      family = MONOMIAL
    [../]
    [./conductance]
      order = CONSTANT
      family = MONOMIAL
    [../]
    [./element_failed]
      order = CONSTANT
      family = MONOMIAL
    [../]
    [./volumetric_strain]
      block = fuel
      order = CONSTANT
      family = MONOMIAL
    [../]
    [./local_power]
      block = fuel
      order = CONSTANT
      family = MONOMIAL
    [../]
    [./coolant_T]
      block = cladding
      order = CONSTANT
      family = MONOMIAL
    [../]
    [./linear_heat_rate]
      order = CONSTANT
      family = MONOMIAL
    [../]
    [./fast_fluence]
      order = CONSTANT
      family = MONOMIAL
    [../]
  []

  [Functions]
    #  Any parameter that is a pre-defined function of space and time is defined
    #  here.
    [./power_history]
      #  x: time, y: Average LHGR (W/m). [Greenquist and Powers, 2020] pgs. 4
      #  and 5.
      type = PiecewiseLinear
      x =  '0 3600 8203212 8206812 13814423 13818023 14428975 14432575 21312419
        21316019 25596874 25600474 26261755 26265355 32714598 32718198 32721798
        32725398 32728998 32896765 32900365 39574695 39578295 42194062 42197662
        43820808 43824408 43895709 43899309 44401212 44404812 47385472 47389072
        48198548 48202148 48205748 48209348 48212948 52079977 52083577 53874489
        53878089 62125235 62128835 62256058 62259658 62620357 62623957 64516928
        64520528 64766586 64770186 67535546 67539146 72155534 72159134 72185697
        72189297 76833647 76837247 77340548 77344148 77738400 77742000 80444447
        80448047 80451647 80455247'
      y = '0.0 44225.3 44225.3 43106.1 43106.1 41403.6 41403.6 41119.9 41119.9
      38881.4 38881.4 38353.3 38353.3 39472.5 39472.5     0.0     0.0     0.0
      33490.2 33490.2 36863.6 36863.6 37123.7 37123.7 32717.8 32717.8 38534.6
      38534.6 38432.1 38432.1 36784.8 36784.8 36036.0 36036.0     0.0     0.0
          0.0 35153.3 35153.3 35153.3 35153.3 35271.5 35271.5 33663.6 33663.6
```

```
        34459.7 34459.7 34640.9 34640.9 34428.1 34428.1 34026.2 34026.2 33624.2
        33624.2 33624.2 33624.2 33718.8 33718.8 34057.7 34057.7 34057.7 34057.7
        34215.3 34215.3     0.0     0.0     0.0'
        scale_factor = 1.0
    [../]
    [./coolant_pressure_ramp]
        type = ConstantFunction
        value = 347702.6
    [../]
    [./coolant_temp_ramp]
        #  x: time (s), y: temperature (K). [Greenquist and Powers, 2020] pg. 7
        #  and [Hayes et al., 1994] pgs. 38, 44-56
        type = PiecewiseLinear
        x = '0   3600   32718198 32721798 32725398 32728998 48202148 48205748
             48209348 48212948 80448047 80451647 80538047'
        y = '295 644.15 644.15   305.00   305.00   644.15   644.15   305.00
             305.00   644.15   644.15   305.00   305.00'
    [../]
    [./axial_peaking_factors]
        type = PiecewiseBilinear
        #  x: axial position (m), y: time (s), z: peaking factor. [Greenquist and
        #  Powers, 2020] pg. 6
        xaxis = 1
        yaxis = 0
        y = '0 32725398 48209348 80455247'
        x = '0.018 0.019 0.022429 0.05329 0.08758 0.12187 0.15616 0.19045 0.22474
             0.25903 0.29332 0.32761 0.3619 0.362'
        z = '0.0 0.914 0.923 1.003 1.061 1.104 1.119 1.104 1.068 1.003 0.915 0.814
             0.705 0.0
             0.0 0.940 0.945 0.997 1.048 1.089 1.099 1.089 1.058 1.007 0.925 0.843
             0.750 0.0
             0.0 0.935 0.942 1.001 1.050 1.089 1.099 1.089 1.060 1.001 0.932 0.844
             0.736 0.0
             0.0 0.915 0.922 0.983 1.043 1.074 1.094 1.094 1.064 1.023 0.942 0.851
             0.750 0.0'
    [../]
    [./heat_generation_rate]
        type = ParsedFunction
        vars = 'lhr_bar p_factor'
        vals = 'power_history axial_peaking_factors'
        value = 'lhr_bar * p_factor'
    [../]
    [./gas_volume]
        type = ParsedFunction
        vars = 'v_cladding v_fuel'
        vals = 'cladding_volume fuel_volume'
        value = 'abs(v_cladding) - abs(v_fuel)'
    [../]
    [./coolant_flux]
        #  x: time (s), y: coolant flux (kg/m2/s). [Greenquist and Powers, 2020]
        #  pg. 4
        type = PiecewiseLinear
        x = '0 3600  8203212  8206812 13814423 13818023 14428975 14432575 21312419
           21316019 25596874 25600474 26261755 26265355 32714598 32718198 32885965
           32889565 39563895 39567495 42183262 42186862 43810008 43813608 43884909
           43888509 44390412 44394012 47374672 47378272 48187748 48191348 52058377
           52061977 53852889 53856489 62103635 62107235 62234458 62238058 62598757
           62602357 64495328 64498928 64744986 64748586 67513946 67517546 72133934
           72137534 72164097 72167697 76812047 76815647 77318948 77322548 77716800
           77720400 80422847 80426447 80430047 80516447'
        y = '2699.1 2699.1 2699.1 2724.0 2724.0 2697.2 2697.2 2781.0 2781.0 2721.1
             2721.1 2696.9 2696.9 2785.4 2785.4 2793.7 2793.7 2803.5 2803.5 2814.2
             2814.2 2799.6 2799.6 2840.1 2840.1 2839.6 2839.6 2873.7 2873.7 2855.7
             2855.7 2826.4 2826.4 2826.4 2826.4 2788.4 2788.4 2780.6 2780.6 2771.8
             2771.8 2781.5 2781.5 2817.1 2817.1 2807.4 2807.4 2777.1 2777.1 2777.1
             2777.1 2746.4 2746.4 2765.9 2765.9 2765.9 2765.9 2777.1 2777.1 2777.1
             2777.1 2777.1'
    [../]
[]
```

```
343
344 [Modules]
345    #  Prepackaged actions to create objects in other blocks.
346    [./TensorMechanics]
347       #  Solid mechanics
348       [./Master]
349          add_variables = true
350          strain = FINITE
351          generate_output = 'stress_xx stress_yy stress_zz vonmises_stress
352                             hydrostatic_stress'
353          [./fuel_mechanics]
354             block = 'fuel'
355             eigenstrain_names = 'fuel_thermal_strain fuel_gaseous_strain
356                                  fuel_solid_strain'
357             extra_vector_tags = 'ref'
358          [../]
359          [./cladding_mechanics]
360             block = 'cladding'
361             eigenstrain_names = 'cladding_thermal_strain
362                                  cladding_swelling_strain'
363             extra_vector_tags = 'ref'
364             additional_generate_output = 'creep_strain_zz elastic_strain_zz
365                                           strain_zz'
366          [../]
367       [../]
368    [../]
369 []
370
371 [Kernels]
372    #  Terms in the PDEs. Most are for the temperature PDE. The solid mechanics
373    #  PDEs are primarily specified in [Modules/TensorMechanics]
374    [./gravity]
375       type = Gravity
376       variable = disp_y
377       value = -9.81
378       extra_vector_tags = 'ref'
379    [../]
380    [./heat]
381       type = HeatConduction
382       variable = T
383       extra_vector_tags = 'ref'
384    [../]
385    [./heat_ie]
386       type = HeatConductionTimeDerivative
387       variable = T
388       extra_vector_tags = 'ref'
389    [../]
390    [./heat_source]
391       type = FissionRateHeatSource
392       variable = T
393       fission_rate = fission_rate
394       extra_vector_tags = 'ref'
395       block = fuel
396    [../]
397 []
398
399 [AuxKernels]
400    #  Specify the calculations that determine the values of the AuxVariables.
401    [./creep_strain_mag]
402       type = RankTwoScalarAux
403       block = cladding
404       rank_two_tensor = creep_strain
405       variable = creep_strain_mag
406       scalar_type = EffectiveStrain
407       execute_on = 'TIMESTEP_END'
408    [../]
409    [./conductance]
410       type = MaterialRealAux
411       variable = conductance
```

```
412         property = gap_conductance
413         boundary = slug_outer_surface
414      [../]
415      [./failed_element]
416         type = MaterialRealAux
417         boundary = 'cladding_outer_bottom cladding_outer_surface
418                     cladding_outer_top'
419         variable = element_failed
420         property = failed
421      [../]
422      [./volumetric_strain]
423         type = RankTwoScalarAux
424         rank_two_tensor = total_strain
425         variable = volumetric_strain
426         scalar_type = VolumetricStrain
427         execute_on = 'TIMESTEP_END'
428         block = fuel
429      [../]
430      [./power_aux]
431         type = FunctionAux
432         variable = local_power
433         function = axial_peaking_factors
434         block = fuel
435      [../]
436      [./coolant_temp_aux]
437         type = MaterialRealAux
438         variable = coolant_T
439         property = coolant_temperature
440         boundary = 'cladding_outer_bottom cladding_outer_surface
441                     cladding_outer_top'
442      [../]
443      [./linear_heat_rate]
444         type = FunctionAux
445         variable = linear_heat_rate
446         function = heat_generation_rate
447         execute_on = 'INITIAL TIMESTEP_END'
448      [../]
449      [./fluence]
450         type = FastNeutronFluenceAux
451         block = cladding
452         fast_neutron_flux = fast_neutron_flux
453         variable = fast_fluence
454      [../]
455   []
456
457   [Contact]
458      #  Action to control the frictional contact model
459      [./pellet_cladding_mechanical]
460         master = cladding_inner_surface
461         slave = slug_outer_surface
462         penalty = 1e8
463         model = coulomb
464         formulation = augmented_lagrange
465         system = constraint
466         friction_coefficient = 0.2
467         tangential_tolerance = 1e-3
468         normal_smoothing_distance = 0.1
469         al_penetration_tolerance = 1e-6
470         al_incremental_slip_tolerance = 1e-4
471         al_frictional_force_tolerance = 5e-2
472      [../]
473   []
474
475   [ThermalContact]
476      #  Action to control heat transfer in regions without meshes. Specifically
477      #  the gap and the coolant.
478      [./thermal_contact]
479         type = GapHeatTransfer
480         variable = T
```

```
      master = cladding_inner_surface
      slave = slug_outer_surface
      quadrature = true
      gap_conductivity = 63.9  # [Fink and Leibowitz, 1995] pg. 18 (778.9 K)
      min_gap = 0.4191e-3  # Initial gap thickness [Greenquist and Powers, 2020]
                           # pg. 3
   [../]
[]

[BCs]
   #  Boundary conditions on PDE variables
   [./pin_centerline]
      type = DirichletBC
      variable = disp_x
      boundary = centerline
      value = 0.0
   [../]
   [./pin_bottoms]
      type = DirichletBC
      variable = disp_y
      boundary = 'cladding_outer_bottom slug_bottom'
      value = 0.0
   [../]
   [./Pressure]
      [./coolant_pressure]
         boundary = 'cladding_outer_bottom cladding_outer_surface
                     cladding_outer_top'
         function = coolant_pressure_ramp
      [../]
   [../]
   [./PlenumPressure]
      [./plenumPressure]
         boundary = 'cladding_inner_bottom cladding_inner_surface
                     cladding_inner_top'
         initial_pressure = 91192.5  # 0.9 atm [Greenquist and Powers, 2020]
                                     # pg. 7
         startup_time = 0
         R = 8.3143
         temperature = avg_temp_interior
         volume = gas_volume
         output = plenum_pressure
         material_input = fission_gas_released
      [../]
   [../]
[]

[CoolantChannel]
   #  Coolant channel heat transfer model for the cladding outer surface BC
   [./convective_cladding_surface]
      boundary = 'cladding_outer_bottom cladding_outer_surface
                  cladding_outer_top'
      variable = T
      inlet_temperature = coolant_temp_ramp
      inlet_pressure = coolant_pressure_ramp
      inlet_massflux = coolant_flux
      coolant_material = sodium
      rod_diameter = 7.366e-3  # [Hayes et al., 1994] pg. 2
      rod_pitch = 8.788e-3  # combined diameters of cladding and spacing wire.
                            # [Hayes et al., 1994] pg. 2
      linear_heat_rate = power_history
      axial_power_profile = axial_peaking_factors
      subchannel_geometry = triangular
   [../]
[]

[Materials]
   # Physical properties of fuel and cladding
   ###### FUEL ######
   [./fission_rate]
```

```
      type = UPuZrFissionRate
      rod_linear_power = power_history
      axial_power_profile = axial_peaking_factors
      pellet_radius = 2.8575e-3  # [Hayes et al., 1994] pg. 2
      block = fuel
    [../]
    [./burnup]
      type = UPuZrBurnup
      block = fuel
      output_properties = burnup
      outputs = exodus
    [../]
    [./fuel_elasticity_tensor]
      type = UPuZrElasticityTensor
      block = fuel
    [../]
    [./fuel_elastic_stress]
      type = ComputeMultipleInelasticStress
      tangent_operator = nonlinear
      inelastic_models = 'fuel_upuzrcreep'
      block = fuel
    [../]
    [./fuel_upuzrcreep]
      type = UPuZrCreepUpdate
      block = fuel
      porosity = porosity
    [../]
    [./fuel_thermal_expansion]
      type = ComputeThermalExpansionEigenstrain
      block = fuel
      thermal_expansion_coeff = 16.6e-6  # [Janney, 2018] pg. 46
      stress_free_temperature = 295  # [Greenquist and Powers, 2020] pg. 7
      eigenstrain_name = fuel_thermal_strain
    [../]
    [./fuel_gaseous_swelling]
      type = UPuZrGaseousEigenstrain
      block = fuel
      eigenstrain_name = fuel_gaseous_strain
      anisotropic_factor = 0.5  # [Greenquist and Powers, 2020] pg. 6
      bubble_number_density = 2.09e18  # [Casagranda, 2020]
      interconnection_initiating_porosity = 0.125  # [Casagranda, 2020]
      interconnection_terminating_porosity = 0.2185  # [Casagranda, 2020]
      fission_rate = fission_rate
      output_properties = porosity
      outputs = exodus
      scalar = 1
    [../]
    [./solid_swelling]
      type = BurnupDependentEigenstrain
      eigenstrain_name = fuel_solid_strain
      block = fuel
      swelling_name = solid_swelling
    [../]
    [./metal_fuel_thermal]
      type = ThermalUPuZr
      block = fuel
      spheat_model = savage
      thcond_model = lanl
    [../]
    [./fuel_density]
      type = Density
      block = fuel
    [../]
    [./fission_gas_release]
      type = FgrUPuZr
      block = fuel
      fission_rate = fission_rate
      critical_porosity = 0.17195  # [Casagranda, 2020]
      fractional_fgr_initial = 0.558  # [Casagranda, 2020]
```

```
      fractional_fgr_post = 0.777  # [Casagranda, 2020]
    [../]
    #### CLADDING ####
    [./cladding_elasticity_tensor]
      type = ComputeIsotropicElasticityTensor
      youngs_modulus = 1.7260e11  # [Hofman et al., 1989] E.2.1.6
      poissons_ratio =  0.2668  # [Hofman et al., 1989] E.2.1.6
      block = cladding
    [../]
    [./cladding_stress]
      type = ComputeMultipleInelasticStress
      tangent_operator = nonlinear
      inelastic_models = cladding_ht9creep
      block = cladding
    [../]
    [./fast_flux]
      type = FastNeutronFlux
      factor = 5.67e14  # [Greenquist and Powers, 2020] pg. 6
      function = heat_generation_rate
      output_properties = fast_neutron_flux
      outputs = exodus
    [../]
    [./cladding_ht9creep]
      type = HT9CreepUpdate
      block = cladding
    [../]
    [./cladding_ht9swelling]
      type = HT9VolumetricSwellingEigenstrain
      eigenstrain_name = cladding_swelling_strain
      fast_neutron_fluence = fast_fluence
      block = cladding
      total_swelling_scaling_factor = 1.0
    [../]
    [./cladding_thermal_expansion]
      type = ComputeThermalExpansionEigenstrain
      block = cladding
      thermal_expansion_coeff = 1.280e-5  # [Hofman et al., 1989] E.2.2.2
      stress_free_temperature = 295  # [Greenquist and Powers, 2020] pg. 7
      eigenstrain_name = cladding_thermal_strain
    [../]
    [./clad_thermal]
      type = ThermalHT9
      block = cladding
      temp = T
    [../]
    [./cladding_density]
      type = Density
      block = cladding
      density = 7770.3  # [Hofman et al., 1989] E.2.2.4
    [../]
    [./longHT9_failure]
      type = FailureCladHT9
      boundary = 'cladding_outer_bottom cladding_outer_surface
                  cladding_outer_top'
      method = cdf_long
      hoop_stress = stress_zz
      output_properties = cdf_failure
      outputs = exodus
    [../]
  []

  [Dampers]
    #  Dampers can help stabilize the solution by preventing large changes during
    #  a single timestep
    [./limitT]
      type = MaxIncrement
      max_increment = 25
      variable = T
    [../]
```

```
    [./limitX]
       type = MaxIncrement
       max_increment = 1e-3
       variable = disp_x
    [../]
    [./limitY]
       type = MaxIncrement
       max_increment = 4e-3
       variable = disp_y
    [../]
  []

  [Preconditioning]
    #  Used to improve solver performance
    [./SMP]
       type = SMP
       full = true
    [../]
  []

  [Executioner]
    #  Instructions to run the simulation
    type = Transient
    solve_type = 'PJFNK'
    petsc_options = '-snes_ksp_ew'
    petsc_options_iname = '-pc_type -pc_factor_mat_solver_package
                           -ksp_gmres_restart'
    petsc_options_value = 'lu       superlu_dist
                           51'
    line_search = 'none'
    l_max_its = 30
    l_tol = 1e-2
    nl_max_its = 100
    nl_rel_tol = 5e-4
    nl_abs_tol = 1e-7
    end_time = 80455247
    dtmin = 1e-2
    dtmax = 1e6
    [./Quadrature]
       order = FIFTH
       side_order = SEVENTH
    [../]
    [./TimeStepper]
       type = IterationAdaptiveDT
       dt = 100
       optimal_iterations = 60
       iteration_window = 20
       growth_factor = 1.25
       cutback_factor = 0.512
       linear_iteration_ratio = 100
       force_step_every_function_point = true
       timestep_limiting_function = power_history
   [../]
  []

  [Postprocessors]
    # Non-spatial calculations performed after the PDE is solved.
    #### FISSION GAS #### (needed for simulation to run)
    [./fission_gas_produced]
       type = ElementIntegralFisGasProduce
       block = fuel
       execute_on = 'INITIAL TIMESTEP_END'
    [../]
    [./fission_gas_released]
       type = ElementIntegralFisGasRelease
       block = fuel
       execute_on = 'INITIAL TIMESTEP_END'
    [../]
    [./fission_gas_percent]
```

```
      type = FGRPercent
      fission_gas_generated = fission_gas_produced
      fission_gas_released = fission_gas_released
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
    [./avg_temp_interior]
      type = SideAverageValue
      boundary = 'cladding_inner_bottom cladding_inner_top
                  cladding_inner_surface'
      variable = T
      execute_on = 'INITIAL LINEAR'
    [../]
    [./cladding_volume]
      type = InternalVolume
      boundary = 'cladding_inner_bottom cladding_inner_top
                  cladding_inner_surface'
      execute_on = 'INITIAL NONLINEAR'
    [../]
    [./fuel_volume]
      type = InternalVolume
      boundary = 'slug_bottom slug_outer_surface slug_top'
      execute_on = 'INITIAL NONLINEAR'
    [../]
    [./gas_volume]
      type = FunctionValuePostprocessor
      function = gas_volume
      execute_on = 'INITIAL NONLINEAR'
    [../]
    #### BURNUP ####
    [./max_burnup]
      type = ElementExtremeValue
      variable = burnup
      block = fuel
      value_type = max
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
    #### TEMPERATURES ####
    [./T_max_fuel]
      type = ElementExtremeValue
      variable = T
      block = fuel
      value_type = max
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
    [./T_max_cladding]
      type = ElementExtremeValue
      variable = T
      block = cladding
      value_type = max
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
    [./T_coolant_out]
      type = ElementExtremeValue
      variable = coolant_T
      value_type = max
      block = cladding
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
    #### MECHANICAL ####
    [./max_cladding_hoop_strain]
      type = ElementExtremeValue
      variable = strain_zz
      block = cladding
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
    #### SWELLING ####
    [./growth_cladding_radial]
      type = NodalMaxValue
      boundary = cladding_outer_surface
```

```
826         variable = disp_x
827         execute_on = 'INITIAL TIMESTEP_END'
828      [../]
829      [./growth_fuel_axial]
830         type = NodalMaxValue
831         variable = disp_y
832         block = fuel
833         execute_on = 'INITIAL TIMESTEP_END'
834      [../]
835      [./cdf_max]
836         type = ElementExtremeValue
837         variable = cdf_failure
838         value_type = max
839         execute_on = 'INITIAL TIMESTEP_END'
840      [../]
841   []
842
843   [VectorPostprocessors]
844      #  Axially dependent calculations after the PDE is solved
845      [./clad_disp]
846         type = SideValueSampler
847         boundary = cladding_outer_surface
848         variable = disp_x
849         sort_by = y
850      [../]
851   []
852
853   [Outputs]
854      #  Instructions for simulation outputs
855      color = true
856      exodus = true
857      csv = true
858      perf_graph = true
859      checkpoint = true
860   []
861
862   #     REFERENCES
863   #  [Casagranda, 2020]
864   #     A. Casagranda, "BISON Metallic Fuel/VTR Training", Oak Ridge, Tennessee,
865   #     (2020)
866   #  [Fink and Leibowitz, 1995]
867   #     J. K. Fink and L. Leibowitz, "Thermodynamic and Transport properties of
868   #     sodium liquid and vapor", Argonne National Laboratory ANL/RE-95/2,
869   #     Argonne, Illinois (1995)
870   #  [Greenquist and Powers, 2020]
871   #     Ian Greenquist and Jeffrey J. Powers, "Metallic Fuel Benchmark Simulations
872   #     Based on the X430 Experiments", Oak Ridge National Laboratory
873   #     ORNL/TM-2020/1565, Oak Ridge, Tennessee (2020)
874   #  [Hayes et al., 1994]
875   #     S. L. Hayes, D. C. Crawford, and R. G. Pahl, "Test Design Description and
876   #     Postirradiation Examination of the HT9 Advanced Driver Fuel Test (X430)",
877   #     Argonne National Laboratory ANL-IFR-225, Idaho Falls, Idaho (1994)
878   #  [Hofman et al., 1989]
879   #     G. L. Hofman, M. C. Billone, J. F. Koenig, J. M. Kramer, J. D. B. Lambert,
880   #     L. Leibowitz, Y. Orechwa, D. R. Pedersen, D. L. Porter, H. Tsai, and A. E.
881   #     Wright, "Metallic Fuels Handbook", Argonne National Laboratory ANL-NSE-3,
882   #     Argonne, Illinois (1989)
883   #  [Janney, 2018]
884   #     Dawn E. Janney, "Metallic Fuels Handbook, Part 1: Alloys Based on U-Zr,
885   #     Pu-Zr, U-Pu, or U-Pu-Zr, Including Those with Minor Actinides (Np, Am,
886   #     Cm), Rare-earth Elements (La, Ce, Pr, Nd, Gd), and Y", Idaho National
887   #     Laboratory INL/EXT-15-36520 Revision 3 Part 1, Idaho Falls, Idaho (2018)
888   #  [Shultis and Faw, 2008]
889   #     J. Kenneth Shultis and Richard E. Faw, "Fundamentals of Nuclear Science
890   #     and Engineering", CRC Press, Boca Raton, Florida, (2008)
```

INPUT FILE FOR T654

The values that were changed in section 3.4 to tune the simulation are on lines 588 and 595. The values are highlighted in red.

```
#     X430 BENCHMARK PROBLEM
#        PIN T654
#  Input file based on the X430 series of experiments performed in EBR-II from
#  1987 to 1992 to a peak burnup of about 11 at%. For a more complete
#  description of the experiment, see [Hayes et al., 1994]. For a more complete
#  description of development and results of this benchmark, see [Greenquist and
#  Powers, 2020].
#  Units are in standard SI: J, K, kg, m, Pa, s.

[GlobalParams]
   #  Parameters that are used in multiple blocks can be included here so that
   #  they only need to be specified one time.
   order = SECOND
   family = LAGRANGE
   elem_type = QUAD8
   density = 15800.0  # kg/m3 (UPuZr fuel) [Janney, 2018] pg. 134
   energy_per_fission = 3.2e-11  # [Shultis and Faw, 2008]
   volumetric_locking_correction = false
   displacements = 'disp_x disp_y'
   temperature = T
   X_Zr = 0.226  # 19wt% [Janney, 2018] pg. 134
   X_Pu = 0.160  # 10wt% [Janney, 2018] pg. 134
   dim = 2
[]

[Problem]
   #  Set up the coordinates and problem type
   coord_type = RZ
   type = AugmentedLagrangianContactProblem
   extra_tag_vectors = 'ref'
   reference_vector = 'ref'
   group_variables = 'T disp_x disp_y'
[]

[Mesh]
   #  The mesh must include a block for the UZr fuel and a block for the HT-9
   #  stainless steel cladding. See [Greenquist and Powers, 2020] pg. 3 and
   #  [Hayes et al., 1994] pg. 2 for complete geometry descriptions.
   type = MeshGeneratorMesh
   patch_size = 5
   patch_update_strategy = auto
   partitioner = centroid
   centroid_partitioner_direction = y
   # build cladding
   [./bottom_plug]
      type = GeneratedMeshGenerator
      xmin = 0.0
      xmax = 3.2766e-3
      nx = 5
      ymin = 0.0
      ymax = 15.0e-3
      ny = 4
   [../]
   [./bottom_corner]
      type = GeneratedMeshGenerator
      xmin = 3.2766e-3
      xmax = 3.683e-3
      nx = 8
      ymin = 0
      ymax = 15.0e-3
      ny = 4
   [../]
   [./bottom_corner_rename_side]
```

```
64          type = SideSetsFromNormalsGenerator
65          input = bottom_corner
66          normals = '0 1 0'
67          new_boundary = new_side
68       [../]
69       [./combine_bottom_and_bottom_corner]
70          type = StitchedMeshGenerator
71          inputs = 'bottom_plug bottom_corner_rename_side'
72          stitch_boundaries_pairs = 'right left'
73       [../]
74       [./cladding_wall]
75          type = GeneratedMeshGenerator
76          xmin = 3.2766e-3
77          xmax = 3.683e-3
78          nx = 8
79          ymin = 15.0e-3
80          ymax = 740.65e-3
81          ny = 120
82       [../]
83       [./cladding_wall_rename_side]
84          type = SideSetsFromNormalsGenerator
85          input = cladding_wall
86          normals = '0 1 0'
87          new_boundary = new_side
88       [../]
89       [./combine_bottom_and_wall]
90          type = StitchedMeshGenerator
91          inputs = 'combine_bottom_and_bottom_corner cladding_wall_rename_side'
92          stitch_boundaries_pairs = '4 bottom'
93       [../]
94       [./top_corner]
95          type = GeneratedMeshGenerator
96          xmin = 3.2766e-3
97          xmax = 3.683e-3
98          nx = 8
99          ymin = 740.65e-3
100         ymax = 755.65e-3
101         ny = 4
102      [../]
103      [./top_corner_rename_side]
104         type = SideSetsFromNormalsGenerator
105         input = top_corner
106         normals = '-1 0 0'
107         new_boundary = new_side
108      [../]
109      [./combine_wall_and_top_corner]
110         type = StitchedMeshGenerator
111         inputs = 'combine_bottom_and_wall top_corner_rename_side'
112         stitch_boundaries_pairs = '4 bottom'
113      [../]
114      [./top_plug]
115         type = GeneratedMeshGenerator
116         xmin = 0
117         xmax = 3.2766e-3
118         nx = 5
119         ymin = 740.65e-3
120         ymax = 755.65e-3
121         ny = 4
122      [../]
123      [./cladding_all]
124         type = StitchedMeshGenerator
125         inputs = 'combine_wall_and_top_corner top_plug'
126         stitch_boundaries_pairs = '4 right'
127      [../]
128      # build fuel slug
129      [./fuel_slug]
130         type = GeneratedMeshGenerator
131         xmin = 0
132         xmax = 2.8575e-3
```

```
133         nx = 5
134         ymin = 19.0e-3
135         ymax = 361.9e-3
136         ny = 250
137      [../]
138      [./combine_fuel_cladding]
139         type = CombinerGenerator
140         inputs = 'cladding_all fuel_slug'
141      [../]
142      # name subdomains and boundaries
143      [./name_cladding]
144         type = SubdomainBoundingBoxGenerator
145         input = combine_fuel_cladding
146         bottom_left = '0.0 0.0 0'
147         top_right = '3.683e-3 755.65e-3 0'
148         block_id = 0
149         block_name = cladding
150      [../]
151      [./name_fuel]
152         type = SubdomainBoundingBoxGenerator
153         input = name_cladding
154         bottom_left = '0.0 19.0e-3 0'
155         top_right = '2.8575e-3 361.9e-3 0'
156         block_id = 1
157         block_name = fuel
158      [../]
159      [./name_centerline]
160         type = SideSetsFromNormalsGenerator
161         input = name_fuel
162         normals = '-1 0 0'
163         new_boundary = centerline
164         replace = true
165      [../]
166      [./name_slug_outer_surface]
167         type = SideSetsFromNormalsGenerator
168         input = name_centerline
169         normals = '1 0 0'
170         new_boundary = slug_outer_surface
171         replace = true
172      [../]
173      [./name_slug_ends]
174         type = SideSetsFromPointsGenerator
175         input = name_slug_outer_surface
176         points = '2.0e-3 19.0e-3 0
177                   2.0e-3 361.9e-3 0'
178         new_boundary = 'slug_bottom slug_top'
179         replace = true
180      [../]
181      [./name_cladding_inside]
182         type = SideSetsFromPointsGenerator
183         input = name_slug_ends
184         points = '2.0e-3 15.0e-3 0
185                   2.0e-3 740.65e-3 0
186                   3.2766e-3 500.0e-3 0'
187         new_boundary = 'cladding_inner_bottom cladding_inner_top
188                         cladding_inner_surface'
189         replace = true
190      [../]
191      [./name_cladding_outer_surface]
192         type = SideSetsFromPointsGenerator
193         input = name_cladding_inside
194         points = '2.0e-3 0.0 0
195                   2.0e-3 755.65e-3 0
196                   3.683e-3 500.0e-3 0'
197         new_boundary = 'cladding_outer_bottom cladding_outer_top
198                         cladding_outer_surface'
199         replace = true
200      [../]
201   []
```

```
[Variables]
   #  Solution variables include T (temperature in K), disp_x (displacement in
   #  radial direction), and disp_y (displacement in axial direction). Only T is
   #  specified here. The others are generated by the [Modules/TensorMechanics]
   #  block.
   [./T]
      initial_condition = 295  # [Greenquist and Powers, 2020] pg. 9
   [../]
[]

[AuxVariables]
   #  Variables that are not part of the system of coupled PDEs are specified
   #  here.
   [./creep_strain_mag]
      order = CONSTANT
      family = MONOMIAL
   [../]
   [./conductance]
      order = CONSTANT
      family = MONOMIAL
   [../]
   [./element_failed]
      order = CONSTANT
      family = MONOMIAL
   [../]
   [./volumetric_strain]
      block = fuel
      order = CONSTANT
      family = MONOMIAL
   [../]
   [./local_power]
      block = fuel
      order = CONSTANT
      family = MONOMIAL
   [../]
   [./coolant_T]
      block = cladding
      order = CONSTANT
      family = MONOMIAL
   [../]
   [./linear_heat_rate]
      order = CONSTANT
      family = MONOMIAL
   [../]
   [./fast_fluence]
      order = CONSTANT
      family = MONOMIAL
   [../]
[]

[Functions]
   #  Any parameter that is a pre-defined function of space and time is defined
   #  here.
   [./power_history]
      #  x: time, y: Average LHGR (W/m). [Greenquist and Powers, 2020] pgs. 4
      #  and 5.
      type = PiecewiseLinear
      x =  '0 3600 8203212 8206812 13814423 13818023 14428975 14432575 21312419
        21316019 25596874 25600474 26261755 26265355 32714598 32718198 32721798
        32725398 32728998 32896765 32900365 39574695 39578295 42194062 42197662
        43820808 43824408 43895709 43899309 44401212 44404812 47385472 47389072
        48198548 48202148 48205748 48209348 48212948 52079977 52083577 53874489
        53878089 62125235 62128835 62256058 62259658 62620357 62623957 64516928
        64520528 64766586 64770186 67535546 67539146 72155534 72159134 72185697
        72189297 76833647 76837247 77340548 77344148 77738400 77742000 80444447
        80448047 80451647 80455247'
      y = '0.0 44225.3 44225.3 43106.1 43106.1 41403.6 41403.6 41119.9 41119.9
      38881.4 38881.4 38353.3 38353.3 39472.5 39472.5     0.0     0.0     0.0
```

```
      33490.2 33490.2 36863.6 36863.6 37123.7 37123.7 32717.8 32717.8 38534.6
      38534.6 38432.1 38432.1 36784.8 36784.8 36036.0 36036.0     0.0     0.0
          0.0 35153.3 35153.3 35153.3 35153.3 35271.5 35271.5 33663.6 33663.6
      34459.7 34459.7 34640.9 34640.9 34428.1 34428.1 34026.2 34026.2 33624.2
      33624.2 33624.2 33624.2 33718.8 33718.8 34057.7 34057.7 34057.7 34057.7
      34215.3 34215.3     0.0     0.0     0.0'
      scale_factor = 1.0
   [../]
   [./coolant_pressure_ramp]
      type = ConstantFunction
      value = 347702.6
   [../]
   [./coolant_temp_ramp]
      #  x: time (s), y: temperature (K). [Greenquist and Powers, 2020] pg. 7
      #  and [Hayes et al., 1994] pgs. 38, 44-56
      type = PiecewiseLinear
      x = '0   3600   32718198 32721798 32725398 32728998 48202148 48205748
           48209348 48212948 80448047 80451647 80538047'
      y = '295 644.15 644.15   305.00   305.00   644.15   644.15   305.00
           305.00   644.15   644.15   305.00   305.00'
   [../]
   [./axial_peaking_factors]
      type = PiecewiseBilinear
      #  x: axial position (m), y: time (s), z: peaking factor. [Greenquist and
      #  Powers, 2020] pg. 6
      xaxis = 1
      yaxis = 0
      y = '0 32725398 48209348 80455247'
      x = '0.018 0.019 0.022429 0.05329 0.08758 0.12187 0.15616 0.19045 0.22474
           0.25903 0.29332 0.32761 0.3619 0.362'
      z = '0.0 0.888 0.898 0.988 1.063 1.115 1.130 1.115 1.078 1.003 0.913 0.808
           0.681 0.0
           0.0 0.906 0.914 0.986 1.049 1.101 1.111 1.101 1.069 1.018 0.924 0.831
           0.716 0.0
           0.0 0.896 0.905 0.985 1.044 1.094 1.114 1.104 1.074 1.014 0.935 0.835
           0.706 0.0
           0.0 0.895 0.903 0.975 1.037 1.088 1.109 1.098 1.078 1.016 0.944 0.842
           0.729 0.0'
   [../]
   [./heat_generation_rate]
      type = ParsedFunction
      vars = 'lhr_bar p_factor'
      vals = 'power_history axial_peaking_factors'
      value = 'lhr_bar * p_factor'
   [../]
   [./gas_volume]
      type = ParsedFunction
      vars = 'v_cladding v_fuel'
      vals = 'cladding_volume fuel_volume'
      value = 'abs(v_cladding) - abs(v_fuel)'
   [../]
   [./coolant_flux]
      #  x: time (s), y: coolant flux (kg/m2/s). [Greenquist and Powers, 2020]
      #  pg. 4
      type = PiecewiseLinear
      x = '0 3600  8203212  8206812 13814423 13818023 14428975 14432575 21312419
         21316019 25596874 25600474 26261755 26265355 32714598 32718198 32885965
         32889565 39563895 39567495 42183262 42186862 43810008 43813608 43884909
         43888509 44390412 44394012 47374672 47378272 48187748 48191348 52058377
         52061977 53852889 53856489 62103635 62107235 62234458 62238058 62598757
         62602357 64495328 64498928 64744986 64748586 67513946 67517546 72133934
         72137534 72164097 72167697 76812047 76815647 77318948 77322548 77716800
         77720400 80422847 80426447 80430047 80516447'
      y = '2699.1 2699.1 2699.1 2724.0 2724.0 2697.2 2697.2 2781.0 2781.0 2721.1
           2721.1 2696.9 2696.9 2785.4 2785.4 2793.7 2793.7 2803.5 2803.5 2814.2
           2814.2 2799.6 2799.6 2840.1 2840.1 2839.6 2839.6 2873.7 2873.7 2855.7
           2855.7 2826.4 2826.4 2826.4 2826.4 2788.4 2788.4 2780.6 2780.6 2771.8
           2771.8 2781.5 2781.5 2817.1 2817.1 2807.4 2807.4 2777.1 2777.1 2777.1
           2777.1 2746.4 2746.4 2765.9 2765.9 2765.9 2765.9 2777.1 2777.1 2777.1
```

```
              2777.1 2777.1'
   [../]
[]

[Modules]
   #  Prepackaged actions to create objects in other blocks.
   [./TensorMechanics]
      #  Solid mechanics
      [./Master]
         add_variables = true
         strain = FINITE
         generate_output = 'stress_xx stress_yy stress_zz vonmises_stress
                            hydrostatic_stress'
         [./fuel_mechanics]
            block = 'fuel'
            eigenstrain_names = 'fuel_thermal_strain fuel_gaseous_strain
                                 fuel_solid_strain'
            extra_vector_tags = 'ref'
         [../]
         [./cladding_mechanics]
            block = 'cladding'
            eigenstrain_names = 'cladding_thermal_strain
                                 cladding_swelling_strain'
            extra_vector_tags = 'ref'
            additional_generate_output = 'creep_strain_zz elastic_strain_zz
                                          strain_zz'
         [../]
      [../]
   [../]
[]

[Kernels]
   #  Terms in the PDEs. Most are for the temperature PDE. The solid mechanics
   #  PDEs are primarily specified in [Modules/TensorMechanics]
   [./gravity]
      type = Gravity
      variable = disp_y
      value = -9.81
      extra_vector_tags = 'ref'
   [../]
   [./heat]
      type = HeatConduction
      variable = T
      extra_vector_tags = 'ref'
   [../]
   [./heat_ie]
      type = HeatConductionTimeDerivative
      variable = T
      extra_vector_tags = 'ref'
   [../]
   [./heat_source]
      type = FissionRateHeatSource
      variable = T
      fission_rate = fission_rate
      extra_vector_tags = 'ref'
      block = fuel
   [../]
[]

[AuxKernels]
   #  Specify the calculations that determine the values of the AuxVariables.
   [./creep_strain_mag]
      type = RankTwoScalarAux
      block = cladding
      rank_two_tensor = creep_strain
      variable = creep_strain_mag
      scalar_type = EffectiveStrain
      execute_on = 'TIMESTEP_END'
   [../]
```

```
409       [./conductance]
410          type = MaterialRealAux
411          variable = conductance
412          property = gap_conductance
413          boundary = slug_outer_surface
414       [../]
415       [./failed_element]
416          type = MaterialRealAux
417          boundary = 'cladding_outer_bottom cladding_outer_surface
418                      cladding_outer_top'
419          variable = element_failed
420          property = failed
421       [../]
422       [./volumetric_strain]
423          type = RankTwoScalarAux
424          rank_two_tensor = total_strain
425          variable = volumetric_strain
426          scalar_type = VolumetricStrain
427          execute_on = 'TIMESTEP_END'
428          block = fuel
429       [../]
430       [./power_aux]
431          type = FunctionAux
432          variable = local_power
433          function = axial_peaking_factors
434          block = fuel
435       [../]
436       [./coolant_temp_aux]
437          type = MaterialRealAux
438          variable = coolant_T
439          property = coolant_temperature
440          boundary = 'cladding_outer_bottom cladding_outer_surface
441                      cladding_outer_top'
442       [../]
443       [./linear_heat_rate]
444          type = FunctionAux
445          variable = linear_heat_rate
446          function = heat_generation_rate
447          execute_on = 'INITIAL TIMESTEP_END'
448       [../]
449       [./fluence]
450          type = FastNeutronFluenceAux
451          block = cladding
452          fast_neutron_flux = fast_neutron_flux
453          variable = fast_fluence
454       [../]
455    []
456
457    [Contact]
458       #  Action to control the frictional contact model
459       [./pellet_cladding_mechanical]
460          master = cladding_inner_surface
461          slave = slug_outer_surface
462          penalty = 1e8
463          model = coulomb
464          formulation = augmented_lagrange
465          system = constraint
466          friction_coefficient = 0.2
467          tangential_tolerance = 1e-3
468          normal_smoothing_distance = 0.1
469          al_penetration_tolerance = 1e-6
470          al_incremental_slip_tolerance = 1e-4
471          al_frictional_force_tolerance = 5e-2
472       [../]
473    []
474
475    [ThermalContact]
476       #  Action to control heat transfer in regions without meshes. Specifically
477       #  the gap and the coolant.
```

```
    [./thermal_contact]
       type = GapHeatTransfer
       variable = T
       master = cladding_inner_surface
       slave = slug_outer_surface
       quadrature = true
       gap_conductivity = 63.9  # [Fink and Leibowitz, 1995] pg. 18 (778.9 K)
       min_gap = 0.4191e-3  # Initial gap thickness [Greenquist and Powers, 2020]
                            # pg. 3
    [../]
  []

  [BCs]
    #  Boundary conditions on PDE variables
    [./pin_centerline]
       type = DirichletBC
       variable = disp_x
       boundary = centerline
       value = 0.0
    [../]
    [./pin_bottoms]
       type = DirichletBC
       variable = disp_y
       boundary = 'cladding_outer_bottom slug_bottom'
       value = 0.0
    [../]
    [./Pressure]
       [./coolant_pressure]
          boundary = 'cladding_outer_bottom cladding_outer_surface
                      cladding_outer_top'
          function = coolant_pressure_ramp
       [../]
    [../]
    [./PlenumPressure]
       [./plenumPressure]
          boundary = 'cladding_inner_bottom cladding_inner_surface
                      cladding_inner_top'
          initial_pressure = 91192.5  # 0.9 atm [Greenquist and Powers, 2020]
                                      # pg. 7
          startup_time = 0
          R = 8.3143
          temperature = avg_temp_interior
          volume = gas_volume
          output = plenum_pressure
          material_input = fission_gas_released
       [../]
    [../]
  []

  [CoolantChannel]
    #  Coolant channel heat transfer model for the cladding outer surface BC
    [./convective_cladding_surface]
       boundary = 'cladding_outer_bottom cladding_outer_surface
                   cladding_outer_top'
       variable = T
       inlet_temperature = coolant_temp_ramp
       inlet_pressure = coolant_pressure_ramp
       inlet_massflux = coolant_flux
       coolant_material = sodium
       rod_diameter = 7.366e-3  # [Hayes et al., 1994] pg. 2
       rod_pitch = 8.788e-3  # combined diameters of cladding and spacing wire.
                             # [Hayes et al., 1994] pg. 2
       linear_heat_rate = power_history
       axial_power_profile = axial_peaking_factors
       subchannel_geometry = triangular
    [../]
  []

  [Materials]
```

```
# Physical properties of fuel and cladding
###### FUEL ######
[./fission_rate]
   type = UPuZrFissionRate
   rod_linear_power = power_history
   axial_power_profile = axial_peaking_factors
   pellet_radius = 2.8575e-3  # [Hayes et al., 1994] pg. 2
   block = fuel
[../]
[./burnup]
   type = UPuZrBurnup
   block = fuel
   output_properties = burnup
   outputs = exodus
[../]
[./fuel_elasticity_tensor]
   type = UPuZrElasticityTensor
   block = fuel
[../]
[./fuel_elastic_stress]
   type = ComputeMultipleInelasticStress
   tangent_operator = nonlinear
   inelastic_models = 'fuel_upuzrcreep'
   block = fuel
[../]
[./fuel_upuzrcreep]
   type = UPuZrCreepUpdate
   block = fuel
   porosity = porosity
[../]
[./fuel_thermal_expansion]
   type = ComputeThermalExpansionEigenstrain
   block = fuel
   thermal_expansion_coeff = 17.3e-6  # [Janney, 2018] pg. 46
   stress_free_temperature = 295  # [Greenquist and Powers, 2020] pg. 7
   eigenstrain_name = fuel_thermal_strain
[../]
[./fuel_gaseous_swelling]
   type = UPuZrGaseousEigenstrain
   block = fuel
   eigenstrain_name = fuel_gaseous_strain
   anisotropic_factor = 0.5 # [Greenquist and Powers, 2020] pg. 6
   bubble_number_density = 2.09e18  # [Casagranda, 2020]
   interconnection_initiating_porosity = 0.125  # [Casagranda, 2020]
   interconnection_terminating_porosity = 0.2185  # [Casagranda, 2020]
   fission_rate = fission_rate
   output_properties = porosity
   outputs = exodus
   scalar = 1
[../]
[./solid_swelling]
   type = BurnupDependentEigenstrain
   eigenstrain_name = fuel_solid_strain
   block = fuel
   swelling_name = solid_swelling
[../]
[./metal_fuel_thermal]
   type = ThermalUPuZr
   block = fuel
   spheat_model = savage
   thcond_model = lanl
[../]
[./fuel_density]
   type = Density
   block = fuel
[../]
[./fission_gas_release]
   type = FgrUPuZr
   block = fuel
```

```
        fission_rate = fission_rate
        critical_porosity = 0.17195  # [Casagranda, 2020]
        fractional_fgr_initial = 0.558  # [Casagranda, 2020]
        fractional_fgr_post = 0.777  # [Casagranda, 2020]
    [../]
    #### CLADDING ####
    [./cladding_elasticity_tensor]
        type = ComputeIsotropicElasticityTensor
        youngs_modulus = 1.7260e11  # [Hofman et al., 1989] E.2.1.6
        poissons_ratio =  0.2668  # [Hofman et al., 1989] E.2.1.6
        block = cladding
    [../]
    [./cladding_stress]
        type = ComputeMultipleInelasticStress
        tangent_operator = nonlinear
        inelastic_models = cladding_ht9creep
        block = cladding
    [../]
    [./fast_flux]
        type = FastNeutronFlux
        factor = 5.76e14  # [Greenquist and Powers, 2020] pg. 6
        function = heat_generation_rate
        output_properties = fast_neutron_flux
        outputs = exodus
    [../]
    [./cladding_ht9creep]
        type = HT9CreepUpdate
        block = cladding
    [../]
    [./cladding_ht9swelling]
        type = HT9VolumetricSwellingEigenstrain
        eigenstrain_name = cladding_swelling_strain
        fast_neutron_fluence = fast_fluence
        block = cladding
        total_swelling_scaling_factor = 1.0
    [../]
    [./cladding_thermal_expansion]
        type = ComputeThermalExpansionEigenstrain
        block = cladding
        thermal_expansion_coeff = 1.280e-5  # [Hofman et al., 1989] E.2.2.2
        stress_free_temperature = 295  # [Greenquist and Powers, 2020] pg. 7
        eigenstrain_name = cladding_thermal_strain
    [../]
    [./clad_thermal]
        type = ThermalHT9
        block = cladding
        temp = T
    [../]
    [./cladding_density]
        type = Density
        block = cladding
        density = 7770.3  # [Hofman et al., 1989] E.2.2.4
    [../]
    [./longHT9_failure]
        type = FailureCladHT9
        boundary = 'cladding_outer_bottom cladding_outer_surface
                    cladding_outer_top'
        method = cdf_long
        hoop_stress = stress_zz
        output_properties = cdf_failure
        outputs = exodus
    [../]
[]

[Dampers]
    #  Dampers can help stabilize the solution by preventing large changes during
    #  a single timestep
    [./limitT]
        type = MaxIncrement
```

```
      max_increment = 25
      variable = T
   [../]
   [./limitX]
      type = MaxIncrement
      max_increment = 1e-3
      variable = disp_x
   [../]
   [./limitY]
      type = MaxIncrement
      max_increment = 4e-3
      variable = disp_y
   [../]
[]

[Preconditioning]
   #  Used to improve solver performance
   [./SMP]
      type = SMP
      full = true
   [../]
[]

[Executioner]
   #  Instructions to run the simulation
   type = Transient
   solve_type = 'PJFNK'
   petsc_options = '-snes_ksp_ew'
   petsc_options_iname = '-pc_type -pc_factor_mat_solver_package
                          -ksp_gmres_restart'
   petsc_options_value = 'lu       superlu_dist
                          51'
   line_search = 'none'
   l_max_its = 30
   l_tol = 1e-2
   nl_max_its = 100
   nl_rel_tol = 5e-4
   nl_abs_tol = 1e-7
   end_time = 80455247
   dtmin = 1e-2
   dtmax = 1e6
   [./Quadrature]
      order = FIFTH
      side_order = SEVENTH
   [../]
   [./TimeStepper]
      type = IterationAdaptiveDT
      dt = 100
      optimal_iterations = 60
      iteration_window = 20
      growth_factor = 1.25
      cutback_factor = 0.512
      linear_iteration_ratio = 100
      force_step_every_function_point = true
      timestep_limiting_function = power_history
  [../]
[]

[Postprocessors]
   # Non-spatial calculations performed after the PDE is solved.
   #### FISSION GAS #### (needed for simulation to run)
   [./fission_gas_produced]
      type = ElementIntegralFisGasProduce
      block = fuel
      execute_on = 'INITIAL TIMESTEP_END'
   [../]
   [./fission_gas_released]
      type = ElementIntegralFisGasRelease
      block = fuel
```

```
754          execute_on = 'INITIAL TIMESTEP_END'
755        [../]
756        [./fission_gas_percent]
757          type = FGRPercent
758          fission_gas_generated = fission_gas_produced
759          fission_gas_released = fission_gas_released
760          execute_on = 'INITIAL TIMESTEP_END'
761        [../]
762        [./avg_temp_interior]
763          type = SideAverageValue
764          boundary = 'cladding_inner_bottom cladding_inner_top
765                      cladding_inner_surface'
766          variable = T
767          execute_on = 'INITIAL LINEAR'
768        [../]
769        [./cladding_volume]
770          type = InternalVolume
771          boundary = 'cladding_inner_bottom cladding_inner_top
772                      cladding_inner_surface'
773          execute_on = 'INITIAL NONLINEAR'
774        [../]
775        [./fuel_volume]
776          type = InternalVolume
777          boundary = 'slug_bottom slug_outer_surface slug_top'
778          execute_on = 'INITIAL NONLINEAR'
779        [../]
780        [./gas_volume]
781          type = FunctionValuePostprocessor
782          function = gas_volume
783          execute_on = 'INITIAL NONLINEAR'
784        [../]
785        #### BURNUP ####
786        [./max_burnup]
787          type = ElementExtremeValue
788          variable = burnup
789          block = fuel
790          value_type = max
791          execute_on = 'INITIAL TIMESTEP_END'
792        [../]
793        #### TEMPERATURES ####
794        [./T_max_fuel]
795          type = ElementExtremeValue
796          variable = T
797          block = fuel
798          value_type = max
799          execute_on = 'INITIAL TIMESTEP_END'
800        [../]
801        [./T_max_cladding]
802          type = ElementExtremeValue
803          variable = T
804          block = cladding
805          value_type = max
806          execute_on = 'INITIAL TIMESTEP_END'
807        [../]
808        [./T_coolant_out]
809          type = ElementExtremeValue
810          variable = coolant_T
811          value_type = max
812          block = cladding
813          execute_on = 'INITIAL TIMESTEP_END'
814        [../]
815        #### MECHANICAL ####
816        [./max_cladding_hoop_strain]
817          type = ElementExtremeValue
818          variable = strain_zz
819          block = cladding
820          execute_on = 'INITIAL TIMESTEP_END'
821        [../]
822        #### SWELLING ####
```

```
    [./growth_cladding_radial]
      type = NodalMaxValue
      boundary = cladding_outer_surface
      variable = disp_x
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
    [./growth_fuel_axial]
      type = NodalMaxValue
      variable = disp_y
      block = fuel
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
    [./cdf_max]
      type = ElementExtremeValue
      variable = cdf_failure
      value_type = max
      execute_on = 'INITIAL TIMESTEP_END'
    [../]
[]

[VectorPostprocessors]
    #  Axially dependent calculations after the PDE is solved
    [./clad_disp]
      type = SideValueSampler
      boundary = cladding_outer_surface
      variable = disp_x
      sort_by = y
    [../]
[]

[Outputs]
    #  Instructions for simulation outputs
    color = true
    exodus = true
    csv = true
    perf_graph = true
    checkpoint = true
[]

#     REFERENCES
#  [Casagranda, 2020]
#     A. Casagranda, "BISON Metallic Fuel/VTR Training", Oak Ridge, Tennessee,
#     (2020)
#  [Fink and Leibowitz, 1995]
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#     sodium liquid and vapor", Argonne National Laboratory ANL/RE-95/2,
#     Argonne, Illinois (1995)
#  [Greenquist and Powers, 2020]
#     Ian Greenquist and Jeffrey J. Powers, "Metallic Fuel Benchmark Simulations
#     Based on the X430 Experiments", Oak Ridge National Laboratory
#     ORNL/TM-2020/1565, Oak Ridge, Tennessee (2020)
#  [Hayes et al., 1994]
#     S. L. Hayes, D. C. Crawford, and R. G. Pahl, "Test Design Description and
#     Postirradiation Examination of the HT9 Advanced Driver Fuel Test (X430)",
#     Argonne National Laboratory ANL-IFR-225, Idaho Falls, Idaho (1994)
#  [Hofman et al., 1989]
#     G. L. Hofman, M. C. Billone, J. F. Koenig, J. M. Kramer, J. D. B. Lambert,
#     L. Leibowitz, Y. Orechwa, D. R. Pedersen, D. L. Porter, H. Tsai, and A. E.
#     Wright, "Metallic Fuels Handbook", Argonne National Laboratory ANL-NSE-3,
#     Argonne, Illinois (1989)
#  [Janney, 2018]
#     Dawn E. Janney, "Metallic Fuels Handbook, Part 1: Alloys Based on U-Zr,
#     Pu-Zr, U-Pu, or U-Pu-Zr, Including Those with Minor Actinides (Np, Am,
#     Cm), Rare-earth Elements (La, Ce, Pr, Nd, Gd), and Y", Idaho National
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#  [Shultis and Faw, 2008]
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#     and Engineering", CRC Press, Boca Raton, Florida, (2008)
```