

Contract Program or  
Project Title: Heavy-Section Steel Technology (HSST) Program

Subject of this Document: **Electronic Archival of the Results of Pressurized Thermal Shock Analyses for Beaver Valley, Oconee, and Palisades Reactor Pressure Vessels Generated with the 04.1 version of FAVOR**

Type of Document: Letter Report

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Date of Document: October 15, 2004

Responsible NRC Individual  
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Division of Engineering Technology  
Office of Nuclear Regulatory Research

Prepared for the  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001  
Under Interagency Agreement DOE 1886-N653-3Y  
NRC JCN No. Y6533

OAK RIDGE NATIONAL LABORATORY  
Oak Ridge, Tennessee 37831-8056  
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UT-Battelle, LLC for the  
U. S. DEPARTMENT OF ENERGY  
under Contract No. DE-AC05-00OR22725

**Electronic Archival of the Results of Pressurized Thermal Shock Analyses for Beaver Valley, Oconee, and Palisades Reactor Pressure Vessels Generated with the 04.1 version of FAVOR**

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Manuscript Completed – October 2004  
Date Published –

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## ACRONYMS

BNL	Brookhaven National Laboratory
CPI	Conditional Probability of Initiation
CPTWC	Conditional Probability of Through Wall Cracking
EFPY	Effective Full-Power Years
FAVOR	Fracture Analysis of Vessels: Oak Ridge
FCI	Frequency of Crack Initiation
HZP	Hot Zero Power
ISL	Information Systems Laboratories
NRC	United States Nuclear Regulatory Commission
ORNL	Oak Ridge National Lab
PFM	Probabilistic Fracture Mechanics
PNNL	Pacific Northwest National Laboratory
PTS	Pressurized Thermal Shock
PWR	Pressurized Water Reactors
RPV	Reactor Pressure Vessel
SNL	Sandia National Laboratory
TWCF	Through Wall Cracking Frequency

# **Electronic Archival of the Results of Pressurized Thermal Shock Analyses for Beaver Valley, Oconee, and Palisades Reactor Pressure Vessels Generated with the 04.1 version of FAVOR**

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## **Abstract**

The current federal regulations to insure that nuclear reactor pressure vessels (RPVs) maintain their structural integrity when subjected to transient loading conditions such as pressurized thermal shock (PTS) events were derived from computational models developed in the early-mid 1980s. Since that time, there have been advancements in relevant technologies associated with the modeling of PTS events that impact RPV integrity assessment. These updated computational models have been implemented into the FAVOR (Fracture Analysis of Vessels: Oak Ridge) computer code.

An objective of the United States Nuclear Regulatory Commission (USNRC) PTS rule re-evaluation project is to determine if the application of improved technology can provide a technical basis to reduce the conservatism in the current regulations while continuing to provide reasonable assurance of adequate protection to public health and safety. A relaxation of PTS regulations could have profound implications for plant license renewal considerations. As part of the PTS re-evaluation project, to date, the 04.1 version of the FAVOR [1-2] code has been applied to three domestic commercial pressurized water reactors (PWRs): Beaver Valley Unit 1, Oconee Unit 1, and Palisades Unit 1.

The objective of this report is to document the electronic archival of the PTS analysis results, including the input data files and the output data files generated by the 04.1 version of FAVOR, for these three PWRs. This archival should provide sufficient detail such that the analysis results, and subsequent conclusions, can be reproduced. This report also contains summary reports of the analysis results. The results reported herein have been incorporated into an integrated document that proposes a technical basis for a revision of the PTS screening criteria [3]



## 1. Introduction

Table 1 is a summary of the integrated risk-informed PTS analysis results of Beaver Valley, Oconee, and Palisades which were generated with the 04.1 version of FAVOR [1-2] as part of the NRC-sponsored PTS Re-evaluation Program. Table 1 contains the mean values of the probability distributions for the frequency of crack initiation (FCI) and the through-wall cracking frequency (TWCF). For each of the three PWRs, analyses were performed at four levels of embrittlement, each one in principal, corresponding to a particular point in the operating life of the RPV.

For Oconee and Palisades, detailed neutron fluence maps were provided by Brookhaven National Laboratory (BNL) corresponding to 32 and 40 effective-full-power years (EFPY). For Beaver Valley, the same maps were provided by Westinghouse. The modeling and procedures used in generating these neutron fluence maps were based on the guidance provided in the NRC Draft Regulatory Guide DG-1053 [4]. The calculations were performed using the DORT discrete ordinates transport code [5] and the BUGLE-93 [6] forty-seven neutron group ENDF/B-VI nuclear cross sections and fission spectra. The Eason and Wright irradiation shift model, as specified in Equation 84 of reference 1, was used to calculate the irradiation-induced Charpy-transition-temperature shift  $\Delta RT_{NDT}$ .

Neutron fluence maps for times in the operating life of the RPV later than 40 EFPY were obtained by linear extrapolation from the maps for 32 and 40 EFPY. The assumption associated with this extrapolation is that the current core refueling scheme is maintained. This assumption is also implicit in the fluence maps for 32 and 40 EFPY. The first two analysis results were performed with neutron fluence maps that correspond to 32 and 60 EFPY. Clearly, some of the extrapolations used in these analyses are far beyond the range of EFPY for which plants would ever actually operate. They were performed since an objective of the analyses was to determine the level of embrittlement that corresponds to a frequency of RPV failure in the  $10^{-6}$  to  $10^{-7}$  range.

The objective of this report is to document the electronic archival of the PTS analysis results, including the input data files and the output data files generated by the 04.1 version of FAVOR, for these three PWRs. This archival should provide sufficient detail such that the analysis results, and subsequent conclusions, can be reproduced. This report also contains summary reports of the analysis results.

**Table 1 - Summary of PTS re-evaluation results evaluated with 04.1 version of FAVOR**

EPFY	Beaver Valley $RT_{NDT}^{(1)}$ (°F)	Beaver Valley FCI <sup>(2)</sup>	Beaver Valley TWCF <sup>(3)</sup>	Palisades $RT_{NDT}^{(1)}$ (°F)	Palisades FCI <sup>(2)</sup>	Palisades TWCF <sup>(3)</sup>	Oconee $RT_{NDT}^{(1)}$ (°F)	Oconee FCI <sup>(2)</sup>	Oconee TWCF <sup>(3)</sup>
32	285.1	1.32e-07	8.89e-10	270.5	5.22e-08	4.90e-09	223.3	1.29e-10	2.30e-11
60	313.1	5.19e-07	4.84e-09	288.6	1.23e-07	1.55e-08	240.6	1.02e-09	6.47E-11
100	343.8	1.71e-06	2.02e-08						
200	396.5	8.87e-06	3.00e-07	335.4	7.46e-07	1.88e-07			
500				390.7	4.47e-06	1.26e-06	299.1	1.01e-07	1.30e-09
1000							329.4	5.24e-07	1.16e-08

(1) Maximum value of  $RT_{NDT}$  including a  $2s$  margin term  $\Delta RT_{NDT}$  calculated by Equation 84 of [1].

(2) Mean value of the frequency of crack initiation expressed in cracked RPVs per reactor operating year.

(3) Mean value of the through-wall crack frequency expressed in failed RPVs per reactor operating year.

## 2. FAVOR Data Streams

Figure 1 illustrates the nature of the data streams that flow through the three computational modules of the FAVOR code. The three modules of FAVOR are: (1) a deterministic load generator (**FAVLoad**), (2) a Monte Carlo PFM module (**FAVPFM**), and (3) a post-processor (**FAVPost**). Figure 1 indicates the nature of the data streams that flow through these modules.

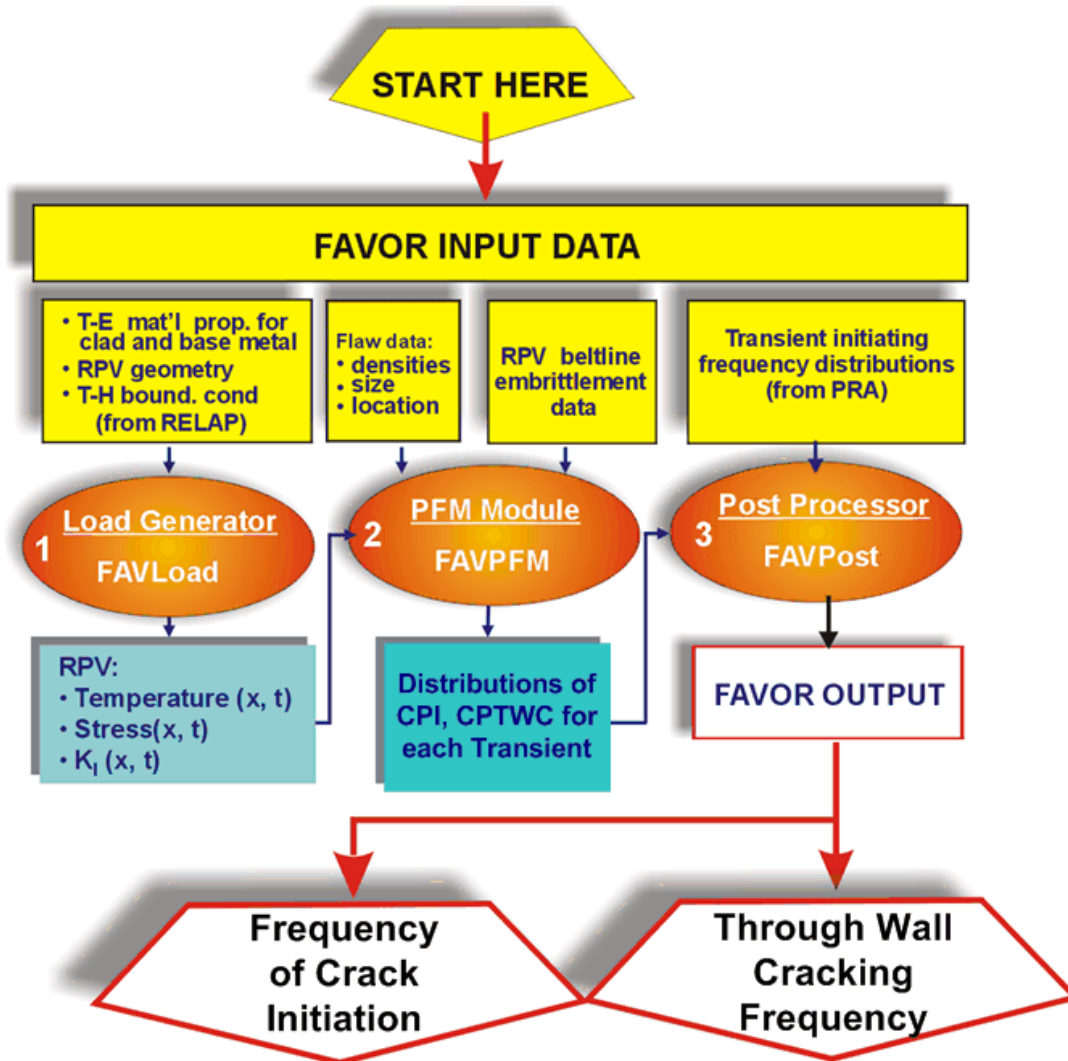


Figure 1 Data streams flow through three FAVOR modules: (1) FAVLoad, (2) FAVPFM, and (3) FAVPost.

The input data requirements and resulting output data of the **FAVLoad** module are as follows:

FAVLOAD input dataset – contains vessel geometry, thermal-elastic material properties, stress free temperature, and transient definitions, i.e., thermal hydraulic boundary conditions applied to the RPV inner surface for each transient in the form of time histories for convective heat transfer, coolant temperature time history, and pressure. The electronic archive, which this report documents, contains all of the FAVLoad input datasets used in the PTS analyses for the three PWRs. The thermal-hydraulic analyses were performed by Information Systems Laboratories (ISL) using the RELAP 5/MOD3 computer code [7].

FAVLOAD output dataset – contains circumferential and axial stress time histories for various through-wall locations in the RPV wall and applied  $K_I$  time histories for various inner-surface breaking flaw geometries for each of the transients. The FAVLoad output dataset becomes one of the input datasets to the FAVPFM module. The FAVLoad output files are not included as part of this archive because (1) the size of the output files are quite large, and (2) they can easily be generated in a minimum amount of computational time by applying the FAVLoad (v04.1) module.

The input data requirements of the **FAVPFM** module are five input dataset as follows:

- (1) FAVLoad output dataset (discussed above)
- (2) embrittlement-related (chemistry and neutron fluence) data of the RPV beltline

Three flaw characterization files as follows:

- (3) inner-surface breaking flaws (applicable to weld and plate material)
- (4) embedded flaws for weld material
- (5) embedded flaws for plate material

The chemistry data was taken from the RVID database [8]. The flaw-characterization data was provided by Pacific Northwest National Laboratory (PNNL). The USNRC has supported research at PNNL that has resulted in the postulation of fabrication flaws based on the non-destructive and destructive examination of actual RPV material. Such measurements have been used to characterize the number, size, and location of flaws in various types of weld and base metal used to fabricate vessels, thus providing a technical basis for the flaw data which is critical input data into FAVOR analyses [9-11]. These measurements have been supplemented by expert elicitation [12].

The electronic archive, which this report documents, provides all of the FAVPFM input datasets used in the PTS analyses for the three PWRs except the FAVLoad output files.

The resulting output data of the **FAVPFM** module consists of three\* output datasets as follows:

(1) initiate.dat – contains the conditional probability of crack initiation (CPI) for each RPV simulated in the PFM Monte Carlo analysis subjected to each transient, i.e., the  $(i,j)$  entry in initiate.dat is the CPI of the  $i$ th RPV subjected to the  $j$ th transient. This file will become an input file to the FAVPost module.

(2) failure.dat - contains the conditional probability of through wall cracking (CPTWC) for each RPV simulated in the PFM Monte Carlo analysis subjected to each transient, i.e., the  $(i,j)$  entry in failure.dat is the CPTWC of the  $i$ th RPV subjected to the  $j$ th transient. This file will become an input file to the FAVPost module.

(3) user-named PFM output file - contains informative reports that have the objective of providing useful information and insights into the fracture analysis.

The electronic archive, which this report documents, provides these three FAVPFM output datasets generated for each PTS analysis for the three PWRs.

\*The FAVPFM module generates additional output reports primarily used by developers for verification and validation purposes. These additional output datasets are not part of the data streams illustrated in Figure 1 and therefore will not be included in this archival.

The input data requirements of the **FAVPost** module are three input dataset as follows:

(1) FAVPost input dataset- contains numerical probability distribution for transient initiating frequency for each transient. Sandia National Laboratory (SNL) provided the probability distributions of the scenario frequency (events per reactor operating year) for all of the transients. The SAPHIRE Version 7 [13] computer code was used to generate the probability distributions

(2) initiate.dat – output file generated by FAVPFM as discussed above

(3) failure.dat – output file generated by FAVPFM as discussed above

The resulting output data of the **FAVPost** module consists of three output datasets as follows:

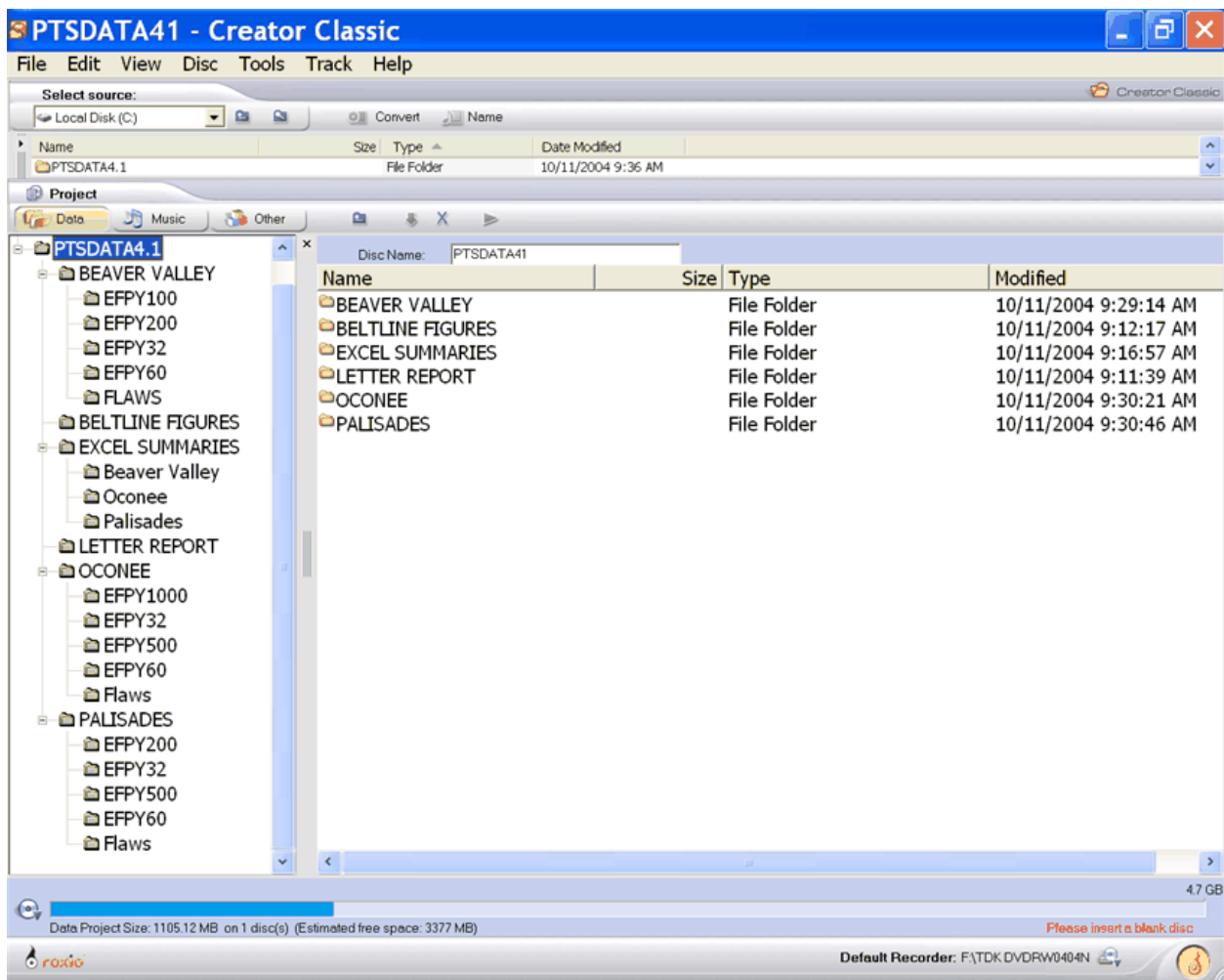
(1) user-named FAVPost output dataset – contains results of integrated analysis of all transients, i.e. descriptive statistics for the frequency of crack initiation (FCI), and frequency of vessel

failure, also referred to as through-wall crack frequency (TWCF). This file also contains results that allocate FCI and TWCF by transient, RPV major region, and flaw depth.

- (2) pdfepi.out – contains descriptive statistics, including a probability distribution function, (histogram) for the cpi for each transient.
- (3) pdfepf.out - contains descriptive statistics, including a probability distribution function, (histogram) for the CPTWC for each transient.

### 3. What’s on the Electronic Archival CD – Data File Structure and Naming Convention

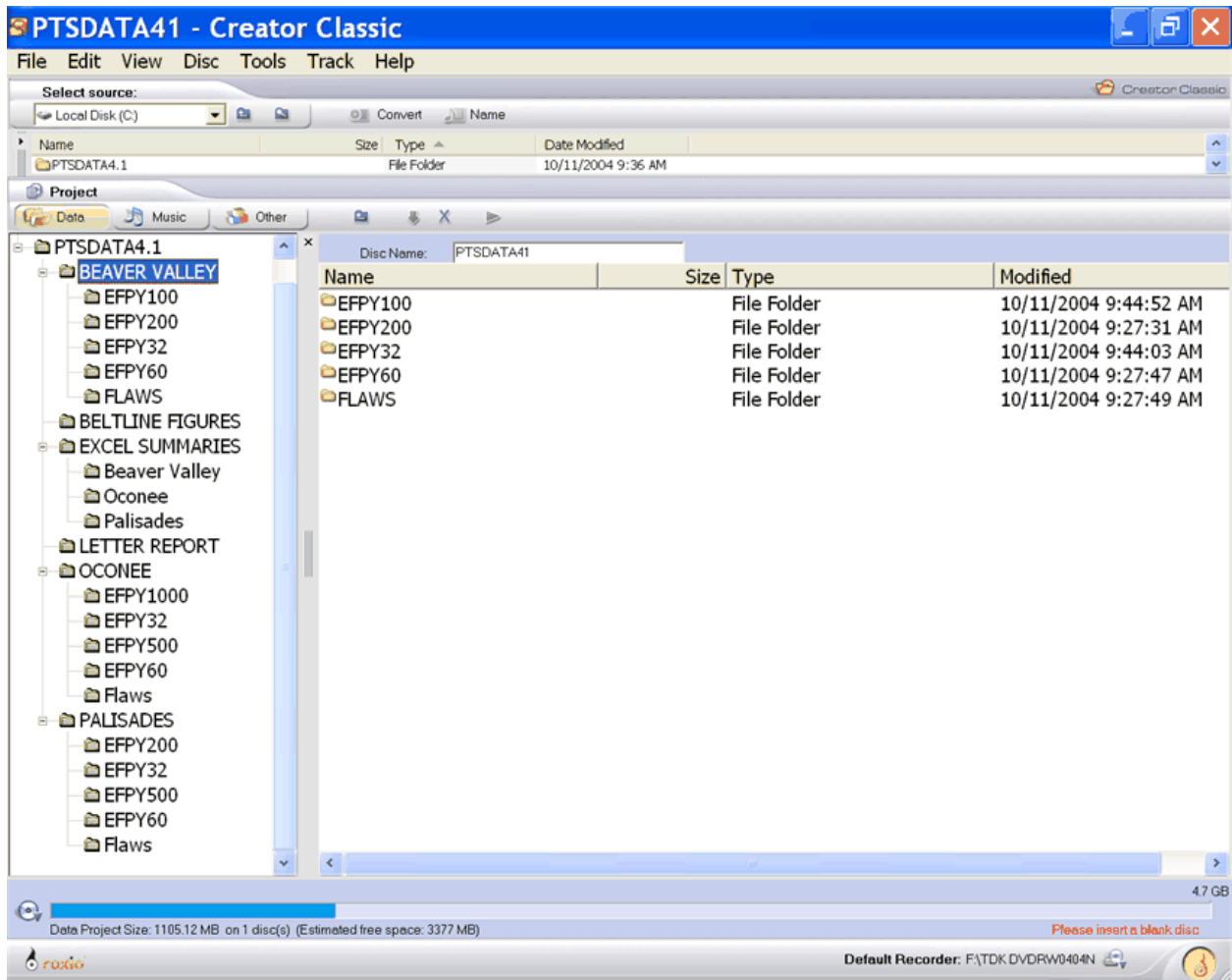
The electronic archival CD contains the following main folder \PTSDATA4.1\ and subfolders:



The main folder \PTSDATA4.1\ contains the following six subfolders:

**Table 2 - Subfolder Names and Contents of main folder \PTSDATA4.1\**

Subfolder	Contents
Beaver Valley	input and output data files for Beaver Valley PTS analyses
Beltline Figures	illustrations of RPV beltline dimensions and major regions (printed versions are in Appendix A of this report)
Excel Summaries	EXCEL spreadsheet summaries (printed versions are in Appendices B, C, D, and E of this report)
Letter Report	this letter report
Oconee	input and output data files for Oconee PTS analyses
Palisades	input and output data files for Palisades PTS analyses



The subfolder **\PTSDATA4.1\Beaver Valley\** contains five subfolders; one for each of the PTS analyses performed for Beaver Valley and a subfolder that contains the flaw characterization data files used as input into FAVPFM for all Beaver Valley analyses.

For Beaver Valley, there were 61 base case transients evaluated at 32, 60, 100 and 200 EFPY.

For Oconee, there were 55 base case transients evaluated at 32, 60, 500, and 1000 EFPY.

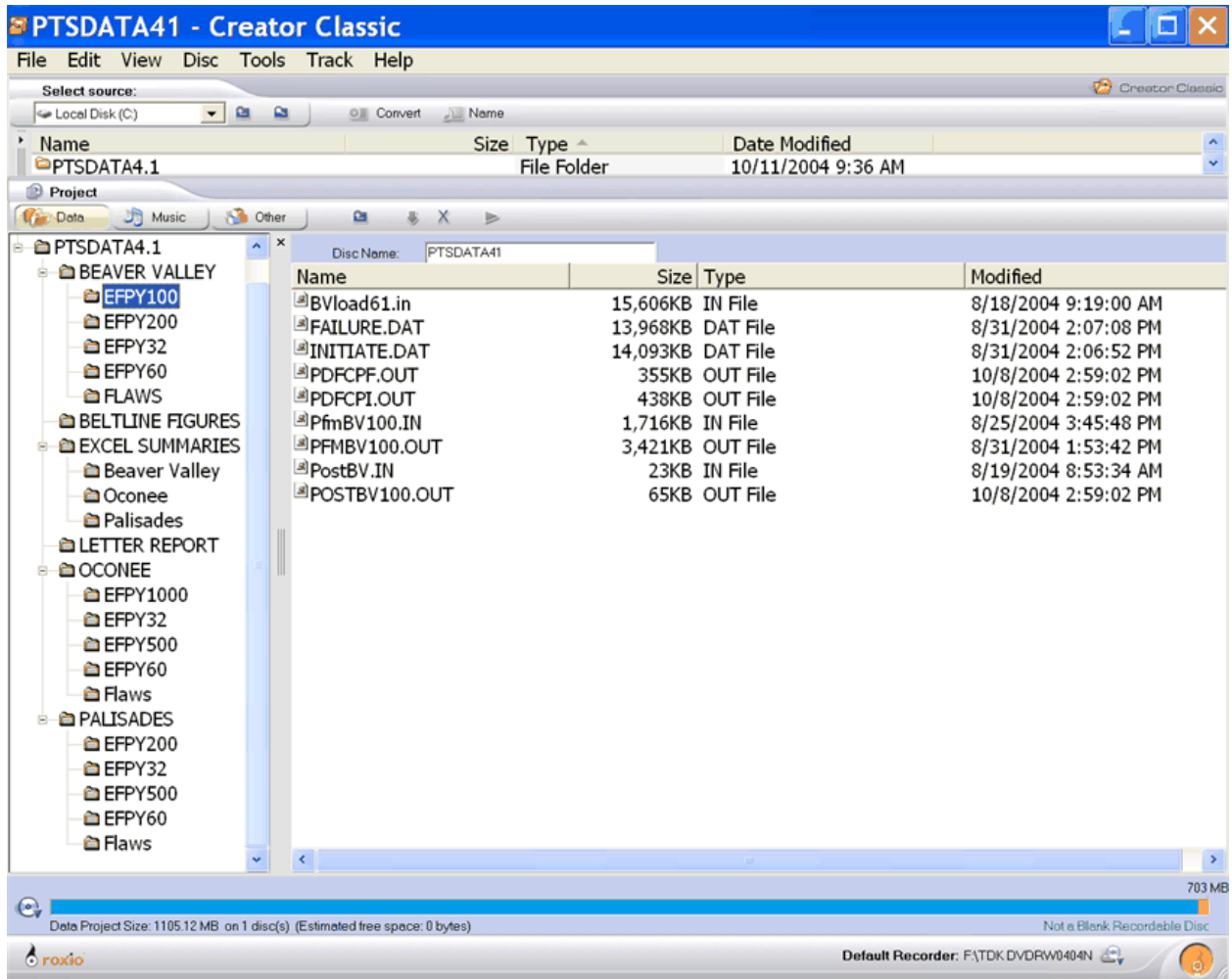
For Palisades, there were 30 base case transients evaluated at 32, 60, 200 and 500 EFPY.

**Table 3 - Subfolder Names and Contents of subfolder \PTSDATA4.1\Beaver Valley\**

Subfolder	Contents
EFPY32	contains input and output data files for a PTS analysis that applies a neutron fluence map that corresponds to 32 EFPY.
EFPY60	contains input and output data for a PTS analysis for a neutron fluence map that corresponds to 60 EFPY.
EFPY100	contains input and output data for a PTS analysis for a neutron fluence map that corresponds to 100 EFPY.
EFPY200	contains input and output data for a PTS analysis for a neutron fluence map that corresponds to 200 EFPY.
FLAWS	contains Beaver Valley specific flaw characterization files that are input files to FAVPFM

The subfolders **\PTSDATA4.1\Oconee\** and **\PTSDATA4.1\Palisades\** have an identical structure and similar naming convention as discussed and illustrated above for **\PTSDATA4.1\Beaver Valley\**.





The subfolder \PTSDATA4.1\Beaver Valley\EFPY100 contains a total of 9 data files: 3 input data files and 6 output data files for the analysis performed with the neutron fluence map that corresponds to 100 EFPY:

**Table 4 - File Names and Contents of subfolder \PTSDATA4.1\Beaver Valley\EFPY100**

Data file name	Contents
Bvload61.in	input data file for FAVLOAD (for 61 transients)
PfmBV100.in	input data file to FAVPFM (neutron map for 100 EFPY)
PfmBV100.out	output file generated by FAVPFM that contains detailed results of PFM analysis for each transient.
PostBV.in	input file for FAVPOST (for 61 transients)
initiate.dat	output file generated by FAVPFM that contains a value of conditional probability of crack initiation (CPI) for each simulated RPV subjected to each transient in the analysis. This file becomes an input file to FAVPOST (see figure 1).
failure.dat	output file generated by FAVPFM that contains a value of conditional probability of through wall cracking (CPTWC) for each simulated RPV subjected to each transient in the analysis. This file becomes an input file to FAVPOST.
PostBV100.out	output data file generated by FAVPOST that contains descriptive statistics of the integrated analysis, i.e., the probability distributions for the frequency of crack initiation and through-wall crack frequency, as well as some additional reports.
pdfcpi.out	output data file generated by FAVPOST that contains descriptive statistics for the CPI of each transient included in the PFM analysis.
pdfcpf.out	output data file generated by FAVPOST that contains descriptive statistics for the CPTWC of each transient included in the PFM analysis.

The subfolders \PTSDATA4.1\Beaver Valley\EFPY32, EFPY60, EFPY100 and EFPY200 have an identical structure and similar naming convention as illustrated in the following table:

**Table 5 - Naming Convention inside of subfolder \PTSDATA4.1\Beaver Valley**

subfolder name	Number of transients in analysis	FAVLOAD input dataset	FAVPFM input dataset	FAVPFM output dataset	FAVPOST input dataset	FAVPOST output dataset
EFPY32	61	BVload61.in	PfmBV32.in	PfmBV32.out	PostBV.in	PostBV32.out
EFPY60	61	BVload61.in	PfmBV60.in	PfmBV60.out	PostBV.in	PostBV60.out
EFPY100	61	BVload61.in	PfmBV100.in	PfmBV100.out	PostBV.in	PostBV100.out
EFPY200	61	BVload61.in	PfmBV200.in	PfmBV200.out	PostBV.in	PostBV200.out

The subfolders \PTSDATA4.1\Oconee\EFPY32, EFPY60, EFPY500 and EFPY1000 have an identical structure as \PTSDATA4.1\Beaver Valley\ illustrated above and a similar naming convention as illustrated in the following table:

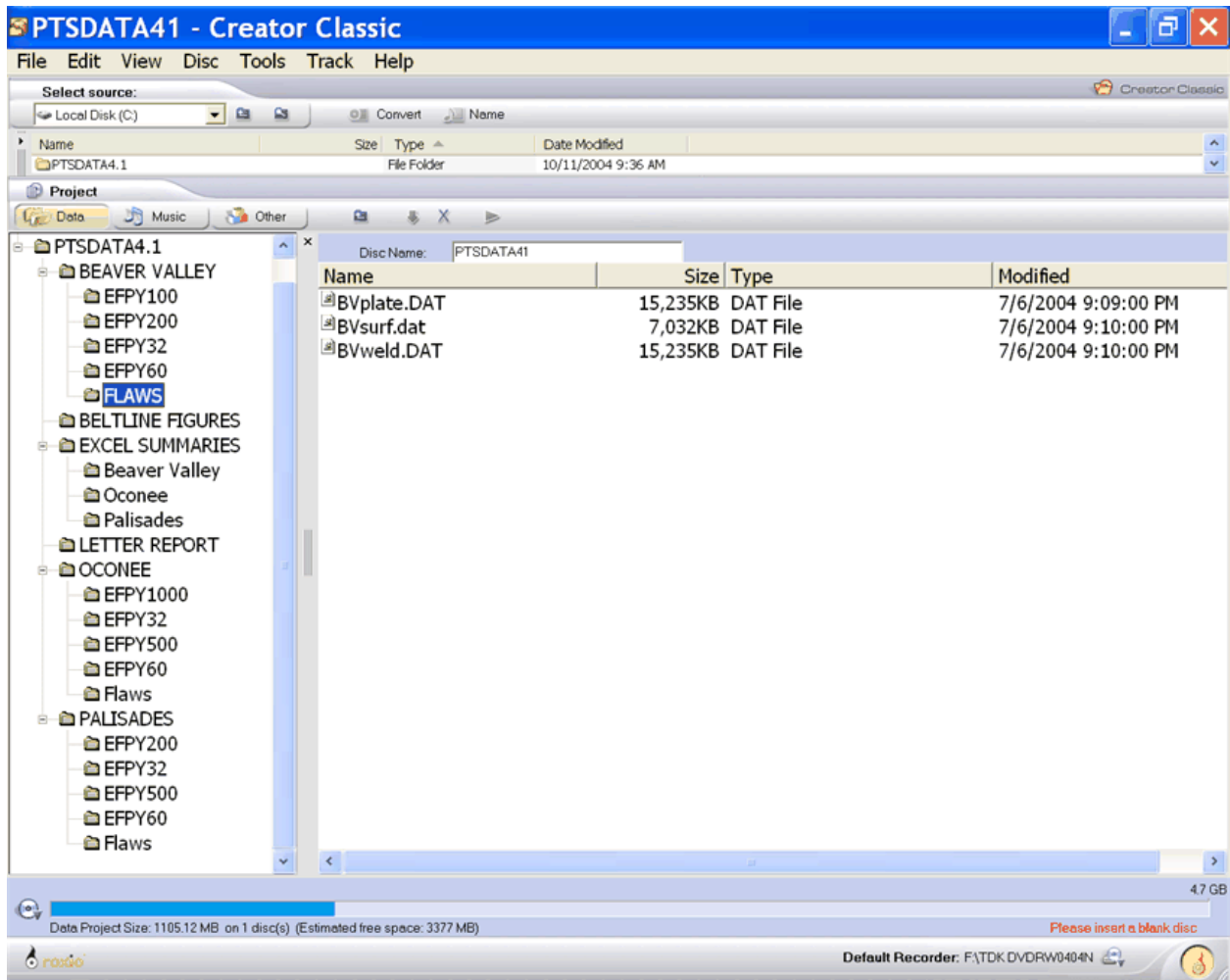
**Table 6 - Naming Convention inside of subfolder \PTSDATA4.1\Oconee**

<b>Subfolder name</b>	<b>Number of transients in analysis</b>	<b>FAVLOAD input dataset</b>	<b>FAVPFM input dataset</b>	<b>FAVPFM output dataset</b>	<b>FAVPOST input dataset</b>	<b>FAVPOST output dataset</b>
EFPY32	55	Oclload55.in	PfmOC32.in	PfmOC32.out	PostOC.in	PostOC32.out
EFPY60	55	Oclload55.in	PfmOC60.in	PfmOC60.out	PostOC.in	PostOC60.out
EFPY500	55	Oclload55.in	PfmOC500.in	PfmOC500.out	PostOC.in	PostOC500.out
EFPY1000	55	Oclload55.in	PfmOC1000.in	PfmOC1000.out	PostOC.in	PostOC1000.out

The subfolders \PTSDATA4.1\Palisades\EFPY32, EFPY60, EFPY200 and EFPY500 have an identical structure as \PTSDATA4.1\Beaver Valley\ illustrated above and similar naming convention as illustrated in the following table:

**Table 7 - Naming Convention inside of subfolder \PTSDATA4.1\Palisades**

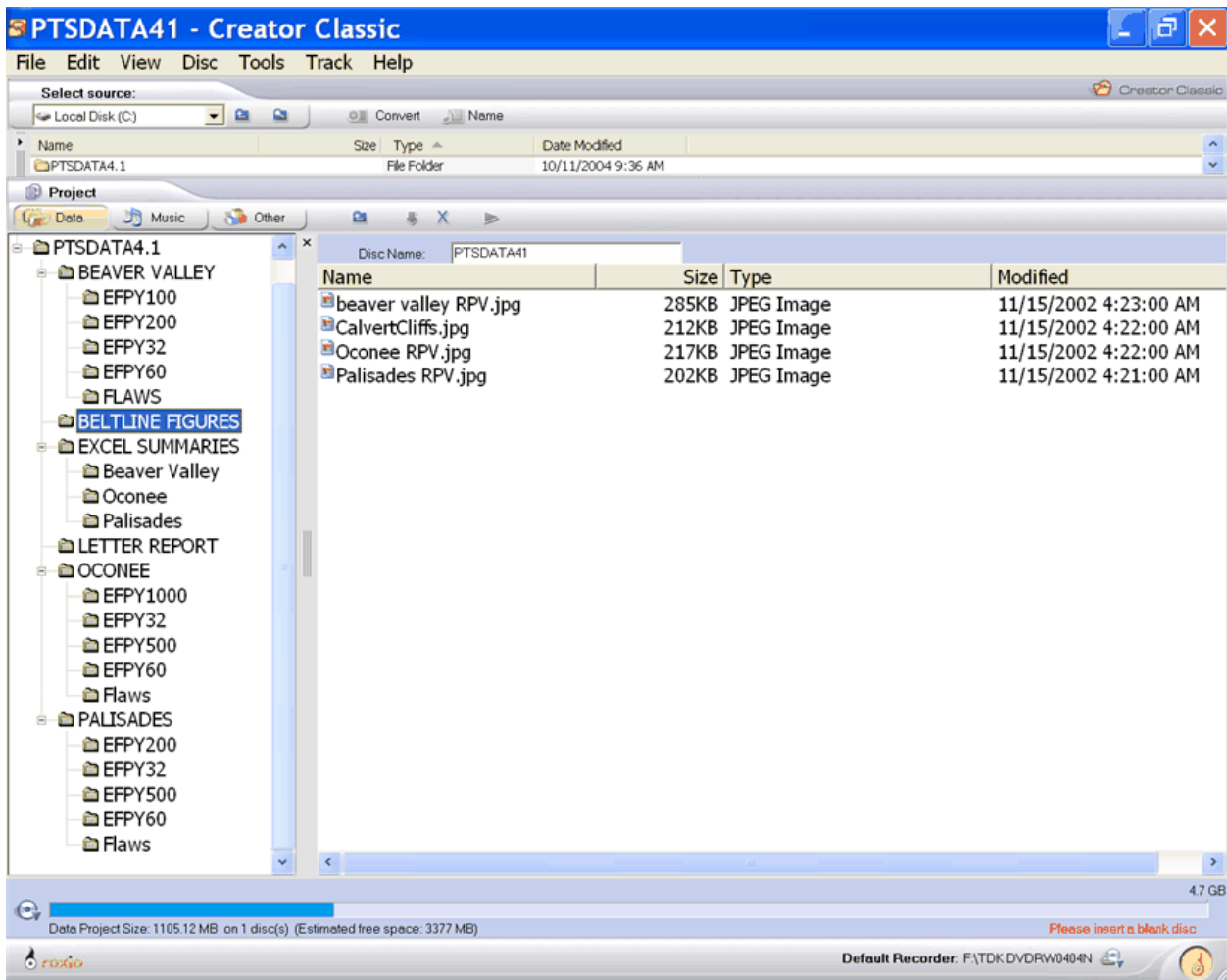
<b>Folder name</b>	<b>Number of transients in analysis</b>	<b>FAVLOAD input dataset</b>	<b>FAVPFM input dataset</b>	<b>FAVPFM output dataset</b>	<b>FAVPOST input dataset</b>	<b>FAVPOST output dataset</b>
EFPY32	30	PLload30.in	PfmPL32.in	PfmPL32.out	PostPL.in	PostPL32.out
EFPY60	30	PLload30.in	PfmPL60.in	PfmPL60.out	PostPL.in	PostPL60.out
EFPY200	30	PLload30.in	PfmPL200.in	PfmPL200.out	PostPL.in	PostPL200.out
EFPY500	30	PLload30.in	PfmPL500.in	PfmPL500.out	PostPL.in	PostPL500.out



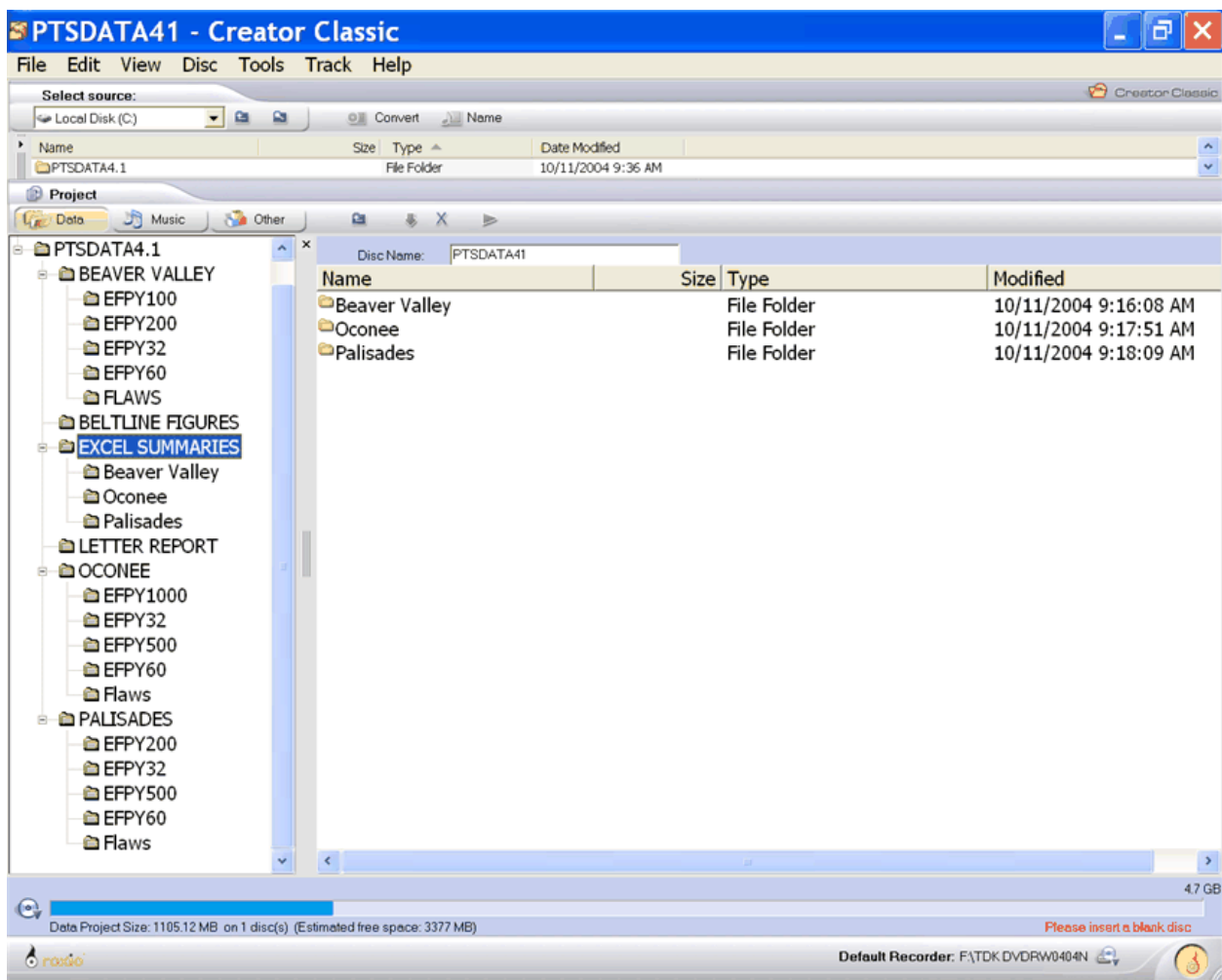
The folder `\PTSDATA4.1\Beaver Valley\FLAWS` contains 3 flaw characterization files used as input for all of the analysis performed for Beaver Valley. The subfolders `\PTSDATA4.1\Oconee\FLAWS` and `\PTSDATA4.1\Palisades\FLAWS` have the same structure and naming convention as illustrated in the following table.

**Table 8 - Naming Convention for Flaw characterization files in FLAWS subfolders**

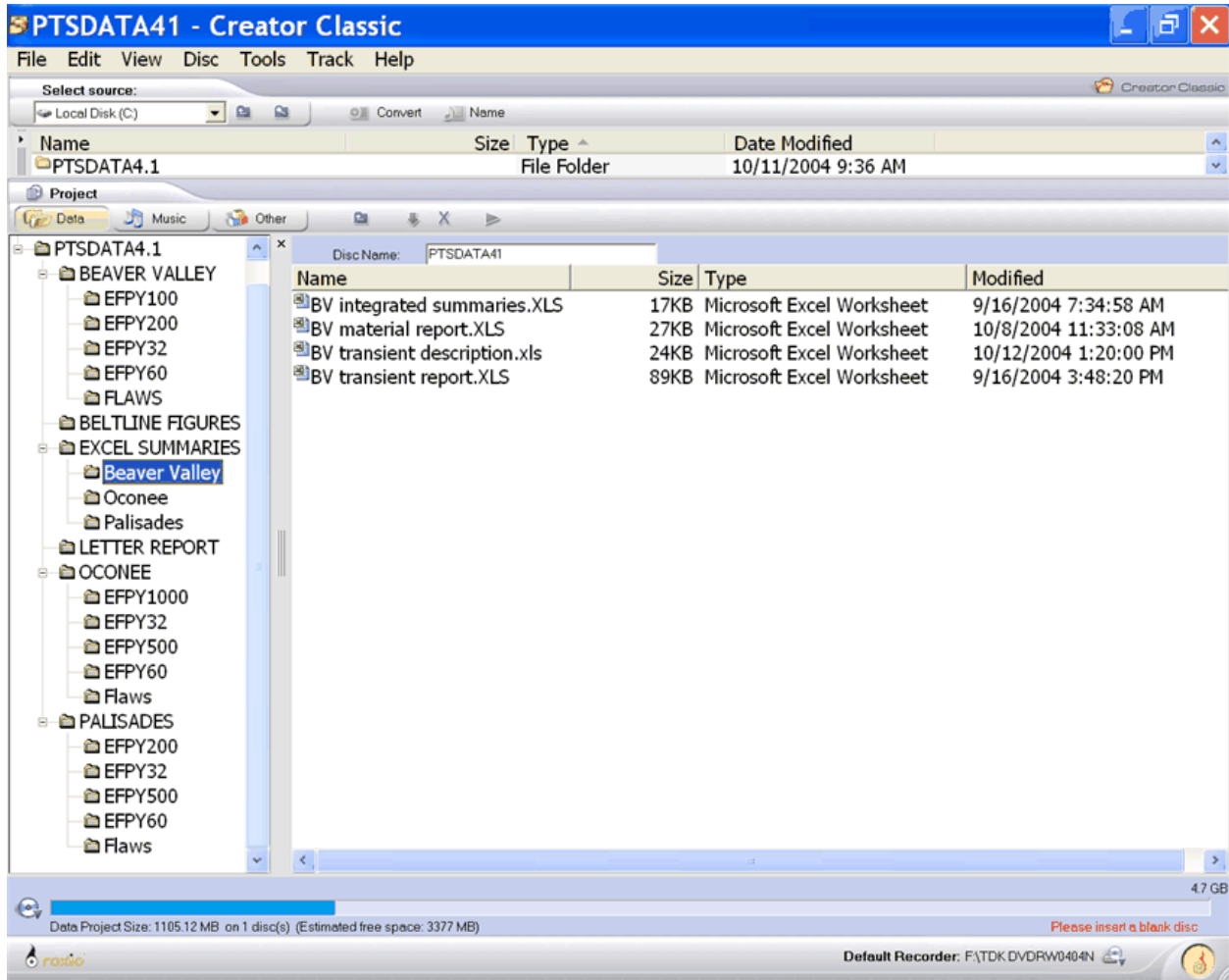
RPV	inner-surface breaking flaws (plate and weld)	weld embedded flaws	plate embedded flaws
Beaver Valley	<b>BV</b> surf.dat	<b>BV</b> weld.dat	<b>BV</b> plate.dat
Oconee	<b>OC</b> surf.dat	<b>OC</b> weld.dat	<b>OC</b> plate.dat
Palisades	<b>PL</b> surf.dat	<b>PL</b> weld.dat	<b>PL</b> plate.dat



The folder \PTSDATA4.1\Beltline Figures\ contains the 360 degree rollout of each of the RPVs as illustrated Appendix A.



The subfolder \PTSDATA4.1\EXCEL SUMMARIES\ contains subfolders for each of the three RPVs.



Each of the subfolders \PTSDATA4.1\EXCEL SUMMARIES\Beaver Valley, \PTSDATA4.1\EXCEL SUMMARIES\Oconee, and \PTSDATA4.1\EXCEL SUMMARIES\Palisades contains the four following files:



**Table 9 - Naming Convention for files in EXCEL SUMMARIES subfolders**

EXECL spreadsheet name	Contents
integrated summaries.XLS	Contains descriptive statistics for the frequency of crack initiation and through wall crack frequency for each PTS analysis. There is a hard copy of each of these reports in Appendix B.
material report.XLS	Contains detailed data regarding the contribution of each of the major RPV beltline regions to the frequency of crack initiation and the through wall crack frequency. There is a hard copy of each of these reports in Appendix C.
transient description.XLS	Contains detailed description of the cause of each transient and operator actions (if any). There is a hard copy of each of these reports in Appendix D.
transient report.XLS	Contains descriptive statistics for the CPI and CPTWC of each transient and the contribution of each transient to the total frequencies of crack initiation and RPV failure. There is a hard copy of each of these reports in Appendix E.

The material reports (Appendix C) allocate the total FCI and total TWCF to specific RPV major regions. The allocations are further distinguished between parent and child major regions. There is a discussion of the relationship between parent and child regions on reference 2. For completeness, an excerpt from that discussion is included here as follows:

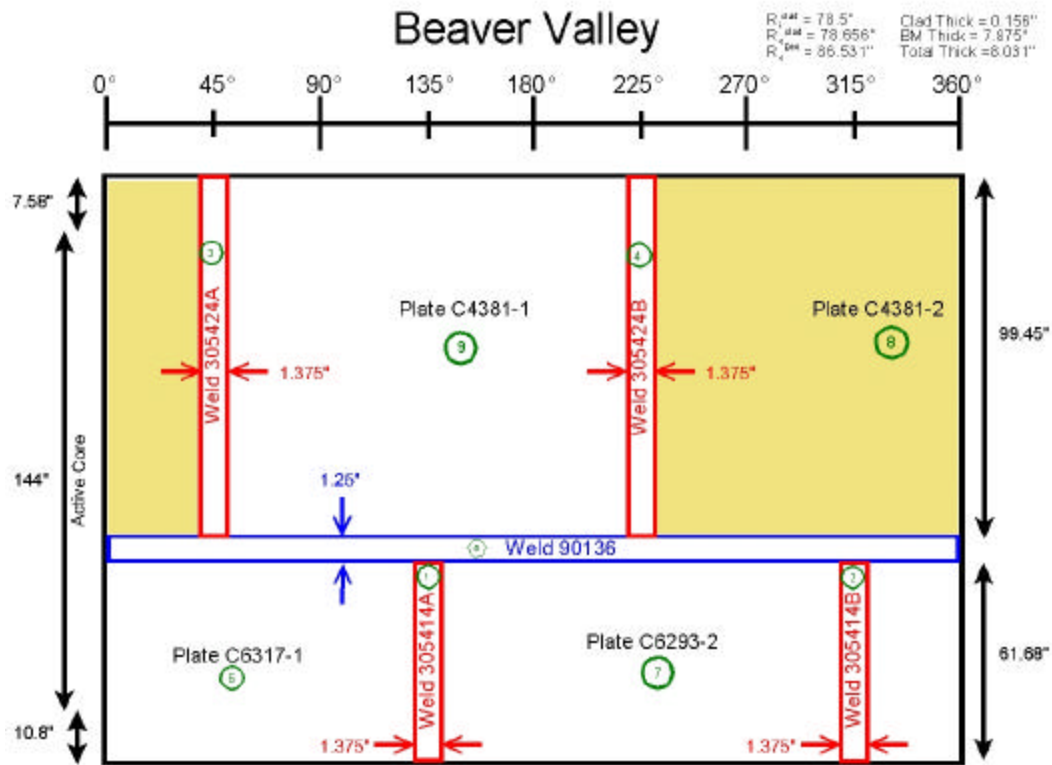
The discretization and organization of major regions and subregions in the beltline includes a special treatment of *weld-fusion lines*. These fusion lines can be visualized as approximate boundaries between the weld subregion and its neighboring plate or forging subregions. FAVOR checks for the possibility that the plate subregions adjacent to a weld subregion (termed *parent* subregions) could have a higher degree of radiation-induced embrittlement than the weld. The irradiated value of  $RT_{NDT}$  for the weld parent subregion of interest is compared to the corresponding values of the adjacent (i.e., nearest-neighbor) plate subregions. Each weld subregion will have at most two adjacent plate subregions. The embrittlement-related properties of the most-limiting (either the weld or the adjacent plate subregion with the highest value of irradiated  $RT_{NDT}$ ) material are used when evaluating the fracture toughness of the weld subregion. A given *parent* weld subregion will have either itself or an adjacent plate subregion as its *child* subregion from which it will inherit its chemistry. The flaw orientation, location, size, fast-neutron fluence, and category are not inherited. A *parent* plate subregion always has itself as a *child* subregion.

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**5. Appendix A - 360 degree RPV beltline figures**

<b>Table number</b>	<b>Table Content</b>
A1	Beaver Valley RPV Beltline Major Region embrittlement-related parameters
A2	Oconee RPV Beltline Major Region embrittlement-related parameters
A3	Palisades RPV Beltline Major Region embrittlement-related parameters



**Table A1 - Beaver Valley RPV Beltline Major Region embrittlement-related parameters**

Major Region	Description	Heat ID	copper	nickel	phos	RT <sub>NDT(u)</sub>	max	max	max	max	max	max	max	
							neutron fluence @32 EFPY	DRT <sub>NDT</sub> @ 32 EFPY	neutron fluence @60 EFPY	DRT <sub>NDT</sub> @ 60 EFPY	neutron fluence @100 EFPY	DRT <sub>NDT</sub> @ 100 EFPY	neutron fluence @200 EFPY	DRT <sub>NDT</sub> @ 200 EFPY
			wt %	wt %	wt %	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)
1	Axial Weld	305414A	0.337	0.609	0.012	-56.0	0.8428	211.2	1.5738	230.5	2.6182	244.3	5.2292	262.7
2	Axial Weld	305414B	0.337	0.609	0.012	-56.0	0.8428	211.2	1.5738	230.5	2.6182	244.3	5.2292	262.7
3	Axial Weld	305424A	0.273	0.629	0.013	-56.0	0.8274	198.9	1.5439	217.8	2.5676	231.7	5.1266	250.5
4	Axial Weld	305424B	0.273	0.629	0.013	-56.0	0.8274	198.9	1.5439	217.8	2.5676	231.7	5.1266	250.5
5	Circ Weld	90136	0.269	0.070	0.013	-56.0	4.2523	139.7	8.1256	157.9	13.6589	177.7	27.4923	211.6
6	Plate	C6317-1	0.200	0.540	0.100	27.0	4.3218	184.0	8.2642	206.9	13.8962	231.7	27.9761	274.0
7	Plate	C6293-2	0.140	0.570	0.150	20.0	4.3218	166.1	8.2642	194.3	13.8962	225.3	27.9761	278.6
8	Plate	C4381-2	0.140	0.620	0.150	73.0	4.2678	170.1	8.1399	198.1	13.6569	228.8	27.4643	281.5
9	Plate	C4381-1	0.140	0.620	0.150	43.0	4.2678	170.1	8.1399	198.1	13.6569	228.8	27.4643	281.5

\*ΔRT<sub>NDT</sub> calculated by Equation 84 of reference 1.

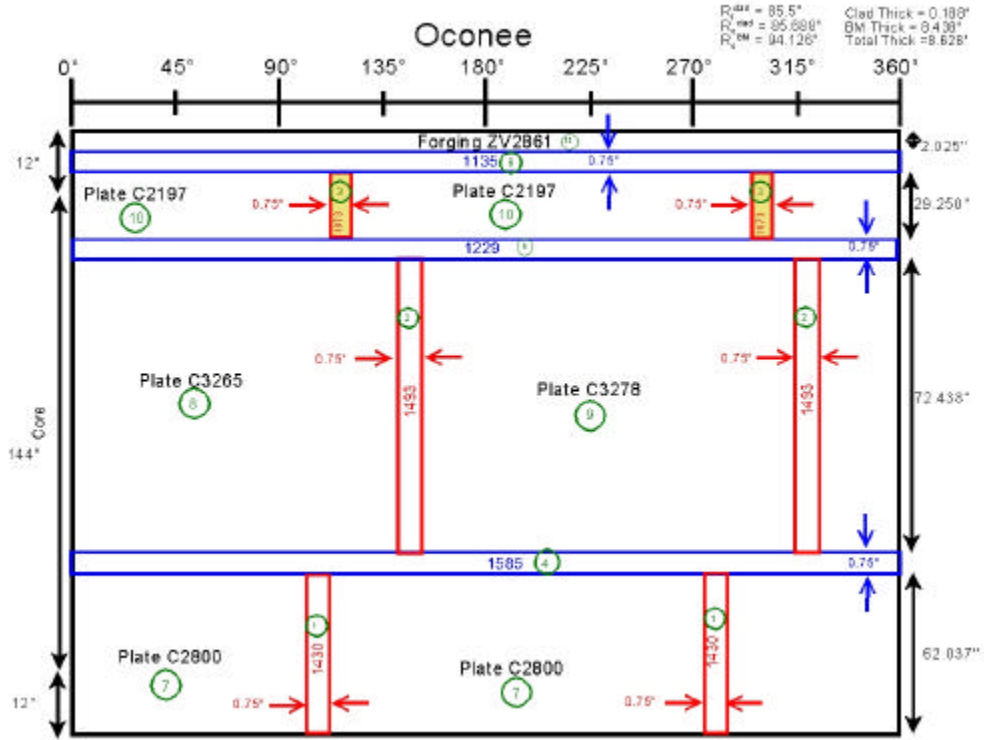
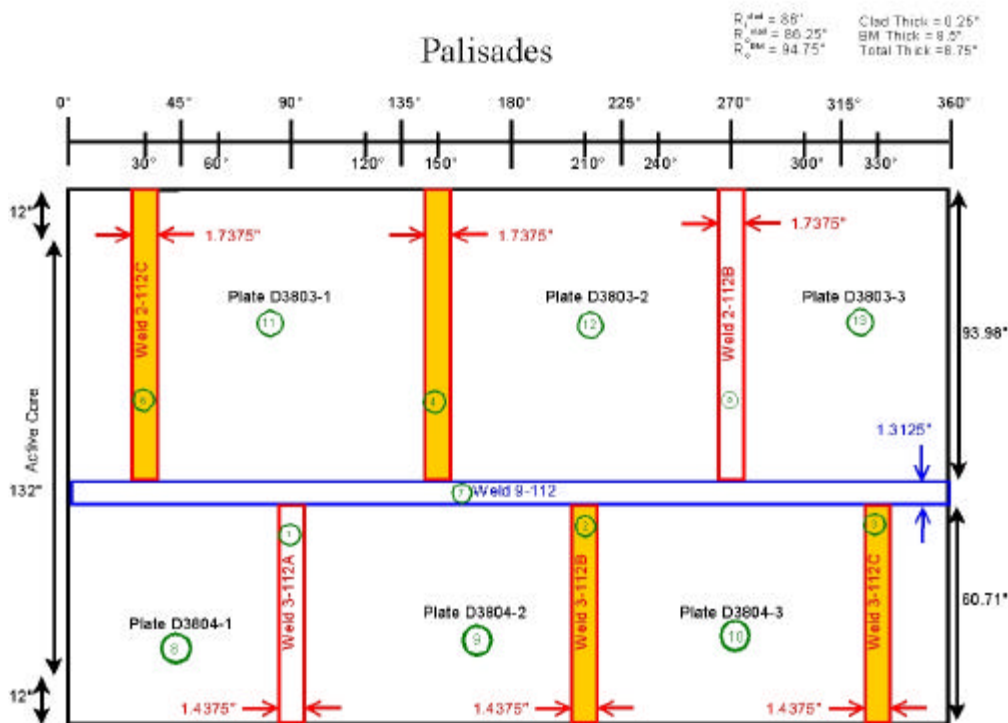


Table A2 - Oconee RPV Beltline Major Region embrittlement-related parameters

Major Region	Description	Heat ID	copper	nickel	phos	RT <sub>NDT(u)</sub>	max	max	max	max	max	max	max	
							neutron fluence @32 EFPY	DRT <sub>NDT</sub> @ 32 EFPY	neutron fluence @60 EFPY	DRT <sub>NDT</sub> @ 60 EFPY	neutron fluence @500 EFPY	DRT <sub>NDT</sub> @ 500 EFPY	neutron fluence @1000 EFPY	DRT <sub>NDT</sub> @1000 EFPY
			wt %	wt %	wt %	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)
1	Axial Weld	SA-1430	0.190	0.570	0.017	-5.0	0.7360	135.4	1.3802	149.9	11.5021	199.6	23.0000	225.4
2	Axial Weld	SA-1493	0.190	0.570	0.017	-5.0	0.6820	133.6	1.2791	148.4	10.6591	197.2	21.3000	222.1
3	Axial Weld	SA-1073	0.210	0.640	0.025	-5.0	0.6070	157.2	1.1387	176.3	9.4896	237.5	19.0000	268.5
4	Circ Weld	SA-1585	0.220	0.540	0.016	-5.0	0.8210	150.1	1.5386	164.9	12.8214	215.1	25.6000	241.1
5	Circ Weld	SA-1229	0.230	0.590	0.021	10.0	0.7690	165.3	1.4422	182.6	12.0180	241.1	24.0000	271.4
6	Circ Weld	SA-1135	0.230	0.520	0.011	-5.0	0.0923	93.0	0.1730	119.3	1.4420	166.0	2.8800	175.7
7	Plate	C-2800	0.110	0.630	0.012	1.0	0.8370	70.4	1.5691	80.8	13.0753	134.9	26.2000	166.4
8	Plate	C3265-1	0.100	0.500	0.015	1.0	0.8330	62.4	1.5610	73.1	13.0080	133.8	26.0000	169.5
9	Plate	C3278-1	0.120	0.600	0.010	1.0	0.8330	72.8	1.5610	82.8	13.0080	132.2	26.0000	160.5
10	Plate	C2197-2	0.150	0.500	0.008	1.0	0.7560	78.4	1.4169	88.3	11.8074	131.8	23.6000	156.1
11	Forging	ZV2861	0.160	0.650	0.006	3.0	0.0855	48.6	0.1602	61.2	1.3354	86.7	2.6700	93.5

\*ΔRT<sub>NDT</sub> calculated by Equation 84 of reference 1.



**Table A3 - Palisades RPV Beltline Major Region embrittlement-related parameters**

Major Region	Description	Heat ID	copper	nickel	phos	RT <sub>NDT(u)</sub>	max	max	max	max	max	max	max	
							neutron fluence @32 EFPY	DRT <sub>NDT</sub> @ 32 EFPY	neutron fluence @60 EFPY	DRT <sub>NDT</sub> @ 60 EFPY	neutron fluence @200 EFPY	DRT <sub>NDT</sub> @ 200 EFPY	neutron fluence @500 EFPY	DRT <sub>NDT</sub> @500 EFPY
			wt %	wt %	wt %	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)	10 <sup>19</sup> n / cm <sup>2</sup>	(°F)
1	Axial Weld	Axial Weld	0.213	1.010	0.019	-56.0	1.6646	262.4	2.4688	276.9	6.4894	315.2	15.1050	360.1
2	Axial Weld	Axial Weld	0.213	1.010	0.019	-56.0	1.9567	268.2	3.1741	286.0	9.2611	332.2	22.3048	386.8
3	Axial Weld	Axial Weld	0.213	1.010	0.019	-56.0	1.9567	268.2	3.1741	286.0	9.2611	332.2	22.3048	386.8
4	Axial Weld	Axial Weld	0.213	1.010	0.019	-56.0	1.9699	268.4	3.2129	286.5	9.4604	333.3	22.8479	388.6
5	Axial Weld	Axial Weld	0.213	1.010	0.019	-56.0	1.6738	262.6	2.4910	277.3	6.6171	316.0	15.4604	361.6
6	Axial Weld	Axial Weld	0.213	1.010	0.019	-56.0	1.9699	268.4	3.2129	286.5	9.4604	333.3	22.8470	388.6
7	Circ Weld	Circ Weld	0.203	1.018	0.013	-56.0	2.5537	256.6	4.0419	270.8	11.5107	309.7	27.5154	356.6
8	Plate	Plate	0.190	0.480	0.016	0.0	2.5516	180.5	4.0380	199.9	11.4979	259.5	27.4834	334.9
9	Plate	Plate	0.190	0.500	0.015	-30.0	2.5516	179.9	4.0380	198.6	11.4979	256.0	27.4834	328.3
10	Plate	Plate	0.120	0.550	0.010	-25.0	2.5516	124.6	4.0380	139.1	11.4979	184.2	27.4834	241.5
11	Plate	Plate	0.240	0.510	0.009	-5.00	2.5680	189.0	4.0846	204.1	11.7410	248.7	28.1477	304.0
12	Plate	Plate	0.240	0.520	0.010	-30.0	2.5680	193.6	4.0846	209.5	11.7410	256.4	28.1477	314.7
13	Plate	Plate	0.240	0.500	0.011	-5.00	2.5680	193.5	4.0846	210.1	11.7410	259.3	28.1477	320.6

\*ΔRT<sub>NDT</sub> calculated by Equation 84 of reference 1.

**6. Appendix B - Integrated Summaries**

<b>Table number</b>	<b>Table Content</b>
B1	Integrated Summary for Beaver Valley
B2	Integrated Summary for Oconee
B3	Integrated Summary for Palisades

**Table B1 - Integrated summary report for Beaver Valley**

Number of Simulated RPVs	EFPY	Frequency of Crack Initiation (FCI)						Through-Wall Cracking Frequency (TWCF)					
		Cracked RPVs Per Reactor Operating Year						Failed RPVs Per Reactor Operating Year					
		Percentiles						Percentiles					
		5%	95%	99%	99.9%	Median	Mean	5%	95%	99%	99.9%	Median	Mean
77,010	32	0.00E+00	2.07E-07	1.95E-06	1.31E-05	1.34E-09	1.32E-07	0.00E+00	3.90E-11	3.23E-09	9.39E-08	3.66E-19	8.89E-10
51,751	60	2.11E-10	9.44E-07	6.26E-06	3.88E-05	5.43E-08	5.19E-07	0.00E+00	2.32E-09	4.85E-08	4.69E-07	1.50E-12	4.84E-09
15,940	100	2.07E-08	6.27E-06	1.94E-05	7.84E-05	4.52E-07	1.71E-06	2.61E-13	2.90E-08	3.46E-07	2.18E-06	2.89E-10	2.02E-08
10,000	200	5.47E-07	3.04E-05	7.63E-05	2.29E-04	4.03E-06	8.87E-06	1.15E-09	1.09E-06	4.30E-06	1.94E-05	4.11E-08	3.00E-07



**Table B2 - Integrated summary report for Oconee**

Number of Simulated RPVs	EFPY	Frequency of Crack Initiation (FCI)						Through-Wall Cracking Frequency (TWCF)					
		Cracked RPVs Per Reactor Operating Year						Failed RPVs Per Reactor Operating Year					
		Percentiles						Percentiles					
		5%	95%	99%	99.9%	Median	Mean	5%	95%	99%	99.9%	Median	Mean
		62211	32	0.00E+00	0.00E+00	2.69E-11	1.46E-08	0.00E+00	1.29E-10	0.00E+00	0.00E+00	0.00E+00	1.15E-09
57461	60	0.00E+00	1.88E-11	4.80E-11	1.59E-07	0.00E+00	1.02E-09	0.00E+00	0.00E+00	5.84E-12	6.63E-09	0.00E+00	6.47E-11
50861	500	1.04E-11	1.66E-07	1.32E-06	7.94E-06	6.37E-09	1.01E-07	0.00E+00	1.35E-10	8.46E-09	2.21E-07	0.00E=00	1.30E-09
16301	1000	5.19E-09	1.82E-06	6.48E-06	2.80E-05	1.16E-07	5.24E-07	0.00E+00	4.93E-07	9.49E-08	1.12E-09	2.40E-12	1.16E-08

**Table B3 - Integrated summary report for Palisades**

Number of Simulated RPVs	EFPY	Frequency of Crack Initiation (FCI)						Through-Wall Cracking Frequency (TWCF)					
		Cracked RPVs Per Reactor Operating Year						Failed RPVs Per Reactor Operating Year					
		Percentiles						Percentiles					
		5%	95%	99%	99.9%	Median	Mean	5%	95%	99%	99.9%	Median	Mean
52011	32	0.00E+00	4.71E-08	7.24E-07	6.64E-06	2.91E-11	5.22E-08	0.00E+00	1.35E-09	4.63E-08	7.42E-07	4.51E-14	4.90E-09
46700	60	0.00E+00	1.50E-07	1.70E-06	1.43E-05	1.52E-09	1.23E-07	0.00E+00	1.04E-08	1.76E-07	1.79E-06	2.81E-11	1.55E-08
23650	200	2.38E-09	2.32E-06	8.89E-06	5.37E-05	8.57E-08	7.46E-07	5.94E-11	1.96E-07	1.67E-06	1.61E-05	7.66E-09	1.88E-07
14511	500	1.50E-07	1.50E-05	4.43E-05	2.01E-04	1.36E-06	4.47E-06	9.21E-09	3.21E-06	1.19E-05	1.02E-04	1.64E-07	1.26E-06

## 7. Appendix C - Material Summaries

<b>Table number</b>	<b>Table Content</b>
C1	Material report for Beaver Valley at 32 EFPY (61 base case transients)
C2	Material report for Beaver Valley at 60 EFPY (61 base case transients)
C3	Material report for Beaver Valley at 100 EFPY (61 base case transients)
C4	Material report for Beaver Valley at 200 EFPY (61 base case transients)
C5	Material Report for Oconee at 32 EFPY (55 base case transients)
C6	Material Report for Oconee at 60 EFPY (55 base case transients)
C7	Material Report for Oconee at 500 EFPY (55 base case transients)
C8	Material Report for Oconee at 1000 EFPY (55 base case transients)
C9	Material report for Palisades at 32 EFPY (30 base case transients)
C10	Material report for Palisades at 60 EFPY (30 base case transients)
C11	Material report for Palisades at 200 EFPY (30 base case transients)
C12	Material report for Palisades at 500 EFPY (30 base case transients)

**Table C1 - Material report for Beaver Valley at 32 EFPY (61 base case transients)**

<b>Plant Name:</b>	Beaver Valley														
<b>EFPY:</b>	32														
<b>WPS:</b>	on														
<b>Ductile Tearing</b>	on														
<b>Through wall failure criteria</b>	0.90		<b># of Subregions</b>	<b>Cu</b>	<b>Ni</b>	<b>P</b>	<b>Max Neutron Fluence</b>	<b>RT<sub>IDT0</sub></b>	<b>ΔRT<sub>IDT</sub></b>	<b>RT<sub>IDT</sub></b>	<b>% of Total Flaws</b>	<b>% of total FCI (By Parent)</b>	<b>% of total TWCF (By Parent)</b>	<b>% of total FCI (By Child)</b>	<b>% of total TWCF (By Child)</b>
<b>Major Region Number</b>	<b>Description</b>														
			<b>(#)</b>	<b>wt%</b>	<b>wt%</b>	<b>wt%</b>	<b>x10<sup>19</sup> n/cm<sup>2</sup></b>	<b>(°F)</b>	<b>(°F)</b>	<b>(°F)</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%t</b>	<b>%</b>
1	Axial Weld	305414A	34	0.337	0.609	0.012	0.8428	-56	211.16	155.16	2.30	0.06	1.27	0.00	0.00
2	Axial Weld	305414B	34	0.337	0.609	0.012	0.8428	-56	211.16	155.16	2.30	0.17	8.14	0.00	0.00
3	Axial Weld	305424A	53	0.273	0.629	0.013	0.8274	-56	198.91	142.91	3.70	1.39	46.47	0.00	0.00
4	Axial Weld	305424B	53	0.273	0.629	0.013	0.8274	-56	198.91	142.91	3.70	0.75	12.56	0.00	0.00
5	Circ Weld	90136	664	0.269	0.070	0.013	4.2523	-56	139.67	83.67	19.31	96.01	0.33	0.00	0.00
6	Plate	C6317-1	2,822	0.200	0.540	0.010	4.3218	27	183.98	210.98	13.15	0.02	0.45	8.09	9.87
7	Plate	C6293-2	2,822	0.140	0.570	0.015	4.3218	20	166.10	186.10	13.15	0.00	0.00	0.00	0.00
8	Plate	C4381-2	4,399	0.140	0.620	0.015	4.2678	73	170.13	243.13	21.20	1.48	30.45	84.41	89.79
9	Plate	C4381-1	4,399	0.140	0.620	0.015	4.2678	43	170.13	213.13	21.20	0.11	0.33	7.50	0.34

**Table C2 –Material report for Beaver Valley at 60 EFPY (61 base case transients)**

Plant Name:	Beaver Valley														
EFPY:	60														
WPS:	on														
Ductile Tearing	on														
Through wall failure criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>INDT0</sub>	ΔRT <sub>INDT</sub>	RT <sub>INDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	Axial Weld	305414A	34	0.337	0.609	0.012	1.5738	-56	230.49	174.49	2.30	0.12	1.47	0.00	0.00
2	Axial Weld	305414B	34	0.337	0.609	0.012	1.5738	-56	230.49	174.49	2.30	0.24	6.69	0.00	0.00
3	Axial Weld	305424A	53	0.273	0.629	0.013	1.5439	-56	217.84	161.84	3.70	1.46	20.60	0.00	0.00
4	Axial Weld	305424B	53	0.273	0.629	0.013	1.5439	-56	217.84	161.84	3.70	1.19	10.43	0.00	0.00
5	Circ Weld	90136	664	0.269	0.070	0.013	8.1256	-56	157.90	101.90	19.31	94.26	0.72	0.00	0.00
6	Plate	C6317-1	2,822	0.200	0.540	0.010	8.2642	27	206.88	233.88	13.15	0.09	1.73	1.77	9.90
7	Plate	C6293-2	2,822	0.140	0.570	0.015	8.2642	20	194.29	214.29	13.15	0.01	0.09	0.01	0.09
8	Plate	C4381-2	4,399	0.140	0.620	0.015	8.1339	73	198.05	271.05	21.20	2.34	55.74	80.24	87.43
9	Plate	C4381-1	4,399	0.140	0.620	0.015	8.1339	43	198.05	241.05	21.20	0.29	2.53	17.98	2.58

**Table C3 - Material report for Beaver Valley at 100 EFPY (61 base case transients)**

Plant Name:	Beaver Valley														
EFPY:	100														
WPS:	on														
Ductile Tearing	on														
Through wall failure criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>INDT0</sub>	ΔRT <sub>INDT</sub>	RT <sub>INDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	Axial Weld	305414A	34	0.337	0.609	0.012	2.6182	-56	244.27	188.27	2.30	0.12	0.61	0.00	0.00
2	Axial Weld	305414B	34	0.337	0.609	0.012	2.6182	-56	244.27	188.27	2.30	0.06	0.30	0.00	0.00
3	Axial Weld	305424A	53	0.273	0.629	0.013	2.5676	-56	231.66	175.66	3.70	1.35	8.34	0.00	0.00
4	Axial Weld	305424B	53	0.273	0.629	0.013	2.5676	-56	231.66	175.66	3.70	1.11	6.44	0.00	0.00
5	Circ Weld	90136	664	0.269	0.070	0.013	13.6589	-56	177.73	121.73	19.31	93.04	1.74	0.00	0.00
6	Plate	C6317-1	2,822	0.200	0.540	0.010	13.8962	27	231.69	258.69	13.15	0.19	4.10	0.69	5.02
7	Plate	C6293-2	2,822	0.140	0.570	0.015	13.8962	20	225.32	245.32	13.15	0.07	0.48	0.07	0.48
8	Plate	C4381-2	4,399	0.140	0.620	0.015	13.6569	73	228.79	301.79	21.20	3.42	69.64	75.94	86.02
9	Plate	C4381-1	4,399	0.140	0.620	0.015	13.6569	43	228.79	271.79	21.20	0.65	8.33	23.30	8.48

**Table C4 - Material report for Beaver Valley at 200 EFPY (61 base case transients)**

Plant Name:	Beaver Valley														
EFPY:	200														
WPS:	on														
Ductile Tearing	on														
Through wall failure criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>HDT0</sub>	ΔRT <sub>HDT</sub>	RT <sub>HDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	Axial Weld	305414A	34	0.337	0.609	0.012	5.2292	-56	262.73	206.73	2.30	0.10	0.25	0.00	0.00
2	Axial Weld	305414B	34	0.337	0.609	0.012	5.2292	-56	262.73	206.73	2.30	0.07	0.19	0.00	0.00
3	Axial Weld	305424A	53	0.273	0.629	0.013	5.1266	-56	250.48	194.48	3.70	1.05	4.86	0.00	0.00
4	Axial Weld	305424B	53	0.273	0.629	0.013	5.1266	-56	250.48	194.48	3.70	1.01	3.91	0.00	0.00
5	Circ Weld	90136	664	0.269	0.070	0.013	27.4923	-56	211.61	155.61	19.31	91.02	6.18	0.00	0.00
6	Plate	C6317-1	2,822	0.200	0.540	0.010	27.9761	27	274.03	301.03	13.15	0.34	4.32	0.51	4.75
7	Plate	C6293-2	2,822	0.140	0.570	0.015	27.9761	20	278.57	298.57	13.15	0.24	1.95	0.24	1.95
8	Plate	C4381-2	4,399	0.140	0.620	0.015	27.4643	73	281.54	354.54	21.20	4.61	62.47	70.20	76.65
9	Plate	C4381-1	4,399	0.140	0.620	0.015	27.4643	43	281.54	324.54	21.20	1.56	15.88	29.05	16.65

**Table C5 – Material Report for Oconee at 32 EFPY (55 base case transients)**

Plant Name:	Oconee														
EFPY:	32														
WPS:	on														
Ductile Tearing	on														
Through wall cracking criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>IDT0</sub>	ΔRT <sub>IDT</sub>	RT <sub>IDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	Axial Weld	SA-1430	77	0.190	0.570	0.017	0.736	-5.00	135.39	130.39	3.03	3.70	18.14	3.70	18.14
2	Axial Weld	SA-1493	85	0.190	0.570	0.017	0.682	-5.00	133.59	128.59	3.54	16.98	72.40	16.98	72.40
3	Axial Weld	SA-1073	49	0.210	0.640	0.025	0.607	-5.00	157.19	152.19	1.43	13.15	9.46	13.15	9.46
4	Circ Weld	SA-1585	480	0.220	0.540	0.016	0.821	-5.00	150.13	145.13	13.82	17.15	0.00	17.15	0.00
5	Circ Weld	SA-1229	480	0.230	0.590	0.021	0.769	10.00	165.32	175.32	13.82	49.01	0.00	49.01	0.00
6	Circ Weld	SA-1135	480	0.230	0.520	0.011	0.0923	-5.00	93.02	88.02	13.82	0.00	0.00	0.00	0.00
7	Plate	C-2800	4,620	0.110	0.630	0.012	0.837	1.00	70.37	71.37	18.91	0.00	0.00	0.00	0.00
8	Plate	C3265-1	5,100	0.100	0.500	0.015	0.833	1.00	62.39	63.39	11.04	0.00	0.00	0.00	0.00
9	Plate	C3278-1	5,100	0.120	0.600	0.010	0.833	1.00	72.82	73.82	11.04	0.00	0.00	0.00	0.00
10	Plate	C2197-2	2,940	0.150	0.500	0.008	0.756	1.00	78.41	79.41	8.92	0.00	0.00	0.00	0.00
11	Forging	ZV2861	240	0.160	0.650	0.006	0.0855	3.00	48.57	51.57	0.62	0.00	0.00	0.00	0.00



**Table C6 – Material Report for Oconee at 60 EFPY (55 base case transients)**

Plant Name:	Oconee														
EFPY:	60														
WPS:	on														
Ductile Tearing	on														
Through wall cracking criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>HDT0</sub>	ΔRT <sub>HDT</sub>	RT <sub>HDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
	Axial Weld	SA-1430	77	0.190	0.570	0.017	1.3802	-5.00	149.92	144.92	3.03	1.95	20.32	1.95	20.32
2	Axial Weld	SA-1493	85	0.190	0.570	0.017	1.2791	-5.00	148.42	143.42	3.54	7.88	63.71	7.88	63.71
3	Axial Weld	SA-1073	49	0.210	0.640	0.025	1.1387	-5.00	176.25	171.25	1.43	8.81	15.87	8.81	15.87
4	Circ Weld	SA-1585	480	0.220	0.540	0.016	1.5386	-5.00	164.89	159.89	13.82	18.42	0.10	18.42	0.10
5	Circ Weld	SA-1229	480	0.230	0.590	0.021	1.4422	10.00	182.58	192.58	13.82	62.87	0.00	62.87	0.00
6	Circ Weld	SA-1135	480	0.230	0.520	0.011	0.173	-5.00	119.26	114.26	13.82	0.06	0.00	0.06	0.00
7	Plate	C-2800	4,620	0.110	0.630	0.012	1.5691	1.00	80.75	81.75	18.91	0.00	0.00	0.00	0.00
8	Plate	C3265-1	5,100	0.100	0.500	0.015	1.561	1.00	73.13	74.13	11.04	0.00	0.00	0.00	0.00
9	Plate	C3278-1	5,100	0.120	0.600	0.010	1.561	1.00	82.76	83.76	11.04	0.01	0.00	0.01	0.00
10	Plate	C2197-2	2,940	0.150	0.500	0.008	1.4169	1.00	88.26	89.26	8.92	0.00	0.00	0.00	0.00
11	Forging	ZV2861	240	0.160	0.650	0.006	0.1602	3.00	61.2	64.2	0.62	0.00	0.00	0.00	0.00

**Table C7 – Material Report for Oconee at 500 EFPY (55 base case transients)**

Plant Name:	Oconee														
EFPY:	500														
WPS:	on														
Ductile Tearing	on														
Through wall cracking criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>NDT0</sub>	ΔRT <sub>NDT</sub>	RT <sub>NDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	Axial Weld SA-1430		77	0.190	0.570	0.017	11.5021	-5.00	199.58	194.58	3.03	1.17	10.82	1.17	10.82
2	Axial Weld SA-1493		85	0.190	0.570	0.017	10.6591	-5.00	197.20	192.20	3.54	2.63	31.13	2.63	31.13
3	Axial Weld SA-1073		49	0.210	0.640	0.025	9.4896	-5.00	237.48	232.48	1.43	5.02	57.88	5.02	57.88
4	Circ Weld SA-1585		480	0.220	0.540	0.016	12.8214	-5.00	215.07	210.07	13.82	13.11	0.10	13.11	0.10
5	Circ Weld SA-1229		480	0.230	0.590	0.021	12.018	10.00	241.12	251.12	13.82	77.54	0.06	77.54	0.06
6	Circ Weld SA-1135		480	0.230	0.520	0.011	1.442	-5.00	166.05	161.05	13.82	0.17	0.00	0.17	0.00
7	Plate C-2800		4,620	0.110	0.630	0.012	13.0753	1.00	134.89	135.89	18.91	0.10	0.00	0.10	0.00
8	Plate C3265-1		5,100	0.100	0.500	0.015	13.008	1.00	133.83	134.83	11.04	0.10	0.00	0.10	0.00
9	Plate C3278-1		5,100	0.120	0.600	0.010	13.008	1.00	132.17	133.17	11.04	0.14	0.00	0.14	0.00
10	Plate C2197-2		2,940	0.150	0.500	0.008	11.8074	1.00	131.81	132.81	8.92	0.01	0.00	0.01	0.00
11	Forging ZV2861		240	0.160	0.650	0.006	1.3354	3.00	86.73	89.73	0.62	0.00	0.00	0.00	0.00

**Table C8 – Material Report for Oconee at 1000 EFPY (55 base case transients)**

Plant Name:	Oconee														
EFPY:	1000														
WPS:	on														
Ductile Tearing	on														
Through wall cracking criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>IHT0</sub>	ΔRT <sub>IHT</sub>	RT <sub>IHT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	Axial Weld SA-1430		77	0.190	0.570	0.017	23.00	-5.00	225.39	220.39	3.03	1.12	8.36	1.12	8.36
2	Axial Weld SA-1493		85	0.190	0.570	0.017	21.30	-5.00	222.13	217.13	3.54	2.62	21.92	2.62	21.92
3	Axial Weld SA-1073		49	0.210	0.640	0.025	19.00	-5.00	268.51	263.51	1.43	4.78	69.53	4.78	69.53
4	Circ Weld SA-1585		480	0.220	0.540	0.016	25.60	-5.00	241.09	236.09	13.82	12.85	0.01	12.85	0.01
5	Circ Weld SA-1229		480	0.230	0.590	0.021	24.00	10.00	271.43	281.43	13.82	77.79	0.10	77.79	0.10
6	Circ Weld SA-1135		480	0.230	0.520	0.011	2.88	-5.00	175.73	170.73	13.82	0.14	0.00	0.14	0.00
7	Plate C-2800		4,620	0.110	0.630	0.012	26.20	1.00	166.37	167.37	18.91	0.19	0.02	0.19	0.02
8	Plate C3265-1		5,100	0.100	0.500	0.015	26.00	1.00	169.51	170.51	11.04	0.34	0.05	0.34	0.05
9	Plate C3278-1		5,100	0.120	0.600	0.010	26.00	1.00	160.51	161.51	11.04	0.17	0.01	0.17	0.01
10	Plate C2197-2		2,940	0.150	0.500	0.008	23.60	1.00	156.14	157.14	8.92	0.01	0.00	0.01	0.00
11	Forging ZV2861		240	0.160	0.650	0.006	2.67	3.00	93.48	96.48	0.62	0.00	0.00	0.00	0.00

**Table C9 - Material report for Palisades at 32 EFPY (30 base case transients)**

Plant Name:	Palisades														
EFPY:	32														
WPS:	on														
Ductile Tearing	on														
Through failure criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>INDT0</sub>	ΔRT <sub>INDT</sub>	RT <sub>INDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By	% of total FCI (By Child)	% of total TWCF (By
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	3-112A*	Axial Weld	80	0.213	1.010	0.019	1.66	-56.00	262.39	206.39	2.04	7.71	7.50	7.71	7.50
2	3-112B*	Axial Weld	80	0.213	1.010	0.019	1.96	-56.00	268.19	212.19	2.04	13.81	15.34	13.81	15.34
3	3-112C*	Axial Weld	80	0.213	1.010	0.019	1.96	-56.00	268.19	212.19	2.04	10.96	12.13	10.96	12.13
4	2-112A	Axial Weld	124	0.213	1.010	0.019	1.97	-56.00	268.43	212.43	3.16	22.02	19.23	22.01	19.23
5	2-112B	Axial Weld	124	0.213	1.010	0.019	1.67	-56.00	262.59	206.59	3.16	18.09	22.59	18.09	22.59
6	2-112C	Axial Weld	124	0.213	1.010	0.019	1.97	-56.00	268.43	212.43	3.16	21.20	23.16	21.19	23.16
7	9-112	Circ Weld	776	0.203	1.018	0.013	2.55	-56.00	256.59	200.59	19.15	6.22	0.05	5.38	0.04
8	D3804-1	Plate	7,680	0.190	0.480	0.016	2.55	0.00	180.48	180.48	8.54	0.00	0.00	0.00	0.00
9	D3804-2	Plate	7,680	0.190	0.500	0.015	2.55	-30.00	179.89	149.89	8.54	0.00	0.00	0.00	0.00
10	D3804-3	Plate	10,400	0.120	0.550	0.010	2.55	-25.00	124.57	99.57	8.54	0.00	0.00	0.00	0.00
11	D3803-1	Plate	16,120	0.240	0.510	0.009	2.57	-5.00	189.00	184.00	13.20	0.00	0.00	0.32	0.00
12	D3803-2	Plate	11,904	0.240	0.520	0.010	2.57	-30.00	193.60	163.60	13.20	0.00	0.00	0.00	0.00
13	D3803-3	Plate	11,904	0.240	0.500	0.011	2.57	-5.00	193.53	188.53	13.20	0.00	0.00	0.52	0.01

**Table C10 - Material report for Palisades at 60 EFPY (30 base case transients)**

Plant Name:	Palisades														
EFPY:	60														
WPS:	on														
Ductile Tearing	on														
Through wall failure criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>HDT0</sub>	ΔRT <sub>HDT</sub>	RT <sub>HDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	3-112A*	Axial Weld	80	0.213	1.010	0.019	2.47	-56.00	276.95	220.95	2.04	6.84	6.07	6.84	6.07
2	3-112B*	Axial Weld	80	0.213	1.010	0.019	3.17	-56.00	286.00	230.00	2.04	14.51	17.10	14.51	17.10
3	3-112C*	Axial Weld	80	0.213	1.010	0.019	3.17	-56.00	286.00	230.00	2.04	11.24	12.73	11.24	12.72
4	2-112A	Axial Weld	124	0.213	1.010	0.019	3.21	-56.00	286.45	230.45	3.16	21.76	20.53	21.76	20.53
5	2-112B	Axial Weld	124	0.213	1.010	0.019	2.49	-56.00	277.27	221.27	3.16	16.74	21.17	16.74	21.17
6	2-112C	Axial Weld	124	0.213	1.010	0.019	3.21	-56.00	286.45	230.45	3.16	21.47	22.37	21.47	22.37
7	9-112	Circ Weld	776	0.203	1.018	0.013	4.04	-56.00	270.84	214.84	19.15	7.44	0.04	5.72	0.03
8	D3804-1	Plate	7,680	0.190	0.480	0.016	4.04	0.00	199.91	199.91	8.54	0.00	0.00	0.08	0.00
9	D3804-2	Plate	7,680	0.190	0.500	0.015	4.04	-30.00	198.64	168.64	8.54	0.00	0.00	0.00	0.00
10	D3804-3	Plate	10,400	0.120	0.550	0.010	4.04	-25.00	139.10	114.10	8.54	0.00	0.00	0.00	0.00
11	D3803-1	Plate	16,120	0.240	0.510	0.009	4.08	-5.00	204.12	199.12	13.20	0.00	0.00	0.55	0.00
12	D3803-2	Plate	11,904	0.240	0.520	0.010	4.08	-30.00	209.47	179.47	13.20	0.00	0.00	0.00	0.00
13	D3803-3	Plate	11,904	0.240	0.500	0.011	4.08	-5.00	210.07	205.07	13.20	0.00	0.00	1.09	0.01

**Table C11 - Material report for Palisades at 200 EFPY (30 base case transients)**

Plant Name:	Palisades														
EFPY:	200														
WPS:	on														
Ductile Tearing	on														
Through wall failure criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>HDT0</sub>	ΔRT <sub>HDT</sub>	RT <sub>HDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	3-112A*	Axial Weld	80	0.213	1.010	0.019	6.49	-56.00	315.17	259.17	2.04	4.92	3.75	4.92	3.75
2	3-112B*	Axial Weld	80	0.213	1.010	0.019	9.26	-56.00	332.18	276.18	2.04	14.90	20.12	14.91	20.12
3	3-112C*	Axial Weld	80	0.213	1.010	0.019	9.26	-56.00	332.18	276.18	2.04	10.62	12.03	10.62	12.03
4	2-112A	Axial Weld	124	0.213	1.010	0.019	9.46	-56.00	333.28	277.28	3.16	20.15	23.48	20.15	23.48
5	2-112B	Axial Weld	124	0.213	1.010	0.019	6.62	-56.00	316.05	260.05	3.16	14.95	19.37	14.95	19.37
6	2-112C	Axial Weld	124	0.213	1.010	0.019	9.46	-56.00	333.28	277.28	3.16	18.91	21.16	18.91	21.16
7	9-112	Circ Weld	776	0.203	1.018	0.013	11.51	-56.00	309.71	253.71	19.15	15.41	0.02	4.75	0.00
8	D3804-1	Plate	7,680	0.190	0.480	0.016	11.50	0.00	259.50	259.50	8.54	0.04	0.01	6.92	0.03
9	D3804-2	Plate	7,680	0.190	0.500	0.015	11.50	-30.00	255.95	225.95	8.54	0.00	0.00	0.16	0.00
10	D3804-3	Plate	10,400	0.120	0.550	0.010	11.50	-25.00	184.21	159.21	8.54	0.00	0.00	0.00	0.00
11	D3803-1	Plate	16,120	0.240	0.510	0.009	11.74	-5.00	248.66	243.66	13.20	0.03	0.03	1.10	0.03
12	D3803-2	Plate	11,904	0.240	0.520	0.010	11.74	-30.00	256.38	226.38	13.20	0.01	0.00	0.05	0.00
13	D3803-3	Plate	11,904	0.240	0.500	0.011	11.74	-5.00	259.29	254.29	13.20	0.07	0.04	2.56	0.04

**Table C12 - Material report for Palisades at 500 EFPY (30 base case transients)**

Plant Name:	Palisades														
EFPY:	500														
WPS:	on														
Ductile Tearing	on														
Through wall failure criteria	0.90		# of Subregions	Cu	Ni	P	Max Neutron Fluence	RT <sub>INDT0</sub>	ΔRT <sub>INDT</sub>	RT <sub>INDT</sub>	% of Total Flaws	% of total FCI (By Parent)	% of total TWCF (By Parent)	% of total FCI (By Child)	% of total TWCF (By Child)
Major Region Number	Description		(#)	wt%	wt%	wt%	x10 <sup>19</sup> n/cm <sup>2</sup>	(°F)	(°F)	(°F)	%	%	%	%t	%
1	3-112A*	Axial Weld	80	0.213	1.010	0.019	15.11	-56.00	360.09	304.09	2.04	2.29	1.87	0.60	0.67
2	3-112B*	Axial Weld	80	0.213	1.010	0.019	22.30	-56.00	386.83	330.83	2.04	10.41	19.10	10.41	19.10
3	3-112C*	Axial Weld	80	0.213	1.010	0.019	22.30	-56.00	386.83	330.83	2.04	7.36	9.36	0.37	0.34
4	2-112A	Axial Weld	124	0.213	1.010	0.019	22.85	-56.00	388.63	332.63	3.16	16.10	27.53	16.10	27.53
5	2-112B	Axial Weld	124	0.213	1.010	0.019	15.46	-56.00	361.56	305.56	3.16	11.04	20.24	11.04	20.24
6	2-112C	Axial Weld	124	0.213	1.010	0.019	22.85	-56.00	388.63	332.63	3.16	13.04	20.52	10.46	17.30
7	9-112	Circ Weld	776	0.203	1.018	0.013	27.52	-56.00	356.60	300.60	19.15	38.58	0.01	0.00	0.00
8	D3804-1	Plate	7,680	0.190	0.480	0.016	27.48	0.00	334.85	334.85	8.54	0.41	0.40	33.20	10.62
9	D3804-2	Plate	7,680	0.190	0.500	0.015	27.48	-30.00	328.33	298.33	8.54	0.07	0.04	5.01	0.04
10	D3804-3	Plate	10,400	0.120	0.550	0.010	27.48	-25.00	241.48	216.48	8.54	0.00	0.00	0.00	0.00
11	D3803-1	Plate	16,120	0.240	0.510	0.009	28.15	-5.00	303.95	298.95	13.20	0.17	0.20	2.12	0.20
12	D3803-2	Plate	11,904	0.240	0.520	0.010	28.15	-30.00	314.71	284.71	13.20	0.09	0.07	1.63	0.07
13	D3803-3	Plate	11,904	0.240	0.500	0.011	28.15	-5.00	320.64	315.64	13.20	0.44	0.66	9.07	3.88

## 8. Appendix D - Transient descriptions

<b>Table number</b>	<b>Table Content</b>
D1	Base case transient descriptions for Beaver Valley
D2	Base case transient descriptions for Oconee
D3	Base case transient descriptions for Palisades



**Table D1 - Base Case Transient Descriptions for Beaver Valley**

<b>Count</b>	<b>TH Case #</b>	<b>System Failure</b>	<b>Operator Action</b>	<b>HZP*</b>	<b>Dominant**</b>
1	002	3.59 cm [1.414 in] surge line break	None.	No	No
2	003	5.08 cm [2 in] surge line break	None.	No	No
3	007	2.54 cm [8 in] surge line break	None.	No	Yes at 32, 60, 100, 200 EFPY
4	009	2.54 cm [16 in] hot leg break	None.	No	Yes at 32, 60, 100, 200 EFPY
5	014	Reactor/turbine trip w/one stuck open pressurizer SRV	None.	No	No
6	031	Reactor/turbine trip w/feed and bleed (Operator open all pressurizer PORVs and use all charging/HHSI pumps)	None.	No	No
7	034	Reactor/turbine trip w/two stuck open pressurizer SRV's	None.	No	No
8	056	10.16 cm [4.0 in] surge line break	None.	Yes	Yes at 32, 60, 100, 200 EFPY
9	059	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 3,000 s.	None.	No	No
10	060	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 6,000 s.	None.	No	Yes at 32, 60, 100 EFPY
11	061	Reactor/turbine trip w/two stuck open pressurizer SRV which recloses at 3,000 s.	None.	No	No

12	062	Reactor/turbine trip w/two stuck open pressurizer SRV which recloses at 6,000 s.	None.	No	No
13	064	Reactor/turbine trip w/two stuck open pressurizer SRV's	None.	Yes	No
14	065	Reactor/turbine trip w/two stuck open pressurizer SRV's and HHSI failure	Operator opens all ASDVs 5 minutes after HHSI would have come on.	No	No
15	066	Reactor/turbine trip w/two stuck open pressurizer SRV's. One valve recloses at 3000 seconds while the other valve remains open.	None.	No	No
16	067	Reactor/turbine trip w/two stuck open pressurizer SRV's. One valve recloses at 6000 seconds while the other valve remains open.	None.	No	No
17	068	Reactor/turbine trip w/two stuck open pressurizer SRV's that reclose at 6000 s with HHSI failure.	Operator opens all ASDVs 5 minutes after HHSI would have come on.	No	No
18	069	Reactor/turbine trip w/two stuck open pressurizer SRVs which reclose at 3,000 s.	None.	Yes	No
19	070	Reactor/turbine trip w/two stuck open pressurizer SRVs which reclose at 6,000 s.	None.	Yes	No
20	071	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 6,000 s.	None.	Yes	Yes at 32 EFPY
21	072	Reactor/turbine trip w/one stuck open pressurizer SRV with HHSI failure.	Operator opens all ASDVs 5 minutes after HHSI would have come on.	No	No

22	073	Reactor/turbine trip w/one stuck open pressurizer SRV with HHSI failure	Operator open all ASDVs 5 minutes after HHSI would have come on.	Yes	No
23	074	Main steam line break with AFW continuing to feed affected generator	None.	No	No
24	076	Reactor/turbine trip w/full MFW to all 3 SGs (MFW maintains SG level near top).	Operator trips reactor coolant pumps.	Yes	No
25	078	Reactor/turbine trip with failure of MFW and AFW.	Operator opens all ASDVs to let condensate fill SGs.	No	No
26	081	Main Steam Line Break with AFW continuing to feed affected generator and with HHSI failure initially.	Operator opens ADVs (on intact generators). HHSI is restored after CFTs discharge 50%.	No	No
27	082	Reactor/turbine trip w/one stuck open pressurizer SRV (recloses at 6000 s) and with HHSI failure.	Operator opens all ASDVs 5 minutes after HHSI would have started.	No	No
28	083	2.54 cm [1.0 in] surge line break with HHSI failure and motor driven AFW failure. MFW is tripped. Level control failure causes all steam generators to be overfed with turbine AFW, with the level maintained at top of SGs.	Operator trips RCPs. Operator opens all ASDVs 5 minutes after HHSI would have come on.	No	No
29	092	Reactor/turbine trip w/two stuck open pressurizer SRV's, one recloses at 3000 s.	None.	Yes	No
30	093	Reactor/turbine trip w/two stuck open pressurizer SRV's. One valve recloses at 6000 seconds while the other valve remains open.	None.	Yes	No
31	094	Reactor/turbine trip w/one stuck open pressurizer SRV.	None.	Yes	No

32	097	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 3,000 s.	None.	Yes	Yes at 32, 60 EFPY
33	102	Main steam line break with AFW continuing to feed affected generator for 30 minutes.	Operator controls HHSI 30 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	No	Yes at 100, 200 EFPY
34	103	Main steam line break with AFW continuing to feed affected generator for 30 minutes.	Operator controls HHSI 30 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	Yes	Yes at 60, 100, 200 EFPY
35	104	Main steam line break with AFW continuing to feed affected generator for 30 minutes.	Operator controls HHSI 60 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	No	Yes at 100, 200 EFPY
36	105	Main steam line break with AFW continuing to feed affected generator for 30 minutes.	Operator controls HHSI 60 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	Yes	No
37	106	Main steam line break with AFW continuing to feed affected generator.	Operator controls HHSI 30 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	No	No
38	107	Main steam line break with AFW continuing to feed affected generator.	Operator controls HHSI 30 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	Yes	No

39	108	Small steam line break (simulated by sticking open all SG-A SRVs) with AFW continuing to feed affected generator for 30 minutes.	Operator controls HHSI 30 minutes after allowed.	Yes	No
40	109	Small steam line break (simulated by sticking open all SG-A SRVs) with AFW continuing to feed affected generator for 30 minutes.	Operator controls HHSI 30 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	Yes	No
41	110	Small steam line break (simulated by sticking open all SG-A SRVs) with AFW continuing to feed affected generator for 30 minutes	Operator controls HHSI 60 minutes after allowed.	No	Yes at 200 EFPY
42	111	Small steam line break (simulated by sticking open all SG-A SRVs) with AFW continuing to feed affected generator for 30 minutes.	Operator controls HHSI 60 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	Yes	No
43	112	Small steam line break (simulated by sticking open all SG-A SRVs) with AFW continuing to feed affected generator.	Operator controls HHSI 30 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	No	No
44	113	Small steam line break (simulated by sticking open all SG-A SRVs) with AFW continuing to feed affected generator.	Operator controls HHSI 30 minutes after allowed. Break is assumed to occur inside containment so that the operator trips the RCPs due to adverse containment conditions.	Yes	No
45	114	7.18 cm [2.828 in] surge line break, summer conditions (HHSI, LHSI temp = 55°F, Accumulator Temp = 105°F), heat transfer coefficient increased 30% (modeled by increasing heat transfer surface area by 30% in passive heat structures).	None.	No	No

46	115	7.18 cm [2.828 in] cold leg break	None.	No	No
47	116	14.366 cm [5.657 in] cold leg break with break area increased 30%	None.	No	No
48	117	14.366 cm [5.657 in] cold leg break, summer conditions (HHSI, LHSI temp = 55°F, Accumulator Temp = 105°F)	None.	No	No
49	118	Small steam line break (simulated by sticking open all SG-A SRVs) with AFW continuing to feed affected generator	None.	No	No
50	119	Reactor/turbine trip w/two stuck open pressurizer SRV which recloses at 6,000 s	Operator controls HHSI (1 minute delay). Updated control logic.	No	No
51	120	Reactor/turbine trip w/two stuck open pressurizer SRV which recloses at 6,000 s	Operator controls HHSI (10 minute delay). Updated control logic.	No	No
52	121	Reactor/turbine trip w/two stuck open pressurizer SRV which recloses at 3,000 s	Operator controls HHSI (1 minute delay). Updated control logic.	Yes	No
53	122	Reactor/turbine trip w/two stuck open pressurizer SRVs which reclose at 6,000 s	Operator controls HHSI (1 minute delay). Updated control logic.	Yes	No
54	123	Reactor/turbine trip w/two stuck open pressurizer SRVs which reclose at 3,000 s	Operator controls HHSI (10 minute delay). Updated control logic.	Yes	Yes at 32 EFPY
55	124	Reactor/turbine trip w/two stuck open pressurizer SRVs which reclose at 6,000 s	Operator controls HHSI (10 minute delay). Updated control logic.	Yes	No

56	125	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 6,000 s	Operator controls HHSI (1 minute delay). Updated control logic.	No	No
57	126	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 6,000 s	Operator controls HHSI (10 minute delay). Updated control logic.	No	Yes at 32, 60, 100 EFPY
58	127	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 6,000 s	Operator controls HHSI (1 minute delay). Updated control logic.	Yes	No
59	128	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 3,000 s	Operator controls HHSI (1 minute delay). Updated control logic.	Yes	No
60	129	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 6,000 s	Operator controls HHSI (10 minute delay). Updated control logic.	Yes	Yes at 32, 60 EFPY
61	130	Reactor/turbine trip w/one stuck open pressurizer SRV which recloses at 3,000 s	Operator controls HHSI (10 minute delay). Updated control logic.	Yes	Yes at 32, 60, 100 EFPY

\* Hot Zero Power

\*\* The arbitrary definition of a dominant transient is a transient that contributes 1% or more of the total Through-Wall Cracking Failure (TWCF).

**Table D2 – Base case transient descriptions for Oconee**

<b>Count</b>	<b>TH Case #</b>	<b>System Failure</b>	<b>Operator Action</b>	<b>HZP*</b>	<b>Hi K</b>	<b>Dominant**</b>
1	8	2.54 cm [1 in] surge line break with 1 stuck open safety valve in SG-A.	None	No	No	No
2	12	2.54 cm [1 in] surge line break with 1 stuck open safety valve in SG-A.	HPI throttled to maintain 27.8 K [50° F] subcooling margin	No	No	No
3	15	2.54 cm [1 in] surge line break with HPI Failure	At 15 minutes after transient initiation, operator opens all TBVs to lower primary system pressure and allow CFT and LPI injection.	No	No	No
4	27	MSLB without trip of turbine driven emergency feedwater.	Operator throttles HPI to maintain 27.8 K [50° F] subcooling margin.	No	No	No
5	28	Reactor/turbine trip with 1 stuck open safety valve in SG-A	None	No	No	No
6	29	Reactor/turbine trip with 1 stuck open safety valve in SG-A and a second stuck open safety valve in SG-B	None	No	No	No
7	30	Reactor/turtine trip with 1 stuck open safety valve in SG-A	None	Yes	No	No
8	31	Reactor/turbine trip with 1 stuck open safety valve in SG-A and a second stuck open safety valve in SG-B	None	Yes	No	No



9	36	Reactor/turbine trip with 1 stuck open safety valve in SG-A and a second stuck open safety valve in SG-B	Operator throttles HPI to maintain 27.8 K [50° F] subcooling and 304.8 cm [120 in] pressurizer level.	No	No	No
10	37	Reactor/turbine trip with 1 stuck open safety valve in SG-A	Operator throttles HPI to maintain 27.8 K [50° F] subcooling and 304.8 cm [120 in] pressurizer level.	Yes	No	No
11	38	Reactor/turbine trip with 1 stuck open safety valve in SG-A and a second stuck open safety valve in SG-B	Operator throttles HPI to maintain 27.8 K [50° F] subcooling and 304.8 cm [120 in] pressurizer level.	Yes	No	No
12	44	2.54 cm [1 in] surge line break with HPI Failure	At 15 minutes after initiation, operators open all TBVs to depressurize the system to the CFT setpoint. When the CFTs are 50 percent discharged, HPI is assumed to be recovered. The TBVs are assumed remain open for the duration of the transient.	No	No	No

13	89	Reactor/turbine trip with Loss of MFW and EFW.	Operator opens all TBVs to depressurize the secondary side to below the condensate booster pump shutoff head so that these pumps feed the steam generators. Booster pumps are assumed to be initially uncontrolled so that the steam generators are overfilled (609 cm [240 in] startup level). Operator controls booster pump flow to maintain SG level at 76 cm [30 in] due to continued RCP operation. Operator also throttles HPI to maintain 55 K [100EF] subcooling and a pressurizer level of 254 cm [100 in]. The TBVs are kept fully opened due to operator error.	No	No	No
14	90	Reactor/turbine trip with 2 stuck open safety valves in SG-A	Operator throttles HPI 20 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached [throttling criteria is 27.8 K [50°F] subcooling].	No	No	No

15	98	Reactor/turbine trip with loss of MFW and EFW	Operator opens all TBVs to depressurize the secondary side to below the condensate booster pump shutoff head so that these pumps feed the steam generators. Booster pumps are assumed to be initially uncontrolled so that the steam generators are overfilled (610 cm [240 in] startup level). Operator controls booster pump flow to maintain SG level at 76 cm [30 in] due to continued RCP operation. Operator also throttles HPI to maintain 55 K [100EF] subcooling and a pressurizer level of 254 cm [100 in]. The TBVs are kept fully opened due to operator error.	Yes	No	No
16	99	MSLB with trip of turbine driven EFW by MSLB Circuitry	HPI is throttled 20 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling).	No	No	No
17	100	MSLB with trip of turbine driven EFW by MSLB Circuitry	Operator throttles HPI 20 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling).	Yes	No	No

18	101	MSLB without trip of turbine driven EFW by MSLB Circuitry	Operator throttles HPI to maintain 27.8 K [50° F] subcooling margin (throttling criteria is 27.8 K [50°F] subcooling).	Yes	No	No
19	102	Reactor/turbine trip with 2 stuck open safety valves in SG-A	Operator throttles HPI 20 minutes after 2.77 K [5°F] subcooling and 254 cm [100 in] pressurizer level is reached (throttling criteria is 27 K [50°F] subcooling).	Yes	No	No
20	109	Stuck open pressurizer safety valve. Valve recloses at 6000 secs [RCS low pressure point].	None	No	Yes	No
21	110	5.08 cm [2 inch] surge line break with HPI failure	At 15 minutes after transient initiation, operator opens both TBV to lower primary system pressure and allow CFT and LPI injection.	No	Yes	Yes at 1000 EPFY
22	111	2.54 cm [1 in] surge line break with HPI failure	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. At 3000 seconds after initiation, operator starts throttling HPI to 55 K [100°F] subcooling and 254 cm [100"] pressurizer level.	No	Yes	No

23	112	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	After valve recloses, operator throttles HPI 1 minute after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27 K [50°F] subcooling)	No	Yes	No
24	113	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	After valve recloses, operator throttles HPI 10 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling)	No	Yes	No
25	114	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	After valve recloses, operator throttles HPI 1 minute after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 50°F subcooling)	No	Yes	No
26	115	Stuck open pressurizer Safety Valve. Valve recloses at 3000 secs.	After valve recloses, operator throttles HPI 10 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 50°F subcooling)	No	Yes	No

27	116	Stuck open pressurizer safety valve and HPI failure	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. The HPI is throttled 20 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 50°F subcooling).	No	Yes	No
28	117	Stuck open pressurizer safety valve and HPI failure	At 15 minutes after initiation, operator opens all TBV to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. The SRV is closed 5 minutes after HPI recovered. HPI is throttled at 1 minute after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling).	No	Yes	No
29	119	2.54 cm [1 in] surge line break with HPI Failure	At 15 minutes after transient initiation, the operator opens all turbine bypass valves to lower primary system pressure and allow core flood tank and LPI injection.	Yes	Yes	No

30	120	2.54 cm [1 in] surge line break with HPI Failure	At 15 minutes after sequence initiation, operators open all TBVs to depressurize the system to the CFT setpoint. When the CFTs are 50 percent discharged, HPI is assumed to be recovered. The TBVs are assumed remain opened for the duration of the transient.	Yes	Yes	No
31	121	Stuck open pressurizer safety valve. Valve recloses at 6000 secs .	Operator throttles HPI at 1 minute after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached [throttling criteria is 27.8 K [50°F] subcooling].	Yes	Yes	No
32	122	Stuck open pressurizer safety valve. Valve recloses at 6000 secs.	Operator throttles HPI at 10 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling).	Yes	Yes	Yes at 32, 60, 500, 1000 EFPY
33	123	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	Operator throttles HPI at 1 minute after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling).	Yes	Yes	No
34	124	Stuck open pressurizer safety valve. Valve recloses at 3000 secs.	Operator throttles HPI at 10 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling).	Yes	Yes	Yes at 60, 500, 1000 EFPY

35	125	Stuck open pressurizer safety valve and HPI Failure	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. HPI is throttled 20 minutes after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling).	Yes	Yes	No
36	126	Stuck open pressurizer safety valve and HPI Failure	At 15 minutes after initiation, operator opens all TBVs to lower primary pressure and allow CFT and LPI injection. When the CFTs are 50% discharged, HPI is recovered. SRV is closed at 5 minutes after HPI is recovered. HPI is throttled at 1 minute after 2.7 K [5°F] subcooling and 254 cm [100"] pressurizer level is reached (throttling criteria is 27.8 K [50°F] subcooling).	Yes	Yes	No
37	127	SGTR with a stuck open SRV in SG-B. A reactor trip is assumed to occur at the time of the tube rupture. Stuck safety relief valve is assumed to reclose 10 minutes after initiation.	Operator trips RCP's 1 minute after initiation. Operator also throttles HPI 10 minutes after 2.77 K [5° F] subcooling and 254 cm [100 in] pressurizer level is reached (assumed throttling criteria is 27 K [50°F] subcooling).	Yes	Yes	No



38	141	8.19 cm [3.22 in] surge line break [Break flow area increased by 30% from 7.18 cm [2.828 in] break].	None	No	Yes	Yes at 500, 1000 EFPY
39	142	6.01 cm [2.37 in] surge line break [Break flow area decreased by 30% from 7.18 cm [2.828 in] break].	None	No	Yes	No
40	145	4.34 cm [1.71 in] surge line break [Break flow area increased by 30% from 3.81 cm [1.5 in] break]. Winter conditions assumed [HPI, LPI temp = 277 K [40° F] and CFT temp = 294 K [70° F]].	None	No	Yes	No
41	146	TT/RT with stuck open pzz SRV [valve flow area reduced by 30 percent]. Summer conditions assumed [HPI, LPI temp = 302 K [85° F] and CFT temp = 310 K [100° F]]. Vent valves do not function.	None	No	Yes	No
42	147	TT/RT with stuck open pzz SRV. Summer conditions assumed [HPI, LPI temp = 302 K [85° F] and CFT temp = 310 K [100° F]].	None	No	Yes	No
43	148	TT/RT with partially stuck open pzz SRV [flow area equivalent to 1.5 in diameter opening]. HTC coefficients increased by 1.3.	None	No	Yes	No
44	149	TT/RT with stuck open pzz SRV. SRV assumed to reclose at 3000 secs. Operator does not throttle HPI.	None	No	Yes	No

45	154	8.53 cm [3.36 in] surge line break [Break flow area reduced by 30% from 10.16 cm [4 in] break]. Vent valves do not function. ECC suction switch to the containment sump included in the analysis.	None	No	Yes	No
46	156	40.64 cm [16 in] hot leg break. ECC suction switch to the containment sump included in the analysis.	None	No	Yes	Yes at 500, 1000 EFY
47	160	14.37 cm [5.656 in] surge line break. ECC suction switch to the containment sump included in the analysis.	None	No	Yes	Yes at 500, 1000 EFY
48	164	20.32 cm [8 inch] surge line break. ECC suction switch to the containment sump included in the analysis.	None	No	Yes	Yes at 60, 500, 1000 EFY
49	165	Stuck open pressurizer safety valve. Valve recloses at 6000 secs [RCS low pressure point].	None	Yes	Yes	Yes at 32, 60, 500, 1000 EFY
50	168	TT/RT with stuck open pZR SRV. SRV assumed to reclose at 3000 secs. Operator does not throttle HPI.	None	Yes	Yes	Yes at 500, 1000 EFY
51	169	TT/RT with stuck open pZR SRV [valve flow area reduced by 30 percent]. Summer conditions assumed [HPI, LPI temp = 302 K [85° F] and CFT temp = 310 K [100° F]]. Vent valves do not function.	None	Yes	Yes	No

52	170	TT/RT with stuck open pwr SRV. Summer conditions assumed [HPI, LPI temp = 302 K [85° F] and CFT temp = 310 K [100° F]].	None	Yes	Yes	No
53	171	TT/RT with partially stuck open pwr SRV [flow area equivalent to 1.5 in diameter opening]. HTC coefficients increased by 1.3.	None	Yes	Yes	No
54	172	10.16 cm [4 in] cold leg break. ECC suction switch to the containment sump included in the analysis.	None	No	Yes	Yes at 1000 EFPY
55	178	8.53 cm [3.36 in] surge line break [Break flow area reduced by 30% from 10.16 cm [4 in] break]. Vent valves do not function. ECC suction switch to the containment sump included in the analysis.	None	No	Yes	No

\* Hot Zero Power

\*\* The arbitrary definition of a dominant transient is a transient that contributes 1% or more of the total Through-Wall Cracking Failure (TWCF).

**Table D3 – Base case transient descriptions for Palisades**

Count	TH Case #	System Failure	Operator Action	HZP*	HiK	Dominant**
1	2	3.59 cm (1.414 in) surge line break. Containment sump recirculation included in the analysis.	None	No	Yes	No
2	16	Turbine/reactor trip with 2 stuck-open ADVs on SG-A combined with controller failure resulting in the flow from two AFW pumps into affected steam generator.	Operator starts second AFW pump. Operator isolates AFW to affected SG at 30 minutes after initiation. Operator assumed to throttle HPI if auxiliary feedwater is running with SG wide range level > -84% and RCS subcooling > 25 F. HPI is throttled to maintain pressurizer level between 40 and 60 %.	No	No	No
3	18	Turbine/reactor trip with 1 stuck-open ADV on SG-A. Failure of both MSIVs (SG-A and SG-B) to close.	Operator does not isolate AFW on affected SG. Normal AFW flow assumed (200 gpm). Operator assumed to throttle HPI if auxiliary feedwater is running with SG wide range level > -84% and RCS subcooling > 25 F. HPI is throttled to maintain pressurizer level between 40 and 60 %.	No	No	No
4	19	Reactor trip with 1 stuck-open ADV on SG-A.	None. Operator does not throttle HPI.	Yes	No	Yes at 60, 200, 500 EFPY

5	22	Turbine/reactor trip with loss of MFW and AFW.	Operator depressurizes through ADVs and feeds SG's using condensate booster pumps. Operators maintain a cooldown rate within technical specification limits and throttle condensate flow at 84 % level in the steam generator.	No	No	No
6	24	Main steam line break with the break assumed to be inside containment causing containment spray actuation.	None	No	No	No
7	26	Main steam line break with the break assumed to be inside containment causing containment spray actuation.	Operator isolates AFW to affected SG at 30 minutes after initiation.	No	No	No
8	27	Main steam line break with controller failure resulting in the flow from two AFW pumps into affected steam generator. Break assumed to be inside containment causing containment spray actuation.	Operator starts second AFW pump.	No	No	No
9	29	Main steam line break with break assumed to be inside containment causing containment spray actuation.	None. Operator does not throttle HPI.	Yes	No	No
10	31	Turbine/reactor trip with failure of MFW and AFW. Containment spray actuation assumed due to PORV discharge.	Operator maintains core cooling by "feed and bleed" using HPI to feed and two PORVs to bleed.	No	No	No

11	32	Turbine/reactor trip with failure of MFW and AFW. Containment spray actuation assumed due to PORV discharge.	Operator maintains core cooling by "feed and bleed" using HPI to feed and two PORV to bleed. AFW is recovered 15 minutes after initiation of "feed and bleed" cooling. Operator closes PORVs when SG level reaches 60 percent.	No	No	No
12	34	Main steam line break concurrent with a single tube failure in SG-A due to MSLB vibration.	Operator isolates AFW to affected SG at 15 minutes after initiation. Operator trips RCPs assuming that they do not trip as a result of the event. Operator assumed to throttle HPI if auxiliary feedwater is running with SG wide range level > -84% and RCS subcooling > 25 F. HPI is throttled to maintain pressurizer level between 40 and 60 %.	No	No	No
13	40	40.64 cm (16 in) hot leg break. Containment sump recirculation included in the analysis.	None. Operator does not throttle HPI.	No	Yes	Yes at 32, 60, 200, 500 EFPY
14	42	Turbine/reactor trip with two stuck open pressurizer SRVs. Containment spray is assumed not to actuate.	Operator assumed to throttle HPI if auxiliary feedwater is running with SG wide range level > -84% and RCS subcooling > 25 F. HPI is throttled to maintain pressurizer level between 40 and 60 %.	No	No	No
15	48	Two stuck-open pressurizer SRVs that reclose at 6000 sec after initiation. Containment spray is assumed not to actuate.	None. Operator does not throttle HPI.	Yes	No	Yes at 32 EFPY
16	49	Main steam line break with the break assumed to be inside containment causing containment spray actuation.	Operator isolates AFW to affected SG at 30 minutes after initiation. Operator does not throttle HPI.	Yes	No	No

17	50	Main steam line break with controller failure resulting in the flow from two AFW pumps into affected steam generator. Break assumed to be inside containment causing containment spray actuation.	Operator starts second AFW pump. Operator does not throttle HPI.	Yes	No	No
18	51	Main steam line break with failure of both MSIVs to close. Break assumed to be inside containment causing containment spray actuation.	Operator does not isolate AFW on affected SG. Operator does not throttle HPI.	Yes	No	No
19	52	Reactor trip with 1 stuck-open ADV on SG-A. Failure of both MSIVs (SG-A and SG-B) to close.	Operator does not isolate AFW on affected SG. Normal AFW flow assumed (200 gpm). Operator does not throttle HPI.	Yes	No	Yes at 500 EFPY
20	53	Turbine/reactor trip with two stuck-open pressurizer SRVs that reclose at 6000 sec after initiation. Containment spray is assumed not to actuate.	None. Operator does not throttle HPI.	No	No	Yes at 500 EFPY
21	54	Main steam line break with failure of both MSIVs to close. Break assumed to be inside containment causing containment spray actuation.	Operator does not isolate AFW on affected SG. Operator does not throttle HPI.	No	No	Yes at 32, 60, 200, 500 EFPY
22	55	Turbine/reactor trip with 2 stuck-open ADVs on SG-A combined with controller failure resulting in the flow from two AFW pumps into affected steam generator.	Operator starts second AFW pump.	No	No	Yes at 32, 60, 200, 500 EFPY
23	58	10.16 cm (4 in) cold leg break. Winter conditions assumed (HPI and LPI injection temp = 40 F, Accumulator temp = 60 F)	None. Operator does not throttle HPI.	No	Yes	Yes at 32, 60, 200, 500 EFPY

24	59	10.16 cm (4 in) cold leg break. Summer conditions assumed (HPI and LPI injection temp = 100 F, Accumulator temp = 90 F)	None. Operator does not throttle HPI.	No	Yes	Yes at 500 EFPY
25	60	5.08 cm (2 in) surge line break. Winter conditions assumed (HPI and LPI injection temp = 40 F, Accumulator temp = 60 F)	None. Operator does not throttle HPI.	No	Yes	Yes at 60, 200, 500 EFPY
26	61	7.18 cm (2.8 in) cold leg break. Summer conditions assumed (HPI and LPI injection temp = 100 F, Accumulator temp = 90 F)	None. Operator does not throttle HPI.	No	Yes	No
27	62	20.32 cm (8 in) cold leg break. Winter conditions assumed (HPI and LPI injection temp = 40 F, Accumulator temp = 60 F)	None. Operator does not throttle HPI.	No	Yes	Yes at 32, 60, 200, 500 EFPY
28	63	14.37 cm (5.656 in) cold leg break. Winter conditions assumed (HPI and LPI injection temp = 40 F, Accumulator temp = 60 F)	None. Operator does not throttle HPI.	No	Yes	Yes at 60, 200, 500 EFPY
29	64	10.16 cm (4 in) surge line break. Summer conditions assumed (HPI and LPI injection temp = 100 F, Accumulator temp = 90 F)	None. Operator does not throttle HPI.	No	Yes	Yes at 32, 60, 200, 500 EFPY
30	65	One stuck-open pressurizer SRV that recloses at 6000 sec after initiation. Containment spray is assumed not to actuate.	None. Operator does not throttle HPI.	Yes	No	Yes at 32, 60, 200, 500 EFPY

\* Hot Zero Power

\*\* The arbitrary definition of a dominant transient is a transient that contributes 1% or more of the total Through-Wall Cracking Failure (TWCF).



## 9. Appendix E - Transient Summaries

<b>Table number</b>	<b>Table Content</b>
E1	Transient report for Beaver Valley at 32 EFPY (61 base case transients)
E2	Transient report for Beaver Valley at 60 EFPY (61 base case transients)
E3	Transient report for Beaver Valley at 100 EFPY (61 base case transients)
E4	Transient report for Beaver Valley at 200 EFPY (61 base case transients)
E5	Transient report for Oconee at 32 EFPY (55 base case transients)
E6	Transient report for Oconee at 60 EFPY(55 base case transients)
E7	Transient report for Oconee at 500 EFPY(55 base case transients)
E8	Transient report for Oconee at 1000 EFPY(55 base case transients)
E9	Transient report for Palisades at 32 EFPY(30 base case transients)
E10	Transient report for Palisades at 60 EFPY (30 base case transients)
E11	Transient report for Palisades at 200 EFPY (30 base case transients)
E12	Transient report for Palisades at 500 EFPY (30 base case transients)

**Table E1 - Transient report for Beaver Valley at 32 EFPY (61 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing		Through-Wall Failure Criteria																				
Beaver Valley	32	on	on		0.900																				
Transient Count	Transient Sequence Number	# of Time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Freq	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles									(%)	(%)	(min)	(min)	(min)	(min)	(min)	
1	2	501	250	263.22	285.01	0.55	0.69	1.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	2
2	3	501	250	99.97	146.9	0.2	0.22	9.76E-05	0.00E+00	3.81E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	42	46	46	-	-	-	3
3	7	501	250	64.5	155.26	0.03	0.05	2.11E-05	0.00E+00	6.18E-04	4.15E-06	1.16E-03	0.00E+00	2.01E-06	0.00E+00	1.09E-07	14.39	17.22	6	14	12	7	13	12	7
4	9	501	250	64.55	154.66	0.02	0.02	6.99E-06	0.00E+00	6.40E-04	1.25E-07	9.54E-04	0.00E+00	8.63E-07	0.00E+00	4.71E-10	5.04	1.50	2	7	4	2	6	3	9
5	14	501	250	70.89	75.15	0.18	0.21	2.22E-04	0.00E+00	1.56E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	66	66	66	-	-	-	14
6	31	501	250	58.19	58.19	0.17	0.2	3.10E-07	0.00E+00	3.44E-07	0.00E+00	0.00E+00	0.00E+00	3.10E-12	0.00E+00	0.00E+00	0.00	0.00	80	91	87	86	91	91	31
7	34	501	250	57.91	128.22	0.13	0.19	4.95E-07	0.00E+00	2.39E-07	0.00E+00	0.00E+00	0.00E+00	1.60E-17	0.00E+00	0.00E+00	0.00	0.00	34	42	40	39	39	39	34
8	56	501	250	59.53	127.66	0.06	0.15	1.23E-04	0.00E+00	7.43E-04	8.41E-06	1.36E-03	0.00E+00	8.76E-07	0.00E+00	2.53E-12	79.44	13.21	11	18	18	13	18	16	56
9	59	501	250	313.68	416.65	0.57	2.36	3.46E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	59
10	60	501	250	133.91	368.63	0.38	2.37	2.15E-05	0.00E+00	4.69E-06	0.00E+00	0.00E+00	0.00E+00	4.69E-06	0.00E+00	0.00E+00	0.11	16.75	66	128	127	66	128	127	60
11	61	501	250	183.16	398.39	0.43	2.38	1.79E-06	0.00E+00	5.67E-06	0.00E+00	0.00E+00	0.00E+00	1.20E-06	0.00E+00	0.00E+00	0.01	0.23	34	85	46	34	85	46	61
12	62	501	250	65.95	348.65	0.19	2.38	1.08E-07	0.00E+00	1.20E-06	0.00E+00	0.00E+00	0.00E+00	9.61E-07	0.00E+00	0.00E+00	0.00	0.01	34	117	117	39	117	117	62
13	64	501	250	52.23	123.57	0.15	0.19	8.67E-08	0.00E+00	7.51E-06	0.00E+00	0.00E+00	0.00E+00	1.28E-09	0.00E+00	0.00E+00	0.00	0.00	18	28	28	21	26	21	64
14	65	501	250	129.54	177.72	0.14	0.17	1.04E-09	0.00E+00	1.71E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	24	26	26	-	-	-	65
15	66	501	250	72.14	72.97	0.19	0.21	1.18E-06	0.00E+00	5.25E-06	0.00E+00	0.00E+00	0.00E+00	1.42E-08	0.00E+00	0.00E+00	0.01	0.00	34	46	46	46	46	46	66
16	67	501	250	70.31	119.17	0.14	0.21	1.18E-06	0.00E+00	2.07E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	33	41	40	-	-	-	67
17	68	501	250	162.57	285.88	0.13	2.37	1.33E-08	0.00E+00	1.41E-07	0.00E+00	0.00E+00	0.00E+00	1.36E-07	0.00E+00	0.00E+00	0.00	0.00	26	105	105	103	105	105	68
18	69	501	250	72.07	72.07	0.12	2.37	2.09E-08	0.00E+00	1.32E-04	0.00E+00	9.86E-05	0.00E+00	9.65E-05	0.00E+00	5.51E-05	0.00	0.34	19	58	58	19	58	58	69

19	70	501	250	59.75	68.67	0.15	2.36	2.09E-08	0.00E+00	1.35E-05	0.00E+00	5.53E-09	0.00E+00	6.03E-06	0.00E+00	0.00E+00	0.00	0.01	18	107	106	19	107	106	70
20	71	501	250	71.25	71.25	0.15	2.37	3.74E-06	0.00E+00	1.96E-06	0.00E+00	0.00E+00	0.00E+00	1.96E-06	0.00E+00	0.00E+00	0.01	1.24	108	109	108	108	109	108	71
21	72	501	250	185.21	185.21	0.17	0.19	5.14E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	72
22	73	501	250	53.31	53.31	0.17	0.19	6.56E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	73
23	74	501	250	222.39	224.53	1.99	2.42	1.46E-06	0.00E+00	1.46E-08	0.00E+00	0.00E+00	0.00E+00	4.12E-12	0.00E+00	0.00E+00	0.00	0.00	23	33	29	28	33	29	74
24	76	501	250	143.37	149.03	0.86	2.37	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	76
25	78	501	250	313.9	313.9	1.96	2.42	3.25E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	78
26	81	501	250	239.6	243.86	0.39	0.87	2.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	81
27	82	501	250	222.59	292.77	0.17	2.37	1.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	82
28	83	501	250	247.3	247.48	0.19	0.21	3.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	83
29	92	501	250	60.33	65.21	0.15	0.21	2.13E-07	0.00E+00	5.15E-05	0.00E+00	2.88E-05	0.00E+00	2.04E-07	0.00E+00	0.00E+00	0.01	0.01	19	29	29	27	29	29	92
30	93	501	250	65.02	65.02	0.15	0.21	2.13E-07	0.00E+00	5.15E-05	0.00E+00	2.88E-05	0.00E+00	2.04E-07	0.00E+00	0.00E+00	0.01	0.00	19	29	29	27	29	29	93
31	94	501	250	54.14	54.14	0.21	0.21	4.10E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	94
32	97	501	250	74.65	74.65	0.26	2.39	3.74E-06	0.00E+00	7.68E-06	0.00E+00	0.00E+00	0.00E+00	7.68E-06	0.00E+00	0.00E+00	0.03	3.96	72	75	72	72	75	72	97
33	102	501	250	212.22	523.97	0.61	2.36	1.02E-04	0.00E+00	3.63E-07	0.00E+00	0.00E+00	0.00E+00	5.21E-10	0.00E+00	0.00E+00	0.03	0.00	9	16	13	9	16	13	102
34	103	501	250	191.46	228.68	0.7	0.7	1.07E-05	0.00E+00	7.36E-06	0.00E+00	0.00E+00	0.00E+00	3.96E-07	0.00E+00	0.00E+00	0.07	0.74	6	16	13	7	16	14	103
35	104	501	250	205.6	504.54	0.66	2.37	1.09E-04	0.00E+00	3.63E-07	0.00E+00	0.00E+00	0.00E+00	5.21E-10	0.00E+00	0.00E+00	0.07	0.01	9	16	13	9	16	13	104
36	105	501	250	222.36	222.51	1.89	2.43	1.07E-05	0.00E+00	8.62E-09	0.00E+00	0.00E+00	0.00E+00	2.70E-11	0.00E+00	0.00E+00	0.00	0.00	23	33	28	24	33	28	105
37	106	501	250	207.13	223.37	0.35	0.35	2.21E-06	0.00E+00	3.52E-07	0.00E+00	0.00E+00	0.00E+00	2.79E-10	0.00E+00	0.00E+00	0.00	0.00	9	15	13	9	15	12	106
38	107	501	250	191.28	220.29	0.73	0.73	4.31E-07	0.00E+00	6.16E-06	0.00E+00	0.00E+00	0.00E+00	5.28E-07	0.00E+00	0.00E+00	0.00	0.03	6	15	14	6	15	15	107
39	108	501	250	251.79	556.5	0.87	2.31	6.46E-04	0.00E+00	1.75E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	15	17	16	-	-	-	108
40	109	501	250	212.97	233.94	0.73	0.73	6.81E-05	0.00E+00	3.08E-09	0.00E+00	0.00E+00	0.00E+00	1.06E-15	0.00E+00	0.00E+00	0.00	0.00	12	15	15	15	15	15	109

41	110	501	250	231.26	542.22	1.41	2.36	6.91E-04	0.00E+00	1.75E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	15	17	16	-	-	-	110
42	111	501	250	189.43	236.77	0.64	0.64	6.82E-05	0.00E+00	3.08E-09	0.00E+00	0.00E+00	0.00E+00	1.06E-15	0.00E+00	0.00E+00	0.00	0.00	12	15	15	15	15	15	111
43	112	501	250	245.43	246.64	0.35	0.35	1.41E-05	0.00E+00	1.86E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	15	17	16	-	-	-	112
44	113	501	250	210.35	224.16	0.65	0.65	2.74E-06	0.00E+00	4.07E-10	0.00E+00	0.00E+00	0.00E+00	7.76E-14	0.00E+00	0.00E+00	0.00	0.00	11	21	12	21	21	21	113
45	114	501	250	87.46	129.26	0.16	0.19	9.76E-05	0.00E+00	2.55E-06	0.00E+00	0.00E+00	0.00E+00	6.63E-11	0.00E+00	0.00E+00	0.24	0.00	33	43	42	38	42	39	114
46	115	501	250	206.19	220.76	0.15	0.23	9.76E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	115
47	116	501	250	136.88	186.69	0.05	0.07	1.81E-05	0.00E+00	1.27E-06	0.00E+00	0.00E+00	0.00E+00	2.15E-10	0.00E+00	0.00E+00	0.01	0.00	24	29	28	27	28	28	116
48	117	501	250	145.6	192.97	0.06	0.09	2.11E-05	0.00E+00	1.27E-05	0.00E+00	9.64E-07	0.00E+00	8.29E-10	0.00E+00	0.00E+00	0.21	0.00	30	47	47	35	47	47	117
49	118	501	250	213.44	213.44	1.25	2.38	9.30E-06	0.00E+00	3.14E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	16	18	18	-	-	-	118
50	119	15001	250	81.39	519.24	0.15	2.37	6.84E-07	0.00E+00	5.60E-07	0.00E+00	0.00E+00	0.00E+00	1.76E-12	0.00E+00	0.00E+00	0.00	0.00	33	41	39	38	38	38	119
51	120	15001	250	81.39	487.84	0.15	2.37	9.98E-07	0.00E+00	3.62E-06	0.00E+00	0.00E+00	0.00E+00	3.07E-06	0.00E+00	0.00E+00	0.00	0.45	33	122	116	35	122	116	120
52	121	15001	250	116.02	361.89	0.15	0.95	1.33E-07	0.00E+00	9.79E-06	0.00E+00	0.00E+00	0.00E+00	6.92E-11	0.00E+00	0.00E+00	0.00	0.00	18	31	30	20	30	30	121
53	122	15001	250	69.79	327.52	0.15	0.25	1.33E-07	0.00E+00	9.79E-06	0.00E+00	0.00E+00	0.00E+00	3.57E-12	0.00E+00	0.00E+00	0.00	0.00	18	31	30	21	21	21	122
54	123	15001	250	116.02	356.74	0.15	0.5	1.65E-07	0.00E+00	6.32E-05	0.00E+00	1.14E-05	0.00E+00	5.59E-05	0.00E+00	8.39E-06	0.01	1.22	18	62	62	19	62	62	123
55	124	15001	250	69.79	227.06	0.15	0.31	1.65E-07	0.00E+00	1.39E-05	0.00E+00	8.39E-10	0.00E+00	4.16E-06	0.00E+00	0.00E+00	0.00	0.09	18	111	30	20	111	111	124
56	125	15001	250	152.5	528.57	0.36	2.37	1.34E-04	0.00E+00	2.39E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	71	74	74	-	-	-	125
57	126	15001	250	148.17	539.05	0.36	2.36	1.87E-04	0.00E+00	8.24E-07	0.00E+00	0.00E+00	0.00E+00	8.19E-07	0.00E+00	0.00E+00	0.16	23.55	71	130	128	72	130	128	126
58	127	15001	250	68.33	237.78	0.16	0.37	2.59E-05	0.00E+00	4.37E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	15	15	15	-	-	-	127
59	128	15001	250	110.01	296.52	0.22	0.63	2.59E-05	0.00E+00	4.37E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	15	15	15	-	-	-	128
60	129	15001	250	68.33	297.54	0.16	0.36	3.09E-05	0.00E+00	9.54E-07	0.00E+00	0.00E+00	0.00E+00	9.54E-07	0.00E+00	0.00E+00	0.02	2.90	15	119	119	118	119	119	129
61	130	15001	250	110.01	350.02	0.22	0.44	3.09E-05	0.00E+00	4.14E-06	0.00E+00	0.00E+00	0.00E+00	4.14E-06	0.00E+00	0.00E+00	0.11	16.52	72	73	72	72	73	72	130

**Table E2 - Transient report for Beaver Valley at 60 EFPY (61 base case transient)**

Plant Name:	EFPY:	WPS:	Ductile Tearing				Through-Wall Failure Criteria																			
Beaver Valley	60	on	on				0.900																			
Transient Count	Transient Sequence Number	# of Time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Freq	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number	
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles						(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)				
1	2	501	250	263.22	285.01	0.55	0.69	1.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	2	
2	3	501	250	99.97	146.9	0.2	0.22	9.76E-05	0.00E+00	6.85E-07	0.00E+00	0.00E+00	0.00E+00	2.28E-10	0.00E+00	0.00E+00	0.02	0.00	40	46	46	45	46	46	3	
3	7	501	250	64.5	155.26	0.03	0.05	2.11E-05	5.71E-07	2.58E-03	3.28E-04	5.32E-03	0.00E+00	2.08E-05	0.00E+00	2.00E-05	15.66	28.57	6	14	12	7	13	12	7	
4	9	501	250	64.55	154.66	0.02	0.02	6.99E-06	9.17E-09	3.02E-03	2.53E-04	6.10E-03	0.00E+00	1.43E-05	0.00E+00	8.75E-06	5.75	3.32	2	8	4	2	7	3	9	
5	14	501	250	70.89	75.15	0.18	0.21	2.22E-04	0.00E+00	2.02E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	63	66	66	-	-	-	14	
6	31	501	250	58.19	58.19	0.17	0.2	3.10E-07	0.00E+00	3.28E-06	0.00E+00	0.00E+00	0.00E+00	4.02E-09	0.00E+00	0.00E+00	0.00	0.00	76	91	87	83	91	86	31	
7	34	501	250	57.91	128.22	0.13	0.19	4.95E-07	0.00E+00	2.53E-06	0.00E+00	0.00E+00	0.00E+00	1.64E-09	0.00E+00	0.00E+00	0.00	0.00	32	42	40	36	40	39	34	
8	56	501	250	59.53	127.66	0.06	0.15	1.23E-04	8.87E-07	2.84E-03	3.90E-04	5.64E-03	0.00E+00	1.07E-05	0.00E+00	5.54E-06	77.05	30.84	11	18	18	12	18	16	56	
9	59	501	250	313.68	416.65	0.57	2.36	3.46E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	59	
10	60	501	250	133.91	368.63	0.38	2.37	2.15E-05	0.00E+00	1.17E-05	0.00E+00	0.00E+00	0.00E+00	1.17E-05	0.00E+00	0.00E+00	0.07	7.52	63	128	127	63	128	127	60	
11	61	501	250	183.16	398.39	0.43	2.38	1.79E-06	0.00E+00	2.93E-05	0.00E+00	7.62E-06	0.00E+00	8.87E-06	0.00E+00	1.40E-06	0.01	0.34	32	85	46	33	85	46	61	
12	62	501	250	65.95	348.65	0.19	2.38	1.08E-07	0.00E+00	4.64E-06	0.00E+00	0.00E+00	0.00E+00	2.12E-06	0.00E+00	0.00E+00	0.00	0.00	32	117	117	35	117	117	62	
13	64	501	250	52.23	123.57	0.15	0.19	8.67E-08	0.00E+00	4.39E-05	0.00E+00	8.91E-06	0.00E+00	7.65E-08	0.00E+00	0.00E+00	0.00	0.00	18	28	21	19	28	21	64	
14	65	501	250	129.54	177.72	0.14	0.17	1.04E-09	0.00E+00	1.43E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	24	28	26	-	-	-	65	
15	66	501	250	72.14	72.97	0.19	0.21	1.18E-06	0.00E+00	2.80E-05	0.00E+00	6.62E-06	0.00E+00	2.15E-07	0.00E+00	0.00E+00	0.01	0.00	32	46	46	37	46	46	66	
16	67	501	250	70.31	119.17	0.14	0.21	1.18E-06	0.00E+00	2.21E-06	0.00E+00	0.00E+00	0.00E+00	2.51E-10	0.00E+00	0.00E+00	0.00	0.00	32	41	40	36	40	38	67	
17	68	501	250	162.57	285.88	0.13	2.37	1.33E-08	0.00E+00	5.69E-07	0.00E+00	0.00E+00	0.00E+00	2.69E-07	0.00E+00	0.00E+00	0.00	0.00	25	105	27	27	105	105	68	
18	69	501	250	72.07	72.07	0.12	2.37	2.09E-08	0.00E+00	4.34E-04	4.19E-06	5.99E-04	0.00E+00	3.09E-04	2.51E-06	3.88E-04	0.00	0.21	18	58	58	18	58	58	69	

19	70	501	250	59.75	68.67	0.15	2.36	2.09E-08	0.00E+00	5.60E-05	0.00E+00	1.57E-05	0.00E+00	1.25E-05	0.00E+00	3.99E-08	0.00	0.01	18	107	21	18	107	106	70
20	71	501	250	71.25	71.25	0.15	2.37	3.74E-06	0.00E+00	4.00E-06	0.00E+00	0.00E+00	0.00E+00	4.00E-06	0.00E+00	0.00E+00	0.01	0.54	14	109	108	108	109	108	71
21	72	501	250	185.21	185.21	0.17	0.19	5.14E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	72
22	73	501	250	53.31	53.31	0.17	0.19	6.56E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	73
23	74	501	250	222.39	224.53	1.99	2.42	1.46E-06	0.00E+00	7.29E-07	0.00E+00	0.00E+00	0.00E+00	3.20E-08	0.00E+00	0.00E+00	0.00	0.00	20	33	29	23	33	33	74
24	76	501	250	143.37	149.03	0.86	2.37	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	76
25	78	501	250	313.9	313.9	1.96	2.42	3.25E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	78
26	81	501	250	239.6	243.86	0.39	0.87	2.65E-06	0.00E+00	3.56E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	14	15	15	-	-	-	81
27	82	501	250	222.59	292.77	0.17	2.37	1.51E-06	0.00E+00	2.03E-11	0.00E+00	0.00E+00	0.00E+00	1.92E-11	0.00E+00	0.00E+00	0.00	0.00	124	125	125	124	125	125	82
28	83	501	250	247.3	247.48	0.19	0.21	3.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	83
29	92	501	250	60.33	65.21	0.15	0.21	2.13E-07	0.00E+00	2.35E-04	5.39E-08	3.25E-04	0.00E+00	1.87E-06	0.00E+00	2.57E-08	0.01	0.01	18	29	29	20	29	29	92
30	93	501	250	65.02	65.02	0.15	0.21	2.13E-07	0.00E+00	2.35E-04	5.39E-08	3.25E-04	0.00E+00	1.87E-06	0.00E+00	2.57E-08	0.01	0.01	18	29	29	20	29	29	93
31	94	501	250	54.14	54.14	0.21	0.21	4.10E-05	0.00E+00	4.70E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	14	15	14	-	-	-	94
32	97	501	250	74.65	74.65	0.26	2.39	3.74E-06	0.00E+00	1.82E-05	0.00E+00	3.27E-11	0.00E+00	1.82E-05	0.00E+00	2.93E-11	0.02	1.98	14	75	72	72	75	72	97
33	102	501	250	212.22	523.97	0.61	2.36	1.02E-04	0.00E+00	6.82E-06	0.00E+00	0.00E+00	0.00E+00	1.47E-07	0.00E+00	0.00E+00	0.11	0.32	9	14	12	9	14	12	102
34	103	501	250	191.46	228.68	0.7	0.7	1.07E-05	0.00E+00	6.67E-05	0.00E+00	3.53E-05	0.00E+00	8.57E-06	0.00E+00	7.93E-07	0.17	2.54	5	16	13	6	16	14	103
35	104	501	250	205.6	504.54	0.66	2.37	1.09E-04	0.00E+00	6.82E-06	0.00E+00	0.00E+00	0.00E+00	1.47E-07	0.00E+00	0.00E+00	0.25	0.55	9	14	12	9	14	12	104
36	105	501	250	222.36	222.51	1.89	2.43	1.07E-05	0.00E+00	6.03E-07	0.00E+00	0.00E+00	0.00E+00	3.75E-08	0.00E+00	0.00E+00	0.00	0.01	21	33	27	21	33	33	105
37	106	501	250	207.13	223.37	0.35	0.35	2.21E-06	0.00E+00	6.92E-06	0.00E+00	0.00E+00	0.00E+00	1.33E-07	0.00E+00	0.00E+00	0.00	0.00	9	15	12	9	15	12	106
38	107	501	250	191.28	220.29	0.73	0.73	4.31E-07	0.00E+00	5.73E-05	0.00E+00	1.95E-05	0.00E+00	1.03E-05	0.00E+00	8.75E-07	0.00	0.12	5	16	14	6	16	14	107
39	108	501	250	251.79	556.5	0.87	2.31	6.46E-04	0.00E+00	2.48E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.01	0.00	13	18	17	-	-	-	108
40	109	501	250	212.97	233.94	0.73	0.73	6.81E-05	0.00E+00	2.62E-07	0.00E+00	0.00E+00	0.00E+00	5.14E-10	0.00E+00	0.00E+00	0.00	0.00	10	17	15	12	17	15	109

41	110	501	250	231.26	542.22	1.41	2.36	6.91E-04	0.00E+00	2.48E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	13	18	17	-	-	-	110
42	111	501	250	189.43	236.77	0.64	0.64	6.82E-05	0.00E+00	2.62E-07	0.00E+00	0.00E+00	0.00E+00	5.14E-10	0.00E+00	0.00E+00	0.01	0.00	10	17	15	12	17	15	111
43	112	501	250	245.43	246.64	0.35	0.35	1.41E-05	0.00E+00	2.13E-08	0.00E+00	0.00E+00	0.00E+00	3.35E-12	0.00E+00	0.00E+00	0.00	0.00	13	17	17	16	16	16	112
44	113	501	250	210.35	224.16	0.65	0.65	2.74E-06	0.00E+00	2.35E-07	0.00E+00	0.00E+00	0.00E+00	6.47E-10	0.00E+00	0.00E+00	0.00	0.00	10	21	21	11	21	21	113
45	114	501	250	87.46	129.26	0.16	0.19	9.76E-05	0.00E+00	1.52E-05	0.00E+00	5.59E-07	0.00E+00	8.69E-09	0.00E+00	0.00E+00	0.35	0.01	32	43	42	35	42	39	114
46	115	501	250	206.19	220.76	0.15	0.23	9.76E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	115
47	116	501	250	136.88	186.69	0.05	0.07	1.81E-05	0.00E+00	9.46E-06	0.00E+00	3.10E-08	0.00E+00	1.27E-08	0.00E+00	0.00E+00	0.03	0.00	21	29	28	26	28	28	116
48	117	501	250	145.6	192.97	0.06	0.09	2.11E-05	0.00E+00	4.66E-05	0.00E+00	2.32E-05	0.00E+00	2.29E-08	0.00E+00	0.00E+00	0.21	0.01	29	47	47	35	47	47	117
49	118	501	250	213.44	213.44	1.25	2.38	9.30E-06	0.00E+00	5.80E-08	0.00E+00	0.00E+00	0.00E+00	2.34E-11	0.00E+00	0.00E+00	0.00	0.00	13	20	18	15	20	18	118
50	119	15001	250	81.39	519.24	0.15	2.37	6.84E-07	0.00E+00	4.78E-06	0.00E+00	0.00E+00	0.00E+00	5.42E-09	0.00E+00	0.00E+00	0.00	0.00	31	41	39	35	40	38	119
51	120	15001	250	81.39	487.84	0.15	2.37	9.98E-07	0.00E+00	1.14E-05	0.00E+00	1.00E-09	0.00E+00	6.71E-06	0.00E+00	0.00E+00	0.00	0.18	31	120	116	32	120	116	120
52	121	15001	250	116.02	361.89	0.15	0.95	1.33E-07	0.00E+00	4.63E-05	0.00E+00	5.12E-06	0.00E+00	1.90E-08	0.00E+00	0.00E+00	0.00	0.00	18	31	30	18	30	30	121
53	122	15001	250	69.79	327.52	0.15	0.25	1.33E-07	0.00E+00	4.63E-05	0.00E+00	5.12E-06	0.00E+00	7.81E-09	0.00E+00	0.00E+00	0.00	0.00	18	31	30	20	21	21	122
54	123	15001	250	116.02	356.74	0.15	0.5	1.65E-07	0.00E+00	1.78E-04	0.00E+00	1.14E-04	0.00E+00	1.50E-04	0.00E+00	8.73E-05	0.01	0.61	18	62	62	18	62	62	123
55	124	15001	250	69.79	227.06	0.15	0.31	1.65E-07	0.00E+00	5.49E-05	0.00E+00	8.51E-06	0.00E+00	8.91E-06	0.00E+00	5.25E-09	0.00	0.03	18	111	30	18	111	111	124
56	125	15001	250	152.5	528.57	0.36	2.37	1.34E-04	0.00E+00	7.20E-08	0.00E+00	0.00E+00	0.00E+00	5.58E-19	0.00E+00	0.00E+00	0.00	0.00	68	74	74	74	74	74	125
57	126	15001	250	148.17	539.05	0.36	2.36	1.87E-04	0.00E+00	2.57E-06	0.00E+00	0.00E+00	0.00E+00	2.50E-06	0.00E+00	0.00E+00	0.13	13.99	69	130	128	69	130	128	126
58	127	15001	250	68.33	237.78	0.16	0.37	2.59E-05	0.00E+00	8.95E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	14	17	17	-	-	-	127
59	128	15001	250	110.01	296.52	0.22	0.63	2.59E-05	0.00E+00	8.95E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	14	17	17	-	-	-	128
60	129	15001	250	68.33	297.54	0.16	0.36	3.09E-05	0.00E+00	1.62E-06	0.00E+00	0.00E+00	0.00E+00	1.61E-06	0.00E+00	0.00E+00	0.01	1.15	14	119	119	16	119	119	129
61	130	15001	250	110.01	350.02	0.22	0.44	3.09E-05	0.00E+00	8.46E-06	0.00E+00	0.00E+00	0.00E+00	8.45E-06	0.00E+00	0.00E+00	0.07	7.13	15	73	72	16	73	72	130

**Table E3 - Transient report for Beaver Valley at 100 EFPY (61 base case transient)**

Plant Name:	EFPY:	WPS:	Ductile Tearing		Through-Wall Failure Criteria																				
Beaver Valley	100	on	on		0.900																				
Transient Count	Transient Sequence Number	# of Time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Freq	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles							(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)		
1	2	501	250	263.22	285.01	0.55	0.69	1.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	2
2	3	501	250	99.97	146.9	0.2	0.22	9.76E-05	0.00E+00	4.01E-06	0.00E+00	0.00E+00	0.00E+00	2.18E-09	0.00E+00	0.00E+00	0.03	0.00	37	46	46	42	46	46	3
3	7	501	250	64.5	155.26	0.03	0.05	2.11E-05	1.59E-04	9.06E-03	3.01E-03	3.47E-02	0.00E+00	1.44E-04	2.91E-06	2.39E-04	17.16	19.41	5	14	12	6	13	12	7
4	9	501	250	64.55	154.66	0.02	0.02	6.99E-06	1.78E-04	1.21E-02	3.76E-03	2.37E-02	0.00E+00	1.58E-04	1.46E-06	2.48E-04	6.47	10.50	2	9	4	2	7	3	9
5	14	501	250	70.89	75.15	0.18	0.21	2.22E-04	0.00E+00	9.33E-08	0.00E+00	0.00E+00	0.00E+00	1.09E-15	0.00E+00	0.00E+00	0.00	0.00	63	66	66	66	66	66	14
6	31	501	250	58.19	58.19	0.17	0.2	3.10E-07	0.00E+00	1.76E-05	0.00E+00	1.13E-06	0.00E+00	3.32E-08	0.00E+00	0.00E+00	0.00	0.00	75	91	87	81	91	86	31
7	34	501	250	57.91	128.22	0.13	0.19	4.95E-07	0.00E+00	1.41E-05	0.00E+00	3.19E-07	0.00E+00	1.56E-08	0.00E+00	0.00E+00	0.00	0.00	30	42	39	35	40	39	34
8	56	501	250	59.53	127.66	0.06	0.15	1.23E-04	1.52E-04	9.36E-03	3.19E-03	3.48E-02	0.00E+00	8.29E-05	2.66E-07	1.18E-04	74.23	51.36	10	18	18	11	18	16	56
9	59	501	250	313.68	416.65	0.57	2.36	3.46E-04	0.00E+00	4.10E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	74	74	74	-	-	-	59
10	60	501	250	133.91	368.63	0.38	2.37	2.15E-05	0.00E+00	1.39E-05	0.00E+00	1.43E-07	0.00E+00	1.39E-05	0.00E+00	1.43E-07	0.02	1.83	63	128	127	63	128	127	60
11	61	501	250	183.16	398.39	0.43	2.38	1.79E-06	0.00E+00	1.15E-04	0.00E+00	1.09E-04	0.00E+00	4.14E-05	0.00E+00	3.95E-05	0.01	0.40	31	85	46	32	85	46	61
12	62	501	250	65.95	348.65	0.19	2.38	1.08E-07	0.00E+00	1.61E-05	0.00E+00	7.08E-07	0.00E+00	2.14E-06	0.00E+00	0.00E+00	0.00	0.00	30	117	39	32	117	117	62
13	64	501	250	52.23	123.57	0.15	0.19	8.67E-08	0.00E+00	2.18E-04	1.36E-09	2.29E-04	0.00E+00	8.92E-07	0.00E+00	0.00E+00	0.00	0.00	17	28	21	18	28	21	64
14	65	501	250	129.54	177.72	0.14	0.17	1.04E-09	0.00E+00	1.19E-06	0.00E+00	0.00E+00	0.00E+00	6.42E-14	0.00E+00	0.00E+00	0.00	0.00	24	28	26	26	26	26	65
15	66	501	250	72.14	72.97	0.19	0.21	1.18E-06	0.00E+00	1.13E-04	0.00E+00	1.05E-04	0.00E+00	1.41E-06	0.00E+00	2.45E-09	0.01	0.01	31	46	46	35	46	46	66
16	67	501	250	70.31	119.17	0.14	0.21	1.18E-06	0.00E+00	1.24E-05	0.00E+00	2.52E-07	0.00E+00	4.49E-09	0.00E+00	0.00E+00	0.00	0.00	31	42	40	35	40	38	67
17	68	501	250	162.57	285.88	0.13	2.37	1.33E-08	0.00E+00	2.36E-06	0.00E+00	0.00E+00	0.00E+00	1.16E-07	0.00E+00	0.00E+00	0.00	0.00	25	105	27	26	105	105	68
18	69	501	250	72.07	72.07	0.12	2.37	2.09E-08	2.26E-08	1.18E-03	1.08E-04	2.05E-03	1.41E-08	8.31E-04	7.17E-05	1.48E-03	0.00	0.11	18	58	29	18	58	29	69



19	70	501	250	59.75	68.67	0.15	2.36	2.09E-08	0.00E+00	2.32E-04	8.07E-09	2.53E-04	0.00E+00	1.78E-05	0.00E+00	3.70E-06	0.00	0.00	17	106	21	17	106	106	70
20	71	501	250	71.25	71.25	0.15	2.37	3.74E-06	0.00E+00	3.57E-06	0.00E+00	0.00E+00	0.00E+00	3.49E-06	0.00E+00	0.00E+00	0.00	0.12	13	109	108	108	109	108	71
21	72	501	250	185.21	185.21	0.17	0.19	5.14E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	72
22	73	501	250	53.31	53.31	0.17	0.19	6.56E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	73
23	74	501	250	222.39	224.53	1.99	2.42	1.46E-06	0.00E+00	5.94E-06	0.00E+00	1.44E-09	0.00E+00	8.04E-07	0.00E+00	0.00E+00	0.00	0.00	19	33	29	19	33	29	74
24	76	501	250	143.37	149.03	0.86	2.37	1.06E-04	0.00E+00	1.14E-10	0.00E+00	0.00E+00	0.00E+00	8.92E-15	0.00E+00	0.00E+00	0.00	0.00	13	16	16	14	15	14	76
25	78	501	250	313.9	313.9	1.96	2.42	3.25E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	78
26	81	501	250	239.6	243.86	0.39	0.87	2.65E-06	0.00E+00	3.54E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	13	16	15	-	-	-	81
27	82	501	250	222.59	232.77	0.17	2.37	1.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	82
28	83	501	250	247.3	247.48	0.19	0.21	3.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	83
29	92	501	250	60.33	65.21	0.15	0.21	2.13E-07	0.00E+00	8.71E-04	4.32E-05	1.54E-03	0.00E+00	1.15E-05	0.00E+00	6.43E-06	0.01	0.01	18	30	29	19	29	29	92
30	93	501	250	65.02	65.02	0.15	0.21	2.13E-07	0.00E+00	8.71E-04	4.32E-05	1.54E-03	0.00E+00	1.15E-05	0.00E+00	6.43E-06	0.01	0.01	18	30	29	19	29	29	93
31	94	501	250	54.14	54.14	0.21	0.21	4.10E-05	0.00E+00	2.14E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	12	17	14	-	-	-	94
32	97	501	250	74.65	74.65	0.26	2.39	3.74E-06	0.00E+00	1.77E-05	0.00E+00	5.64E-07	0.00E+00	1.77E-05	0.00E+00	5.07E-07	0.01	0.64	13	75	73	14	75	73	97
33	102	501	250	212.22	523.97	0.61	2.36	1.02E-04	0.00E+00	5.76E-05	0.00E+00	3.17E-05	0.00E+00	4.93E-06	0.00E+00	5.28E-07	0.36	3.05	8	16	12	8	16	12	102
34	103	501	250	191.46	228.68	0.7	0.7	1.07E-05	0.00E+00	4.14E-04	2.60E-06	6.98E-04	0.00E+00	7.41E-05	5.74E-08	9.20E-05	0.30	4.78	5	16	13	5	16	14	103
35	104	501	250	205.6	504.54	0.66	2.37	1.09E-04	0.00E+00	5.76E-05	0.00E+00	3.17E-05	0.00E+00	4.93E-06	0.00E+00	5.28E-07	0.36	2.67	8	16	12	8	16	12	104
36	105	501	250	222.36	222.51	1.89	2.43	1.07E-05	0.00E+00	5.76E-06	0.00E+00	1.20E-11	0.00E+00	8.38E-07	0.00E+00	0.00E+00	0.01	0.04	19	33	27	19	33	33	105
37	106	501	250	207.13	223.37	0.35	0.35	2.21E-06	0.00E+00	5.83E-05	0.00E+00	3.22E-05	0.00E+00	4.73E-06	0.00E+00	5.51E-07	0.01	0.08	8	15	12	8	15	12	106
38	107	501	250	191.28	220.29	0.73	0.73	4.31E-07	0.00E+00	3.48E-04	9.96E-07	4.93E-04	0.00E+00	8.51E-05	3.26E-08	1.04E-04	0.01	0.18	5	15	14	5	15	14	107
39	108	501	250	251.79	556.5	0.87	2.31	6.46E-04	0.00E+00	4.71E-07	0.00E+00	0.00E+00	0.00E+00	4.20E-09	0.00E+00	0.00E+00	0.01	0.02	11	17	16	13	17	17	108
40	109	501	250	212.97	233.94	0.73	0.73	6.81E-05	0.00E+00	3.45E-06	0.00E+00	0.00E+00	0.00E+00	1.43E-07	0.00E+00	0.00E+00	0.02	0.03	8	20	15	9	20	15	109

41	110	501	250	231.26	542.22	1.41	2.36	6.91E-04	0.00E+00	4.71E-07	0.00E+00	0.00E+00	0.00E+00	4.20E-09	0.00E+00	0.00E+00	0.02	0.02	11	17	16	13	17	17	110
42	111	501	250	189.43	236.77	0.64	0.64	6.82E-05	0.00E+00	3.45E-06	0.00E+00	0.00E+00	0.00E+00	1.43E-07	0.00E+00	0.00E+00	0.02	0.07	8	20	15	9	20	15	111
43	112	501	250	245.43	246.64	0.35	0.35	1.41E-05	0.00E+00	3.84E-07	0.00E+00	0.00E+00	0.00E+00	4.82E-09	0.00E+00	0.00E+00	0.00	0.00	11	17	16	13	17	16	112
44	113	501	250	210.35	224.16	0.65	0.65	2.74E-06	0.00E+00	3.06E-06	0.00E+00	0.00E+00	0.00E+00	4.69E-08	0.00E+00	0.00E+00	0.00	0.00	9	21	20	9	21	21	113
45	114	501	250	87.46	129.26	0.16	0.19	9.76E-05	0.00E+00	6.70E-05	0.00E+00	3.47E-05	0.00E+00	7.25E-08	0.00E+00	0.00E+00	0.54	0.03	27	43	42	33	42	39	114
46	115	501	250	206.19	220.76	0.15	0.23	9.76E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	115
47	116	501	250	136.88	186.69	0.05	0.07	1.81E-05	0.00E+00	4.85E-05	0.00E+00	2.54E-05	0.00E+00	6.23E-08	0.00E+00	0.00E+00	0.07	0.01	20	29	28	26	28	28	116
48	117	501	250	145.6	192.97	0.06	0.09	2.11E-05	0.00E+00	1.36E-04	5.79E-09	1.42E-04	0.00E+00	9.46E-08	0.00E+00	0.00E+00	0.21	0.02	29	47	47	35	47	47	117
49	118	501	250	213.44	213.44	1.25	2.38	9.30E-06	0.00E+00	1.02E-06	0.00E+00	0.00E+00	0.00E+00	2.44E-08	0.00E+00	0.00E+00	0.00	0.00	12	20	18	13	20	18	118
50	119	15001	250	81.39	519.24	0.15	2.37	6.84E-07	0.00E+00	2.57E-05	0.00E+00	3.50E-06	0.00E+00	6.34E-08	0.00E+00	0.00E+00	0.00	0.00	30	41	39	33	41	38	119
51	120	15001	250	81.39	487.84	0.15	2.37	9.98E-07	0.00E+00	3.17E-05	0.00E+00	7.16E-06	0.00E+00	6.64E-06	0.00E+00	1.18E-07	0.00	0.04	30	120	39	31	120	116	120
52	121	15001	250	116.02	361.89	0.15	0.95	1.33E-07	0.00E+00	1.91E-04	0.00E+00	1.24E-04	0.00E+00	5.74E-07	0.00E+00	3.81E-08	0.00	0.00	17	31	30	17	31	30	121
53	122	15001	250	69.79	327.52	0.15	0.25	1.33E-07	0.00E+00	1.91E-04	0.00E+00	1.24E-04	0.00E+00	1.14E-07	0.00E+00	0.00E+00	0.00	0.00	17	31	30	19	30	21	122
54	123	15001	250	116.02	356.74	0.15	0.5	1.65E-07	0.00E+00	3.90E-04	2.18E-06	4.45E-04	0.00E+00	2.86E-04	1.45E-06	3.28E-04	0.00	0.28	17	62	62	17	62	62	123
55	124	15001	250	69.79	227.06	0.15	0.31	1.65E-07	0.00E+00	2.00E-04	0.00E+00	1.44E-04	0.00E+00	1.17E-05	0.00E+00	2.04E-06	0.00	0.01	17	111	30	17	111	111	124
56	125	15001	250	152.5	528.57	0.36	2.37	1.34E-04	0.00E+00	3.27E-07	0.00E+00	0.00E+00	0.00E+00	7.77E-11	0.00E+00	0.00E+00	0.00	0.00	68	74	74	71	74	74	125
57	126	15001	250	148.17	539.05	0.36	2.36	1.87E-04	0.00E+00	2.79E-06	0.00E+00	0.00E+00	0.00E+00	2.50E-06	0.00E+00	0.00E+00	0.04	3.10	68	130	128	69	130	128	126
58	127	15001	250	68.33	237.78	0.16	0.37	2.59E-05	0.00E+00	1.62E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	13	18	16	-	-	-	127
59	128	15001	250	110.01	296.52	0.22	0.63	2.59E-05	0.00E+00	1.62E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	13	18	16	-	-	-	128
60	129	15001	250	68.33	297.54	0.16	0.36	3.09E-05	0.00E+00	1.76E-06	0.00E+00	0.00E+00	0.00E+00	1.60E-06	0.00E+00	0.00E+00	0.00	0.16	13	119	119	118	119	119	129
61	130	15001	250	110.01	350.02	0.22	0.44	3.09E-05	0.00E+00	6.53E-06	0.00E+00	6.41E-10	0.00E+00	6.37E-06	0.00E+00	1.55E-10	0.01	1.02	13	73	72	15	73	72	130

**Table E4 - Transient report for Beaver Valley at 200 EFPY (61 base case transients)**

Plant Name:	EPFY:	WPS:	Ductile Tearing				Through-Wall Failure Criteria																			
Beaver Valley	200	on	on				0.900																			
Transient Count	Transient Sequence Number	# of Time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Freq	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number	
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles							(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)			
1	2	501	250	263.22	285.01	0.55	0.69	1.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	2	
2	3	501	250	99.97	146.9	0.2	0.22	9.76E-05	0.00E+00	5.79E-05	0.00E+00	2.51E-05	0.00E+00	3.57E-07	0.00E+00	0.00E+00	0.08	0.01	32	47	46	40	46	46	3	
3	7	501	250	64.5	155.26	0.03	0.05	2.11E-05	4.79E-03	4.66E-02	2.75E-02	1.44E-01	5.60E-06	1.52E-03	2.94E-04	2.98E-03	17.39	14.90	5	14	12	5	13	12	7	
4	9	501	250	64.55	154.66	0.02	0.02	6.99E-06	9.36E-03	7.44E-02	4.61E-02	2.29E-01	8.50E-06	2.66E-03	5.22E-04	5.52E-03	7.55	10.24	2	8	4	2	7	3	9	
5	14	501	250	70.89	75.15	0.18	0.21	2.22E-04	0.00E+00	2.93E-06	0.00E+00	0.00E+00	0.00E+00	3.80E-10	0.00E+00	0.00E+00	0.01	0.00	57	66	66	64	66	66	14	
6	31	501	250	58.19	58.19	0.17	0.2	3.10E-07	0.00E+00	1.72E-04	7.83E-10	1.61E-04	0.00E+00	1.39E-06	0.00E+00	7.99E-09	0.00	0.00	73	91	86	74	91	86	31	
7	34	501	250	57.91	128.22	0.13	0.19	4.95E-07	0.00E+00	1.53E-04	0.00E+00	1.38E-04	0.00E+00	1.03E-06	0.00E+00	0.00E+00	0.00	0.00	25	42	39	26	41	39	34	
8	56	501	250	59.53	127.66	0.06	0.15	1.23E-04	4.15E-03	4.46E-02	2.63E-02	1.37E-01	9.15E-07	9.82E-04	1.36E-04	1.91E-03	68.89	43.17	9	19	18	10	18	16	56	
9	59	501	250	313.68	416.65	0.57	2.36	3.46E-04	0.00E+00	1.97E-07	0.00E+00	0.00E+00	0.00E+00	1.61E-08	0.00E+00	0.00E+00	0.00	0.00	73	74	74	73	74	74	59	
10	60	501	250	133.91	368.63	0.38	2.37	2.15E-05	0.00E+00	4.24E-05	0.00E+00	1.04E-05	0.00E+00	4.20E-05	0.00E+00	1.04E-05	0.01	0.41	57	128	127	57	128	127	60	
11	61	501	250	183.16	398.39	0.43	2.38	1.79E-06	0.00E+00	7.15E-04	2.78E-05	1.09E-03	0.00E+00	4.14E-04	1.31E-05	6.87E-04	0.02	0.26	25	85	46	25	85	46	61	
12	62	501	250	65.95	348.65	0.19	2.38	1.08E-07	0.00E+00	1.57E-04	6.59E-12	1.48E-04	0.00E+00	7.76E-06	0.00E+00	2.63E-06	0.00	0.00	25	117	39	25	117	117	62	
13	64	501	250	52.23	123.57	0.15	0.19	8.67E-08	4.53E-08	1.80E-03	1.52E-04	3.20E-03	0.00E+00	2.43E-05	0.00E+00	1.57E-05	0.00	0.00	16	28	21	17	28	21	64	
14	65	501	250	129.54	177.72	0.14	0.17	1.04E-09	0.00E+00	3.64E-05	0.00E+00	1.04E-05	0.00E+00	2.98E-08	0.00E+00	0.00E+00	0.00	0.00	20	28	26	24	26	26	65	
15	66	501	250	72.14	72.97	0.19	0.21	1.18E-06	0.00E+00	7.05E-04	2.59E-05	1.07E-03	0.00E+00	1.83E-05	0.00E+00	1.13E-05	0.01	0.01	25	46	46	30	46	46	66	
16	67	501	250	70.31	119.17	0.14	0.21	1.18E-06	0.00E+00	1.38E-04	0.00E+00	1.14E-04	0.00E+00	5.39E-07	0.00E+00	0.00E+00	0.00	0.00	25	42	40	25	41	38	67	
17	68	501	250	162.57	285.88	0.13	2.37	1.33E-08	0.00E+00	5.94E-05	0.00E+00	4.25E-05	0.00E+00	1.51E-06	0.00E+00	4.68E-07	0.00	0.00	19	105	27	19	105	27	68	
18	69	501	250	72.07	72.07	0.12	2.37	2.09E-08	6.57E-05	5.68E-03	1.69E-03	2.00E-02	5.16E-05	4.72E-03	1.37E-03	1.71E-02	0.00	0.04	16	58	29	16	58	29	69	

19	70	501	250	59.75	68.67	0.15	2.36	2.09E-08	6.60E-08	1.82E-03	1.58E-04	3.25E-03	0.00E+00	1.25E-04	3.02E-06	1.91E-04	0.00	0.00	16	106	21	16	106	21	70
20	71	501	250	71.25	71.25	0.15	2.37	3.74E-06	0.00E+00	1.94E-05	0.00E+00	1.87E-06	0.00E+00	8.10E-06	0.00E+00	0.00E+00	0.00	0.02	10	109	108	11	109	108	71
21	72	501	250	185.21	185.21	0.17	0.19	5.14E-07	0.00E+00	1.19E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	24	24	24	-	-	-	72
22	73	501	250	53.31	53.31	0.17	0.19	6.56E-08	0.00E+00	4.64E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	19	21	21	-	-	-	73
23	74	501	250	222.39	224.53	1.99	2.42	1.46E-06	0.00E+00	1.47E-04	2.44E-09	1.65E-04	0.00E+00	3.66E-05	1.52E-11	3.95E-05	0.01	0.02	14	33	29	14	33	29	74
24	76	501	250	143.37	149.03	0.86	2.37	1.06E-04	0.00E+00	1.74E-06	0.00E+00	0.00E+00	0.00E+00	9.73E-08	0.00E+00	0.00E+00	0.00	0.00	4	16	15	4	16	15	76
25	78	501	250	313.9	313.9	1.96	2.42	3.25E-08	0.00E+00	7.79E-11	0.00E+00	0.00E+00	0.00E+00	9.99E-20	0.00E+00	0.00E+00	0.00	0.00	26	27	27	26	26	26	78
26	81	501	250	239.6	243.86	0.39	0.87	2.65E-06	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	1.24E-09	0.00E+00	0.00E+00	0.00	0.00	10	16	14	12	15	14	81
27	82	501	250	222.59	292.77	0.17	2.37	1.51E-06	0.00E+00	2.40E-09	0.00E+00	0.00E+00	0.00E+00	2.30E-09	0.00E+00	0.00E+00	0.00	0.00	24	125	125	24	125	125	82
28	83	501	250	247.3	247.48	0.19	0.21	3.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	83
29	92	501	250	60.33	65.21	0.15	0.21	2.13E-07	2.43E-05	4.82E-03	1.26E-03	8.45E-03	0.00E+00	1.21E-04	6.59E-07	1.92E-04	0.01	0.01	16	30	29	17	30	29	92
30	93	501	250	65.02	65.02	0.15	0.21	2.13E-07	2.43E-05	4.82E-03	1.26E-03	8.45E-03	0.00E+00	1.21E-04	6.59E-07	1.92E-04	0.01	0.01	16	30	29	17	30	29	93
31	94	501	250	54.14	54.14	0.21	0.21	4.10E-05	0.00E+00	7.76E-06	0.00E+00	5.74E-08	0.00E+00	4.73E-08	0.00E+00	0.00E+00	0.00	0.00	10	18	14	11	15	14	94
32	97	501	250	74.65	74.65	0.26	2.39	3.74E-06	0.00E+00	6.03E-05	0.00E+00	2.64E-05	0.00E+00	5.27E-05	0.00E+00	1.54E-05	0.01	0.13	10	75	73	11	75	73	97
33	102	501	250	212.22	523.97	0.61	2.36	1.02E-04	0.00E+00	1.22E-03	8.59E-05	2.34E-03	0.00E+00	2.36E-04	8.13E-06	4.26E-04	1.62	10.45	7	16	12	7	16	12	102
34	103	501	250	191.46	228.68	0.7	0.7	1.07E-05	4.00E-05	4.68E-03	1.28E-03	8.55E-03	5.29E-06	1.29E-03	2.68E-04	2.52E-03	0.63	5.17	4	16	13	4	16	13	103
35	104	501	250	205.6	504.54	0.66	2.37	1.09E-04	0.00E+00	1.22E-03	8.59E-05	2.34E-03	0.00E+00	2.36E-04	8.13E-06	4.26E-04	1.72	10.24	7	16	12	7	16	12	104
36	105	501	250	222.36	222.51	1.89	2.43	1.07E-05	0.00E+00	1.45E-04	8.22E-10	1.56E-04	0.00E+00	3.63E-05	1.31E-12	3.37E-05	0.02	0.14	14	33	27	14	33	27	105
37	106	501	250	207.13	223.37	0.35	0.35	2.21E-06	0.00E+00	1.23E-03	8.70E-05	2.39E-03	0.00E+00	2.35E-04	7.94E-06	4.30E-04	0.04	0.21	7	16	12	7	16	12	106
38	107	501	250	191.28	220.29	0.73	0.73	4.31E-07	2.36E-05	3.95E-03	1.01E-03	7.09E-03	4.25E-06	1.35E-03	2.74E-04	2.55E-03	0.02	0.22	4	16	14	4	16	14	107
39	108	501	250	251.79	556.5	0.87	2.31	6.46E-04	0.00E+00	3.64E-05	0.00E+00	1.67E-05	0.00E+00	3.65E-06	0.00E+00	6.20E-07	0.20	0.64	8	18	16	8	18	15	108
40	109	501	250	212.97	233.94	0.73	0.73	6.81E-05	0.00E+00	1.40E-04	0.00E+00	1.72E-04	0.00E+00	2.04E-05	0.00E+00	1.63E-05	0.12	0.43	6	20	14	6	20	15	109

41	110	501	250	231.26	542.22	1.41	2.36	6.91E-04	0.00E+00	3.64E-05	0.00E+00	1.67E-05	0.00E+00	3.65E-06	0.00E+00	6.20E-07	0.32	1.43	8	18	16	8	18	15	110
42	111	501	250	189.43	236.77	0.64	0.64	6.82E-05	0.00E+00	1.40E-04	0.00E+00	1.72E-04	0.00E+00	2.04E-05	0.00E+00	1.63E-05	0.11	0.51	6	20	14	6	20	15	111
43	112	501	250	245.43	246.64	0.35	0.35	1.41E-05	0.00E+00	3.55E-05	0.00E+00	1.69E-05	0.00E+00	3.76E-06	0.00E+00	6.49E-07	0.01	0.02	8	19	16	8	19	16	112
44	113	501	250	210.35	224.16	0.65	0.65	2.74E-06	0.00E+00	1.00E-04	0.00E+00	9.15E-05	0.00E+00	1.17E-05	0.00E+00	6.05E-06	0.00	0.01	6	21	12	6	21	12	113
45	114	501	250	87.46	129.26	0.16	0.19	9.76E-05	0.00E+00	4.57E-04	5.17E-06	6.02E-04	0.00E+00	2.45E-06	0.00E+00	1.27E-07	0.70	0.08	22	43	42	25	43	39	114
46	115	501	250	206.19	220.76	0.15	0.23	9.76E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	115
47	116	501	250	136.88	186.69	0.05	0.07	1.81E-05	0.00E+00	4.33E-04	4.04E-06	6.34E-04	0.00E+00	2.16E-06	0.00E+00	8.68E-09	0.14	0.01	12	29	28	21	28	28	116
48	117	501	250	145.6	192.97	0.06	0.09	2.11E-05	0.00E+00	6.45E-04	2.58E-05	9.96E-04	0.00E+00	1.14E-06	0.00E+00	1.18E-07	0.20	0.02	17	47	47	30	47	47	117
49	118	501	250	213.44	213.44	1.25	2.38	9.30E-06	0.00E+00	5.40E-05	0.00E+00	3.67E-05	0.00E+00	6.94E-06	0.00E+00	2.66E-06	0.01	0.02	9	20	18	9	20	18	118
50	119	15001	250	81.39	519.24	0.15	2.37	6.84E-07	0.00E+00	2.51E-04	1.37E-07	2.85E-04	0.00E+00	2.81E-06	0.00E+00	8.67E-07	0.00	0.00	25	41	39	25	41	38	119
51	120	15001	250	81.39	487.84	0.15	2.37	9.98E-07	0.00E+00	2.63E-04	2.30E-07	3.07E-04	0.00E+00	2.69E-05	1.17E-09	2.21E-05	0.00	0.01	25	120	39	25	120	116	120
52	121	15001	250	116.02	361.89	0.15	0.95	1.33E-07	0.00E+00	1.26E-03	5.89E-05	1.92E-03	0.00E+00	2.89E-05	5.73E-08	4.13E-05	0.00	0.00	16	31	30	16	31	30	121
53	122	15001	250	69.79	327.52	0.15	0.25	1.33E-07	0.00E+00	1.26E-03	5.89E-05	1.92E-03	0.00E+00	5.81E-06	0.00E+00	1.05E-06	0.00	0.00	16	31	30	16	30	21	122
54	123	15001	250	116.02	356.74	0.15	0.5	1.65E-07	4.39E-07	1.81E-03	1.61E-04	2.90E-03	2.85E-07	1.38E-03	1.12E-04	2.27E-03	0.00	0.09	16	63	30	16	63	30	123
55	124	15001	250	69.79	227.06	0.15	0.31	1.65E-07	0.00E+00	1.27E-03	6.13E-05	1.96E-03	0.00E+00	1.06E-04	1.34E-06	1.51E-04	0.00	0.01	16	111	30	16	111	30	124
56	125	15001	250	152.5	528.57	0.36	2.37	1.34E-04	0.00E+00	4.87E-06	0.00E+00	0.00E+00	0.00E+00	1.16E-08	0.00E+00	0.00E+00	0.01	0.00	66	74	74	68	74	74	125
57	126	15001	250	148.17	539.05	0.36	2.36	1.87E-04	0.00E+00	1.40E-05	0.00E+00	2.97E-07	0.00E+00	1.04E-05	0.00E+00	2.13E-07	0.04	0.77	63	132	128	66	132	128	126
58	127	15001	250	68.33	237.78	0.16	0.37	2.59E-05	0.00E+00	1.75E-05	0.00E+00	1.99E-06	0.00E+00	1.18E-07	0.00E+00	0.00E+00	0.00	0.00	11	19	15	12	17	15	127
59	128	15001	250	110.01	296.52	0.22	0.63	2.59E-05	0.00E+00	1.75E-05	0.00E+00	1.99E-06	0.00E+00	1.18E-07	0.00E+00	0.00E+00	0.01	0.00	11	19	15	12	17	15	128
60	129	15001	250	68.33	297.54	0.16	0.36	3.09E-05	0.00E+00	2.08E-05	0.00E+00	2.92E-06	0.00E+00	3.46E-06	0.00E+00	0.00E+00	0.01	0.03	11	119	15	11	119	119	129
61	130	15001	250	110.01	350.02	0.22	0.44	3.09E-05	0.00E+00	3.69E-05	0.00E+00	1.64E-05	0.00E+00	1.99E-05	0.00E+00	2.71E-06	0.02	0.24	11	73	72	11	73	72	130

**Table E5 - Transient report for Oconee at 32 EFPY (55 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing	Through-Wall Failure Criteria																						
Oconee	32	on	on	0.900																						
FAVOR Transient Number	Transient Sequence Number	# of time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Frequency	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number	
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles										(%)	(%)	(min)	(min)	(min)	(min)		(min)
1	8	10001	166	334.80	335.00	1.198	1.897	9.68E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	8	
2	12	10001	166	367.50	367.80	0.386	0.387	9.24E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	12	
3	15	10001	166	211.00	212.90	0.141	0.155	3.39E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	15	
4	27	10001	166	220.20	221.10	0.225	0.225	2.13E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	27	
5	28	10001	166	361.20	361.60	1.670	2.515	7.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	28	
6	29	10001	166	315.20	316.20	1.268	2.523	3.09E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	29	
7	30	10001	166	306.00	306.00	1.673	2.518	1.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	30	
8	31	10001	166	268.50	268.50	1.611	2.522	8.36E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	31	
9	36	10001	166	337.60	338.30	1.185	1.186	1.40E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	36	
10	37	10001	166	345.50	345.50	1.428	1.428	1.41E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	37	
11	38	10001	166	296.70	296.70	1.411	1.411	2.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	38	
12	44	10001	166	210.90	211.20	0.175	1.879	2.69E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	44	
13	89	10001	166	292.40	292.40	0.875	0.998	5.38E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	89	
14	90	10001	166	347.90	347.90	0.883	0.885	6.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	90	
15	98	10001	166	258.80	258.80	1.327	1.332	9.96E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	98	
16	99	10001	166	220.50	223.10	0.434	0.454	2.44E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	99	
17	100	10001	166	217.70	220.50	1.277	1.315	5.11E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	100	
18	101	10001	166	217.60	221.30	0.253	0.289	3.86E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	101	

19	102	10001	166	308.80	308.80	1.236	1.236	2.03E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	102
20	109	10001	166	172.30	396.90	0.319	2.457	9.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	109
21	110	10001	166	135.60	206.00	0.136	0.211	3.42E-06	0.00E+00	7.19E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.93E-13	0.00E+00	0.00E+00	0.18	0.00	30	31	30	30	30	30	110
22	111	10001	166	243.40	254.90	0.233	0.282	4.16E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	111
23	112	10001	166	172.30	521.60	0.319	2.439	1.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	112
24	113	10001	166	172.30	500.20	0.319	2.437	5.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	113
25	114	10001	166	321.30	545.10	0.527	2.469	1.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	114
26	115	10001	166	321.30	492.80	0.527	2.295	5.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	115
27	116	10001	166	181.50	183.20	0.174	0.210	2.60E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	116
28	117	10001	166	199.40	253.50	0.158	0.288	5.38E-07	0.00E+00	2.12E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	28	28	28	-	-	-	117
29	119	10001	166	179.50	204.20	0.136	0.217	4.41E-07	0.00E+00	2.83E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	54	55	55	-	-	-	119
30	120	10001	166	95.70	95.70	0.200	1.849	4.22E-08	0.00E+00	1.69E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-12	0.00E+00	0.00E+00	0.00	0.00	65	65	65	65	65	65	120
31	121	10001	166	92.80	178.90	0.213	0.409	2.28E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	121
32	122	10001	166	92.80	173.00	0.213	0.361	7.57E-06	0.00E+00	3.01E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.01E-06	0.00E+00	0.00E+00	13.72	76.82	120	121	121	120	121	121	122
33	123	10001	166	187.70	349.00	0.408	0.681	2.28E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	123
34	124	10001	166	187.70	341.50	0.412	0.664	7.57E-06	0.00E+00	3.61E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-08	0.00E+00	0.00E+00	0.09	0.49	69	69	69	69	69	69	124
35	125	10001	166	77.10	77.10	0.125	0.219	4.61E-08	0.00E+00	1.44E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	43	43	43	-	-	-	125
36	126	10001	166	227.60	227.60	0.181	0.250	8.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	126
37	127	10001	166	377.20	447.00	0.757	0.820	1.25E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	127
38	141	10001	166	73.40	73.40	0.192	0.208	1.06E-04	0.00E+00	2.00E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-13	0.00E+00	0.00E+00	0.64	0.00	65	71	71	68	68	68	141
39	142	10001	166	140.00	140.00	0.203	0.218	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	142
40	145	10001	166	386.30	387.10	0.448	0.448	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	145

41	146	10001	166	105.20	105.20	0.425	0.425	4.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	146
42	147	10001	166	180.80	180.80	0.251	0.251	3.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	147
43	148	10001	166	196.50	196.50	0.428	0.430	4.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	148
44	149	10001	166	321.30	481.70	0.527	2.457	9.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	149
45	154	10001	166	83.70	124.10	0.173	0.207	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	154
46	156	10001	166	76.40	117.60	0.024	0.026	7.03E-06	0.00E+00	1.63E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-10	0.00E+00	0.00E+00	6.78	0.01	4	8	5	5	6	5	156
47	160	10001	166	78.30	123.20	0.117	0.157	1.82E-05	0.00E+00	2.77E-06	0.00E+00	0.00E+00	0.00E+00	1.36E-09	0.00E+00	0.00E+00	33.34	0.07	25	30	29	27	29	29	160	
48	164	10001	166	74.30	118.30	0.077	0.096	2.12E-05	0.00E+00	1.20E-06	0.00E+00	0.00E+00	0.00E+00	7.78E-11	0.00E+00	0.00E+00	41.19	0.06	14	17	16	15	16	16	164	
49	165	10001	166	90.90	133.10	0.222	2.458	1.76E-06	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	2.75E-06	0.00E+00	0.00E+00	4.01	22.44	120	120	120	120	120	120	165	
50	168	10001	166	183.60	211.60	0.420	2.456	1.76E-06	0.00E+00	5.48E-08	0.00E+00	0.00E+00	0.00E+00	5.45E-08	0.00E+00	0.00E+00	0.02	0.11	68	68	68	68	68	68	168	
51	169	10001	166	105.90	105.90	0.412	0.412	7.33E-06	0.00E+00	1.90E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	31	35	33	-	-	-	169	
52	170	10001	166	91.50	91.50	0.210	0.217	6.28E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	170	
53	171	10001	166	314.70	314.70	0.488	0.488	7.33E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	45	45	45	-	-	-	171	
54	172	10001	166	166.50	166.50	0.161	0.192	1.06E-04	0.00E+00	4.90E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.03	0.00	-	-	-	-	-	-	172	
55	178	10001	166	83.70	124.10	0.173	0.207	2.12E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	178	



**Table E6 - Transient report for Oconee at 60 EFPY (55 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing				Through-Wall Failure Criteria																		
Oconee	60	on	on				0.900																		
FAVOR Transient Number	Transient Sequence Number	# of time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Frequency	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles									(%)	(%)	(min)	(min)	(min)	(min)	(min)	
1	8	10001	166	334.80	335.00	1.198	1.897	9.68E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	8
2	12	10001	166	367.50	367.80	0.386	0.387	9.24E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	12
3	15	10001	166	211.00	212.90	0.141	0.155	3.39E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	15
4	27	10001	166	220.20	221.10	0.225	0.225	2.13E-06	0.00E+00	3.05E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	57	57	57	-	-	-	27
5	28	10001	166	361.20	361.60	1.670	2.515	7.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	28
6	29	10001	166	315.20	316.20	1.268	2.523	3.09E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	29
7	30	10001	166	306.00	306.00	1.673	2.518	1.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	30
8	31	10001	166	268.50	268.50	1.611	2.522	8.36E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	31
9	36	10001	166	337.60	338.30	1.185	1.186	1.40E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	36
10	37	10001	166	345.50	345.50	1.428	1.428	1.41E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	37
11	38	10001	166	296.70	296.70	1.411	1.411	2.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	38
12	44	10001	166	210.90	211.20	0.175	1.879	2.69E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	44
13	89	10001	166	292.40	292.40	0.875	0.998	5.38E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	89
14	90	10001	166	347.90	347.90	0.883	0.885	6.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	90
15	98	10001	166	258.80	258.80	1.327	1.332	9.96E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	98
16	99	10001	166	220.50	223.10	0.434	0.454	2.44E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	99
17	100	10001	166	217.70	220.50	1.277	1.315	5.11E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	100
18	101	10001	166	217.60	221.30	0.253	0.289	3.86E-07	0.00E+00	1.51E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	37	38	38	-	-	-	101

19	102	10001	166	308.80	308.80	1.236	1.236	2.03E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	102
20	109	10001	166	172.30	396.90	0.319	2.457	9.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	109
21	110	10001	166	135.60	206.00	0.136	0.211	3.42E-06	0.00E+00	1.02E-06	0.00E+00	0.00E+00	0.00E+00	6.88E-10	0.00E+00	0.00E+00	0.46	0.00	24	31	30	30	31	30	110	
22	111	10001	166	243.40	254.90	0.233	0.282	4.16E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	111	
23	112	10001	166	172.30	521.60	0.319	2.439	1.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	112	
24	113	10001	166	172.30	500.20	0.319	2.437	5.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	113	
25	114	10001	166	321.30	545.10	0.527	2.469	1.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	114	
26	115	10001	166	321.30	492.80	0.527	2.295	5.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	115	
27	116	10001	166	181.50	183.20	0.174	0.210	2.60E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	116	
28	117	10001	166	199.40	253.50	0.158	0.288	5.38E-07	0.00E+00	7.19E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	28	28	28	-	-	-	117	
29	119	10001	166	179.50	204.20	0.136	0.217	4.41E-07	0.00E+00	1.36E-08	0.00E+00	0.00E+00	0.00E+00	4.42E-14	0.00E+00	0.00E+00	0.00	0.00	54	55	55	55	55	55	119	
30	120	10001	166	95.70	95.70	0.200	1.849	4.22E-08	0.00E+00	7.80E-09	0.00E+00	0.00E+00	0.00E+00	7.03E-09	0.00E+00	0.00E+00	0.00	0.00	60	70	65	60	70	65	120	
31	121	10001	166	92.80	178.90	0.213	0.409	2.28E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	121	
32	122	10001	166	92.80	173.00	0.213	0.361	7.57E-06	0.00E+00	7.23E-06	0.00E+00	0.00E+00	0.00E+00	7.23E-06	0.00E+00	0.00E+00	4.72	74.53	120	122	121	120	121	121	122	
33	123	10001	166	187.70	349.00	0.408	0.681	2.28E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	123	
34	124	10001	166	187.70	341.50	0.412	0.664	7.57E-06	0.00E+00	2.81E-07	0.00E+00	0.00E+00	0.00E+00	2.80E-07	0.00E+00	0.00E+00	0.19	2.97	69	69	69	69	69	69	124	
35	125	10001	166	77.10	77.10	0.125	0.219	4.61E-08	0.00E+00	4.89E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	43	43	43	-	-	-	125	
36	126	10001	166	227.60	227.60	0.181	0.250	8.41E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	126	
37	127	10001	166	377.20	447.00	0.757	0.820	1.25E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	127	
38	141	10001	166	73.40	73.40	0.192	0.208	1.06E-04	0.00E+00	2.05E-07	0.00E+00	0.00E+00	0.00E+00	7.57E-10	0.00E+00	0.00E+00	1.40	0.06	63	71	71	66	68	68	141	
39	142	10001	166	140.00	140.00	0.203	0.218	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	142	
40	145	10001	166	386.30	387.10	0.448	0.448	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	145	

41	146	10001	166	105.20	105.20	0.425	0.425	4.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	-	146
42	147	10001	166	180.80	180.80	0.251	0.251	3.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	-	147
43	148	10001	166	196.50	196.50	0.428	0.430	4.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	-	148
44	149	10001	166	321.30	481.70	0.527	2.457	9.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	-	149
45	154	10001	166	83.70	124.10	0.173	0.207	1.34E-04	0.00E+00	1.56E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	23	30	30	-	-	-	-	154
46	156	10001	166	76.40	117.60	0.024	0.026	7.03E-06	0.00E+00	1.74E-05	0.00E+00	7.63E-10	0.00E+00	6.82E-09	0.00E+00	0.00E+00	13.17	0.09	3	8	5	4	6	5	5	156
47	160	10001	166	78.30	123.20	0.117	0.157	1.82E-05	0.00E+00	1.97E-05	0.00E+00	5.02E-07	0.00E+00	4.01E-08	0.00E+00	0.00E+00	39.81	0.58	24	30	29	26	30	29	160	
48	164	10001	166	74.30	118.30	0.077	0.096	2.12E-05	0.00E+00	1.09E-05	0.00E+00	0.00E+00	0.00E+00	9.05E-09	0.00E+00	0.00E+00	38.85	1.17	13	17	16	15	16	16	164	
49	165	10001	166	90.90	133.10	0.222	2.458	1.76E-06	0.00E+00	6.55E-06	0.00E+00	0.00E+00	0.00E+00	6.55E-06	0.00E+00	0.00E+00	1.28	20.25	120	129	120	120	129	120	165	
50	168	10001	166	183.60	211.60	0.420	2.456	1.76E-06	0.00E+00	3.75E-07	0.00E+00	0.00E+00	0.00E+00	3.73E-07	0.00E+00	0.00E+00	0.02	0.36	68	68	68	68	68	68	168	
51	169	10001	166	105.90	105.90	0.412	0.412	7.33E-06	0.00E+00	2.65E-08	0.00E+00	0.00E+00	0.00E+00	3.12E-11	0.00E+00	0.00E+00	0.02	0.00	28	36	34	33	34	34	169	
52	170	10001	166	91.50	91.50	0.210	0.217	6.28E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	170	
53	171	10001	166	314.70	314.70	0.488	0.488	7.33E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	171	
54	172	10001	166	166.50	166.50	0.161	0.182	1.06E-04	0.00E+00	8.71E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.07	0.00	45	45	45	-	-	-	172	
55	178	10001	166	83.70	124.10	0.173	0.207	2.12E-05	0.00E+00	1.56E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	23	30	30	-	-	-	178	

**Table E7 - Transient report for Oconee at 500 EFPY (55 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing	Through-Wall Failure Criteria																					
Oconee	500	on	on	0.900																					
FAVOR Transient Number	Transient Sequence Number	# of time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Frequency	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles							(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)		
1	8	10001	166	334.80	335.00	1.198	1.897	9.68E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	8
2	12	10001	166	367.50	367.80	0.386	0.387	9.24E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	12
3	15	10001	166	211.00	212.90	0.141	0.155	3.39E-08	0.00E+00	1.74E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	69	69	69	-	-	-	15
4	27	10001	166	220.20	221.10	0.225	0.225	2.13E-06	0.00E+00	2.80E-07	0.00E+00	0.00E+00	0.00E+00	5.16E-09	0.00E+00	0.00E+00	0.00	0.00	52	60	57	54	57	57	27
5	28	10001	166	361.20	361.60	1.670	2.515	7.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	28
6	29	10001	166	315.20	316.20	1.268	2.523	3.09E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	29
7	30	10001	166	306.00	306.00	1.673	2.518	1.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	30
8	31	10001	166	268.50	268.50	1.611	2.522	8.36E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	31
9	36	10001	166	337.60	338.30	1.185	1.186	1.40E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	36
10	37	10001	166	345.50	345.50	1.428	1.428	1.41E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	37
11	38	10001	166	296.70	296.70	1.411	1.411	2.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	38
12	44	10001	166	210.90	211.20	0.175	1.879	2.69E-07	0.00E+00	4.41E-07	0.00E+00	0.00E+00	0.00E+00	4.27E-07	0.00E+00	0.00E+00	0.00	0.00	67	94	90	86	94	90	44
13	89	10001	166	292.40	292.40	0.875	0.998	5.38E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	89
14	90	10001	166	347.90	347.90	0.883	0.885	6.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	90
15	98	10001	166	258.80	258.80	1.327	1.332	9.96E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	98
16	99	10001	166	220.50	223.10	0.434	0.454	2.44E-07	0.00E+00	1.19E-07	0.00E+00	0.00E+00	0.00E+00	2.06E-09	0.00E+00	0.00E+00	0.00	0.00	51	62	61	52	54	54	99
17	100	10001	166	217.70	220.50	1.277	1.315	5.11E-08	0.00E+00	7.81E-08	0.00E+00	0.00E+00	0.00E+00	4.08E-08	0.00E+00	0.00E+00	0.00	0.00	19	24	23	19	23	23	100
18	101	10001	166	217.60	221.30	0.253	0.289	3.86E-07	0.00E+00	1.05E-06	0.00E+00	0.00E+00	0.00E+00	1.06E-09	0.00E+00	0.00E+00	0.00	0.00	26	38	38	27	29	29	101

19	102	10001	166	308.80	308.80	1.236	1.236	2.03E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	102
20	109	10001	166	172.30	396.90	0.319	2.457	9.58E-06	0.00E+00	1.31E-09	0.00E+00	0.00E+00	0.00E+00	1.30E-09	0.00E+00	0.00E+00	0.00	0.00	119	119	119	119	119	119	109
21	110	10001	166	135.60	206.00	0.136	0.211	3.42E-06	0.00E+00	2.62E-04	2.11E-07	4.19E-04	0.00E+00	2.16E-06	0.00E+00	0.00E+00	1.18	0.64	24	31	30	24	31	30	110
22	111	10001	166	243.40	254.90	0.233	0.282	4.16E-07	0.00E+00	1.01E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	74	75	74	-	-	-	111
23	112	10001	166	172.30	521.60	0.319	2.439	1.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	112
24	113	10001	166	172.30	500.20	0.319	2.437	5.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	113
25	114	10001	166	321.30	545.10	0.527	2.469	1.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	114
26	115	10001	166	321.30	492.80	0.527	2.295	5.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	115
27	116	10001	166	181.50	183.20	0.174	0.210	2.60E-07	0.00E+00	1.40E-07	0.00E+00	0.00E+00	0.00E+00	1.15E-10	0.00E+00	0.00E+00	0.00	0.00	26	27	27	26	27	27	116
28	117	10001	166	199.40	253.50	0.158	0.288	5.38E-07	0.00E+00	4.21E-06	0.00E+00	0.00E+00	0.00E+00	8.73E-09	0.00E+00	0.00E+00	0.00	0.00	26	28	28	26	28	28	117
29	119	10001	166	179.50	204.20	0.136	0.217	4.41E-07	0.00E+00	8.48E-06	0.00E+00	7.35E-08	0.00E+00	1.81E-07	0.00E+00	0.00E+00	0.00	0.00	53	56	55	53	56	55	119
30	120	10001	166	95.70	95.70	0.200	1.849	4.22E-08	0.00E+00	2.69E-06	0.00E+00	0.00E+00	0.00E+00	2.51E-06	0.00E+00	0.00E+00	0.00	0.01	44	70	63	44	70	63	120
31	121	10001	166	92.80	178.90	0.213	0.409	2.28E-05	0.00E+00	6.54E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	26	27	27	-	-	-	121
32	122	10001	166	92.80	173.00	0.213	0.361	7.57E-06	0.00E+00	4.68E-05	0.00E+00	3.41E-07	0.00E+00	4.68E-05	0.00E+00	3.41E-07	0.35	26.87	27	122	121	120	122	121	122
33	123	10001	166	187.70	349.00	0.408	0.681	2.28E-05	0.00E+00	6.54E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	26	27	27	-	-	-	123
34	124	10001	166	187.70	341.50	0.412	0.664	7.57E-06	0.00E+00	1.48E-05	0.00E+00	2.85E-08	0.00E+00	1.48E-05	0.00E+00	2.85E-08	0.16	12.78	27	69	69	27	69	69	124
35	125	10001	166	77.10	77.10	0.125	0.219	4.61E-08	0.00E+00	6.24E-06	0.00E+00	2.55E-09	0.00E+00	7.42E-08	0.00E+00	0.00E+00	0.00	0.00	38	43	43	41	43	43	125
36	126	10001	166	227.60	227.60	0.181	0.250	8.41E-08	0.00E+00	5.26E-08	0.00E+00	0.00E+00	0.00E+00	7.67E-11	0.00E+00	0.00E+00	0.00	0.00	38	39	39	39	39	39	126
37	127	10001	166	377.20	447.00	0.757	0.820	1.25E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	127
38	141	10001	166	73.40	73.40	0.192	0.208	1.06E-04	0.00E+00	1.54E-05	0.00E+00	1.20E-07	0.00E+00	3.77E-07	0.00E+00	0.00E+00	1.71	1.92	57	71	67	60	71	68	141
39	142	10001	166	140.00	140.00	0.203	0.218	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	142
40	145	10001	166	386.30	387.10	0.448	0.448	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	145

41	146	10001	166	105.20	105.20	0.425	0.425	4.23E-05	0.00E+00	9.28E-08	0.00E+00	0.00E+00	0.00E+00	7.44E-09	0.00E+00	0.00E+00	0.00	0.01	30	35	32	31	33	32	146
42	147	10001	166	180.80	180.80	0.251	0.251	3.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	147
43	148	10001	166	196.50	196.50	0.428	0.430	4.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	148
44	149	10001	166	321.30	481.70	0.527	2.457	9.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	149
45	154	10001	166	83.70	124.10	0.173	0.207	1.34E-04	0.00E+00	1.18E-06	0.00E+00	0.00E+00	0.00E+00	1.44E-08	0.00E+00	0.00E+00	0.15	0.10	20	30	30	20	25	24	154
46	156	10001	166	76.40	117.60	0.024	0.026	7.03E-06	7.06E-08	2.81E-03	3.77E-04	6.16E-03	0.00E+00	6.21E-06	0.00E+00	3.04E-07	26.92	4.60	3	11	5	3	9	5	156
47	160	10001	166	78.30	123.20	0.117	0.157	1.82E-05	3.06E-08	1.32E-03	1.64E-04	2.39E-03	0.00E+00	1.33E-05	0.00E+00	9.67E-07	32.40	24.60	23	31	28	24	30	29	160
48	164	10001	166	74.30	118.30	0.077	0.096	2.12E-05	0.00E+00	1.29E-03	8.87E-05	2.39E-03	0.00E+00	6.85E-06	0.00E+00	7.35E-08	36.05	17.10	12	19	16	13	17	15	164
49	165	10001	166	90.90	133.10	0.222	2.458	1.76E-06	0.00E+00	4.24E-05	0.00E+00	1.31E-07	0.00E+00	4.24E-05	0.00E+00	1.30E-07	0.10	7.79	26	129	120	120	129	120	165
50	168	10001	166	183.60	211.60	0.420	2.456	1.76E-06	0.00E+00	1.78E-05	0.00E+00	1.55E-07	0.00E+00	1.78E-05	0.00E+00	1.52E-07	0.03	2.38	26	68	68	26	68	68	168
51	169	10001	166	105.90	105.90	0.412	0.412	7.33E-06	0.00E+00	1.47E-05	0.00E+00	2.47E-07	0.00E+00	7.13E-07	0.00E+00	0.00E+00	0.11	0.64	25	36	34	26	34	33	169
52	170	10001	166	91.50	91.50	0.210	0.217	6.28E-06	0.00E+00	6.68E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	27	27	27	-	-	-	170
53	171	10001	166	314.70	314.70	0.488	0.488	7.33E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	171
54	172	10001	166	166.50	166.50	0.161	0.192	1.06E-04	0.00E+00	6.86E-06	0.00E+00	2.87E-08	0.00E+00	9.55E-08	0.00E+00	0.00E+00	0.80	0.51	41	46	45	42	46	45	172
55	178	10001	166	83.70	124.10	0.173	0.207	2.12E-05	0.00E+00	1.18E-06	0.00E+00	0.00E+00	0.00E+00	1.44E-08	0.00E+00	0.00E+00	0.04	0.03	20	30	30	20	25	24	178

**Table E8 - Transient report for Oconee at 1000 EFPY (55 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing				Through-Wall Failure Criteria																		
Oconee	1000	on	on				0.900																		
FAVOR Transient Number	Transient Sequence Number	# of time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Frequency	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles						(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)			
1	8	10001	166	334.80	335.00	1.198	1.897	9.68E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	8
2	12	10001	166	367.50	367.80	0.386	0.387	9.24E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	12
3	15	10001	166	211.00	212.90	0.141	0.155	3.39E-08	0.00E+00	5.79E-07	0.00E+00	0.00E+00	0.00E+00	1.33E-09	0.00E+00	0.00E+00	0.00	0.00	68	70	69	69	69	69	15
4	27	10001	166	220.20	221.10	0.225	0.225	2.13E-06	0.00E+00	5.11E-06	0.00E+00	0.00E+00	0.00E+00	3.70E-07	0.00E+00	0.00E+00	0.00	0.01	49	60	57	50	57	56	27
5	28	10001	166	361.20	361.60	1.670	2.515	7.53E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	28
6	29	10001	166	315.20	316.20	1.268	2.523	3.09E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	29
7	30	10001	166	306.00	306.00	1.673	2.518	1.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	30
8	31	10001	166	268.50	268.50	1.611	2.522	8.36E-09	0.00E+00	6.19E-11	0.00E+00	0.00E+00	0.00E+00	6.19E-11	0.00E+00	0.00E+00	0.00	0.00	20	21	21	20	21	21	31
9	36	10001	166	337.60	338.30	1.185	1.186	1.40E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	36
10	37	10001	166	345.50	345.50	1.428	1.428	1.41E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	37
11	38	10001	166	296.70	296.70	1.411	1.411	2.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	38
12	44	10001	166	210.90	211.20	0.175	1.879	2.69E-07	0.00E+00	6.48E-06	0.00E+00	0.00E+00	0.00E+00	6.18E-06	0.00E+00	0.00E+00	0.00	0.01	67	94	90	67	94	90	44
13	89	10001	166	292.40	292.40	0.875	0.998	5.38E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	89
14	90	10001	166	347.90	347.90	0.883	0.885	6.29E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	90
15	98	10001	166	258.80	258.80	1.327	1.332	9.96E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	98
16	99	10001	166	220.50	223.10	0.434	0.454	2.44E-07	0.00E+00	2.08E-06	0.00E+00	0.00E+00	0.00E+00	4.26E-07	0.00E+00	0.00E+00	0.00	0.00	47	62	54	48	54	54	99
17	100	10001	166	217.70	220.50	1.277	1.315	5.11E-08	0.00E+00	6.06E-06	0.00E+00	0.00E+00	0.00E+00	3.47E-06	0.00E+00	0.00E+00	0.00	0.00	17	24	23	17	23	23	100
18	101	10001	166	217.60	221.30	0.253	0.289	3.86E-07	0.00E+00	7.58E-06	0.00E+00	0.00E+00	0.00E+00	2.02E-07	0.00E+00	0.00E+00	0.00	0.00	23	38	29	25	32	29	101

19	102	10001	166	308.80	308.80	1.236	1.236	2.03E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	-	102
20	109	10001	166	172.30	396.90	0.319	2.457	9.58E-06	0.00E+00	1.83E-07	0.00E+00	0.00E+00	0.00E+00	1.83E-07	0.00E+00	0.00E+00	0.00	0.00	119	119	119	119	119	119	119	109
21	110	10001	166	135.60	206.00	0.136	0.211	3.42E-06	3.68E-07	1.73E-03	2.59E-04	3.38E-03	0.00E+00	3.11E-05	0.00E+00	4.14E-06	1.48	1.16	23	31	30	23	31	30	110	
22	111	10001	166	243.40	254.90	0.233	0.282	4.16E-07	0.00E+00	1.83E-07	0.00E+00	0.00E+00	0.00E+00	2.07E-09	0.00E+00	0.00E+00	0.00	0.00	73	75	74	73	74	74	111	
23	112	10001	166	172.30	521.60	0.319	2.439	1.25E-04	0.00E+00	1.20E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	101	101	101	-	-	-	112	
24	113	10001	166	172.30	500.20	0.319	2.437	5.07E-05	0.00E+00	1.42E-07	0.00E+00	0.00E+00	0.00E+00	1.31E-07	0.00E+00	0.00E+00	0.01	0.30	101	119	119	101	119	119	113	
25	114	10001	166	321.30	545.10	0.527	2.469	1.25E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	114	
26	115	10001	166	321.30	492.80	0.527	2.295	5.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	115	
27	116	10001	166	181.50	183.20	0.174	0.210	2.60E-07	0.00E+00	6.43E-06	0.00E+00	0.00E+00	0.00E+00	6.68E-08	0.00E+00	0.00E+00	0.00	0.00	24	28	26	24	27	27	116	
28	117	10001	166	199.40	253.50	0.158	0.288	5.38E-07	0.00E+00	7.37E-05	0.00E+00	5.61E-05	0.00E+00	7.36E-07	0.00E+00	0.00E+00	0.01	0.01	24	28	28	24	28	28	117	
29	119	10001	166	179.50	204.20	0.136	0.217	4.41E-07	0.00E+00	5.52E-05	0.00E+00	3.73E-05	0.00E+00	2.95E-06	0.00E+00	0.00E+00	0.01	0.01	53	56	55	53	56	55	119	
30	120	10001	166	95.70	95.70	0.200	1.849	4.22E-08	0.00E+00	2.50E-05	0.00E+00	3.52E-07	0.00E+00	2.28E-05	0.00E+00	2.33E-07	0.00	0.01	43	70	63	43	70	63	120	
31	121	10001	166	92.80	178.90	0.213	0.409	2.28E-05	0.00E+00	2.06E-07	0.00E+00	0.00E+00	0.00E+00	1.28E-08	0.00E+00	0.00E+00	0.00	0.00	22	29	27	24	27	27	121	
32	122	10001	166	92.80	173.00	0.213	0.361	7.57E-06	0.00E+00	1.44E-04	0.00E+00	2.52E-05	0.00E+00	1.44E-04	0.00E+00	2.48E-05	0.25	11.27	23	122	121	24	122	121	122	
33	123	10001	166	187.70	349.00	0.408	0.681	2.28E-05	0.00E+00	2.06E-07	0.00E+00	0.00E+00	0.00E+00	1.28E-08	0.00E+00	0.00E+00	0.00	0.00	22	29	27	24	27	27	123	
34	124	10001	166	187.70	341.50	0.412	0.664	7.57E-06	0.00E+00	9.38E-05	0.00E+00	2.89E-05	0.00E+00	9.37E-05	0.00E+00	2.89E-05	0.20	9.02	23	69	69	23	69	69	124	
35	125	10001	166	77.10	77.10	0.125	0.219	4.61E-08	0.00E+00	5.54E-05	0.00E+00	3.80E-05	0.00E+00	2.34E-06	0.00E+00	0.00E+00	0.00	0.00	34	43	43	36	43	43	125	
36	126	10001	166	227.60	227.60	0.181	0.250	8.41E-08	0.00E+00	2.31E-06	0.00E+00	0.00E+00	0.00E+00	8.95E-08	0.00E+00	0.00E+00	0.00	0.00	34	39	39	36	39	39	126	
37	127	10001	166	377.20	447.00	0.757	0.820	1.25E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	127	
38	141	10001	166	73.40	73.40	0.192	0.208	1.06E-04	0.00E+00	6.44E-05	0.00E+00	2.82E-05	0.00E+00	4.21E-06	0.00E+00	0.00E+00	1.45	2.66	57	71	67	57	71	67	141	
39	142	10001	166	140.00	140.00	0.203	0.218	1.06E-04	0.00E+00	2.24E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	59	67	59	-	-	-	142	
40	145	10001	166	386.30	387.10	0.448	0.448	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	145	



41	146	10001	166	105.20	105.20	0.425	0.425	4.23E-05	0.00E+00	3.91E-06	0.00E+00	0.00E+00	0.00E+00	8.90E-07	0.00E+00	0.00E+00	0.03	0.17	28	35	32	30	33	31	146
42	147	10001	166	180.80	180.80	0.251	0.251	3.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	147
43	148	10001	166	196.50	196.50	0.428	0.430	4.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	148
44	149	10001	166	321.30	481.70	0.527	2.457	9.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	149
45	154	10001	166	83.70	124.10	0.173	0.207	1.34E-04	0.00E+00	1.44E-05	0.00E+00	8.22E-09	0.00E+00	1.08E-06	0.00E+00	0.00E+00	0.36	0.79	17	30	24	18	25	24	154
46	156	10001	166	76.40	117.60	0.024	0.026	7.03E-06	5.25E-04	1.55E-02	6.80E-03	5.68E-02	0.00E+00	7.83E-05	3.22E-15	5.23E-05	28.49	6.28	3	10	5	3	10	5	156
47	160	10001	166	78.30	123.20	0.117	0.157	1.82E-05	1.00E-04	5.84E-03	2.25E-03	2.06E-02	0.00E+00	1.21E-04	6.99E-10	8.81E-05	26.25	32.75	22	31	28	23	31	29	160
48	164	10001	166	74.30	118.30	0.077	0.096	2.12E-05	1.10E-04	7.06E-03	2.53E-03	2.55E-02	0.00E+00	8.05E-05	0.00E+00	3.52E-05	39.69	29.58	12	19	15	12	17	15	164
49	165	10001	166	90.90	133.10	0.222	2.458	1.76E-06	0.00E+00	1.24E-04	0.00E+00	1.66E-05	0.00E+00	1.24E-04	0.00E+00	1.64E-05	0.05	2.26	22	129	120	24	129	120	165
50	168	10001	166	183.60	211.60	0.420	2.456	1.76E-06	0.00E+00	1.10E-04	0.00E+00	4.15E-05	0.00E+00	1.09E-04	0.00E+00	4.13E-05	0.03	1.33	22	68	68	22	68	68	168
51	169	10001	166	105.90	105.90	0.412	0.412	7.33E-06	0.00E+00	9.92E-05	0.00E+00	7.73E-05	0.00E+00	1.00E-05	0.00E+00	0.00E+00	0.15	0.95	22	36	33	23	35	33	169
52	170	10001	166	91.50	91.50	0.210	0.217	6.28E-06	0.00E+00	1.38E-07	0.00E+00	0.00E+00	0.00E+00	7.72E-09	0.00E+00	0.00E+00	0.00	0.00	23	29	27	24	27	27	170
53	171	10001	166	314.70	314.70	0.488	0.488	7.33E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	171
54	172	10001	166	166.50	166.50	0.161	0.192	1.06E-04	0.00E+00	6.29E-05	0.00E+00	5.70E-05	0.00E+00	2.27E-06	0.00E+00	0.00E+00	1.47	1.21	40	46	45	40	46	45	172
55	178	10001	166	83.70	124.10	0.173	0.207	2.12E-05	0.00E+00	1.44E-05	0.00E+00	8.22E-09	0.00E+00	1.08E-06	0.00E+00	0.00E+00	0.07	0.21	17	30	24	18	25	24	178

**Table E9 - Transient report for Palisades at 32 EFPY (30 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing				Through-Wall Cracking Criteria																		
Palisades	32	on	on				0.900																		
Transient Count	Transient Sequence Number	# of Time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Frequency	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles						(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)			
1	2	501	250	326.14	326.14	0.865	0.956	2.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	2
2	16	501	250	352.88	536.24	0.897	2.394	1.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	16
3	18	501	250	338.46	340.56	1.085	2.150	4.71E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	18
4	19	501	250	301.87	301.87	1.212	2.499	2.29E-03	0.00E+00	9.06E-09	0.00E+00	0.00E+00	0.00E+00	3.58E-09	0.00E+00	0.00E+00	0.22	0.93	84	134	89	84	134	89	19
5	22	501	250	251.21	251.21	1.904	2.065	6.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	22
6	24	501	250	316.07	317.07	0.867	2.064	2.43E-06	0.00E+00	4.98E-08	0.00E+00	0.00E+00	0.00E+00	1.67E-09	0.00E+00	0.00E+00	0.00	0.00	5	8	7	5	8	7	24
7	26	501	250	316.07	535.62	0.867	2.393	5.69E-04	0.00E+00	4.98E-08	0.00E+00	0.00E+00	0.00E+00	2.13E-09	0.00E+00	0.00E+00	0.04	0.02	5	8	7	5	8	7	26
8	27	501	250	230.65	230.65	0.848	2.372	3.65E-05	0.00E+00	1.56E-06	0.00E+00	0.00E+00	0.00E+00	2.97E-07	0.00E+00	0.00E+00	0.13	0.26	5	234	13	5	234	13	27
9	29	501	250	224.21	230.97	0.776	2.486	4.20E-08	0.00E+00	2.02E-07	0.00E+00	0.00E+00	0.00E+00	1.94E-07	0.00E+00	0.00E+00	0.00	0.00	4	201	198	5	201	198	29
10	31	501	250	183.37	183.37	0.173	0.173	1.29E-05	0.00E+00	2.09E-06	0.00E+00	0.00E+00	0.00E+00	2.36E-07	0.00E+00	0.00E+00	0.05	0.06	58	77	77	59	77	77	31
11	32	501	250	280.35	524.62	0.301	2.253	1.08E-06	0.00E+00	3.87E-09	0.00E+00	0.00E+00	0.00E+00	1.50E-09	0.00E+00	0.00E+00	0.00	0.00	79	82	81	79	82	81	32
12	34	501	250	219.59	220.74	0.759	1.226	1.48E-05	0.00E+00	1.43E-07	0.00E+00	0.00E+00	0.00E+00	8.33E-09	0.00E+00	0.00E+00	0.00	0.00	5	17	9	5	17	9	34
13	40	501	250	94.38	132.07	0.160	0.018	3.22E-05	0.00E+00	7.60E-04	7.68E-07	1.23E-03	0.00E+00	1.36E-05	0.00E+00	1.39E-05	65.31	14.41	3	9	5	3	9	5	40
14	42	501	250	294.77	296.04	0.204	0.208	7.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	42
15	48	501	250	172.65	293.27	0.220	2.474	7.67E-07	0.00E+00	8.57E-05	0.00E+00	2.42E-05	0.00E+00	8.46E-05	0.00E+00	2.40E-05	0.13	1.42	61	114	110	62	114	110	48
16	49	501	250	307.36	446.72	0.776	2.429	1.00E-05	0.00E+00	9.02E-09	0.00E+00	0.00E+00	0.00E+00	5.90E-10	0.00E+00	0.00E+00	0.00	0.00	4	12	10	4	12	10	49
17	50	501	250	166.89	166.89	0.783	2.420	5.81E-07	0.00E+00	4.45E-06	0.00E+00	0.00E+00	0.00E+00	1.24E-06	0.00E+00	0.00E+00	0.01	0.02	5	250	12	5	250	12	50
18	51	501	250	215.94	232.57	0.387	2.241	7.51E-08	0.00E+00	2.55E-05	0.00E+00	4.44E-07	0.00E+00	9.92E-06	0.00E+00	1.59E-07	0.00	0.02	3	75	14	3	75	14	51
19	52	501	250	304.66	304.78	1.101	2.330	6.37E-04	0.00E+00	1.65E-08	0.00E+00	0.00E+00	0.00E+00	6.61E-09	0.00E+00	0.00E+00	0.00	0.02	86	142	95	86	142	95	52
20	53	501	250	319.89	523.83	0.278	2.560	1.09E-03	0.00E+00	9.91E-10	0.00E+00	0.00E+00	0.00E+00	3.86E-10	0.00E+00	0.00E+00	0.00	0.01	105	106	106	105	106	106	53
21	54	501	250	219.14	227.69	0.508	2.084	4.26E-06	0.00E+00	5.16E-05	0.00E+00	7.77E-06	0.00E+00	1.79E-05	0.00E+00	2.49E-06	0.44	1.66	3	136	14	4	136	14	54
22	55	501	250	327.68	370.42	1.192	2.475	2.74E-03	0.00E+00	3.54E-08	0.00E+00	0.00E+00	0.00E+00	1.88E-08	0.00E+00	0.00E+00	0.58	3.00	75	80	77	75	80	79	55
23	58	501	250	136.18	172.91	0.117	0.220	2.66E-04	0.00E+00	2.01E-05	0.00E+00	9.82E-07	0.00E+00	8.11E-07	0.00E+00	4.41E-09	11.52	4.90	19	46	37	19	45	38	58
24	59	501	250	171.61	172.30	0.118	0.222	2.09E-04	0.00E+00	1.34E-06	0.00E+00	0.00E+00	0.00E+00	2.00E-08	0.00E+00	0.00E+00	0.59	0.08	22	47	45	24	47	45	59
25	60	501	250	172.71	179.54	0.335	0.456	2.09E-04	0.00E+00	3.82E-06	0.00E+00	0.00E+00	0.00E+00	1.81E-07	0.00E+00	0.00E+00	1.67	0.89	32	47	47	32	47	46	60
26	61	501	250	230.40	253.08	0.157	0.164	2.09E-04	0.00E+00	2.98E-08	0.00E+00	0.00E+00	0.00E+00	3.57E-10	0.00E+00	0.00E+00	0.01	0.00	34	42	42	35	42	41	61
27	62	501	250	94.72	210.62	0.042	0.043	7.07E-06	0.00E+00	3.73E-04	0.00E+00	4.88E-04	0.00E+00	1.08E-05	0.00E+00	9.30E-06	6.86	2.07	5	13	12	5	13	12	62
28	63	501	250	91.74	223.87	0.075	0.076	6.06E-06	0.00E+00	1.41E-04	0.00E+00	1.02E-04	0.00E+00	5.00E-06	0.00E+00	1.66E-06	2.00	0.79	13	26	19	13	26	19	63
29	64	501	250	121.43	126.16	0.064	0.064	7.07E-06	0.00E+00	2.35E-04	0.00E+00	3.06E-04	0.00E+00	1.21E-05	0.00E+00	9.40E-06	3.96	2.24	25	33	32	25	33	32	64
30	65	501	250	199.34	316.23	0.694	2.523	1.24E-04	0.00E+00	2.60E-05	0.00E+00	3.71E-07	0.00E+00	2.53E-05	0.00E+00	3.68E-07	6.45	67.20	110	119	114	110	119	114	65

**Table E10 - Transient report for Palisades at 60 EFPY (30 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing				Through-Wall Cracking Criteria																		
Palisades	60	on	on				0.900																		
Transient Count	Transient Sequence Number	# of Time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Frequency	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles						(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)			
1	2	501	250	326.14	326.14	0.865	0.956	2.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	2
2	16	501	250	352.88	536.24	0.897	2.394	1.23E-04	0.00E+00	9.35E-12	0.00E+00	0.00E+00	0.00E+00	6.42E-13	0.00E+00	0.00E+00	0.00	0.00	25	29	28	25	29	28	16
3	18	501	250	338.46	340.56	1.085	2.150	4.71E-03	0.00E+00	2.14E-12	0.00E+00	0.00E+00	0.00E+00	8.77E-13	0.00E+00	0.00E+00	0.00	0.00	197	197	197	197	197	197	18
4	19	501	250	301.87	301.87	1.212	2.499	2.29E-03	0.00E+00	1.07E-07	0.00E+00	0.00E+00	0.00E+00	5.35E-08	0.00E+00	0.00E+00	0.80	3.17	38	134	89	38	134	89	19
5	22	501	250	251.21	251.21	1.904	2.065	6.67E-05	0.00E+00	1.38E-12	0.00E+00	0.00E+00	0.00E+00	4.25E-13	0.00E+00	0.00E+00	0.00	0.00	104	110	110	104	110	110	22
6	24	501	250	316.07	317.07	0.867	2.064	2.43E-06	0.00E+00	2.41E-07	0.00E+00	0.00E+00	0.00E+00	1.41E-08	0.00E+00	0.00E+00	0.00	0.00	5	8	7	5	8	7	24
7	26	501	250	316.07	535.62	0.867	2.393	5.69E-04	0.00E+00	2.41E-07	0.00E+00	0.00E+00	0.00E+00	1.55E-08	0.00E+00	0.00E+00	0.11	0.05	5	8	7	5	8	7	26
8	27	501	250	230.65	230.65	0.848	2.372	3.65E-05	0.00E+00	5.92E-06	0.00E+00	0.00E+00	0.00E+00	1.48E-06	0.00E+00	0.00E+00	0.20	0.41	5	234	12	5	234	13	27
9	29	501	250	224.21	230.97	0.776	2.486	4.20E-08	0.00E+00	5.18E-07	0.00E+00	0.00E+00	0.00E+00	4.71E-07	0.00E+00	0.00E+00	0.00	0.00	4	201	198	4	201	198	29
10	31	501	250	183.37	183.37	0.173	0.173	1.29E-05	0.00E+00	5.34E-06	0.00E+00	0.00E+00	0.00E+00	1.08E-06	0.00E+00	0.00E+00	0.05	0.08	57	77	77	58	77	77	31
11	32	501	250	280.35	524.62	0.301	2.253	1.08E-06	0.00E+00	6.77E-08	0.00E+00	0.00E+00	0.00E+00	3.30E-08	0.00E+00	0.00E+00	0.00	0.00	79	82	79	79	82	81	32
12	34	501	250	219.59	220.74	0.759	1.226	1.48E-05	0.00E+00	7.88E-07	0.00E+00	0.00E+00	0.00E+00	6.97E-08	0.00E+00	0.00E+00	0.01	0.01	4	17	9	4	17	9	34
13	40	501	250	94.38	132.07	0.160	0.018	3.22E-05	0.00E+00	1.76E-03	5.92E-05	3.43E-03	0.00E+00	7.11E-05	5.99E-07	1.15E-04	63.66	20.51	3	10	5	3	10	5	40
14	42	501	250	294.77	296.04	0.204	0.208	7.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	42
15	48	501	250	172.65	293.27	0.220	2.474	7.67E-07	0.00E+00	1.67E-04	0.00E+00	9.83E-05	0.00E+00	1.66E-04	0.00E+00	9.75E-05	0.11	0.87	61	115	110	61	115	110	48
16	49	501	250	307.36	446.72	0.776	2.429	1.00E-05	0.00E+00	5.39E-08	0.00E+00	0.00E+00	0.00E+00	6.17E-09	0.00E+00	0.00E+00	0.00	0.00	4	12	10	4	12	10	49
17	50	501	250	166.89	166.89	0.783	2.420	5.81E-07	0.00E+00	1.45E-05	0.00E+00	4.29E-10	0.00E+00	4.73E-06	0.00E+00	1.24E-10	0.01	0.02	4	250	12	4	250	12	50
18	51	501	250	215.94	232.57	0.387	2.241	7.51E-08	0.00E+00	7.09E-05	0.00E+00	2.51E-05	0.00E+00	3.51E-05	0.00E+00	1.28E-05	0.00	0.02	3	75	14	3	75	14	51
19	52	501	250	304.66	304.78	1.101	2.330	6.37E-04	0.00E+00	1.46E-07	0.00E+00	0.00E+00	0.00E+00	7.60E-08	0.00E+00	0.00E+00	0.02	0.12	85	142	92	85	142	92	52
20	53	501	250	319.89	523.83	0.278	2.560	1.09E-03	0.00E+00	3.34E-08	0.00E+00	0.00E+00	0.00E+00	1.62E-08	0.00E+00	0.00E+00	0.04	0.15	104	106	106	104	106	106	53
21	54	501	250	219.14	227.69	0.508	2.084	4.26E-06	0.00E+00	1.37E-04	0.00E+00	9.87E-05	0.00E+00	6.30E-05	0.00E+00	4.60E-05	0.51	1.88	3	136	14	3	149	14	54
22	55	501	250	327.68	370.42	1.192	2.475	2.74E-03	0.00E+00	2.97E-07	0.00E+00	0.00E+00	0.00E+00	1.85E-07	0.00E+00	0.00E+00	1.74	8.43	26	80	77	26	80	77	55
23	58	501	250	136.18	172.91	0.117	0.220	2.66E-04	0.00E+00	4.79E-05	0.00E+00	1.66E-05	0.00E+00	4.47E-06	0.00E+00	9.10E-07	11.73	8.80	17	46	37	17	46	38	58
24	59	501	250	171.61	172.30	0.118	0.222	2.09E-04	0.00E+00	3.94E-06	0.00E+00	0.00E+00	0.00E+00	1.72E-07	0.00E+00	0.00E+00	0.75	0.25	21	47	45	22	47	45	59
25	60	501	250	172.71	179.54	0.335	0.456	2.09E-04	0.00E+00	1.07E-05	0.00E+00	3.95E-08	0.00E+00	1.13E-06	0.00E+00	1.10E-09	1.94	1.69	30	47	47	30	47	47	60
26	61	501	250	230.40	253.08	0.157	0.164	2.09E-04	0.00E+00	1.89E-07	0.00E+00	0.00E+00	0.00E+00	3.32E-09	0.00E+00	0.00E+00	0.03	0.01	33	44	42	33	42	42	61
27	62	501	250	94.72	210.62	0.042	0.043	7.07E-06	0.00E+00	8.85E-04	6.29E-06	1.55E-03	0.00E+00	5.50E-05	6.75E-08	8.38E-05	6.58	3.24	5	13	12	5	14	12	62
28	63	501	250	91.74	223.87	0.075	0.076	6.06E-06	0.00E+00	3.37E-04	2.97E-09	4.47E-04	0.00E+00	2.72E-05	0.00E+00	2.51E-05	2.01	1.36	12	26	19	12	26	19	63
29	64	501	250	121.43	126.16	0.064	0.064	7.07E-06	0.00E+00	5.28E-04	1.86E-06	9.15E-04	0.00E+00	6.03E-05	2.20E-08	8.49E-05	3.84	3.51	25	33	32	25	33	32	64
30	65	501	250	199.34	316.23	0.694	2.523	1.24E-04	0.00E+00	5.50E-05	0.00E+00	6.75E-06	0.00E+00	5.40E-05	0.00E+00	6.68E-06	5.84	45.41	43	119	114	44	119	114	65

**Table E11 - Transient report for Palisades at 200 EFPY (30 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing				Through-Wall Cracking Criteria																		
Palisades	200	on	on				0.900																		
Transient Count	Transient Sequence Number	# of Time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Frequency	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles						(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)			
1	2	501	250	326.14	326.14	0.865	0.956	2.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	2
2	16	501	250	352.88	536.24	0.897	2.394	1.23E-04	0.00E+00	2.31E-08	0.00E+00	0.00E+00	0.00E+00	2.10E-09	0.00E+00	0.00E+00	0.00	0.00	17	31	28	17	31	28	16
3	18	501	250	338.46	340.56	1.085	2.150	4.71E-03	0.00E+00	2.99E-11	0.00E+00	0.00E+00	0.00E+00	2.90E-11	0.00E+00	0.00E+00	0.00	0.00	41	197	197	41	197	197	18
4	19	501	250	301.87	301.87	1.212	2.499	2.29E-03	0.00E+00	2.44E-06	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	0.00E+00	2.54	7.41	28	134	88	28	134	88	19
5	22	501	250	251.21	251.21	1.904	2.065	6.67E-05	0.00E+00	3.12E-08	0.00E+00	0.00E+00	0.00E+00	5.61E-09	0.00E+00	0.00E+00	0.00	0.00	80	110	109	83	110	109	22
6	24	501	250	316.07	317.07	0.867	2.064	2.49E-06	0.00E+00	5.20E-06	0.00E+00	0.00E+00	0.00E+00	9.22E-07	0.00E+00	0.00E+00	0.00	0.00	4	8	7	4	8	7	24
7	26	501	250	316.07	535.62	0.867	2.393	5.69E-04	0.00E+00	5.20E-06	0.00E+00	0.00E+00	0.00E+00	1.01E-06	0.00E+00	0.00E+00	0.41	0.29	4	8	7	4	8	7	26
8	27	501	250	230.65	230.65	0.848	2.372	3.65E-05	0.00E+00	7.00E-05	0.00E+00	2.20E-05	0.00E+00	3.23E-05	0.00E+00	1.06E-05	0.37	0.72	4	234	12	4	234	12	27
9	29	501	250	224.21	230.97	0.776	2.486	4.20E-08	0.00E+00	3.54E-06	0.00E+00	0.00E+00	0.00E+00	2.16E-06	0.00E+00	0.00E+00	0.00	0.00	3	213	10	4	213	187	29
10	31	501	250	183.37	183.37	0.173	0.173	1.29E-05	0.00E+00	3.82E-05	0.00E+00	4.55E-06	0.00E+00	1.54E-05	0.00E+00	1.32E-06	0.07	0.10	48	77	77	50	77	77	31
11	32	501	250	280.35	524.62	0.301	2.253	1.08E-06	0.00E+00	2.26E-06	0.00E+00	0.00E+00	0.00E+00	1.71E-06	0.00E+00	0.00E+00	0.00	0.00	43	83	79	43	83	79	32
12	34	501	250	219.59	220.74	0.759	1.226	1.48E-05	0.00E+00	1.38E-05	0.00E+00	7.15E-10	0.00E+00	3.30E-06	0.00E+00	1.40E-10	0.03	0.03	4	17	9	4	17	9	34
13	40	501	250	94.38	132.07	0.160	0.018	3.22E-05	1.30E-04	1.03E-02	3.09E-03	2.01E-02	2.06E-06	1.21E-03	2.01E-04	2.39E-03	58.19	27.74	3	10	5	3	10	5	40
14	42	501	250	294.77	296.04	0.204	0.208	7.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	42
15	48	501	250	172.65	293.27	0.220	2.474	7.67E-07	0.00E+00	6.50E-04	4.85E-06	7.56E-04	0.00E+00	6.47E-04	4.83E-06	7.54E-04	0.07	0.28	61	115	110	61	115	110	48
16	49	501	250	307.36	446.72	0.776	2.429	1.00E-05	0.00E+00	1.83E-06	0.00E+00	0.00E+00	0.00E+00	3.85E-07	0.00E+00	0.00E+00	0.00	0.00	3	13	10	3	92	10	49
17	50	501	250	166.89	166.89	0.783	2.420	5.81E-07	0.00E+00	1.41E-04	0.00E+00	1.04E-04	0.00E+00	7.46E-05	0.00E+00	5.53E-05	0.01	0.03	4	250	12	4	250	12	50
18	51	501	250	215.94	232.57	0.387	2.241	7.51E-08	0.00E+00	5.26E-04	3.74E-07	7.78E-04	0.00E+00	3.53E-04	2.09E-07	5.51E-04	0.01	0.02	3	75	14	3	75	14	51
19	52	501	250	304.66	304.78	1.101	2.330	6.37E-04	0.00E+00	2.96E-06	0.00E+00	0.00E+00	0.00E+00	2.32E-06	0.00E+00	0.00E+00	0.13	0.43	29	142	93	30	142	93	52
20	53	501	250	319.89	523.83	0.278	2.560	1.09E-03	0.00E+00	1.48E-06	0.00E+00	0.00E+00	0.00E+00	1.13E-06	0.00E+00	0.00E+00	0.28	0.84	104	107	106	104	107	106	53
21	54	501	250	219.14	227.69	0.508	2.084	4.26E-06	0.00E+00	9.41E-04	9.36E-06	1.59E-03	0.00E+00	6.12E-04	5.75E-06	1.10E-03	0.66	1.62	3	149	14	3	149	14	54
22	55	501	250	327.68	370.42	1.192	2.475	2.74E-03	0.00E+00	5.94E-06	0.00E+00	0.00E+00	0.00E+00	5.04E-06	0.00E+00	0.00E+00	5.04	16.80	18	82	77	18	82	77	55
23	58	501	250	136.18	172.91	0.117	0.220	2.68E-04	0.00E+00	3.05E-04	3.46E-07	3.57E-04	0.00E+00	7.88E-05	4.97E-10	8.01E-05	11.84	12.63	16	46	37	16	46	37	58
24	59	501	250	171.61	172.30	0.118	0.222	2.09E-04	0.00E+00	3.32E-05	0.00E+00	4.23E-06	0.00E+00	5.73E-06	0.00E+00	4.57E-07	1.02	0.68	20	47	43	20	47	45	59
25	60	501	250	172.71	179.54	0.335	0.456	2.09E-04	0.00E+00	8.22E-05	0.00E+00	4.47E-05	0.00E+00	2.41E-05	0.00E+00	1.18E-05	2.60	3.00	27	47	47	28	47	46	60
26	61	501	250	230.40	253.08	0.157	0.164	2.09E-04	0.00E+00	3.87E-06	0.00E+00	0.00E+00	0.00E+00	3.71E-07	0.00E+00	0.00E+00	0.11	0.04	31	44	42	32	43	42	61
27	62	501	250	94.72	210.62	0.042	0.043	7.07E-06	1.59E-05	5.31E-03	1.10E-03	1.03E-02	2.12E-07	8.57E-04	1.00E-04	1.70E-03	6.58	4.15	5	13	12	5	13	12	62
28	63	501	250	91.74	223.87	0.075	0.076	6.06E-06	3.49E-08	2.08E-03	1.83E-04	3.92E-03	0.00E+00	4.53E-04	1.82E-05	8.08E-04	2.25	2.04	12	26	19	12	26	19	63
29	64	501	250	121.43	126.16	0.064	0.064	7.07E-06	2.40E-06	2.95E-03	4.94E-04	5.54E-03	6.99E-09	7.92E-04	6.02E-05	1.57E-03	3.36	3.69	24	34	32	24	34	32	64
30	65	501	250	199.34	316.23	0.694	2.523	1.24E-04	0.00E+00	2.57E-04	6.82E-10	1.67E-04	0.00E+00	2.55E-04	6.80E-10	1.66E-04	4.44	17.46	28	119	114	30	119	114	65

**Table E12 - Transient report for Palisades at 500 EFPY (30 base case transients)**

Plant Name:	EFPY:	WPS:	Ductile Tearing				Through-Wall Cracking Criteria																			
Palisades	500	on	on				0.900																			
Transient Count	Transient Sequence Number	# of Time history pairs	Final Time	Min Temp	Final Temp	Min Press	Final Press	Mean Initiating Frequency	5% CPI	Mean CPI	Median CPI	95% CPI	5% CPTWC	Mean CPTWC	Median CPTWC	95% CPTWC	% total freq of crack initiation	% total freq of thru-wall cracking	First Crack Initiation Time	Last Crack Initiation Time	Most Crack Init Occur Time	First Failure Time	Last Failure Time	Most Failures Occur Time	Transient Sequence Number	
			(min)	(°F)	(°F)	(ksi)	(ksi)	(events/yr)	Percentiles						(%)	(%)	(min)	(min)	(min)	(min)	(min)	(min)				
1	2	501	250	326.14	326.14	0.865	0.956	2.66E-04	0.00E+00	1.41E-14	0.00E+00	0.00E+00	0.00E+00	2.82E-15	0.00E+00	0.00E+00	0.00	0.00	61	62	62	61	62	62	2	
2	16	501	250	352.88	536.24	0.897	2.394	1.23E-04	0.00E+00	8.59E-07	0.00E+00	0.00E+00	0.00E+00	2.72E-07	0.00E+00	0.00E+00	0.00	0.00	13	31	29	13	31	29	16	
3	18	501	250	338.46	340.56	1.085	2.150	4.71E-03	0.00E+00	8.28E-09	0.00E+00	0.00E+00	0.00E+00	3.27E-09	0.00E+00	0.00E+00	0.00	0.00	32	197	41	13	197	197	18	
4	19	501	250	301.87	301.87	1.212	2.499	2.29E-03	0.00E+00	1.65E-05	0.00E+00	0.00E+00	0.00E+00	1.50E-05	0.00E+00	0.00E+00	3.10	9.74	23	134	88	23	134	88	19	
5	22	501	250	251.21	251.21	1.904	2.065	6.67E-05	0.00E+00	1.20E-06	0.00E+00	0.00E+00	0.00E+00	7.07E-07	0.00E+00	0.00E+00	0.00	0.01	66	110	109	66	110	109	22	
6	24	501	250	316.07	317.07	0.867	2.064	2.43E-06	0.00E+00	5.02E-05	0.00E+00	9.48E-06	0.00E+00	1.96E-05	0.00E+00	2.79E-06	0.00	0.00	3	9	7	3	9	7	24	
7	26	501	250	316.07	535.62	0.867	2.393	5.69E-04	0.00E+00	5.02E-05	0.00E+00	9.48E-06	0.00E+00	2.07E-05	0.00E+00	2.99E-06	0.70	0.98	3	9	7	3	9	7	26	
8	27	501	250	230.65	230.65	0.848	2.372	3.65E-05	0.00E+00	4.71E-04	7.37E-07	6.74E-04	0.00E+00	2.98E-04	1.45E-07	4.38E-04	0.41	0.92	3	234	12	3	234	12	27	
9	29	501	250	224.21	230.97	0.776	2.486	4.20E-08	0.00E+00	2.36E-05	0.00E+00	4.33E-07	0.00E+00	1.38E-05	0.00E+00	2.45E-07	0.00	0.00	3	201	10	3	201	10	29	
10	31	501	250	183.37	183.37	0.173	0.173	1.29E-05	0.00E+00	2.04E-04	1.57E-08	1.67E-04	0.00E+00	9.24E-05	0.00E+00	5.29E-05	0.07	0.09	45	77	76	45	77	76	31	
11	32	501	250	280.35	524.62	0.301	2.253	1.08E-06	0.00E+00	1.70E-05	0.00E+00	0.00E+00	0.00E+00	1.58E-05	0.00E+00	0.00E+00	0.00	0.00	39	83	79	39	83	79	32	
12	34	501	250	219.59	220.74	0.759	1.226	1.48E-05	0.00E+00	1.08E-04	0.00E+00	5.66E-05	0.00E+00	4.77E-05	0.00E+00	2.31E-05	0.04	0.06	3	18	9	3	18	9	34	
13	40	501	250	94.38	132.07	0.160	0.018	3.22E-05	9.27E-03	6.42E-02	4.27E-02	1.87E-01	4.08E-04	9.57E-03	3.96E-03	3.56E-02	58.65	30.47	3	10	5	3	10	5	40	
14	42	501	250	294.77	296.04	0.204	0.208	7.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00	-	-	-	-	-	-	42	
15	48	501	250	172.65	293.27	0.220	2.474	7.67E-07	3.02E-07	1.96E-03	8.36E-05	3.11E-03	3.02E-07	1.95E-03	8.33E-05	3.11E-03	0.03	0.12	20	115	110	20	115	110	48	
16	49	501	250	307.36	446.72	0.776	2.429	1.00E-05	0.00E+00	1.98E-05	0.00E+00	2.37E-07	0.00E+00	9.10E-06	0.00E+00	1.02E-07	0.01	0.01	3	14	10	3	92	10	49	
17	50	501	250	166.89	166.89	0.783	2.420	5.81E-07	0.00E+00	8.92E-04	1.76E-05	1.49E-03	0.00E+00	6.03E-04	6.28E-06	1.02E-03	0.01	0.03	3	250	12	3	250	12	50	
18	51	501	250	215.94	232.57	0.387	2.241	7.51E-08	7.13E-07	2.85E-03	3.90E-04	5.06E-03	7.53E-08	2.05E-03	2.34E-04	3.82E-03	0.01	0.02	3	75	14	3	75	14	51	
19	52	501	250	304.66	304.78	1.101	2.330	6.37E-04	0.00E+00	1.90E-05	0.00E+00	0.00E+00	0.00E+00	1.75E-05	0.00E+00	0.00E+00	0.36	1.20	24	142	93	24	143	93	52	
20	53	501	250	319.89	523.83	0.278	2.560	1.09E-03	0.00E+00	1.23E-05	0.00E+00	0.00E+00	0.00E+00	1.15E-05	0.00E+00	0.00E+00	0.38	1.27	101	107	106	101	107	106	53	
21	54	501	250	219.14	227.69	0.508	2.084	4.26E-06	1.23E-05	4.88E-03	1.02E-03	8.96E-03	3.87E-06	3.52E-03	6.52E-04	6.73E-03	0.69	1.51	3	136	14	3	149	14	54	
22	55	501	250	327.68	370.42	1.192	2.475	2.74E-03	0.00E+00	3.81E-05	0.00E+00	4.43E-07	0.00E+00	3.63E-05	0.00E+00	4.16E-07	5.42	17.95	14	82	77	14	82	77	55	
23	58	501	250	136.18	172.91	0.117	0.220	2.66E-04	7.03E-07	1.78E-03	2.56E-04	2.95E-03	0.00E+00	5.34E-04	2.35E-05	8.37E-04	11.30	12.36	16	46	37	16	46	37	58	
24	59	501	250	171.61	172.30	0.118	0.222	2.09E-04	0.00E+00	2.15E-04	1.59E-07	2.01E-04	0.00E+00	5.37E-05	0.00E+00	3.17E-05	1.15	1.01	18	47	44	18	47	43	59	
25	60	501	250	172.71	179.54	0.335	0.456	2.09E-04	0.00E+00	5.02E-04	1.11E-05	6.95E-04	0.00E+00	1.88E-04	5.01E-07	2.33E-04	2.56	3.51	26	47	47	26	47	45	60	
26	61	501	250	230.40	253.08	0.157	0.164	2.09E-04	0.00E+00	3.06E-05	0.00E+00	2.86E-06	0.00E+00	6.55E-06	0.00E+00	2.80E-07	0.16	0.11	25	44	42	25	43	42	61	
27	62	501	250	94.72	210.62	0.042	0.043	7.07E-06	3.15E-03	3.37E-02	1.95E-02	1.06E-01	1.53E-04	6.59E-03	2.39E-03	2.42E-02	6.89	4.70	5	13	12	5	13	12	62	
28	63	501	250	91.74	223.87	0.075	0.076	6.06E-06	4.95E-04	1.30E-02	5.66E-03	4.51E-02	1.87E-05	3.30E-03	7.21E-04	6.40E-03	2.33	2.14	11	26	19	11	26	19	63	
29	64	501	250	121.43	126.16	0.064	0.064	7.07E-06	9.00E-04	1.68E-02	8.41E-03	5.46E-02	4.65E-05	4.88E-03	1.42E-03	9.30E-03	3.34	3.39	24	34	32	32	34	32	64	
30	65	501	250	199.34	316.23	0.694	2.523	1.24E-04	0.00E+00	8.40E-04	5.03E-06	1.04E-03	0.00E+00	8.37E-04	5.02E-06	1.04E-03	2.38	8.40	24	119	114	24	119	114	65	

