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Testing, Verifying, and Validating SAPHIRE Versions 6.0 and 7.0

Idaho National Engineering and Environmental Laboratory

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Office of Nuclear Regulatory Research
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Testing, Verifying, and Validating SAPHIRE Versions 6.0 and 7.0

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ABSTRACT

This report describes a testing-based verification and validation (TV&V) process created for SAPHIRE (System Analysis Program for Hands-on Integrated Reliability Evaluation), version 6.0 and subsequent versions. The TV&V process comprises a set of specially designed software models used to test each major version of SAPHIRE (such as versions 6.0 and 7.0) and individual interim releases (6.1, 6.2, etc.).

SAPHIRE is a probabilistic risk assessment (PRA) software tool developed at the Idaho National Engineering and Environmental Laboratory (INEEL) for use by the U.S. Nuclear Regulatory Commission (NRC). SAPHIRE was created to provide a means for depicting a nuclear power plant's response to an accident; evaluating and quantifying the risk represented by those models; and performing sensitivity analyses associated with the attributes of the models. SAPHIRE is best suited for quantifying sequences leading to core damage (Level 1 PRA); estimating radioactive releases to the environment (Level 2 PRA); and, to a limited degree, to quantify risk in terms of evaluating release consequences to the environment and the public (Level 3 PRA).

The TV&V process was engineered to provide a dynamic verification and validation process for testing all releases and versions of SAPHIRE. The process allows for an increase in the software quantification quality to a high level, as dictated by the nature of the testing models.

This document comprises a main report and three appendices. The main report presents an overall perspective on the TV&V approach; specifics on the testing, verification, and validation process; and the results of the TV&V process. Appendix A provides the background, including the history of SAPHIRE; prior verification and validation efforts; the SAPHIRE code development control process; and minimum PC requirements. Appendix B details the test reference descriptions. Appendix C presents test results from a sample case.

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EXECUTIVE SUMMARY

SAPHIRE (Systems Analysis Program for Hands-on Integrated Reliability Evaluation) is a personal computer program for performing probabilistic risk assessments (PRAs). The SAPHIRE project is sponsored by the Nuclear Regulatory Commission (NRC) and conducted at the Idaho National Engineering and Environmental Laboratory (INEEL).

SAPHIRE offers the capability to create and quantify logic models depicting a nuclear power plant's response to an accident, evaluate the reliability or risk represented by those models, and perform sensitivity analyses associated with attributes of the models. SAPHIRE is suitable for quantifying accident sequences leading to core damage (Level 1 PRA) and estimating radioactive releases from the core damage to the environment (Level 2 PRA). Further, it can be used to model reactor conditions when at full power, low power, or shutdown. It can also be used in a limited manner to quantify risk in terms of evaluating release consequences to the environment and the public (Level 3 PRA). SAPHIRE includes a separate module called the Graphical Evaluation Module (GEM) that automates the process for evaluating operational events.

SAPHIRE is used in a variety of regulatory applications, including the following:

- Analyzing the risk implications of plant design, systems operation, and procedures
- Assessing the effectiveness of existing and proposed regulations, including the potential for plant retrofitting (i.e., *backfits*)
- Evaluating the significance of operational occurrences
- Prioritizing generic safety issues, research and licensing programs, and inspection activities
- Assisting the committee to review generic requirements in tracking the progress of plant modifications required to provide improved safety levels
- Performing pilot studies for the development of regulatory guides on risk-informed regulation.

Earlier SAPHIRE versions (SAPHIRE 4.0 and 5.0) were tested through a traditional (i.e., manual) verification and validation (V&V) process that met the IEEE's "Standard for Software Verification and Validation Plans" (IEEE, 1986). The focus of these earlier tests was specifically on the software itself; user documentation and software requirements specification were not evaluated to the detail recommended in the IEEE standard. The INEEL's current testing process maintains the same focus.

With the advance of computer technology, the process of automating software testing is becoming pervasive throughout the software industry. The phrase *automated testing* indicates a process where user input to the computer is simulated in a test script and results are captured and compared to stored expected results. The SAPHIRE automated testing, verification, and validation

(TV&V) process uses software models designed to ensure that, given a static input PRA file, the risk or reliability results from SAPHIRE will be the same from one release to the next. TV&V is also consistent with the IEEE's V&V standard mentioned above. Lessons learned from the previous V&V SAPHIRE efforts were also taken into consideration when developing the electronic test scripts.

Automated testing boasts significant advantages over manual V&V testing. The traditional V&V process requires extensive documentation of every step of the process, and it is keyed on a specific version and release of a code. Therefore, it inherently limits the testing to only essential features of a specific version (or release) of a code. TV&V, on the other hand, uses automated testing models and computers capable of running a battery of tests in a few hours, so tests can be applied to *every* new release of a code. It can effect testing of many more functions of the software and use a larger variety of test cases than ever before. Benefits of the new TV&V process over the older formal V&V are numerous, including the following:

- Most effort is spent on developing rigorous tests that focus on actual PRA calculations. These tests can be repeated any number of times on a variety of SAPHIRE versions.
- Application of the test is less prone to human error.
- The tests are consistent, efficient, and thorough, since the test scripts can be constructed to test single or multiple portions of the software, once or numerous times.
- Any or all of the tests can be applied to every release of SAPHIRE rather than limited to specific versions or releases at some given time.
- The tests can address a large variety of functions
- The tests encourage difficult calculations, since they can be rerun at will.
- Construction of other tests builds on prior knowledge gained from the testing process.
- The process ensures consistency of the software between tests. Since every test is rerun for each release of SAPHIRE, the initial testing conditions for each release is at least that of the previous release.

Even though the automated testing employed in the TV&V has numerous benefits, it does have limitations. For example, as new software is created or new functions are added to SAPHIRE, the test scripts may need to be modified.

And, while the TV&V process has advantages over the earlier V&V, some general procedures used in the TV&V process are consistent with the process used in earlier V&V efforts:

- Preparing a TV&V plan
- Developing the list of features to be tested
- Selecting a method for testing selected SAPHIRE functions.
- Obtaining a variety of PRA models that collectively use the features under

consideration

- Developing and applying actual test cases
- Documenting test results (primarily the conclusions of the automated testing).

To determine the SAPHIRE features most important to be tested, we first identified the critical tasks performed in a PRA (e.g., fault tree analysis, event tree analysis, sensitivity analysis). Then, we determined the SAPHIRE functions needed to accomplish each of these tasks. The process produced a list of items to be tested, which PRA analysts expert in the using SAPHIRE reviewed and revised. In summary, we tested the following SAPHIRE functions:

1. *Fault Tree Analysis,* including cut set generation and quantification, application of recovery rules (i.e., modifications made to the cut set results after they are generated), and the capability to perform the analysis on a single fault tree or on multiple fault trees.
2. *Event Tree and Sequence Analysis,* including event tree sequence generation, sequence cut set generation, quantification, application of recovery rules, application of partition rules (i.e., steps to move particular cut sets to a specified end state category), and the capability of performing the analysis on a single event tree/sequence or on multiple trees/sequences.
3. *End State Analysis,* including gathering cut sets by sequence end-state designation, gathering of cut sets by partitioning rules, quantification, and the capability of performing the analysis on a single end state or on multiple end states.
4. *Importance Measures Analysis,* for options available to quantify importance measures.
5. *Uncertainty Analysis,* for individual sequences or groups of sequences, using either Latin Hypercube or the Monte Carlo sampling.
6. *Change Sets,* and other similar features, providing the capability to perform sensitivity analyses. (Change sets contain user-defined modifications to basic event probabilities.)
7. *Data Utility Functions,* intended to facilitate data handling and manipulation.
8. *GEM module* functionality, including initiating event and condition assessments.

To test the above SAPHIRE functions, we selected a variety of models, with varying degrees of size and complexity, based on their suitability for adequately testing the selected functions. The intent of this TV&V effort was to acquire basic assurance that new updates or changes have not compromised any existing capabilities. Consequently, we did not consider size and boundary conditions of the PRA models major issues. Databases of typical size and complexity were selected from among the available models. Also, we decided that it is better to test more features with less complex models than to test less features with complex models. We did, however, us *actual PRA models* developed by experienced analysts for analyzing nuclear power plants rather than create models just for testing (except for two tests: importance measures and change sets). Table E-1 lists the models used for testing SAPHIRE in the current TV&V. Note that these PRA models provide much more complexity than do those that could be created for test purposes only. The complexity allows the model to test certain SAPHIRE functions to a high degree specific to the test. Table E-2 shows the SAPHIRE functions tested by each type of model. At a minimum, each feature tested was evaluated with at least two PRA models. Further, many of the basic features (e.g., moving from one menu option to the next, basic event probability generation, minimal cut set solving) were tested by almost all the PRA models owing to the need to perform these basic functions as part of a more complex calculation.

Like most software-development projects, time and budget constraints prohibited exhaustive testing. Our TV&V effort focused on *quantitative aspects* of SAPHIRE. We did not consider nonquantitative aspects of the code, e.g., user interface. However, during operation of the automated test calculations, the testing software mimics the actions taken by an analyst. These actions include moving the cursor, selecting objects, clicking on-screen buttons, and typing information into SAPHIRE. While the tests and acceptance criteria address a large part of the calculational functionality within SAPHIRE, the tests do not cover 100% of SAPHIRE's capabilities. For example, the current test suite did not encompass every possible way of modifying cut sets after generation. Users can manipulate cut sets after generation (e.g., "post-processing") by manually editing them, using "recovery rules," using the "prune" option, and performing a cut set update. But the test suite does test the most commonly used mechanisms of performing tasks in SAPHIRE. Other calculational aspects *not* tested include the following:

- Conditional cut set probability cut off
- Event probability cut off (not frequently used due to the calculation speed of modern computers and software such as SAPHIRE)
- Size/Zone cut off (not frequently used due to the calculation speed of modern computers and software such as SAPHIRE)
- Transformations (generally used only for fire or flooding analyses)
- Solving sequences without fault trees (an obsolete calculation technique that may be removed from future versions of the software)
- Starting gate name (generally used only during development or debugging of a PRA)
- Link event trees with "Generate cut set" option checked (used for the "large event tree" PRA methodology)
- Seismic analysis.

Table E-1. Plant model names, type, and version used in the testing-based verification and validation (TV&V).

Plant model name, type	Type of PRA model	SAPHIRE version used to make the model
Beaver Valley Unit 2, PWR	Individual Plant Examination (IPE)	5
Byron Units 1 and 2, PWR	Simplified Plant Analysis Risk (SPAR) revision 2QA	5
Comanche Peak 1 and 2, PWR	IPE	6
Crystal River 3, PWR	IPE	6
Demo database provided with SAPHIRE installation	simple test model	4
Dresden Units 2 and 3, boiling water reactor (BWR)	SPAR revision 2QA	5
Grand Gulf Unit 1, BWR	SPAR revision 2QA	5
Milstone Unit 3, PWR	SPAR revision 2QA	5
Oconee Units 1, 2, and 3, PWR	SPAR revision 2QA	5
Oyster Creek, BWR	SPAR revision 2QA	5
Peach Bottom Units 2 and 3, BWR	SPAR revision 2QA	5
Surry Units 1and 2 large early release frequency (LERF) model, PWR	SPAR LERF	6
San Onofre Units 2 and 3, PWR	SPAR revision 2QA	5
St Lucie Unit 1, PWR	SPAR revision 2QA	5
Surry Unit 1, PWR	NUREG-1150	4
Surry Unit 1, PWR	NUREG-1150	5
Surry Units 1 and 2 PWR	SPAR revision 2QA	5
Uncertainty Project written specifically for testing, version 5	simple test model	5

Table E-2. Summary of features tested by SAPHIRE 6.0 test suite.

Feature Tested[a] / Model type used	SPAR (Level 1)	NUREG-1150	IPE	SPAR (LERF)
Generate Basic Event Data	●	●	●	●
Generate Change Sets	●	●	●	
Solve Fault Trees	●	●	●	
Solve Sequences	●	●	●	●
Gather End States by Sequences and by Cut Set		●	●	●
Uncertainty – Fault Tree or End States			●	
Uncertainty – Sequences		●	●	
Importance Measures – Fault Trees, Sequences, and End States			●	
Cut Set Update – Fault Trees, Sequences, and End States		●	●	
Cut Set Recovery – Fault Trees and Sequences	●	●	●	●
Partition Sequences				●
Link Small and Large Event Trees				●
Logic Save – Fault Tree Text Editor and Graphical Editor			●	
Logic Save – Event Tree Graphical Editor				●
Version Upgrade	●	●	●	●
GEM-Initiating Event Assessment	●			
GEM-Condition Event Assessment	●			
Load Data, Extract Data, and Fault Tree Paging			●	

a. A ● denotes that the particular feature was tested.

The TV&V testing results of SAPHIRE versions 6 and 7 did not identify significant deficiencies. They did, however, identify some anomalies, which were subsequently fixed. These anomalies could be characterized as "round-off" issues, similar to those frequently faced when programming scientific software. The following are examples of the anomalies:

- "Floating point" calculation differences were discovered in the 1.0E-15 range due to differences between the DOS (SAPHIRE 5) and Windows (SAPHIRE 6) versions caused by the structure of the DOS versus the Windows operating systems. These differences could not be fixed but have been noted, along with an explanation.
- Uncertainty sampling in versions 6 and 7 were performed in a different order than that performed in Version 5. Modifications were made to force consistency between each version.
- A couple of the GEM assessments produced more minimal cut sets in Version 7 than in Version 6. The results were stored in a slightly differently structure in Version 7, but this has since been modified.

Though we noted a couple of minor anomalies from the TV&V process for SAPHIRE, overall the process provides extensive testing of the SAPHIRE software. Conclusions from the process can be summarized in two points:

1. SAPHIRE performs accurate PRA calculations; all vital features required for these calculations have been tested with a reasonable degree of confidence.

2. Automated testing allows each new version of SAPHIRE to be tested for accuracy at least as well as the previous version. Adding additional tests to the test suite will increase the overall confidence in the software performance.

As versions of SAPHIRE are released, new results of the testing are generated. But the results discussed in this report only provide details for the testing from an earlier version of the software (specifically version 6.63). INEEL offers an Internet location that lists recent changes performed in SAPHIRE. These files may be accessed at http://saphire.inel.gov.

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Martin Sattison and Douglas Brownson for their help suggesting and selecting appropriate data models/features to test and for their help documenting the various models used for testing, and Dr. Cory Atwood for his help with verifying the SAPHIRE uncertainty calculations.

ACRONYMS

AFW	auxiliary feedwater
ASP	Accident Sequence Precursor
BWR	boiling water reactor
CCDP	conditional core damage probability
FEP	Fault Tree, Event Tree, and Piping and Instrumentation Diagram
GEM	Graphical Evaluation Module
INEEL	Idaho National Engineering and Environmental Laboratory
IPE	Individual Plant Examination
IRRAS	Integrated Reliability and Risk Analysis System
LERF	large early release frequency
LOOP	loss of off-site power
MAR-D	Models And Results Database
NRC	Nuclear Regulatory Commission
PRA	probabilistic risk assessments
PWR	pressurized water reactor
SAPHIRE	Systems Analysis Programs for Hands-on Integrated Reliability Evaluation
SARA	Systems Analysis Risk Assessment
SPAR	Simplified Plant Analysis Risk
TV&V	testing, verification, and validation
V&V	verification and validation

Testing, Verifying, and Validating SAPHIRE Versions 6.0 and 7.0

1. BACKGROUND

1.1 Introduction

SAPHIRE (Systems Analysis Programs for Hands-on Integrated Reliability Evaluation) is a personal computer program for performing probabilistic risk assessments (PRAs). The SAPHIRE project is sponsored by the Nuclear Regulatory Commission (NRC) and conducted at the Idaho National Engineering and Environmental Laboratory (INEEL).

SAPHIRE offers capability to create and quantify logic models depicting a nuclear power plant's response to an accident, evaluate the reliability or risk represented by those models, and perform sensitivity analyses associated with attributes of the models. SAPHIRE is best suited for quantifying sequences leading to core damage (Level 1 PRA) and estimating radioactive releases from the core damage to the environment (Level 2 PRA). It can also be used in a limited manner to quantify risk in terms of evaluating release consequences to the environment and the public (Level 3 PRA). SAPHIRE includes a separate module called Graphical Evaluation Module (GEM) that automates the process for evaluating operational events.

The various implementations of the SAPHIRE code are distinguished by version and release numbers, displayed in the form X.Y. In this notation, the value X denotes the *version*, each of which has one or more major differences that distinguish it from a previous version. The value Y denotes the *release*, which usually is distinguished from its predecessor by one or more minor changes, implemented to correct anomalies or make minor changes in function. The version number can be found within the software by clicking the "About" option from the main Help menu.

Early versions of SAPHIRE (Russell et al. 1994) comprised a suite of programs that included the Models and Results Database (MAR-D); the Integrated Reliability and Risk Analysis System (IRRAS); the Systems Analysis Risk Assessment (SARA); and the Fault Tree, Event Tree, and Piping and Instrumentation Diagram (FEP) graphical editor. With version 6.0, these programs were combined into a single program referred to simply as SAPHIRE. A new software program has been added to SAPHIRE designed for evaluating operational occurrences using the Accident Sequence Precursor (ASP) program methods. This new module is referred to as GEM.

GEM offers a simple user interface for performing nuclear power plant operational event assessments using the SAPHIRE-based Accident Precursor Program (ASP) models and methods. GEM streamlines and automates selected inputs and processes used to calculate conditional core damage probabilities (CCDPs) and provides outputs and reports consistent with ASP applications. For both initiating events and plant conditions, GEM simplifies the process of modifying the models for failed or out-of-service components and generating/quantifying the minimal conditional cut sets. With GEM, a user can establish an analysis work area, make modifications to the model to represent the conditions of the operational event, and reprocess the models to automatically calculate the CCDP.

This includes application of the appropriate recovery factors for initiating events. For pressurized water reactors , GEM also reevaluates the probability of a reactor coolant pump seal loss-of-coolant accident (LOCA).

SAPHIRE supports several regulatory activities (NRC 1994). Examples follow:

- Analyzing the risk implications of plant design, systems operation, and procedures
- Assessing the effectiveness of existing and proposed regulations, including the potential for plant retrofitting (e.g., "backfits")
- Evaluating the significance of operational occurrences
- Prioritizing generic safety issues, research and licensing programs, and inspection activities
- Assisting the Committee to Review Generic Requirements in tracking the progress of plant modifications required to provide improved safety levels
- Performing pilot studies for developing regulatory guides on risk-informed regulation.

Because use of SAPHIRE in regulatory applications is extensive, SAPHIRE is being tested through various processes. Earlier SAPHIRE versions (SAPHIRE 4.0 and 5.0) were tested through a traditional (i.e., manual) verification and validation (V&V) process that met the IEEE's "Standard for Software Verification and Validation Plans (IEEE 1012-1986). Note that the user documentation and the software requirements specification were not evaluated to the detail recommended in the IEEE standard. Instead, the focus of the earlier V&V was solely on functionality of the software (Bolander et al. 1994, Jones et al. 1995).

Historically, each new SAPHIRE version was beta tested to some degree before its release. Beta testers are analysts experienced with PRA methods and terminology and typically are familiar with earlier versions of SAPHIRE. The primary objective of the beta testing is to verify that the results produced by the new version are correct. The secondary objective is to ensure the software is user-friendly and functional. In addition, INEEL personnel receive feedback from users around the world. Hundreds of users rely on the calculational ability of SAPHIRE for both risk and reliability calculations. Included among these users are U.S. national laboratory personnel, U.S. and foreign government regulators, private contractors, university professors and students, industry researchers, and nuclear power plant PRA analysts. Based on feedback from users, programmatic errors and discrepancies are corrected, the user interface is improved, and new features are recommended.

Also, since the INEEL is continually loading new PRAs into SAPHIRE, new SAPHIRE releases are tested extensively by (a) comparing them with PRA models and results of earlier versions and, especially, with PRAs loaded in SAPHIRE version 5.0, and (b) by loading new PRAs and comparing them with the original PRA models and results. About 30 nuclear power plant PRAs have been (completely or partially) loaded into SAPHIRE. The loading process requires a detailed comparison of the models and results with the models and results of the original PRAs. Identified discrepancies are resolved through interaction between individual licensees and PRA analysts at the INEEL. Given that different PRAs have been performed with different types of software, one can argue that SAPHIRE has been tested with an enormous number of test cases.

However, with the advance of computer technology, the process of automating software testing is becoming more pervasive throughout the software industry. *Automated testing* is a process where user input to the computer is simulated in a test script and results are captured and compared to stored expected results. The SAPHIRE automated testing, verification, and validation (TV&V) process uses software models designed to ensure that, given a static input PRA file, the risk or reliability results from SAPHIRE will be the same from one release to the next.

This report documents the results of the TV&V of SAPHIRE 6.0 and 7.0. It describes the software development approach and the TV&V process.

1.2 Verification and Validation Approach

Previous versions of SAPHIRE have been tested in formal verification and validation (V&V) processes. These earlier formal V&Vs of SAPHIRE versions 4.0 and 5.0 consisted of the following steps (Bolander et al. 1994, Jones et al. 1995):

1. Preparing a V&V plan
2. Evaluating the code development control procedures
3. Developing a test case
4. Testing V&V
5. Documenting the test results and recommendations.

This report documents an automated TV&V process used with SAPHIRE versions 6.0 and 7.0 (and future versions). While the process is not a formal V&V, we intended that the TV&V process be consistent with IEEE's testing standard (IEEE 1012-1986). We considered lessons learned from the V&V efforts for SAPHIRE version 4.0 and 5.0 when developing the models used with the new TV&V process. And, where applicable, actual tests and test specifications from the older testing were used in the TV&V. Of course, additional tests were developed specifically for the newer TV&V process, primarily due to the fact that the test could be automated. This automation aspect of testing allows the testing team to rerun a battery of calculations as many times as they wish, regardless of the complexity of the test. In order to decide which tests were to be used and why, a test plan was developed. This plan followed the general procedures used in the earlier V&V efforts, but was modified to take advantage of unique features found when performing automated testing. Thus, the updated testing plan for the TV&V includes the following steps:

- Preparing a TV&V plan.
- Determining the areas requiring testing. This step is similar to the V&V process of identifying vital and nonvital functions. Note that more features are checked in the current TV&V process than were tested in the old V&V.
- Developing the test model, including the identification of available SAPHIRE PRA databases that would adequately test SAPHIRE functions.
- TV&V model testing, which encompassed identification of base-case or nominal results for each test case. These results are considered to be the "reference" set of correct answers and are used to identify deficiencies in SAPHIRE.

- Documenting the test results, including the conclusions of the automated testing (as well as details of the test itself). Insights into why particular failures happen are not part of the documentation. Instead, effort is put into fixing the portion(s) of SAPHIRE that caused the failure.

Benefits of the TV&V process over the older formal V&V are many. In general, most of the effort expended in the testing is spent on developing rigorous tests that focus on the calculational aspects of SAPHIRE, namely the generation and manipulation of minimal cut sets. More specific benefits of the TV&V over the older V&V process include the following:

- The TV&V process is less prone to human error, since the test script that performs each test is repeatable and has a single (known) set of results to compare the analysis results against.
- The TV&V process is consistent, efficient, and thorough, since the test scripts can be constructed to test single or multiple portions of the software, once or numerous times. Testing can be performed easily on tests that would otherwise be burdensome to analysts (e.g., many repetitive tests, very long test runs).
- The TV&V process is applied to every release of SAPHIRE rather than only to specific versions or releases at some given time. Since the old V&V was analyst time-intensive, the option to test each version of the software simply was not available.
- The TV&V process actually encourages performing difficult tests. The old V&V process was limited in the number of tests that could be performed, since the tests were analyst time-intensive. The new process uses automated testing software that, in practice, is fairly insensitive to the complexity of a particular test.
- The TV&V process readily builds on prior knowledge gained from the testing process. Since every test is rerun for each release of SAPHIRE, the initial testing conditions for each release is at least that of the previous release.

1.3 Verification and Validation Scope

The intent of the TV&V was not only to standardize and automate the testing process, but to allow testing of all features that could have an impact on any results generated. Also, the TV&V process almost totally eliminates the need to test only those features considered as most vital to the generation of risk or reliability results. In practice, however, a couple of the less-vital features were not tested due to the pragmatics of time and budget restraints. Nonetheless, the noted items are not considered to detract from the TV&V effort. Specific features *not* tested include:

- Review of the software "requirements specification" document. An important part of the IEEE V&V process is to identify and review this document, since it is supposedly the driver of the overall software development process and the anticipated results of the software product. In practice, a requirements specification may be a necessity for large (multimillion dollar) or distributed software development projects. But for the SAPHIRE project, we believe the self-contained development team at the INEEL, along with the formal interaction with program managers funding the development, provides adequate control of the development process.

- Review of the online help documents. While an extensive set of online help files exist for SAPHIRE, they were not reviewed for applicability or quality.
- The Fault Tree, Event Tree, Piping and Instrumentation Diagram (FEP) editors. This graphics drawing program has not kept pace with the rest of SAPHIRE development. DOS versions of SAPHIRE 5.0 and earlier versions of the FEP program allowed interaction between the plant piping and instrumentation diagrams (P&Ids) loaded into a database and the basic event data in order to quickly modify specific component failure data. Although the interactive capability does not exist in the SAPHIRE 6.0 and 7.0 Windows versions, one can still create and load plant piping and instrumentation diagrams documented in the associated PRAs. As the P&IDs loaded into a database are noninteractive, there is nothing significant to test. That is, the P&IDs as currently implemented are pictorial tools to assist the user and cannot directly impact the analysis capabilities of the SAPHIRE software.

While the noted testing omissions were restricted to nonvital features of SAPHIRE, the bulk of the tests performed evaluated both the analysis capabilities and the interface portions of the software. The general scope of the automated testing was to test, perhaps multiple times with a variety of models, all of the major calculation aspects of SAPHIRE. Since SAPHIRE is primarily a tool to generate minimal cut sets, the calculations focused on the solution and quantification of logic models (e.g., fault trees, event trees). Automating the testing of these calculations were the driver behind the developing automated tests.

For additional details on the SAPHIRE development process, see Appendix A.3. This appendix contains programmatic information of the overall process used by the developers at the INEEL.

1.4 Report Organization

This report has seven main sections and three appendices. Section 2 briefly overviews PRA concepts as they pertain to the SAPHIRE software. Section 3 outlines the methodology behind the TV&V performed on SAPHIRE. Section 4 discusses the automated test suite used during the TV&V. Section 5 discusses results of the TV&V process. Section 6 presents overall conclusions obtained from the TV&V and contrasts them with those of the earlier verification and validation of SAPHIRE. Section 7 presents the references referred to in the body of the report. Appendix A presents additional background information relating specifically to the TV&V, the SAPHIRE development process, and the SAPHIRE software. Appendix B details specific tests found in the automated test suite. Appendix C presents all of the detailed results from the automated test suite.

2. OVERVIEW OF PRA CONCEPTS

The TV&V process involves selecting a set of vital SAPHIRE function and a set of PRA models—applicable to NRC activities—on which to test these functions (NRC 1997). The decisions are based on understanding PRA issues and how these are translated into modeling and quantification. This section briefly summarizes the PRA concepts and how they relate to SAPHIRE.

2.1 PRA Analysis Levels

A full-scope PRA involves three levels. A modern nuclear power plant PRA is analyzed using a layered approach. The first level contains the logic models (e.g., fault trees and event trees) and probability data representing the outcome of damage to the reactor core. The second level concerns the plant response to the core damage progression (primarily the containment and associated systems). And third level focuses on the off-site consequences resulting from the damaged core and containment. These levels are called Level 1, Level 2, and Level 3 analysis, respectively (NRC 1989).

Level 1 PRA identifies and quantifies sequences leading to core damage. This involves identifying significant initiating events, generally those that challenge normal plant operation and that must be successfully dealt with to prevent core damage. Once these initiators are identified, possible plant responses (sequences) must be determined. The response depends on the different combinations of successes and failures of the systems involved. When the systems have been determined, they must be modeled (usually with fault trees) to identify credible failure modes and unavailabilities. Finally, a Level 1 PRA quantifies the plant's core damage frequency and its associated statistical uncertainty. To determine these results, initiating event frequencies and equipment failure/unavailability probabilities must be ascertained.

A Level 2 PRA evaluates and quantifies subsequent material releases from core damage. This analysis involves filtering the large number of Level 1 sequences to a practical number for detailed analysis, typically by grouping Level 1 cut sets into a smaller set of plant damage states. Assessment of containment system performance with Level 1 accident sequence analyses is performed much the same as Level 1 analysis by using fault tree models to estimate failure probabilities and linking them directly to sequences developed in the Level 1 analysis.

Level 3 addresses not only Level 1 and 2 issues but evaluates and quantifies resulting consequences to the public and environment as well. Thus, questions such as weather conditions, population levels surrounding the plant site, and dispersion (from containment) characteristics are important in this analysis. Figure 2-1 illustrates all three PRA levels.

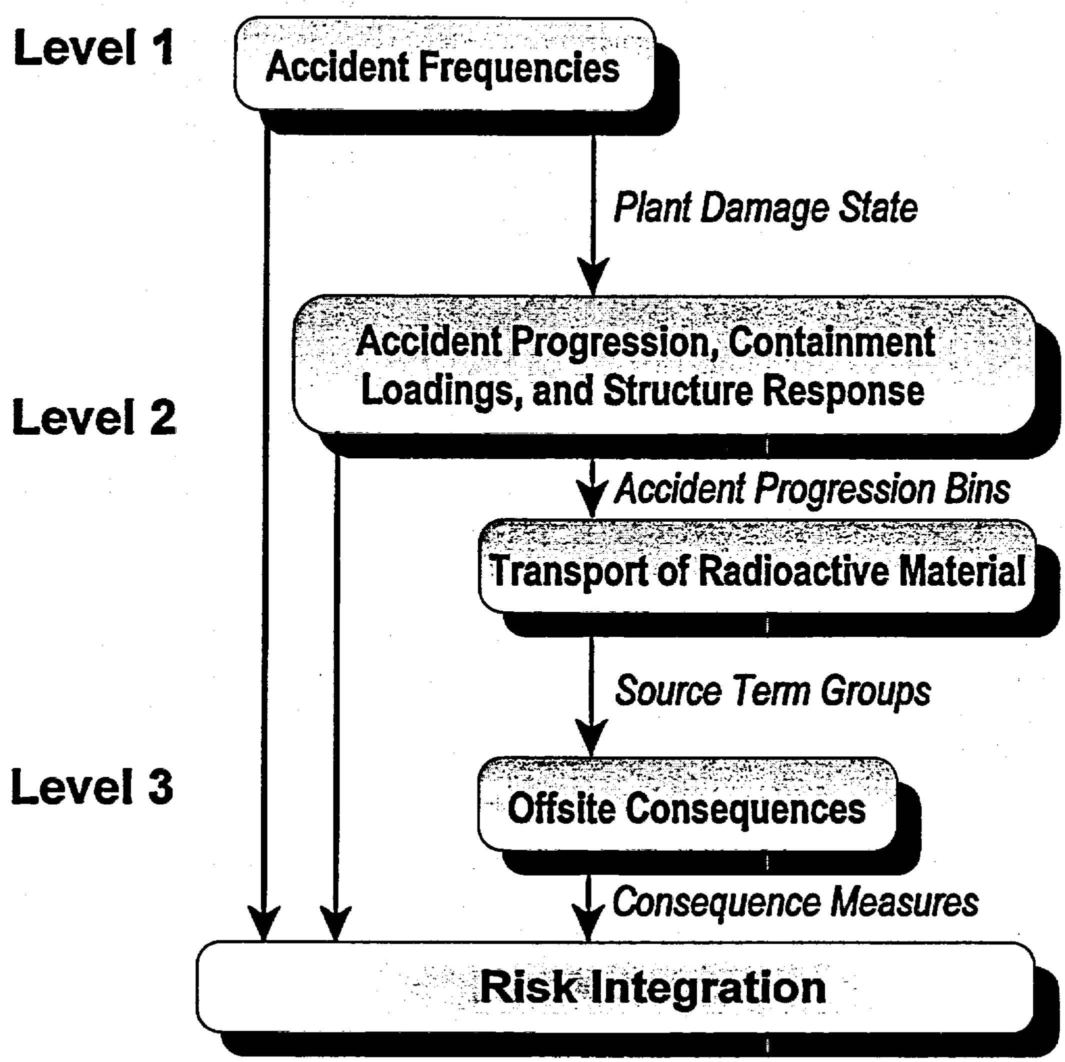


Figure 2-1. Representation of the three PRA "levels."

2.2 PRA Elements Embodied within SAPHIRE

SAPHIRE provides mechanisms to model all traditional Level 1 tasks. Event trees can be built to determine accident sequences using initiating events and systems. The individual systems¾as named on the event trees¾can be modeled using the SAPHIRE graphic or logic fault tree editors. Initiating events and other failure events that comprise each system can be assigned frequencies or probabilities. Minimal cut sets (i.e., a minimally sufficient group of failures that can lead to an undesired outcome) can be generated to quantify fault trees and sequences. The PRA analyst has mechanisms available to perform a variety of different uncertainty analyses, sensitivity analyses, and importance measures.

In addition to its Level 1 capabilities, SAPHIRE has the functionality to perform many calculations for Level 2 analysis. Excluded from the built-in SAPHIRE functionality are complex phenomenological calculations (e.g., postcore damage situations) germane to Level 2 analyses. SAPHIRE also offers the analyst some simple Level 3 calculation tools, but these focus on logic-model scenario development (e.g., containment is breached with probability X and the dispersion has a magnitude of Y). In general, SAPHIRE is intended to provide analysts a tool for developing and quantifying Level 1 and 2 PRA models.

Since the SAPHIRE software is a tool primarily to conduct Level 1 and 2 PRA analyses, our testing of this software focused on the important areas relating to this type of PRA. Consequently, the tests themselves and the functional areas of the software being subjected to examination are defined in terms of PRA attributes. The remainder of this section discusses these PRA attributes and specific SAPHIRE terms.

Within the three PRA levels of analysis are a variety of computational models, data, and associated assumptions. Table 2-2 lists these important items and their definitions. Included in the table is a graphical illustration (where applicable) of the item representing the PRA element.

Table 2-1. PRA elements embodied in the SAPHIRE software.

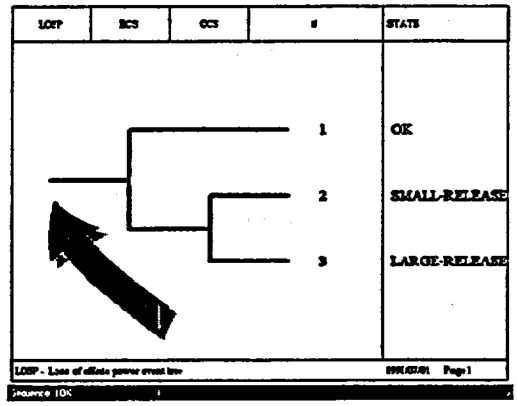
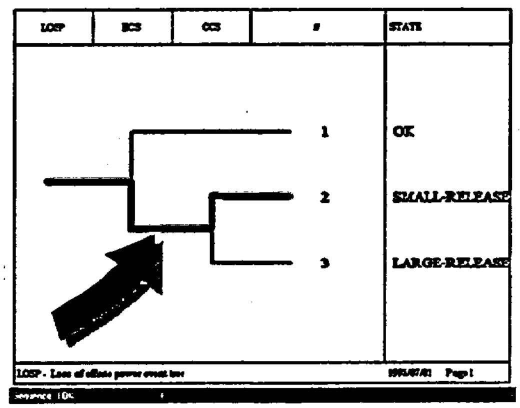
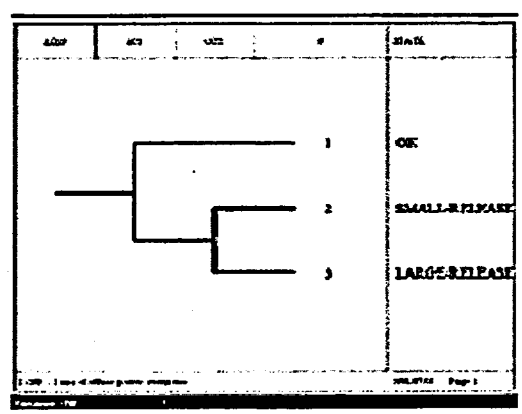
PRA element	Definition	Graphical illustration of element
Initiating event	An initiating event is an operational occurrence (such as a pipe break or plant transient) which threatens fuel safety and may require safety system response to avoid core damage.	
Accident sequence	The branching path, from initiating event to end state, that is a unique combination of system failures and/or successes. This string of failures or successes defines the sequence of events leading to an accident (i.e., undesired end state). The sequence results are expressed as minimal cut sets.	
Event trees	Event trees are logic models that are used to identify accident sequences. Within an event tree, all sequences begin from an identical initiating event. After the initiating event, specific system responses determine the course of the accident sequence.	

Table 2-1. (continued).

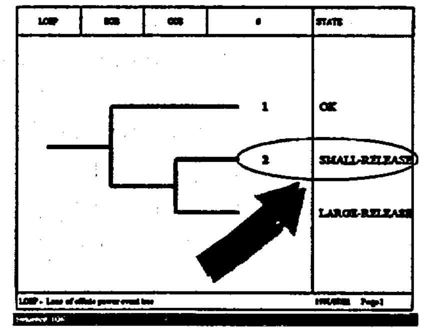
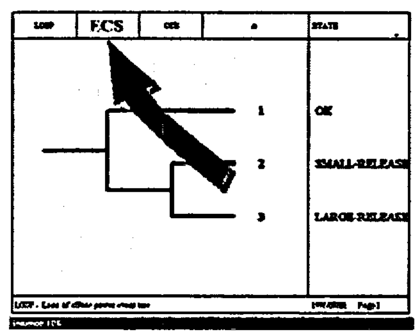
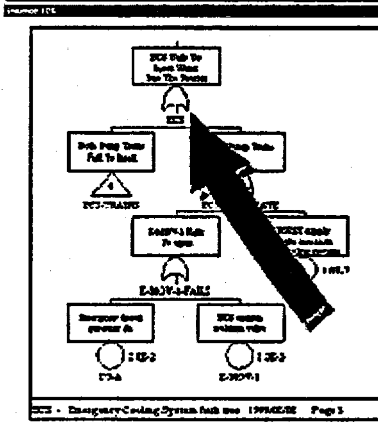
PRA element	Definition	Graphical illustration of element
End states	Groups of accident sequences which share certain characteristics that the analyst delineates. These groups may be related to ability to perform selected safety functions or timing of functional failures.	
Success criteria	The success criteria is a specification of the compliment of equipment that must successfully operate to achieve functional success for each branch point or top event. This specification is developed analytically. The success criteria is used to define the boundary conditions for the failure modeling embodied within the corresponding fault tree.	
Top event	Safety systems (or human actions) which are intended to respond to an initiating event. Top events could be represented in either event trees or fault trees.	 

Table 2-1. (continued).

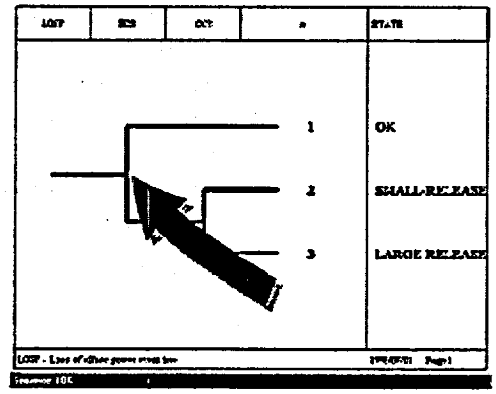
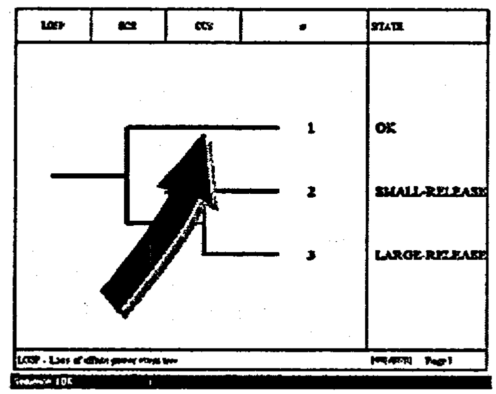
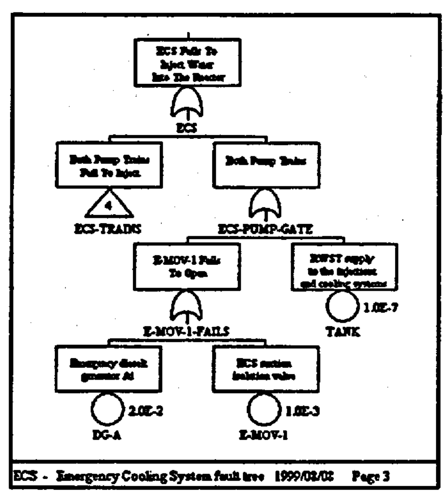
PRA element	Definition	Graphical illustration of element
Branching	The branching underneath a top event which indicates success with an up branch and failure with a down branch. The down branch is typically represented by a fault tree.	
Pass	A pass is denoted when there is no branching beneath a top event. In this case, the top event is not relevant to the particular sequence.	
Systems analysis	Systems analysis represents the fault tree analysis of a physical system. The system function is decomposed into potential failures for individual components or structures. Then, these potential failures are combined in a logic model (i.e., fault tree) that represents operation of the system in question. Minimal cut sets are the product of systems analysis.	

Table 2-1. (continued).

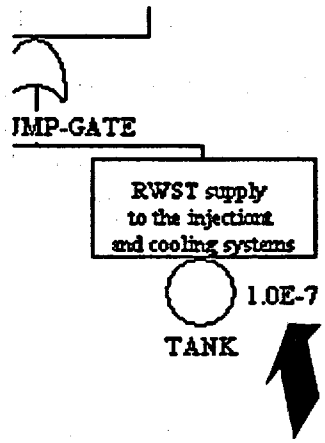
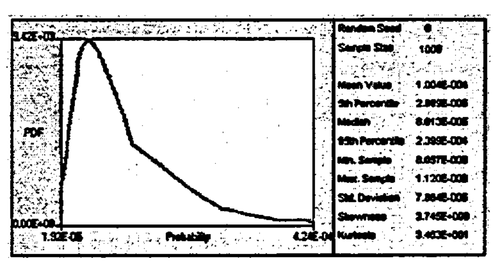
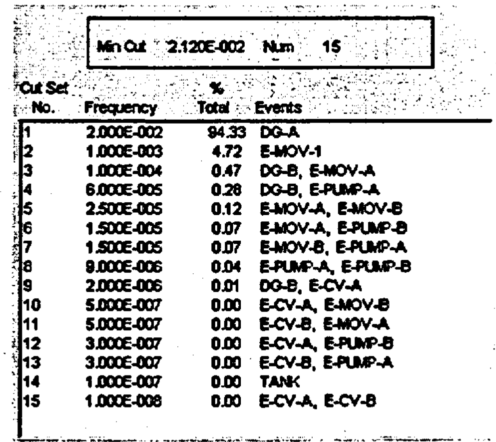
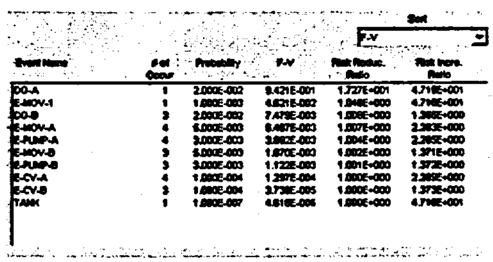
PRA element	Definition	Graphical illustration of element
Data analysis	Data analysis represents the collection of operational data or expert judgement such that a determination can be made regarding a particular component failure probability or unavailability.	
Cut set generation	Cut set generation involves the process of evaluating the PRA logic models (either fault trees or event trees) in order to determine the minimally-sufficient set of failures associated with the logic model.	
Human reliability analysis	Human reliability analysis embodies the process of evaluating human actions (both positive and negative) with respect to their inclusion in the logic models. For example, the probability of errors due to human actions may be incorporated directly into a fault tree. Or, the failure of a human to fix a broken component (i.e., a "recovery" action) may be appended to accident sequence results.	
Dependency analysis	Dependency analysis is an evaluation centered upon accounting for specific types of dependent (i.e., not independent) failures. For example, the failure of multiple, redundant components may be included in a fault tree model as one type of potential failure mechanism.	
Uncertainty analysis	Uncertainty analysis is the process of quantifying uncertainty metrics (e.g., mean, standard deviation, upper bound) for any of the PRA results.	

Table 2-1. (continued).

PRA element	Definition	Graphical illustration of element
Change sets and flag sets	Change sets and flag sets are user-defined data modifications that are used during the quantification of fault trees, sequences, or end states. Change sets are general purpose data modifications while flag sets are assigned to specific fault trees or accident sequences.	
Quantification	The process where the minimal cut sets are evaluated to determine a numerical result. Quantification can take place for systems, sequences, or end state analyses.	
Importance measures	Importance measures provide "reliability-worth" information for basic events in cut sets for systems, sequence, or end state analysis. The measure of worth can take on many forms depending on what concern the analyst has for a particular basic event. PRA analysts frequently use measures such as risk increase, Fussell-Vesely, or Birnbaum.	

Min Cut 2.120E-002 Num 15

Cut Set No.	Frequency	% Total	Events
1	2.000E-002	94.33	DG-A
2	1.000E-003	4.72	E-MOV-1
3	1.000E-004	0.47	DG-B, E-MOV-A
4	6.000E-005	0.28	DG-B, E-PUMP-A
5	2.500E-005	0.12	E-MOV-A, E-MOV-B
6	1.500E-005	0.07	E-MOV-A, E-PUMP-B
7	1.500E-005	0.07	E-MOV-B, E-PUMP-A
8	9.000E-006	0.04	E-PUMP-A, E-PUMP-B
9	2.000E-006	0.01	DG-B, E-CV-A
10	5.000E-007	0.00	E-CV-A, E-MOV-B
11	5.000E-007	0.00	E-CV-B, E-MOV-A
12	3.000E-007	0.00	E-CV-A, E-PUMP-B
13	3.000E-007	0.00	E-CV-B, E-PUMP-A
14	1.000E-007	0.00	TANK
15	1.000E-008	0.00	E-CV-A, E-CV-B

Sort F-V

Event Name	# of Occur	Probability	F-V	Risk Reduc. Ratio	Risk Incre. Ratio
DG-A	1	2.000E-002	9.421E-001	1.727E+001	4.716E+001
E-MOV-1	1	1.000E-003	4.621E-002	1.048E+000	4.716E+001
DG-B	3	2.000E-002	7.479E-003	1.008E+000	1.366E+000
E-MOV-A	4	5.000E-003	8.467E-003	1.007E+000	2.263E+000
E-PUMP-A	4	3.000E-003	3.862E-003	1.004E+000	2.265E+000
E-MOV-B	3	5.000E-003	1.870E-003	1.002E+000	1.371E+000
E-PUMP-B	3	3.000E-003	1.122E-003	1.001E+000	1.372E+000
E-CV-A	4	1.000E-004	1.297E-004	1.000E+000	2.269E+000
E-CV-B	3	1.000E-004	3.736E-005	1.000E+000	1.373E+000
TANK	1	1.000E-007	4.616E-006	1.000E+000	4.716E+001

SAPHIRE was designed to perform reliability and risk analyses typical of those in nuclear power plant PRAs. As such, the majority of the terminology and methodology that has been designed into SAPHIRE is derived from the PRA community. In any software as complex and feature-rich as SAPHIRE, limitations and special items of note are present. A variety of these items have been collected and are described in Table 2-2 for many of the PRA areas identified previously, including the following:

- Initiating events
- Accident sequences (also called sequences, event tree sequences, or sequence logic)
- Event trees (also called event tree graphic or event tree logic)
- End states (also called end state partition)
- Success criteria
- Top event (also called a developed event or top gate)
- Branching (also called a branch point, node, split, or bifurcation)
- Systems analysis (also called fault tree analysis)
- Data analysis
- Cut set generation (also called cut set solving)
- Uncertainty analysis (also called uncertainty propagation or sampling)
- Change sets and flag sets
- Quantification
- Importance measures

These identified PRA areas are considered vital for most traditional PRA analyses. Thus, if one were to select portions of PRA software to test, these areas would be likely candidates. It was this consideration that led to development (as is discussed later) of the TV&V tests.

Note that software limits, where applicable, are shown in Table 2-2, but it is not the intention of TV&V to perform *stress* testing of the SAPHIRE software. For example, while it is indicated that a SAPHIRE database may contain 64,000 event trees, no tests were performed to verify proper operation of the software around this limit. Instead, our tests were designed to provide a battery of real-world calculational challenges typical of nuclear power plant PRAs. We believe that to verify proper operation of the software and to provide a level of confidence for analysts using SAPHIRE, our resources were best invested in testing the software similarly to how it will ultimately be used. Consequently, stress testing played no role in the current implementation of the TV&V test suite. Practically speaking, very few PRAs approach the limits built into SAPHIRE. For example, while the total number of basic events in SAPHIRE may be approximately 64,000, most nuclear power plant PRAs in the United States contain between 1,500 and 4,000 basic events.

Table 2-2. SAPHIRE-specific terms and features for each PRA element.

PRA element	SAPHIRE terms and features
Accident sequences	Within an accident sequence, the total number of minimal cut sets that can be generated and stored is only limited by the available hard drive space. The total number of accident sequences that may be in a database is 64,000.
Branching	The top-most branch is assumed to represent success of the particular top event. Downward branches (i.e., under the top-most branch) are assumed to represent failure of the particular top event. Branches may be multi-nodal (i.e., non-binary).
Change sets and flag sets	There is no limit as to the number of change sets or flag sets that can be stored in a database. For a quantification calculation, every change set could be used if desired. Since flag sets are assigned to either a specific fault tree or a specific accident sequence, only the assigned flag sets will be utilized during a calculation.
Cut set generation	In general, for a database, the total number of minimal cut sets that can be generated and stored is only limited by the available hard drive space. For example, analyses with over 15×10^6 cut sets in the results have been reported by analysts using SAPHIRE.
Data analysis	To denote the complement of an event, precede the event name with a "/" character [e.g., /DG-A represents the calculation 1 - P(DG-A)]. The total number of basic events that may be in a database is 64,000.
End states	End state names that are "OK" or "SUCCESS" or begin with "@" will not be quantified. Within an end state, the total number of minimal cut sets that can be generated and stored is only limited by the available hard drive space.
Event trees	Only one initiating event is permitted per event tree. Event trees may transfer from one tree to another separate event tree. The total number of event trees that may be in a database is 64,000.
Importance measures	There is no limit as to the number of basic events or cut sets that may be utilized for the importance measure calculation. Available importance measures include: Fussell-Vesely, risk increase ratio (a.k.a. risk achievement worth, or RAW), Birnbaum, risk increase interval, risk decrease ratio, risk decrease interval, group importance measures, and uncertainty importance measures.

Table 2-2. (continued)

PRA element	SAPHIRE terms and features
Initiating events	Within SAPHIRE, initiating events are considered to be "developed events." Developed events are simply a special type of basic event. The numerical value of initiating events can be any positive value. Since SAPHIRE does not impose specific units on basic events, the units of initiating events can be either per time (e.g., a frequency) or dimensionless (e.g., a probability).
Quantification	There is no limit as to the number of basic events or cut sets that may be utilized for the quantification calculation. Three types of quantification methods are built into SAPHIRE. The default method is the "min-cut upper bound" and generally provides a very good approximation to the exact failure probability or frequency. The other two methods are the exact quantification, called "min-max", or the "rare-event" approximation.
Success criteria	Since SAPHIRE utilizes fault trees to represent system behavior, the system success criteria is captured in the specifics of the logic modeling. As such, system success criteria is not directly evident as part of a system model but may be inferred from the logic of the model. Logic modeling may include the typical "OR" and "AND" gates in addition to the complemented gates "NOR" and "NAND." Also, "N-of-M," transfer, and inhibit gates may be used. The maximum for the "N-of-M" type of gate is 98 out of 99.
Systems analysis	In SAPHIRE, a system (or fault tree) may have only one top gate per tree. A system may transfer from one tree to another separate tree or trees (the transfer gate and separate tree names must be identical). Within a system, the total number of minimal cut sets that can be generated and stored is only limited by the available hard drive space. The total number of system fault trees that may be stored in a database is approximately 64,000.
Top event	Within SAPHIRE, top events are considered to be "developed events." Top events are handled similar to basic events.
Uncertainty analysis	SAPHIRE has two types of uncertainty sampling, simple Monte Carlo and Latin Hypercube. A total of 99,999 iterations can be used for either sampling technique. In addition to the sampling techniques, a total of thirteen different uncertainty distributions may be utilized for individual basic events.

Where possible, the tests we constructed and used for the TV&V were tied to one of the primary PRA areas identified above. For example, a test to generate minimal cut sets for an event tree accident sequence would be identified as a test of the "accident sequence" area. But, as a function of how PRA is performed, most of the automated tests end up examining more than one PRA area. To illustrate this point, the general steps required to perform an accident sequence analysis are shown below. With each step, we note the particular PRA areas represented.

1. Construct the accident sequence of interest. This step will test the PRA areas of:

    - Initiating events
    - Accident sequences
    - Event trees
    - End states
    - Success criteria
    - Top event
    - Branching
    - Systems analysis
    - Flag sets

2. Generate the basic event data. This step will test the PRA area of basic event data analysis and, possibly, change sets.

3. Generate minimal cut sets for the accident sequence. This step will test the PRA areas of cut set generation and quantification.

4. Evaluate the results of the analysis. This step may test the PRA areas of uncertainty analysis or importance measures.

As one can see from the items above, even though a particular test focuses on the outcome of a single type of PRA calculation (e.g., accident sequence cut set generation), during the process of testing this calculation, many PRA areas are tested. In the example above (accident sequence analysis), a potential of fourteen areas could be scrutinized by the test. If any one of the fourteen areas failed to function properly, the end results (i.e., sequence minimal cut sets) would probably be in error and would be flagged as a software discrepancy. Further, these areas would be used for just this one test; the test suite used for the TV&V contains dozens of different tests and PRA models.

3. SAPHIRE TESTING, VALIDATION, AND VERIFICATION

3.1 Approach

Previous versions of SAPHIRE were tested by a traditional V&V process. In brief, a V&V process consisted of the following steps:

- Preparing a V&V plan
- Identifying SAPHIRE's vital and non-vital features
- Evaluating the code-development control procedures
- Developing test cases
- Performing the V&V testing
- Documenting the test results
- Developing recommendations.

These steps were performed in accordance with IEEE's "Standard for Software Verification and Validation Plans" (IEEE 1012-1986). Note, however, that evaluation of the user documentation and of the software requirements-specification was not performed to the detail found in the IEEE standard.

While the automated TV&V process is *not* a "formal V&V," it was intended to be consistent with the IEEE standard mentioned above. Lessons learned from the earlier V&V efforts were taken into consideration when developing this process. We followed general procedures consistent with the IEEE standard, which included

- Preparing a TV&V plan
- Developing the automated testing methodology
- Identifying what SAPHIRE features should be tested
- Developing or selecting PRA databases to be used as testing-models (this step included the explicit identification of the particular features tested)
- Specifying testing criteria specific to each test procedure
- Identifying for each test-model its "base-case" or "nominal results" (these results were used as a "reference" set of correct answers against which the results of new versions of SAPHIRE were compared to identify potential deficiencies)
- Testing document results and identify any discrepancies and their causes
- Fixing the software to remove the discrepancy.

Upon completing the software modification made to correct the discrepancy, the automated test suite will be rerun to determine if the fix has corrected the problem.

3.2 Automated Testing Methodology

Automated testing methodology involved developing testing procedures, constructing test scripts, the identifying test acceptance criteria for passing the test, and physically operating the tests with the software being tested. This section discusses the attributes of each aspect of the testing methodology.

3.2.1 Testing Procedures

The test procedure dictates how the mechanics of the testing process is to take place. To perform the tests for the TV&V, we decided that all test scripts and test databases be first stored on a network drive (at the INEEL) accessible by version control software. The version control software tracks *all* changes by author and time. Note that only one person is allowed to check out an item for modification at any one time. These *personal* copies are stored on a local machine for development and testing. Any completed changes are then submitted to the version control library with the name of the author, date, time, and a short description of the change. The version control software stores and marks the changed copy as the newest version but retains the old versions for historical purposes.

Individual test cases were designed to perform a specific analysis task, just as a SAPHIRE user might perform them. Each test case consists of one or more scenarios (e.g., modifying data, generating cut sets). These scenarios focus on a particular piece or variation of the test case analysis task. The *complete* set of tests and scenarios comprise the test suite, which is executed prior to release of each new version of SAPHIRE.

Prior to running the test suite, the latest, completed, and debugged scripts are checked out of the control library and compiled (by the testing software) into run-time form. The compiled suite of tests, along with the compressed (.zip format) database files and SAPHIRE, are transferred to the test machine on which the tests are to be run (if any changes to the scripts have been made since the last test run). This delivery mechanism allows the TV&V team to quickly test SAPHIRE on a variety of computer platforms and operating systems. (Currently, SAPHIRE is supported for the Microsoft Windows operating systems of Windows 95, Windows 98, Windows NT, and Windows 2000. The SAPHIRE software should function properly under derivatives of these operating systems (e.g., Windows ME), but at this time, the TV&V has not evaluated these other operating systems.)

A small batch file then executes the test suite. For each test, the batch file decompresses the required database into a test directory. Consequently, for each test, the test database is started from a new "fresh" database that is in a known state. The compiled test script then runs a series of test scenarios on that database, recording expected results and any deviations into summary and detail files. These results files are named according to the run date and particular test. If SAPHIRE fails a test, the cause is investigated and fixed, and the entire process is repeated. Results of various details can be sent to an output file for review if desired. For example, one could set up the testing software to just output a pass/fail metric for each of the tests. As discussed in Section 5, the default for the TV&V test suite is to output detailed results for each test.

After the tests are run on the version of SAPHIRE being tested, the automation software generates two documents: a summary report and a detail report. The complete output from the current test suite execution on SAPHIRE version 6.63 are included in Appendix C. The report in this appendix lists the test identification number, a description, and an overall pass/fail indicator. A test is marked failed if even one result is incorrect. The detail report displays a more thorough description of the steps taken, the results obtained, the expected results, and deviations, if any. As the code developers run the test suite, any discrepancies are noted and corrected prior to release of a new version.

Advantages of Automated Testing

Test automation is becoming more and more prevalent in the software industry as a means to ensure software quality quickly and accurately. Test automation refers to the simulation of user actions such as selecting menus, clicking buttons, and typing. Using an automated test program offers the following advantages:

- Speed and reliability for repetitive tasks. Tests can be performed in a fraction of the time it would take to perform the same verification by hand.
- Exact repetition of testing process. All analysis steps are reproducible.
- Minimal potential for tester errors and omissions.
- Computer rather than visual results comparison. Where slight differences exist, visual comparison can overlook them, and occasional errors do occur.
- Versatility to readily run tests on a variety of machine configurations and operating systems to further verify the stability of the code.
- Automatically recorded results, which can be used to pin-point errors in the software.

Disadvantages of Automated Testing

Using an automated test program may have the following disadvantages:

- Need to modify when new software features are created or functionality is changed. For example, if the steps required to perform an analysis were modified, the associated steps captured in the test script would require adjustments.
- Rote process leading to errors.
- Testing process quitting without completing, possibly skipping a particular test. If the missed test were one of many, it is possible that the tester would not notice the omission.

Applicability to SAPHIRE Versions 6.0 and 7.0

As long as the user interface or navigation of SAPHIRE remains the same, the test suite developed for this TV&V will be effective. At this time, the SAPHIRE 6.0 and SAPHIRE 7.0 user interfaces are very similar. Since a test script defines the series of user actions to perform an analysis (open a menu, click a button, etc), if those actions change, some modifications to affected test scripts will need to be made. Versions 6.0 and 7.0 are a Windows application and follow standard Windows interface guidelines. Consequently, we anticipate changes to be minimal.

3.2.2 Construction of Test Scripts

To construct test scripts, the salient features of the software to be tested must first be identified. We identified the SAPHIRE features to be tested by outlining the major functions performed in a PRA and then overlayed these functions onto specific SAPHIRE features. As discussed in Section 2, applicable PRA functions include cut set generation and quantification; uncertainty analysis; and importance measures. We solicited and received input from experienced PRA users to expand and refine the list. From the list, we deemed SAPHIRE features important and, thus, testable, when those features:

- May impact the results of a PRA (e.g., core damage frequency, importance measures, uncertainty)
- Are essential for completing a PRA analysis (e.g., fault tree analysis, event tree analysis).

Consequently, from the list of important features, coverage of required PRA functions are ensured. The following summarizes the PRA functions tested by the automated test suite:

1. *Fault Tree Analysis*. Test cases are designed to evaluate the fault tree cut set generation process, the quantification process, the application of recovery rules (i.e., modifications made to the cut set results after they are generated), and the capability to perform the analysis on a single fault tree or on multiple fault trees. This function directly applies to reliability analysis.

2. *Event Tree and Sequence Analysis*. Test cases are designed to evaluate the event tree sequence generation process, the sequence cut set generation process, the quantification process, the application of recovery rules, the application of partition rules (i.e., steps to move particular cut sets to a specified end state category), and the capability of performing the analysis on a single event tree sequence or on multiple event trees/sequences. This function directly applies to risk analysis.

3. *End State Analysis*. Test cases are designed to evaluate the gathering of cut sets by sequence end state designation, gathering of cut sets by partitioning rules, quantification process, and the capability of performing the analysis on a single end state or on multiple end states.

4. *Importance Measures*. Test cases are designed to evaluate each of the applicable PRA models for a variety of traditional importance measures for both single and groups of events.

5. *Uncertainty Analysis*. Test cases are designed to evaluate the uncertainty analysis for fault trees, individual sequences, and groups of sequences. These tests are performed for both the Latin Hypercube and the Monte Carlo sampling processes.

6. *Change Sets Feature*. Test cases are designed to evaluate the change sets feature and similar features used to perform sensitivity analyses. Change sets contain user-defined modifications to basic event probabilities.

7. *Graphical Evaluation Module (GEM) Initiating Event and Condition Assessments*. Test cases are designed to evaluate the functionality of the GEM code. The GEM

software is intended to simplify the types of analyses performed as part of the Accident Precursor Program at the NRC.

8. *Data Utility Functions.* Test cases are designed to evaluate functions intended to facilitate data handling and general manipulation. These functions include extraction of PRA data outside of SAPHIRE, loading of PRA data into a SAPHIRE database, and paging (i.e., subdividing) fault tree models.

Note that the areas described above are captured within specific tests contained in the automated test suite. For each test, one or more of these areas are pointed out as the primary purpose behind the test.

Once the important SAPHIRE features were identified, we identified general tests that would evaluate each feature. These general tests may have more than one type of analysis approach, since it is possible within PRA (and SAPHIRE also) to solve some problems in more than one way. For example, sequence cut sets could be determined by solving sequence logic explicitly or by combining pre-existing fault tree cut sets. Table 3-1 overviews all SAPHIRE features currently tested as part of the TV&V. For each feature, the function associated with the SAPHIRE feature and a general test description are provided. Appendix B presents additional detail on each test.

3.2.3 Test Acceptance Criteria

A total of 54 different tests have been identified and defined as part of the test suite. For each test, we developed criteria to determine if SAPHIRE accomplished a task. This generation of acceptance criteria resulted in a significant amount of information, since a test may use multiple PRA models. For example, the first test (Test-01) is performed using 10 different databases. Also, where applicable, the test evaluated the different mechanisms in SAPHIRE to accomplish the same task. An example of this aspect is the ability to generate end state cut sets using either the predefined end state categories (on the event tree) or using the end state partition rules.

The test acceptance criteria ranged from a single value (e.g., total core damage frequency) to hundreds of similar values (e.g., core damage frequency from individual accident sequences) to a set of dissimilar values (e.g., different importance measures for fault trees, moments, and percentiles from uncertainty sampling). In all cases, though, knowledgeable PRA personnel or statisticians at the INEEL obtained and verified the results.

Table 3-1. An overview of the SAPHIRE TV&V test scripts.

SAPHIRE Function	Software Option	Test Description and Criteria
Basic event data	Change sets	Determine if basic event data generated is based on the original values present in the model. Affected fault trees and sequences are solved and cut set results are verified. Tests were performed for no data changes, single event data changes, multiple event data changes, and multiple change sets.
Fault tree cut set generation	Solving fault trees	Determine that the correct cut sets are generated. Test were performed with and without flag sets.
Sequence cut set generation	Solving sequences	Determine that the correct cut set results are generated, including minimal cut sets. Test performed both specifically to test cut sets, and in the process of obtaining results for most of the other tests involving event trees. Tests were performed with and without flag sets.
Gather sequence cut sets into end states	End state gathering	Determine that the correct cut sets are gathered at the sequence level or after partitioning cut sets via the end state partition rules.
Fault tree uncertainty analysis	Monte Carlo and Latin Hypercube sampling on fault trees	Determine that the uncertainty is propagated through fault tree cut sets using the distributions of: lognormal, normal, beta, chi-squared, exponential, uniform, gamma, histogram, maximum-entropy, seismic, and constrained non-informative.
Sequence uncertainty analysis	Monte Carlo and Latin Hypercube sampling on sequences	Determine that the uncertainty is propagated through sequence cut sets using the distributions of: lognormal, normal, beta, chi-squared, exponential,:uniform, gamma, histogram, maximum-entropy, seismic, and constrained non-informative.
End State uncertainty analysis	Monte Carlo and Latin Hypercube sampling on end states	Determine that the uncertainty is propagated through end state cut sets using the distributions of: lognormal, normal, beta, chi-squared, exponential, uniform, gamma, histogram, maximum-entropy, seismic, and constrained non-informative.

Table 3-1. (continued).

SAPHIRE Function	Software Option	Test Description and Criteria
Importance measures	Fault tree, sequence, and end state importance measures	A fault tree, sequence, or end state is solved and the following importance measures are calculated/verified for each event, along with the name, number of occurrences, and probability: Fussell-Vesely, Risk Reduction/Increase Ratios Birnbaum, Risk Reduction/Increase Differences Uncertainty, Risk Reduction/Increase Differences
Cut Set Update	Fault trees, sequences, and end state updating	A series of fault trees or sequences are solved with recovery, and then a cut set update is performed to requantify with cut set probability truncation. Each cut set is verified for correct frequency and correct events.
Cut set recovery	"Auto-recover" option for fault trees and sequences	Determine that generated cut set results match version 6 results after checking the "auto-recover" option during solving.
Sequence cut set partitioning	Batch apply option	Determine that generated cut set results are correct after "batch" applying existing project, event tree, and sequence level rules.
Link Small event tree (logic)	Linkage Rules	Test to see that event tree logic (and linkage rules) generates correct sequences. Sequences are solved with cut off and then number of cut sets and min cut upper bounds are verified for each Level 1 sequence.
Link Large event tree (cut sets)	Create cut sets option	Event trees are created using partition rules and linked using large event tree methodology to create sequence logic cut sets. The LERF end states are then gathered by sequence end state and requantified using the Rare Event approximation. The number of cut sets and min cut upper bounds are verified for each LERF end state.
Fault tree logic	Alpha-numeric logic editor and graphical editors	This test opens the fault tree editors and saves the tree. This test is not intended to test the logic editor interface (other than the Save Menu option), but to ensure that the existing logic is correctly loaded into the editor and saved back out correctly. Cut set results are verified to ensure this option works correctly. The pager option is also tested.

Table 3-1. (continued).

SAPHIRE Function	Software Option	Test Description and Criteria
Event tree logic	Graphical editor	This test opens the graphical event tree logic editor and saves the displayed logic. This test is not intended to test the graphical editor interface (other than the Save Menu option), but to ensure that the existing logic is correctly loaded into the editor and saved back out correctly. Cut set results are verified to ensure this option preserves the correct logic.
Project update	Version Upgrade	All tests using version 5 data must be converted to version 6 data via this process before any other testing can take place. If this process were to fail, the results of the tests would also fail.
GEM modifications	Delete, add, or modify in GEM	Test to see that an initiating event or condition assessment can be deleted, added, or modified.
GEM analysis for initiating events	Process	Determine that initiating event assessments for ten different models produce same results for version 6 as for version 5. Overall results verified include number of sequences; total CCDP; total core damage probability; total importance. Also verified are each individual sequences' CCDP and importance. Tests include: Transient with no other failures Transient with auxiliary feedwater (AFW) failed Small Loss of Coolant Accident with no other failures Steam Generator Tube Rupture with no other failures Grid-Related Loss of Off-Site Power (LOOP) with no other failures Plant-Centered LOOP with no other failures Severe Weather LOOP with no other failures Extreme Severe Weather LOOP with no other failures
GEM analysis for condition assessments	Process	Determine that condition assessments for ten lead plant models produce same results for version 6 as for version 5. Overall results verified include number of sequences; total CCDP; total core damage probability; total importance. Also verified are each individual sequence's CCDP and importance. Tests include: AFW out of service for 72 hours, Emergency Diesel Generator out of service for three months.
Fault Trees	Load/Extract	Test to ensure integrity is maintained when fault tree logic is extracted to an .FTL file and loaded back into the data base. The test extracts the logic, deletes the tree and associated basic event data, then reloads the logic and basic event data. The tree is resolved to ensure the results are the same as before the extraction.

Table 3-1. (continued).

SAPHIRE Function	Software Option	Test Description and Criteria
Basic Events	Load/Extract	Test to ensure data integrity is maintained when basic event data is extracted to .BEI and .BED files.
Fault Trees	Modify/Delete	Tests deletion of fault trees and unused basic events

While the tests and acceptance criteria address a large part of the calculational functionality within SAPHIRE, the tests do not cover 100% of SAPHIRE's capabilities. For example, the current test suite did not encompass every possible way of modifying cut sets after generation. Users can manipulate cut sets after generation (i.e., "post-processing") by manually editing them, using "recovery rules," using the "prune" option, and performing a cut set update. But the test suite does test the most commonly used mechanisms of performing tasks in SAPHIRE. Other calculational aspects not tested include

- Conditional cut set probability cut off
- Event probability cut off (not frequently used due to the calculation speed of modern computers and software such as SAPHIRE)
- Size/Zone cut off (not frequently used due to the calculation speed of modern computers and software such as SAPHIRE)
- Transformations (generally used only for fire or flooding analyses)
- Solving sequences without fault trees (an obsolete calculation technique that may be removed from future versions of the software)
- Starting gate name (generally used only during the development or debugging of a PRA)
- Link event trees with "Generate cut set" option checked (used for the "large event tree" PRA methodology)
- Seismic analysis
- Loading and unloading data via MAR-D interface (with the exception of loading and unloading fault tree logic files)

In addition, explicit testing of user-interface features was not part of this effort. However, as noted, these and other features not explicitly identified here as tested are covered in the beta testing process as part of the release process of each new SAPHIRE version. Beta testers are analysts experienced with PRA methods and terminology, and typically they are familiar with earlier versions of SAPHIRE. The primary objective of the beta testing is to verify that the results produced by the new version are correct. The secondary objective is to ensure that the software is user-friendly and functional. Prior to general release of a version of SAPHIRE (after the successful completion of the test suite), the code is released to a small group of beta testers. Usually, the requestor (or beneficiary) of a new feature is asked to also conduct beta testing for that feature.

The beta testers report any discrepancies and findings to the development team. This beta testing relies on *informal* acceptance criteria (i.e., the analyst using the software decides whether a discrepancy is present or not). The development team then implements any indicated modifications needed. When it appears that the modified version better "fits" existing system requirements, the test suite is rerun and another beta version is released to the beta testers. This process is continued until a version is produced that appears ready for general use. This version is then placed under version control, an appropriate version number assigned, and released for production to the sponsor and user community. The beta test approach covers the entire SAPHIRE software package and is a necessary step in testing any software. Development of the TV&V test suite is not intended to replace this step, but to enhance it.

In addition to beta testing, INEEL personnel receive feedback from users around the world. Hundreds of users rely on the calculational ability of SAPHIRE for both risk and reliability calculations. Included in these users are U.S. national laboratory personnel, U.S. and foreign government regulators, private contractors, university students, and nuclear power plant PRA analysts. Based on feedback from users, the INEEL corrects programmatic errors and discrepancies, improves the user interface, and recommends new features.

Furthermore, because the INEEL is continually loading new PRAs into SAPHIRE, its features are tested by comparing them with the original PRA models and results. About 30 full-scope nuclear power plant PRAs have been (completely or partially) loaded in SAPHIRE. The loading process requires a detailed comparison of the models and results with the models and results of the original PRAs (which were constructed in other PRA software). Identified discrepancies are resolved through the interaction with the individual licensees and analysts building the PRA. Given that different PRAs have been performed with different types of software, one can argue that SAPHIRE has been tested by an enormous number of test cases.

Appendix C details the test acceptance criteria. Listed for each of the tests (and for each model used for each test) are the expected results that SAPHIRE should generate upon completion of the test. Thus, the *formal* acceptance criteria are simply those results used to verify a pass-or-fail status of SAPHIRE specific to the test.

3.3 Selection of PRA Modes for Testing

Once the list of SAPHIRE features (and feature-testing needs) had been established, we identified suitable models on which to test the features identified. A primary source of data was the PRA databases loaded into SAPHIRE Version 5. Results of these databases were verified during the verification and validation of SAPHIRE 5, and formed a baseline for debugging new SAPHIRE versions. In addition, we used input from experienced SAPHIRE users extensively in selecting appropriate PRA databases for testing.

We selected a variety of models, with varying degrees of size and complexity, based on their suitability for adequately testing the selected features. The models used for testing SAPHIRE were actual PRAs, or parts thereof, prepared by experienced analysts for nuclear power plant application. In a few cases, the model used for testing was created specifically for testing. But the bulk of the testing relied on detailed PRA models.

Rather than exhaustively test every feature of SAPHIRE, the intent of this TV&V effort was to obtain basic assurance that new updates/changes had not compromised existing capabilities. Size and boundary conditions of the PRA models were not major issues. Consequently, we selected databases of reasonable size and complexity from among the available model choices. Selecting reasonable models expedited the running of test scripts, which complete in a matter of hours rather than days, while still accomplishing the purpose of the testing. The philosophy guiding our decision concerning model size is that it was better to conduct more less-complex but dissimilar tests than more-complicated but fewer tests.

Table 3-2 lists the various data models included in the test suite, their names, and the version of SAPHIRE originally used to construct the model. Note that for those databases constructed in older versions of SAPHIRE (e.g., Versions 4.0 or 5.0), the database was converted by SAPHIRE before the test could be performed. Consequently, the test not only verified the calculational aspect of the software, but also the function of converting a PRA model from one version to another. The remainder of this section describes the PRA models used for testing.

Table 3-2. Plant model names, information, and abbreviations.

Plant model name, type	Type of PRA model	SAPHIRE version used to construct the model	Model abbreviation
Beaver Valley Unit 2, PWR,	Individual Plant Examination (IPE)	5	BV2-5
Byron Units 1&2, PWR	Simplified Plant Analysis Risk (SPAR) revision 2QA	5	BYRN
Comanche Peak 1&2, PWR	IPE	6	COM-PEAK
Crystal River 3, PWR	IPE	6	CR3
Demo database provided with SAPHIRE installation	simple test model	4	DEMO
Dresden Units 2&3, boiling water reactor (BWR)	SPAR revision 2QA	5	DRES
Grand Gulf Unit 1, BWR	SPAR revision 2QA	5	GGUL
Milstone Unit 3, PWR	SPAR revision 2QA	5	MIL3
Oconee Units 1,2,&3, PWR	SPAR revision 2QA	5	OCON
Oyster Creek, BWR	SPAR revision 2QA	5	OYST
Peach Bottom Units 2&3, BWR	SPAR revision 2QA	5	PBOT
Surry Units 1&2 large early release frequency (LERF) model, PWR	SPAR	6	S_LERF
San Onofre Units 2&3, PWR	SPAR revision 2QA	5	SONG
St Lucie Unit 1, PWR	SPAR revision 2QA	5	STL1
Surry Unit 1, PWR	NUREG-1150	4	SUR40
Surry Unit 1, PWR	NUREG-1150	5	SURRY-50
Surry Units 1&2 PWR	SPAR revision 2QA	5	SURY
Uncertainty Project, written specifically for testing, version 5	simple test model	5	TSTU

3.3.1 Simplified Plant Analysis Risk Models

We developed a set of 72 simplified plant analysis risk (SPAR) models (Revision 2QA) for the NRC's Accident Precursor Program. This is a set of reasonably accurate, consistent, and representative Level 1 PRA models for operating plants for use in evaluating operational event analysis (Long et al. 1998).

Several classes of plants were identified within the 72 SPAR models: four classes of boiling water reactors (BWRs) and six classes of pressurized water reactors (PWRs), based on similar plant responses to transients and accidents and the systems designed to perform those responses. We chose the lead plant model for each class as the testing tool for this TV&V. Models other than the lead plant within a particular class could have been used as additional tests, but we expected that, since additional models are derivatives from the lead plant in its category, the potential for capturing a SAPHIRE problem not already found in the lead-plant model is low.

We obtained the set of written procedures developed for manually testing the ten lead plant models. These procedures were translated into an automated test script, initially for the Byron (BYRN) and Peach Bottom (PBOT) models. Once these were completed, we applied the automated test script to eight other lead plant models by changing only the inputs and the result tables associated with the script. These changes were subsequently checked to ensure that the proper analysis steps were being applied.

In general, SPAR model testing focused on solving fault trees, solving accident sequences from the event trees, and using the Graphical Evaluation Module (GEM) to apply change sets for sensitivity analyses. The eight other SPAR models in the overall test suite are Dresden (DRES), Grand Gulf (GGUL), Milstone (MIL3), Oconee (OCON), Oyster Creek (OYST), San Onofre (SONG), St Lucie (STL1), and Surry (SURY).

3.3.2 SUR40

We performed a limited study using a Surry Level 1, NUREG-1150 database developed with SAPHIRE 4.0 to test SAPHIRE versions through SAPHIRE Version 6.42 (McCabe 1998). No changes were made to the original Surry database other than those necessary to upgrade the data to the current versions. Results of all 45 accident sequences were recorded and tracked through a series of SAPHIRE releases. Differences from version to version, if any, were documented and explained. Results tracked included minimal cut set upper bound (i.e., min-cut upper bound) and the number of cut sets per sequence. In addition to these results, the PRA database overall uncertainty, consisting of the mean, 5^{th}, and 95^{th} percentile results, were recorded. For this testing, the latest results of the study were used as a baseline for the SUR40 database. The analysis method for generating the values to be compared was translated into an automated test script. Then, this test was added to the overall test suite.

3.3.3 TESTU

PRA analysts developed most models chosen for testing to represent real models and data. An exception is a model we refer to as *TESTU*, a database identifier for *Test of Uncertainty*. For uncertainty testing, we developed a simple database for testing the spectrum of different available distributions. This test database contains a series of simple fault tree models, each consisting of a single OR gate with a single basic event as its input. These basic events were assigned a different distribution. Use of this simple database allowed the test developer and the statistician to verify correct results of the uncertainty tests.

3.3.4 DEMO

The DEMO database, packaged with SAPHIRE, is a simple model consisting of a single event tree, two fault trees, and 24 basic events. It was designed to demonstrate the basic features of SAPHIRE. Although small, the model and its data are manipulated in the same way as other models. For this reason, and in the interests of speed, the DEMO project was deemed sufficient, as in earlier verification and validation, for testing importance measures and as one of the models for testing change sets.

Importance measures are calculated for individual events found in a list of cut sets. Since the history of the cut sets are immaterial at the point in a PRA study where importance measures are generated, it was sufficient to use DEMO cut sets to perform importance measures testing. This database provides a succinct set of minimal cut sets from which to derive the importance measures.

Likewise, change sets, a SAPHIRE mechanism for performing sensitivity analysis and which operate *only* on basic event data, were tested using the DEMO database. The function of a change set is to temporarily modify one or more basic event's data characteristics (known as the *current* event data). All cut set operations exclusively use the current event data, regardless of database size and complexity. The mechanism for creating current event data with basic event changes is the same, regardless of which model is used.

3.3.5 SURRY-50

Surry-50 is a Level 1, NUREG-1150 database developed with SAPHIRE 5.0. It was adopted for use in testing change sets and generating and quantifying cut sets. These analysis options included sequences with flag sets, the application of recovery rules, and cut set updating (e.g., requantifying cut sets without regenerating them from scratch).

The Surry PRA involves a two-stage event tree analysis process. The first stage uses a set of event trees to develop the dominant accident event sequences that lead to core damage. The second stage uses a different set of event trees, identified in the PRA as *bridge* event trees, to aggregate the core damage sequences into plant damage states.

The SAPHIRE model developers performed quality assurance checks of the data to ensure completeness and accuracy of the data input to the database. The dominant accident sequences in the database were benchmarked against the results reported in the source PRA, and the principal author of the original PRA reviewed them.

3.3.6 COM-PEAK

Comanche Peak is a Level 1 IPE database developed with SAPHIRE 6.0. It, like SURRY-50, is used for testing cut set generation and quantification, recovery rules, and cut set updating. It is included for additional cut set verification and for testing fault tree flag sets not available in SAPHIRE 5.

3.3.7 BV2-5

Beaver Valley 2, Version 5, is a Level 1 PRA developed from the plant's IPE, using SAPHIRE 5. This database was specifically constructed as a train-level database, since modeling is simplified to the system train level. The model defines 17 plant damage states (end states) associated with its Level 1 event trees. Plant damage states are defined by the RCS pressure, availability of containment heat removal systems, and status of containment isolation or bypass at the time of reactor vessel failure after core damage.

Experienced PRA analysts recommended this model as a good Version 5 database for end state analysis testing, particularly for importance measures and uncertainty testing.

3.3.8 CR3

Crystal River 3, Version 6, is a Level 1 PRA developed from the plant's IPE, using SAPHIRE 6. This is a large fault tree model based on the master logic diagram modeling methodology. The master logic diagram method translates all PRA accident sequences into a fault tree (where each sequence is input into a top OR gate). Then, this single fault tree is further developed until the entire PRA is represented within the fault tree. Experienced PRA analysts recommended this model as a good Version 6 database for data manipulation and fault tree paging tests. A unique feature of this model is that since the PRA logic is contained with a single fault tree, the size of the fault tree is somewhat large.

3.3.9 S_LERF

Surry large early release frequency (LERF) is a Level 2 SPAR model developed with SAPHIRE 6.0. It offers a good working example of sequence and end state analysis. In particular, it links event trees using both small and large event tree methods. Further, it partitions and gathers cut sets by accident sequence using the partition rules option built into SAPHIRE.

Since this model is a Level 1/Level 2 model, the S_LERF model links the ASP Surry Level 1 event trees (used to calculate core damage frequency) to the ASP Surry Level 2 event tree (used for calculating LERF). This link is performed by a bridge event tree that generates plant damage states. These plant damage states are then used as initiating events to the LERF event trees. The plant damage states are generated by querying the Level 1 bridge event tree sequence logic to determine the seven to eight characteristics of the plant damage state using "IF-THEN-ELSE" partition rules. All cut sets associated with each Level 1 bridge event tree sequence are assigned to the same plant damage state using the "GlobalPartition" feature of SAPHIRE. In addition, plant damage states that have been determined to produce identical LERF results have been collapsed into a representative plant damage state using the "CurrentPart" feature of SAPHIRE.

Selection of a variety of different data models further enhances the viability of the test suite. As stated, many core features are exercised repeatedly across tests (and their associated models) in the process of performing each test's specific analysis task. Use of different models, from the simple DEMO database to the SPAR Revision 2QA models to NUREG-1150 models, provides quality and reliability assurance that any variations among models are appropriately handled by any released version of SAPHIRE. While the current tests do not address every feature within SAPHIRE, they do cover the important calculational parts of the software. Also, some specific PRA areas are tested using only a single test case. We hope that over time as models and test cases are added to the TV&V test suite, the overall coverage of testing vital functions in SAPHIRE will be more than sufficient.

4. THE AUTOMATED TEST SUITE

Because we organized SAPHIRE testing according to PRA tasks, some of the more fundamental features of SAPHIRE were exercised repeatedly across test cases. For example, since basic event generation, solving for cut sets, and quantification of cut sets must occur prior to nearly any other analysis task available, nearly every test case performs these tasks. While these preliminary items are not the primary focus of every test, they must work correctly for the remainder of the analysis to complete successfully. This built-in test redundancy provides significant assurance that these important (and frequently used) features are working as expected. Nonetheless, the suite of tests currently used to evaluate SAPHIRE Versions 6.0 and 7.0 has a primary point of focus for each of the tests. Table 4-1 lists the *primary* areas addressed for the test suite, where the applicable model and test number are identified for each area.

The top row in Table 4-1 indicates sets of test scenario identifiers. The test scenario identifiers consist of an abbreviation of the plant model tested (described in Section 3.3) and a number unique to that plant[†] After the plant model abbreviation and number, test identifiers are noted in parentheses. These test identifiers can be found in Appendix B, which defines the test scenarios. The left-most column of Table 4-1 lists the features tested. An "?" indicates the features the set (column) of scenarios were designed to test. A blank indicates that the set of scenarios does not use the feature on that row as a primary test metric.

Information for each of the individual tests is shown in Table 4-2. The first column in Table 4-2 identifies the test number (1 through 54). The middle of the table indicates both the PRA area and SAPHIRE function evaluated for the test. The last column indicates the PRA model(s) used for the test.

[*] For example, multiple copies of the DEMO database were used. The tenth copy of this database is denoted in the table as DEMO(10), the eleventh as DEMO(11), etc.

Table 4-1. Features tested by the SAPHIRE test suite.

Models used and test reference[a] / Feature Tested[b]	SPAR(1) SPAR(2)[c] (Test-1, Test-2)	SPAR(3) SPAR(4)[c] (Test-3, Test-4)	SPAR(5)- SPAR(12)[C] (Test-5 through Test-12)	SUR40(1) SUR40(2) (Test-13)	TSTU(1)- TSTU(23) BV2-5(1)- BV2-5(3) (Test-14 through Test-40)	Surry50(1)- Surry50(5) Com-Peak(1)- Com-Peak(5) (Test-41)	S_LERF(1)- S_LERF(3) (Test-42 through Test-44)	DEMO(1)- DEMO(13) BV2-5(4)- BV2-5(9) (Test-45 through Test-49)	DEMO(10)- DEMO(13) Surry-50(6) - Surry-50(9) (Test-50 through Test-52)	CR3(1)- CR3(4) (Test-53, Test-54)
Generate Basic Event Data	●	●	●	●	●	●	●	●	●	●
Generate Change Sets		●	●		●				●	
Solve Fault Tree	●					●		●		
Solve Sequences	●	●	●	●	●	●	●	●	●	
Gather End States by Sequence					●	●	●	●		
Gather End States by cut set							●			
Uncertainty-Fault Tree					●					
Uncertainty-Sequences - Single					●					
Uncertainty-Sequences - Group				●	●					
Uncertainty-End States- Single					●					
Uncertainty-End States-Group					●					
Importance-Fault Tree								●		
Importance-Sequences-Single								●		
Importance-Sequences-Group								●		
Importance-End States- Single								●		
Importance-End States-Group								●		
Cut Set Update-Fault Trees						●				●
Cut Set Update - Sequences				●		●				
Cut Set Update - End States						●				

Feature Tested[b] \ Models used and test reference[a]	SPAR(1) SPAR(2)[c] (Test-1, Test-2)	SPAR(3) SPAR(4)[c] (Test-3, Test-4)	SPAR(5)-SPAR(12)[C] (Test-5 through Test-12)	SUR40(1) SUR40(2) (Test-13)	TSTU(1)-TSTU(23) BV2-5(1)-BV2-5(3) (Test-14 through Test-40)	Surry50(1)-Surry50(5) Com-Peak(1)-Com-Peak(5) (Test-41)	S_LERF(1)-S_LERF(3) (Test-42 through Test-44)	DEMO(1)-DEMO(13) BV2-5(4)-BV2-5(9) (Test-45 through Test-49)	DEMO(10)-DEMO(13) Surry-50(6) - Surry-50(9) (Test-50 through Test-52)	CR3(1)-CR3(4) (Test-53, Test-54)
Recover-Fault Trees	●					●				●
Recover-Sequences	●	●	●	●		●	●		●	
Partition Sequences							●			
Link Small/Large Event Trees							●			
Logic Save-Fault tree editors						●				
Logic Save-Event tree editor							●			
Version Upgrade	●	●	●	●	●	●	●	●	●	
GEM-Initiating Event Assessment			●							
GEM-Condition Event Assessment		●								
Load/ Extract Data										●
Fault Tree Paging										●

a. See Appendix B for a complete description of the tests.
b. A ● denotes that the particular feature was tested.
c. Each of the ten identified SPAR models (BYRN, PBOT, DRES, GGUL, MIL3, OCON, OYST, SONG, STL1, SURY) is used for this test.

Table 4-2. Test information for all tests in the testing suite.

Test Number[a]	PRA Area	SAPHIRE option	Test Model(s)[b]
Test-1, 2, 5..11, 13..21, 23..32, 34..49	Generate current event data	No change set data	All
Test-3, 4, 12, 22, 33, 50	Generate current event data	Single changes	DEMO, SURRY-50
Test-51	Generate current event data	Class changes	DEMO, SURRY-50
Test-52	Generate current event data	Marked order	DEMO, SURRY-50
Test-41	Fault tree cut set generation	With flag sets[c]	COM-PEAK
Test-1, 41, 53	Fault tree cut set generation	Without flag sets	SPAR,[d] COM-PEAK, SURRY-50, CR3
Test-41	Sequence cut set generation	With flag sets	All
Test-2, 13, 41, 42	Sequence cut set generation	Without flag sets	Multiple
Test-38, 41, 44	Gather sequence cut sets into end states	By sequence	BV2-5, SURRY-50, COM-PEAK, S_LERF
Test-43	Gather sequence cut sets into end states	By cut set	S_LERF
Test-14..21, 23, 24	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 25	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 26	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 27	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 28	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 29	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 30	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 31	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU

Table 4-2. (continued).

Test Number[a]	PRA Area	SAPHIRE option	Test Model(s)[b]
Test-14..21, 23, 32	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 33	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 34	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-14..21, 23, 35	Uncertainty of fault tree distributions	Monte Carlo sampling	TSTU
Test-25..31, 34..37	Uncertainty of fault tree distributions	Latin Hypercube sampling	TSTU
Test-22, 24	Sequence uncertainty analysis	Monte Carlo sampling	TSTU
Test-39	End State uncertainty analysis	Monte Carlo sampling	BV2-5
Test-40	End State uncertainty analysis	Latin Hypercube sampling	BV2-5
Test-45	Importance measures	Fault trees	DEMO
Test-46	Importance measures	Sequences	DEMO
Test-47	Importance measures	End States	BV2-5
Test-41, 53	Cut Set Update	Fault trees	SURRY-50, COM-PEAK, CR3
Test-13, 41	Cut Set Update	Sequences	SURRY-50, COM-PEAK
Test-41	Cut Set Update	End State	SURRY-50, COM-PEAK
Test-41, 53	Fault tree cut set recovery	Auto-recover option	SURRY-50, COM-PEAK, CR3
Test-2, 13, 41	Sequence cut set recovery	Auto-recover option	SURRY-50, COM-PEAK
Test-43	Sequence cut set partitioning	Batch apply option	S_LERF
Test-42	Link Small event tree (logic)	Linkage Rules	S_LERF
Test-44	Link Large event tree (cut sets)	Create cut sets option	S_LERF

Table 4-2. (continued).

Test Number[a]	PRA Area	SAPHIRE option	Test Model(s)[b]
Test-41	Fault tree logic	Alpha-numeric logic editor	SURRY-50, COM-PEAK
Test-41	Fault tree logic	Graphical editor	SURRY-50, COM-PEAK,
Test 54		Pager	CR3
Test-42	Event tree logic	Graphical editor	S_LERF
All	n/a	Version Upgrade	All version 5 models
Test-5..12	GEM initiating event assessments	Delete	SPAR[d]
Test-5..12	GEM initiating event assessments	Add	SPAR[d]
Test-5..12	GEM version upgrade	Process	SPAR[d]
Test-3, 4	GEM condition assessments	Delete	SPAR[d]
Test-3, 4	GEM condition assessments	Add	SPAR[d]
Test-3, 4	GEM condition assessments	Add events to assessment	SPAR[d]
Test-3, 4	GEM condition assessments	Process	SPAR[d]
Test 53	Fault Trees	Load/Extract	CR3
Test 53	Basic Events	Load/Extract	CR3
Test 54	Fault Trees	Modify/Delete	CR3

a. Refer to Appendix B for further description of the test performed.

b. Refer to Section 3.3 for descriptions of the individual models.

c. Feature not available in version 5.

d. The SPAR Revision 2QA (ten lead plant) models are: Byron, Dresden, Grand Gulf, Millstone, Oconee, Oyster Creek, Peach Bottom, San Onofre, St Lucie, and Surry.

5. RESULTS OF TESTING, VERIFICATION, AND VALIDATION

Appendix C presents the complete detailed results output from the automated testing software for all tests in the test suite for a given version of SAPHIRE. Glancing at this appendix, one will notice that the results span over 260 pages. The critical information related to the outcome of each test, however, is shown up front in the "pass/fail" results. These results identify any anomalies that require investigation. If, for a particular version of SAPHIRE, one of the tests is shown as "failed," then the software developers would use that specific test case to first duplicate the problem and then to debug the software. Fortunately, most (if not all) of the test results fall into the "passed" category when the test suite is run.

SAPHIRE Version 7.63 is represented in the results presented in Appendix C. For each test result in the Appendix, the first line identifies the test ID, description, and time the test was started. Figure 5-1 illustrates this output from the testing software (Rational Software 1999) for the sample test result of SURRY-50(05). The steps performed by the test script are shown in the lines thereafter. In the example, the SURRY-50 database sequences are solved using a truncation of 1E-9/yr, and then recovery rules are applied. The cut sets are run through a cut-set update. Then, the test gathers end-state cut sets via the partition rules (again with 1E-9/yr truncation). These end-state cut sets are updated. Lastly, the results are compared against the stored "correct" results for the end states of AD5, AD6, AH1, and S2D1. If the results match the "correct" results, "pass" is indicated, otherwise "failed" is indicated. The time of test completion is then recorded.

Figure 5-1. Example of the test results output from the automated testing software.

```
SURRY-50(05) Scenario: Check End State Cut Sets started at 12:48:28 AM
Sequences solved
 with prob cut off (1.0E-09) and with recovery
Sequence cut sets updated
End States gathered by cut set partition
 with prob cut off (1.0E-09)
End State cut sets updated

END STATE CUTSET RESULTS:
AD5     pass
AD6     pass
AH1     pass
S2D1    pass
Scenario: Check End State Cut Sets completed at 12:50:05 AM
```

It is evident from the "pass/fail" results presented in Appendix C, that SAPHIRE Version 6.63 passed every test. Recall, though, that this test script is run on SAPHIRE before a new version is released. The candidate release Version 6.63 may not have passed all tests on the first try. But before this version is subsequently released, any discrepancies noted by the test suite would be fixed and the tests rerun. This cycle would be repeated until a 100% pass rate is achieved. At that point, the software is released for general use.

1. Uncertainty sampling in Versions 6 and 7 was performed in a slightly different order than in Version 5, depending on the types of distribution used for the basic events. While this was not technically an error, it meant that use of the same sample size and seed would not generate identical results from Versions 5 and 6 or 7. The software was modified to ensure consistency among the versions.

2. Some graphical evaluation model condition assessments produced more minimal cut sets in Version 7 than in Version 6. The results data were being stored slightly differently in Version 7, but this difference has since been modified to match Version 6.

3. "Floating point" calculation differences caused by differences between the DOS and Windows operating systems were discovered in the 1.0E-15 range. These differences could not be fixed, but have been noted.

6. CONCLUSIONS

Automation of a broad set of tests designed to exercise the features of the SAPHIRE software (Systems Analysis Programs for Hands-on Integrated Reliability Evaluation) has achieved a higher level of quality assurance. The automated test suite gives confidence that all functions of the code operate correctly. Because the test suite is automated, tests can be run quickly and accurately on each incremental release of the software, thereby offering a continuous testing, verification, and validation (TV&V) process. Any software error is corrected prior to release of a new version, thereby saving analyst's time and minimizing potential for analysis error. Use of the test suite also encourages improvements and development of new features, since introduction of undesirable side effects will be readily noticed from the test results.

The earlier versions of SAPHIRE, Versions 4.0 and 5.0, were subjected to the more traditional verification and validation process; i.e., the software was the focal point. Specific software releases of these versions were verified and validated in a manner to meet the intent of the IEEE's "Standard for Software Verification and Validation Plans," (IEEE 1986). Given that future releases of the software basically involved mostly upgrades and corrections (i.e., basic software changes were minimal), it was presumed that the V&V remained valid. Upon release of SAPHIRE 6.0 and 7.0, however, it was decided that a new V&V of the software was in order. It was also determined that inasmuch as a number of releases were involved with a specific version of SAPHIRE, that a more dynamic process would be desirable, a process that would readily verify and validate each new release. Thus, the testing verification and validation (TV&V) process was designed, which could be used not only to test all future releases, but with the addition of new tests (if required) could be used for future versions of SAPHIRE. Consequently, the TV&V process provides a means to verify that the results from one version or release of SPHIRE to the next are reproducible and accurate, thus ensuring stability of the software.

Benefits of the TV&V process over the older formal V&V are numerous. In particular, most of the effort is spent on developing rigorous tests that focus on actual probabilistic risk assessment (PRA) calculations. Tests can be repeated any number of times on a variety of SAPHIRE versions. Also, the automated test suite will not be soon outdated, since the types of PRA calculations currently tested are expected to be valid in the foreseeable future. Conversely, manual verification is expensive and time consuming. Part of the success of the SAPHIRE software has been its continuous improvement in all areas, including speed, convenience, and new features. However, until now, these improvements have served to make previous V&V efforts quickly obsolete.

More specific benefits of the TV&V over the older V&V process include the following:

- The TV&V process automates formerly manual V&V testing that used human operations prone to inadvertent error..
- The TV&V process is consistent, efficient, and thorough since the test scripts can be constructed to test single or multiple portions of the software once or numerous times. Manual V&V testing is resource intensive since rerunning a set of tests absorbs resources at the same level as the previous run.
- The TV&V process is applied to every release of SAPHIRE rather than specific

versions or releases at some point in time. Manual V&V testing generally focuses on a "frozen" release of the code.

- The TV&V process encourages difficult tests. Manual V&V testing may have both easy and difficult tests, but resources may limit difficult-to-run tests.
- The TV&V process readily builds upon prior knowledge gained from the testing process. Since every test is rerun for each release of SAPHIRE, the initial testing conditions for each release is at least that of the previous release. Manual V&V testing only transfers testing knowledge when subsequent software versions are tested.
- The TV&V process allows for tests to be added and existing tests modified, as needed, with minimal effect on the existing test suite. Manual V&V testing would limit any test modifications due to the need to rerun the test.

During automated testing, minor anomalies were uncovered. These anomalies mainly fell into the category of minor calculational differences between versions of SAPHIRE (e.g., floating point round-off, uncertainty sampling order). Where possible, these issues have been fixed.

The TV&V process has now been in place for approximately two years. The automated testing suite has allowed code developers to focus on development and maintenance of SAPHIRE while ensuring calculational stability of the software. From the experience gained to this point, two outcomes have resulted from the TV&V process:

1. TV&V has demonstrated that subsequent versions of SAPHIRE continue to perform accurate PRA analysis calculations, since all vital features required for these calculations have been tested and results yield an adequate degree of confidence.

2. Automated testing allows each new version of SAPHIRE to be tested at least as well as the previous version. Adding additional tests to the test suite over time will only increase the overall confidence in the software performance.

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Appendix A

Background Information

CONTENTS

Appendix A
Background Information

A.1 HISTORY OF SAPHIRE

A.1.1 SAPHIRE DEVELOPMENT UP TO VERSIONS 6.0

With probabilistic risk assessment (PRA) becoming a significant tool for evaluating the safety of nuclear power plants, the NRC determined that there was a need for developing microcomputer based software for use with desktop microcomputers to aid the PRA analyst. The initial scope of the project concentrated on demonstrating the feasibility of such a workstation. The first version (Version 1.0) of the Integrated Reliability and Risk Assessment System (IRRAS) software did not necessarily need to provide all required PRA functions; however it needed to provide certain essential functions such as fault tree construction, failure data input, cut set generation, and cut set quantification.

At about the same time, the need for a simple tool that used the results of a PRA to perform limited review and sensitivity analyses was identified. This tool need not be able to create and solve fault trees and event trees, but should be able to perform limited modifications to failure data and cut sets and compare these changes to a base case set of data. This need resulted in another software development project, the System Analysis and Risk Assessment (SARA) system. The IRRAS and SARA system soon became complementary tools for the performance of PRAs. Each release of IRRAS resulted in a corresponding release of the SARA system. The first version of these software packages was released in February of 1987 and contained only the essential concepts mentioned above.

Version 1.0 of IRRAS/SARA was an immediate success and clearly demonstrated not only the need but also the feasibility of performing PRA work on a microcomputer. As a result of this success, Version 2.0 development was initiated. Version 2.0 was designed to be a comprehensive PRA analysis package that included all functions necessary for a PRA analyst to perform his or her work. As a result of Version 2.0 being a complete rewrite from Version 1.0, a thorough test plan was necessary. The major features of Version 2.0, along with an Alpha test, were completed in early March of 1988. Subsequent to the Alpha test, a Beta test copy of Version 2.0 was sent out to approximately 15 sites that were selected from among those sites currently using Version 1.0. Beta testing was completed in May of 1988 and work was initiated for fixing any bugs identified. Additionally, any desired new features that could reasonably be incorporated into Version 2.0 were included. Version 2.0 was released in June of 1990 and work began on Version 2.5.

IRRAS Version 2.5 gave the user an enhanced ability to create and analyze fault tees and event trees using a personal computer (PC). This program provided functions for fault tree and event tree construction and analysis. The fault tree functions ranged from graphical fault tree construction to fault tree cut set generation and quantification. The event tree functions included graphical event tree construction, the linking of fault trees, defining accident sequences, generating accident sequence cut sets, and quantifying them.

IRRAS Version 4.0 included many significant enhancements over previous versions. This version provided much more powerful cut set generation algorithms, which were more than a thousand times faster than previous versions. Problems that previously took hours to solve could now be solved in as little as a few seconds. Other enhancements provided with Version 4.0 included the ability to use the system fault tree logic to solve accident sequences and the addition of flag sets to automatically prune the sequence logic. Also, Version 4.0 included fault tree, event tree, and cut set editors to improve analysis capabilities without requiring the complete regeneration and reduction of the fault trees. Basic event and initiating event frequencies could be easily changed. Cut sets could easily be modified with the new cut set editor feature for adding recovery events, or cut sets could be deleted, if desired. Such changes could be made, saved in the database, and quantified as desired. Many of the operations in IRRAS and SARA were also streamlined and simplified to provide an even more powerful tool for the PRA analyst. Version 4.0 also underwent a rigorous testing program to ensure reliability and usability.

Many new features were included in IRRAS 5.0 including the capability to perform rule based recovery analysis, end state cut set partitioning, a new alphanumeric fault tree editor, which allows the analyst to more easily modify fault tree logic, the Models and Results Database (MAR-D) data interchange processor was completely rewritten to allow more flexibility in defining output options, an error message file system was added, a Windows compatible version of the graphical fault tree editor and a 386 protected mode version were developed, the event tree rule editor was changed to a more powerful free format editor, and with the event tree changes, came the ability to better handle the large event tree-small fault tree methodology.

SAPHIRE Versions 4.0 and 5.0 consisted of a suite of four PRA software modules: IRRAS, SARA, MAR-D, and the Fault Tree, Event Tree, and Piping & Instrumentation Diagram (FEP). FEP was developed to provide a common access to the graphical editors. The IRRAS and FEP software both accessed the fault tree and event tree graphical editors, but the Piping and Instrumentation Diagram (P&ID) editor was only accessible through FEP.

A.1.2 SAPHIRE VERSION 6.0

Along with integrating the four modules (IRRAS, SARA, MAR-D, and FEP), SAPHIRE Version 6.0 includes more features, a simpler (Windows based) user interface, and increased analysis capabilities. Using SAPHIRE Version 6.0, an analyst can perform a PRA for any industrial facility or process. Regarding nuclear power plants, SAPHIRE can be used to model a plant's response to initiating events, quantify associated core damage frequencies, identify important contributors to core damage (Level 1 PRA), to analyze containment performance during a severe accident, and to estimate radioactive releases (Level 2 PRA). It can be used to model a reactor that is at full power, low power, or shutdown conditions. Furthermore, it can be used to analyze both internal and external initiating events and has special features for transforming models built for internal event analysis into models for external event analysis. It can also be used in a limited manner to quantify risk in terms of release consequences to the public and the environment (Level 3 PRA).

A.2 PREVIOUS SAPHIRE V&V ACTIVITIES

A.2.1 V&V OF SAPHIRE 4.0 AND 5.0

Due to the potential impact that SAPHIRE-based calculations can have on the regulatory process, the NRC determined a need for verifying and validating the IRRAS/SAPHIRE software. In the beginning Alpha tests were conducted in house, followed by the Beta testing of the software by approximately 15 selected sites/users that were then using Version 1.0.

SAPHIRE 4.0 was verified and validated (NUREG/CR-6145)[1] based on the IEEE Standard for Software Verification and Validation Plans (IEEE Std 1012-1986).[2] The standard presents a plan that includes 7 topics to be addressed when evaluating software: 1) concept, 2) requirements, 3) design, 4) implementation, 5) test, 6) installation and checkout, and 7) operation and maintenance.

The SAPHIRE 4.0 V&V plan described the process and criteria by which the V&V was to be performed. The software requirements documentation was reviewed to determine the correctness, completeness, and traceability of the requirements. A user survey was conducted to determine the usefulness of the user documentation. Vital and non-vital features were identified. Testing was performed and documented, and any discrepancies identified were passed to the code developers for resolution.

SAPHIRE 5.0 was also verified and validated (NUREG/CR-6116, Volume 9)[3] based on the IEEE Standard.[2] The V&V of SAPHIRE 5.0 consisted of the preparation of a V&V plan, evaluation of the code development control procedures, test case development, V&V testing, and documentation of test results and recommendations. Two steps recommended in the Reference 2 standard were not performed: evaluation of the user documentation, and an evaluation of the software requirements specification.

A.3 SAPHIRE CODE DEVELOPMENT CONTROL PROCESS

In previous SAPHIRE V&V efforts, a basic task was to review the development control process. First of all, a minimum set of V&V activities was identified from the IEEE Standard for Software Verification and Validation Plans (IEEE-Std 1016-1986)[1] and the Software Quality Assurance Program and Guidelines (NUREG/BR-0167).[2] Using this set of plans, the minimum set of procedures required were determined. The next step was to evaluate the actual code development control process currently in place against the minimum set and make recommendations, as necessary.

It should be noted that deriving a minimum set of code development control procedures based on V&V activities is only one approach that can be used. It is possible that a different set of minimum code development control procedures could be derived based on another approach such as project management activities. Even though different approaches were not tried, it is judged that the set identified would always show up as minimum code development control procedures for any software development project. It is not recommended that this "minimum set" take the place of existing standards and guidelines. For any software project, the standards and guidelines should be reviewed and evaluated so that procedures can be established that are commensurate with the importance of the code.

Section A.3.1 gives a very brief overview of the software development life cycle and variations that are commonly used. In Section A.3.2 the minimum V&V activities for each life-cycle phase are discussed and from this the minimum code development control procedures are identified. In Section A.3.3, the actual code development control procedures used for SAPHIRE 6.0 are evaluated. Conclusions and recommendations are provided in Section A.3.4.

A.3.1 SOFTWARE DEVELOPMENT LIFE CYCLE

The development of a software product can be viewed as progressing through various phases that describe the life cycle. The five phases that are generally used to describe the life cycle are: requirements analysis, system design, implementation, testing, and operation and maintenance.

This life cycle is typically referred to as the waterfall approach because one step logically leads to the next. The product developed during one phase becomes the basis upon which the product of the next phase is developed. There are several adaptations of the waterfall life-cycle approach, but the activities performed under each approach are very similar. For example, the life-cycle described in NUREG/BR-0167 consists of seven phases where testing has been split into (a) qualification testing and (b) installation and acceptance, and maintenance has been split into (a) operations and sustaining engineering and (b) retirement and archiving. However, the overall activities that are performed in both life-cycle approaches are the same.

A.3.1.1 Waterfall Life-Cycle Phases

The following briefly describes each life-cycle phase. Following this is a brief examination of some adaptations to the waterfall life-cycle.

Requirements Analysis. Requirements are gathered and analyzed during this first phase. The development team interviews the sponsor (as used in NUREG/BR-01673) and users, individually and collectively, to determine what the proposed code is to do. The purpose of requirements gathering and analysis is to identify the desired functionality of the system. The development team documents these requirements in some formal format, usually following a predefined standard. If the standard chosen is IEEE, the requirements document will be identified as the System Requirements Specification (SRS).

Formal and informal requirements reviews will be held to allow the sponsor and user community to evaluate the development team's understanding and interpretation of their needs, wants, and desires. Reviews are held to determine if the requirements are consistent, complete, correct, and most importantly, what the sponsor really wants. A final requirements review is held that allows the sponsor and user community to formally accept the requirements documentation. Formal acceptance of the requirements identifies the baseline requirements for the remainder of the development efforts. The requirements document should then be placed under configuration control. Further modifications to the requirements document should then follow the software configuration management procedures. The requirements document serves to document this phase of the life-cycle and is used in preparing a design document during the next phase.

System Design. This phase involves determining how the system is to be designed in order to satisfy the requirements identified during the previous phase. The development team will put together the algorithms needed to accomplish the functionality requested. The design may be accomplished through the use of a variety of tools including computer assisted software engineering (CASE) tools or prototypes. The design phase will also be documented by the development team. If using the IEEE methodology, the design will be documented in a Software Design Description (SDD). During this phase, design reviews are held where the development team presents the design to the sponsor and user community for input and approval. The reviews may be formal or informal with the final review meeting being a formal meeting held for the purpose of the sponsor/user community to approve the finalized design document.

During design reviews, requirements may be identified that have not been satisfied by design. There may be several reasons for this such as the requirement being overlooked, conflicting with another requirement, or hardware limitations. If the requirement cannot be satisfied, it will be necessary for the development team to modify the requirements document per configuration management procedures.

Implementation. This phase involves generating the code to satisfy the requirements as described in the design. The requirements analysis phase determined what was to be done. The design phase identified how it was to be done. In this phase, the code is generated to implement the requirements through the design. The development team will test the code produced through shop testing (also referred to as informal unit and integration testing in NUREG/BR-01673). This testing will reveal defects that can be corrected immediately. If the defects impact the requirements or design, it will be necessary to revise the requirements and/or design documents per configuration management procedures. In addition, peer reviews and code walkthroughs will occur. In both activities, the developer's peers assist in evaluating the logic, the correctness of the code, and if the code satisfies the requirements and design to be implemented.

Testing. Testing includes those activities that determine if the generated code satisfies complies with the requirements and the design. The code is examined through actual execution of the code as well as by using static analysis of the code. Both the development team and the V&V team perform testing.

Testing performed may include but is not limited to:

- ***Unit Testing*** – Testing of a distinct, executable software unit is completed to determine if the unit satisfies requirements and correctly implements the approved design.

- ***Integration Testing*** – Testing of units as they are integrated into larger modules. This testing is directed at the interfaces between previously tested nonintegrated units or modules.

- ***System Testing*** – When all modules are completed and integrated into a single system, the entire system is tested.

- ***Acceptance Testing*** – When the system is deemed ready for sponsor/user-community use, it is tested by the sponsor/user-community to determine compliance to critical functional requirements. Acceptance testing is formal with documented test criteria, test plan, and test results. Successful completion of this testing activity signifies acceptance of the system and willingness to place it into a production environment for use.

Static analysis of the code involves the use of software to collect software metrics or indicators without actually executing the code. Static analysis is also used to assist the test developer in developing test cases and test procedures to accurately and effectively test the code.

Operation and Maintenance. This phase of the life cycle includes the day-to-day activities involving continued use of the system after it has been accepted by the sponsor and entered into a production environment. It usually involves fine tuning the system as the user community becomes more familiar with the system through daily use.

Except for minor changes, system maintenance usually does not include modifications, enhancements, or additions to the code (these are treated the same as development activities). Maintenance activities may include monitoring system use and performance and generating reports.

A.3.1.2 Adaptations of the Waterfall Life-Cycle

Some have interpreted the waterfall life-cycle approach to imply that one phase must be completed before the next can begin. The phases are viewed as a stream of water passing over a waterfall. One rock is covered before the next can be reached. However, the waterfall approach does not dictate nor imply that one phase must be completely finished before the next can begin. As the design evolves or as the software is implemented, situations such as an inaccurate requirement, conflicting requirements, or hardware limitations may be identified. Under these situations it will be necessary to return to one or more previous phases to correct or enhance the requirements document, the design document, or the actual program code.

No phase is totally dependent upon completion of the previous phase. As a part of the code development process, a design team may begin developing some algorithms while the requirements gathering team is still conducting interviews. To insist that each phase be 100% completed and every detail of the product produced for that phase be unchangeable is unrealistic. Each of the previous phases can be readdressed as the development progresses.

There are variations of the waterfall life-cycle, but mostly in descriptions of what occurs within each phase. The phases will usually be repeated through a cyclic process. The following describes a variation on the life-cycle approach, and a useful software development tool.

Whirlpool Life-Cycle. As the name implies, the whirlpool life cycle circulates through a series of activities. These activities include requirements analysis, design, implementation, testing, and maintenance. The phases are the same as those identified in the classic waterfall software development methodology. The significant difference between the two lies almost entirely in the approach in which the phases are encountered. The whirlpool model predicts and recommends a development approach where the products of each phase are dynamic. They may be changed during activities of any successive phase. Changes will require a return to the present or previous phase and the activities performed therein. Products produced in earlier phases can be reexamined as the development progresses.

This methodology encourages the return to earlier phase activities if the product of that phase can be improved in such a manner as to improve the products produced during activities of later phases. The iterative process of following the waterfall life-cycle phases, when diagramed, present the appearance of a spiraling whirlpool through the activities of all phases. As the product of each phase is repeatedly improved, the cycle becomes tighter and tighter until the project is completed and the product delivered.

Rapid Prototyping. Rapid prototyping is a tool to be used during requirements analysis and design to further clarify and refine requirements and design issues. Rapid prototyping may be successfully implemented into a variety of different life-cycle approaches.

During rapid prototype development, the development team prepares models of the proposed system. These models are evaluated by the sponsor and user community to determine compliance to the requirements and to assist developers in designing the system. The model is a tool through which the developers can demonstrate their understanding of desired system functionality and through which the sponsor and user community can clarify their needs and expectations. Rapid prototyping is the process of quickly building and evaluating the requirements and specifications for the critical components of the desired system. The sponsor, user, and designer work together to define the requirements and the specifications.

Rapid prototyping serves as an aid in analysis and design. The prototype is not production software. It is used to redefine and/or clarify system specifications. The designer uses the validated requirements as a basis for continuing design activities and for designing the production software. Documentation prepared during the development of the software serves to assist in establishing a baseline from which the next prototype is developed.

The development of software through rapid prototyping does not preclude the necessity of developing correct, complete, and consistent requirements nor does it preclude the necessity to document requirements and design in formal documentation. Rapid prototyping also involves each of the five phases of the classic waterfall software development life-cycle. Requirements are still collected and documented. Design issues are clarified through prototyping desired system behavior. A prototype demonstration may be held in lieu of a review to determine adequacy of design or to help clarify requirements issues. Units are tested upon completion and the modules are integrated into a whole system and tested. The sponsor and user community perform acceptance testing before accepting the finished product. Finally, the code moves into the production environment and the project enters the maintenance phase.

A.3.2 V&V ACTIVITIES AND CODE DEVELOPMENT CONTROL PROCEDURES

The approach of developing software by engineering quality into the product as it is developed is preferred to an approach that attempts to "test in" quality, by testing out bugs, after the software has been developed. The set of activities designed to ensure that each phase of the development of a software product conforms to the requirements established in the previous phase is often defined as Software Quality Assurance (SQA). Projects that design and implement a specific set of SQA policies and procedures are more likely to produce software that complies with the stated requirements regardless of the software development approach and the language or tools used to develop the system. Software products that have included specific V&V activities at each phase will have a lower error rate and a higher confidence level that the software will perform as desired.

A.3.2.1 V&V Activities During Code Development

V&V should be an integral part of any software product development. V&V activities are designed to be performed during each phase of the life-cycle to increase the probability that defects and errors will be prevented or detected and corrected early in the life-cycle. Early detection implies early correction at a fraction of the cost to correct it later. V&V activities can be performed by the development team, by an independent V&V team, or by both teams. For example, the requirements and design reviews can be viewed as a V&V activity because these reviews allow all parties (sponsor, users, and development team) to check the consistency and correctness of the requirements and design. An evaluation of the requirements and design documents by an independent V&V team is also a V&V activity and acts as another check.

V&V activities implemented during the development (including modifications, enhancements, or additions) of a software product involve more than just a set of testing activities to be performed during or after the actual development of the code. To ensure that a completed software package performs the desired tasks in the prescribed fashion and attains the desired results, the entire development process for the code needs to be examined. To do this, intermediate products are examined and evaluated at each stage or phase of the development of the software product. The following sections provide a brief overview of the minimum V&V activities that should be performed at each phase of the life-cycle, and identification of the resulting minimum set of code development control procedures.

Requirements Analysis Phase. During this phase the V&V team would review requirements documents for consistency and completeness. If any discrepancies are identified, anomaly reports would be generated and submitted to the development team. The requirements document is also critical in the preparation of test cases, test data, and test procedures to demonstrate system compliance to requirements. Without a formally developed set of requirements, it is very difficult to demonstrate system compliance to stated requirements. The requirements document would be used by both the development team and the V&V team to start putting together tests cases. The V&V team would also review the configuration management procedures during this phase.

The inputs needed to perform the above V&V activities are the requirements documents and configuration management procedures. Therefore, the minimum code development control procedures are developing and documenting the software requirements and establishing configuration management procedures.

System Design Phase. During this phase the V&V team would evaluate the design document for compliance and consistency both within the design document and with the requirements document. The evaluation of the design document should identify any requirement that has not been satisfied and if each section of the design document can be justified by a requirement. An anomaly report would be generated for any discrepancies. If the requirement cannot be satisfied, it will be necessary for the development team to modify the requirements document per configuration management procedures. Because it may be necessary to revise the requirements document, how well the configuration management procedures are implemented may also be reviewed by the V&V team.

As with the requirements document, the design document is critical to the development of test cases, test data, and test procedures to be used in testing the system. Requirements are used in preparing tests to demonstrate compliance to system requirements. Design documentation is used to develop tests to exercise such items as each logic path and each decision statement in order to provide a predetermined level of code or path coverage. Without design documentation, this type of testing is very difficult to perform.

The inputs needed to perform the above V&V activities are a requirements document, a design document and configuration management procedures. The code development control procedure for this would be developing and documenting the design. Establishment of configuration management procedures was identified in the previous phase.

Implementation Phase. The minimum V&V activity during this phase would be to compare the source code against the requirements and design documents to determine if the code implements the design and complies with the requirements. Any discrepancies would result in an anomaly report. As in the previous phase, there may be cases where a particular part of the design or a requirement cannot be implemented. This may necessitate the modification of the requirement and/or design documents.

Even though there are minimum V&V activities that occur during this phase, the inputs are still a requirements document and a design document, as well as the source code. Therefore, there are no new code development control procedures for this phase.

Testing Phase. Both the development team and the V&V team perform testing. The development team will usually perform unit, integration, and system testing first to identify any problems. The development team may also have a group of users perform beta testing. When the development team has determined that the code exists in a state that is essentially ready for production, it is placed under version control and submitted for acceptance testing. For the purposes of the V&V, the level of testing is determined beforehand. The V&V team may also perform unit, integration, and system testing, as well as acceptance testing. Test cases that were prepared during the previous phases when the requirements, design, and source code were being evaluated are finalized. Developing test cases through the life cycle provides better assurance that system compliance with the requirements can be demonstrated and that there will be adequate test coverage of the system. Formal reports describing the results of the testing efforts are prepared. The contents and format of the report should comply with adopted standards and guidelines. A detailed test log is usually maintained during test efforts that identifies the item being tested, the actions to be performed by the tester, the expected results, and the actual results obtained during testing. Any discrepancies are logged.

As with the previous phases, the completeness of the testing is highly dependent on having established and documented requirements and design information. Even though testing really is not an"input" as this term has been used in the previous phases, establishing and documenting a testing program that covers testing that will be performed by the development team and by the V&V team is also considered to be a minimum code development control procedure.

Operation and Maintenance. If version control has not previously been addressed in the configuration management procedures, it should be before the code is placed into production. A system for dealing with nonconformance reporting and correction should also be established and coordinated with the configuration management procedures so that control of the software and code version can be controlled. A potential V&V activity during this phase would be to evaluate the procedures for version control and for nonconformance reporting and correction. Therefore, the minimum code development control procedures include establishing version control and a system for nonconformance reporting and correction, with both being a part of or coordinated with the configuration management procedures.

A.3.2.2 Summary of Minimum Code Development Control Procedures

The above has identified that the minimum code development control procedures for NRC software are essentially:

- Developing and documenting the software requirements
- Establishing configuration management procedures that include or have been coordinated with code version control and nonconformance reporting and correction
- Developing and documenting the design
- Establishing and documenting a testing program that includes independent acceptance testing.

A.3.3 EVALUATION OF SAPHIRE 6.0 CODE DEVELOPMENT CONTROL PROCEDURES

A.3.3.1 Develop and Document Software Requirements

New features, enhancements, and/or modifications to be included in the next version of SAPHIRE are determined by the NRC. The SAPHIRE development team maintains a list of sponsor/user requests for system modifications. The list is submitted to the NRC for prioritization. The NRC selects those items deemed important for continued use of SAPHIRE and to be included in the next version.

A project plan (as represented by the NRC Form 189) is prepared that describes the new features and/or modifications to be included in the next release. The project plan serves as a high level requirements document for continued efforts on SAPHIRE. No detailed requirements document is prepared at this stage of the development process.

A.3.3.2 Configuration Management

Configuration Management Procedures. Overall, configuration management complies with the requirements specified in the Conduct of Operations Manual for the National Security Infrastructure Unit.

Version Control. Released versions are assigned an appropriate release number and placed under version control as specified in the Conduct of Operations Manual. However, interviews with SAPHIRE users indicate that the users are not aware of the difference between beta test versions and versions released for production use. This misunderstanding has given numerous users the perception that the SAPHIRE project has loose or nonexistent version control policies and procedures. However, the beta versions are clearly labeled as such. The actual problem is attributed to using beta test versions on projects that should actually be using only production versions. The credibility of SAPHIRE is significantly degraded by this practice.

Nonconformance Reporting and Corrective Action. The SAPHIRE project does maintain a log of defect reports, including resolution of defect reports.

A.3.3.3 Develop and Document the Design

No separate design document was prepared for SAPHIRE 6.0. From a review of the project plan, it was determined that there was no requirement for the SAPHIRE 6.0 design be developed and documented.

A.3.3.4 Establish and Document a Testing Program

As with SAPHIRE 5.0, the SAPHIRE 6.0 implementation and testing phases are very closely intertwined due to using the whirlpool life-cycle approach in conjunction with automated and beta testing. The requirements phase is also revisited during the implementation phase, with the number of times each phase is repeated dependent entirely on the automated and beta test results.

During the implementation phase, further clarification of the requirements is obtained through correspondence and conversations with the sponsor/user requesting a certain feature. As the requirements are clarified, the system is developed and coded. When a module appears to have satisfied the requirements collected by the development team and passes automated testing, a beta version is released to a set of users for testing. The majority of the beta testing of SAPHIRE 6.0 has been essentially performed under three separate NRC sponsored projects:

1. JCN W6241, Plant Database Development for SAPHIRE
2. JCN W6340, PWR Level 2 / 3 Models for the ASP Program
3. JCN W6467, Technical Support for ASP Models.

A new release is assigned a unique number and is placed under version control procedures.

The beta testers report any discrepancies and findings to the software development team, which in turn implements any indicated modifications. When it appears that the modified version better "fits" existing system requirements, a new beta version is released to the beta testers. The process is continued until a version is produced that appears ready to comply with the system requirements as described in the project plan. This version is then placed under version control, with an appropriate version number assigned, and is released for production purposes to the sponsor and user community. The process of identifying requirements, clarifying requirements, developing code to implement the requirements, and performing beta testing is repeated until the sponsor formally accepts the version being tested.

Tests have been developed for the purpose of determining if the results produced by the code are correct, and if not, to identify any areas requiring correction. Specifically, under the TV&V of SAPHIRE 6.0, test cases were developed by the software developers and experienced users to test the features of the code. For the TV&V of SAPHIRE 6.0, experienced users revised and modified these test cases and developed additional tests as necessary. More stress tests were added to the test cases for SAPHIRE 6.0 so that known limits could be tested and unknown limits could be identified.

Where possible, test results will be compared to theoretically-based hand calculations and to results from previous SAPHIRE cases. A successful comparison of the 6.0 results to the 5.0 results will provide added confidence that the enhancement/modifications made to produce SAPHIRE 6.0 have not degraded the performance of those portions of the code that were not changed. Where hand calculations are not practical, existing codes such as CAFTA and PC-SETS software can be used to provide computer-assisted results for comparison. Although neither CAFTA or PC-SETS have been verified and validated, it is deemed appropriate that correlation of results with SAPHIRE signifies correct operation of SAPHIRE because the three codes use different coding techniques and methodologies.

The automated testing that has been added to the TV&V process brings several advantages to the users of SAPHIRE. All tests can be performed on each release of the code, which provides thorough testing of the existing and added features, and the tested releases are available on a timely basis for ongoing analytical work.

A.4 MINIMUM PC REQUIREMENTS

The minimum PC related hardware requirement for the Windows 95/NT releases are:

- Windows 95, 98, 2000 or Windows NT (NT is recommended)
- 386 or higher Intel compatible computer with random access memory of at least:
  16 megabytes for Windows 95 or 98
  32 megabytes for Windows NT or 2000
- 15 megabytes of hard disk space for program installation. The required hard disk space for each database varies depending on the size of a given database
- 16 color EGA/VGA monitor/video card and a keyboard and mouse (or other pointing device)
- A math coprocessor is optional and recommended for pre-Pentium class machines.

A.5 PLANT MODELS AVAILABLE IN SAPHIRE

Plant models become available from two major sources. Models of various levels of detail arise from the Plant Database Development for SAPHIRE project, which converts existing PRA models from other software to also operate in SAPHIRE. These models are listed in Table A.5.1. Simplified plant models are developed for the Accident Sequence Precursor (ASP) program, referred to herein as Simplified Plant Analysis Risk (SPAR) models, which are listed in Table A.5.2. A few SPAR models have been extended to estimate accident releases, referred to as large early release frequency (LERF) models, which are shown in the right-hand column of Table A.5.2

Table A.5.1. Probabilistic risk assessment databases for use with SAPHIRE.

Plant, Design, and Region	IRRAS/SAPHIRE Version, Database types(s), and ASP Category	PRA Source, Date, and PRA type	Comments
BRUNSWICK UNIT 1 General Electric Type 4 Mark 1 Containment Region II	SAPHIRE 6.0 model only - **BNP1-FTL** Fault Tree Level 1 Load. AT POWER Conditions ASP Category: BWR C	Carolina Power & Light Company's IPE (1992), plus updated data Modeling Methodology: Master Logic Diagram (Large Fault Tree Model) SAIC's CAFTA Code	The database was requested by RES. The database was completed on September 17, 1998.
COMANCHE PEAK UNITS 1 & 2 Westinghouse Electric 4-Loop Dry, Ambient Pressure Containment Region I	SAPHIRE 6.0 model only - **COM-PEAK** Full scope Level 1 load: Linked Event Tree and Fault Tree Model AT POWER Conditions ASP Category: PWR B	Texas Utilities Electric Company IPE (1992) Modeling Methodology: Small Event Tree and Large Fault Tree SAIC's CAFTA Code	The database was requested by RES for use in developing generic guidance and review procedures concerning risk-informed regulation. The database was completed on August 6, 1997.
CRYSTAL RIVER UNIT 3 Babcock & Wilcox Lowered-Loop Dry, Ambient Pressure Containment Region II	SAPHIRE 6.0 model only - **CRP3-FTL** Fault Tree Level 1 Load. AT POWER Conditions ASP Category: PWR D	Florida Power Corporation's IPE (1993), plus updated data Modeling Methodology: Master Logic Diagram (Fault Tree Logic Model) SAIC's CAFTA Code	The database was requested by RES. The database was completed on September 28, 1998.
D. C. COOK UNITS 1 & 2 Westinghouse Electric 4-Loop Wet, Ice-Condenser Containment Region III	SAPHIRE 6.0 model only - **DC-COOK** Full-Scope Level 1 Load: Linked Event Tree and Fault Tree Model AT POWER Conditions ASP Category: PWR B	Indiana/Michigan Power Company IPE Model (1992), plus updated data Modeling Methodology: Small Event Tree and Large Fault Tree Westinghouse Electric's Code (e.g., GRAFTER, WLINK)	The database was requested by RES. The database was completed on August 31, 1998.

Table A.5.1. Probabilistic risk assessment databases for use with SAPHIRE.

Plant, Design, and Region	IRRAS/SAPHIRE Version, Database types(s), and ASP Category	PRA Source, Date, and PRA type	Comments
FORT CALHOUN Combustion Engineering CE Dry, Ambient Pressure Containment Region IV	SAPHIRE 5.0 & 6.0 models - **FORTCAL** Full-Scope Level 1 Load: Linked Event Tree and Fault Tree Model **AT POWER** Conditions ASP Category: PWR G	Omaha Public Power District's IPE (1993) Modeling Methodology: Small Event Tree and Large Fault Tree SAIC's CAFTA Code	The database was requested by Region IV. The database was completed on November 22, 1996.
FARLEY, JOSEPH M. UNITS 1 & 2 Westinghouse 3-Loop Dry, Ambient Pressure Containment Region II	SAPHIRE 5.0 & 6.0 models - **FARLEY** "Limited Full-Scope" Level 1 Load: Event Tree Model. Split-Fraction approach **AT POWER** Conditions ASP Category: PWR B	Southern Nuclear Operating Company's PRA (1993) Modeling Methodology: Large Event Tree and Large Fault Tree Westinghouse Electric's Code: (e.g., GRAFTER, WLINK)	This database was requested by Region II. NOTE 1: Fault tree models are not included in the database because the number of fault tree gates exceeded the 10K limit of SAPHIRE 5.0 code that was in use at the time. As a result, the database was completed using the split-fraction approach. NOTE 2: Sequences can be generated at the "split-fraction" level only. The "limited full-scope" load was completed on January 9, 1994.
GRAND GULF UNIT 1 General Electric Type 6 Mark 3 Containment Region IV	SAPHIRE 5.0 NUREG-1150 model - **GGULF-50** "Limited" Full-Scope Level 1 Load: Linked Event Tree and Fault Tree Model **AT POWER** Conditions ASP Category: BWR C	NUREG/CR-4550, Volume 6, September 1989 Modeling Methodology: Small Event Tree and Large Fault Tree NUREG-1150 Model	The database was requested by RES/PRAB. NOTE: This is a "Limited full-scope" load in that the non-dominant sequences can be generated, but, no rules were created for adding recovery events. Also, cut set editing rules were used to reproduce the dominant accident sequence results reported in NUREG-4550 PRA. The database was completed on April 24, 1995.

Table A.5.1. Probabilistic risk assessment databases for use with SAPHIRE.

Plant, Design, and Region	IRRAS/SAPHIRE Version, Database types(s), and ASP Category	PRA Source, Date, and PRA type	Comments
OCONEE UNIT 3 Babcock &Wilcox Lowered-Loop Dry, Ambient Pressure Containment Region II	SAPHIRE 5.0 & 6.0 models - **OCONE-FT** Fault Tree Level 1 Load. **AT POWER** Conditions ASP Category: PWR D	Duke Power Company's updated fault tree model (1997) Modeling Methodology: Master Logic Diagram (Fault Tree Logic Model) SAIC's CAFTA Code	The database was requested by Region II. The database was completed on May 7, 1997.
OCONEE STATION KEOWEE HYDRO STATION Region II	SAPHIRE 5.0 & 6.0 models - **KEOWEE** Fault Tree Level 1 Load.	Duke Power Company PRA (1990) Modeling Methodology: Master Logic Diagram (Fault Tree Logic Model) SAIC's CAFTA Code	The database was requested by NRR to support their review of the PRA. The database was completed on December 28, 1995.
OYSTER CREEK General Electric Type 2 Mark 1 Containment Region I	SAPHIRE 5.0 & 6.0 models - **OYCREEK** "Limited" Full-Scope Level 1 Load: Dominant Accident Sequence Results Generated Using the Split-Fraction Approach **AT POWER** Conditions ASP Category: BWR A	GPU Nuclear Corporation's IPE (1992) Modeling Methodology: Large Event Tree and Large Fault Tree Model PLG's RISKMAN Code	The database was requested by Region I. NOTE 1: The fault trees could not be included in the database because the number of fault tree gates significantly exceeded the 10K limit of SAPHIRE 5.0 used to generate the model. Also, it would take a significant effort to develop the fault tree models from that information reported in the IPE. NOTE 2: Sequences can be generated at the "split-fraction" level only. The "Limited scope" database was completed on March 21, 1995.

Table A.5.1. Probabilistic risk assessment databases for use with SAPHIRE.

Plant, Design, and Region	IRRAS/SAPHIRE Version, Database types(s), and ASP Category	PRA Source, Date, and PRA type	Comments
PALO VERDE STATION Combustion Engineering CE80 Dry, Ambient Pressure Containment Region IV	SAPHIRE 5.0 & 6.0 models - **PALVERDE & PVWIN-12** **PALVERDE** - Full-Scope Level 1 Load: DOS 5.0 Version of SAPHIRE **PVWIN-12** - Full-Scope Level 1 Load: Windows 6.0 Version of SAPHIRE Both Databases are Linked Event Tree and Fault Tree Model AT POWER Conditions ASP Category: PWR H	Arizona Public Service Company's updated IPE Model (1994) Modeling Methodology: Small Event Tree and Large Fault Tree CRYSTAL Code (UNIX based)	The database was requested by RES for use in developing generic guidance and review procedures concerning risk-informed regulation. NOTE: The PALVERDE database was developed for use with the DOS version of SAPHIRE. The PVWIN-12 database was developed for use with the Windows version of SAPHIRE, and it included more cut sets (truncated to 1E-12). Otherwise, the databases are the same. The PALVERDE database was completed on December 6, 1996. The PVWIN-12 database was completed on December 22, 1996.
PEACH BOTTOM UNIT 2 General Electric Type 4 Mark 1 Containment Region I	SAPHIRE 6.0 NUREG-1150 model only - **PBNUREG** Full-Scope Level 1 Load: Linked Event Tree and Fault Tree Model AT POWER Conditions ASP Category: BWR C	NUREG/CR-4550, Volume 4, August 1989 Modeling Methodology: Small Event Tree and Large Fault Tree NUREG-1150 Model	The database was requested by RES. NOTE: Dominant and non-dominant sequences can be generated with recovery events applied. External events (fire and seismic) can also be generated. The PRA does not provide the data needed to adequately handle the flood analysis in the database. Thus, flood-related data is not included in the SAPHIRE database. The database was completed on October 30, 1997.

Table A.5.1. Probabilistic risk assessment databases for use with SAPHIRE.

Plant, Design, and Region	IRRAS/SAPHIRE Version, Database types(s), and ASP Category	PRA Source, Date, and PRA type	Comments
RIVER BEND UNIT 1 General Electric Type 6 Mark 3 Containment Region IV	SAPHIRE 5.0 & 6.0 models - RIVERBEN Full-Scope Level 1 Load: Linked Event Tree and Fault Tree Model AT POWER Conditions ASP Category: BWR C	Gulf States Utilities Company's IPE (1993) Modeling Methodology: Small Event Tree and Large Fault Tree SAIC's CAFTA Code	The database was requested by Region IV. The database was completed on October 19, 1994.
SAN ONOFRE UNITS 2 & 3 Combustion Engineering CE Dry, Ambient Pressure Containment Region IV	SAPHIRE 5.0 & 6.0 models - SONGS2&3 Full-Scope Level 1 Load: Event Tree and Fault Tree Model AT POWER Conditions ASP Category: PWR H	Southern California Edison Company's IPE (1993) Modeling Methodology: Cut Set Matching ERIN Industries' REBECA Code	The database was requested by NRR. NOTE: The sequence cut sets are generated using the previously generated system cut sets; i.e., the event trees are not directly linked to the fault trees. This is the same process used in the IPE. The database was completed on June 6, 1994.
SEQUOYAH UNIT 1 Westinghouse Electric 4-Loop Wet, Ice-Condenser Containment Region II	SAPHIRE 5.0 & 6.0 models - SEQUOYAH "Limited" Full-Scope Level 1 Load: Linked Event Tree and Fault Tree Model AT POWER Conditions ASP Category: PWR B	NUREG/CR-4550, Volume 5, April 1990 Modeling Methodology: Small Event Tree and Large Fault Tree NUREG-1150 Model	The database was requested by RES/PRAB. NOTE: This is a "Limited" full-scope load in that the non-dominant sequences can be generated, but, no rules were created for adding recovery events. Also, cut set editing rules were used to reproduce the dominant accident sequence results reported in NUREG-4550 PRA. The database was completed on April 5, 1995.

Table A.5.1. Probabilistic risk assessment databases for use with SAPHIRE.

Plant, Design, and Region	IRRAS/SAPHIRE Version, Database types(s), and ASP Category	PRA Source, Date, and PRA type	Comments
SURRY UNIT 1 Westinghouse Electric 3-Loop Dry, Sub-Ambient Pressure Containment Region II	SAPHIRE 6.0 model - BNL-SDWN Full-Scope Level 1 Load: Linked Event Tree and Fault Tree Model AT SHUTDOWN Conditions ASP Category: PWR A1	Brookhaven National Laboratory's PRA (NUREG/CR-6144, June 1994) Modeling Methodology: Small Event Tree and Large Fault Tree NRC's SAPHIRE 5.0 Code	The initial database was created by the ***Brookhaven National Laboratory*** for RES/PRAB. NOTE: The BNL's database required hours to generate results. The INEEL modified the model to reduce the analysis time. It now takes less than an hour to generate results. The INEEL's database was verified to function correctly by the BNL. The INEEL's version of the database was completed on October 20, 1998.
SURRY STATION Westinghouse Electric 3-Loop Dry, Sub-Ambient Pressure Containment Region II	SAPHIRE 6.0 models only - SURRYLV1 and SURRYLV2 SURRYLV1 - Full-Scope Level 1 Load: SURRYLV2 - Full-Scope Level 2 Load: Both models are Linked Event Tree and Fault Tree Models AT POWER Conditions ASP Category: PWR A1	Virginia Electric and Power Company's IPE updated model (1993) Modeling Methodology: Small Event Tree and Large Fault Tree NUS-Halliburton's NUPRA Code	The databases were requested by RES for use in developing generic guidance and review procedures concerning risk-informed regulation. The SURRYLV1 database was completed on July 14, 1998. The SURRYLV2 database was completed on June 30, 1998.

Table A.5.1. Probabilistic risk assessment databases for use with SAPHIRE.

Plant, Design, and Region	IRRAS/SAPHIRE Version, Database types(s), and ASP Category	PRA Source, Date, and PRA type	Comments
SURRY *UNIT 1* Westinghouse Electric 3-Loop Dry, Sub-Ambient Pressure Containment Region II	SAPHIRE 6.0 model only - **SP1150-E** Full-Scope Level 1 Load: Linked Event Tree and Fault Tree Model **AT POWER** Conditions ASP Category: PWR A1	NUREG/CR-4550, Volume 3, April 1990 Modeling Methodology: Small Event Tree and Large Fault Tree NUREG-1150 Model	The database was requested by RES/PRAB. NOTE: Dominant and non-dominant sequences can be generated with recovery events applied. External events (fire and seismic) can also be generated. The PRA does not provide the data needed to adequately handle the flood analysis in the database. Thus, flood-related data are not included in the SAPHIRE database. The database was completed on October 15, 1997.

Table A.5.2. SPAR Revision 2QA and LERF models[a] available.

SPAR Model Class	Plant[b]	Database completed	LERF Model
BWR A	Millstone 1	2/19/98	
BWR A	Nine Mile Point 1	4/3/98	
BWR A	**Oyster Creek**	7/14/97	
BWR B	**Dresden 2 and 3**	7/14/97	Available
BWR C	Browns Ferry 1, 2, and 3	5/1/98	
BWR C	Brunswick 1 and 2	9/16/97	
BWR C	Clinton 1	9/16/97	
BWR C	Cooper Station	11/18/97	
BWR C	Duane Arnold	11/18/97	
BWR C	Enrico Fermi 2	12/1/97	
BWR C	Fitzpatrick	12/1/97	
BWR C	Grand Gulf 1	7/14/97	
BWR C	Hatch 1 and 2	2/10/98	
BWR C	Hope Creek 1	2/10/98	
BWR C	LaSalle 1 and 2	7/14/97	
BWR C	Limerick 1 and 2	3/3/98	
BWR C	Monticello	1/14/98	
BWR C	Nine Mile Pt. 2	1/14/98	
BWR C	**Peach Bottom 2 and 3**	7/14/97	Available
BWR C	Perry 1	7/14/97	
BWR C	Pilgrim 1	1/14/98	
BWR C	Quad Cities 1 and 2	3/23/98	
BWR C	River Bend 1	3/16/98	
BWR C	Susquehanna 1 and 2	2/19/98	
BWR C	Vermont Yankee	2/19/98	
BWR C	Washington NP 2	2/10/98	
PWR A1	Beaver Valley 1	2/2/98	
PWR A1	North Anna 1 and 2	4/3/98	
PWR A1	**Surry 1 and 2**	2/2/98	Available
PWR A2	Beaver Valley 2	4/29/98	
PWR A2	Millstone 3	5/1/98	
PWR A2	South Texas 1 & 2	3/23/98	
PWR B	Braidwood 1 and 2	2/2/98	
PWR B	**Byron 1 and 2**	2/2/98	Available
PWR B	Callaway	2/2/98	
PWR B	Catawba 1 and 2	3/3/98	
PWR B	Comanche Peak 1 & 2	2/2/98	
PWR B	Cook 1 and 2	4/16/98	
PWR B	Diablo Canyon 1 and 2	4/16/98	
PWR B	Farley 1 and 2	3/3/98	
PWR B	Ginna	2/19/98	

Table A.5.2. SPAR Revision 2QA and LERF models[a] available.

SPAR Model Class	Plant[b]	Database completed	LERF Model
PWR B	Indian Point 2	4/29/98	
PWR B	Indian Point 3	4/29/98	
PWR B	Kewaunee	4/16/98	
PWR B	McGuire 1 and 2	3/23/98	
PWR B	Pt. Beach 1 and 2	3/3/98	
PWR B	Prairie Island 1 and 2	5/1/98	
PWR B	Robinson 2	2/2/98	
PWR B	Salem 1 and 2	2/10/98	
PWR B	Seabrook 1	2/10/98	
PWR B	Sequoyah 1 and 2	3/16/98	Available
PWR B	Shearon Harris	3/23/98	
PWR B	Summer 1	4/3/98	
PWR B	Turkey Point 3 and 4	4/29/98	
PWR B	Vogtle 1 and 2	3/16/98	
PWR B	Watts Bar 1 and 2	3/23/98	
PWR B	Wolf Creek 1	2/2/98	
PWR D	ANO 1	4/29/98	
PWR D	Crystal River 3	2/2/98	
PWR D	Davis-Besse 1	5/1/98	
PWR D	**Oconee 1, 2, and 3**	2/2/98	Available
PWR D	TMI 1	2/19/98	
PWR G	Calvert Cliffs 1 and 2	2/2/98	Available
PWR G	Fort Calhoun 1	2/10/98	
PWR G	Palisades	3/3/98	
PWR G	**St. Lucie 1**	2/2/98	
PWR G	St. Lucie 2	2/2/98	
PWR G	Millstone 2	2/2/98	
PWR H	ANO 2	4/29/98	
PWR H	Palo Verde 1, 2, and 3	3/23/98	Available
PWR H	**San Onofre 2 and 3**	2/19/98	
PWR H	Waterford 3	3/3/98	

a. Simplified Plant Analysis Risk (SPAR), Large Early Release Frequency (LERF).
b. Lead plant of each class is in bold type.

A.6 REFERENCES

1. T. W. Bolander et al, *Verification and Validation of the SAPHIRE Version 4.0 PRA Software Package,* NUREG/CR-6145, February 1994.

2. IEEE Std 1012-1986, "IEEE Standard for Software Verification and Validation Plans," Institute of Electrical and Electronic Engineers.

3. J. L. Jones et al, *Systems Analysis Programs for Hands-On Integrated Reliability Evaluations (SAPHIRE) Version 5.0 Verification and Validation (V&V) Manual,* NUREG/CR-6116, February 1995.

Appendix B

SAPHIRE 6.0 Test Reference Descriptions

Appendix B
SAPHIRE 6.0 Test Reference Descriptions

B.1 TEST DEFINITIONS

This appendix contains a complete list of descriptions referenced by one or more test scenarios in the report. Note that, unless otherwise specified, SAPHIRE test results were compared with results from SAPHIRE Version 5.67.

Test-01 Fault Tree solve and quantify cut sets

Scenarios generate basic event data (with no change sets), solve (with cut set probability cutoff) and quantify fault tree minimal cut sets, and recovery rules. The alternate case min cut upper bound, base case min cut upper bound, and cut set totals are verified for each fault tree.

Ten SPAR Revision 2QA models are used for testing and validation with this and other GEM scenarios (Byron (BYRN), Peach Bottom (PBOT), Dresden (DRES), Grand Gulf (GGUL), Milstone (MIL3), Oconee (OCON), Oyster Creek (OYST), San Onofre (SONG), St Lucie (STL1), and Surry (SURY). These were the models used in *SPAR Revision 2QA Model Comparison Using SAPHIRE 5.0 and SAPHIRE 6.0.*[1] Cut set probability cutoff values used in generating fault tree and sequence cut sets are 1E-15 for BWRs and 1E-16 for PWRs.

Test-02 Core Damage Frequency

Scenarios generate basic event data (with no change sets), solve (with cut set probability cutoff) and quantify sequence minimal cut sets, and recovery rules. The alternate case min cut upper bound, base case min cut upper bound, and cut set totals are verified for each sequence. Refer to Test-01 for model information.

Test-03 Condition Assessment with Auxiliary Feed Water (AFW) out of service for 72 hours

GEM scenarios exercise all aspects of operational event analysis including removal of equipment from service and automated processing of all steps. These steps include basic event generation with change sets; and generation, quantification, and recovery of cut sets. The number of sequences; total CCDP; total core damage probability (CDP); total importance; and CCDP, CDP, and importance for each sequence are verified. Refer to Test-01 for model information.

Test-04 Condition Assessment with an emergency diesel generator out of service for three months

Refer to Test-03.

Test-05 Initiating Event Assessment - Transient with no other failures

For all GEM initiating event assessments, the number of sequences; total CCDP; total core damage probability (CDP); total importance; and CCDP, CDP, and importance for each sequence are verified. Automated steps performed for initiating event assessments include basic event generation with change sets; and generation, quantification, and recovery of cut sets. Refer to Test-01 for model information.

Test-06 Initiating Event Assessment - Small Loss of Coolant Accident with no other failures

Refer to Test-05.

Test-07 Initiating Event Assessment - Steam Generator Tube Rupture with no other failures

Refer to Test-05.

Test-08 Initiating Event Assessment - Grid-Related Loss of Off-Site Power (LOOP) with no other failures

Refer to Test-05.

Test-09 Initiating Event Assessment - Plant-Centered LOOP with no other failures

Refer to Test-05.

Test-10 Initiating Event Assessment - Severe Weather LOOP with no other failures

Refer to Test-05.

Test-11 Initiating Event Assessment - Extreme Severe Weather LOOP with no other failures

Refer to Test-05.

Test-12 Initiating Event Assessment - Transient with AFW failed

Refer to Test-05.

Test-13 Dominant sequence frequencies and core damage frequency uncertainty

The SUR40 database was initially generated using IRRAS 4.0. An earlier limited manual study[2] tracked the results though incremental versions of SAPHIRE 5.0 up through an early 6.0 release. This test continues the tracking with an automated test script.

Cut sets generated with cut set probability cutoff and cut set size cutoff. Recovery rules are applied without cutoff. Cut set update performed with no truncation. Project level Monte Carlo uncertainty performed on results using 5000 samples.

Test-14 Fault Tree Uncertainty - Monte Carlo Method/Log Normal Distribution

This scenario consists of six variations that test uncertainty using the Monte Carlo simulation technique for the log normal distribution type. The six variations use fault trees that consists of an OR gate with a single basic event as its input. Each variation uses differing basic event nominal probabilities and error factors. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 5,000 samples (simulated values) and a random number seed of 4,321 for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-15 Fault Tree Uncertainty - Monte Carlo Method/Normal Distribution

This scenario consists of variations that test uncertainty using the Monte Carlo simulation technique for the normal distribution type. Two fault trees are used that consist of an OR gate with a single basic event as its input, with differing basic event nominal probabilities and standard deviation values. Fault tree combinations of five sample sizes and two seed values are used for a total of ten tests for each tree. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-16 Fault Tree Uncertainty - Monte Carlo Method/Beta Distribution

This scenario consists of ten variations that test uncertainty using the Monte Carlo simulation technique for the beta distribution type. The ten variations use fault trees that consists of an OR gate with a single basic event as its input. Each variation uses differing basic event nominal probabilities and uncertainty values. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 5,000 samples and a seed of 4,321 for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-17 Fault Tree Uncertainty - Monte Carlo Method/Chi Squared Distribution

This scenario consists of twelve variations that test uncertainty using the Monte Carlo simulation technique for the chi-square distribution type. For ten of the variations, ten fault trees are used that consists of an OR gate with a single basic event as its input. Each basic event has a different nominal probability and uncertainty value (degrees of freedom). The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 5,000 samples and a seed of 4,321 for each test.

For the other variations two fault trees are used that consist of an OR gate with a single basic event as its input with differing basic event nominal probabilities and uncertainty values. For each of these fault trees, four different sample sizes and seed of 4,321 are used. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-18 Fault Tree Uncertainty - Monte Carlo Method/Exponential Distribution

This scenario consists of eight variations that test uncertainty using the Monte Carlo simulation technique for the exponential distribution type. The eight variations use fault trees that consists of an OR gate with a single basic event as its input. Each variation uses differing basic event nominal probabilities. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 5,000 samples and a seed of 4,321 for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-19 Fault Tree Uncertainty - Monte Carlo Method/Uniform Distribution

This scenario consists of four variations that test uncertainty using the Monte Carlo simulation technique for the uniform distribution type. The four variations use fault trees that consists of an OR gate with a single basic event as its input. Each variation uses differing basic event nominal probabilities and upper end uncertainty values. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 5,000 samples and a seed of 4,321 for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-20 Fault Tree Uncertainty - Monte Carlo Method/Gamma Distribution

This scenario consists of six variations that test uncertainty using the Monte Carlo simulation technique for the gamma distribution type. The six variations use fault trees that consists of an OR gate with a single basic event as its input. Each variation uses differing basic event nominal probabilities and uncertainty values (r). The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 5,000 samples and a seed of 4,321 for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-21 Fault Tree Uncertainty - Monte Carlo Method/Maximum Entropy Distribution

This scenario consists of seven variations that test uncertainty using the Monte Carlo simulation technique for the maximum entropy distribution type. The seven variations use fault trees that consists of an OR gate with a single basic event as its input. Each variation uses differing basic event nominal probabilities and upper end and lower end uncertainty values. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 5,000 samples and a seed of 4,321 for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-22 Sequence Uncertainty - Monte Carlo Method/Dirichlet Distribution

This test scenario consists of four variations that test uncertainty analyses using the Monte Carlo simulation technique for the Dirichlet distribution type. The first three variations each use a three-branch event tree with differing failure probabilities and parameter values. The fourth variation uses a 121-branch event tree. Change sets are used to correlate the basic events. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified. Since this distribution type was not available in version 5, version 6 results have been inspected for acceptance and are used for comparison against subsequent incremental releases.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-23 Fault Tree Uncertainty - Monte Carlo Method/Seismic Distribution

This scenario consists of four variations that test uncertainty using the Monte Carlo simulation technique for the seismic distribution type. The four variations use fault trees that consists of an OR gate with a single basic event as its input. Each variation uses differing basic event median failure acceleration, screening G-level, Beta-R and Beta-U values. Uncertainty analysis is performed using the Seismic analysis type. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 10,000 samples and a seed of 4,321 for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-24 Fault Tree and Sequence Uncertainty - Monte Carlo Method/Constrained Noninformative Distribution

This scenario consists of five variations that test uncertainty using the Monte Carlo simulation techniques for the Constrained Noninformative distribution type. The three variations involving fault trees use fault trees that consists of an OR gate with a single basic event as its input with differing basic event nominal probabilities. The two variations involving sequences use event trees with differing initiating event nominal frequencies. The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 10,000 simulated values for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-25 Fault Tree Uncertainty - Latin Hypercube Method/Log Normal Distribution

Refer to Test-14.

Test-26 Fault Tree Uncertainty - Latin Hypercube Method/Normal Distribution

Refer to Test-15.

Test-27 Fault Tree Uncertainty - Latin Hypercube Method/Beta Distribution

Refer to Test-16.

Test-28 Fault Tree Uncertainty - Latin Hypercube Method/Chi Squared Distribution

Refer to Test-17.

Test-29 Fault Tree Uncertainty - Latin Hypercube Method/Exponential Distribution

Refer to Test-18.

Test-30 Fault Tree Uncertainty - Latin Hypercube Method/Uniform Distribution

Refer to Test-19.

Test-31 Fault Tree Uncertainty - Latin Hypercube Method/Gamma Distribution

Refer to Test-20.

Test-32 Sequence Uncertainty - Latin Hypercube Method/Maximum Entropy Distribution

Refer to Test-21.

Test-33 Sequence Uncertainty - Latin Hypercube Method/Dirichlet Distribution

Refer to Test-22. Test not yet done.

Test-34 Fault Tree Uncertainty - Latin Hypercube Method/Seismic Distribution

Refer to Test-23.

Test-35 Fault Tree and Sequence Uncertainty - Latin Hypercube Method/Constrained Noninformative Distribution

Refer to Test-24. Sequence test not yet done.

Test-36 Fault Tree Uncertainty - Monte Carlo Method/Histogram Distribution

This scenario consists of four variations that test uncertainty using the Monte Carlo simulation technique for the histogram distribution type. The four variations use fault trees that consists of an OR gate with a single basic event as its input. Each variation uses differing basic event nominal probabilities and histograms (of percentage, area, and range types). The 5th percentile, 50th percentile, 95th percentile, and standard deviation results are verified based on 5,000 samples and a seed of 4,321 for each test.

These tests are based on TSTU developed for the SAPHIRE 5.0 V&V.

Test-37 Fault Tree Uncertainty - Latin Hypercube Method/Histogram Distribution

Refer to Test-36.

Test-38 Gather End States

This scenario generates basic event data (with no change sets) and gathers the end states (without cut set probability cutoff, by sequence end state). The alternate case min cut upper bound and number of cut sets are verified for each end state.

The Beaver Valley Unit 2 IPE model (BV2-5) is used for testing and validation with this scenario. This model was used in the SAPHIRE 5.0 V&V effort.

Test-39 End State Uncertainty - Monte Carlo Method.

These scenarios perform multiple event sampling on all sequences that belong to a particular end state (single uncertainty), as well as the collection of all end states (group uncertainty) . The mean, 5th percentile, median, 95th percentile, and standard deviation results are verified based on 3,000 simulated values for each test. Refer to Test-38 for model information.

Test-40 End State Uncertainty - Latin Hypercube Method

Refer to Test-39.

Test-41 Cut Set Verification

This test case consists of scenarios that compare cut sets from selected fault trees, sequences, and end states. The cut set frequency, percent contribution to the total, and basic events in the cut set are verified. Cut sets are solved/gathered with truncation, auto-recovered, and updated. Sequences and fault trees are solved with and without their default flag sets.

Also, fault tree editing is briefly tested. This is done by opening the alphanumeric logic editor, saving and converting logic to graphics, then pulling up the graphical editor and saving the graphics. This test does not test specific editing features but it does verify that the original logic is correctly loaded and saved. Failure of the logic to be preserved correctly would be detected with incorrect cut set results.

The Surry version 5 model (SURRY-50) and the Comanche Peak version 6 model (COM-PEAK) were used to perform this test. Since flag sets for fault trees did not exist in version 5, it was necessary to test that feature using a version 6 model. The version 6 model results have been inspected for acceptance and are used as the basis for comparison against subsequent incremental releases.

Test-42 Link Small Event Tree

This scenario uses the Surry Large Early Release Frequency (LERF) Level 2/3 model (S_LERF) to link event trees using the small event tree methodology. Prior to link, each event tree is loaded into the graphical editor and saved to ensure that the correct logic is preserved. The sequences are then solved with cutoff. The alternate case min cut upper bound and number of cut sets are verified for each Level 1 sequence.

Test-43 Partition Sequence Cut Sets

This scenario applies event tree partition rules to the sequences generated in scenario reference number Test-42. These partition rules assign Plant Damage States (PDSs) to all sequences with cut sets. These end states are then gathered by cut set partition. The alternate case min cut upper bound and number of cut sets are verified for each PDS.

Test-44 Link Large Event Tree

This scenario uses the results from scenario reference number Test-43. The PDS event trees created by the partition rules are linked using the large event tree methodology and creates sequence logic cut sets. The LERF end states are then gathered by sequence end state and requantified using the Rare Event approximation. The alternate case min cut upper bound and number of cut sets are verified for each LERF end state.

Test-45 Fault Tree Importance Measures

This test case consists of scenarios that test importance measure calculations for each of the importance measures: ratio, difference, and uncertainty. For each event, the name, number of occurrences, probability, Fussell-Vesely (or Birnbaum or uncertainty importance), risk reduction ratio (or difference), risk increase ratio (or difference) results are verified.

These scenarios duplicate tests used for the V&V of SAPHIRE Version 4.0 (NUREG/CR-6145).[3] As with those tests, the DEMO database is used.

Test-46 Sequence Importance Measures

Refer to Test-45.

Test-47 Sequence Group Importance Measures

Refer to Test-45 for information about the test.

Test-48 End State Importance Measures

Refer to Test-45 for information about the test.

Because the DEMO database does not contain end states with generated cut sets, the Beaver Valley Unit 2 IPE database (BV2-5) is used.

Test-49 End State Group Importance

Refer to Test-45 for information about the test.

Because the DEMO database does not contain end states with generated cut sets, the Beaver Valley Unit 2 IPE (BV2-5) database is used.

Test-50 Change Set Processing- Single

This test case consists of scenarios that test the effects of basic event changes, via change sets, on sequence cut set results. In these scenarios, single basic event changes are made in a change set. The change set is then marked and the basic event data is generated. An affected sequence is then selected and cut set results are verified.

These scenarios duplicate tests used for the V&V of SAPHIRE Version 4.0 (Reference 3). As with those tests, the DEMO database is used.

Test-51 Change Set Processing- Class

This test case consists of scenarios that test the effects of basic event changes, via change sets, on sequence cut set results. In these scenarios, class basic event changes are made in a change set. The change set is then marked and the basic event data is generated. An affected sequence is then selected and cut set results are verified.

Refer to Test-51 for database information.

Test-52 Change Set Processing - Marked Order

This test case consists of scenarios that test the effects of basic event changes, via change sets, on sequence cut set results. In these scenarios, the change sets created in Test-50 and Test-51 are used. Multiple change sets are marked and the basic event data is generated. An affected sequence is then selected and cut set results are validated. This test verifies that the changed basic events are processed correctly based on the marked order of the change sets.

Test-53 Data Extract/Load Functions

This test exercises some of the key Extract/Load data functionality. Fault tree logic and basic event information are extracted into flat files, then deleted from the database. The flat files are then loaded back into the database and solved again. This verifies that the extraction and load process preserves key information.

Crystal River 3, a large-fault-tree PRA database, is used for this test.

Test-54 Fault Tree Utility Functions

SAPHIRE provides several utility functions to help manipulate fault trees. These tests verify that the use of these features does not introduce any errors into the database.

The Auto-page option is used to break up a large tree into a series of more manageable smaller trees with transfer information. One test scenario performs the auto-page on a large fault tree and then solves the modified tree to verify that the cut set results do not change as a result of the paging operation.

Fault tree cut sets can be copied to an end state. One test scenario performs this copy, and then verifies that the cut sets in the end state match the cut sets in the fault tree.

Crystal River 3, a large-fault-tree PRA database, is used for this test.

B.2 REFERENCES

1. R. D. Fowler, *SPAR Revision 2QA Model Comparision using SAPHIRE 5.0 and SAPHIRE 6.0*, INEEL letter report to the NRC, M. B. Sattison to E. G. Rodrick, July 13, 1998.

2. P. H. McCabe, *Comparison of Results from Various Versions of SAPHIRE*, INEEL/EXT-98-00057, January 1998.

3. T. W. Bolander et al., *Verification and Validation of the SAPHIRE Version 4.0 PRA Software Package*, NUREG/CR-6145, February 1994.

Appendix C

Detailed Test Results

Appendix C
Detailed Test Results

This document contains the complete detailed results output from the testing software for all tests contained in the test suite. The version of SAPHIRE tested was 6.63. For each test result, the first line of the test result identifies the test ID and description along with the time at which the particular test was started. This is illustrated below in the sample test result (e.g., SURRY-50-05). Then, after the identifier line, the steps processed by the test are shown. In the example, the SURRY-50 sequences are solved using a truncation of 1E-9/yr and then recovery rules are applied. The cut sets are run through a cut-set update. Then, the test gathers end-state cut sets via the partition rules (again with 1E-9/yr truncation). These end-state cut sets are updated. Lastly, the results are compared against the stored "correct" results for the end states of AD5, AD6, AH1, and S2D1. If the results match the "correct" results, a "pass" is indicated, otherwise a "failed" would be indicated. Then, the time of test completion is recorded.

SURRY-50-05 Scenario: Check End State Cut Sets started at 12:48:28 AM
Sequences solved
with prob cut off (1.0E-09) and with recovery
Sequence cut sets updated
End States gathered by cut set partition
with prob cut off (1.0E-09)
End State cut sets updated

END STATE CUTSET RESULTS:
AD5 pass
AD6 pass
AH1 pass
S2D1 pass
Scenario: Check End State Cut Sets completed at 12:50:05 AM

TEST SUMMARY

SAPHIRE/GEM Test Suite Summary Report
DATE & TIME: 8/30/99 8:38:56 PM
SAPHIRE Version 6.63

Test No.	Test Description	PASS/FAIL	Ref. No.	Page No.
BYRN-01	Solve Fault Trees	PASSED	Test-01	5
BYRN-02	Core Damage Frequency	PASSED	Test-02	7
BYRN-03	Condition AFW out of service for 72 hours	PASSED	Test-03	10
BYRN-04	Condition EDG out of service for 3 months	PASSED	Test-04	12
BYRN-05	Transient - No other failures	PASSED	Test-05	14
BYRN-06	Small LOCA - No other failures	PASSED	Test-06	14
BYRN-07	SGTR - no other failures	PASSED	Test-07	15
BYRN-08	Grid-related LOOP - no other failures	PASSED	Test-08	15
BYRN-09	Plant-centered LOOP - no other failures	PASSED	Test-09	16
BYRN-10	Severe Weather LOOP - no other failures	PASSED	Test-10	16
BYRN-11	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	17
BYRN-12	Transient - AFW failed	PASSED	Test-12	17
PBOT-01	Solve Fault Trees	PASSED	Test-01	18
PBOT-02	Core Damage Frequency	PASSED	Test-02	21
PBOT-03	Condition HPCI out of service for 72 hours	PASSED	Test-03	27
PBOT-04	Condition EDG out of service for 3 months	PASSED	Test-04	29
PBOT-05	Transient - No other failures	PASSED	Test-05	31
PBOT-06	Small LOCA - No other failures	PASSED	Test-06	32
PBOT-07	Grid-related LOOP - no other failures	PASSED	Test-08	33
PBOT-08	Plant-centered LOOP - no other failures	PASSED	Test-09	34
PBOT-09	Severe Weather LOOP - no other failures	PASSED	Test-10	35
PBOT-10	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	36

Test No.	Test Description	PASS/FAIL	Ref. No.	Page No.
PBOT-11	Transient - HPCI failed	PASSED	Test-12	37
DRES-01	Solve Fault Trees	PASSED	Test-01	38
DRES-02	Core Damage Frequency	PASSED	Test-02	41
DRES-03	Condition HPCI out of service for 72 hours	PASSED	Test-03	47
DRES-04	Condition EDG out of service for 3 months	PASSED	Test-04	49
DRES-05	Transient - No other failures	PASSED	Test-05	51
DRES-06	Small LOCA - No other failures	PASSED	Test-06	52
DRES-07	Grid-related LOOP - no other failures	PASSED	Test-08	53
DRES-08	Plant-centered LOOP - no other failures	PASSED	Test-09	54
DRES-09	Severe Weather LOOP - no other failures	PASSED	Test-10	55
DRES-10	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	56
DRES-11	Transient - HPCI failed	PASSED	Test-12	57
GGUL-01	Solve Fault Trees	PASSED	Test-01	58
GGUL-02	Core Damage Frequency	PASSED	Test-02	61
GGUL-03	Condition HPCI out of service for 72 hours	PASSED	Test-03	66
GGUL-04	Condition EDG out of service for 3 months	PASSED	Test-04	68
GGUL-05	Transient - No other failures	PASSED	Test-05	70
GGUL-06	Small LOCA - No other failures	PASSED	Test-06	71
GGUL-07	Grid-related LOOP - no other failures	PASSED	Test-08	72
GGUL-08	Plant-centered LOOP - no other failures	PASSED	Test-09	73
GGUL-09	Severe Weather LOOP - no other failures	PASSED	Test-10	74
GGUL-10	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	75
GGUL-11	Transient - HPCI failed	PASSED	Test-12	76
MIL3-01	Solve Fault Trees	PASSED	Test-01	77
MIL3-02	Core Damage Frequency	PASSED	Test-02	80
MIL3-03	Condition AFW out of service for 72 hours	PASSED	Test-03	84
MIL3-04	Condition EDG out of service for 3 months	PASSED	Test-04	86
MIL3-05	Transient - No other failures	PASSED	Test-05	88
MIL3-06	Small LOCA - No other failures	PASSED	Test-06	88
MIL3-07	SGTR - no other failures	PASSED	Test-07	89
MIL3-08	Grid-related LOOP - no other failures	PASSED	Test-08	89
MIL3-09	Plant-centered LOOP - no other failures	PASSED	Test-09	90
MIL3-10	Severe Weather LOOP - no other failures	PASSED	Test-10	91
MIL3-11	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	91
MIL3-12	Transient - AFW failed	PASSED	Test-12	92
OCON-01	Solve Fault Trees	PASSED	Test-01	93
OCON-02	Core Damage Frequency	PASSED	Test-02	95
OCON-03	Condition EFW out of service for 72 hours	PASSED	Test-03	98
OCON-04	Condition 3TC out of service for 3 months	PASSED	Test-04	100
OCON-05	Transient - No other failures	PASSED	Test-05	102
OCON-06	Small LOCA - No other failures	PASSED	Test-06	102
OCON-07	SGTR - no other failures	PASSED	Test-07	103
OCON-08	Grid-related LOOP - no other failures	PASSED	Test-08	103
OCON-09	Plant-centered LOOP - no other failures	PASSED	Test-09	104
OCON-10	Severe Weather LOOP - no other failures	PASSED	Test-10	104
OCON-11	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	105
OCON-12	Transient - EFW failed	PASSED	Test-12	105
OYST-01	Solve Fault Trees	PASSED	Test-01	106
OYST-02	Core Damage Frequency	PASSED	Test-02	108
OYST-03	Condition MFW out of service for 72 hours	PASSED	Test-03	111
OYST-04	Condition EDG out of service for 3 months	PASSED	Test-04	113
OYST-05	Transient - No other failures	PASSED	Test-05	114
OYST-06	Small LOCA - No other failures	PASSED	Test-06	115
OYST-07	Grid-related LOOP - no other failures	PASSED	Test-08	115
OYST-08	Plant-centered LOOP - no other failures	PASSED	Test-09	116
OYST-09	Severe Weather LOOP - no other failures	PASSED	Test-10	116
OYST-10	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	117
OYST-11	Transient - MFW failed	PASSED	Test-12	118
SONG-01	Solve Fault Trees	PASSED	Test-01	119
SONG-02	Core Damage Frequency	PASSED	Test-02	121
SONG-03	Condition AFW out of service for 72 hours	PASSED	Test-03	124
SONG-04	Condition EDG out of service for 3 months	PASSED	Test-04	126
SONG-05	Transient - No other failures	PASSED	Test-05	128
SONG-06	Small LOCA - No other failures	PASSED	Test-06	128

Test No.	Test Description	PASS/FAIL	Ref. No.	Page No.
SONG-07	SGTR - no other failures	PASSED	Test-07	129
SONG-08	Grid-related LOOP - no other failures	PASSED	Test-08	129
SONG-09	Plant-centered LOOP - no other failures	PASSED	Test-09	130
SONG-10	Severe Weather LOOP - no other failures	PASSED	Test-10	130
SONG-11	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	131
SONG-12	Transient - AFW failed	PASSED	Test-12	131
STL1-01	Solve Fault Trees	PASSED	Test-01	132
STL1-02	Core Damage Frequency	PASSED	Test-02	134
STL1-03	Condition AFW out of service for 72 hours	PASSED	Test-03	138
STL1-04	Condition EDG out of service for 3 months	PASSED	Test-04	140
STL1-05	Transient - No other failures	PASSED	Test-05	142
STL1-06	Small LOCA - No other failures	PASSED	Test-06	142
STL1-07	SGTR - no other failures	PASSED	Test-07	143
STL1-08	Grid-related LOOP - no other failures	PASSED	Test-08	144
STL1-09	Plant-centered LOOP - no other failures	PASSED	Test-09	145
STL1-10	Severe Weather LOOP - no other failures	PASSED	Test-10	146
STL1-11	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	147
STL1-12	Transient - AFW failed	PASSED	Test-12	147
SURY-01	Solve Fault Trees	PASSED	Test-01	148
SURY-02	Core Damage Frequency	PASSED	Test-02	150
SURY-03	Condition AFW out of service for 72 hours	PASSED	Test-03	154
SURY-04	Condition EDG out of service for 3 months	PASSED	Test-04	156
SURY-05	Transient - No other failures	PASSED	Test-05	158
SURY-06	Small LOCA - No other failures	PASSED	Test-06	158
SURY-07	SGTR - no other failures	PASSED	Test-07	159
SURY-08	Grid-related LOOP - no other failures	PASSED	Test-08	159
SURY-09	Plant-centered LOOP - no other failures	PASSED	Test-09	160
SURY-10	Severe Weather LOOP - no other failures	PASSED	Test-10	161
SURY-11	Extreme Severe Weather LOOP - no other failures	PASSED	Test-11	161
SURY-12	Transient - AFW failed	PASSED	Test-12	162
SUR40-01	Solve Sequence Cutsets	PASSED	Test-02	163
SUR40-02	Project Uncertainty - Monte Carlo Method	PASSED	Test-13	164
TstU-01	Log Normal Distribution using MCS	PASSED	Test-14	165
TstU-02	Normal Distribution using MCS	PASSED	Test-15	166
TstU-03	Beta Distribution using MCS	PASSED	Test-16	169
TstU-04	Chi-Squared Distribution using MCS	PASSED	Test-17	171
TstU-05	Exponential Distribution using MCS	PASSED	Test-18	175
TstU-06	Uniform Distribution using MCS	PASSED	Test-19	177
TstU-07	Gamma Distribution using MCS	PASSED	Test-20	178
TstU-08	Maximum Entropy Distribution using MCS	PASSED	Test-21	179
TstU-09	Constrained Noninformative Distribution using MCS	PASSED	Test-24	180
TstU-10	Seismic Log Normal Distribution using MCS	PASSED	Test-23	181
TstU-11	Histogram Distribution using MCS	PASSED	Test-36	182
TstU-12	Log Normal Distribution using LHS	PASSED	Test-25	183
TstU-13	Normal Distribution using LHS	PASSED	Test-26	184
TstU-14	Beta Distribution using LHS	PASSED	Test-27	187
TstU-15	Chi-Squared Distribution using LHS	PASSED	Test-28	189
TstU-16	Exponential Distribution using LHS	PASSED	Test-29	193
TstU-17	Uniform Distribution using LHS	PASSED	Test-30	195
TstU-18	Gamma Distribution using LHS	PASSED	Test-31	196
TstU-19	Maximum Entropy Distribution using LHS	PASSED	Test-32	197
TstU-20	Constrained Noninformative Distribution using LHS	PASSED	Test-35	198
TstU-21	Seismic Log Normal Distribution using LHS	PASSED	Test-34	199
TstU-22	Histogram Distribution using LHS	PASSED	Test-37	200
TstU-23	Sq Constrained Noninformative Distribution using MCS	PASSED	Test-24	201
TstU-24	Sq Dirichlet Distribution using MCS	PASSED	Test-22	140
BV2-5-01	Gather End States	PASSED	Test-38	203
BV2-5-02	End State Uncertainty using MCS	PASSED	Test-39	204
BV2-5-03	End State Uncertainty using LHS	PASSED	Test-40	207
BV2-5-10	End State Group Uncertainty using MCS	PASSED	Test-39	210
BV2-5-11	End State Group Uncertainty using LHS	PASSED	Test-40	210
SURRY-50-01	Check Sequence Cut Sets without Flag Sets	PASSED	Test-41	210
SURRY-50-02	Check Sequence Cut Sets with Flag Sets	PASSED	Test-41	210
SURRY-50-03	Check Fault Tree Cut Sets (no flag sets in this db)	PASSED	Test-41	211

Test No.	Test Description	PASS/FAIL	Ref. No.	Page No.
SURRY-50-04	Check Fault Tree Cut Sets without Flag Sets	PASSED	Test-41	211
SURRY-50-05	Check End State Cut Sets	PASSED	Test-41	211
SURRY-5O-06	Class Change - All Events	PASSED	Test-51	213
SURRY-5O-07	Class Change - LPR-MOV-* Events	PASSED	Test-51	214
SURRY-5O-08	Single Change - 1 Event	PASSED	Test-51	215
SURRY-5O-09	Marked Change Sets	PASSED	Test-52	216
COM-PEAK-01	Check Sequence Cut Sets without Flag Sets	PASSED	Test-41	217
COM-PEAK-02	Check Sequence Cut Sets with Flag Sets	PASSED	Test-41	217
COM-PEAK-03	Check Fault Tree Cut Sets	PASSED	Test-41	217
COM-PEAK-04	Check Fault Tree Cut Sets without Flag Sets	PASSED	Test-41	217
COM-PEAK-05	Check End State Cut Sets	PASSED	Test-41	218
S_LERF-01	Link Level 1 Event Trees	PASSED	Test-42	219
S_LERF-02	Partition Sequence Cut Sets	PASSED	Test-43	228
S_LERF-03	Link PDS Trees	PASSED	Test-44	230
DEMO-04	Sequence Fussell-Vesely Importance	PASSED	Test-46	231
DEMO-05	Sequence Birnbaum Importance	PASSED	Test-46	232
DEMO-06	Sequence Uncertainty Importance	PASSED	Test-46	232
DEMO-07	Sequence Fussell-Vesely Group Importance	PASSED	Test-46	233
DEMO-08	Sequence Birnbaum Group Importance	PASSED	Test-46	233
DEMO-09	Sequence Uncertainty Group Importance	PASSED	Test-46	234
DEMO-10	Class Change - All Events	PASSED	Test-51	235
DEMO-11	Class Change - ?-MOV-1 Events	PASSED	Test-51	236
DEMO-12	Single Change - 1 Event	PASSED	Test-51	236
DEMO-13	Marked Change Sets	PASSED	Test-52	237
BV2-5-04	End State Fussell-Vesely Importance	PASSED	Test-48	238
BV2-5-05	End State Birnbaum Importance	PASSED	Test-48	241
BV2-5-06	End State Uncertainty Importance	PASSED	Test-48	244
BV2-5-07	End State Fussell-Vesely Group Importance	PASSED	Test-48	247
BV2-5-08	End State Birnbaum Group Importance	PASSED	Test-48	251
BV2-5-09	End State Uncertainty Group Importance	PASSED	Test-48	255
CR3-01	Solve Fault tree	PASSED	Test-01	259
CR3-02	Extract,Delete,Load,Solve	PASSED	Test-53	259
CR3-03	Auto page, Solve	PASSED	Test-54	260
CR3-04	Save cutsets to end state	PASSED	Test-54	260

TEST CASE : SAPHIRE QA Models (CDF_BYRN)
DATE & TIME: 8/30/99 8:39:02 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: bryn_2qa

BYRN-01 Scenario: Solve Fault Trees started at 8:39:33 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-16)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
ACP-ST	5.300E-001		pass	5.300E-01	pass	1	pass
AFW	3.341E-004		pass	3.341E-04	pass	13	pass
AFW-ATWS	2.425E-002		pass	2.425E-02	pass	14	pass
AFW-L	3.341E-004		pass	3.341E-04	pass	13	pass
AFW-SGTR	3.531E-004		pass	3.531E-04	pass	12	pass
BORATION	1.000E-003		pass	1.000E-03	pass	1	pass
COOLDOWN	3.997E-003		pass	3.997E-03	pass	2	pass
DEP-REC	3.500E-003		pass	3.500E-03	pass	1	pass
EP	2.889E-003		pass	2.889E-03	pass	5	pass
F&B	2.244E-002		pass	2.244E-02	pass	91	pass
F&B-L	2.244E-002		pass	2.244E-02	pass	91	pass
HPI	9.140E-006		pass	9.140E-06	pass	88	pass
HPI-L	9.140E-006		pass	9.140E-06	pass	88	pass
HPR	2.731E-003		pass	2.731E-03	pass	754	pass
HPR-L	2.731E-003		pass	2.731E-03	pass	754	pass
LPR	2.228E-003		pass	2.228E-03	pass	44	pass
MFW-A	2.000E-001		pass	2.000E-01	pass	1	pass
MFW-NT	5.000E-002		pass	5.000E-02	pass	1	pass
MFW-T	7.840E-002		pass	7.840E-02	pass	2	pass
OP-2H	1.200E-001		pass	1.200E-01	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
ACP-ST	0.000E+00		pass
AFW	0.000E+00		pass
AFW-ATWS	0.000E+00		pass
AFW-L	0.000E+00		pass
AFW-SGTR	0.000E+00		pass
BORATION	0.000E+00		pass
COOLDOWN	0.000E+00		pass
DEP-REC	0.000E+00		pass
EP	0.000E+00		pass
F&B	0.000E+00		pass
F&B-L	0.000E+00		pass
HPI	0.000E+00		pass
HPI-L	0.000E+00		pass
HPR	0.000E+00		pass
HPR-L	0.000E+00		pass
LPR	0.000E+00		pass
MFW-A	0.000E+00		pass
MFW-NT	0.000E+00		pass
MFW-T	0.000E+00		pass
OP-2H	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
OP-6H	3.600E-002		pass	3.600E-02	pass	1	pass
OP-BD	2.000E-002		pass	2.000E-02	pass	1	pass
OP-SL	6.300E-001		pass	6.300E-01	pass	1	pass

PORV	4.000E-002		pass	4.000E-02	pass	1	pass
PORV-1	1.000E+000		pass	1.000E+00	pass	1	pass
PORV-A	2.716E-001		pass	2.716E-01	pass	9	pass
PORV-L	1.600E-001		pass	1.600E-01	pass	1	pass
PORV-RES	2.454E-004		pass	2.454E-04	pass	6	pass
PORV-SBO	3.700E-001		pass	3.700E-01	pass	1	pass
PRVL-RES	2.454E-004		pass	2.454E-04	pass	6	pass
RCS-DEP	3.997E-003		pass	3.997E-03	pass	2	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
OP-6H	0.000E+00		pass
OP-BD	0.000E+00		pass
OP-SL	0.000E+00		pass
PORV	0.000E+00		pass
PORV-1	0.000E+00		pass
PORV-A	0.000E+00		pass
PORV-L	0.000E+00		pass
PORV-RES	0.000E+00		pass
PORV-SBO	0.000E+00		pass
PRVL-RES	0.000E+00		pass
RCS-DEP	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
RCS-SG	3.738E-002		pass	3.738E-02	pass	3	pass
RCS-SG1	2.766E-002		pass	2.766E-02	pass	2	pass
RCSPRESS	1.303E-002		pass	1.303E-02	pass	2	pass
RHR	3.298E-003		pass	3.298E-03	pass	45	pass
RT	5.529E-006		pass	5.529E-06	pass	3	pass
RT-L	8.900E-008		pass	8.900E-08	pass	1	pass
SEALLOCA	3.500E-002		pass	3.500E-02	pass	1	pass
SG-DEP	1.000E-005		pass	1.000E-05	pass	1	pass
SGCOOL	2.005E-001		pass	2.005E-01	pass	5	pass
SGCOOL-L	3.404E-001		pass	3.404E-01	pass	5	pass
SGISOL	1.099E-002		pass	1.099E-02	pass	2	pass
SGISOL1	1.228E-002		pass	1.228E-02	pass	4	pass
SLOCA-NR	4.300E-001		pass	4.300E-01	pass	1	pass
THROTTLE	1.000E-002		pass	1.000E-02	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
RCS-SG	0.000E+00		pass
RCS-SG1	0.000E+00		pass
RCSPRESS	0.000E+00		pass
RHR	0.000E+00		pass
RT	0.000E+00		pass
RT-L	0.000E+00		pass
SEALLOCA	0.000E+00		pass
SG-DEP	0.000E+00		pass
SGCOOL	0.000E+00		pass
SGCOOL-L	0.000E+00		pass
SGISOL	0.000E+00		pass
SGISOL1	0.000E+00		pass
SLOCA-NR	0.000E+00		pass
THROTTLE	0.000E+00		pass

Scenario: Solve Fault Trees completed at 8:40:40 PM

BYRN-02 Scenario: Core Damage Frequency Test started at 8:40:40 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-16) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	05	5.403E-12	pass	5.403E-12	pass	105	pass
LOOP	07	5.303E-14	pass	5.303E-14	pass	43	pass
LOOP	09	1.692E-11	pass	1.692E-11	pass	208	pass
LOOP	10	2.376E-11	pass	2.376E-11	pass	58	pass
LOOP	13	2.395E-12	pass	2.395E-12	pass	441	pass
LOOP	16	1.185E-12	pass	1.185E-12	pass	270	pass
LOOP	17	9.942E-11	pass	9.942E-11	pass	155	pass
LOOP	18-02	4.499E-10	pass	4.499E-10	pass	5	pass
LOOP	18-05	2.877E-13	pass	2.877E-13	pass	48	pass
LOOP	18-07	2.595E-15	pass	2.595E-15	pass	14	pass
LOOP	18-08	5.188E-15	pass	5.188E-15	pass	13	pass
LOOP	18-09	5.140E-10	pass	5.140E-10	pass	5	pass
LOOP	18-11	2.642E-10	pass	2.642E-10	pass	5	pass
LOOP	18-14	1.683E-13	pass	1.683E-13	pass	37	pass
LOOP	18-16	1.005E-15	pass	1.005E-15	pass	6	pass
LOOP	18-17	2.873E-15	pass	2.873E-15	pass	9	pass
LOOP	18-18	3.019E-10	pass	3.019E-10	pass	5	pass
LOOP	18-20	4.354E-10	pass	4.354E-10	pass	10	pass
LOOP	18-22	1.350E-10	pass	1.350E-10	pass	29	pass
LOOP	19	1.424E-12	pass	1.424E-12	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	05	0.000E+00	pass
LOOP	07	0.000E+00	pass
LOOP	09	0.000E+00	pass
LOOP	10	0.000E+00	pass
LOOP	13	0.000E+00	pass
LOOP	16	0.000E+00	pass
LOOP	17	0.000E+00	pass
LOOP	18-02	0.000E+00	pass
LOOP	18-05	0.000E+00	pass
LOOP	18-07	0.000E+00	pass
LOOP	18-08	0.000E+00	pass
LOOP	18-09	0.000E+00	pass
LOOP	18-11	0.000E+00	pass
LOOP	18-14	0.000E+00	pass
LOOP	18-16	0.000E+00	pass
LOOP	18-17	0.000E+00	pass
LOOP	18-18	0.000E+00	pass
LOOP	18-20	0.000E+00	pass
LOOP	18-22	0.000E+00	pass
LOOP	19	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	03	5.920E-11	pass	5.920E-11	pass	82	pass
SGTR	04	7.172E-11	pass	7.172E-11	pass	4	pass
SGTR	05	1.630E-11	pass	1.630E-11	pass	1	pass
SGTR	08	2.496E-12	pass	2.496E-12	pass	228	pass
SGTR	09	3.031E-12	pass	3.031E-12	pass	24	pass
SGTR	10	6.161E-13	pass	6.161E-13	pass	3	pass
SGTR	11	2.156E-10	pass	2.156E-10	pass	3	pass
SGTR	13	1.363E-13	pass	1.363E-13	pass	48	pass
SGTR	14	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status	Failure
SGTR	03	0.000E+00	pass	
SGTR	04	0.000E+00	pass	
SGTR	05	0.000E+00	pass	
SGTR	08	0.000E+00	pass	
SGTR	09	0.000E+00	pass	
SGTR	10	0.000E+00	pass	
SGTR	11	0.000E+00	pass	
SGTR	13	0.000E+00	pass	
SGTR	14	0.000E+00	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Base	Status	Count	Status
SGTR	16	2.860E-15	pass		2.860E-15	pass	10	pass
SGTR	17	0.000E+00	pass		0.000E+00	pass	0	pass
SGTR	18	7.546E-16	pass		7.546E-16	pass	4	pass
SGTR	21	1.312E-14	pass		1.312E-14	pass	28	pass
SGTR	22	6.463E-15	pass		6.463E-15	pass	17	pass
SGTR	23	1.483E-15	pass		1.483E-15	pass	6	pass
SGTR	26	2.884E-16	pass		2.884E-16	pass	3	pass
SGTR	27	8.277E-17	pass		8.277E-17	pass	2	pass
SGTR	28	0.000E+00	pass		0.000E+00	pass	0	pass
SGTR	29	1.975E-14	pass		1.975E-14	pass	21	pass
SGTR	31	2.431E-17	pass		2.431E-17	pass	1	pass
SGTR	32	0.000E+00	pass		0.000E+00	pass	0	pass
SGTR	34	0.000E+00	pass		0.000E+00	pass	0	pass
SGTR	35	0.000E+00	pass		0.000E+00	pass	0	pass
SGTR	36	0.000E+00	pass		0.000E+00	pass	0	pass
SGTR	39	6.887E-15	pass		6.887E-15	pass	23	pass
SGTR	41	4.450E-17	pass		4.450E-17	pass	1	pass
SGTR	42	8.230E-14	pass		8.230E-14	pass	16	pass
SGTR	43	1.419E-13	pass		1.419E-13	pass	26	pass
SGTR	44	9.012E-12	pass		9.012E-12	pass	3	pass

Compare Mean:

Event Tree	Sequence	Mean	Status	Failure
SGTR	16	0.000E+00	pass	
SGTR	17	0.000E+00	pass	
SGTR	18	0.000E+00	pass	
SGTR	21	0.000E+00	pass	
SGTR	22	0.000E+00	pass	
SGTR	23	0.000E+00	pass	
SGTR	26	0.000E+00	pass	
SGTR	27	0.000E+00	pass	
SGTR	28	0.000E+00	pass	
SGTR	29	0.000E+00	pass	
SGTR	31	0.000E+00	pass	
SGTR	32	0.000E+00	pass	
SGTR	34	0.000E+00	pass	
SGTR	35	0.000E+00	pass	
SGTR	36	0.000E+00	pass	
SGTR	39	0.000E+00	pass	
SGTR	41	0.000E+00	pass	
SGTR	42	0.000E+00	pass	
SGTR	43	0.000E+00	pass	
SGTR	44	0.000E+00	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Base	Status	Count	Status
SLOCA	04	9.088E-10	pass		9.088E-10	pass	357	pass
SLOCA	06	1.092E-11	pass		1.092E-11	pass	236	pass
SLOCA	07	7.692E-12	pass		7.692E-12	pass	66	pass
SLOCA	11	8.798E-14	pass		8.798E-14	pass	62	pass
SLOCA	13	5.689E-16	pass		5.689E-16	pass	9	pass
SLOCA	14	2.304E-15	pass		2.304E-15	pass	10	pass
SLOCA	17	9.983E-15	pass		9.983E-15	pass	30	pass
SLOCA	19	0.000E+00	pass		0.000E+00	pass	0	pass
SLOCA	21	4.728E-15	pass		4.728E-15	pass	24	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	04	0.000E+00	pass
SLOCA	06	0.000E+00	pass
SLOCA	07	0.000E+00	pass
SLOCA	11	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	14	0.000E+00	pass
SLOCA	17	0.000E+00	pass
SLOCA	19	0.000E+00	pass
SLOCA	21	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SLOCA	22	1.920E-13	pass	1.920E-13	pass	26	pass
SLOCA	23	1.288E-11	pass	1.288E-11	pass	3	pass
TRANS	05	3.420E-12	pass	3.420E-12	pass	108	pass
TRANS	07	2.545E-14	pass	2.545E-14	pass	49	pass
TRANS	08	2.362E-13	pass	2.362E-13	pass	44	pass
TRANS	13	8.295E-14	pass	8.295E-14	pass	69	pass
TRANS	15	1.995E-16	pass	1.995E-16	pass	6	pass
TRANS	16	1.493E-14	pass	1.493E-14	pass	14	pass
TRANS	19	9.935E-13	pass	9.935E-13	pass	640	pass
TRANS	20	3.271E-11	pass	3.271E-11	pass	134	pass
TRANS	21-04	3.695E-13	pass	3.695E-13	pass	62	pass
TRANS	21-06	1.817E-15	pass	1.817E-15	pass	9	pass
TRANS	21-07	1.371E-12	pass	1.371E-12	pass	3	pass
TRANS	21-11	7.246E-14	pass	7.246E-14	pass	36	pass
TRANS	21-13	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	21-14	2.742E-13	pass	2.742E-13	pass	3	pass
TRANS	21-15	6.675E-12	pass	6.675E-12	pass	21	pass
TRANS	21-16	1.788E-11	pass	1.788E-11	pass	6	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	22	0.000E+00	pass
SLOCA	23	0.000E+00	pass
TRANS	05	0.000E+00	pass
TRANS	07	0.000E+00	pass
TRANS	08	0.000E+00	pass
TRANS	13	0.000E+00	pass
TRANS	15	0.000E+00	pass
TRANS	16	0.000E+00	pass
TRANS	19	0.000E+00	pass
TRANS	20	0.000E+00	pass
TRANS	21-04	0.000E+00	pass
TRANS	21-06	0.000E+00	pass
TRANS	21-07	0.000E+00	pass
TRANS	21-11	0.000E+00	pass
TRANS	21-13	0.000E+00	pass
TRANS	21-14	0.000E+00	pass
TRANS	21-15	0.000E+00	pass
TRANS	21-16	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 8:42:36 PM

TEST CASE COMPLETE: at 8:42:37 PM

TEST CASE : GEM Condition Assessments (COND_BYRN)
DATE & TIME: 8/30/99 8:42:38 PM

TEST FOR: GEM Version 6.63

Opened project: bryn_2qa

BYRN-03 Scenario: Condition AFW out of service for 72 hours started at 8:42:47 PM
Assessment AFW-72HRS created
Assessment processed
Sequences: 71 of 00071 pass
Total CCDP: 1.4E-005 1.4E-005 pass
Total CDP: 2.6E-007 2.6E-007 pass
Total Importance: 1.4E-005 1.4E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	+0.0E+000	3.9E-010	-3.9E-010	pass
2	LOOP	07	+0.0E+000	3.8E-012	-3.8E-012	pass
3	LOOP	09	+0.0E+000	1.2E-009	-1.2E-009	pass
4	LOOP	10	+0.0E+000	1.7E-009	-1.7E-009	pass
5	LOOP	13	1.6E-007	1.7E-010	1.6E-007	pass
6	LOOP	16	1.8E-008	8.5E-011	1.8E-008	pass
7	LOOP	17	5.8E-006	7.2E-009	5.8E-006	pass
8	LOOP	18-02	+0.0E+000	3.2E-008	-3.2E-008	pass
9	LOOP	18-05	+0.0E+000	2.1E-011	-2.1E-011	pass
10	LOOP	18-07	+0.0E+000	1.9E-013	-1.9E-013	pass
11	LOOP	18-08	+0.0E+000	3.7E-013	-3.7E-013	pass
12	LOOP	18-09	+0.0E+000	3.7E-008	-3.7E-008	pass
13	LOOP	18-11	+0.0E+000	1.9E-008	-1.9E-008	pass
14	LOOP	18-14	+0.0E+000	1.2E-011	-1.2E-011	pass
15	LOOP	18-16	+0.0E+000	7.2E-014	-7.2E-014	pass
16	LOOP	18-17	+0.0E+000	2.1E-013	-2.1E-013	pass
17	LOOP	18-18	+0.0E+000	2.2E-008	-2.2E-008	pass
18	LOOP	18-20	+0.0E+000	3.1E-008	-3.1E-008	pass
19	LOOP	18-22	4.8E-007	9.7E-009	4.7E-007	pass
20	LOOP	19	1.0E-010	1.0E-010	+0.0E+000	pass
21	SGTR	03	+0.0E+000	4.3E-009	-4.3E-009	pass
22	SGTR	04	+0.0E+000	5.2E-009	-5.2E-009	pass
23	SGTR	05	+0.0E+000	1.2E-009	-1.2E-009	pass
24	SGTR	08	+0.0E+000	1.8E-010	-1.8E-010	pass
25	SGTR	09	+0.0E+000	2.2E-010	-2.2E-010	pass
26	SGTR	10	+0.0E+000	4.4E-011	-4.4E-011	pass
27	SGTR	11	+0.0E+000	1.6E-008	-1.6E-008	pass
28	SGTR	13	+0.0E+000	9.8E-012	-9.8E-012	pass
29	SGTR	16	+0.0E+000	2.1E-013	-2.1E-013	pass
30	SGTR	18	+0.0E+000	5.4E-014	-5.4E-014	pass
31	SGTR	21	1.1E-009	9.5E-013	1.1E-009	pass
32	SGTR	22	1.3E-009	4.7E-013	1.3E-009	pass
33	SGTR	23	3.1E-010	1.1E-013	3.1E-010	pass
34	SGTR	26	4.7E-011	2.1E-014	4.7E-011	pass
35	SGTR	27	5.7E-011	6.0E-015	5.7E-011	pass
36	SGTR	28	1.2E-011	+0.0E+000	1.2E-011	pass
37	SGTR	29	4.0E-009	1.4E-012	4.0E-009	pass
38	SGTR	31	2.6E-012	1.8E-015	2.6E-012	pass
39	SGTR	34	5.3E-014	+0.0E+000	5.3E-014	pass
40	SGTR	36	1.4E-014	+0.0E+000	1.4E-014	pass
41	SGTR	39	1.4E-009	5.0E-013	1.4E-009	pass
42	SGTR	41	3.4E-011	3.2E-015	3.4E-011	pass
43	SGTR	42	1.7E-008	5.9E-012	1.7E-008	pass
44	SGTR	43	2.9E-008	1.0E-011	2.9E-008	pass
45	SGTR	44	6.5E-010	6.5E-010	+0.0E+000	pass
46	SLOCA	04	+0.0E+000	6.5E-008	-6.5E-008	pass
47	SLOCA	06	+0.0E+000	7.9E-010	-7.9E-010	pass
48	SLOCA	07	+0.0E+000	5.5E-010	-5.5E-010	pass
49	SLOCA	11	1.7E-008	6.3E-012	1.7E-008	pass
50	SLOCA	13	2.0E-010	4.1E-014	2.0E-010	pass
51	SLOCA	14	1.4E-010	1.7E-013	1.4E-010	pass
52	SLOCA	17	2.0E-009	7.2E-013	2.0E-009	pass
53	SLOCA	19	2.4E-011	+0.0E+000	2.4E-011	pass
54	SLOCA	21	1.2E-009	3.4E-013	1.2E-009	pass

55	SLOCA	22	4.1E-008	1.4E-011	4.1E-008	pass
56	SLOCA	23	9.3E-010	9.3E-010	+0.0E+000	pass
57	TRANS	05	+0.0E+000	2.5E-010	-2.5E-010	pass
58	TRANS	07	+0.0E+000	1.8E-012	-1.8E-012	pass
59	TRANS	08	+0.0E+000	1.7E-011	-1.7E-011	pass
60	TRANS	13	1.6E-009	6.0E-012	1.6E-009	pass
61	TRANS	15	1.4E-011	1.4E-014	1.4E-011	pass
62	TRANS	16	1.1E-010	1.1E-012	1.1E-010	pass
63	TRANS	19	2.0E-007	7.2E-011	2.0E-007	pass
64	TRANS	20	7.0E-006	2.4E-009	7.0E-006	pass
65	TRANS	21-04	2.7E-011	2.7E-011	+0.0E+000	pass
66	TRANS	21-06	1.3E-013	1.3E-013	+0.0E+000	pass
67	TRANS	21-07	9.9E-011	9.9E-011	+0.0E+000	pass
68	TRANS	21-11	+0.0E+000	5.2E-012	-5.2E-012	pass
69	TRANS	21-14	+0.0E+000	2.0E-011	-2.0E-011	pass
70	TRANS	21-15	2.0E-008	4.8E-010	1.9E-008	pass
71	TRANS	21-16	1.3E-009	1.3E-009	+0.0E+000	pass

Scenario: Condition AFW out of service for 72 hours completed at 8:43:29 PM

BYRN-04 Scenario: Condition EDG out of service for 3 months started at 8:43:29 PM
Assessment EDG-2190HRS created
Assessment processed
Sequences: 67 of 00067 pass
Total CCDP: 7.2E-005 7.2E-005 pass
Total CDP: 8.0E-006 8.0E-006 pass
Total Importance: 6.4E-005 6.4E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	1.3E-007	1.2E-008	1.2E-007	pass
2	LOOP	07	1.6E-009	1.2E-010	1.5E-009	pass
3	LOOP	09	4.5E-007	3.7E-008	4.1E-007	pass
4	LOOP	10	6.8E-007	5.2E-008	6.3E-007	pass
5	LOOP	13	9.5E-008	5.3E-009	9.0E-008	pass
6	LOOP	16	6.5E-008	2.6E-009	6.2E-008	pass
7	LOOP	17	4.2E-006	2.2E-007	4.0E-006	pass
8	LOOP	18-02	1.4E-005	9.9E-007	1.3E-005	pass
9	LOOP	18-05	8.7E-009	6.3E-010	8.0E-009	pass
10	LOOP	18-07	9.5E-011	5.7E-012	8.9E-011	pass
11	LOOP	18-08	1.5E-010	1.1E-011	1.4E-010	pass
12	LOOP	18-09	1.5E-005	1.1E-006	1.4E-005	pass
13	LOOP	18-11	7.9E-006	5.8E-007	7.3E-006	pass
14	LOOP	18-14	5.1E-009	3.7E-010	4.7E-009	pass
15	LOOP	18-16	5.2E-011	2.2E-012	4.9E-011	pass
16	LOOP	18-17	8.7E-011	6.3E-012	8.1E-011	pass
17	LOOP	18-18	9.0E-006	6.6E-007	8.4E-006	pass
18	LOOP	18-20	1.3E-005	9.5E-007	1.2E-005	pass
19	LOOP	18-22	4.0E-006	3.0E-007	3.8E-006	pass
20	LOOP	19	3.1E-009	3.1E-009	+0.0E+000	pass
21	SGTR	03	1.3E-007	1.3E-007	+0.0E+000	pass
22	SGTR	04	1.6E-007	1.6E-007	+0.0E+000	pass
23	SGTR	05	3.6E-008	3.6E-008	+0.0E+000	pass
24	SGTR	08	5.5E-009	5.5E-009	+0.0E+000	pass
25	SGTR	09	6.6E-009	6.6E-009	+0.0E+000	pass
26	SGTR	10	1.4E-009	1.4E-009	+0.0E+000	pass
27	SGTR	11	4.7E-007	4.7E-007	+0.0E+000	pass
28	SGTR	13	3.0E-010	3.0E-010	+0.0E+000	pass
29	SGTR	16	6.3E-012	6.3E-012	+0.0E+000	pass
30	SGTR	18	1.7E-012	1.7E-012	+0.0E+000	pass
31	SGTR	21	2.9E-011	2.9E-011	+0.0E+000	pass
32	SGTR	22	1.4E-011	1.4E-011	+0.0E+000	pass
33	SGTR	23	3.3E-012	3.3E-012	+0.0E+000	pass
34	SGTR	26	6.3E-013	6.3E-013	+0.0E+000	pass
35	SGTR	27	1.8E-013	1.8E-013	+0.0E+000	pass
36	SGTR	29	4.3E-011	4.3E-011	+0.0E+000	pass
37	SGTR	31	5.3E-014	5.3E-014	+0.0E+000	pass
38	SGTR	39	1.5E-011	1.5E-011	+0.0E+000	pass
39	SGTR	41	9.8E-014	9.8E-014	+0.0E+000	pass
40	SGTR	42	1.8E-010	1.8E-010	+0.0E+000	pass
41	SGTR	43	3.1E-010	3.1E-010	+0.0E+000	pass
42	SGTR	44	2.0E-008	2.0E-008	+0.0E+000	pass
43	SLOCA	04	2.0E-006	2.0E-006	+0.0E+000	pass
44	SLOCA	06	2.4E-008	2.4E-008	+0.0E+000	pass
45	SLOCA	07	1.7E-008	1.7E-008	+0.0E+000	pass
46	SLOCA	11	1.9E-010	1.9E-010	+0.0E+000	pass
47	SLOCA	13	1.3E-012	1.3E-012	+0.0E+000	pass
48	SLOCA	14	5.1E-012	5.1E-012	+0.0E+000	pass
49	SLOCA	17	2.2E-011	2.2E-011	+0.0E+000	pass
50	SLOCA	21	1.0E-011	1.0E-011	+0.0E+000	pass
51	SLOCA	22	4.2E-010	4.2E-010	+0.0E+000	pass
52	SLOCA	23	2.8E-008	2.8E-008	+0.0E+000	pass
53	TRANS	05	7.5E-009	7.5E-009	+0.0E+000	pass
54	TRANS	07	5.6E-011	5.6E-011	+0.0E+000	pass
55	TRANS	08	5.2E-010	5.2E-010	+0.0E+000	pass
56	TRANS	13	1.8E-010	1.8E-010	+0.0E+000	pass
57	TRANS	15	4.4E-013	4.4E-013	+0.0E+000	pass
58	TRANS	16	3.3E-011	3.3E-011	+0.0E+000	pass
59	TRANS	19	2.2E-009	2.2E-009	+0.0E+000	pass
60	TRANS	20	7.2E-008	7.2E-008	+0.0E+000	pass
61	TRANS	21-04	8.1E-010	8.1E-010	+0.0E+000	pass

62	TRANS	21-06	4.0E-012	4.0E-012	+0.0E+000	pass
63	TRANS	21-07	3.0E-009	3.0E-009	+0.0E+000	pass
64	TRANS	21-11	1.6E-010	1.6E-010	+0.0E+000	pass
65	TRANS	21-14	6.0E-010	6.0E-010	+0.0E+000	pass
66	TRANS	21-15	1.5E-008	1.5E-008	+0.0E+000	pass
67	TRANS	21-16	3.9E-008	3.9E-008	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 8:43:59 PM
TEST CASE COMPLETE: at 8:43:59 PM

TEST CASE : GEM Initiating Events (IE_BYRN)
DATE & TIME: 8/30/99 8:44:00 PM

TEST FOR: GEM Version 6.63

Opened project: bryn_2qa

BYRN-05 Scenario: Transient - No other failures started at 8:44:07 PM
Assessment TRANS created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 15 of 00015 pass
Total CCDP: 2.6E-007 2.6E-007 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	1.4E-008	pass
2	TRANS	07	1.3E-010	pass
3	TRANS	08	9.6E-010	pass
4	TRANS	13	3.4E-010	pass
5	TRANS	15	1.5E-012	pass
6	TRANS	16	6.1E-011	pass
7	TRANS	19	4.0E-009	pass
8	TRANS	20	1.3E-007	pass
9	TRANS	21-04	1.5E-009	pass
10	TRANS	21-06	1.8E-011	pass
11	TRANS	21-07	5.5E-009	pass
12	TRANS	21-11	3.0E-010	pass
13	TRANS	21-14	1.1E-009	pass
14	TRANS	21-15	2.7E-008	pass
15	TRANS	21-16	7.2E-008	pass

Scenario: Transient - No other failures completed at 8:45:06 PM

BYRN-06 Scenario: Small LOCA - No other failures started at 8:45:06 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 10 of 00010 pass
Total CCDP: 4.0E-004 4.0E-004 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	04	3.9E-004	pass
2	SLOCA	06	4.7E-006	pass
3	SLOCA	07	3.3E-006	pass
4	SLOCA	11	3.8E-008	pass
5	SLOCA	13	4.2E-010	pass
6	SLOCA	14	1.1E-009	pass
7	SLOCA	17	4.4E-009	pass
8	SLOCA	21	2.5E-009	pass
9	SLOCA	22	8.2E-008	pass
10	SLOCA	23	5.5E-006	pass

Scenario: Small LOCA - No other failures completed at 8:46:07 PM

BYRN-07 Scenario: SGTR - no other failures started at 8:46:07 PM
Assessment SGTR created
Initiating event IE-SGTR selected
Assessment processed
Sequences: 22 of 00022 pass
Total CCDP: 2.3E-004 2.3E-004 pass

#	Tree	Sequence	CCDP	Status
1	SGTR	03	3.6E-005	pass
2	SGTR	04	4.4E-005	pass
3	SGTR	05	1.0E-005	pass
4	SGTR	08	1.5E-006	pass
5	SGTR	09	1.9E-006	pass
6	SGTR	10	3.8E-007	pass
7	SGTR	11	1.3E-004	pass
8	SGTR	13	8.5E-008	pass
9	SGTR	16	2.6E-009	pass
10	SGTR	18	7.5E-010	pass
11	SGTR	21	8.5E-009	pass
12	SGTR	22	4.0E-009	pass
13	SGTR	23	9.2E-010	pass
14	SGTR	26	3.6E-010	pass
15	SGTR	27	1.7E-010	pass
16	SGTR	29	1.2E-008	pass
17	SGTR	31	2.9E-011	pass
18	SGTR	39	4.4E-009	pass
19	SGTR	41	1.1E-010	pass
20	SGTR	42	5.1E-008	pass
21	SGTR	43	8.7E-008	pass
22	SGTR	44	5.5E-006	pass

Scenario: SGTR - no other failures completed at 8:46:44 PM

BYRN-08 Scenario: Grid-related LOOP - no other failures started at 8:46:44 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 20 of 00020 pass
Total CCDP: 4.8E-005 4.8E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	3.3E-007	pass
2	LOOP	07	3.8E-009	pass
3	LOOP	09	4.3E-007	pass
4	LOOP	10	1.3E-006	pass
5	LOOP	13	1.5E-007	pass
6	LOOP	16	3.2E-010	pass
7	LOOP	17	5.7E-006	pass
8	LOOP	18-02	1.5E-006	pass
9	LOOP	18-05	6.7E-009	pass
10	LOOP	18-07	7.7E-011	pass
11	LOOP	18-08	1.4E-010	pass
12	LOOP	18-09	6.4E-006	pass
13	LOOP	18-11	9.0E-007	pass
14	LOOP	18-14	3.9E-009	pass
15	LOOP	18-16	4.5E-011	pass
16	LOOP	18-17	8.2E-011	pass
17	LOOP	18-18	3.8E-006	pass
18	LOOP	18-20	2.1E-005	pass
19	LOOP	18-22	6.5E-006	pass
20	LOOP	19	8.9E-008	pass

Scenario: Grid-related LOOP - no other failures completed at 8:47:53 PM

BYRN-09 Scenario: Plant-centered LOOP - no other failures started at 8:47:53 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 20 of 00020 pass
Total CCDP: 5.8E-005 5.8E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	3.3E-007	pass
2	LOOP	07	3.8E-009	pass
3	LOOP	09	5.9E-007	pass
4	LOOP	10	1.4E-006	pass
5	LOOP	13	1.5E-007	pass
6	LOOP	16	9.5E-010	pass
7	LOOP	17	5.9E-006	pass
8	LOOP	18-02	3.1E-006	pass
9	LOOP	18-05	8.1E-009	pass
10	LOOP	18-07	9.3E-011	pass
11	LOOP	18-08	1.7E-010	pass
12	LOOP	18-09	9.5E-006	pass
13	LOOP	18-11	1.8E-006	pass
14	LOOP	18-14	4.7E-009	pass
15	LOOP	18-16	5.5E-011	pass
16	LOOP	18-17	9.8E-011	pass
17	LOOP	18-18	5.6E-006	pass
18	LOOP	18-20	2.3E-005	pass
19	LOOP	18-22	7.1E-006	pass
20	LOOP	19	8.9E-008	pass

Scenario: Plant-centered LOOP - no other failures completed at 8:49:05 PM

BYRN-10 Scenario: Severe Weather LOOP - no other failures started at 8:49:05 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 20 of 00020 pass
Total CCDP: 1.5E-003 1.5E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	1.9E-007	pass
2	LOOP	07	2.2E-009	pass
3	LOOP	09	9.7E-006	pass
4	LOOP	10	2.4E-006	pass
5	LOOP	13	1.5E-007	pass
6	LOOP	16	1.1E-006	pass
7	LOOP	17	9.1E-006	pass
8	LOOP	18-02	5.9E-004	pass
9	LOOP	18-05	2.6E-008	pass
10	LOOP	18-07	3.0E-010	pass
11	LOOP	18-08	4.2E-010	pass
12	LOOP	18-09	2.8E-004	pass
13	LOOP	18-11	3.5E-004	pass
14	LOOP	18-14	1.5E-008	pass
15	LOOP	18-16	1.8E-010	pass
16	LOOP	18-17	2.5E-010	pass
17	LOOP	18-18	1.6E-004	pass
18	LOOP	18-20	1.0E-004	pass
19	LOOP	18-22	3.1E-005	pass
20	LOOP	19	8.9E-008	pass

Scenario: Severe Weather LOOP - no other failures completed at 8:50:26 PM

BYRN-11 Scenario: Extreme Severe Weather LOOP - no other failures started at 8:50:26 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 11 of 00011 pass
Total CCDP: 4.2E-003 4.2E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	09	1.8E-005	pass
2	LOOP	10	3.0E-006	pass
3	LOOP	16	4.1E-006	pass
4	LOOP	17	1.1E-005	pass
5	LOOP	18-02	1.9E-003	pass
6	LOOP	18-09	6.2E-004	pass
7	LOOP	18-11	1.1E-003	pass
8	LOOP	18-18	3.7E-004	pass
9	LOOP	18-20	1.6E-004	pass
10	LOOP	18-22	5.0E-005	pass
11	LOOP	19	8.9E-008	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 8:51:12 PM

BYRN-12 Scenario: Transient - AFW failed started at 8:51:12 PM
Assessment TRANS-AFW created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 10 of 00010 pass
Total CCDP: 4.1E-004 4.1E-004 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	13	9.0E-008	pass
2	TRANS	15	8.1E-010	pass
3	TRANS	16	6.2E-009	pass
4	TRANS	19	1.1E-005	pass
5	TRANS	20	3.9E-004	pass
6	TRANS	21-04	1.5E-009	pass
7	TRANS	21-06	1.8E-011	pass
8	TRANS	21-07	5.5E-009	pass
9	TRANS	21-15	1.1E-006	pass
10	TRANS	21-16	7.2E-008	pass

Scenario: Transient - AFW failed completed at 8:52:12 PM

TEST CASE COMPLETE: at 8:52:13 PM

TEST CASE : SAPHIRE QA Models (CDF_PBOT)
DATE & TIME: 8/30/99 8:52:18 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: pbot_2qa

PBOT-01 Scenario: Solve Fault Trees started at 8:52:54 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-15)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
AC-4HR	2.300E-002		pass		2.300E-02 pass	1	pass
AC-90MIN	6.100E-002		pass		6.100E-02 pass	1	pass
AC-BD	8.000E-003		pass		8.000E-03 pass	1	pass
AC-CU	2.200E-001		pass		2.200E-01 pass	1	pass
CD1	4.054E-003		pass		4.054E-03 pass	13	pass
CDS	3.792E-002		pass		3.792E-02 pass	14	pass
CR1	9.398E-005		pass		9.398E-05 pass	8	pass
CRD	1.555E-002		pass		1.555E-02 pass	6	pass
CS1	6.912E-003		pass		6.912E-03 pass	20	pass
CSS	1.469E-003		pass		1.469E-03 pass	199	pass
CSS-4	6.141E-003		pass		6.141E-03 pass	14	pass
CSS-5	6.141E-003		pass		6.141E-03 pass	14	pass
CVS	1.807E-002		pass		1.807E-02 pass	7	pass
DE1	1.109E-002		pass		1.109E-02 pass	6	pass
DE2	1.027E-002		pass		1.027E-02 pass	3	pass
DE3	5.852E-002		pass		5.852E-02 pass	6	pass
DEP	1.268E-002		pass		1.268E-02 pass	12	pass
DGA	3.659E-002		pass		3.659E-02 pass	2	pass
DGB	3.659E-002		pass		3.659E-02 pass	2	pass
DGC	3.659E-002		pass		3.659E-02 pass	2	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
AC-4HR	0.000E+00		pass
AC-90MIN	0.000E+00		pass
AC-BD	0.000E+00		pass
AC-CU	0.000E+00		pass
CD1	0.000E+00		pass
CDS	0.000E+00		pass
CR1	0.000E+00		pass
CRD	0.000E+00		pass
CS1	0.000E+00		pass
CSS	0.000E+00		pass
CSS-4	0.000E+00		pass
CSS-5	0.000E+00		pass
CVS	0.000E+00		pass
DE1	0.000E+00		pass
DE2	0.000E+00		pass
DE3	0.000E+00		pass
DEP	0.000E+00		pass
DGA	0.000E+00		pass
DGB	0.000E+00		pass
DGC	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
DGD	3.659E-002		pass		3.659E-02 pass	2	pass
DIV-1-AC	9.000E-005		pass		9.000E-05 pass	1	pass
DIV-1-DC	9.020E-005		pass		9.020E-05 pass	5	pass
DIV-2-AC	9.000E-005		pass		9.000E-05 pass	1	pass
DIV-2-DC	9.020E-005		pass		9.020E-05 pass	5	pass
DIV-3-AC	9.000E-005		pass		9.000E-05 pass	1	pass
DIV-3-DC	9.020E-005		pass		9.020E-05 pass	5	pass

DIV-4-AC	9.000E-005		pass	9.000E-05	pass	1	pass
DIV-4-DC	9.020E-005		pass	9.020E-05	pass	5	pass
DIV1AC8H	9.000E-005		pass	9.000E-05	pass	1	pass
DIV2AC8H	9.000E-005		pass	9.000E-05	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
DGD	0.000E+00		pass
DIV-1-AC	0.000E+00		pass
DIV-1-DC	0.000E+00		pass
DIV-2-AC	0.000E+00		pass
DIV-2-DC	0.000E+00		pass
DIV-3-AC	0.000E+00		pass
DIV-3-DC	0.000E+00		pass
DIV-4-AC	0.000E+00		pass
DIV-4-DC	0.000E+00		pass
DIV1AC8H	0.000E+00		pass
DIV2AC8H	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
DIV3AC8H	9.000E-005		pass	9.000E-05	pass	1	pass
DIV4AC8H	9.000E-005		pass	9.000E-05	pass	1	pass
EPS	6.729E-005		pass	6.729E-05	pass	28	pass
FWS	1.000E+000		pass	1.000E+00	pass	1	pass
HCI	5.117E-002		pass	5.117E-02	pass	6	pass
HS1	1.963E-002		pass	1.963E-02	pass	12	pass
HSW	1.072E-002		pass	1.072E-02	pass	12	pass
L	5.000E-001		pass	5.000E-01	pass	1	pass
LCI	1.451E-003		pass	1.451E-03	pass	280	pass
LCI-4	3.152E-003		pass	3.152E-03	pass	17	pass
LCI-5	3.152E-003		pass	3.152E-03	pass	17	pass
LCS	2.113E-003		pass	2.113E-03	pass	35	pass
LCS-3	1.026E-002		pass	1.026E-02	pass	4	pass
LCS-4	1.026E-002		pass	1.026E-02	pass	4	pass
LCS-5	1.017E-002		pass	1.017E-02	pass	3	pass
LCS-6	1.017E-002		pass	1.017E-02	pass	3	pass
LVL	2.500E-002		pass	2.500E-02	pass	1	pass
MSV	1.000E-002		pass	1.000E-02	pass	1	pass
NX	2.500E-002		pass	2.500E-02	pass	1	pass
P1	1.800E-001		pass	1.800E-01	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
DIV3AC8H	0.000E+00		pass
DIV4AC8H	0.000E+00		pass
EPS	0.000E+00		pass
FWS	0.000E+00		pass
HCI	0.000E+00		pass
HS1	0.000E+00		pass
HSW	0.000E+00		pass
L	0.000E+00		pass
LCI	0.000E+00		pass
LCI-4	0.000E+00		pass
LCI-5	0.000E+00		pass
LCS	0.000E+00		pass
LCS-3	0.000E+00		pass
LCS-4	0.000E+00		pass
LCS-5	0.000E+00		pass
LCS-6	0.000E+00		pass
LVL	0.000E+00		pass
MSV	0.000E+00		pass
NX	0.000E+00		pass
P1	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
P2	1.300E-003		pass	1.300E-03	pass	1	pass
P3	2.200E-004		pass	2.200E-04	pass	1	pass
PC1	3.002E-002		pass	3.002E-02	pass	16	pass
PC2	3.773E-001		pass	3.773E-01	pass	20	pass
PCS	3.640E-001		pass	3.640E-01	pass	20	pass
PPR	1.100E-004		pass	1.100E-04	pass	1	pass
RCI	5.117E-002		pass	5.117E-02	pass	6	pass
RPS	1.000E-005		pass	1.000E-05	pass	4	pass
RRS	9.998E-004		pass	9.998E-04	pass	2	pass
SD1	6.823E-003		pass	6.823E-03	pass	235	pass
SD2	1.012E-002		pass	1.012E-02	pass	25	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
P2	0.000E+00		pass
P3	0.000E+00		pass
PC1	0.000E+00		pass
PC2	0.000E+00		pass
PCS	0.000E+00		pass
PPR	0.000E+00		pass
RCI	0.000E+00		pass
RPS	0.000E+00		pass
RRS	0.000E+00		pass
SD1	0.000E+00		pass
SD2	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
SDC	6.723E-003		pass	6.723E-03	pass	234	pass
SDC-5	3.200E-003		pass	3.200E-03	pass	17	pass
SDC-6	3.200E-003		pass	3.200E-03	pass	17	pass
SLC	1.084E-002		pass	1.084E-02	pass	16	pass
SP1	6.912E-003		pass	6.912E-03	pass	20	pass
SPC	1.469E-003		pass	1.469E-03	pass	199	pass
SPC-4	6.141E-003		pass	6.141E-03	pass	14	pass
SPC-5	6.141E-003		pass	6.141E-03	pass	14	pass
SRV	1.813E-001		pass	1.813E-01	pass	3	pass
TAF	2.500E-002		pass	2.500E-02	pass	1	pass
VA	1.072E-002		pass	1.072E-02	pass	12	pass
VA1	1.963E-002		pass	1.963E-02	pass	12	pass
VA2	1.973E-002		pass	1.973E-02	pass	13	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
SDC	0.000E+00		pass
SDC-5	0.000E+00		pass
SDC-6	0.000E+00		pass
SLC	0.000E+00		pass
SP1	0.000E+00		pass
SPC	0.000E+00		pass
SPC-4	0.000E+00		pass
SPC-5	0.000E+00		pass
SRV	0.000E+00		pass
TAF	0.000E+00		pass
VA	0.000E+00		pass
VA1	0.000E+00		pass
VA2	0.000E+00		pass

Scenario: Solve Fault Trees completed at 8:54:31 PM

PBOT-02 Scenario: Core Damage Frequency Test started at 8:54:31 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-15) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	05	1.231E-12	pass	1.231E-12	pass	27	pass
LOOP	08	1.990E-12	pass	1.990E-12	pass	30	pass
LOOP	09	4.648E-11	pass	4.648E-11	pass	141	pass
LOOP	14	4.004E-14	pass	4.004E-14	pass	10	pass
LOOP	17	6.621E-14	pass	6.621E-14	pass	10	pass
LOOP	18	1.612E-12	pass	1.612E-12	pass	54	pass
LOOP	24	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	25	6.794E-14	pass	6.794E-14	pass	20	pass
LOOP	31	2.598E-16	pass	2.598E-16	pass	1	pass
LOOP	32	1.424E-15	pass	1.424E-15	pass	3	pass
LOOP	37	1.476E-15	pass	1.476E-15	pass	4	pass
LOOP	38	7.939E-12	pass	7.939E-12	pass	18	pass
LOOP	42	1.009E-15	pass	1.009E-15	pass	1	pass
LOOP	43	5.403E-12	pass	5.403E-12	pass	62	pass
LOOP	44-03	5.536E-11	pass	5.536E-11	pass	117	pass
LOOP	44-06	2.789E-13	pass	2.789E-13	pass	24	pass
LOOP	44-09	4.744E-13	pass	4.744E-13	pass	22	pass
LOOP	44-10	2.102E-11	pass	2.102E-11	pass	128	pass
LOOP	44-13	1.930E-12	pass	1.930E-12	pass	64	pass
LOOP	44-16	6.427E-15	pass	6.427E-15	pass	3	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	05	0.000E+00	pass
LOOP	08	0.000E+00	pass
LOOP	09	0.000E+00	pass
LOOP	14	0.000E+00	pass
LOOP	17	0.000E+00	pass
LOOP	18	0.000E+00	pass
LOOP	24	0.000E+00	pass
LOOP	25	0.000E+00	pass
LOOP	31	0.000E+00	pass
LOOP	32	0.000E+00	pass
LOOP	37	0.000E+00	pass
LOOP	38	0.000E+00	pass
LOOP	42	0.000E+00	pass
LOOP	43	0.000E+00	pass
LOOP	44-03	0.000E+00	pass
LOOP	44-06	0.000E+00	pass
LOOP	44-09	0.000E+00	pass
LOOP	44-10	0.000E+00	pass
LOOP	44-13	0.000E+00	pass
LOOP	44-16	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	44-19	1.444E-14	pass	1.444E-14	pass	7	pass
LOOP	44-20	7.199E-13	pass	7.199E-13	pass	44	pass
LOOP	44-25	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	44-26	1.394E-14	pass	1.394E-14	pass	10	pass
LOOP	44-31	6.345E-16	pass	6.345E-16	pass	1	pass
LOOP	44-32	3.855E-15	pass	3.855E-15	pass	8	pass
LOOP	44-36	1.939E-14	pass	1.939E-14	pass	5	pass
LOOP	44-37	1.745E-12	pass	1.745E-12	pass	13	pass
LOOP	44-38	3.956E-11	pass	3.956E-11	pass	24	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	44-19	0.000E+00	pass
LOOP	44-20	0.000E+00	pass
LOOP	44-25	0.000E+00	pass
LOOP	44-26	0.000E+00	pass
LOOP	44-31	0.000E+00	pass
LOOP	44-32	0.000E+00	pass
LOOP	44-36	0.000E+00	pass
LOOP	44-37	0.000E+00	pass
LOOP	44-38	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	45-04	1.105E-13	pass	1.105E-13	pass	14	pass
LOOP	45-05	8.424E-14	pass	8.424E-14	pass	15	pass
LOOP	45-09	1.020E-12	pass	1.020E-12	pass	7	pass
LOOP	45-10	1.953E-14	pass	1.953E-14	pass	8	pass
LOOP	45-14	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	45-15	7.072E-12	pass	7.072E-12	pass	1	pass
LOOP	45-19	7.280E-16	pass	7.280E-16	pass	1	pass
LOOP	45-20	7.280E-16	pass	7.280E-16	pass	1	pass
LOOP	45-24	3.623E-14	pass	3.623E-14	pass	3	pass
LOOP	45-25	3.235E-16	pass	3.235E-16	pass	1	pass
LOOP	45-29	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	45-30	2.557E-13	pass	2.557E-13	pass	4	pass
LOOP	45-31	5.472E-12	pass	5.472E-12	pass	8	pass
LOOP	46-04	1.511E-14	pass	1.511E-14	pass	8	pass
LOOP	46-05	7.920E-15	pass	7.920E-15	pass	3	pass
LOOP	46-09	1.725E-13	pass	1.725E-13	pass	6	pass
LOOP	46-10	1.551E-15	pass	1.551E-15	pass	1	pass
LOOP	46-11	1.199E-12	pass	1.199E-12	pass	2	pass
LOOP	47-02	0.000E+00	pass	0.000E+00	pass	1	pass
LOOP	47-04	2.027E-11	pass	2.027E-11	pass	4	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	45-04	0.000E+00	pass
LOOP	45-05	0.000E+00	pass
LOOP	45-09	0.000E+00	pass
LOOP	45-10	0.000E+00	pass
LOOP	45-14	0.000E+00	pass
LOOP	45-15	0.000E+00	pass
LOOP	45-19	0.000E+00	pass
LOOP	45-20	0.000E+00	pass
LOOP	45-24	0.000E+00	pass
LOOP	45-25	0.000E+00	pass
LOOP	45-29	0.000E+00	pass
LOOP	45-30	0.000E+00	pass
LOOP	45-31	0.000E+00	pass
LOOP	46-04	0.000E+00	pass
LOOP	46-05	0.000E+00	pass
LOOP	46-09	0.000E+00	pass
LOOP	46-10	0.000E+00	pass
LOOP	46-11	0.000E+00	pass
LOOP	47-02	0.000E+00	pass
LOOP	47-04	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	47-06	1.823E-13	pass	1.823E-13	pass	4	pass
LOOP	47-08	0.000E+00	pass	0.000E+00	pass	1	pass
LOOP	47-10	7.122E-13	pass	7.122E-13	pass	5	pass
LOOP	47-12	5.836E-15	pass	5.836E-15	pass	2	pass
LOOP	47-14	3.341E-13	pass	3.341E-13	pass	8	pass
LOOP	47-16	0.000E+00	pass	0.000E+00	pass	1	pass
LOOP	47-18	1.182E-11	pass	1.182E-11	pass	4	pass
LOOP	47-20	0.000E+00	pass	0.000E+00	pass	1	pass
LOOP	47-22	1.556E-13	pass	1.556E-13	pass	2	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	47-06	0.000E+00	pass
LOOP	47-08	0.000E+00	pass
LOOP	47-10	0.000E+00	pass
LOOP	47-12	0.000E+00	pass
LOOP	47-14	0.000E+00	pass
LOOP	47-16	0.000E+00	pass
LOOP	47-18	0.000E+00	pass
LOOP	47-20	0.000E+00	pass
LOOP	47-22	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	47-23	3.339E-13	pass	3.339E-13	pass	8	pass
LOOP	47-24	1.399E-12	pass	1.399E-12	pass	3	pass
LOOP	47-25	2.362E-13	pass	2.362E-13	pass	2	pass
LOOP	48	5.440E-11	pass	5.440E-11	pass	2	pass
SLOCA	04	9.530E-10	pass	9.530E-10	pass	66	pass
SLOCA	06	1.191E-12	pass	1.191E-12	pass	17	pass
SLOCA	08	2.039E-13	pass	2.039E-13	pass	18	pass
SLOCA	09	1.871E-13	pass	1.871E-13	pass	20	pass
SLOCA	11	3.349E-11	pass	3.349E-11	pass	57	pass
SLOCA	13	3.677E-14	pass	3.677E-14	pass	4	pass
SLOCA	15	4.460E-15	pass	4.460E-15	pass	4	pass
SLOCA	16	3.508E-15	pass	3.508E-15	pass	3	pass
SLOCA	20	1.358E-15	pass	1.358E-15	pass	2	pass
SLOCA	24	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	25	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	29	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	30	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	34	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	35	3.036E-13	pass	3.036E-13	pass	5	pass
SLOCA	36	6.946E-12	pass	6.946E-12	pass	20	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	47-23	0.000E+00	pass
LOOP	47-24	0.000E+00	pass
LOOP	47-25	0.000E+00	pass
LOOP	48	0.000E+00	pass
SLOCA	04	0.000E+00	pass
SLOCA	06	0.000E+00	pass
SLOCA	08	0.000E+00	pass
SLOCA	09	0.000E+00	pass
SLOCA	11	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	15	0.000E+00	pass
SLOCA	16	0.000E+00	pass
SLOCA	20	0.000E+00	pass
SLOCA	24	0.000E+00	pass
SLOCA	25	0.000E+00	pass
SLOCA	29	0.000E+00	pass
SLOCA	30	0.000E+00	pass
SLOCA	34	0.000E+00	pass
SLOCA	35	0.000E+00	pass
SLOCA	36	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SLOCA	37	5.610E-12	pass	5.610E-12	pass	1	pass
TRAN	06	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	09	1.104E-16	pass	1.104E-16	pass	6	pass
TRAN	10	1.735E-12	pass	1.735E-12	pass	248	pass
TRAN	15	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	18	0.000E+00	pass	0.000E+00	pass	0	pass

TRAN	19	5.976E-14	pass	5.976E-14	pass	147	pass
TRAN	24	4.277E-15	pass	4.277E-15	pass	59	pass
TRAN	30	2.022E-17	pass	2.022E-17	pass	4	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	37	0.000E+00	pass
TRAN	06	0.000E+00	pass
TRAN	09	0.000E+00	pass
TRAN	10	0.000E+00	pass
TRAN	15	0.000E+00	pass
TRAN	18	0.000E+00	pass
TRAN	19	0.000E+00	pass
TRAN	24	0.000E+00	pass
TRAN	30	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	31	2.815E-16	pass	2.815E-16	pass	22	pass
TRAN	37	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	38	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43	2.898E-18	pass	2.898E-18	pass	2	pass
TRAN	44	8.324E-11	pass	8.324E-11	pass	59	pass
TRAN	48	6.333E-15	pass	6.333E-15	pass	14	pass
TRAN	49	4.470E-11	pass	4.470E-11	pass	164	pass
TRAN	50-03	3.484E-11	pass	3.484E-11	pass	136	pass
TRAN	50-06	3.225E-14	pass	3.225E-14	pass	6	pass
TRAN	50-09	1.205E-15	pass	1.205E-15	pass	1	pass
TRAN	50-10	8.825E-11	pass	8.825E-11	pass	228	pass
TRAN	50-13	1.205E-12	pass	1.205E-12	pass	52	pass
TRAN	50-16	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	50-19	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	50-20	3.071E-12	pass	3.071E-12	pass	113	pass
TRAN	50-24	5.705E-13	pass	5.705E-13	pass	59	pass
TRAN	50-29	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	50-30	7.085E-15	pass	7.085E-15	pass	6	pass
TRAN	50-35	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	50-36	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	31	0.000E+00	pass
TRAN	37	0.000E+00	pass
TRAN	38	0.000E+00	pass
TRAN	43	0.000E+00	pass
TRAN	44	0.000E+00	pass
TRAN	48	0.000E+00	pass
TRAN	49	0.000E+00	pass
TRAN	50-03	0.000E+00	pass
TRAN	50-06	0.000E+00	pass
TRAN	50-09	0.000E+00	pass
TRAN	50-10	0.000E+00	pass
TRAN	50-13	0.000E+00	pass
TRAN	50-16	0.000E+00	pass
TRAN	50-19	0.000E+00	pass
TRAN	50-20	0.000E+00	pass
TRAN	50-24	0.000E+00	pass
TRAN	50-29	0.000E+00	pass
TRAN	50-30	0.000E+00	pass
TRAN	50-35	0.000E+00	pass
TRAN	50-36	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	50-40	1.276E-14	pass	1.276E-14	pass	7	pass
TRAN	50-41	1.830E-11	pass	1.830E-11	pass	39	pass
TRAN	50-42	4.182E-10	pass	4.182E-10	pass	105	pass
TRAN	51-04	6.681E-13	pass	6.681E-13	pass	45	pass
TRAN	51-05	6.124E-13	pass	6.124E-13	pass	56	pass

TRAN	51-09	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	51-10	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	51-14	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	51-15	5.162E-11	pass	5.162E-11	pass	11	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	50-40	0.000E+00	pass
TRAN	50-41	0.000E+00	pass
TRAN	50-42	0.000E+00	pass
TRAN	51-04	0.000E+00	pass
TRAN	51-05	0.000E+00	pass
TRAN	51-09	0.000E+00	pass
TRAN	51-10	0.000E+00	pass
TRAN	51-14	0.000E+00	pass
TRAN	51-15	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	51-19	1.477E-14	pass	1.477E-14	pass	8	pass
TRAN	51-23	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	51-24	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	51-28	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	51-29	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	51-33	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	51-34	1.924E-12	pass	1.924E-12	pass	15	pass
TRAN	51-35	4.118E-11	pass	4.118E-11	pass	36	pass
TRAN	52-04	1.007E-13	pass	1.007E-13	pass	17	pass
TRAN	52-05	9.252E-14	pass	9.252E-14	pass	21	pass
TRAN	52-09	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	52-10	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	52-11	8.778E-12	pass	8.778E-12	pass	16	pass
TRAN	53-02-05	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-02-06	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-02-07	2.550E-13	pass	2.550E-13	pass	1	pass
TRAN	53-02-12	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-02-13	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-02-14	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-02-18	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	51-19	0.000E+00	pass
TRAN	51-23	0.000E+00	pass
TRAN	51-24	0.000E+00	pass
TRAN	51-28	0.000E+00	pass
TRAN	51-29	0.000E+00	pass
TRAN	51-33	0.000E+00	pass
TRAN	51-34	0.000E+00	pass
TRAN	51-35	0.000E+00	pass
TRAN	52-04	0.000E+00	pass
TRAN	52-05	0.000E+00	pass
TRAN	52-09	0.000E+00	pass
TRAN	52-10	0.000E+00	pass
TRAN	52-11	0.000E+00	pass
TRAN	53-02-05	0.000E+00	pass
TRAN	53-02-06	0.000E+00	pass
TRAN	53-02-07	0.000E+00	pass
TRAN	53-02-12	0.000E+00	pass
TRAN	53-02-13	0.000E+00	pass
TRAN	53-02-14	0.000E+00	pass
TRAN	53-02-18	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	53-02-19	0.000E+00	pass	0.000E+00	pass	0	pass

TRAN	53-02-20	3.600E-15	pass	3.600E-15	pass	1	pass
TRAN	53-02-21	4.320E-13	pass	4.320E-13	pass	6	pass
TRAN	53-04	2.550E-11	pass	2.550E-11	pass	2	pass
TRAN	53-05	1.107E-11	pass	1.107E-11	pass	9	pass
TRAN	53-06-05	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-06-06	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-06-07	1.049E-11	pass	1.049E-11	pass	10	pass
TRAN	53-06-12	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	53-02-19	0.000E+00	pass
TRAN	53-02-20	0.000E+00	pass
TRAN	53-02-21	0.000E+00	pass
TRAN	53-04	0.000E+00	pass
TRAN	53-05	0.000E+00	pass
TRAN	53-06-05	0.000E+00	pass
TRAN	53-06-06	0.000E+00	pass
TRAN	53-06-07	0.000E+00	pass
TRAN	53-06-12	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	53-06-13	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-06-14	3.439E-15	pass	3.439E-15	pass	3	pass
TRAN	53-06-18	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-06-19	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	53-06-20	1.480E-13	pass	1.480E-13	pass	8	pass
TRAN	53-06-21	1.776E-11	pass	1.776E-11	pass	54	pass
TRAN	53-07	1.049E-11	pass	1.049E-11	pass	10	pass
TRAN	53-08	1.049E-11	pass	1.049E-11	pass	10	pass
TRAN	53-09	4.542E-12	pass	4.542E-12	pass	31	pass
TRAN	53-10	1.024E-12	pass	1.024E-12	pass	4	pass
TRAN	53-11	1.122E-13	pass	1.122E-13	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	53-06-13	0.000E+00	pass
TRAN	53-06-14	0.000E+00	pass
TRAN	53-06-18	0.000E+00	pass
TRAN	53-06-19	0.000E+00	pass
TRAN	53-06-20	0.000E+00	pass
TRAN	53-06-21	0.000E+00	pass
TRAN	53-07	0.000E+00	pass
TRAN	53-08	0.000E+00	pass
TRAN	53-09	0.000E+00	pass
TRAN	53-10	0.000E+00	pass
TRAN	53-11	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 8:58:21 PM

TEST CASE COMPLETE: at 8:58:22 PM

TEST CASE : GEM Condition Assessments (COND_PBOT)
DATE & TIME: 8/30/99 8:58:23 PM

TEST FOR: GEM Version 6.63

Project pbot_2qa is open

PBOT-03 Scenario: Condition HPCI out of service for 72 hours started at 8:58:29 PM
Assessment HPCI-72HRS created
Assessment processed
Sequences: 115 of 00115 pass
Total CCDP: 6.1E-007 6.1E-007 pass
Total CDP: 1.6E-007 1.6E-007 pass
Total Importance: 4.5E-007 4.5E-007 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	+0.0E+000	8.9E-011	-8.9E-011	pass
2	LOOP	08	+0.0E+000	1.4E-010	-1.4E-010	pass
3	LOOP	09	+0.0E+000	3.4E-009	-3.4E-009	pass
4	LOOP	14	6.2E-011	2.9E-012	5.9E-011	pass
5	LOOP	17	1.0E-010	4.8E-012	9.6E-011	pass
6	LOOP	18	2.3E-009	1.2E-010	2.2E-009	pass
7	LOOP	25	7.5E-011	4.9E-012	7.0E-011	pass
8	LOOP	31	6.1E-013	1.9E-014	5.9E-013	pass
9	LOOP	32	2.6E-012	1.0E-013	2.5E-012	pass
10	LOOP	37	1.1E-013	1.1E-013	+0.0E+000	pass
11	LOOP	38	8.2E-009	5.7E-010	7.7E-009	pass
12	LOOP	42	1.1E-012	7.3E-014	1.1E-012	pass
13	LOOP	43	5.1E-009	3.9E-010	4.7E-009	pass
14	LOOP	44-03	+0.0E+000	4.0E-009	-4.0E-009	pass
15	LOOP	44-06	+0.0E+000	2.0E-011	-2.0E-011	pass
16	LOOP	44-09	+0.0E+000	3.4E-011	-3.4E-011	pass
17	LOOP	44-10	+0.0E+000	1.5E-009	-1.5E-009	pass
18	LOOP	44-13	2.8E-009	1.4E-010	2.7E-009	pass
19	LOOP	44-16	1.4E-011	4.6E-013	1.4E-011	pass
20	LOOP	44-19	2.4E-011	1.0E-012	2.3E-011	pass
21	LOOP	44-20	1.1E-009	5.2E-011	1.0E-009	pass
22	LOOP	44-26	2.1E-011	1.0E-012	2.0E-011	pass
23	LOOP	44-31	1.8E-013	4.6E-014	1.4E-013	pass
24	LOOP	44-32	5.3E-012	2.8E-013	5.0E-012	pass
25	LOOP	44-36	1.4E-012	1.4E-012	+0.0E+000	pass
26	LOOP	44-37	1.8E-009	1.3E-010	1.7E-009	pass
27	LOOP	44-38	4.1E-008	2.9E-009	3.8E-008	pass
28	LOOP	45-04	+0.0E+000	8.0E-012	-8.0E-012	pass
29	LOOP	45-05	+0.0E+000	6.1E-012	-6.1E-012	pass
30	LOOP	45-09	+0.0E+000	7.3E-011	-7.3E-011	pass
31	LOOP	45-10	+0.0E+000	1.4E-012	-1.4E-012	pass
32	LOOP	45-15	+0.0E+000	5.1E-010	-5.1E-010	pass
33	LOOP	45-19	5.6E-012	5.2E-014	5.5E-012	pass
34	LOOP	45-20	4.3E-012	5.2E-014	4.2E-012	pass
35	LOOP	45-24	5.2E-011	2.6E-012	4.9E-011	pass
36	LOOP	45-25	9.9E-013	2.3E-014	9.7E-013	pass
37	LOOP	45-30	3.6E-010	1.8E-011	3.4E-010	pass
38	LOOP	45-31	7.7E-009	3.9E-010	7.3E-009	pass
39	LOOP	46-04	1.1E-012	1.1E-012	+0.0E+000	pass
40	LOOP	46-05	5.7E-013	5.7E-013	+0.0E+000	pass
41	LOOP	46-09	1.2E-011	1.2E-011	+0.0E+000	pass
42	LOOP	46-10	1.1E-013	1.1E-013	+0.0E+000	pass
43	LOOP	46-11	8.6E-011	8.6E-011	+0.0E+000	pass
44	LOOP	47-04	+0.0E+000	1.5E-009	-1.5E-009	pass
45	LOOP	47-06	+0.0E+000	1.3E-011	-1.3E-011	pass
46	LOOP	47-10	1.0E-009	5.1E-011	9.7E-010	pass
47	LOOP	47-12	9.2E-012	4.2E-013	8.8E-012	pass
48	LOOP	47-14	3.5E-010	2.4E-011	3.3E-010	pass
49	LOOP	47-18	+0.0E+000	8.5E-010	-8.5E-010	pass
50	LOOP	47-22	2.3E-010	1.1E-011	2.1E-010	pass

51	LOOP	47-23	3.5E-010	2.4E-011	3.3E-010	pass
52	LOOP	47-24	1.0E-010	1.0E-010	+0.0E+000	pass
53	LOOP	47-25	1.7E-011	1.7E-011	+0.0E+000	pass
54	LOOP	48	3.9E-009	3.9E-009	+0.0E+000	pass
55	SLOCA	04	+0.0E+000	6.9E-008	-6.9E-008	pass
56	SLOCA	06	+0.0E+000	8.6E-011	-8.6E-011	pass
57	SLOCA	08	+0.0E+000	1.5E-011	-1.5E-011	pass
58	SLOCA	09	+0.0E+000	1.4E-011	-1.4E-011	pass
59	SLOCA	11	4.8E-008	2.4E-009	4.6E-008	pass
60	SLOCA	13	6.0E-011	2.7E-012	5.7E-011	pass
61	SLOCA	15	1.0E-011	3.2E-013	1.0E-011	pass
62	SLOCA	16	9.4E-012	2.5E-013	9.2E-012	pass
63	SLOCA	20	2.8E-013	9.8E-014	1.8E-013	pass
64	SLOCA	35	5.0E-011	2.2E-011	2.8E-011	pass
65	SLOCA	36	1.1E-009	5.0E-010	6.4E-010	pass
66	SLOCA	37	4.0E-010	4.0E-010	+0.0E+000	pass
67	TRAN	09	+0.0E+000	8.0E-015	-8.0E-015	pass
68	TRAN	10	+0.0E+000	1.3E-010	-1.3E-010	pass
69	TRAN	18	5.5E-015	+0.0E+000	5.5E-015	pass
70	TRAN	19	8.6E-011	4.3E-012	8.2E-011	pass
71	TRAN	24	2.9E-012	3.1E-013	2.6E-012	pass
72	TRAN	30	1.5E-015	1.5E-015	+0.0E+000	pass
73	TRAN	31	3.1E-013	2.0E-014	2.9E-013	pass
74	TRAN	43	2.1E-016	2.1E-016	+0.0E+000	pass
75	TRAN	44	6.2E-008	6.0E-009	5.6E-008	pass
76	TRAN	48	2.5E-012	4.6E-013	2.0E-012	pass
77	TRAN	49	2.6E-008	3.2E-009	2.3E-008	pass
78	TRAN	50-03	+0.0E+000	2.5E-009	-2.5E-009	pass
79	TRAN	50-06	+0.0E+000	2.3E-012	-2.3E-012	pass
80	TRAN	50-09	+0.0E+000	8.7E-014	-8.7E-014	pass
81	TRAN	50-10	+0.0E+000	6.4E-009	-6.4E-009	pass
82	TRAN	50-13	1.8E-009	8.7E-011	1.7E-009	pass
83	TRAN	50-16	1.6E-012	+0.0E+000	1.6E-012	pass
84	TRAN	50-19	6.1E-014	+0.0E+000	6.1E-014	pass
85	TRAN	50-20	4.5E-009	2.2E-010	4.2E-009	pass
86	TRAN	50-24	1.8E-010	4.1E-011	1.4E-010	pass
87	TRAN	50-30	1.4E-011	5.1E-013	1.3E-011	pass
88	TRAN	50-40	9.2E-013	9.2E-013	+0.0E+000	pass
89	TRAN	50-41	1.4E-008	1.3E-009	1.2E-008	pass
90	TRAN	50-42	3.1E-007	3.0E-008	2.8E-007	pass
91	TRAN	51-04	+0.0E+000	4.8E-011	-4.8E-011	pass
92	TRAN	51-05	+0.0E+000	4.4E-011	-4.4E-011	pass
93	TRAN	51-15	+0.0E+000	3.7E-009	-3.7E-009	pass
94	TRAN	51-19	2.8E-011	1.1E-012	2.7E-011	pass
95	TRAN	51-23	2.9E-012	+0.0E+000	2.9E-012	pass
96	TRAN	51-24	2.7E-012	+0.0E+000	2.7E-012	pass
97	TRAN	51-34	2.6E-009	1.4E-010	2.5E-009	pass
98	TRAN	51-35	5.6E-008	3.0E-009	5.3E-008	pass
99	TRAN	52-04	7.3E-012	7.3E-012	+0.0E+000	pass
100	TRAN	52-05	6.7E-012	6.7E-012	+0.0E+000	pass
101	TRAN	52-11	6.3E-010	6.3E-010	+0.0E+000	pass
102	TRAN	53-02-07	1.8E-011	1.8E-011	+0.0E+000	pass
103	TRAN	53-02-20	2.6E-013	2.6E-013	+0.0E+000	pass
104	TRAN	53-02-21	3.1E-011	3.1E-011	+0.0E+000	pass
105	TRAN	53-04	1.8E-009	1.8E-009	+0.0E+000	pass
106	TRAN	53-05	8.0E-010	8.0E-010	+0.0E+000	pass
107	TRAN	53-06-07	7.6E-010	7.6E-010	+0.0E+000	pass
108	TRAN	53-06-14	2.5E-013	2.5E-013	+0.0E+000	pass
109	TRAN	53-06-20	1.1E-011	1.1E-011	+0.0E+000	pass
110	TRAN	53-06-21	1.3E-009	1.3E-009	+0.0E+000	pass
111	TRAN	53-07	7.6E-010	7.6E-010	+0.0E+000	pass
112	TRAN	53-08	7.6E-010	7.6E-010	+0.0E+000	pass
113	TRAN	53-09	3.3E-010	3.3E-010	+0.0E+000	pass
114	TRAN	53-10	7.4E-011	7.4E-011	+0.0E+000	pass
115	TRAN	53-11	8.1E-012	8.1E-012	+0.0E+000	pass

Scenario: Condition HPCI out of service for 72 hours completed at 8:59:28 PM

PBOT-04 Scenario: Condition EDG out of service for 3 months started at 8:59:28 PM
Assessment EDG-2190HRS created
Assessment processed
Sequences: 110 of 00110 pass
Total CCDP: 8.4E-006 8.4E-006 pass
Total CDP: 4.8E-006 4.8E-006 pass
Total Importance: 3.6E-006 3.6E-006 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	7.6E-008	2.7E-009	7.4E-008	pass
2	LOOP	08	1.2E-007	4.4E-009	1.2E-007	pass
3	LOOP	09	3.7E-007	1.0E-007	2.6E-007	pass
4	LOOP	14	2.7E-009	8.8E-011	2.6E-009	pass
5	LOOP	17	4.3E-009	1.5E-010	4.1E-009	pass
6	LOOP	18	1.3E-008	3.5E-009	9.2E-009	pass
7	LOOP	25	1.9E-010	1.5E-010	3.9E-011	pass
8	LOOP	31	4.2E-011	5.7E-013	4.2E-011	pass
9	LOOP	32	1.4E-010	3.1E-012	1.4E-010	pass
10	LOOP	37	6.0E-011	3.2E-012	5.7E-011	pass
11	LOOP	38	1.8E-008	1.7E-008	7.7E-011	pass
12	LOOP	42	2.2E-012	2.2E-012	+0.0E+000	pass
13	LOOP	43	5.8E-008	1.2E-008	4.6E-008	pass
14	LOOP	44-03	3.0E-006	1.2E-007	2.9E-006	pass
15	LOOP	44-06	1.7E-008	6.1E-010	1.6E-008	pass
16	LOOP	44-09	2.7E-008	1.0E-009	2.6E-008	pass
17	LOOP	44-10	8.6E-008	4.6E-008	4.0E-008	pass
18	LOOP	44-13	1.1E-007	4.2E-009	1.0E-007	pass
19	LOOP	44-16	5.7E-010	1.4E-011	5.6E-010	pass
20	LOOP	44-19	9.3E-010	3.2E-011	8.9E-010	pass
21	LOOP	44-20	3.0E-009	1.6E-009	1.4E-009	pass
22	LOOP	44-26	3.6E-011	3.1E-011	5.6E-012	pass
23	LOOP	44-31	8.5E-012	1.4E-012	7.2E-012	pass
24	LOOP	44-32	2.8E-011	8.4E-012	2.0E-011	pass
25	LOOP	44-36	5.1E-011	4.3E-011	8.3E-012	pass
26	LOOP	44-37	3.8E-009	3.8E-009	1.5E-011	pass
27	LOOP	44-38	8.7E-008	8.7E-008	+0.0E+000	pass
28	LOOP	45-04	2.4E-010	2.4E-010	+0.0E+000	pass
29	LOOP	45-05	2.2E-010	1.8E-010	3.3E-011	pass
30	LOOP	45-09	2.2E-009	2.2E-009	-8.8E-012	pass
31	LOOP	45-10	1.3E-010	4.3E-011	8.2E-011	pass
32	LOOP	45-15	1.6E-008	1.6E-008	6.6E-011	pass
33	LOOP	45-19	1.6E-012	1.6E-012	+0.0E+000	pass
34	LOOP	45-20	1.6E-012	1.6E-012	+0.0E+000	pass
35	LOOP	45-24	7.9E-011	7.9E-011	+0.0E+000	pass
36	LOOP	45-25	3.0E-012	7.1E-013	2.3E-012	pass
37	LOOP	45-30	5.6E-010	5.6E-010	+0.0E+000	pass
38	LOOP	45-31	1.2E-008	1.2E-008	+0.0E+000	pass
39	LOOP	46-04	3.3E-011	3.3E-011	+0.0E+000	pass
40	LOOP	46-05	2.0E-011	1.7E-011	2.5E-012	pass
41	LOOP	46-09	3.8E-010	3.8E-010	-2.4E-012	pass
42	LOOP	46-10	1.8E-011	3.4E-012	1.4E-011	pass
43	LOOP	46-11	2.6E-009	2.6E-009	1.5E-011	pass
44	LOOP	47-04	4.8E-008	4.4E-008	3.3E-009	pass
45	LOOP	47-06	4.3E-010	4.0E-010	3.0E-011	pass
46	LOOP	47-10	1.7E-009	1.6E-009	1.2E-010	pass
47	LOOP	47-12	1.3E-011	1.3E-011	+0.0E+000	pass
48	LOOP	47-14	7.9E-010	7.3E-010	5.4E-011	pass
49	LOOP	47-18	2.8E-008	2.6E-008	1.9E-009	pass
50	LOOP	47-22	3.7E-010	3.4E-010	2.6E-011	pass
51	LOOP	47-23	7.9E-010	7.3E-010	5.4E-011	pass
52	LOOP	47-24	3.3E-009	3.1E-009	2.3E-010	pass
53	LOOP	47-25	5.6E-010	5.2E-010	4.0E-011	pass
54	LOOP	48	1.2E-007	1.2E-007	+0.0E+000	pass
55	SLOCA	04	2.1E-006	2.1E-006	+0.0E+000	pass
56	SLOCA	06	2.6E-009	2.6E-009	+0.0E+000	pass
57	SLOCA	08	4.5E-010	4.5E-010	+0.0E+000	pass
58	SLOCA	09	4.1E-010	4.1E-010	+0.0E+000	pass

59	SLOCA	11	7.3E-008	7.3E-008	+0.0E+000	pass
60	SLOCA	13	8.1E-011	8.1E-011	+0.0E+000	pass
61	SLOCA	15	9.8E-012	9.8E-012	+0.0E+000	pass
62	SLOCA	16	7.7E-012	7.7E-012	+0.0E+000	pass
63	SLOCA	20	3.0E-012	3.0E-012	+0.0E+000	pass
64	SLOCA	35	6.7E-010	6.7E-010	+0.0E+000	pass
65	SLOCA	36	1.5E-008	1.5E-008	+0.0E+000	pass
66	SLOCA	37	1.2E-008	1.2E-008	+0.0E+000	pass
67	TRAN	09	2.4E-013	2.4E-013	+0.0E+000	pass
68	TRAN	10	3.8E-009	3.8E-009	+0.0E+000	pass
69	TRAN	19	1.3E-010	1.3E-010	+0.0E+000	pass
70	TRAN	24	9.4E-012	9.4E-012	+0.0E+000	pass
71	TRAN	30	4.4E-014	4.4E-014	+0.0E+000	pass
72	TRAN	31	6.2E-013	6.2E-013	+0.0E+000	pass
73	TRAN	43	6.4E-015	6.4E-015	+0.0E+000	pass
74	TRAN	44	1.8E-007	1.8E-007	+0.0E+000	pass
75	TRAN	48	1.4E-011	1.4E-011	+0.0E+000	pass
76	TRAN	49	9.8E-008	9.8E-008	+0.0E+000	pass
77	TRAN	50-03	7.6E-008	7.6E-008	+0.0E+000	pass
78	TRAN	50-06	7.1E-011	7.1E-011	+0.0E+000	pass
79	TRAN	50-09	2.6E-012	2.6E-012	+0.0E+000	pass
80	TRAN	50-10	1.9E-007	1.9E-007	+0.0E+000	pass
81	TRAN	50-13	2.6E-009	2.6E-009	+0.0E+000	pass
82	TRAN	50-20	6.7E-009	6.7E-009	+0.0E+000	pass
83	TRAN	50-24	1.3E-009	1.3E-009	+0.0E+000	pass
84	TRAN	50-30	1.6E-011	1.6E-011	+0.0E+000	pass
85	TRAN	50-40	2.8E-011	2.8E-011	+0.0E+000	pass
86	TRAN	50-41	4.0E-008	4.0E-008	+0.0E+000	pass
87	TRAN	50-42	9.2E-007	9.2E-007	+0.0E+000	pass
88	TRAN	51-04	1.5E-009	1.5E-009	+0.0E+000	pass
89	TRAN	51-05	1.3E-009	1.3E-009	+0.0E+000	pass
90	TRAN	51-15	1.1E-007	1.1E-007	+0.0E+000	pass
91	TRAN	51-19	3.2E-011	3.2E-011	+0.0E+000	pass
92	TRAN	51-34	4.2E-009	4.2E-009	+0.0E+000	pass
93	TRAN	51-35	9.0E-008	9.0E-008	+0.0E+000	pass
94	TRAN	52-04	2.2E-010	2.2E-010	+0.0E+000	pass
95	TRAN	52-05	2.0E-010	2.0E-010	+0.0E+000	pass
96	TRAN	52-11	1.9E-008	1.9E-008	+0.0E+000	pass
97	TRAN	53-02-07	5.6E-010	5.6E-010	+0.0E+000	pass
98	TRAN	53-02-20	7.9E-012	7.9E-012	+0.0E+000	pass
99	TRAN	53-02-21	9.5E-010	9.5E-010	+0.0E+000	pass
100	TRAN	53-04	5.6E-008	5.6E-008	+0.0E+000	pass
101	TRAN	53-05	2.4E-008	2.4E-008	+0.0E+000	pass
102	TRAN	53-06-07	2.3E-008	2.3E-008	+0.0E+000	pass
103	TRAN	53-06-14	7.5E-012	7.5E-012	+0.0E+000	pass
104	TRAN	53-06-20	3.2E-010	3.2E-010	+0.0E+000	pass
105	TRAN	53-06-21	3.9E-008	3.9E-008	+0.0E+000	pass
106	TRAN	53-07	2.3E-008	2.3E-008	+0.0E+000	pass
107	TRAN	53-08	2.3E-008	2.3E-008	+0.0E+000	pass
108	TRAN	53-09	1.0E-008	1.0E-008	+0.0E+000	pass
109	TRAN	53-10	2.2E-009	2.2E-009	+0.0E+000	pass
110	TRAN	53-11	2.5E-010	2.5E-010	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 9:00:26 PM

TEST CASE COMPLETE: at 9:00:26 PM

TEST CASE : GEM Initiating Events (IE_PBOT)
DATE & TIME: 8/30/99 9:00:26 PM

TEST FOR: GEM Version 6.63

Project pbot_2qa is open

PBOT-05 Scenario: Transient - No other failures started at 9:00:31 PM
Assessment TRANS created
Initiating event IE-TRAN selected
Assessment processed
Sequences: 44 of 00044 pass
Total CCDP: 3.0E-006 3.0E-006 pass

#	Tree	Sequence	CCDP	Status
1	TRAN	09	5.2E-013	pass
2	TRAN	10	5.8E-009	pass
3	TRAN	19	2.0E-010	pass
4	TRAN	24	1.5E-011	pass
5	TRAN	30	8.5E-014	pass
6	TRAN	31	1.1E-012	pass
7	TRAN	43	1.8E-014	pass
8	TRAN	44	2.8E-007	pass
9	TRAN	48	3.2E-011	pass
10	TRAN	49	1.5E-007	pass
11	TRAN	50-03	1.2E-007	pass
12	TRAN	50-06	1.5E-010	pass
13	TRAN	50-09	2.6E-011	pass
14	TRAN	50-10	2.9E-007	pass
15	TRAN	50-13	4.1E-009	pass
16	TRAN	50-20	1.0E-008	pass
17	TRAN	50-24	2.0E-009	pass
18	TRAN	50-30	5.1E-011	pass
19	TRAN	50-40	4.5E-011	pass
20	TRAN	50-41	6.1E-008	pass
21	TRAN	50-42	1.4E-006	pass
22	TRAN	51-04	2.3E-009	pass
23	TRAN	51-05	2.1E-009	pass
24	TRAN	51-15	1.7E-007	pass
25	TRAN	51-19	8.5E-011	pass
26	TRAN	51-34	6.4E-009	pass
27	TRAN	51-35	1.4E-007	pass
28	TRAN	52-04	3.9E-010	pass
29	TRAN	52-05	3.6E-010	pass
30	TRAN	52-11	2.9E-008	pass
31	TRAN	53-02-07	8.5E-010	pass
32	TRAN	53-02-20	1.2E-011	pass
33	TRAN	53-02-21	1.4E-009	pass
34	TRAN	53-04	8.5E-008	pass
35	TRAN	53-05	3.7E-008	pass
36	TRAN	53-06-07	3.5E-008	pass
37	TRAN	53-06-14	1.6E-011	pass
38	TRAN	53-06-20	4.9E-010	pass
39	TRAN	53-06-21	5.9E-008	pass
40	TRAN	53-07	3.5E-008	pass
41	TRAN	53-08	3.5E-008	pass
42	TRAN	53-09	1.5E-008	pass
43	TRAN	53-10	3.4E-009	pass
44	TRAN	53-11	3.7E-010	pass

Scenario: Transient - No other failures completed at 9:01:41 PM

PBOT-06 Scenario: Small LOCA - No other failures started at 9:01:41 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 12 of 00012 pass
Total CCDP: 3.0E-004 3.0E-004 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	04	2.9E-004	pass
2	SLOCA	06	3.7E-007	pass
3	SLOCA	08	6.7E-008	pass
4	SLOCA	09	6.1E-008	pass
5	SLOCA	11	1.0E-005	pass
6	SLOCA	13	1.3E-008	pass
7	SLOCA	15	2.4E-009	pass
8	SLOCA	16	2.2E-009	pass
9	SLOCA	20	1.4E-009	pass
10	SLOCA	35	9.2E-008	pass
11	SLOCA	36	2.1E-006	pass
12	SLOCA	37	1.7E-006	pass

Scenario: Small LOCA - No other failures completed at 9:02:18 PM

PBOT-07 Scenario: Grid-related LOOP - no other failures started at 9:02:18 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 58 of 00058 pass
Total CCDP: 1.6E-005 1.6E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	6.7E-008	pass
2	LOOP	08	1.1E-007	pass
3	LOOP	09	2.7E-006	pass
4	LOOP	14	2.4E-009	pass
5	LOOP	17	3.8E-009	pass
6	LOOP	18	9.4E-008	pass
7	LOOP	24	1.9E-011	pass
8	LOOP	25	4.5E-009	pass
9	LOOP	31	4.0E-011	pass
10	LOOP	32	6.2E-011	pass
11	LOOP	37	1.0E-010	pass
12	LOOP	38	5.0E-007	pass
13	LOOP	42	2.3E-010	pass
14	LOOP	43	3.3E-007	pass
15	LOOP	44-03	3.0E-006	pass
16	LOOP	44-06	1.6E-008	pass
17	LOOP	44-09	2.6E-008	pass
18	LOOP	44-10	1.2E-006	pass
19	LOOP	44-13	1.1E-007	pass
20	LOOP	44-16	5.6E-010	pass
21	LOOP	44-19	9.2E-010	pass
22	LOOP	44-20	4.2E-008	pass
23	LOOP	44-25	5.8E-012	pass
24	LOOP	44-26	1.3E-009	pass
25	LOOP	44-31	4.8E-011	pass
26	LOOP	44-32	2.6E-010	pass
27	LOOP	44-36	1.2E-009	pass
28	LOOP	44-37	1.1E-007	pass
29	LOOP	44-38	2.5E-006	pass
30	LOOP	45-04	7.6E-009	pass
31	LOOP	45-05	5.5E-009	pass
32	LOOP	45-09	5.7E-008	pass
33	LOOP	45-10	1.0E-009	pass
34	LOOP	45-14	5.6E-014	pass
35	LOOP	45-15	4.4E-007	pass
36	LOOP	45-19	2.7E-010	pass
37	LOOP	45-20	2.0E-010	pass
38	LOOP	45-24	2.1E-009	pass
39	LOOP	45-25	3.8E-011	pass
40	LOOP	45-29	1.3E-011	pass
41	LOOP	45-30	1.6E-008	pass
42	LOOP	45-31	3.4E-007	pass
43	LOOP	46-04	1.3E-009	pass
44	LOOP	46-05	9.3E-010	pass
45	LOOP	46-09	9.6E-009	pass
46	LOOP	46-10	1.8E-010	pass
47	LOOP	46-11	7.5E-008	pass
48	LOOP	47-04	8.1E-008	pass
49	LOOP	47-06	7.3E-010	pass
50	LOOP	47-10	2.9E-009	pass
51	LOOP	47-12	2.6E-011	pass
52	LOOP	47-14	4.0E-008	pass
53	LOOP	47-18	1.0E-006	pass
54	LOOP	47-22	6.3E-010	pass
55	LOOP	47-23	2.0E-008	pass
56	LOOP	47-24	8.5E-008	pass
57	LOOP	47-25	1.4E-008	pass
58	LOOP	48	3.4E-006	pass

Scenario: Grid-related LOOP - no other failures completed at 9:05:21 PM

PBOT-08 Scenario: Plant-centered LOOP - no other failures started at 9:05:21 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 58 of 00058 pass
Total CCDP: 1.5E-005 1.5E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	5.7E-008	pass
2	LOOP	08	9.0E-008	pass
3	LOOP	09	2.7E-006	pass
4	LOOP	14	2.0E-009	pass
5	LOOP	17	3.2E-009	pass
6	LOOP	18	9.4E-008	pass
7	LOOP	24	1.9E-011	pass
8	LOOP	25	4.5E-009	pass
9	LOOP	31	3.3E-011	pass
10	LOOP	32	5.4E-011	pass
11	LOOP	37	1.0E-010	pass
12	LOOP	38	5.0E-007	pass
13	LOOP	42	2.2E-010	pass
14	LOOP	43	3.3E-007	pass
15	LOOP	44-03	2.7E-006	pass
16	LOOP	44-06	1.4E-008	pass
17	LOOP	44-09	2.2E-008	pass
18	LOOP	44-10	1.1E-006	pass
19	LOOP	44-13	9.4E-008	pass
20	LOOP	44-16	4.7E-010	pass
21	LOOP	44-19	7.7E-010	pass
22	LOOP	44-20	4.0E-008	pass
23	LOOP	44-25	5.7E-012	pass
24	LOOP	44-26	1.3E-009	pass
25	LOOP	44-31	4.2E-011	pass
26	LOOP	44-32	2.3E-010	pass
27	LOOP	44-36	1.2E-009	pass
28	LOOP	44-37	1.1E-007	pass
29	LOOP	44-38	2.5E-006	pass
30	LOOP	45-04	7.5E-009	pass
31	LOOP	45-05	5.5E-009	pass
32	LOOP	45-09	5.1E-008	pass
33	LOOP	45-10	9.3E-010	pass
34	LOOP	45-14	4.9E-014	pass
35	LOOP	45-15	4.4E-007	pass
36	LOOP	45-19	2.7E-010	pass
37	LOOP	45-20	2.0E-010	pass
38	LOOP	45-24	1.8E-009	pass
39	LOOP	45-25	3.4E-011	pass
40	LOOP	45-29	1.3E-011	pass
41	LOOP	45-30	1.6E-008	pass
42	LOOP	45-31	3.4E-007	pass
43	LOOP	46-04	1.3E-009	pass
44	LOOP	46-05	9.3E-010	pass
45	LOOP	46-09	8.5E-009	pass
46	LOOP	46-10	1.6E-010	pass
47	LOOP	46-11	7.5E-008	pass
48	LOOP	47-04	1.4E-009	pass
49	LOOP	47-06	1.3E-011	pass
50	LOOP	47-10	4.9E-011	pass
51	LOOP	47-12	4.5E-013	pass
52	LOOP	47-14	1.2E-008	pass
53	LOOP	47-18	9.2E-008	pass
54	LOOP	47-22	1.1E-011	pass
55	LOOP	47-23	2.0E-008	pass
56	LOOP	47-24	8.2E-008	pass
57	LOOP	47-25	1.4E-008	pass
58	LOOP	48	3.4E-006	pass

Scenario: Plant-centered LOOP - no other failures completed at 9:08:20 PM

PBOT-09 Scenario: Severe Weather LOOP - no other failures started at 9:08:20 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 58 of 00058 pass
Total CCDP: 6.6E-005 6.6E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	3.6E-007	pass
2	LOOP	08	6.4E-007	pass
3	LOOP	09	9.0E-006	pass
4	LOOP	14	1.3E-008	pass
5	LOOP	17	2.3E-008	pass
6	LOOP	18	3.2E-007	pass
7	LOOP	24	2.7E-011	pass
8	LOOP	25	5.4E-009	pass
9	LOOP	31	2.4E-010	pass
10	LOOP	32	3.5E-009	pass
11	LOOP	37	5.9E-010	pass
12	LOOP	38	5.0E-007	pass
13	LOOP	42	3.0E-010	pass
14	LOOP	43	4.1E-007	pass
15	LOOP	44-03	1.3E-005	pass
16	LOOP	44-06	8.1E-008	pass
17	LOOP	44-09	1.5E-007	pass
18	LOOP	44-10	4.6E-006	pass
19	LOOP	44-13	4.7E-007	pass
20	LOOP	44-16	2.9E-009	pass
21	LOOP	44-19	5.3E-009	pass
22	LOOP	44-20	1.6E-007	pass
23	LOOP	44-25	7.9E-012	pass
24	LOOP	44-26	1.5E-009	pass
25	LOOP	44-31	1.8E-010	pass
26	LOOP	44-32	2.2E-009	pass
27	LOOP	44-36	1.4E-009	pass
28	LOOP	44-37	1.1E-007	pass
29	LOOP	44-38	2.5E-006	pass
30	LOOP	45-04	9.1E-009	pass
31	LOOP	45-05	6.4E-009	pass
32	LOOP	45-09	1.9E-007	pass
33	LOOP	45-10	9.2E-009	pass
34	LOOP	45-14	2.5E-012	pass
35	LOOP	45-15	4.4E-007	pass
36	LOOP	45-19	3.3E-010	pass
37	LOOP	45-20	2.3E-010	pass
38	LOOP	45-24	6.8E-009	pass
39	LOOP	45-25	3.3E-010	pass
40	LOOP	45-29	1.5E-011	pass
41	LOOP	45-30	1.6E-008	pass
42	LOOP	45-31	3.4E-007	pass
43	LOOP	46-04	1.5E-009	pass
44	LOOP	46-05	1.1E-009	pass
45	LOOP	46-09	3.2E-008	pass
46	LOOP	46-10	1.6E-009	pass
47	LOOP	46-11	7.5E-008	pass
48	LOOP	47-04	1.8E-005	pass
49	LOOP	47-06	1.6E-007	pass
50	LOOP	47-10	6.4E-007	pass
51	LOOP	47-12	5.8E-009	pass
52	LOOP	47-14	1.1E-007	pass
53	LOOP	47-18	9.8E-006	pass
54	LOOP	47-22	1.4E-007	pass
55	LOOP	47-23	3.0E-008	pass
56	LOOP	47-24	1.2E-007	pass
57	LOOP	47-25	2.1E-008	pass
58	LOOP	48	3.4E-006	pass

Scenario: Severe Weather LOOP - no other failures completed at 9:12:12 PM

PBOT-10 Scenario: Extreme Severe Weather LOOP - no other failures started at 9:12:12 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 58 of 00058 pass
Total CCDP: 1.8E-004 1.8E-004 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	7.0E-007	pass
2	LOOP	08	1.3E-006	pass
3	LOOP	09	5.5E-005	pass
4	LOOP	14	2.5E-008	pass
5	LOOP	17	4.5E-008	pass
6	LOOP	18	1.9E-006	pass
7	LOOP	24	3.3E-011	pass
8	LOOP	25	9.6E-009	pass
9	LOOP	31	4.7E-010	pass
10	LOOP	32	2.9E-008	pass
11	LOOP	37	2.8E-009	pass
12	LOOP	38	5.0E-007	pass
13	LOOP	42	3.5E-010	pass
14	LOOP	43	4.6E-007	pass
15	LOOP	44-03	2.5E-005	pass
16	LOOP	44-06	1.6E-007	pass
17	LOOP	44-09	3.0E-007	pass
18	LOOP	44-10	2.4E-005	pass
19	LOOP	44-13	8.6E-007	pass
20	LOOP	44-16	5.5E-009	pass
21	LOOP	44-19	1.0E-008	pass
22	LOOP	44-20	8.5E-007	pass
23	LOOP	44-25	9.5E-012	pass
24	LOOP	44-26	2.6E-009	pass
25	LOOP	44-31	3.0E-010	pass
26	LOOP	44-32	1.4E-008	pass
27	LOOP	44-36	2.4E-009	pass
28	LOOP	44-37	1.1E-007	pass
29	LOOP	44-38	2.5E-006	pass
30	LOOP	45-04	1.0E-008	pass
31	LOOP	45-05	1.1E-008	pass
32	LOOP	45-09	3.0E-007	pass
33	LOOP	45-10	5.6E-008	pass
34	LOOP	45-14	1.7E-011	pass
35	LOOP	45-15	4.4E-007	pass
36	LOOP	45-19	3.6E-010	pass
37	LOOP	45-20	3.9E-010	pass
38	LOOP	45-24	1.1E-008	pass
39	LOOP	45-25	2.0E-009	pass
40	LOOP	45-29	2.5E-011	pass
41	LOOP	45-30	1.6E-008	pass
42	LOOP	45-31	3.4E-007	pass
43	LOOP	46-04	1.7E-009	pass
44	LOOP	46-05	1.8E-009	pass
45	LOOP	46-09	5.1E-008	pass
46	LOOP	46-10	9.5E-009	pass
47	LOOP	46-11	7.5E-008	pass
48	LOOP	47-04	4.7E-005	pass
49	LOOP	47-06	4.2E-007	pass
50	LOOP	47-10	1.6E-006	pass
51	LOOP	47-12	1.5E-008	pass
52	LOOP	47-14	1.5E-007	pass
53	LOOP	47-18	1.6E-005	pass
54	LOOP	47-22	3.6E-007	pass
55	LOOP	47-23	3.6E-008	pass
56	LOOP	47-24	1.5E-007	pass
57	LOOP	47-25	2.5E-008	pass
58	LOOP	48	3.4E-006	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 9:16:32 PM

PBOT-11 Scenario: Transient - HPCI failed started at 9:16:32 PM
Assessment TRAN-HPCI created
Initiating event IE-TRAN selected
Assessment processed
Sequences: 48 of 00048 pass
Total CCDP: 2.2E-005 2.2E-005 pass

#	Tree	Sequence	CCDP	Status
1	TRAN	15	6.0E-014	pass
2	TRAN	18	3.6E-013	pass
3	TRAN	19	4.0E-009	pass
4	TRAN	24	1.4E-010	pass
5	TRAN	30	8.6E-014	pass
6	TRAN	31	1.5E-011	pass
7	TRAN	38	2.8E-015	pass
8	TRAN	43	1.8E-014	pass
9	TRAN	44	2.9E-006	pass
10	TRAN	48	1.3E-010	pass
11	TRAN	49	1.2E-006	pass
12	TRAN	50-13	8.1E-008	pass
13	TRAN	50-16	1.0E-010	pass
14	TRAN	50-19	1.9E-011	pass
15	TRAN	50-20	2.1E-007	pass
16	TRAN	50-24	8.2E-009	pass
17	TRAN	50-29	4.1E-012	pass
18	TRAN	50-30	7.0E-010	pass
19	TRAN	50-35	2.4E-015	pass
20	TRAN	50-36	1.2E-013	pass
21	TRAN	50-40	4.5E-011	pass
22	TRAN	50-41	6.3E-007	pass
23	TRAN	50-42	1.4E-005	pass
24	TRAN	51-19	1.4E-009	pass
25	TRAN	51-23	1.5E-010	pass
26	TRAN	51-24	1.4E-010	pass
27	TRAN	51-28	1.1E-013	pass
28	TRAN	51-29	2.2E-014	pass
29	TRAN	51-33	4.5E-013	pass
30	TRAN	51-34	1.2E-007	pass
31	TRAN	51-35	2.6E-006	pass
32	TRAN	52-04	3.9E-010	pass
33	TRAN	52-05	3.6E-010	pass
34	TRAN	52-11	2.9E-008	pass
35	TRAN	53-02-07	8.5E-010	pass
36	TRAN	53-02-20	1.2E-011	pass
37	TRAN	53-02-21	1.4E-009	pass
38	TRAN	53-04	8.5E-008	pass
39	TRAN	53-05	3.7E-008	pass
40	TRAN	53-06-07	3.5E-008	pass
41	TRAN	53-06-14	1.6E-011	pass
42	TRAN	53-06-20	4.9E-010	pass
43	TRAN	53-06-21	5.9E-008	pass
44	TRAN	53-07	3.5E-008	pass
45	TRAN	53-08	3.5E-008	pass
46	TRAN	53-09	1.5E-008	pass
47	TRAN	53-10	3.4E-009	pass
48	TRAN	53-11	3.7E-010	pass

Scenario: Transient - HPCI failed completed at 9:17:58 PM

TEST CASE COMPLETE: at 9:17:58 PM

TEST CASE : SAPHIRE QA Models (CDF_DRES)
DATE & TIME: 8/30/99 9:18:03 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: dres_2qa

DRES-01 Scenario: Solve Fault Trees started at 9:18:36 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-15)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status	
AC-4HR	2.200E-002		pass	2.200E-02	pass	1	pass	
AC-90MIN	8.200E-002		pass	8.200E-02	pass	1	pass	
AC-BD	2.200E-002		pass	2.200E-02	pass	1	pass	
AC-CU	3.600E-001		pass	3.600E-01	pass	1	pass	
AC-SL	0.000E+000		pass	0.000E+00		pass	1	pass
AC-ST	3.600E-001		pass	3.600E-01	pass	1	pass	
CD1	1.344E-002		pass	1.344E-02	pass	23	pass	
CDS	4.699E-002		pass	4.699E-02	pass	24	pass	
CDS-HW	1.238E-002		pass	1.238E-02	pass	9	pass	
CDS-PMPS	1.352E-005		pass	1.352E-05	pass	6	pass	
CMS	1.040E-002		pass	1.040E-02	pass	7	pass	
CRD	9.317E-005		pass	9.317E-05	pass	8	pass	
CSS	2.063E-003		pass	2.063E-03	pass	46	pass	
CTS	1.040E-002		pass	1.040E-02	pass	7	pass	
CVS	1.315E-002		pass	1.315E-02	pass	6	pass	
DE1	1.091E-002		pass	1.091E-02	pass	7	pass	
DE2	1.019E-002		pass	1.019E-02	pass	3	pass	
DEP	1.268E-002		pass	1.268E-02	pass	12	pass	
DG2	4.554E-002		pass	4.554E-02	pass	2	pass	
DG23	4.554E-002		pass	4.554E-02	pass	2	pass	

Compare Mean:

Fault Tree	Mean	Status	Failure
AC-4HR	0.000E+00		pass
AC-90MIN	0.000E+00		pass
AC-BD	0.000E+00		pass
AC-CU	0.000E+00		pass
AC-SL	0.000E+00		pass
AC-ST	0.000E+00		pass
CD1	0.000E+00		pass
CDS	0.000E+00		pass
CDS-HW	0.000E+00		pass
CDS-PMPS	0.000E+00		pass
CMS	0.000E+00		pass
CRD	0.000E+00		pass
CSS	0.000E+00		pass
CTS	0.000E+00		pass
CVS	0.000E+00		pass
DE1	0.000E+00		pass
DE2	0.000E+00		pass
DEP	0.000E+00		pass
DG2	0.000E+00		pass
DG23	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
DG3	4.554E-002		pass	4.554E-02	pass	2	pass
DIV-1-AC	9.000E-005		pass	9.000E-05	pass	1	pass
DIV-2-AC	9.000E-005		pass	9.000E-05	pass	1	pass
DIV1AC8H	9.000E-005		pass	9.000E-05	pass	1	pass
DIV2AC8H	9.000E-005		pass	9.000E-05	pass	1	pass
EPS	1.248E-002		pass	1.248E-02	pass	9	pass

FWS	1.500E-003		pass	1.500E-03	pass	2	pass
HCI	5.098E-002		pass	5.098E-02	pass	8	pass
ISO	2.285E-002		pass	2.285E-02	pass	28	pass
L	5.000E-001		pass	5.000E-01	pass	1	pass
LCI	1.702E-003		pass	1.702E-03	pass	30	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
DG3	0.000E+00		pass
DIV-1-AC	0.000E+00		pass
DIV-2-AC	0.000E+00		pass
DIV1AC8H	0.000E+00		pass
DIV2AC8H	0.000E+00		pass
EPS	0.000E+00		pass
FWS	0.000E+00		pass
HCI	0.000E+00		pass
ISO	0.000E+00		pass
L	0.000E+00		pass
LCI	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status	
LCS	2.081E-003		pass	2.081E-03	pass	15	pass	
LVL	2.500E-002		pass	2.500E-02	pass	1	pass	
MF1	1.345E-002		pass	1.345E-02	pass	24	pass	
MFW	5.281E-002		pass	5.281E-02	pass	26	pass	
MFW-FP	6.026E-005		pass	6.026E-05	pass	5	pass	
MFW-PMPS	9.926E-006		pass	9.926E-06	pass	3	pass	
MSV	1.000E-002		pass	1.000E-02	pass	1	pass	
NX	2.500E-002		pass	2.500E-02	pass	1	pass	
P1	1.800E-001		pass	1.800E-01	pass	1	pass	
P2	1.300E-003		pass	1.300E-03	pass	1	pass	
P3	2.200E-004		pass	2.200E-04	pass	1	pass	
PC1	6.124E-002		pass	6.124E-02	pass	26	pass	
PC2	1.266E-001		pass	1.266E-01	pass	29	pass	
PCS	1.161E-001		pass	1.161E-01	pass	29	pass	
PPR	1.100E-004		pass	1.100E-04	pass	1	pass	
RPS	1.000E-005		pass	1.000E-05	pass	4	pass	
RRS	9.998E-004		pass	9.998E-04	pass	2	pass	
SD1	3.999E-002		pass	3.999E-02	pass	15	pass	
SDC	3.029E-002		pass	3.029E-02	pass	14	pass	
SEALS	0.000E+000		pass	0.000E+00		pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
LCS	0.000E+00		pass
LVL	0.000E+00		pass
MF1	0.000E+00		pass
MFW	0.000E+00		pass
MFW-FP	0.000E+00		pass
MFW-PMPS	0.000E+00		pass
MSV	0.000E+00		pass
NX	0.000E+00		pass
P1	0.000E+00		pass
P2	0.000E+00		pass
P3	0.000E+00		pass
PC1	0.000E+00		pass
PC2	0.000E+00		pass
PCS	0.000E+00		pass
PPR	0.000E+00		pass
RPS	0.000E+00		pass
RRS	0.000E+00		pass
SD1	0.000E+00		pass
SDC	0.000E+00		pass
SEALS	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
SLC	1.084E-002		pass	1.084E-02	pass	16	pass
SPC	2.063E-003		pass	2.063E-03	pass	46	pass
SRV	1.813E-001		pass	1.813E-01	pass	3	pass
TAF	2.500E-002		pass	2.500E-02	pass	1	pass
VA	1.154E-002		pass	1.154E-02	pass	8	pass
VA1	2.143E-002		pass	2.143E-02	pass	9	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
SLC	0.000E+00		pass
SPC	0.000E+00		pass
SRV	0.000E+00		pass
TAF	0.000E+00		pass
VA	0.000E+00		pass
VA1	0.000E+00		pass

Scenario: Solve Fault Trees completed at 9:19:56 PM

DRES-02 Scenario: Core Damage Frequency Test started at 9:19:56 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-15) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	06	1.272E-15	pass	1.272E-15	pass	8	pass
LOOP	09	9.281E-16	pass	9.281E-16	pass	8	pass
LOOP	10	4.378E-13	pass	4.378E-13	pass	246	pass
LOOP	15	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	18	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	19	1.677E-14	pass	1.677E-14	pass	59	pass
LOOP	24	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	27	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	28	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	29	1.330E-12	pass	1.330E-12	pass	36	pass
LOOP	30	3.349E-11	pass	3.349E-11	pass	81	pass
LOOP	31-03	2.005E-11	pass	2.005E-11	pass	29	pass
LOOP	31-06	4.164E-14	pass	4.164E-14	pass	10	pass
LOOP	31-09	3.870E-14	pass	3.870E-14	pass	19	pass
LOOP	31-10	3.309E-11	pass	3.309E-11	pass	184	pass
LOOP	31-14	6.121E-16	pass	6.121E-16	pass	1	pass
LOOP	31-17	6.121E-16	pass	6.121E-16	pass	2	pass
LOOP	31-18	1.175E-12	pass	1.175E-12	pass	207	pass
LOOP	31-22	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	31-25	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	06	0.000E+00	pass
LOOP	09	0.000E+00	pass
LOOP	10	0.000E+00	pass
LOOP	15	0.000E+00	pass
LOOP	18	0.000E+00	pass
LOOP	19	0.000E+00	pass
LOOP	24	0.000E+00	pass
LOOP	27	0.000E+00	pass
LOOP	28	0.000E+00	pass
LOOP	29	0.000E+00	pass
LOOP	30	0.000E+00	pass
LOOP	31-03	0.000E+00	pass
LOOP	31-06	0.000E+00	pass
LOOP	31-09	0.000E+00	pass
LOOP	31-10	0.000E+00	pass
LOOP	31-14	0.000E+00	pass
LOOP	31-17	0.000E+00	pass
LOOP	31-18	0.000E+00	pass
LOOP	31-22	0.000E+00	pass
LOOP	31-25	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	31-26	8.403E-16	pass	8.403E-16	pass	4	pass
LOOP	31-27	3.727E-11	pass	3.727E-11	pass	71	pass
LOOP	31-28	7.926E-10	pass	7.926E-10	pass	21	pass
LOOP	32-04	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	32-07	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	32-08	2.334E-13	pass	2.334E-13	pass	59	pass
LOOP	32-12	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	32-15	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	32-16	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	31-26	0.000E+00	pass
LOOP	31-27	0.000E+00	pass
LOOP	31-28	0.000E+00	pass
LOOP	32-04	0.000E+00	pass
LOOP	32-07	0.000E+00	pass
LOOP	32-08	0.000E+00	pass
LOOP	32-12	0.000E+00	pass
LOOP	32-15	0.000E+00	pass
LOOP	32-16	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	32-17	7.109E-12	pass	7.109E-12	pass	15	pass
LOOP	32-21	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	32-24	0.000E+00	pass	0.000E+00	pass	0.	pass
LOOP	32-25	3.969E-15	pass	3.969E-15	pass	6	pass
LOOP	32-29	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	32-32	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	32-33	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	32-34	2.677E-13	pass	2.677E-13	pass	7	pass
LOOP	32-35	5.450E-12	pass	5.450E-12	pass	11	pass
LOOP	33-04	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	33-07	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	33-08	3.417E-14	pass	3.417E-14	pass	22	pass
LOOP	33-12	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	33-15	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	33-16	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	33-17	1.205E-12	pass	1.205E-12	pass	6	pass
LOOP	34-02	3.604E-09	pass	3.604E-09	pass	9	pass
LOOP	34-04	0.000E+00	pass	0.000E+00	pass	1	pass
LOOP	34-06	0.000E+00	pass	0.000E+00	pass	1	pass
LOOP	34-08	0.000E+00	pass	0.000E+00	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	32-17	0.000E+00	pass
LOOP	32-21	0.000E+00	pass
LOOP	32-24	0.000E+00	pass
LOOP	32-25	0.000E+00	pass
LOOP	32-29	0.000E+00	pass
LOOP	32-32	0.000E+00	pass
LOOP	32-33	0.000E+00	pass
LOOP	32-34	0.000E+00	pass
LOOP	32-35	0.000E+00	pass
LOOP	33-04	0.000E+00	pass
LOOP	33-07	0.000E+00	pass
LOOP	33-08	0.000E+00	pass
LOOP	33-12	0.000E+00	pass
LOOP	33-15	0.000E+00	pass
LOOP	33-16	0.000E+00	pass
LOOP	33-17	0.000E+00	pass
LOOP	34-02	0.000E+00	pass
LOOP	34-04	0.000E+00	pass
LOOP	34-06	0.000E+00	pass
LOOP	34-08	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	34-10	0.000E+00	pass	0.000E+00	pass	1	pass
LOOP	34-12	2.821E-11	pass	2.821E-11	pass	26	pass
LOOP	34-14	4.687E-14	pass	4.687E-14	pass	19	pass
LOOP	34-16	2.524E-13	pass	2.524E-13	pass	18	pass
LOOP	34-18	1.675E-11	pass	1.675E-11	pass	82	pass
LOOP	34-20	7.923E-10	pass	7.923E-10	pass	7	pass
LOOP	34-22	4.425E-12	pass	4.425E-12	pass	6	pass
LOOP	34-23	1.852E-12	pass	1.852E-12	pass	48	pass
LOOP	34-24	2.601E-10	pass	2.601E-10	pass	7	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	34-10	0.000E+00	pass
LOOP	34-12	0.000E+00	pass
LOOP	34-14	0.000E+00	pass
LOOP	34-16	0.000E+00	pass
LOOP	34-18	0.000E+00	pass
LOOP	34-20	0.000E+00	pass
LOOP	34-22	0.000E+00	pass
LOOP	34-23	0.000E+00	pass
LOOP	34-24	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	34-25	4.402E-11	pass	4.402E-11	pass	7	pass
LOOP	35	5.440E-11	pass	5.440E-11	pass	2	pass
SLOCA	06	3.209E-13	pass	3.209E-13	pass	55	pass
SLOCA	08	1.836E-10	pass	1.836E-10	pass	42	pass
SLOCA	10	7.903E-14	pass	7.903E-14	pass	16	pass
SLOCA	12	5.094E-14	pass	5.094E-14	pass	49	pass
SLOCA	13	2.887E-14	pass	2.887E-14	pass	40	pass
SLOCA	17	1.042E-15	pass	1.042E-15	pass	4	pass
SLOCA	20	1.164E-15	pass	1.164E-15	pass	3	pass
SLOCA	22	5.325E-16	pass	5.325E-16	pass	4	pass
SLOCA	23	3.328E-16	pass	3.328E-16	pass	2	pass
SLOCA	26	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	28	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	29	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	30	2.250E-13	pass	2.250E-13	pass	21	pass
SLOCA	31	5.019E-12	pass	5.019E-12	pass	46	pass
SLOCA	32	5.610E-12	pass	5.610E-12	pass	1	pass
TRAN	07	4.083E-16	pass	4.083E-16	pass	117	pass
TRAN	12	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	15	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	34-25	0.000E+00	pass
LOOP	35	0.000E+00	pass
SLOCA	06	0.000E+00	pass
SLOCA	08	0.000E+00	pass
SLOCA	10	0.000E+00	pass
SLOCA	12	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	17	0.000E+00	pass
SLOCA	20	0.000E+00	pass
SLOCA	22	0.000E+00	pass
SLOCA	23	0.000E+00	pass
SLOCA	26	0.000E+00	pass
SLOCA	28	0.000E+00	pass
SLOCA	29	0.000E+00	pass
SLOCA	30	0.000E+00	pass
SLOCA	31	0.000E+00	pass
SLOCA	32	0.000E+00	pass
TRAN	07	0.000E+00	pass
TRAN	12	0.000E+00	pass
TRAN	15	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	16	1.920E-16	pass	1.920E-16	pass	109	pass
TRAN	21	8.371E-19	pass	8.371E-19	pass	2	pass
TRAN	26	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	29	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	30	1.159E-18	pass	1.159E-18	pass	2	pass
TRAN	35	0.000E+00	pass	0.000E+00	pass	0	pass

TRAN	38	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	39	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	40	5.750E-13	pass	5.750E-13	pass	95	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	16	0.000E+00	pass
TRAN	21	0.000E+00	pass
TRAN	26	0.000E+00	pass
TRAN	29	0.000E+00	pass
TRAN	30	0.000E+00	pass
TRAN	35	0.000E+00	pass
TRAN	38	0.000E+00	pass
TRAN	39	0.000E+00	pass
TRAN	40	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	41	1.474E-11	pass	1.474E-11	pass	271	pass
TRAN	42-04	1.452E-11	pass	1.452E-11	pass	220	pass
TRAN	42-07	9.760E-13	pass	9.760E-13	pass	50	pass
TRAN	42-10	1.840E-16	pass	1.840E-16	pass	1	pass
TRAN	42-13	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	42-14	4.021E-12	pass	4.021E-12	pass	312	pass
TRAN	42-18	6.462E-14	pass	6.462E-14	pass	59	pass
TRAN	42-22	5.137E-16	pass	5.137E-16	pass	1	pass
TRAN	42-25	2.568E-16	pass	2.568E-16	pass	2	pass
TRAN	42-26	1.135E-13	pass	1.135E-13	pass	122	pass
TRAN	42-30	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	42-33	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	42-34	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	42-35	1.612E-11	pass	1.612E-11	pass	78	pass
TRAN	42-36	3.548E-10	pass	3.548E-10	pass	113	pass
TRAN	43-04	9.646E-14	pass	9.646E-14	pass	48	pass
TRAN	43-08	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-11	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-12	2.496E-14	pass	2.496E-14	pass	44	pass
TRAN	43-16	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	41	0.000E+00	pass
TRAN	42-04	0.000E+00	pass
TRAN	42-07	0.000E+00	pass
TRAN	42-10	0.000E+00	pass
TRAN	42-13	0.000E+00	pass
TRAN	42-14	0.000E+00	pass
TRAN	42-18	0.000E+00	pass
TRAN	42-22	0.000E+00	pass
TRAN	42-25	0.000E+00	pass
TRAN	42-26	0.000E+00	pass
TRAN	42-30	0.000E+00	pass
TRAN	42-33	0.000E+00	pass
TRAN	42-34	0.000E+00	pass
TRAN	42-35	0.000E+00	pass
TRAN	42-36	0.000E+00	pass
TRAN	43-04	0.000E+00	pass
TRAN	43-08	0.000E+00	pass
TRAN	43-11	0.000E+00	pass
TRAN	43-12	0.000E+00	pass
TRAN	43-16	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	43-19	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-20	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-21	2.380E-12	pass	2.380E-12	pass	18	pass
TRAN	43-25	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-28	0.000E+00	pass	0.000E+00	pass	0	pass

TRAN	43-29	4.441E-16	pass	4.441E-16	pass	4	pass
TRAN	43-33	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-36	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-37	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	43-19	0.000E+00	pass
TRAN	43-20	0.000E+00	pass
TRAN	43-21	0.000E+00	pass
TRAN	43-25	0.000E+00	pass
TRAN	43-28	0.000E+00	pass
TRAN	43-29	0.000E+00	pass
TRAN	43-33	0.000E+00	pass
TRAN	43-36	0.000E+00	pass
TRAN	43-37	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	43-38	1.161E-13	pass	1.161E-13	pass	23	pass
TRAN	43-39	2.389E-12	pass	2.389E-12	pass	45	pass
TRAN	44-04	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	44-07	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	44-08	1.892E-14	pass	1.892E-14	pass	18	pass
TRAN	44-12	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	44-15	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	44-16	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	44-17	2.644E-12	pass	2.644E-12	pass	15	pass
TRAN	45-02	2.465E-11	pass	2.465E-11	pass	2	pass
TRAN	45-03	2.465E-11	pass	2.465E-11	pass	2	pass
TRAN	45-04-05	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-04-08	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-04-09	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-04-10	2.465E-13	pass	2.465E-13	pass	1	pass
TRAN	45-04-15	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-04-18	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-04-19	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-04-20	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-04-21	9.860E-15	pass	9.860E-15	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	43-38	0.000E+00	pass
TRAN	43-39	0.000E+00	pass
TRAN	44-04	0.000E+00	pass
TRAN	44-07	0.000E+00	pass
TRAN	44-08	0.000E+00	pass
TRAN	44-12	0.000E+00	pass
TRAN	44-15	0.000E+00	pass
TRAN	44-16	0.000E+00	pass
TRAN	44-17	0.000E+00	pass
TRAN	45-02	0.000E+00	pass
TRAN	45-03	0.000E+00	pass
TRAN	45-04-05	0.000E+00	pass
TRAN	45-04-08	0.000E+00	pass
TRAN	45-04-09	0.000E+00	pass
TRAN	45-04-10	0.000E+00	pass
TRAN	45-04-15	0.000E+00	pass
TRAN	45-04-18	0.000E+00	pass
TRAN	45-04-19	0.000E+00	pass
TRAN	45-04-20	0.000E+00	pass
TRAN	45-04-21	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	45-04-22	8.839E-14	pass	8.839E-14	pass	2	pass

TRAN	45-05	2.465E-13	pass	2.465E-13	pass	1	pass
TRAN	45-07	1.070E-11	pass	1.070E-11	pass	9	pass
TRAN	45-08-05	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-08-08	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-08-09	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-08-10	3.292E-12	pass	3.292E-12	pass	12	pass
TRAN	45-08-15	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-08-18	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	45-04-22	0.000E+00	pass
TRAN	45-05	0.000E+00	pass
TRAN	45-07	0.000E+00	pass
TRAN	45-08-05	0.000E+00	pass
TRAN	45-08-08	0.000E+00	pass
TRAN	45-08-09	0.000E+00	pass
TRAN	45-08-10	0.000E+00	pass
TRAN	45-08-15	0.000E+00	pass
TRAN	45-08-18	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	45-08-19	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-08-20	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-08-21	4.645E-14	pass	4.645E-14	pass	10	pass
TRAN	45-08-22	1.180E-12	pass	1.180E-12	pass	21	pass
TRAN	45-09	3.292E-12	pass	3.292E-12	pass	12	pass
TRAN	45-10	3.292E-12	pass	3.292E-12	pass	12	pass
TRAN	45-11	1.419E-12	pass	1.419E-12	pass	29	pass
TRAN	45-12	1.085E-13	pass	1.085E-13	pass	1	pass
TRAN	45-13	9.899E-13	pass	9.899E-13	pass	4	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	45-08-19	0.000E+00	pass
TRAN	45-08-20	0.000E+00	pass
TRAN	45-08-21	0.000E+00	pass
TRAN	45-08-22	0.000E+00	pass
TRAN	45-09	0.000E+00	pass
TRAN	45-10	0.000E+00	pass
TRAN	45-11	0.000E+00	pass
TRAN	45-12	0.000E+00	pass
TRAN	45-13	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 9:23:31 PM

TEST CASE COMPLETE: at 9:23:32 PM

TEST CASE : GEM Condition Assessments (COND_DRES)
DATE & TIME: 8/30/99 9:23:34 PM

TEST FOR: GEM Version 6.63

Project dres_2qa is open

DRES-03 Scenario: Condition HPCI out of service for 72 hours started at 9:23:40 PM
Assessment HPCI-72HRS created
Assessment processed
Sequences: 89 of 00089 pass
Total CCDP: 2.0E-006 2.0E-006 pass
Total CDP: 4.6E-007 4.6E-007 pass
Total Importance: 1.5E-006 1.5E-006 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	06	+0.0E+000	9.2E-014	-9.2E-014	pass
2	LOOP	09	+0.0E+000	6.7E-014	-6.7E-014	pass
3	LOOP	10	+0.0E+000	3.2E-011	-3.2E-011	pass
4	LOOP	15	3.2E-014	+0.0E+000	3.2E-014	pass
5	LOOP	18	2.4E-014	+0.0E+000	2.4E-014	pass
6	LOOP	19	3.1E-011	1.2E-012	3.0E-011	pass
7	LOOP	28	3.7E-014	+0.0E+000	3.7E-014	pass
8	LOOP	29	1.8E-009	9.6E-011	1.7E-009	pass
9	LOOP	30	4.7E-008	2.4E-009	4.5E-008	pass
10	LOOP	31-03	+0.0E+000	1.4E-009	-1.4E-009	pass
11	LOOP	31-06	+0.0E+000	3.0E-012	-3.0E-012	pass
12	LOOP	31-09	+0.0E+000	2.8E-012	-2.8E-012	pass
13	LOOP	31-10	+0.0E+000	2.4E-009	-2.4E-009	pass
14	LOOP	31-14	2.1E-012	4.4E-014	2.1E-012	pass
15	LOOP	31-17	2.0E-012	4.4E-014	1.9E-012	pass
16	LOOP	31-18	1.7E-009	8.5E-011	1.6E-009	pass
17	LOOP	31-26	2.2E-012	6.1E-014	2.1E-012	pass
18	LOOP	31-27	5.0E-008	2.7E-009	4.8E-008	pass
19	LOOP	31-28	1.1E-006	5.7E-008	1.1E-006	pass
20	LOOP	32-08	+0.0E+000	1.7E-011	-1.7E-011	pass
21	LOOP	32-17	+0.0E+000	5.1E-010	-5.1E-010	pass
22	LOOP	32-25	1.2E-011	2.9E-013	1.2E-011	pass
23	LOOP	32-34	3.6E-010	1.9E-011	3.4E-010	pass
24	LOOP	32-35	7.6E-009	3.9E-010	7.2E-009	pass
25	LOOP	33-08	2.5E-012	2.5E-012	+0.0E+000	pass
26	LOOP	33-17	8.7E-011	8.7E-011	+0.0E+000	pass
27	LOOP	34-02	2.6E-007	2.6E-007	+0.0E+000	pass
28	LOOP	34-12	+0.0E+000	2.0E-009	-2.0E-009	pass
29	LOOP	34-14	+0.0E+000	3.4E-012	-3.4E-012	pass
30	LOOP	34-16	+0.0E+000	1.8E-011	-1.8E-011	pass
31	LOOP	34-18	2.4E-008	1.2E-009	2.2E-008	pass
32	LOOP	34-20	+0.0E+000	5.7E-008	-5.7E-008	pass
33	LOOP	34-22	+0.0E+000	3.2E-010	-3.2E-010	pass
34	LOOP	34-23	2.6E-009	1.3E-010	2.5E-009	pass
35	LOOP	34-24	1.9E-008	1.9E-008	+0.0E+000	pass
36	LOOP	34-25	3.2E-009	3.2E-009	+0.0E+000	pass
37	LOOP	35	3.9E-009	3.9E-009	+0.0E+000	pass
38	SLOCA	06	2.3E-011	2.3E-011	+0.0E+000	pass
39	SLOCA	08	+0.0E+000	1.3E-008	-1.3E-008	pass
40	SLOCA	10	+0.0E+000	5.7E-012	-5.7E-012	pass
41	SLOCA	12	+0.0E+000	3.7E-012	-3.7E-012	pass
42	SLOCA	13	+0.0E+000	2.1E-012	-2.1E-012	pass
43	SLOCA	17	7.5E-014	7.5E-014	+0.0E+000	pass
44	SLOCA	20	2.4E-012	8.4E-014	2.3E-012	pass
45	SLOCA	22	1.5E-012	3.8E-014	1.5E-012	pass
46	SLOCA	23	1.3E-012	2.4E-014	1.3E-012	pass
47	SLOCA	30	1.3E-010	1.6E-011	1.2E-010	pass
48	SLOCA	31	3.0E-009	3.6E-010	2.6E-009	pass
49	SLOCA	32	4.0E-010	4.0E-010	+0.0E+000	pass
50	TRAN	07	2.9E-014	2.9E-014	+0.0E+000	pass

51	TRAN	16	+0.0E+000	1.4E-014	-1.4E-014	pass
52	TRAN	21	1.0E-015	6.0E-017	9.8E-016	pass
53	TRAN	30	8.2E-015	8.3E-017	8.1E-015	pass
54	TRAN	40	5.9E-010	4.1E-011	5.5E-010	pass
55	TRAN	41	1.6E-008	1.1E-009	1.5E-008	pass
56	TRAN	42-04	1.1E-009	1.1E-009	+0.0E+000	pass
57	TRAN	42-07	+0.0E+000	7.0E-011	-7.0E-011	pass
58	TRAN	42-10	+0.0E+000	1.3E-014	-1.3E-014	pass
59	TRAN	42-14	+0.0E+000	2.9E-010	-2.9E-010	pass
60	TRAN	42-18	2.6E-011	4.7E-012	2.2E-011	pass
61	TRAN	42-22	4.6E-014	3.7E-014	9.1E-015	pass
62	TRAN	42-25	1.9E-014	1.9E-014	+0.0E+000	pass
63	TRAN	42-26	1.7E-010	8.2E-012	1.7E-010	pass
64	TRAN	42-34	3.5E-014	+0.0E+000	3.5E-014	pass
65	TRAN	42-35	1.7E-008	1.2E-009	1.5E-008	pass
66	TRAN	42-36	3.7E-007	2.6E-008	3.5E-007	pass
67	TRAN	43-04	7.0E-012	7.0E-012	+0.0E+000	pass
68	TRAN	43-12	+0.0E+000	1.8E-012	-1.8E-012	pass
69	TRAN	43-21	+0.0E+000	1.7E-010	-1.7E-010	pass
70	TRAN	43-29	1.2E-012	3.2E-014	1.2E-012	pass
71	TRAN	43-38	1.2E-010	8.4E-012	1.1E-010	pass
72	TRAN	43-39	2.5E-009	1.7E-010	2.4E-009	pass
73	TRAN	44-08	1.4E-012	1.4E-012	+0.0E+000	pass
74	TRAN	44-17	1.9E-010	1.9E-010	+0.0E+000	pass
75	TRAN	45-02	1.8E-009	1.8E-009	+0.0E+000	pass
76	TRAN	45-03	1.8E-009	1.8E-009	+0.0E+000	pass
77	TRAN	45-04-10	1.8E-011	1.8E-011	+0.0E+000	pass
78	TRAN	45-04-21	7.1E-013	7.1E-013	+0.0E+000	pass
79	TRAN	45-04-22	6.4E-012	6.4E-012	+0.0E+000	pass
80	TRAN	45-05	1.8E-011	1.8E-011	+0.0E+000	pass
81	TRAN	45-07	7.7E-010	7.7E-010	+0.0E+000	pass
82	TRAN	45-08-10	2.4E-010	2.4E-010	+0.0E+000	pass
83	TRAN	45-08-21	3.3E-012	3.3E-012	+0.0E+000	pass
84	TRAN	45-08-22	8.5E-011	8.5E-011	+0.0E+000	pass
85	TRAN	45-09	2.4E-010	2.4E-010	+0.0E+000	pass
86	TRAN	45-10	2.4E-010	2.4E-010	+0.0E+000	pass
87	TRAN	45-11	1.0E-010	1.0E-010	+0.0E+000	pass
88	TRAN	45-12	7.8E-012	7.8E-012	+0.0E+000	pass
89	TRAN	45-13	7.1E-011	7.1E-011	+0.0E+000	pass

Scenario: Condition HPCI out of service for 72 hours completed at 9:24:23 PM

DRES-04 Scenario: Condition EDG out of service for 3 months started at 9:24:23 PM
Assessment EDG-2190HRS created
Assessment processed
Sequences: 88 of 00088 pass
Total CCDP: 7.3E-005 7.3E-005 pass
Total CDP: 1.4E-005 1.4E-005 pass
Total Importance: 5.9E-005 5.9E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	06	5.5E-012	2.8E-012	2.7E-012	pass
2	LOOP	09	4.1E-012	2.0E-012	2.0E-012	pass
3	LOOP	10	1.2E-008	9.6E-010	1.1E-008	pass
4	LOOP	19	6.0E-010	3.7E-011	5.7E-010	pass
5	LOOP	28	6.3E-013	+0.0E+000	6.3E-013	pass
6	LOOP	29	3.1E-009	2.9E-009	1.9E-010	pass
7	LOOP	30	7.3E-008	7.3E-008	+0.0E+000	pass
8	LOOP	31-03	5.8E-008	4.4E-008	1.4E-008	pass
9	LOOP	31-06	1.4E-010	9.1E-011	4.8E-011	pass
10	LOOP	31-09	1.3E-010	8.5E-011	4.7E-011	pass
11	LOOP	31-10	6.7E-007	7.3E-008	6.0E-007	pass
12	LOOP	31-14	4.1E-012	1.3E-012	2.8E-012	pass
13	LOOP	31-17	2.7E-012	1.3E-012	1.3E-012	pass
14	LOOP	31-18	2.4E-008	2.6E-009	2.2E-008	pass
15	LOOP	31-26	4.2E-011	1.8E-012	4.0E-011	pass
16	LOOP	31-27	8.7E-008	8.2E-008	5.4E-009	pass
17	LOOP	31-28	1.7E-006	1.7E-006	+0.0E+000	pass
18	LOOP	32-08	4.9E-009	5.1E-010	4.3E-009	pass
19	LOOP	32-16	7.1E-012	+0.0E+000	7.1E-012	pass
20	LOOP	32-17	1.7E-008	1.6E-008	1.1E-009	pass
21	LOOP	32-25	1.6E-010	8.7E-012	1.6E-010	pass
22	LOOP	32-34	6.2E-010	5.9E-010	3.5E-011	pass
23	LOOP	32-35	1.2E-008	1.2E-008	+0.0E+000	pass
24	LOOP	33-08	8.1E-010	7.5E-011	7.4E-010	pass
25	LOOP	33-16	1.1E-012	+0.0E+000	1.1E-012	pass
26	LOOP	33-17	2.8E-009	2.6E-009	1.8E-010	pass
27	LOOP	34-02	5.2E-005	7.9E-006	4.4E-005	pass
28	LOOP	34-12	4.1E-007	6.2E-008	3.4E-007	pass
29	LOOP	34-14	6.5E-010	1.0E-010	5.5E-010	pass
30	LOOP	34-16	3.6E-009	5.5E-010	3.1E-009	pass
31	LOOP	34-18	2.4E-007	3.7E-008	2.0E-007	pass
32	LOOP	34-20	1.1E-005	1.7E-006	9.7E-006	pass
33	LOOP	34-22	6.4E-008	9.7E-009	5.4E-008	pass
34	LOOP	34-23	2.7E-008	4.1E-009	2.3E-008	pass
35	LOOP	34-24	3.7E-006	5.7E-007	3.2E-006	pass
36	LOOP	34-25	6.3E-007	9.6E-008	5.4E-007	pass
37	LOOP	35	1.2E-007	1.2E-007	+0.0E+000	pass
38	SLOCA	06	7.0E-010	7.0E-010	+0.0E+000	pass
39	SLOCA	08	4.0E-007	4.0E-007	+0.0E+000	pass
40	SLOCA	10	1.7E-010	1.7E-010	+0.0E+000	pass
41	SLOCA	12	1.1E-010	1.1E-010	+0.0E+000	pass
42	SLOCA	13	6.3E-011	6.3E-011	+0.0E+000	pass
43	SLOCA	17	2.3E-012	2.3E-012	+0.0E+000	pass
44	SLOCA	20	2.6E-012	2.6E-012	+0.0E+000	pass
45	SLOCA	22	1.2E-012	1.2E-012	+0.0E+000	pass
46	SLOCA	23	7.3E-013	7.3E-013	+0.0E+000	pass
47	SLOCA	30	4.9E-010	4.9E-010	+0.0E+000	pass
48	SLOCA	31	1.1E-008	1.1E-008	+0.0E+000	pass
49	SLOCA	32	1.2E-008	1.2E-008	+0.0E+000	pass
50	TRAN	07	8.9E-013	8.9E-013	+0.0E+000	pass
51	TRAN	16	4.2E-013	4.2E-013	+0.0E+000	pass
52	TRAN	21	1.8E-015	1.8E-015	+0.0E+000	pass
53	TRAN	30	2.5E-015	2.5E-015	+0.0E+000	pass
54	TRAN	40	1.3E-009	1.3E-009	+0.0E+000	pass
55	TRAN	41	3.2E-008	3.2E-008	+0.0E+000	pass
56	TRAN	42-04	3.2E-008	3.2E-008	+0.0E+000	pass
57	TRAN	42-07	2.1E-009	2.1E-009	+0.0E+000	pass
58	TRAN	42-10	4.0E-013	4.0E-013	+0.0E+000	pass

59	TRAN	42-14	8.8E-009	8.8E-009	+0.0E+000	pass
60	TRAN	42-18	1.4E-010	1.4E-010	+0.0E+000	pass
61	TRAN	42-22	1.1E-012	1.1E-012	+0.0E+000	pass
62	TRAN	42-25	5.6E-013	5.6E-013	+0.0E+000	pass
63	TRAN	42-26	2.5E-010	2.5E-010	+0.0E+000	pass
64	TRAN	42-35	3.5E-008	3.5E-008	+0.0E+000	pass
65	TRAN	42-36	7.8E-007	7.8E-007	+0.0E+000	pass
66	TRAN	43-04	2.1E-010	2.1E-010	+0.0E+000	pass
67	TRAN	43-12	5.5E-011	5.5E-011	+0.0E+000	pass
68	TRAN	43-21	5.2E-009	5.2E-009	+0.0E+000	pass
69	TRAN	43-29	9.7E-013	9.7E-013	+0.0E+000	pass
70	TRAN	43-38	2.5E-010	2.5E-010	+0.0E+000	pass
71	TRAN	43-39	5.2E-009	5.2E-009	+0.0E+000	pass
72	TRAN	44-08	4.1E-011	4.1E-011	+0.0E+000	pass
73	TRAN	44-17	5.8E-009	5.8E-009	+0.0E+000	pass
74	TRAN	45-02	5.4E-008	5.4E-008	+0.0E+000	pass
75	TRAN	45-03	5.4E-008	5.4E-008	+0.0E+000	pass
76	TRAN	45-04-10	5.4E-010	5.4E-010	+0.0E+000	pass
77	TRAN	45-04-21	2.2E-011	2.2E-011	+0.0E+000	pass
78	TRAN	45-04-22	1.9E-010	1.9E-010	+0.0E+000	pass
79	TRAN	45-05	5.4E-010	5.4E-010	+0.0E+000	pass
80	TRAN	45-07	2.3E-008	2.3E-008	+0.0E+000	pass
81	TRAN	45-08-10	7.2E-009	7.2E-009	+0.0E+000	pass
82	TRAN	45-08-21	1.0E-010	1.0E-010	+0.0E+000	pass
83	TRAN	45-08-22	2.6E-009	2.6E-009	+0.0E+000	pass
84	TRAN	45-09	7.2E-009	7.2E-009	+0.0E+000	pass
85	TRAN	45-10	7.2E-009	7.2E-009	+0.0E+000	pass
86	TRAN	45-11	3.1E-009	3.1E-009	+0.0E+000	pass
87	TRAN	45-12	2.4E-010	2.4E-010	+0.0E+000	pass
88	TRAN	45-13	2.2E-009	2.2E-009	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 9:25:14 PM

TEST CASE COMPLETE: at 9:25:14 PM

TEST CASE : GEM Initiating Events (IE_DRES)
DATE & TIME: 8/30/99 9:25:15 PM

TEST FOR: GEM Version 6.63

Project dres_2qa is open

DRES-05 Scenario: Transient - No other failures started at 9:25:20 PM
Assessment TRANS created
Initiating event IE-TRAN selected
Assessment processed
Sequences: 39 of 00039 pass
Total CCDP: 1.7E-006 1.7E-006 pass

#	Tree	Sequence	CCDP	Status
1	TRAN	07	1.6E-012	pass
2	TRAN	16	7.7E-013	pass
3	TRAN	21	8.8E-015	pass
4	TRAN	30	1.9E-014	pass
5	TRAN	40	2.0E-009	pass
6	TRAN	41	5.1E-008	pass
7	TRAN	42-04	5.0E-008	pass
8	TRAN	42-07	3.4E-009	pass
9	TRAN	42-10	1.6E-012	pass
10	TRAN	42-14	1.4E-008	pass
11	TRAN	42-18	2.4E-010	pass
12	TRAN	42-22	2.2E-012	pass
13	TRAN	42-25	1.4E-012	pass
14	TRAN	42-26	4.3E-010	pass
15	TRAN	42-35	5.6E-008	pass
16	TRAN	42-36	1.2E-006	pass
17	TRAN	43-04	3.6E-010	pass
18	TRAN	43-12	9.9E-011	pass
19	TRAN	43-21	8.2E-009	pass
20	TRAN	43-29	4.7E-012	pass
21	TRAN	43-38	4.0E-010	pass
22	TRAN	43-39	8.3E-009	pass
23	TRAN	44-08	1.1E-010	pass
24	TRAN	44-17	9.1E-009	pass
25	TRAN	45-02	8.5E-008	pass
26	TRAN	45-03	8.5E-008	pass
27	TRAN	45-04-10	8.5E-010	pass
28	TRAN	45-04-21	3.4E-011	pass
29	TRAN	45-04-22	3.1E-010	pass
30	TRAN	45-05	8.5E-010	pass
31	TRAN	45-07	3.7E-008	pass
32	TRAN	45-08-10	1.1E-008	pass
33	TRAN	45-08-21	1.6E-010	pass
34	TRAN	45-08-22	4.1E-009	pass
35	TRAN	45-09	1.1E-008	pass
36	TRAN	45-10	1.1E-008	pass
37	TRAN	45-11	4.9E-009	pass
38	TRAN	45-12	3.7E-010	pass
39	TRAN	45-13	3.4E-009	pass

Scenario: Transient - No other failures completed at 9:26:42 PM

DRES-06 Scenario: Small LOCA - No other failures started at 9:26:42 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 12 of 00012 pass
Total CCDP: 5.9E-005 5.9E-005 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	06	1.0E-007	pass
2	SLOCA	08	5.6E-005	pass
3	SLOCA	10	2.4E-008	pass
4	SLOCA	12	1.6E-008	pass
5	SLOCA	13	9.8E-009	pass
6	SLOCA	17	4.9E-010	pass
7	SLOCA	20	5.4E-010	pass
8	SLOCA	22	3.6E-010	pass
9	SLOCA	23	3.3E-010	pass
10	SLOCA	30	6.8E-008	pass
11	SLOCA	31	1.5E-006	pass
12	SLOCA	32	1.7E-006	pass

Scenario: Small LOCA - No other failures completed at 9:27:28 PM

DRES-07 Scenario: Grid-related LOOP - no other failures started at 9:27:28 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 56 of 00056 pass
Total CCDP: 9.9E-005 9.9E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	06	1.2E-010	pass
2	LOOP	09	1.2E-010	pass
3	LOOP	10	1.0E-008	pass
4	LOOP	15	2.4E-012	pass
5	LOOP	18	2.4E-012	pass
6	LOOP	19	5.1E-010	pass
7	LOOP	24	6.3E-015	pass
8	LOOP	27	2.8E-015	pass
9	LOOP	28	8.2E-013	pass
10	LOOP	29	8.3E-008	pass
11	LOOP	30	2.1E-006	pass
12	LOOP	31-03	1.2E-006	pass
13	LOOP	31-06	2.6E-009	pass
14	LOOP	31-09	2.5E-009	pass
15	LOOP	31-10	1.1E-006	pass
16	LOOP	31-14	1.0E-010	pass
17	LOOP	31-17	9.8E-011	pass
18	LOOP	31-18	3.9E-008	pass
19	LOOP	31-22	3.5E-013	pass
20	LOOP	31-25	1.7E-013	pass
21	LOOP	31-26	3.6E-011	pass
22	LOOP	31-27	2.3E-006	pass
23	LOOP	31-28	5.0E-005	pass
24	LOOP	32-04	1.9E-011	pass
25	LOOP	32-07	1.8E-011	pass
26	LOOP	32-08	7.8E-009	pass
27	LOOP	32-12	6.8E-014	pass
28	LOOP	32-15	3.2E-014	pass
29	LOOP	32-16	7.4E-012	pass
30	LOOP	32-17	4.5E-007	pass
31	LOOP	32-21	3.1E-012	pass
32	LOOP	32-24	6.9E-013	pass
33	LOOP	32-25	2.8E-010	pass
34	LOOP	32-29	1.7E-015	pass
35	LOOP	32-32	5.6E-016	pass
36	LOOP	32-33	2.5E-013	pass
37	LOOP	32-34	1.7E-008	pass
38	LOOP	32-35	3.4E-007	pass
39	LOOP	33-04	3.2E-012	pass
40	LOOP	33-07	3.1E-012	pass
41	LOOP	33-08	1.3E-009	pass
42	LOOP	33-12	1.1E-014	pass
43	LOOP	33-15	4.6E-015	pass
44	LOOP	33-16	1.3E-012	pass
45	LOOP	33-17	7.5E-008	pass
46	LOOP	34-02	1.5E-005	pass
47	LOOP	34-12	1.2E-007	pass
48	LOOP	34-14	2.0E-010	pass
49	LOOP	34-16	1.0E-009	pass
50	LOOP	34-18	1.2E-006	pass
51	LOOP	34-20	3.3E-006	pass
52	LOOP	34-22	2.8E-007	pass
53	LOOP	34-23	1.1E-007	pass
54	LOOP	34-24	1.6E-005	pass
55	LOOP	34-25	2.6E-006	pass
56	LOOP	35	3.4E-006	pass

Scenario: Grid-related LOOP - no other failures completed at 9:29:05 PM

DRES-08 Scenario: Plant-centered LOOP - no other failures started at 9:29:05 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 56 of 00056 pass
Total CCDP: 8.4E-005 8.4E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	06	1.2E-010	pass
2	LOOP	09	1.1E-010	pass
3	LOOP	10	9.8E-009	pass
4	LOOP	15	2.3E-012	pass
5	LOOP	18	2.3E-012	pass
6	LOOP	19	5.0E-010	pass
7	LOOP	24	6.3E-015	pass
8	LOOP	27	2.8E-015	pass
9	LOOP	28	8.0E-013	pass
10	LOOP	29	8.3E-008	pass
11	LOOP	30	2.1E-006	pass
12	LOOP	31-03	1.2E-006	pass
13	LOOP	31-06	2.5E-009	pass
14	LOOP	31-09	2.5E-009	pass
15	LOOP	31-10	1.1E-006	pass
16	LOOP	31-14	1.0E-010	pass
17	LOOP	31-17	9.6E-011	pass
18	LOOP	31-18	3.9E-008	pass
19	LOOP	31-22	3.4E-013	pass
20	LOOP	31-25	1.6E-013	pass
21	LOOP	31-26	3.5E-011	pass
22	LOOP	31-27	2.3E-006	pass
23	LOOP	31-28	5.0E-005	pass
24	LOOP	32-04	1.8E-011	pass
25	LOOP	32-07	1.8E-011	pass
26	LOOP	32-08	7.7E-009	pass
27	LOOP	32-12	6.6E-014	pass
28	LOOP	32-15	3.1E-014	pass
29	LOOP	32-16	7.3E-012	pass
30	LOOP	32-17	4.4E-007	pass
31	LOOP	32-21	3.0E-012	pass
32	LOOP	32-24	6.7E-013	pass
33	LOOP	32-25	2.8E-010	pass
34	LOOP	32-29	1.7E-015	pass
35	LOOP	32-32	5.6E-016	pass
36	LOOP	32-33	2.4E-013	pass
37	LOOP	32-34	1.7E-008	pass
38	LOOP	32-35	3.4E-007	pass
39	LOOP	33-04	3.1E-012	pass
40	LOOP	33-07	3.0E-012	pass
41	LOOP	33-08	1.3E-009	pass
42	LOOP	33-12	1.0E-014	pass
43	LOOP	33-15	4.3E-015	pass
44	LOOP	33-16	1.2E-012	pass
45	LOOP	33-17	7.5E-008	pass
46	LOOP	34-02	3.7E-006	pass
47	LOOP	34-12	2.9E-008	pass
48	LOOP	34-14	4.8E-011	pass
49	LOOP	34-16	2.6E-010	pass
50	LOOP	34-18	7.6E-007	pass
51	LOOP	34-20	8.1E-007	pass
52	LOOP	34-22	1.1E-007	pass
53	LOOP	34-23	1.1E-007	pass
54	LOOP	34-24	1.5E-005	pass
55	LOOP	34-25	2.6E-006	pass
56	LOOP	35	3.4E-006	pass

Scenario: Plant-centered LOOP - no other failures completed at 9:30:43 PM

DRES-09 Scenario: Severe Weather LOOP - no other failures started at 9:30:43 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 56 of 00056 pass
Total CCDP: 5.2E-003 5.2E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	06	2.2E-010	pass
2	LOOP	09	2.1E-010	pass
3	LOOP	10	2.3E-007	pass
4	LOOP	15	4.4E-012	pass
5	LOOP	18	4.3E-012	pass
6	LOOP	19	1.2E-008	pass
7	LOOP	24	1.4E-014	pass
8	LOOP	27	5.6E-015	pass
9	LOOP	28	2.2E-011	pass
10	LOOP	29	8.4E-008	pass
11	LOOP	30	2.1E-006	pass
12	LOOP	31-03	2.0E-006	pass
13	LOOP	31-06	4.7E-009	pass
14	LOOP	31-09	4.6E-009	pass
15	LOOP	31-10	1.3E-005	pass
16	LOOP	31-14	1.8E-010	pass
17	LOOP	31-17	1.7E-010	pass
18	LOOP	31-18	4.8E-007	pass
19	LOOP	31-22	6.3E-013	pass
20	LOOP	31-25	3.1E-013	pass
21	LOOP	31-26	8.7E-010	pass
22	LOOP	31-27	2.3E-006	pass
23	LOOP	31-28	5.0E-005	pass
24	LOOP	32-04	3.4E-011	pass
25	LOOP	32-07	3.3E-011	pass
26	LOOP	32-08	9.6E-008	pass
27	LOOP	32-12	1.3E-013	pass
28	LOOP	32-15	6.0E-014	pass
29	LOOP	32-16	1.8E-010	pass
30	LOOP	32-17	4.5E-007	pass
31	LOOP	32-21	5.4E-012	pass
32	LOOP	32-24	1.2E-012	pass
33	LOOP	32-25	3.5E-009	pass
34	LOOP	32-29	3.3E-015	pass
35	LOOP	32-32	1.3E-015	pass
36	LOOP	32-33	6.3E-012	pass
37	LOOP	32-34	1.7E-008	pass
38	LOOP	32-35	3.4E-007	pass
39	LOOP	33-04	5.7E-012	pass
40	LOOP	33-07	5.6E-012	pass
41	LOOP	33-08	1.6E-008	pass
42	LOOP	33-12	2.0E-014	pass
43	LOOP	33-15	9.3E-015	pass
44	LOOP	33-16	3.0E-011	pass
45	LOOP	33-17	7.6E-008	pass
46	LOOP	34-02	4.1E-003	pass
47	LOOP	34-12	3.2E-005	pass
48	LOOP	34-14	5.4E-008	pass
49	LOOP	34-16	2.9E-007	pass
50	LOOP	34-18	4.2E-006	pass
51	LOOP	34-20	9.1E-004	pass
52	LOOP	34-22	3.4E-006	pass
53	LOOP	34-23	2.0E-007	pass
54	LOOP	34-24	2.8E-005	pass
55	LOOP	34-25	4.8E-006	pass
56	LOOP	35	3.4E-006	pass

Scenario: Severe Weather LOOP - no other failures completed at 9:32:34 PM

DRES-10 Scenario: Extreme Severe Weather LOOP - no other failures started at 9:32:34 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 56 of 00056 pass
Total CCDP: 1.4E-002 1.4E-002 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	06	2.7E-010	pass
2	LOOP	09	2.7E-010	pass
3	LOOP	10	1.2E-006	pass
4	LOOP	15	5.5E-012	pass
5	LOOP	18	5.4E-012	pass
6	LOOP	19	6.3E-008	pass
7	LOOP	24	1.8E-014	pass
8	LOOP	27	7.9E-015	pass
9	LOOP	28	1.2E-010	pass
10	LOOP	29	8.4E-008	pass
11	LOOP	30	2.1E-006	pass
12	LOOP	31-03	2.5E-006	pass
13	LOOP	31-06	5.9E-009	pass
14	LOOP	31-09	5.8E-009	pass
15	LOOP	31-10	6.9E-005	pass
16	LOOP	31-14	2.2E-010	pass
17	LOOP	31-17	2.2E-010	pass
18	LOOP	31-18	2.5E-006	pass
19	LOOP	31-22	8.0E-013	pass
20	LOOP	31-25	3.9E-013	pass
21	LOOP	31-26	4.7E-009	pass
22	LOOP	31-27	2.3E-006	pass
23	LOOP	31-28	5.0E-005	pass
24	LOOP	32-04	4.2E-011	pass
25	LOOP	32-07	4.2E-011	pass
26	LOOP	32-08	5.0E-007	pass
27	LOOP	32-12	1.6E-013	pass
28	LOOP	32-15	7.7E-014	pass
29	LOOP	32-16	9.7E-010	pass
30	LOOP	32-17	4.5E-007	pass
31	LOOP	32-21	6.7E-012	pass
32	LOOP	32-24	1.6E-012	pass
33	LOOP	32-25	1.8E-008	pass
34	LOOP	32-29	4.2E-015	pass
35	LOOP	32-32	1.7E-015	pass
36	LOOP	32-33	3.4E-011	pass
37	LOOP	32-34	1.7E-008	pass
38	LOOP	32-35	3.4E-007	pass
39	LOOP	33-04	7.2E-012	pass
40	LOOP	33-07	7.0E-012	pass
41	LOOP	33-08	8.5E-008	pass
42	LOOP	33-12	2.5E-014	pass
43	LOOP	33-15	1.2E-014	pass
44	LOOP	33-16	1.6E-010	pass
45	LOOP	33-17	7.6E-008	pass
46	LOOP	34-02	1.2E-002	pass
47	LOOP	34-12	9.0E-005	pass
48	LOOP	34-14	1.5E-007	pass
49	LOOP	34-16	8.1E-007	pass
50	LOOP	34-18	6.0E-006	pass
51	LOOP	34-20	2.5E-003	pass
52	LOOP	34-22	5.9E-006	pass
53	LOOP	34-23	2.6E-007	pass
54	LOOP	34-24	3.7E-005	pass
55	LOOP	34-25	6.2E-006	pass
56	LOOP	35	3.4E-006	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 9:34:28 PM

DRES-11 Scenario: Transient - HPCI failed started at 9:34:28 PM
Assessment TRAN-HPCI created
Initiating event IE-TRAN selected
Assessment processed
Sequences: 39 of 00039 pass
Total CCDP: 2.0E-005 2.0E-005 pass

#	Tree	Sequence	CCDP	Status
1	TRAN	07	1.6E-012	pass
2	TRAN	21	6.2E-014	pass
3	TRAN	30	4.4E-013	pass
4	TRAN	40	2.8E-008	pass
5	TRAN	41	7.4E-007	pass
6	TRAN	42-04	5.0E-008	pass
7	TRAN	42-18	1.3E-009	pass
8	TRAN	42-22	3.1E-012	pass
9	TRAN	42-25	2.0E-012	pass
10	TRAN	42-26	8.3E-009	pass
11	TRAN	42-30	8.9E-016	pass
12	TRAN	42-33	1.1E-016	pass
13	TRAN	42-34	3.2E-012	pass
14	TRAN	42-35	7.9E-007	pass
15	TRAN	42-36	1.8E-005	pass
16	TRAN	43-04	3.6E-010	pass
17	TRAN	43-25	2.2E-014	pass
18	TRAN	43-28	1.3E-014	pass
19	TRAN	43-29	6.9E-011	pass
20	TRAN	43-37	2.2E-014	pass
21	TRAN	43-38	5.7E-009	pass
22	TRAN	43-39	1.2E-007	pass
23	TRAN	44-08	1.1E-010	pass
24	TRAN	44-17	9.1E-009	pass
25	TRAN	45-02	8.5E-008	pass
26	TRAN	45-03	8.5E-008	pass
27	TRAN	45-04-10	8.5E-010	pass
28	TRAN	45-04-21	3.4E-011	pass
29	TRAN	45-04-22	3.1E-010	pass
30	TRAN	45-05	8.5E-010	pass
31	TRAN	45-07	3.7E-008	pass
32	TRAN	45-08-10	1.1E-008	pass
33	TRAN	45-08-21	1.6E-010	pass
34	TRAN	45-08-22	4.1E-009	pass
35	TRAN	45-09	1.1E-008	pass
36	TRAN	45-10	1.1E-008	pass
37	TRAN	45-11	4.9E-009	pass
38	TRAN	45-12	3.7E-010	pass
39	TRAN	45-13	3.4E-009	pass

Scenario: Transient - HPCI failed completed at 9:35:48 PM

TEST CASE COMPLETE: at 9:35:48 PM

TEST CASE : SAPHIRE QA Models (CDF_GGUL)
DATE & TIME: 8/30/99 9:35:53 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: ggul_2qa

GGUL-01 Scenario: Solve Fault Trees started at 9:36:30 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-15)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status Failure	Base	Status	Count	Status
AC-4HR	2.400E-002	pass	2.400E-02	pass	1	pass
AC-BD	2.400E-002	pass	2.400E-02	pass	1	pass
AC-CU	4.900E-001	pass	4.900E-01	pass	1	pass
B1	9.000E-005	pass	9.000E-05	pass	1	pass
CD1	4.054E-003	pass	4.054E-03	pass	10	pass
CDS	3.792E-002	pass	3.792E-02	pass	11	pass
CR1	9.325E-005	pass	9.325E-05	pass	8	pass
CRD	1.787E-002	pass	1.787E-02	pass	11	pass
CS1	1.630E-002	pass	1.630E-02	pass	8	pass
CSS	2.583E-003	pass	2.583E-03	pass	45	pass
CVS	1.413E-002	pass	1.413E-02	pass	7	pass
DE1	1.129E-002	pass	1.129E-02	pass	9	pass
DE2	1.019E-002	pass	1.019E-02	pass	3	pass
DE3	8.648E-002	pass	8.648E-02	pass	9	pass
DEP	1.515E-002	pass	1.515E-02	pass	30	pass
DGA	4.127E-002	pass	4.127E-02	pass	2	pass
DGB	4.127E-002	pass	4.127E-02	pass	2	pass
DGC	3.800E-002	pass	3.800E-02	pass	1	pass
DGX	3.400E-001	pass	3.400E-01	pass	1	pass
DIV-1-AC	9.000E-005	pass	9.000E-05	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status Failure
AC-4HR	0.000E+00	pass
AC-BD	0.000E+00	pass
AC-CU	0.000E+00	pass
B1	0.000E+00	pass
CD1	0.000E+00	pass
CDS	0.000E+00	pass
CR1	0.000E+00	pass
CRD	0.000E+00	pass
CS1	0.000E+00	pass
CSS	0.000E+00	pass
CVS	0.000E+00	pass
DE1	0.000E+00	pass
DE2	0.000E+00	pass
DE3	0.000E+00	pass
DEP	0.000E+00	pass
DGA	0.000E+00	pass
DGB	0.000E+00	pass
DGC	0.000E+00	pass
DGX	0.000E+00	pass
DIV-1-AC	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status Failure	Base	Status	Count	Status
DIV-2-AC	9.000E-005	pass	9.000E-05	pass	1	pass
DIV-3-AC	9.000E-005	pass	9.000E-05	pass	1	pass
DIV1AC8H	9.000E-005	pass	9.000E-05	pass	1	pass
DIV2AC8H	9.000E-005	pass	9.000E-05	pass	1	pass
EPS	4.846E-003	pass	4.846E-03	pass	5	pass
FW1	1.070E-002	pass	1.070E-02	pass	7	pass

FW2	2.059E-002		pass	2.059E-02	pass	8	pass
FW3	1.446E-002		pass	1.446E-02	pass	5	pass
FW4	2.432E-002		pass	2.432E-02	pass	6	pass
FWS	1.070E-002		pass	1.070E-02	pass	7	pass
HCS	1.720E-002		pass	1.720E-02	pass	6	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
DIV-2-AC	0.000E+00		pass
DIV-3-AC	0.000E+00		pass
DIV1AC8H	0.000E+00		pass
DIV2AC8H	0.000E+00		pass
EPS	0.000E+00		pass
FW1	0.000E+00		pass
FW2	0.000E+00		pass
FW3	0.000E+00		pass
FW4	0.000E+00		pass
FWS	0.000E+00		pass
HCS	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
LCI	1.277E-003		pass	1.277E-03	pass	113	pass
LCI-3	1.382E-002		pass	1.382E-02	pass	9	pass
LCI-4	1.035E-002		pass	1.035E-02	pass	9	pass
LCI1	1.415E-002		pass	1.415E-02	pass	7	pass
LCI2	1.192E-003		pass	1.192E-03	pass	149	pass
LCI2-3	1.076E-002		pass	1.076E-02	pass	10	pass
LCI2-4	1.035E-002		pass	1.035E-02	pass	9	pass
LCS	1.110E-002		pass	1.110E-02	pass	5	pass
LVL	2.500E-002		pass	2.500E-02	pass	1	pass
MSV	1.000E-002		pass	1.000E-02	pass	1	pass
NX	2.500E-002		pass	2.500E-02	pass	1	pass
P1	1.300E-001		pass	1.300E-01	pass	1	pass
P2	1.300E-003		pass	1.300E-03	pass	1	pass
P3	2.200E-004		pass	2.200E-04	pass	1	pass
PC1	1.025E-002		pass	1.025E-02	pass	15	pass
PC2	3.646E-001		pass	3.646E-01	pass	19	pass
PCS	3.666E-001		pass	3.666E-01	pass	19	pass
PPR	2.000E-004		pass	2.000E-04	pass	1	pass
RCI	5.226E-002		pass	5.226E-02	pass	6	pass
RPS	1.000E-005		pass	1.000E-05	pass	4	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
LCI	0.000E+00		pass
LCI-3	0.000E+00		pass
LCI-4	0.000E+00		pass
LCI1	0.000E+00		pass
LCI2	0.000E+00		pass
LCI2-3	0.000E+00		pass
LCI2-4	0.000E+00		pass
LCS	0.000E+00		pass
LVL	0.000E+00		pass
MSV	0.000E+00		pass
NX	0.000E+00		pass
P1	0.000E+00		pass
P2	0.000E+00		pass
P3	0.000E+00		pass
PC1	0.000E+00		pass
PC2	0.000E+00		pass
PCS	0.000E+00		pass
PPR	0.000E+00		pass
RCI	0.000E+00		pass
RPS	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
RRS	9.998E-004	pass		9.998E-04	pass	2	pass
S2-NR	5.000E-001	pass		5.000E-01	pass	1	pass
SD1	1.881E-002	pass		1.881E-02	pass	95	pass
SD2	2.511E-002	pass		2.511E-02	pass	14	pass
SDC	8.902E-003	pass		8.902E-03	pass	94	pass
SLC	1.125E-002	pass		1.125E-02	pass	21	pass
SP1	1.334E-002	pass		1.334E-02	pass	8	pass
SP2	1.334E-002	pass		1.334E-02	pass	8	pass
SPC	1.596E-003	pass		1.596E-03	pass	45	pass
SPM	0.000E+000	pass		0.000E+00	pass	1	pass
SRV	1.313E-001	pass		1.313E-01	pass	3	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
RRS	0.000E+00	pass	
S2-NR	0.000E+00	pass	
SD1	0.000E+00	pass	
SD2	0.000E+00	pass	
SDC	0.000E+00	pass	
SLC	0.000E+00	pass	
SP1	0.000E+00	pass	
SP2	0.000E+00	pass	
SPC	0.000E+00	pass	
SPM	0.000E+00	pass	
SRV	0.000E+00	pass	

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
SS1	2.293E-002	pass		2.293E-02	pass	4	pass
SSW	1.405E-002	pass		1.405E-02	pass	4	pass
TAF	2.500E-002	pass		2.500E-02	pass	1	pass
VA	1.405E-002	pass		1.405E-02	pass	4	pass
VA1	2.472E-004	pass		2.472E-04	pass	28	pass
VA2	1.025E-002	pass		1.025E-02	pass	29	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
SS1	0.000E+00	pass	
SSW	0.000E+00	pass	
TAF	0.000E+00	pass	
VA	0.000E+00	pass	
VA1	0.000E+00	pass	
VA2	0.000E+00	pass	

Scenario: Solve Fault Trees completed at 9:38:03 PM

GGUL-02 Scenario: Core Damage Frequency Test started at 9:38:03 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-15) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	05	7.742E-10	pass	7.742E-10	pass	219	pass
LOOP	10	7.591E-15	pass	7.591E-15	pass	3	pass
LOOP	13	2.633E-14	pass	2.633E-14	pass	7	pass
LOOP	14	2.933E-11	pass	2.933E-11	pass	318	pass
LOOP	19	9.072E-13	pass	9.072E-13	pass	152	pass
LOOP	24	1.727E-13	pass	1.727E-13	pass	76	pass
LOOP	29	1.242E-14	pass	1.242E-14	pass	18	pass
LOOP	30	9.287E-12	pass	9.287E-12	pass	40	pass
LOOP	34	1.627E-15	pass	1.627E-15	pass	2	pass
LOOP	35	2.703E-11	pass	2.703E-11	pass	128	pass
LOOP	36-04	1.162E-10	pass	1.162E-10	pass	199	pass
LOOP	36-07	3.056E-14	pass	3.056E-14	pass	9	pass
LOOP	36-10	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	36-13	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	36-14	4.354E-12	pass	4.354E-12	pass	190	pass
LOOP	36-18	1.145E-13	pass	1.145E-13	pass	51	pass
LOOP	36-22	2.243E-14	pass	2.243E-14	pass	24	pass
LOOP	36-26	1.178E-14	pass	1.178E-14	pass	6	pass
LOOP	36-27	1.389E-12	pass	1.389E-12	pass	26	pass
LOOP	36-28	3.121E-11	pass	3.121E-11	pass	22	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	05	0.000E+00	pass
LOOP	10	0.000E+00	pass
LOOP	13	0.000E+00	pass
LOOP	14	0.000E+00	pass
LOOP	19	0.000E+00	pass
LOOP	24	0.000E+00	pass
LOOP	29	0.000E+00	pass
LOOP	30	0.000E+00	pass
LOOP	34	0.000E+00	pass
LOOP	35	0.000E+00	pass
LOOP	36-04	0.000E+00	pass
LOOP	36-07	0.000E+00	pass
LOOP	36-10	0.000E+00	pass
LOOP	36-13	0.000E+00	pass
LOOP	36-14	0.000E+00	pass
LOOP	36-18	0.000E+00	pass
LOOP	36-22	0.000E+00	pass
LOOP	36-26	0.000E+00	pass
LOOP	36-27	0.000E+00	pass
LOOP	36-28	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	37-04	1.137E-12	pass	1.137E-12	pass	75	pass
LOOP	37-08	1.621E-14	pass	1.621E-14	pass	9	pass
LOOP	37-12	3.502E-15	pass	3.502E-15	pass	5	pass
LOOP	37-16	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	37-17	2.765E-13	pass	2.765E-13	pass	7	pass
LOOP	37-18	5.852E-12	pass	5.852E-12	pass	9	pass
LOOP	38-04	1.724E-13	pass	1.724E-13	pass	36	pass
LOOP	38-08	7.258E-16	pass	7.258E-16	pass	1	pass
LOOP	38-12	2.489E-16	pass	2.489E-16	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	37-04	0.000E+00	pass
LOOP	37-08	0.000E+00	pass
LOOP	37-12	0.000E+00	pass
LOOP	37-16	0.000E+00	pass
LOOP	37-17	0.000E+00	pass
LOOP	37-18	0.000E+00	pass
LOOP	38-04	0.000E+00	pass
LOOP	38-08	0.000E+00	pass
LOOP	38-12	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	38-13	4.832E-14	pass	4.832E-14	pass	4	pass
LOOP	39-04	2.370E-13	pass	2.370E-13	pass	27	pass
LOOP	39-07	2.523E-15	pass	2.523E-15	pass	4	pass
LOOP	39-08	9.236E-13	pass	9.236E-13	pass	28	pass
LOOP	39-09	6.569E-13	pass	6.569E-13	pass	17	pass
LOOP	39-11	6.208E-12	pass	6.208E-12	pass	6	pass
LOOP	39-13	1.508E-13	pass	1.508E-13	pass	10	pass
LOOP	39-15	6.681E-14	pass	6.681E-14	pass	4	pass
LOOP	39-17	1.012E-11	pass	1.012E-11	pass	18	pass
LOOP	39-21	8.197E-15	pass	8.197E-15	pass	6	pass
LOOP	39-23	1.855E-14	pass	1.855E-14	pass	10	pass
LOOP	39-26	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	39-27	1.364E-13	pass	1.364E-13	pass	18	pass
LOOP	39-28	1.013E-13	pass	1.013E-13	pass	8	pass
LOOP	39-30	9.277E-13	pass	9.277E-13	pass	4	pass
LOOP	39-32	1.268E-14	pass	1.268E-14	pass	5	pass
LOOP	39-33	3.092E-12	pass	3.092E-12	pass	18	pass
LOOP	39-35	1.209E-12	pass	1.209E-12	pass	8	pass
LOOP	39-37	2.039E-13	pass	2.039E-13	pass	5	pass
LOOP	39-39	6.163E-11	pass	6.163E-11	pass	6	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	38-13	0.000E+00	pass
LOOP	39-04	0.000E+00	pass
LOOP	39-07	0.000E+00	pass
LOOP	39-08	0.000E+00	pass
LOOP	39-09	0.000E+00	pass
LOOP	39-11	0.000E+00	pass
LOOP	39-13	0.000E+00	pass
LOOP	39-15	0.000E+00	pass
LOOP	39-17	0.000E+00	pass
LOOP	39-21	0.000E+00	pass
LOOP	39-23	0.000E+00	pass
LOOP	39-26	0.000E+00	pass
LOOP	39-27	0.000E+00	pass
LOOP	39-28	0.000E+00	pass
LOOP	39-30	0.000E+00	pass
LOOP	39-32	0.000E+00	pass
LOOP	39-33	0.000E+00	pass
LOOP	39-35	0.000E+00	pass
LOOP	39-37	0.000E+00	pass
LOOP	39-39	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	39-41	1.506E-12	pass	1.506E-12	pass	12	pass
LOOP	39-43	6.634E-13	pass	6.634E-13	pass	5	pass
LOOP	39-45	4.609E-11	pass	4.609E-11	pass	16	pass
LOOP	39-47	9.224E-12	pass	9.224E-12	pass	6	pass
LOOP	39-49	1.332E-13	pass	1.332E-13	pass	8	pass
LOOP	39-50	1.408E-11	pass	1.408E-11	pass	14	pass
LOOP	39-51	3.843E-12	pass	3.843E-12	pass	6	pass
LOOP	39-52	6.490E-13	pass	6.490E-13	pass	3	pass
LOOP	40	5.440E-11	pass	5.440E-11	pass	2	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	39-41	0.000E+00	pass
LOOP	39-43	0.000E+00	pass
LOOP	39-45	0.000E+00	pass
LOOP	39-47	0.000E+00	pass
LOOP	39-49	0.000E+00	pass
LOOP	39-50	0.000E+00	pass
LOOP	39-51	0.000E+00	pass
LOOP	39-52	0.000E+00	pass
LOOP	40	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SLOCA	06	2.355E-13	pass	2.355E-13	pass	66	pass
SLOCA	08	3.747E-14	pass	3.747E-14	pass	12	pass
SLOCA	10	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	12	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	13	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	17	9.398E-15	pass	9.398E-15	pass	6	pass
SLOCA	21	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	25	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	29	8.864E-16	pass	8.864E-16	pass	4	pass
SLOCA	30	3.986E-13	pass	3.986E-13	pass	31	pass
SLOCA	31	7.318E-12	pass	7.318E-12	pass	37	pass
SLOCA	32	5.610E-12	pass	5.610E-12	pass	1	pass
TRAN	06	1.271E-11	pass	1.271E-11	pass	899	pass
TRAN	11	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	14	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	15	1.410E-13	pass	1.410E-13	pass	479	pass
TRAN	20	2.159E-14	pass	2.159E-14	pass	180	pass
TRAN	25	1.059E-15	pass	1.059E-15	pass	63	pass
TRAN	30	1.884E-17	pass	1.884E-17	pass	5	pass
TRAN	35	5.058E-18	pass	5.058E-18	pass	3	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	06	0.000E+00	pass
SLOCA	08	0.000E+00	pass
SLOCA	10	0.000E+00	pass
SLOCA	12	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	17	0.000E+00	pass
SLOCA	21	0.000E+00	pass
SLOCA	25	0.000E+00	pass
SLOCA	29	0.000E+00	pass
SLOCA	30	0.000E+00	pass
SLOCA	31	0.000E+00	pass
SLOCA	32	0.000E+00	pass
TRAN	06	0.000E+00	pass
TRAN	11	0.000E+00	pass
TRAN	14	0.000E+00	pass
TRAN	15	0.000E+00	pass
TRAN	20	0.000E+00	pass
TRAN	25	0.000E+00	pass
TRAN	30	0.000E+00	pass
TRAN	35	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	36	6.724E-11	pass	6.724E-11	pass	61	pass
TRAN	40	1.512E-14	pass	1.512E-14	pass	34	pass
TRAN	41	5.317E-11	pass	5.317E-11	pass	201	pass
TRAN	42-05	3.332E-10	pass	3.332E-10	pass	780	pass
TRAN	42-08	2.199E-15	pass	2.199E-15	pass	2	pass
TRAN	42-11	0.000E+00	pass	0.000E+00	pass	0	pass

TRAN	42-14	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	42-15	3.686E-12	pass	3.686E-12	pass	229	pass
TRAN	42-19	7.470E-13	pass	7.470E-13	pass	97	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	36	0.000E+00	pass
TRAN	40	0.000E+00	pass
TRAN	41	0.000E+00	pass
TRAN	42-05	0.000E+00	pass
TRAN	42-08	0.000E+00	pass
TRAN	42-11	0.000E+00	pass
TRAN	42-14	0.000E+00	pass
TRAN	42-15	0.000E+00	pass
TRAN	42-19	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	42-23	1.594E-14	pass	1.594E-14	pass	11	pass
TRAN	42-27	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	42-31	7.869E-15	pass	7.869E-15	pass	5	pass
TRAN	42-32	1.006E-11	pass	1.006E-11	pass	33	pass
TRAN	42-33	2.339E-10	pass	2.339E-10	pass	91	pass
TRAN	43-04	8.451E-12	pass	8.451E-12	pass	83	pass
TRAN	43-08	9.563E-14	pass	9.563E-14	pass	28	pass
TRAN	43-12	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-16	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-20	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	43-21	1.827E-12	pass	1.827E-12	pass	5	pass
TRAN	43-22	3.878E-11	pass	3.878E-11	pass	10	pass
TRAN	44-04	1.413E-12	pass	1.413E-12	pass	57	pass
TRAN	44-08	8.713E-15	pass	8.713E-15	pass	4	pass
TRAN	44-12	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	44-13	3.487E-13	pass	3.487E-13	pass	6	pass
TRAN	45-02	2.890E-11	pass	2.890E-11	pass	2	pass
TRAN	45-03-04	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-03-05	2.890E-13	pass	2.890E-13	pass	1	pass
TRAN	45-03-09	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	42-23	0.000E+00	pass
TRAN	42-27	0.000E+00	pass
TRAN	42-31	0.000E+00	pass
TRAN	42-32	0.000E+00	pass
TRAN	42-33	0.000E+00	pass
TRAN	43-04	0.000E+00	pass
TRAN	43-08	0.000E+00	pass
TRAN	43-12	0.000E+00	pass
TRAN	43-16	0.000E+00	pass
TRAN	43-20	0.000E+00	pass
TRAN	43-21	0.000E+00	pass
TRAN	43-22	0.000E+00	pass
TRAN	44-04	0.000E+00	pass
TRAN	44-08	0.000E+00	pass
TRAN	44-12	0.000E+00	pass
TRAN	44-13	0.000E+00	pass
TRAN	45-02	0.000E+00	pass
TRAN	45-03-04	0.000E+00	pass
TRAN	45-03-05	0.000E+00	pass
TRAN	45-03-09	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	45-03-10	3.264E-15	pass	3.264E-15	pass	1	pass
TRAN	45-03-14	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-03-15	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-03-19	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-03-20	0.000E+00	pass	0.000E+00	pass	0	pass

TRAN	45-03-21	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-03-25	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-03-26	1.836E-14	pass	1.836E-14	pass	9	pass
TRAN	45-03-27	8.323E-15	pass	8.323E-15	pass	9	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	45-03-10	0.000E+00	pass
TRAN	45-03-14	0.000E+00	pass
TRAN	45-03-15	0.000E+00	pass
TRAN	45-03-19	0.000E+00	pass
TRAN	45-03-20	0.000E+00	pass
TRAN	45-03-21	0.000E+00	pass
TRAN	45-03-25	0.000E+00	pass
TRAN	45-03-26	0.000E+00	pass
TRAN	45-03-27	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	45-04	2.890E-13	pass	2.890E-13	pass	1	pass
TRAN	45-06	1.302E-11	pass	1.302E-11	pass	12	pass
TRAN	45-07-04	3.727E-15	pass	3.727E-15	pass	4	pass
TRAN	45-07-05	1.128E-11	pass	1.128E-11	pass	10	pass
TRAN	45-07-09	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-07-10	1.491E-13	pass	1.491E-13	pass	12	pass
TRAN	45-07-14	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-07-15	3.381E-16	pass	3.381E-16	pass	1	pass
TRAN	45-07-19	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-07-20	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-07-21	1.928E-15	pass	1.928E-15	pass	4	pass
TRAN	45-07-25	0.000E+00	pass	0.000E+00	pass	0	pass
TRAN	45-07-26	7.111E-13	pass	7.111E-13	pass	54	pass
TRAN	45-07-27	3.763E-13	pass	3.763E-13	pass	72	pass
TRAN	45-08	1.131E-11	pass	1.131E-11	pass	11	pass
TRAN	45-09	1.131E-11	pass	1.131E-11	pass	11	pass
TRAN	45-10	5.094E-12	pass	5.094E-12	pass	68	pass
TRAN	45-11	1.161E-12	pass	1.161E-12	pass	4	pass
TRAN	45-12	2.312E-13	pass	2.312E-13	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	45-04	0.000E+00	pass
TRAN	45-06	0.000E+00	pass
TRAN	45-07-04	0.000E+00	pass
TRAN	45-07-05	0.000E+00	pass
TRAN	45-07-09	0.000E+00	pass
TRAN	45-07-10	0.000E+00	pass
TRAN	45-07-14	0.000E+00	pass
TRAN	45-07-15	0.000E+00	pass
TRAN	45-07-19	0.000E+00	pass
TRAN	45-07-20	0.000E+00	pass
TRAN	45-07-21	0.000E+00	pass
TRAN	45-07-25	0.000E+00	pass
TRAN	45-07-26	0.000E+00	pass
TRAN	45-07-27	0.000E+00	pass
TRAN	45-08	0.000E+00	pass
TRAN	45-09	0.000E+00	pass
TRAN	45-10	0.000E+00	pass
TRAN	45-11	0.000E+00	pass
TRAN	45-12	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 9:41:14 PM
TEST CASE COMPLETE: at 9:41:15 PM

TEST CASE : GEM Condition Assessments (COND_GGUL)
DATE & TIME: 8/30/99 9:41:17 PM

TEST FOR: GEM Version 6.63

Project ggul_2qa is open

GGUL-03 Scenario: Condition HPCI out of service for 72 hours started at 9:41:23 PM
Assessment HPCI-72HRS created
Assessment processed
Sequences: 118 of 00118 pass

Total CCDP: 8.0E-007 8.0E-007 pass
Total CDP: 1.5E-007 1.5E-007 pass
Total Importance: 6.5E-007 6.5E-007 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	+0.0E+000	5.6E-008	-5.6E-008	pass
2	LOOP	10	1.4E-011	5.5E-013	1.3E-011	pass
3	LOOP	13	4.8E-011	1.9E-012	4.6E-011	pass
4	LOOP	14	3.9E-008	2.1E-009	3.7E-008	pass
5	LOOP	19	9.3E-010	6.5E-011	8.6E-010	pass
6	LOOP	24	1.8E-010	1.2E-011	1.7E-010	pass
7	LOOP	29	6.1E-012	8.9E-013	5.2E-012	pass
8	LOOP	30	9.0E-009	6.7E-010	8.3E-009	pass
9	LOOP	34	4.3E-012	1.2E-013	4.2E-012	pass
10	LOOP	35	2.6E-008	2.0E-009	2.4E-008	pass
11	LOOP	36-04	+0.0E+000	8.4E-009	-8.4E-009	pass
12	LOOP	36-07	4.9E-011	2.2E-012	4.7E-011	pass
13	LOOP	36-10	8.6E-014	+0.0E+000	8.6E-014	pass
14	LOOP	36-13	2.8E-013	+0.0E+000	2.8E-013	pass
15	LOOP	36-14	5.9E-009	3.1E-010	5.6E-009	pass
16	LOOP	36-18	1.4E-010	8.2E-012	1.3E-010	pass
17	LOOP	36-22	2.7E-011	1.6E-012	2.5E-011	pass
18	LOOP	36-26	1.5E-012	8.5E-013	6.7E-013	pass
19	LOOP	36-27	1.3E-009	1.0E-010	1.2E-009	pass
20	LOOP	36-28	3.1E-008	2.3E-009	2.9E-008	pass
21	LOOP	37-04	+0.0E+000	8.2E-011	-8.2E-011	pass
22	LOOP	37-08	3.7E-011	1.2E-012	3.6E-011	pass
23	LOOP	37-12	7.0E-012	2.5E-013	6.7E-012	pass
24	LOOP	37-16	1.1E-013	+0.0E+000	1.1E-013	pass
25	LOOP	37-17	3.6E-010	2.0E-011	3.4E-010	pass
26	LOOP	37-18	7.6E-009	4.2E-010	7.2E-009	pass
27	LOOP	38-04	+0.0E+000	1.2E-011	-1.2E-011	pass
28	LOOP	38-08	5.7E-012	5.2E-014	5.6E-012	pass
29	LOOP	38-12	1.0E-012	1.8E-014	1.0E-012	pass
30	LOOP	38-13	6.2E-011	3.5E-012	5.9E-011	pass
31	LOOP	39-04	1.1E-009	1.7E-011	1.1E-009	pass
32	LOOP	39-07	1.1E-011	1.8E-013	1.1E-011	pass
33	LOOP	39-08	1.8E-009	6.7E-011	1.7E-009	pass
34	LOOP	39-09	1.4E-009	4.7E-011	1.3E-009	pass
35	LOOP	39-11	2.8E-008	4.5E-010	2.7E-008	pass
36	LOOP	39-13	6.8E-010	1.1E-011	6.7E-010	pass
37	LOOP	39-15	3.0E-010	4.8E-012	3.0E-010	pass
38	LOOP	39-17	2.1E-008	7.3E-010	2.0E-008	pass
39	LOOP	39-21	4.7E-011	5.9E-013	4.6E-011	pass
40	LOOP	39-23	1.0E-010	1.3E-012	1.0E-010	pass
41	LOOP	39-26	1.5E-012	+0.0E+000	1.5E-012	pass
42	LOOP	39-27	2.6E-010	9.8E-012	2.5E-010	pass
43	LOOP	39-28	2.1E-010	7.3E-012	2.0E-010	pass
44	LOOP	39-30	4.2E-009	6.7E-011	4.1E-009	pass
45	LOOP	39-32	6.0E-011	9.1E-013	5.9E-011	pass
46	LOOP	39-33	6.3E-009	2.2E-010	6.1E-009	pass
47	LOOP	39-35	5.1E-009	8.7E-011	5.0E-009	pass
48	LOOP	39-37	8.6E-010	1.5E-011	8.5E-010	pass
49	LOOP	39-39	4.4E-009	4.4E-009	+0.0E+000	pass
50	LOOP	39-41	1.1E-010	1.1E-010	+0.0E+000	pass
51	LOOP	39-43	4.8E-011	4.8E-011	+0.0E+000	pass

52	LOOP	39-45	3.3E-009	3.3E-009	+0.0E+000	pass
53	LOOP	39-47	6.6E-010	6.6E-010	+0.0E+000	pass
54	LOOP	39-49	9.6E-012	9.6E-012	+0.0E+000	pass
55	LOOP	39-50	1.0E-009	1.0E-009	+0.0E+000	pass
56	LOOP	39-51	2.8E-010	2.8E-010	+0.0E+000	pass
57	LOOP	39-52	4.7E-011	4.7E-011	+0.0E+000	pass
58	LOOP	40	3.9E-009	3.9E-009	+0.0E+000	pass
59	SLOCA	06	+0.0E+000	1.7E-011	-1.7E-011	pass
60	SLOCA	08	1.9E-010	2.7E-012	1.9E-010	pass
61	SLOCA	13	1.2E-011	+0.0E+000	1.2E-011	pass
62	SLOCA	17	6.8E-013	6.8E-013	+0.0E+000	pass
63	SLOCA	29	6.4E-014	6.4E-014	+0.0E+000	pass
64	SLOCA	30	3.8E-011	2.9E-011	9.4E-012	pass
65	SLOCA	31	7.5E-010	5.3E-010	2.2E-010	pass
66	SLOCA	32	4.0E-010	4.0E-010	+0.0E+000	pass
67	TRAN	06	+0.0E+000	9.2E-010	-9.2E-010	pass
68	TRAN	11	7.6E-016	+0.0E+000	7.6E-016	pass
69	TRAN	14	2.8E-014	+0.0E+000	2.8E-014	pass
70	TRAN	15	6.3E-010	1.0E-011	6.2E-010	pass
71	TRAN	20	2.2E-011	1.6E-012	2.0E-011	pass
72	TRAN	25	2.2E-012	7.6E-014	2.1E-012	pass
73	TRAN	30	4.9E-014	1.4E-015	4.7E-014	pass
74	TRAN	35	1.4E-015	3.6E-016	1.0E-015	pass
75	TRAN	36	7.7E-008	4.8E-009	7.2E-008	pass
76	TRAN	40	1.4E-011	1.1E-012	1.3E-011	pass
77	TRAN	41	4.4E-008	3.8E-009	4.0E-008	pass
78	TRAN	42-05	+0.0E+000	2.4E-008	-2.4E-008	pass
79	TRAN	42-08	1.7E-011	1.6E-013	1.7E-011	pass
80	TRAN	42-15	1.7E-008	2.7E-010	1.7E-008	pass
81	TRAN	42-19	5.9E-010	5.4E-011	5.4E-010	pass
82	TRAN	42-23	5.1E-011	1.2E-012	5.0E-011	pass
83	TRAN	42-27	1.1E-012	+0.0E+000	1.1E-012	pass
84	TRAN	42-31	5.7E-013	5.7E-013	+0.0E+000	pass
85	TRAN	42-32	1.2E-008	7.2E-010	1.1E-008	pass
86	TRAN	42-33	2.7E-007	1.7E-008	2.5E-007	pass
87	TRAN	43-04	+0.0E+000	6.1E-010	-6.1E-010	pass
88	TRAN	43-08	4.3E-010	6.9E-012	4.2E-010	pass
89	TRAN	43-12	1.4E-011	+0.0E+000	1.4E-011	pass
90	TRAN	43-16	2.3E-013	+0.0E+000	2.3E-013	pass
91	TRAN	43-21	7.6E-009	1.3E-010	7.5E-009	pass
92	TRAN	43-22	1.6E-007	2.8E-009	1.6E-007	pass
93	TRAN	44-04	+0.0E+000	1.0E-010	-1.0E-010	pass
94	TRAN	44-08	6.8E-011	6.3E-013	6.7E-011	pass
95	TRAN	44-12	1.4E-012	+0.0E+000	1.4E-012	pass
96	TRAN	44-13	1.3E-009	2.5E-011	1.3E-009	pass
97	TRAN	45-02	2.1E-009	2.1E-009	+0.0E+000	pass
98	TRAN	45-03-05	+0.0E+000	2.1E-011	-2.1E-011	pass
99	TRAN	45-03-10	1.5E-011	2.4E-013	1.5E-011	pass
100	TRAN	45-03-15	4.9E-014	+0.0E+000	4.9E-014	pass
101	TRAN	45-03-21	2.0E-013	+0.0E+000	2.0E-013	pass
102	TRAN	45-03-26	+0.0E+000	1.3E-012	-1.3E-012	pass
103	TRAN	45-03-27	3.8E-011	6.0E-013	3.7E-011	pass
104	TRAN	45-04	2.1E-011	2.1E-011	+0.0E+000	pass
105	TRAN	45-06	9.4E-010	9.4E-010	+0.0E+000	pass
106	TRAN	45-07-04	+0.0E+000	2.7E-013	-2.7E-013	pass
107	TRAN	45-07-05	+0.0E+000	8.1E-010	-8.1E-010	pass
108	TRAN	45-07-09	1.9E-013	+0.0E+000	1.9E-013	pass
109	TRAN	45-07-10	5.8E-010	1.1E-011	5.6E-010	pass
110	TRAN	45-07-15	1.9E-012	2.4E-014	1.9E-012	pass
111	TRAN	45-07-21	7.8E-012	1.4E-013	7.6E-012	pass
112	TRAN	45-07-26	+0.0E+000	5.1E-011	-5.1E-011	pass
113	TRAN	45-07-27	1.5E-009	2.7E-011	1.4E-009	pass
114	TRAN	45-08	8.1E-010	8.1E-010	+0.0E+000	pass
115	TRAN	45-09	8.1E-010	8.1E-010	+0.0E+000	pass
116	TRAN	45-10	3.7E-010	3.7E-010	+0.0E+000	pass
117	TRAN	45-11	8.4E-011	8.4E-011	+0.0E+000	pass

118 TRAN	45-12	1.7E-011	1.7E-011	+0.0E+000	pass

Scenario: Condition HPCI out of service for 72 hours completed at 9:42:17 PM

GGUL-04 Scenario: Condition EDG out of service for 3 months started at 9:42:17 PM
Assessment EDG-2190HRS created
Assessment processed
Sequences: 106 of 00106 pass
Total CCDP: 2.4E-005 2.4E-005 pass
Total CDP: 4.6E-006 4.6E-006 pass
Total Importance: 1.9E-005 1.9E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	1.5E-005	1.7E-006	1.4E-005	pass
2	LOOP	10	5.3E-010	1.7E-011	5.1E-010	pass
3	LOOP	13	1.8E-009	5.8E-011	1.8E-009	pass
4	LOOP	14	5.8E-007	6.4E-008	5.1E-007	pass
5	LOOP	19	+0.0E+000	2.0E-009	-2.0E-009	pass
6	LOOP	24	9.8E-009	3.8E-010	9.4E-009	pass
7	LOOP	29	8.0E-010	2.7E-011	7.7E-010	pass
8	LOOP	30	2.1E-008	2.0E-008	1.4E-010	pass
9	LOOP	34	+0.0E+000	3.6E-012	-3.6E-012	pass
10	LOOP	35	6.2E-007	5.9E-008	5.6E-007	pass
11	LOOP	36-04	2.3E-006	2.5E-007	2.0E-006	pass
12	LOOP	36-07	5.9E-010	6.7E-011	5.2E-010	pass
13	LOOP	36-14	8.6E-008	9.5E-009	7.7E-008	pass
14	LOOP	36-18	+0.0E+000	2.5E-010	-2.5E-010	pass
15	LOOP	36-22	1.5E-009	4.9E-011	1.4E-009	pass
16	LOOP	36-26	1.1E-010	2.6E-011	8.7E-011	pass
17	LOOP	36-27	3.1E-009	3.0E-009	1.8E-011	pass
18	LOOP	36-28	6.8E-008	6.8E-008	+0.0E+000	pass
19	LOOP	37-04	2.3E-008	2.5E-009	2.0E-008	pass
20	LOOP	37-08	+0.0E+000	3.6E-011	-3.6E-011	pass
21	LOOP	37-12	2.9E-010	7.7E-012	2.8E-010	pass
22	LOOP	37-16	3.9E-012	+0.0E+000	3.9E-012	pass
23	LOOP	37-17	6.2E-010	6.1E-010	1.6E-011	pass
24	LOOP	37-18	1.3E-008	1.3E-008	+0.0E+000	pass
25	LOOP	38-04	3.8E-009	3.8E-010	3.5E-009	pass
26	LOOP	38-08	+0.0E+000	1.6E-012	-1.6E-012	pass
27	LOOP	38-12	4.2E-011	5.5E-013	4.1E-011	pass
28	LOOP	38-13	1.4E-010	1.1E-010	3.7E-011	pass
29	LOOP	39-04	4.6E-009	5.2E-010	4.1E-009	pass
30	LOOP	39-07	9.6E-011	5.5E-012	9.0E-011	pass
31	LOOP	39-08	1.7E-008	2.0E-009	1.5E-008	pass
32	LOOP	39-09	1.2E-008	1.4E-009	1.1E-008	pass
33	LOOP	39-11	1.2E-007	1.4E-008	1.0E-007	pass
34	LOOP	39-13	2.8E-009	3.3E-010	2.5E-009	pass
35	LOOP	39-15	1.3E-009	1.5E-010	1.1E-009	pass
36	LOOP	39-17	1.9E-007	2.2E-008	1.7E-007	pass
37	LOOP	39-21	1.9E-010	1.8E-011	1.7E-010	pass
38	LOOP	39-23	4.3E-010	4.1E-011	3.9E-010	pass
39	LOOP	39-26	9.2E-012	+0.0E+000	9.2E-012	pass
40	LOOP	39-27	2.6E-009	3.0E-010	2.3E-009	pass
41	LOOP	39-28	1.9E-009	2.2E-010	1.7E-009	pass
42	LOOP	39-30	1.7E-008	2.0E-009	1.5E-008	pass
43	LOOP	39-32	2.5E-010	2.8E-011	2.2E-010	pass
44	LOOP	39-33	5.8E-008	6.8E-009	5.1E-008	pass
45	LOOP	39-35	2.3E-008	2.7E-009	2.0E-008	pass
46	LOOP	39-37	3.8E-009	4.5E-010	3.4E-009	pass
47	LOOP	39-39	1.2E-006	1.4E-007	1.0E-006	pass
48	LOOP	39-41	2.8E-008	3.3E-009	2.5E-008	pass
49	LOOP	39-43	1.3E-008	1.5E-009	1.1E-008	pass
50	LOOP	39-45	8.6E-007	1.0E-007	7.6E-007	pass
51	LOOP	39-47	1.7E-007	2.0E-008	1.5E-007	pass
52	LOOP	39-49	2.5E-009	2.9E-010	2.2E-009	pass
53	LOOP	39-50	2.6E-007	3.1E-008	2.3E-007	pass
54	LOOP	39-51	7.2E-008	8.4E-009	6.4E-008	pass
55	LOOP	39-52	1.2E-008	1.4E-009	1.1E-008	pass
56	LOOP	40	1.2E-007	1.2E-007	+0.0E+000	pass
57	SLOCA	06	5.2E-010	5.2E-010	+0.0E+000	pass
58	SLOCA	08	8.2E-011	8.2E-011	+0.0E+000	pass

59	SLOCA	17	2.1E-011	2.1E-011	+0.0E+000	pass
60	SLOCA	29	1.9E-012	1.9E-012	+0.0E+000	pass
61	SLOCA	30	8.7E-010	8.7E-010	+0.0E+000	pass
62	SLOCA	31	1.6E-008	1.6E-008	+0.0E+000	pass
63	SLOCA	32	1.2E-008	1.2E-008	+0.0E+000	pass
64	TRAN	06	2.8E-008	2.8E-008	+0.0E+000	pass
65	TRAN	15	3.1E-010	3.1E-010	+0.0E+000	pass
66	TRAN	20	4.7E-011	4.7E-011	+0.0E+000	pass
67	TRAN	25	2.3E-012	2.3E-012	+0.0E+000	pass
68	TRAN	30	4.1E-014	4.1E-014	+0.0E+000	pass
69	TRAN	35	1.1E-014	1.1E-014	+0.0E+000	pass
70	TRAN	36	1.5E-007	1.5E-007	+0.0E+000	pass
71	TRAN	40	3.3E-011	3.3E-011	+0.0E+000	pass
72	TRAN	41	1.2E-007	1.2E-007	+0.0E+000	pass
73	TRAN	42-05	7.3E-007	7.3E-007	+0.0E+000	pass
74	TRAN	42-08	4.8E-012	4.8E-012	+0.0E+000	pass
75	TRAN	42-15	8.1E-009	8.1E-009	+0.0E+000	pass
76	TRAN	42-19	1.6E-009	1.6E-009	+0.0E+000	pass
77	TRAN	42-23	3.5E-011	3.5E-011	+0.0E+000	pass
78	TRAN	42-31	1.7E-011	1.7E-011	+0.0E+000	pass
79	TRAN	42-32	2.2E-008	2.2E-008	+0.0E+000	pass
80	TRAN	42-33	5.1E-007	5.1E-007	+0.0E+000	pass
81	TRAN	43-04	1.9E-008	1.9E-008	+0.0E+000	pass
82	TRAN	43-08	2.1E-010	2.1E-010	+0.0E+000	pass
83	TRAN	43-21	4.0E-009	4.0E-009	+0.0E+000	pass
84	TRAN	43-22	8.5E-008	8.5E-008	+0.0E+000	pass
85	TRAN	44-04	3.1E-009	3.1E-009	+0.0E+000	pass
86	TRAN	44-08	1.9E-011	1.9E-011	+0.0E+000	pass
87	TRAN	44-13	7.6E-010	7.6E-010	+0.0E+000	pass
88	TRAN	45-02	6.3E-008	6.3E-008	+0.0E+000	pass
89	TRAN	45-03-05	6.3E-010	6.3E-010	+0.0E+000	pass
90	TRAN	45-03-10	7.2E-012	7.2E-012	+0.0E+000	pass
91	TRAN	45-03-26	4.0E-011	4.0E-011	+0.0E+000	pass
92	TRAN	45-03-27	1.8E-011	1.8E-011	+0.0E+000	pass
93	TRAN	45-04	6.3E-010	6.3E-010	+0.0E+000	pass
94	TRAN	45-06	2.9E-008	2.9E-008	+0.0E+000	pass
95	TRAN	45-07-04	8.2E-012	8.2E-012	+0.0E+000	pass
96	TRAN	45-07-05	2.5E-008	2.5E-008	+0.0E+000	pass
97	TRAN	45-07-10	3.3E-010	3.3E-010	+0.0E+000	pass
98	TRAN	45-07-15	7.4E-013	7.4E-013	+0.0E+000	pass
99	TRAN	45-07-21	4.2E-012	4.2E-012	+0.0E+000	pass
100	TRAN	45-07-26	1.6E-009	1.6E-009	+0.0E+000	pass
101	TRAN	45-07-27	8.2E-010	8.2E-010	+0.0E+000	pass
102	TRAN	45-08	2.5E-008	2.5E-008	+0.0E+000	pass
103	TRAN	45-09	2.5E-008	2.5E-008	+0.0E+000	pass
104	TRAN	45-10	1.1E-008	1.1E-008	+0.0E+000	pass
105	TRAN	45-11	2.5E-009	2.5E-009	+0.0E+000	pass
106	TRAN	45-12	5.1E-010	5.1E-010	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 9:43:11 PM

TEST CASE COMPLETE: at 9:43:11 PM

TEST CASE : GEM Initiating Events (IE_GGUL)
DATE & TIME: 8/30/99 9:43:12 PM

TEST FOR: GEM Version 6.63

Project ggul_2qa is open

GGUL-05 Scenario: Transient - No other failures started at 9:43:17 PM
Assessment TRANS created
Initiating event IE-TRAN selected
Assessment processed
Sequences: 43 of 00043 pass
Total CCDP: 2.5E-006 2.5E-006 pass

#	Tree	Sequence	CCDP	Status
1	TRAN	06	3.7E-008	pass
2	TRAN	15	4.2E-010	pass
3	TRAN	20	6.4E-011	pass
4	TRAN	25	3.7E-012	pass
5	TRAN	30	8.1E-014	pass
6	TRAN	35	3.4E-014	pass
7	TRAN	36	2.0E-007	pass
8	TRAN	40	6.0E-011	pass
9	TRAN	41	1.6E-007	pass
10	TRAN	42-05	9.8E-007	pass
11	TRAN	42-08	1.2E-011	pass
12	TRAN	42-15	1.1E-008	pass
13	TRAN	42-19	2.3E-009	pass
14	TRAN	42-23	8.9E-011	pass
15	TRAN	42-31	2.5E-011	pass
16	TRAN	42-32	3.0E-008	pass
17	TRAN	42-33	6.9E-007	pass
18	TRAN	43-04	2.5E-008	pass
19	TRAN	43-08	3.3E-010	pass
20	TRAN	43-21	5.4E-009	pass
21	TRAN	43-22	1.1E-007	pass
22	TRAN	44-04	4.2E-009	pass
23	TRAN	44-08	4.8E-011	pass
24	TRAN	44-13	1.0E-009	pass
25	TRAN	45-02	8.5E-008	pass
26	TRAN	45-03-05	8.5E-010	pass
27	TRAN	45-03-10	9.7E-012	pass
28	TRAN	45-03-26	5.4E-011	pass
29	TRAN	45-03-27	2.5E-011	pass
30	TRAN	45-04	8.5E-010	pass
31	TRAN	45-06	3.8E-008	pass
32	TRAN	45-07-04	2.5E-011	pass
33	TRAN	45-07-05	3.3E-008	pass
34	TRAN	45-07-10	4.4E-010	pass
35	TRAN	45-07-15	1.5E-012	pass
36	TRAN	45-07-21	6.0E-012	pass
37	TRAN	45-07-26	2.1E-009	pass
38	TRAN	45-07-27	1.1E-009	pass
39	TRAN	45-08	3.3E-008	pass
40	TRAN	45-09	3.3E-008	pass
41	TRAN	45-10	1.5E-008	pass
42	TRAN	45-11	3.4E-009	pass
43	TRAN	45-12	6.8E-010	pass

Scenario: Transient - No other failures completed at 9:44:49 PM

GGUL-06 Scenario: Small LOCA - No other failures started at 9:44:49 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 7 of 00007 pass
Total CCDP: 4.2E-006 4.2E-006 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	06	8.9E-008	pass
2	SLOCA	08	1.3E-008	pass
3	SLOCA	17	5.2E-009	pass
4	SLOCA	29	5.6E-010	pass
5	SLOCA	30	1.2E-007	pass
6	SLOCA	31	2.2E-006	pass
7	SLOCA	32	1.7E-006	pass

Scenario: Small LOCA - No other failures completed at 9:45:29 PM

GGUL-07 Scenario: Grid-related LOOP - no other failures started at 9:45:29 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 58 of 00058 pass
Total CCDP: 4.2E-005 4.2E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	2.5E-005	pass
2	LOOP	10	5.5E-010	pass
3	LOOP	13	1.9E-009	pass
4	LOOP	14	8.8E-007	pass
5	LOOP	19	3.5E-008	pass
6	LOOP	24	3.5E-009	pass
7	LOOP	29	4.1E-010	pass
8	LOOP	30	5.5E-007	pass
9	LOOP	34	4.3E-010	pass
10	LOOP	35	1.5E-006	pass
11	LOOP	36-04	3.8E-006	pass
12	LOOP	36-07	2.0E-009	pass
13	LOOP	36-10	6.2E-012	pass
14	LOOP	36-13	2.1E-011	pass
15	LOOP	36-14	1.3E-007	pass
16	LOOP	36-18	5.3E-009	pass
17	LOOP	36-22	5.2E-010	pass
18	LOOP	36-26	7.0E-010	pass
19	LOOP	36-27	8.2E-008	pass
20	LOOP	36-28	1.9E-006	pass
21	LOOP	37-04	3.8E-008	pass
22	LOOP	37-08	1.1E-009	pass
23	LOOP	37-12	1.1E-010	pass
24	LOOP	37-16	1.3E-011	pass
25	LOOP	37-17	1.6E-008	pass
26	LOOP	37-18	3.4E-007	pass
27	LOOP	38-04	6.4E-009	pass
28	LOOP	38-08	1.8E-010	pass
29	LOOP	38-12	1.8E-011	pass
30	LOOP	38-13	2.9E-009	pass
31	LOOP	39-04	1.4E-008	pass
32	LOOP	39-07	3.2E-010	pass
33	LOOP	39-08	5.2E-008	pass
34	LOOP	39-09	3.7E-008	pass
35	LOOP	39-11	2.2E-008	pass
36	LOOP	39-13	5.4E-010	pass
37	LOOP	39-15	2.4E-010	pass
38	LOOP	39-17	5.1E-007	pass
39	LOOP	39-21	5.9E-010	pass
40	LOOP	39-23	1.3E-009	pass
41	LOOP	39-26	4.7E-011	pass
42	LOOP	39-27	7.8E-009	pass
43	LOOP	39-28	5.8E-009	pass
44	LOOP	39-30	3.3E-009	pass
45	LOOP	39-32	4.8E-011	pass
46	LOOP	39-33	1.7E-007	pass
47	LOOP	39-35	6.8E-008	pass
48	LOOP	39-37	1.2E-008	pass
49	LOOP	39-39	2.0E-007	pass
50	LOOP	39-41	4.8E-009	pass
51	LOOP	39-43	2.1E-009	pass
52	LOOP	39-45	2.1E-006	pass
53	LOOP	39-47	2.9E-008	pass
54	LOOP	39-49	4.3E-010	pass
55	LOOP	39-50	7.1E-007	pass
56	LOOP	39-51	1.9E-007	pass
57	LOOP	39-52	3.3E-008	pass
58	LOOP	40	3.4E-006	pass

Scenario: Grid-related LOOP - no other failures completed at 9:47:15 PM

GGUL-08 Scenario: Plant-centered LOOP - no other failures started at 9:47:15 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 58 of 00058 pass
Total CCDP: 4.3E-005 4.3E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	2.5E-005	pass
2	LOOP	10	5.7E-010	pass
3	LOOP	13	2.0E-009	pass
4	LOOP	14	9.0E-007	pass
5	LOOP	19	3.6E-008	pass
6	LOOP	24	3.7E-009	pass
7	LOOP	29	4.2E-010	pass
8	LOOP	30	5.6E-007	pass
9	LOOP	34	4.3E-010	pass
10	LOOP	35	1.5E-006	pass
11	LOOP	36-04	3.8E-006	pass
12	LOOP	36-07	2.1E-009	pass
13	LOOP	36-10	6.5E-012	pass
14	LOOP	36-13	2.2E-011	pass
15	LOOP	36-14	1.4E-007	pass
16	LOOP	36-18	5.4E-009	pass
17	LOOP	36-22	5.5E-010	pass
18	LOOP	36-26	7.0E-010	pass
19	LOOP	36-27	8.3E-008	pass
20	LOOP	36-28	1.9E-006	pass
21	LOOP	37-04	3.8E-008	pass
22	LOOP	37-08	1.1E-009	pass
23	LOOP	37-12	1.1E-010	pass
24	LOOP	37-16	1.3E-011	pass
25	LOOP	37-17	1.6E-008	pass
26	LOOP	37-18	3.5E-007	pass
27	LOOP	38-04	6.4E-009	pass
28	LOOP	38-08	1.9E-010	pass
29	LOOP	38-12	1.9E-011	pass
30	LOOP	38-13	2.9E-009	pass
31	LOOP	39-04	1.4E-008	pass
32	LOOP	39-07	3.2E-010	pass
33	LOOP	39-08	5.4E-008	pass
34	LOOP	39-09	3.8E-008	pass
35	LOOP	39-11	4.4E-008	pass
36	LOOP	39-13	1.1E-009	pass
37	LOOP	39-15	4.8E-010	pass
38	LOOP	39-17	5.5E-007	pass
39	LOOP	39-21	6.1E-010	pass
40	LOOP	39-23	1.4E-009	pass
41	LOOP	39-26	4.9E-011	pass
42	LOOP	39-27	8.0E-009	pass
43	LOOP	39-28	5.9E-009	pass
44	LOOP	39-30	6.6E-009	pass
45	LOOP	39-32	9.5E-011	pass
46	LOOP	39-33	1.8E-007	pass
47	LOOP	39-35	7.0E-008	pass
48	LOOP	39-37	1.2E-008	pass
49	LOOP	39-39	4.0E-007	pass
50	LOOP	39-41	9.9E-009	pass
51	LOOP	39-43	4.3E-009	pass
52	LOOP	39-45	2.3E-006	pass
53	LOOP	39-47	6.0E-008	pass
54	LOOP	39-49	8.7E-010	pass
55	LOOP	39-50	7.5E-007	pass
56	LOOP	39-51	2.0E-007	pass
57	LOOP	39-52	3.5E-008	pass
58	LOOP	40	3.4E-006	pass

Scenario: Plant-centered LOOP - no other failures completed at 9:49:03 PM

GGUL-09 Scenario: Severe Weather LOOP - no other failures started at 9:49:03 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 58 of 00058 pass
Total CCDP: 5.3E-004 5.3E-004 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	3.0E-004	pass
2	LOOP	10	1.6E-009	pass
3	LOOP	13	5.4E-009	pass
4	LOOP	14	1.7E-005	pass
5	LOOP	19	3.9E-007	pass
6	LOOP	24	1.2E-007	pass
7	LOOP	29	8.9E-009	pass
8	LOOP	30	7.8E-007	pass
9	LOOP	34	5.4E-010	pass
10	LOOP	35	3.3E-006	pass
11	LOOP	36-04	4.5E-005	pass
12	LOOP	36-07	5.5E-009	pass
13	LOOP	36-10	1.8E-011	pass
14	LOOP	36-13	6.0E-011	pass
15	LOOP	36-14	2.5E-006	pass
16	LOOP	36-18	5.8E-008	pass
17	LOOP	36-22	1.9E-008	pass
18	LOOP	36-26	2.0E-009	pass
19	LOOP	36-27	1.2E-007	pass
20	LOOP	36-28	2.6E-006	pass
21	LOOP	37-04	4.5E-007	pass
22	LOOP	37-08	1.3E-008	pass
23	LOOP	37-12	4.1E-009	pass
24	LOOP	37-16	1.5E-010	pass
25	LOOP	37-17	2.5E-008	pass
26	LOOP	37-18	5.3E-007	pass
27	LOOP	38-04	7.6E-008	pass
28	LOOP	38-08	2.2E-009	pass
29	LOOP	38-12	7.0E-010	pass
30	LOOP	38-13	4.5E-009	pass
31	LOOP	39-04	2.7E-008	pass
32	LOOP	39-07	6.1E-010	pass
33	LOOP	39-08	1.0E-007	pass
34	LOOP	39-09	7.2E-008	pass
35	LOOP	39-11	6.5E-006	pass
36	LOOP	39-13	1.6E-007	pass
37	LOOP	39-15	7.1E-008	pass
38	LOOP	39-17	1.9E-006	pass
39	LOOP	39-21	1.2E-009	pass
40	LOOP	39-23	2.5E-009	pass
41	LOOP	39-26	9.2E-011	pass
42	LOOP	39-27	1.5E-008	pass
43	LOOP	39-28	1.1E-008	pass
44	LOOP	39-30	9.8E-007	pass
45	LOOP	39-32	1.4E-008	pass
46	LOOP	39-33	3.4E-007	pass
47	LOOP	39-35	1.3E-007	pass
48	LOOP	39-37	2.2E-008	pass
49	LOOP	39-39	1.1E-004	pass
50	LOOP	39-41	2.6E-006	pass
51	LOOP	39-43	1.1E-006	pass
52	LOOP	39-45	1.4E-005	pass
53	LOOP	39-47	1.6E-005	pass
54	LOOP	39-49	2.3E-007	pass
55	LOOP	39-50	2.5E-006	pass
56	LOOP	39-51	6.8E-007	pass
57	LOOP	39-52	1.2E-007	pass
58	LOOP	40	3.4E-006	pass

Scenario: Severe Weather LOOP - no other failures completed at 9:51:05 PM

GGUL-10 Scenario: Extreme Severe Weather LOOP - no other failures started at 9:51:05 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 58 of 00058 pass
Total CCDP: 2.5E-003 2.5E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	1.6E-003	pass
2	LOOP	10	2.3E-009	pass
3	LOOP	13	8.1E-009	pass
4	LOOP	14	1.0E-004	pass
5	LOOP	19	2.3E-006	pass
6	LOOP	24	7.8E-007	pass
7	LOOP	29	5.1E-008	pass
8	LOOP	30	9.1E-007	pass
9	LOOP	34	6.0E-010	pass
10	LOOP	35	4.7E-006	pass
11	LOOP	36-04	2.4E-004	pass
12	LOOP	36-07	8.2E-009	pass
13	LOOP	36-10	2.7E-011	pass
14	LOOP	36-13	9.1E-011	pass
15	LOOP	36-14	1.6E-005	pass
16	LOOP	36-18	3.4E-007	pass
17	LOOP	36-22	1.2E-007	pass
18	LOOP	36-26	8.3E-009	pass
19	LOOP	36-27	1.4E-007	pass
20	LOOP	36-28	3.0E-006	pass
21	LOOP	37-04	2.4E-006	pass
22	LOOP	37-08	7.9E-008	pass
23	LOOP	37-12	2.7E-008	pass
24	LOOP	37-16	9.4E-010	pass
25	LOOP	37-17	3.0E-008	pass
26	LOOP	37-18	6.3E-007	pass
27	LOOP	38-04	4.0E-007	pass
28	LOOP	38-08	1.3E-008	pass
29	LOOP	38-12	4.5E-009	pass
30	LOOP	38-13	5.4E-009	pass
31	LOOP	39-04	3.7E-008	pass
32	LOOP	39-07	8.3E-010	pass
33	LOOP	39-08	1.4E-007	pass
34	LOOP	39-09	9.8E-008	pass
35	LOOP	39-11	1.9E-005	pass
36	LOOP	39-13	4.7E-007	pass
37	LOOP	39-15	2.1E-007	pass
38	LOOP	39-17	2.8E-006	pass
39	LOOP	39-21	1.6E-009	pass
40	LOOP	39-23	3.5E-009	pass
41	LOOP	39-26	1.3E-010	pass
42	LOOP	39-27	2.1E-008	pass
43	LOOP	39-28	1.5E-008	pass
44	LOOP	39-30	2.9E-006	pass
45	LOOP	39-32	4.2E-008	pass
46	LOOP	39-33	4.6E-007	pass
47	LOOP	39-35	1.8E-007	pass
48	LOOP	39-37	3.0E-008	pass
49	LOOP	39-39	3.9E-004	pass
50	LOOP	39-41	9.6E-006	pass
51	LOOP	39-43	4.2E-006	pass
52	LOOP	39-45	2.6E-005	pass
53	LOOP	39-47	5.8E-005	pass
54	LOOP	39-49	8.5E-007	pass
55	LOOP	39-50	4.3E-006	pass
56	LOOP	39-51	1.2E-006	pass
57	LOOP	39-52	2.0E-007	pass
58	LOOP	40	3.4E-006	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 9:53:11 PM

GGUL-11 Scenario: Transient - HPCI failed started at 9:53:11 PM
Assessment TRAN-HPCI created
Initiating event IE-TRAN selected
Assessment processed
Sequences: 53 of 00053 pass
Total CCDP: 2.4E-005 2.4E-005 pass

#	Tree	Sequence	CCDP	Status
1	TRAN	11	6.9E-014	pass
2	TRAN	14	1.4E-012	pass
3	TRAN	15	2.6E-008	pass
4	TRAN	20	8.9E-010	pass
5	TRAN	25	9.1E-011	pass
6	TRAN	30	2.1E-012	pass
7	TRAN	35	9.0E-014	pass
8	TRAN	36	3.1E-006	pass
9	TRAN	40	6.3E-010	pass
10	TRAN	41	1.8E-006	pass
11	TRAN	42-08	7.6E-010	pass
12	TRAN	42-11	3.5E-013	pass
13	TRAN	42-14	7.9E-013	pass
14	TRAN	42-15	6.9E-007	pass
15	TRAN	42-19	2.4E-008	pass
16	TRAN	42-23	2.2E-009	pass
17	TRAN	42-27	5.1E-011	pass
18	TRAN	42-31	2.6E-011	pass
19	TRAN	42-32	4.7E-007	pass
20	TRAN	42-33	1.1E-005	pass
21	TRAN	43-08	1.8E-008	pass
22	TRAN	43-12	6.1E-010	pass
23	TRAN	43-16	1.4E-011	pass
24	TRAN	43-20	7.5E-013	pass
25	TRAN	43-21	3.1E-007	pass
26	TRAN	43-22	6.6E-006	pass
27	TRAN	44-08	2.8E-009	pass
28	TRAN	44-12	6.3E-011	pass
29	TRAN	44-13	5.3E-008	pass
30	TRAN	45-02	8.5E-008	pass
31	TRAN	45-03-09	4.3E-013	pass
32	TRAN	45-03-10	6.0E-010	pass
33	TRAN	45-03-14	8.9E-015	pass
34	TRAN	45-03-15	2.1E-012	pass
35	TRAN	45-03-19	2.2E-016	pass
36	TRAN	45-03-20	8.9E-016	pass
37	TRAN	45-03-21	8.1E-012	pass
38	TRAN	45-03-27	1.5E-009	pass
39	TRAN	45-04	8.5E-010	pass
40	TRAN	45-06	3.8E-008	pass
41	TRAN	45-07-09	1.7E-011	pass
42	TRAN	45-07-10	2.4E-008	pass
43	TRAN	45-07-14	3.7E-013	pass
44	TRAN	45-07-15	8.0E-011	pass
45	TRAN	45-07-19	1.6E-014	pass
46	TRAN	45-07-20	3.1E-014	pass
47	TRAN	45-07-21	3.2E-010	pass
48	TRAN	45-07-27	6.0E-008	pass
49	TRAN	45-08	3.3E-008	pass
50	TRAN	45-09	3.3E-008	pass
51	TRAN	45-10	1.5E-008	pass
52	TRAN	45-11	3.4E-009	pass
53	TRAN	45-12	6.8E-010	pass

Scenario: Transient - HPCI failed completed at 9:55:07 PM

TEST CASE COMPLETE: at 9:55:08 PM

TEST CASE : SAPHIRE QA Models (CDF_MIL3)
DATE & TIME: 8/30/99 9:55:13 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: mil3_2qa

MIL3-01 Scenario: Solve Fault Trees started at 9:55:43 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-16)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
ACP-ST	3.300E-001		pass	3.300E-01	pass	1	pass
AFW	8.314E-005		pass	8.314E-05	pass	66	pass
AFW-ATWS	3.445E-004		pass	3.445E-04	pass	54	pass
AFW-L	8.314E-005		pass	8.314E-05	pass	66	pass
AFW-SGTR	8.318E-005		pass	8.318E-05	pass	58	pass
BORATION	1.000E-002		pass	1.000E-02	pass	1	pass
COOLDOWN	1.297E-002		pass	1.297E-02	pass	2	pass
CSR	1.321E-003		pass	1.321E-03	pass	17	pass
CSR-L	1.311E-003		pass	1.311E-03	pass	16	pass
DEP-REC	3.500E-003		pass	3.500E-03	pass	1	pass
EP	5.923E-004		pass	5.923E-04	pass	10	pass
EP-DG3A	4.971E-002		pass	4.971E-02	pass	3	pass
EP-DG3B	4.971E-002		pass	4.971E-02	pass	3	pass
F&B	2.244E-002		pass	2.244E-02	pass	129	pass
F&B-L	2.244E-002		pass	2.244E-02	pass	129	pass
HPI	6.094E-006		pass	6.094E-06	pass	126	pass
HPI-L	6.094E-006		pass	6.094E-06	pass	126	pass
HPR	1.342E-003		pass	1.342E-03	pass	148	pass
HPR-CVC	1.152E-002		pass	1.152E-02	pass	14	pass
HPR-CVCL	1.152E-002		pass	1.152E-02	pass	14	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
ACP-ST	0.000E+00		pass
AFW	0.000E+00		pass
AFW-ATWS	0.000E+00		pass
AFW-L	0.000E+00		pass
AFW-SGTR	0.000E+00		pass
BORATION	0.000E+00		pass
COOLDOWN	0.000E+00		pass
CSR	0.000E+00		pass
CSR-L	0.000E+00		pass
DEP-REC	0.000E+00		pass
EP	0.000E+00		pass
EP-DG3A	0.000E+00		pass
EP-DG3B	0.000E+00		pass
F&B	0.000E+00		pass
F&B-L	0.000E+00		pass
HPI	0.000E+00		pass
HPI-L	0.000E+00		pass
HPR	0.000E+00		pass
HPR-CVC	0.000E+00		pass
HPR-CVCL	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
HPR-L	1.342E-003		pass	1.342E-03	pass	148	pass
LPR	1.131E-002		pass	1.131E-02	pass	21	pass
MFW	8.800E-002		pass	8.800E-02	pass	2	pass
MFW-NT	5.000E-002		pass	5.000E-02	pass	1	pass
OP-2H	1.400E-001		pass	1.400E-01	pass	1	pass
OP-6H	6.800E-002		pass	6.800E-02	pass	1	pass

OP-BD	3.800E-003		pass	3.800E-03	pass	1	pass
OP-SL	8.300E-001		pass	8.300E-01	pass	1	pass
PORV	4.000E-002		pass	4.000E-02	pass	1	pass
PORV-1	1.000E+000		pass	1.000E+00	pass	1	pass
PORV-A	2.914E-001		pass	2.914E-01	pass	9	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
HPR-L	0.000E+00		pass
LPR	0.000E+00		pass
MFW	0.000E+00		pass
MFW-NT	0.000E+00		pass
OP-2H	0.000E+00		pass
OP-6H	0.000E+00		pass
OP-BD	0.000E+00		pass
OP-SL	0.000E+00		pass
PORV	0.000E+00		pass
PORV-1	0.000E+00		pass
PORV-A	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
PORV-L	1.600E-001		pass	1.600E-01	pass	1	pass
PORV-RES	8.452E-004		pass	8.452E-04	pass	6	pass
PORV-SBO	3.700E-001		pass	3.700E-01	pass	1	pass
PRVL-RES	8.452E-004		pass	8.452E-04	pass	6	pass
RCS-DEP	3.997E-003		pass	3.997E-03	pass	2	pass
RCS-SG	4.100E-004		pass	4.100E-04	pass	2	pass
RCS-SG1	2.766E-002		pass	2.766E-02	pass	2	pass
RCSCOOL	3.997E-003		pass	3.997E-03	pass	2	pass
RCSPRESS	1.839E-003		pass	1.839E-03	pass	2	pass
RHR	2.244E-003		pass	2.244E-03	pass	31	pass
RT	5.529E-006		pass	5.529E-06	pass	3	pass
RT-L	1.000E-008		pass	1.000E-08	pass	1	pass
SEALLOCA	1.100E-001		pass	1.100E-01	pass	1	pass
SG-DEP	1.000E-005		pass	1.000E-05	pass	1	pass
SGA-T	1.100E-004		pass	1.100E-04	pass	3	pass
SGB-T	1.100E-004		pass	1.100E-04	pass	3	pass
SGC-T	1.100E-004		pass	1.100E-04	pass	3	pass
SGCOOL	1.000E+000		pass	1.000E+00	pass	1	pass
SGCOOL-L	1.000E+000		pass	1.000E+00	pass	1	pass
SGD-T	1.100E-004		pass	1.100E-04	pass	3	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
PORV-L	0.000E+00		pass
PORV-RES	0.000E+00		pass
PORV-SBO	0.000E+00		pass
PRVL-RES	0.000E+00		pass
RCS-DEP	0.000E+00		pass
RCS-SG	0.000E+00		pass
RCS-SG1	0.000E+00		pass
RCSCOOL	0.000E+00		pass
RCSPRESS	0.000E+00		pass
RHR	0.000E+00		pass
RT	0.000E+00		pass
RT-L	0.000E+00		pass
SEALLOCA	0.000E+00		pass
SG-DEP	0.000E+00		pass
SGA-T	0.000E+00		pass
SGB-T	0.000E+00		pass
SGC-T	0.000E+00		pass
SGCOOL	0.000E+00		pass
SGCOOL-L	0.000E+00		pass
SGD-T	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
SGISOL	1.099E-002		pass	1.099E-02	pass	2	pass
SGISOL1	1.099E-001		pass	1.099E-01	pass	3	pass
SLOCA-NR	4.300E-001		pass	4.300E-01	pass	1	pass
THROTTLE	1.000E-002		pass	1.000E-02	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
SGISOL	0.000E+00		pass
SGISOL1	0.000E+00		pass
SLOCA-NR	0.000E+00		pass
THROTTLE	0.000E+00		pass

Scenario: Solve Fault Trees completed at 9:57:00 PM

MIL3-02 Scenario: Core Damage Frequency Test started at 9:57:00 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-16) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	05	3.270E-015	pass	3.270E-15	pass	14	pass
LOOP	06	3.034E-015	pass	3.034E-15	pass	12	pass
LOOP	08	1.484E-014	pass	1.484E-14	pass	22	pass
LOOP	09	1.337E-014	pass	1.337E-14	pass	24	pass
LOOP	11	4.924E-013	pass	4.924E-13	pass	67	pass
LOOP	12	2.011E-013	pass	2.011E-13	pass	58	pass
LOOP	13	9.718E-013	pass	9.718E-13	pass	58	pass
LOOP	16	1.609E-013	pass	1.609E-13	pass	44	pass
LOOP	17	1.591E-013	pass	1.591E-13	pass	58	pass
LOOP	20	1.274E-014	pass	1.274E-14	pass	26	pass
LOOP	21	1.131E-014	pass	1.131E-14	pass	23	pass
LOOP	22	2.487E-012	pass	2.487E-12	pass	101	pass
LOOP	23-02	5.958E-012	pass	5.958E-12	pass	8	pass
LOOP	23-05	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	23-06	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	23-08	2.961E-016	pass	2.961E-16	pass	2	pass
LOOP	23-09	2.961E-016	pass	2.961E-16	pass	2	pass
LOOP	23-10	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	23-11	1.608E-010	pass	1.608E-10	pass	9	pass
LOOP	23-13	3.499E-012	pass	3.499E-12	pass	8	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	05	0.000E+00	pass
LOOP	06	0.000E+00	pass
LOOP	08	0.000E+00	pass
LOOP	09	0.000E+00	pass
LOOP	11	0.000E+00	pass
LOOP	12	0.000E+00	pass
LOOP	13	0.000E+00	pass
LOOP	16	0.000E+00	pass
LOOP	17	0.000E+00	pass
LOOP	20	0.000E+00	pass
LOOP	21	0.000E+00	pass
LOOP	22	0.000E+00	pass
LOOP	23-02	0.000E+00	pass
LOOP	23-05	0.000E+00	pass
LOOP	23-06	0.000E+00	pass
LOOP	23-08	0.000E+00	pass
LOOP	23-09	0.000E+00	pass
LOOP	23-10	0.000E+00	pass
LOOP	23-11	0.000E+00	pass
LOOP	23-13	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	23-16	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	23-17	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	23-19	1.117E-016	pass	1.117E-16	pass	1	pass
LOOP	23-20	1.117E-016	pass	1.117E-16	pass	1	pass
LOOP	23-21	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	23-22	9.446E-011	pass	9.446E-11	pass	9	pass
LOOP	23-24	3.018E-013	pass	3.018E-13	pass	22	pass
LOOP	23-26	2.577E-014	pass	2.577E-14	pass	20	pass
LOOP	24	5.900E-014	pass	5.900E-14	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status	Failure
LOOP	23-16	0.000E+00	pass	
LOOP	23-17	0.000E+00	pass	
LOOP	23-19	0.000E+00	pass	
LOOP	23-20	0.000E+00	pass	
LOOP	23-21	0.000E+00	pass	
LOOP	23-22	0.000E+00	pass	
LOOP	23-24	0.000E+00	pass	
LOOP	23-26	0.000E+00	pass	
LOOP	24	0.000E+00	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Base	Status	Count	Status
SGTR	03	4.026E-011	pass		4.026E-11	pass	42	pass
SGTR	04	7.172E-011	pass		7.172E-11	pass	4	pass
SGTR	05	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	08	1.616E-013	pass		1.616E-13	pass	23	pass
SGTR	09	2.895E-013	pass		2.895E-13	pass	6	pass
SGTR	10	1.630E-011	pass		1.630E-11	pass	1	pass
SGTR	11	2.339E-012	pass		2.339E-12	pass	2	pass
SGTR	13	9.022E-014	pass		9.022E-14	pass	36	pass
SGTR	14	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	16	2.406E-014	pass		2.406E-14	pass	33	pass
SGTR	17	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	18	4.974E-016	pass		4.974E-16	pass	3	pass
SGTR	21	6.547E-016	pass		6.547E-16	pass	8	pass
SGTR	22	1.437E-015	pass		1.437E-15	pass	8	pass
SGTR	23	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	26	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	27	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	28	3.329E-016	pass		3.329E-16	pass	3	pass
SGTR	29	3.323E-017	pass		3.323E-17	pass	1	pass
SGTR	31	0.000E+000	pass		0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status	Failure
SGTR	03	0.000E+00	pass	
SGTR	04	0.000E+00	pass	
SGTR	05	0.000E+00	pass	
SGTR	08	0.000E+00	pass	
SGTR	09	0.000E+00	pass	
SGTR	10	0.000E+00	pass	
SGTR	11	0.000E+00	pass	
SGTR	13	0.000E+00	pass	
SGTR	14	0.000E+00	pass	
SGTR	16	0.000E+00	pass	
SGTR	17	0.000E+00	pass	
SGTR	18	0.000E+00	pass	
SGTR	21	0.000E+00	pass	
SGTR	22	0.000E+00	pass	
SGTR	23	0.000E+00	pass	
SGTR	26	0.000E+00	pass	
SGTR	27	0.000E+00	pass	
SGTR	28	0.000E+00	pass	
SGTR	29	0.000E+00	pass	
SGTR	31	0.000E+00	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Base	Status	Count	Status
SGTR	32	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	34	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	35	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	36	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	39	0.000E+000	pass		0.000E+00	pass	0	pass
SGTR	41	1.187E-016	pass		1.187E-16	pass	1	pass
SGTR	42	1.935E-014	pass		1.935E-14	pass	11	pass
SGTR	43	3.365E-014	pass		3.365E-14	pass	18	pass
SGTR	44	9.012E-012	pass		9.012E-12	pass	3	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	32	0.000E+00	pass
SGTR	34	0.000E+00	pass
SGTR	35	0.000E+00	pass
SGTR	36	0.000E+00	pass
SGTR	39	0.000E+00	pass
SGTR	41	0.000E+00	pass
SGTR	42	0.000E+00	pass
SGTR	43	0.000E+00	pass
SGTR	44	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SLOCA	04	3.125E-012	pass	3.125E-12	pass	131	pass
SLOCA	05	3.061E-012	pass	3.061E-12	pass	109	pass
SLOCA	07	1.797E-011	pass	1.797E-11	pass	70	pass
SLOCA	08	1.773E-011	pass	1.773E-11	pass	19	pass
SLOCA	09	5.282E-012	pass	5.282E-12	pass	65	pass
SLOCA	13	0.000E+000	pass	0.000E+00	pass	0	pass
SLOCA	14	0.000E+000	pass	0.000E+00	pass	0	pass
SLOCA	16	3.010E-016	pass	3.010E-16	pass	5	pass
SLOCA	17	2.559E-016	pass	2.559E-16	pass	4	pass
SLOCA	18	9.686E-017	pass	9.686E-17	pass	2	pass
SLOCA	21	+0.000E+000	pass	0.000E+00	pass	1	pass
SLOCA	22	+0.000E+000	pass	0.000E+00	pass	1	pass
SLOCA	24	+0.000E+000	pass	0.000E+00	pass	1	pass
SLOCA	25	+0.000E+000	pass	0.000E+00	pass	1	pass
SLOCA	27	3.311E-015	pass	3.311E-15	pass	8	pass
SLOCA	28	3.172E-015	pass	3.172E-15	pass	12	pass
SLOCA	29	4.955E-014	pass	4.955E-14	pass	18	pass
SLOCA	30	1.327E-011	pass	1.327E-11	pass	3	pass
TRANS	05	5.309E-014	pass	5.309E-14	pass	58	pass
TRANS	06	4.259E-014	pass	4.259E-14	pass	58	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	04	0.000E+00	pass
SLOCA	05	0.000E+00	pass
SLOCA	07	0.000E+00	pass
SLOCA	08	0.000E+00	pass
SLOCA	09	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	14	0.000E+00	pass
SLOCA	16	0.000E+00	pass
SLOCA	17	0.000E+00	pass
SLOCA	18	0.000E+00	pass
SLOCA	21	0.000E+00	pass
SLOCA	22	0.000E+00	pass
SLOCA	24	0.000E+00	pass
SLOCA	25	0.000E+00	pass
SLOCA	27	0.000E+00	pass
SLOCA	28	0.000E+00	pass
SLOCA	29	0.000E+00	pass
SLOCA	30	0.000E+00	pass
TRANS	05	0.000E+00	pass
TRANS	06	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRANS	08	2.848E-013	pass	2.848E-13	pass	54	pass
TRANS	09	2.723E-013	pass	2.723E-13	pass	60	pass
TRANS	10	4.459E-013	pass	4.459E-13	pass	62	pass
TRANS	15	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	16	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	18	0.000E+000	pass	0.000E+00	pass	0	pass

TRANS	19	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	20	2.102E-015	pass	2.102E-15	pass	6	pass
TRANS	23	1.225E-012	pass	1.225E-12	pass	142	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRANS	08	0.000E+00	pass
TRANS	09	0.000E+00	pass
TRANS	10	0.000E+00	pass
TRANS	15	0.000E+00	pass
TRANS	16	0.000E+00	pass
TRANS	18	0.000E+00	pass
TRANS	19	0.000E+00	pass
TRANS	20	0.000E+00	pass
TRANS	23	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRANS	24	1.208E-012	pass	1.208E-12	pass	103	pass
TRANS	25	1.749E-011	pass	1.749E-11	pass	115	pass
TRANS	26-04	9.458E-016	pass	9.458E-16	pass	6	pass
TRANS	26-05	9.458E-016	pass	9.458E-16	pass	6	pass
TRANS	26-07	1.326E-014	pass	1.326E-14	pass	23	pass
TRANS	26-08	1.229E-014	pass	1.229E-14	pass	29	pass
TRANS	26-09	4.649E-015	pass	4.649E-15	pass	13	pass
TRANS	26-10	2.599E-011	pass	2.599E-11	pass	3	pass
TRANS	26-11	4.782E-012	pass	4.782E-12	pass	6	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRANS	24	0.000E+00	pass
TRANS	25	0.000E+00	pass
TRANS	26-04	0.000E+00	pass
TRANS	26-05	0.000E+00	pass
TRANS	26-07	0.000E+00	pass
TRANS	26-08	0.000E+00	pass
TRANS	26-09	0.000E+00	pass
TRANS	26-10	0.000E+00	pass
TRANS	26-11	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 9:59:21 PM

TEST CASE COMPLETE: at 9:59:22 PM

TEST CASE : GEM Condition Assessments (COND_MIL3)
DATE & TIME: 8/30/99 9:59:24 PM

TEST FOR: GEM Version 6.63

Project mil3_2qa is open

MIL3-03 Scenario: Condition AFW out of service for 72 hours started at 9:59:30 PM
Assessment AFW-72HRS created
Assessment processed
Sequences: 80 of 00080 pass
Total CCDP: 2.0E-005 2.0E-005 pass
Total CDP: 3.8E-008 3.8E-008 pass
Total Importance: 2.0E-005 2.0E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	+0.0E+000	2.4E-013	-2.4E-013	pass
2	LOOP	06	+0.0E+000	2.2E-013	-2.2E-013	pass
3	LOOP	08	+0.0E+000	1.1E-012	-1.1E-012	pass
4	LOOP	09	+0.0E+000	9.6E-013	-9.6E-013	pass
5	LOOP	11	+0.0E+000	3.6E-011	-3.6E-011	pass
6	LOOP	12	+0.0E+000	1.5E-011	-1.5E-011	pass
7	LOOP	13	+0.0E+000	7.0E-011	-7.0E-011	pass
8	LOOP	16	1.4E-007	1.2E-011	1.4E-007	pass
9	LOOP	17	1.4E-007	1.2E-011	1.4E-007	pass
10	LOOP	20	1.1E-008	9.2E-013	1.1E-008	pass
11	LOOP	21	9.9E-009	8.1E-013	9.9E-009	pass
12	LOOP	22	2.1E-006	1.8E-010	2.1E-006	pass
13	LOOP	23-02	+0.0E+000	4.3E-010	-4.3E-010	pass
14	LOOP	23-08	+0.0E+000	2.1E-014	-2.1E-014	pass
15	LOOP	23-09	+0.0E+000	2.1E-014	-2.1E-014	pass
16	LOOP	23-11	+0.0E+000	1.2E-008	-1.2E-008	pass
17	LOOP	23-13	+0.0E+000	2.5E-010	-2.5E-010	pass
18	LOOP	23-19	+0.0E+000	8.0E-015	-8.0E-015	pass
19	LOOP	23-20	+0.0E+000	8.0E-015	-8.0E-015	pass
20	LOOP	23-22	+0.0E+000	6.8E-009	-6.8E-009	pass
21	LOOP	23-24	+0.0E+000	2.2E-011	-2.2E-011	pass
22	LOOP	23-26	2.2E-008	1.9E-012	2.2E-008	pass
23	LOOP	24	4.3E-012	4.3E-012	+0.0E+000	pass
24	SGTR	03	+0.0E+000	2.9E-009	-2.9E-009	pass
25	SGTR	04	+0.0E+000	5.2E-009	-5.2E-009	pass
26	SGTR	08	+0.0E+000	1.2E-011	-1.2E-011	pass
27	SGTR	09	+0.0E+000	2.1E-011	-2.1E-011	pass
28	SGTR	10	+0.0E+000	1.2E-009	-1.2E-009	pass
29	SGTR	11	+0.0E+000	1.7E-010	-1.7E-010	pass
30	SGTR	13	+0.0E+000	6.5E-012	-6.5E-012	pass
31	SGTR	16	+0.0E+000	1.7E-012	-1.7E-012	pass
32	SGTR	18	+0.0E+000	3.6E-014	-3.6E-014	pass
33	SGTR	21	7.5E-010	4.7E-014	7.5E-010	pass
34	SGTR	22	1.3E-009	1.0E-013	1.3E-009	pass
35	SGTR	26	3.0E-012	+0.0E+000	3.0E-012	pass
36	SGTR	27	5.4E-012	+0.0E+000	5.4E-012	pass
37	SGTR	28	3.1E-010	2.4E-014	3.1E-010	pass
38	SGTR	29	4.4E-011	2.4E-015	4.4E-011	pass
39	SGTR	31	1.7E-012	+0.0E+000	1.7E-012	pass
40	SGTR	34	4.5E-013	+0.0E+000	4.5E-013	pass
41	SGTR	36	9.4E-015	+0.0E+000	9.4E-015	pass
42	SGTR	39	4.2E-011	+0.0E+000	4.2E-011	pass
43	SGTR	41	1.7E-010	8.6E-015	1.7E-010	pass
44	SGTR	42	1.7E-008	1.4E-012	1.7E-008	pass
45	SGTR	43	2.9E-008	2.4E-012	2.9E-008	pass
46	SGTR	44	6.5E-010	6.5E-010	+0.0E+000	pass
47	SLOCA	04	+0.0E+000	2.3E-010	-2.3E-010	pass
48	SLOCA	05	+0.0E+000	2.2E-010	-2.2E-010	pass
49	SLOCA	07	+0.0E+000	1.3E-009	-1.3E-009	pass
50	SLOCA	08	+0.0E+000	1.3E-009	-1.3E-009	pass

51	SLOCA	09	+0.0E+000	3.8E-010	-3.8E-010	pass
52	SLOCA	13	5.9E-011	+0.0E+000	5.9E-011	pass
53	SLOCA	14	5.7E-011	+0.0E+000	5.7E-011	pass
54	SLOCA	16	3.4E-010	2.2E-014	3.4E-010	pass
55	SLOCA	17	3.3E-010	1.8E-014	3.3E-010	pass
56	SLOCA	18	1.0E-010	7.0E-015	1.0E-010	pass
57	SLOCA	27	3.0E-009	2.4E-013	3.0E-009	pass
58	SLOCA	28	3.0E-009	2.3E-013	3.0E-009	pass
59	SLOCA	29	4.3E-008	3.6E-012	4.3E-008	pass
60	SLOCA	30	9.6E-010	9.6E-010	+0.0E+000	pass
61	TRANS	05	+0.0E+000	3.8E-012	-3.8E-012	pass
62	TRANS	06	+0.0E+000	3.1E-012	-3.1E-012	pass
63	TRANS	08	+0.0E+000	2.1E-011	-2.1E-011	pass
64	TRANS	09	+0.0E+000	2.0E-011	-2.0E-011	pass
65	TRANS	10	+0.0E+000	3.2E-011	-3.2E-011	pass
66	TRANS	15	2.7E-011	+0.0E+000	2.7E-011	pass
67	TRANS	16	2.3E-011	+0.0E+000	2.3E-011	pass
68	TRANS	18	1.3E-010	+0.0E+000	1.3E-010	pass
69	TRANS	19	1.3E-010	+0.0E+000	1.3E-010	pass
70	TRANS	20	2.1E-010	1.5E-013	2.1E-010	pass
71	TRANS	23	1.1E-006	8.8E-011	1.1E-006	pass
72	TRANS	24	1.1E-006	8.7E-011	1.1E-006	pass
73	TRANS	25	1.5E-005	1.3E-009	1.5E-005	pass
74	TRANS	26-04	6.8E-014	6.8E-014	+0.0E+000	pass
75	TRANS	26-05	6.8E-014	6.8E-014	+0.0E+000	pass
76	TRANS	26-07	9.6E-013	9.6E-013	+0.0E+000	pass
77	TRANS	26-08	8.9E-013	8.9E-013	+0.0E+000	pass
78	TRANS	26-09	3.4E-013	3.4E-013	+0.0E+000	pass
79	TRANS	26-10	1.9E-009	1.9E-009	+0.0E+000	pass
80	TRANS	26-11	3.4E-010	3.4E-010	+0.0E+000	pass

Scenario: Condition AFW out of service for 72 hours completed at 10:00:07 PM

MIL3-04 Scenario: Condition EDG out of service for 3 months started at 10:00:07 PM
Assessment EDG-2190HRS created
Assessment processed
Sequences: 74 of 00074 pass
Total CCDP: 5.5E-006 5.5E-006 pass
Total CDP: 1.1E-006 1.1E-006 pass
Total Importance: 4.3E-006 4.3E-006 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	8.5E-011	8.5E-011	7.2E-012	7.7E-011	pass
2	LOOP	8.2E-011	8.2E-011	6.6E-012	7.5E-011	pass
3	LOOP	1.2E-010	1.2E-010	3.3E-011	8.4E-011	pass
4	LOOP	1.1E-010	1.1E-010	2.9E-011	8.5E-011	pass
5	LOOP	6.8E-009	6.8E-009	1.1E-009	5.8E-009	pass
6	LOOP	1.6E-009	1.6E-009	4.4E-010	1.2E-009	pass
7	LOOP	2.3E-008	2.3E-008	2.1E-009	2.1E-008	pass
8	LOOP	4.0E-010	4.0E-010	3.5E-010	5.1E-011	pass
9	LOOP	4.0E-010	4.0E-010	3.5E-010	5.0E-011	pass
10	LOOP	5.9E-011	5.9E-011	2.8E-011	3.1E-011	pass
11	LOOP	2.9E-011	2.9E-011	2.5E-011	4.4E-012	pass
12	LOOP	6.5E-009	6.5E-009	5.5E-009	1.0E-009	pass
13	LOOP	1.1E-007	1.1E-007	1.3E-008	9.7E-008	pass
14	LOOP	7.9E-013	7.9E-013	+0.0E+000	7.9E-013	pass
15	LOOP	7.9E-013	7.9E-013	+0.0E+000	7.9E-013	pass
16	LOOP	9.5E-012	9.5E-012	6.5E-013	8.9E-012	pass
17	LOOP	9.1E-012	9.1E-012	6.5E-013	8.4E-012	pass
18	LOOP	5.5E-012	5.5E-012	+0.0E+000	5.5E-012	pass
19	LOOP	3.0E-006	3.0E-006	3.5E-007	2.6E-006	pass
20	LOOP	6.5E-008	6.5E-008	7.7E-009	5.7E-008	pass
21	LOOP	3.0E-013	3.0E-013	+0.0E+000	3.0E-013	pass
22	LOOP	3.0E-013	3.0E-013	+0.0E+000	3.0E-013	pass
23	LOOP	5.6E-012	5.6E-012	2.5E-013	5.3E-012	pass
24	LOOP	4.9E-012	4.9E-012	2.5E-013	4.6E-012	pass
25	LOOP	3.2E-012	3.2E-012	+0.0E+000	3.2E-012	pass
26	LOOP	1.7E-006	1.7E-006	2.1E-007	1.5E-006	pass
27	LOOP	5.6E-009	5.6E-009	6.6E-010	5.0E-009	pass
28	LOOP	4.8E-010	4.8E-010	5.6E-011	4.2E-010	pass
29	LOOP	1.3E-010	1.3E-010	1.3E-010	+0.0E+000	pass
30	SGTR	8.8E-008	8.8E-008	8.8E-008	+0.0E+000	pass
31	SGTR	1.6E-007	1.6E-007	1.6E-007	+0.0E+000	pass
32	SGTR	3.5E-010	3.5E-010	3.5E-010	+0.0E+000	pass
33	SGTR	6.3E-010	6.3E-010	6.3E-010	+0.0E+000	pass
34	SGTR	3.6E-008	3.6E-008	3.6E-008	+0.0E+000	pass
35	SGTR	5.1E-009	5.1E-009	5.1E-009	+0.0E+000	pass
36	SGTR	2.0E-010	2.0E-010	2.0E-010	+0.0E+000	pass
37	SGTR	5.3E-011	5.3E-011	5.3E-011	+0.0E+000	pass
38	SGTR	1.1E-012	1.1E-012	1.1E-012	+0.0E+000	pass
39	SGTR	1.4E-012	1.4E-012	1.4E-012	+0.0E+000	pass
40	SGTR	3.2E-012	3.2E-012	3.2E-012	+0.0E+000	pass
41	SGTR	7.3E-013	7.3E-013	7.3E-013	+0.0E+000	pass
42	SGTR	7.3E-014	7.3E-014	7.3E-014	+0.0E+000	pass
43	SGTR	2.6E-013	2.6E-013	2.6E-013	+0.0E+000	pass
44	SGTR	4.2E-011	4.2E-011	4.2E-011	+0.0E+000	pass
45	SGTR	7.4E-011	7.4E-011	7.4E-011	+0.0E+000	pass
46	SGTR	2.0E-008	2.0E-008	2.0E-008	+0.0E+000	pass
47	SLOCA	6.8E-009	6.8E-009	6.8E-009	+0.0E+000	pass
48	SLOCA	6.7E-009	6.7E-009	6.7E-009	+0.0E+000	pass
49	SLOCA	3.9E-008	3.9E-008	3.9E-008	+0.0E+000	pass
50	SLOCA	3.9E-008	3.9E-008	3.9E-008	+0.0E+000	pass
51	SLOCA	1.2E-008	1.2E-008	1.2E-008	+0.0E+000	pass
52	SLOCA	6.6E-013	6.6E-013	6.6E-013	+0.0E+000	pass
53	SLOCA	5.6E-013	5.6E-013	5.6E-013	+0.0E+000	pass
54	SLOCA	2.1E-013	2.1E-013	2.1E-013	+0.0E+000	pass
55	SLOCA	7.3E-012	7.3E-012	7.3E-012	+0.0E+000	pass
56	SLOCA	7.0E-012	7.0E-012	7.0E-012	+0.0E+000	pass
57	SLOCA	1.1E-010	1.1E-010	1.1E-010	+0.0E+000	pass
58	SLOCA	2.9E-008	2.9E-008	2.9E-008	+0.0E+000	pass

59	TRANS	1.2E-010	1.2E-010	1.2E-010	+0.0E+000	pass
60	TRANS	9.3E-011	9.3E-011	9.3E-011	+0.0E+000	pass
61	TRANS	6.2E-010	6.2E-010	6.2E-010	+0.0E+000	pass
62	TRANS	6.0E-010	6.0E-010	6.0E-010	+0.0E+000	pass
63	TRANS	9.8E-010	9.8E-010	9.8E-010	+0.0E+000	pass
64	TRANS	4.6E-012	4.6E-012	4.6E-012	+0.0E+000	pass
65	TRANS	2.7E-009	2.7E-009	2.7E-009	+0.0E+000	pass
66	TRANS	2.7E-009	2.7E-009	2.7E-009	+0.0E+000	pass
67	TRANS	3.8E-008	3.8E-008	3.8E-008	+0.0E+000	pass
68	TRANS	2.1E-012	2.1E-012	2.1E-012	+0.0E+000	pass
69	TRANS	2.1E-012	2.1E-012	2.1E-012	+0.0E+000	pass
70	TRANS	2.9E-011	2.9E-011	2.9E-011	+0.0E+000	pass
71	TRANS	2.7E-011	2.7E-011	2.7E-011	+0.0E+000	pass
72	TRANS	1.0E-011	1.0E-011	1.0E-011	+0.0E+000	pass
73	TRANS	5.7E-008	5.7E-008	5.7E-008	+0.0E+000	pass
74	TRANS	1.1E-008	1.1E-008	1.1E-008	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 10:00:42 PM

TEST CASE COMPLETE: at 10:00:42 PM

TEST CASE : GEM Initiating Events (IE_MIL3)
DATE & TIME: 8/30/99 10:00:43 PM

TEST FOR: GEM Version 6.63

Project mil3_2qa is open

MIL3-05 Scenario: Transient - No other failures started at 10:00:48 PM
Assessment TRANS created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 16 of 00016 pass
Total CCDP: 1.1E-007 1.1E-007 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	1.3E-010	pass
2	TRANS	06	1.0E-010	pass
3	TRANS	08	6.1E-010	pass
4	TRANS	09	5.8E-010	pass
5	TRANS	10	9.6E-010	pass
6	TRANS	20	4.9E-012	pass
7	TRANS	23	2.6E-009	pass
8	TRANS	24	2.6E-009	pass
9	TRANS	25	3.7E-008	pass
10	TRANS	26-04	5.6E-012	pass
11	TRANS	26-05	5.4E-012	pass
12	TRANS	26-07	3.2E-011	pass
13	TRANS	26-08	3.1E-011	pass
14	TRANS	26-09	1.5E-011	pass
15	TRANS	26-10	5.5E-008	pass
16	TRANS	26-11	1.0E-008	pass

Scenario: Transient - No other failures completed at 10:01:26 PM

MIL3-06 Scenario: Small LOCA - No other failures started at 10:01:26 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 12 of 00012 pass
Total CCDP: 2.5E-005 2.5E-005 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	04	1.3E-006	pass
2	SLOCA	05	1.3E-006	pass
3	SLOCA	07	7.5E-006	pass
4	SLOCA	08	7.4E-006	pass
5	SLOCA	09	2.2E-006	pass
6	SLOCA	16	1.6E-010	pass
7	SLOCA	17	1.6E-010	pass
8	SLOCA	18	8.4E-011	pass
9	SLOCA	27	1.5E-009	pass
10	SLOCA	28	1.4E-009	pass
11	SLOCA	29	2.1E-008	pass
12	SLOCA	30	5.5E-006	pass

Scenario: Small LOCA - No other failures completed at 10:01:57 PM

MIL3-07 Scenario: SGTR - no other failures started at 10:01:57 PM
Assessment SGTR created
Initiating event IE-SGTR selected
Assessment processed
Sequences: 17 of 00017 pass
Total CCDP: 8.6E-005 8.6E-005 pass

#	Tree	Sequence	CCDP	Status
1	SGTR	03	2.5E-005	pass
2	SGTR	04	4.4E-005	pass
3	SGTR	08	1.0E-007	pass
4	SGTR	09	1.8E-007	pass
5	SGTR	10	1.0E-005	pass
6	SGTR	11	1.4E-006	pass
7	SGTR	13	5.6E-008	pass
8	SGTR	16	1.6E-008	pass
9	SGTR	18	5.0E-010	pass
10	SGTR	21	5.4E-010	pass
11	SGTR	22	9.5E-010	pass
12	SGTR	28	2.2E-010	pass
13	SGTR	29	3.1E-011	pass
14	SGTR	41	1.2E-010	pass
15	SGTR	42	1.2E-008	pass
16	SGTR	43	2.1E-008	pass
17	SGTR	44	5.5E-006	pass

Scenario: SGTR - no other failures completed at 10:02:24 PM

MIL3-08 Scenario: Grid-related LOOP - no other failures started at 10:02:24 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 4.6E-006 4.6E-006 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	9.8E-010	pass
2	LOOP	06	8.9E-010	pass
3	LOOP	08	2.9E-009	pass
4	LOOP	09	2.7E-009	pass
5	LOOP	11	2.7E-008	pass
6	LOOP	12	1.2E-008	pass
7	LOOP	13	1.2E-007	pass
8	LOOP	16	2.9E-008	pass
9	LOOP	17	2.9E-008	pass
10	LOOP	20	5.6E-012	pass
11	LOOP	21	5.0E-012	pass
12	LOOP	22	4.2E-007	pass
13	LOOP	23-02	8.4E-011	pass
14	LOOP	23-05	8.8E-012	pass
15	LOOP	23-06	8.0E-012	pass
16	LOOP	23-08	4.7E-011	pass
17	LOOP	23-09	4.6E-011	pass
18	LOOP	23-10	4.4E-011	pass
19	LOOP	23-11	2.5E-006	pass
20	LOOP	23-13	4.9E-011	pass
21	LOOP	23-16	5.2E-012	pass
22	LOOP	23-17	4.7E-012	pass
23	LOOP	23-19	2.8E-011	pass
24	LOOP	23-20	2.7E-011	pass
25	LOOP	23-21	2.6E-011	pass
26	LOOP	23-22	1.5E-006	pass
27	LOOP	23-24	3.2E-008	pass
28	LOOP	23-26	2.6E-009	pass
29	LOOP	24	1.0E-008	pass

Scenario: Grid-related LOOP - no other failures completed at 10:03:15 PM

MIL3-09 Scenario: Plant-centered LOOP - no other failures started at 10:03:15 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 8.0E-007 8.0E-007 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	1.0E-009	pass
2	LOOP	06	9.1E-010	pass
3	LOOP	08	3.0E-009	pass
4	LOOP	09	2.9E-009	pass
5	LOOP	11	1.6E-009	pass
6	LOOP	12	7.5E-010	pass
7	LOOP	13	1.2E-007	pass
8	LOOP	16	2.9E-008	pass
9	LOOP	17	2.9E-008	pass
10	LOOP	20	4.3E-014	pass
11	LOOP	21	3.9E-014	pass
12	LOOP	22	4.2E-007	pass
13	LOOP	23-02	3.5E-013	pass
14	LOOP	23-05	8.5E-013	pass
15	LOOP	23-06	7.8E-013	pass
16	LOOP	23-08	4.6E-012	pass
17	LOOP	23-09	4.5E-012	pass
18	LOOP	23-10	4.4E-012	pass
19	LOOP	23-11	1.1E-007	pass
20	LOOP	23-13	2.1E-013	pass
21	LOOP	23-16	5.0E-013	pass
22	LOOP	23-17	4.5E-013	pass
23	LOOP	23-19	2.7E-012	pass
24	LOOP	23-20	2.6E-012	pass
25	LOOP	23-21	2.6E-012	pass
26	LOOP	23-22	6.6E-008	pass
27	LOOP	23-24	8.9E-009	pass
28	LOOP	23-26	7.4E-010	pass
29	LOOP	24	1.0E-008	pass

Scenario: Plant-centered LOOP - no other failures completed at 10:04:03 PM

MIL3-10 Scenario: Severe Weather LOOP - no other failures started at 10:04:03 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 1.5E-004 1.5E-004 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	4.9E-010	pass
2	LOOP	06	4.6E-010	pass
3	LOOP	08	1.2E-009	pass
4	LOOP	09	1.2E-009	pass
5	LOOP	11	4.6E-007	pass
6	LOOP	12	1.7E-007	pass
7	LOOP	13	2.1E-007	pass
8	LOOP	16	2.1E-008	pass
9	LOOP	17	2.1E-008	pass
10	LOOP	20	9.6E-009	pass
11	LOOP	21	8.1E-009	pass
12	LOOP	22	4.2E-007	pass
13	LOOP	23-02	3.5E-006	pass
14	LOOP	23-05	3.3E-011	pass
15	LOOP	23-06	3.1E-011	pass
16	LOOP	23-08	1.8E-010	pass
17	LOOP	23-09	1.8E-010	pass
18	LOOP	23-10	1.3E-010	pass
19	LOOP	23-11	9.2E-005	pass
20	LOOP	23-13	2.0E-006	pass
21	LOOP	23-16	1.9E-011	pass
22	LOOP	23-17	1.8E-011	pass
23	LOOP	23-19	1.1E-010	pass
24	LOOP	23-20	1.0E-010	pass
25	LOOP	23-21	7.6E-011	pass
26	LOOP	23-22	5.4E-005	pass
27	LOOP	23-24	1.3E-007	pass
28	LOOP	23-26	1.1E-008	pass
29	LOOP	24	1.0E-008	pass

Scenario: Severe Weather LOOP - no other failures completed at 10:04:59 PM

MIL3-11 Scenario: Extreme Severe Weather LOOP - no other failures started at 10:04:59 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 13 of 00013 pass
Total CCDP: 4.4E-004 4.4E-004 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	11	8.8E-007	pass
2	LOOP	12	2.9E-007	pass
3	LOOP	13	2.8E-007	pass
4	LOOP	20	3.7E-008	pass
5	LOOP	21	2.9E-008	pass
6	LOOP	22	4.3E-007	pass
7	LOOP	23-02	3.1E-005	pass
8	LOOP	23-11	2.4E-004	pass
9	LOOP	23-13	1.8E-005	pass
10	LOOP	23-22	1.4E-004	pass
11	LOOP	23-24	2.4E-007	pass
12	LOOP	23-26	2.0E-008	pass
13	LOOP	24	1.0E-008	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 10:05:35 PM

MIL3-12 Scenario: Transient - AFW failed started at 10:05:35 PM
Assessment TRANS-AFW created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 15 of 00015 pass
Total CCDP: 5.1E-004 5.1E-004 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	15	8.2E-010	pass
2	TRANS	16	6.7E-010	pass
3	TRANS	18	4.0E-009	pass
4	TRANS	19	3.8E-009	pass
5	TRANS	20	6.3E-009	pass
6	TRANS	23	3.1E-005	pass
7	TRANS	24	3.1E-005	pass
8	TRANS	25	4.5E-004	pass
9	TRANS	26-04	5.6E-012	pass
10	TRANS	26-05	5.4E-012	pass
11	TRANS	26-07	3.2E-011	pass
12	TRANS	26-08	3.1E-011	pass
13	TRANS	26-09	1.5E-011	pass
14	TRANS	26-10	5.5E-008	pass
15	TRANS	26-11	1.0E-008	pass

Scenario: Transient - AFW failed completed at 10:06:23 PM

TEST CASE COMPLETE: at 10:06:24 PM

TEST CASE : SAPHIRE QA Models (CDF_OCON)
DATE & TIME: 8/30/99 10:06:28 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: ocon_2qa

OCON-01 Scenario: Solve Fault Trees started at 10:06:59 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-16)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status	
ACP-ST	2.400E-001		pass		2.400E-01	pass	1	pass
BORATION	1.000E-003		pass		1.000E-03	pass	1	pass
COOLDOWN	3.997E-003		pass		3.997E-03	pass	2	pass
DEP-REC	3.500E-003		pass		3.500E-03	pass	1	pass
DHR	1.084E-002		pass		1.084E-02	pass	66	pass
EFW	1.096E-002		pass		1.096E-02	pass	78	pass
EFW-L	1.096E-002		pass		1.096E-02	pass	78	pass
EFW-SGTR	1.755E-002		pass		1.755E-02	pass	29	pass
EP	3.496E-003		pass		3.496E-03	pass	12	pass
HPI	3.160E-004		pass		3.160E-04	pass	39	pass
HPI-C	1.031E-002		pass		1.031E-02	pass	40	pass
HPI-C-L	1.031E-002		pass		1.031E-02	pass	40	pass
HPI-COOL	1.130E-002		pass		1.130E-02	pass	41	pass
HPI-L	3.160E-004		pass		3.160E-04	pass	39	pass
LPR	2.052E-003		pass		2.052E-03	pass	87	pass
MFW-A	2.000E-001		pass		2.000E-01	pass	1	pass
MFW-NT	5.000E-002		pass		5.000E-02	pass	1	pass
MFW-T	4.000E-002		pass		4.000E-02	pass	1	pass
OP-2H	6.400E-002		pass		6.400E-02	pass	1	pass
OP-6H	3.700E-002		pass		3.700E-02	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
ACP-ST	0.000E+00		pass
BORATION	0.000E+00		pass
COOLDOWN	0.000E+00		pass
DEP-REC	0.000E+00		pass
DHR	0.000E+00		pass
EFW	0.000E+00		pass
EFW-L	0.000E+00		pass
EFW-SGTR	0.000E+00		pass
EP	0.000E+00		pass
HPI	0.000E+00		pass
HPI-C	0.000E+00		pass
HPI-C-L	0.000E+00		pass
HPI-COOL	0.000E+00		pass
HPI-L	0.000E+00		pass
LPR	0.000E+00		pass
MFW-A	0.000E+00		pass
MFW-NT	0.000E+00		pass
MFW-T	0.000E+00		pass
OP-2H	0.000E+00		pass
OP-6H	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status	
OP-BD	2.000E-002		pass		2.000E-02	pass	1	pass
OP-SL	7.500E-001		pass		7.500E-01	pass	1	pass
PB-C-L	2.481E-003		pass		2.481E-03	pass	272	pass
PB-COOL	2.481E-003		pass		2.481E-03	pass	272	pass
PORV	8.000E-002		pass		8.000E-02	pass	1	pass
PORV-A	1.904E-001		pass		1.904E-01	pass	5	pass

PORV-L	1.600E-001		pass		1.600E-01	pass	1	pass
PORV-RES	3.563E-005		pass		3.563E-05	pass	3	pass
PORV-SBO	3.700E-001		pass		3.700E-01	pass	1	pass
PRVL-RES	3.563E-005		pass		3.563E-05	pass	3	pass
RCS-DEP	3.997E-003		pass		3.997E-03	pass	2	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
OP-BD	0.000E+00		pass
OP-SL	0.000E+00		pass
PB-C-L	0.000E+00		pass
PB-COOL	0.000E+00		pass
PORV	0.000E+00		pass
PORV-A	0.000E+00		pass
PORV-L	0.000E+00		pass
PORV-RES	0.000E+00		pass
PORV-SBO	0.000E+00		pass
PRVL-RES	0.000E+00		pass
RCS-DEP	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status	
RCS-SG	3.738E-002		pass		3.738E-02	pass	3	pass
RCS-SG1	2.766E-002		pass		2.766E-02	pass	2	pass
RCSPRESS	1.542E-002		pass		1.542E-02	pass	3	pass
RT	5.529E-006		pass		5.529E-06	pass	3	pass
RT-L	8.900E-008		pass		8.900E-08	pass	1	pass
SEALLOCA	9.200E-003		pass		9.200E-03	pass	1	pass
SG-DEP	1.000E-005		pass		1.000E-05	pass	1	pass
SGCOOL	2.000E-001		pass		2.000E-01	pass	3	pass
SGCOOL-L	3.400E-001		pass		3.400E-01	pass	3	pass
SGISOL	1.099E-002		pass		1.099E-02	pass	2	pass
SGISOL1	1.228E-002		pass		1.228E-02	pass	4	pass
SLOCA-NR	4.300E-001		pass		4.300E-01	pass	1	pass
THROTTLE	1.000E-002		pass		1.000E-02	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
RCS-SG	0.000E+00		pass
RCS-SG1	0.000E+00		pass
RCSPRESS	0.000E+00		pass
RT	0.000E+00		pass
RT-L	0.000E+00		pass
SEALLOCA	0.000E+00		pass
SG-DEP	0.000E+00		pass
SGCOOL	0.000E+00		pass
SGCOOL-L	0.000E+00		pass
SGISOL	0.000E+00		pass
SGISOL1	0.000E+00		pass
SLOCA-NR	0.000E+00		pass
THROTTLE	0.000E+00		pass

Scenario: Solve Fault Trees completed at 10:08:04 PM

OCON-02 Scenario: Core Damage Frequency Test started at 10:08:04 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-16) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	05	5.720E-014	pass	5.720E-14	pass	26	pass
LOOP	07	2.013E-016	pass	2.013E-16	pass	1	pass
LOOP	09	1.406E-014	pass	1.406E-14	pass	17	pass
LOOP	10	3.104E-014	pass	3.104E-14	pass	18	pass
LOOP	13	2.159E-011	pass	2.159E-11	pass	571	pass
LOOP	16	1.408E-012	pass	1.408E-12	pass	258	pass
LOOP	17	3.957E-010	pass	3.957E-10	pass	227	pass
LOOP	18-02	7.448E-010	pass	7.448E-10	pass	7	pass
LOOP	18-05	2.909E-014	pass	2.909E-14	pass	12	pass
LOOP	18-07	3.423E-016	pass	3.423E-16	pass	2	pass
LOOP	18-08	2.281E-014	pass	2.281E-14	pass	11	pass
LOOP	18-09	2.594E-010	pass	2.594E-10	pass	6	pass
LOOP	18-11	1.419E-010	pass	1.419E-10	pass	4	pass
LOOP	18-14	5.282E-015	pass	5.282E-15	pass	5	pass
LOOP	18-16	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	18-17	4.075E-015	pass	4.075E-15	pass	3	pass
LOOP	18-18	4.940E-011	pass	4.940E-11	pass	4	pass
LOOP	18-20	1.203E-011	pass	1.203E-11	pass	3	pass
LOOP	18-22	2.684E-010	pass	2.684E-10	pass	42	pass
LOOP	19	1.424E-012	pass	1.424E-12	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	05	0.000E+00	pass
LOOP	07	0.000E+00	pass
LOOP	09	0.000E+00	pass
LOOP	10	0.000E+00	pass
LOOP	13	0.000E+00	pass
LOOP	16	0.000E+00	pass
LOOP	17	0.000E+00	pass
LOOP	18-02	0.000E+00	pass
LOOP	18-05	0.000E+00	pass
LOOP	18-07	0.000E+00	pass
LOOP	18-08	0.000E+00	pass
LOOP	18-09	0.000E+00	pass
LOOP	18-11	0.000E+00	pass
LOOP	18-14	0.000E+00	pass
LOOP	18-16	0.000E+00	pass
LOOP	18-17	0.000E+00	pass
LOOP	18-18	0.000E+00	pass
LOOP	18-20	0.000E+00	pass
LOOP	18-22	0.000E+00	pass
LOOP	19	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	03	1.950E-010	pass	1.950E-10	pass	74	pass
SGTR	04	7.172E-011	pass	7.172E-11	pass	4	pass
SGTR	05	1.630E-011	pass	1.630E-11	pass	1	pass
SGTR	08	8.238E-012	pass	8.238E-12	pass	217	pass
SGTR	09	3.031E-012	pass	3.031E-12	pass	24	pass
SGTR	10	6.161E-013	pass	6.161E-13	pass	3	pass
SGTR	11	2.156E-010	pass	2.156E-10	pass	3	pass
SGTR	13	4.759E-012	pass	4.759E-12	pass	33	pass
SGTR	14	4.075E-015	pass	4.075E-15	pass	3	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	03	0.000E+00	pass
SGTR	04	0.000E+00	pass

SGTR	05	0.000E+00	pass
SGTR	08	0.000E+00	pass
SGTR	09	0.000E+00	pass
SGTR	10	0.000E+00	pass
SGTR	11	0.000E+00	pass
SGTR	13	0.000E+00	pass
SGTR	14	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	16	1.463E-013	pass	1.463E-13	pass	41	pass
SGTR	17	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	18	4.167E-014	pass	4.167E-14	pass	16	pass
SGTR	21	9.183E-013	pass	9.183E-13	pass	199	pass
SGTR	22	3.294E-013	pass	3.294E-13	pass	42	pass
SGTR	23	7.485E-014	pass	7.485E-14	pass	12	pass
SGTR	26	3.608E-014	pass	3.608E-14	pass	153	pass
SGTR	27	1.309E-014	pass	1.309E-14	pass	68	pass
SGTR	28	2.765E-015	pass	2.765E-15	pass	16	pass
SGTR	29	9.909E-013	pass	9.909E-13	pass	45	pass
SGTR	31	2.122E-014	pass	2.122E-14	pass	50	pass
SGTR	32	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	34	4.113E-016	pass	4.113E-16	pass	7	pass
SGTR	35	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	36	9.596E-017	pass	9.596E-17	pass	3	pass
SGTR	39	2.475E-013	pass	2.475E-13	pass	150	pass
SGTR	41	6.814E-015	pass	6.814E-15	pass	25	pass
SGTR	42	4.120E-012	pass	4.120E-12	pass	35	pass
SGTR	43	3.553E-012	pass	3.553E-12	pass	108	pass
SGTR	44	9.012E-012	pass	9.012E-12	pass	3	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	16	0.000E+00	pass
SGTR	17	0.000E+00	pass
SGTR	18	0.000E+00	pass
SGTR	21	0.000E+00	pass
SGTR	22	0.000E+00	pass
SGTR	23	0.000E+00	pass
SGTR	26	0.000E+00	pass
SGTR	27	0.000E+00	pass
SGTR	28	0.000E+00	pass
SGTR	29	0.000E+00	pass
SGTR	31	0.000E+00	pass
SGTR	32	0.000E+00	pass
SGTR	34	0.000E+00	pass
SGTR	35	0.000E+00	pass
SGTR	36	0.000E+00	pass
SGTR	39	0.000E+00	pass
SGTR	41	0.000E+00	pass
SGTR	42	0.000E+00	pass
SGTR	43	0.000E+00	pass
SGTR	44	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SLOCA	04	2.278E-010	pass	2.278E-10	pass	322	pass
SLOCA	06	6.404E-012	pass	6.404E-12	pass	90	pass
SLOCA	07	1.735E-010	pass	1.735E-10	pass	21	pass
SLOCA	11	6.474E-013	pass	6.474E-13	pass	248	pass
SLOCA	13	1.685E-014	pass	1.685E-14	pass	83	pass
SLOCA	14	4.951E-013	pass	4.951E-13	pass	93	pass
SLOCA	17	7.406E-014	pass	7.406E-14	pass	81	pass
SLOCA	19	1.484E-015	pass	1.484E-15	pass	18	pass
SLOCA	21	1.050E-013	pass	1.050E-13	pass	120	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	04	0.000E+00	pass
SLOCA	06	0.000E+00	pass
SLOCA	07	0.000E+00	pass
SLOCA	11	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	14	0.000E+00	pass
SLOCA	17	0.000E+00	pass
SLOCA	19	0.000E+00	pass
SLOCA	21	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SLOCA	22	1.879E-012	pass	1.879E-12	pass	70	pass
SLOCA	23	8.404E-012	pass	8.404E-12	pass	3	pass
TRANS	05	5.830E-013	pass	5.830E-13	pass	51	pass
TRANS	07	7.683E-015	pass	7.683E-15	pass	21	pass
TRANS	08	2.955E-013	pass	2.955E-13	pass	30	pass
TRANS	13	2.257E-014	pass	2.257E-14	pass	19	pass
TRANS	15	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	16	1.128E-014	pass	1.128E-14	pass	10	pass
TRANS	19	1.687E-011	pass	1.687E-11	pass	539	pass
TRANS	20	2.978E-010	pass	2.978E-10	pass	212	pass
TRANS	21-04	1.127E-013	pass	1.127E-13	pass	47	pass
TRANS	21-06	2.085E-015	pass	2.085E-15	pass	14	pass
TRANS	21-07	1.664E-012	pass	1.664E-12	pass	3	pass
TRANS	21-11	2.146E-014	pass	2.146E-14	pass	20	pass
TRANS	21-13	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	21-14	3.329E-013	pass	3.329E-13	pass	3	pass
TRANS	21-15	3.660E-012	pass	3.660E-12	pass	37	pass
TRANS	21-16	2.570E-011	pass	2.570E-11	pass	9	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	22	0.000E+00	pass
SLOCA	23	0.000E+00	pass
TRANS	05	0.000E+00	pass
TRANS	07	0.000E+00	pass
TRANS	08	0.000E+00	pass
TRANS	13	0.000E+00	pass
TRANS	15	0.000E+00	pass
TRANS	16	0.000E+00	pass
TRANS	19	0.000E+00	pass
TRANS	20	0.000E+00	pass
TRANS	21-04	0.000E+00	pass
TRANS	21-06	0.000E+00	pass
TRANS	21-07	0.000E+00	pass
TRANS	21-11	0.000E+00	pass
TRANS	21-13	0.000E+00	pass
TRANS	21-14	0.000E+00	pass
TRANS	21-15	0.000E+00	pass
TRANS	21-16	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 10:10:02 PM

TEST CASE COMPLETE: at 10:10:03 PM

TEST CASE : GEM Condition Assessments (COND_OCON)
DATE & TIME: 8/30/99 10:10:04 PM

TEST FOR: GEM Version 6.63

Project ocon_2qa is open

OCON-03 Scenario: Condition EFW out of service for 72 hours started at 10:10:10 PM
Assessment EFW-72HRS created
Assessment processed
Sequences: 71 of 00071 pass
Total CCDP: 5.2E-006 5.2E-006 pass
Total CDP: 2.3E-007 2.3E-007 pass
Total Importance: 4.9E-006 4.9E-006 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	+0.0E+000	4.1E-012	-4.1E-012	pass
2	LOOP	07	+0.0E+000	1.5E-014	-1.5E-014	pass
3	LOOP	09	+0.0E+000	1.0E-012	-1.0E-012	pass
4	LOOP	10	+0.0E+000	2.2E-012	-2.2E-012	pass
5	LOOP	13	1.4E-007	1.6E-009	1.4E-007	pass
6	LOOP	16	9.2E-009	1.0E-010	9.1E-009	pass
7	LOOP	17	2.6E-006	2.9E-008	2.6E-006	pass
8	LOOP	18-02	+0.0E+000	5.4E-008	-5.4E-008	pass
9	LOOP	18-05	+0.0E+000	2.1E-012	-2.1E-012	pass
10	LOOP	18-07	+0.0E+000	2.5E-014	-2.5E-014	pass
11	LOOP	18-08	+0.0E+000	1.6E-012	-1.6E-012	pass
12	LOOP	18-09	+0.0E+000	1.9E-008	-1.9E-008	pass
13	LOOP	18-11	+0.0E+000	1.0E-008	-1.0E-008	pass
14	LOOP	18-14	+0.0E+000	3.8E-013	-3.8E-013	pass
15	LOOP	18-17	+0.0E+000	2.9E-013	-2.9E-013	pass
16	LOOP	18-18	+0.0E+000	3.6E-009	-3.6E-009	pass
17	LOOP	18-20	+0.0E+000	8.7E-010	-8.7E-010	pass
18	LOOP	18-22	2.6E-007	1.9E-008	2.4E-007	pass
19	LOOP	19	1.0E-010	1.0E-010	+0.0E+000	pass
20	SGTR	03	+0.0E+000	1.4E-008	-1.4E-008	pass
21	SGTR	04	+0.0E+000	5.2E-009	-5.2E-009	pass
22	SGTR	05	+0.0E+000	1.2E-009	-1.2E-009	pass
23	SGTR	08	+0.0E+000	5.9E-010	-5.9E-010	pass
24	SGTR	09	+0.0E+000	2.2E-010	-2.2E-010	pass
25	SGTR	10	+0.0E+000	4.4E-011	-4.4E-011	pass
26	SGTR	11	+0.0E+000	1.6E-008	-1.6E-008	pass
27	SGTR	13	+0.0E+000	3.4E-010	-3.4E-010	pass
28	SGTR	14	+0.0E+000	2.9E-013	-2.9E-013	pass
29	SGTR	16	+0.0E+000	1.1E-011	-1.1E-011	pass
30	SGTR	18	+0.0E+000	3.0E-012	-3.0E-012	pass
31	SGTR	21	3.7E-009	6.6E-011	3.6E-009	pass
32	SGTR	22	1.3E-009	2.4E-011	1.3E-009	pass
33	SGTR	23	3.1E-010	5.4E-012	3.0E-010	pass
34	SGTR	26	1.5E-010	2.6E-012	1.5E-010	pass
35	SGTR	27	5.7E-011	9.4E-013	5.6E-011	pass
36	SGTR	28	1.2E-011	2.0E-013	1.1E-011	pass
37	SGTR	29	4.0E-009	7.1E-011	4.0E-009	pass
38	SGTR	31	8.9E-011	1.5E-012	8.7E-011	pass
39	SGTR	32	7.6E-014	+0.0E+000	7.6E-014	pass
40	SGTR	34	2.7E-012	3.0E-014	2.7E-012	pass
41	SGTR	36	7.8E-013	6.9E-015	7.7E-013	pass
42	SGTR	39	1.0E-009	1.8E-011	1.0E-009	pass
43	SGTR	41	3.1E-011	4.9E-013	3.1E-011	pass
44	SGTR	42	1.7E-008	3.0E-010	1.7E-008	pass
45	SGTR	43	1.5E-008	2.6E-010	1.4E-008	pass
46	SGTR	44	6.5E-010	6.5E-010	+0.0E+000	pass
47	SLOCA	04	+0.0E+000	1.6E-008	-1.6E-008	pass
48	SLOCA	06	+0.0E+000	4.6E-010	-4.6E-010	pass
49	SLOCA	07	+0.0E+000	1.3E-008	-1.3E-008	pass
50	SLOCA	11	4.3E-009	4.7E-011	4.2E-009	pass

51	SLOCA	13	1.2E-010	1.2E-012	1.2E-010	pass
52	SLOCA	14	3.2E-009	3.6E-011	3.2E-009	pass
53	SLOCA	17	5.0E-010	5.3E-012	4.9E-010	pass
54	SLOCA	19	1.4E-011	1.1E-013	1.4E-011	pass
55	SLOCA	21	7.0E-010	7.6E-012	6.9E-010	pass
56	SLOCA	22	1.2E-008	1.4E-010	1.2E-008	pass
57	SLOCA	23	6.1E-010	6.1E-010	+0.0E+000	pass
58	TRANS	05	4.2E-011	4.2E-011	+0.0E+000	pass
59	TRANS	07	5.5E-013	5.5E-013	+0.0E+000	pass
60	TRANS	08	2.1E-011	2.1E-011	+0.0E+000	pass
61	TRANS	13	+0.0E+000	1.6E-012	-1.6E-012	pass
62	TRANS	16	+0.0E+000	8.1E-013	-8.1E-013	pass
63	TRANS	19	1.1E-007	1.2E-009	1.1E-007	pass
64	TRANS	20	2.0E-006	2.1E-008	1.9E-006	pass
65	TRANS	21-04	8.1E-012	8.1E-012	+0.0E+000	pass
66	TRANS	21-06	1.5E-013	1.5E-013	+0.0E+000	pass
67	TRANS	21-07	1.2E-010	1.2E-010	+0.0E+000	pass
68	TRANS	21-11	+0.0E+000	1.6E-012	-1.6E-012	pass
69	TRANS	21-14	+0.0E+000	2.4E-011	-2.4E-011	pass
70	TRANS	21-15	2.4E-008	2.6E-010	2.4E-008	pass
71	TRANS	21-16	1.9E-009	1.9E-009	+0.0E+000	pass

Scenario: Condition EFW out of service for 72 hours completed at 10:10:45 PM

OCON-04 Scenario: Condition 3TC out of service for 3 months started at 10:10:45 PM
Assessment 3TC-2190HRS created
Assessment processed
Sequences: 70 of 00070 pass
Total CCDP: 7.0E-006 7.0E-006 pass
Total CDP: 7.0E-006 7.0E-006 pass
Total Importance: +0.0E+000 +0.0E+000 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	1.3E-010	1.3E-010	+0.0E+000	pass
2	LOOP	07	4.4E-013	4.4E-013	+0.0E+000	pass
3	LOOP	09	3.1E-011	3.1E-011	+0.0E+000	pass
4	LOOP	10	6.8E-011	6.8E-011	+0.0E+000	pass
5	LOOP	13	4.7E-008	4.7E-008	+0.0E+000	pass
6	LOOP	16	3.1E-009	3.1E-009	+0.0E+000	pass
7	LOOP	17	8.7E-007	8.7E-007	+0.0E+000	pass
8	LOOP	18-02	1.6E-006	1.6E-006	+0.0E+000	pass
9	LOOP	18-05	6.4E-011	6.4E-011	+0.0E+000	pass
10	LOOP	18-07	7.5E-013	7.5E-013	+0.0E+000	pass
11	LOOP	18-08	5.0E-011	5.0E-011	+0.0E+000	pass
12	LOOP	18-09	5.7E-007	5.7E-007	+0.0E+000	pass
13	LOOP	18-11	3.1E-007	3.1E-007	+0.0E+000	pass
14	LOOP	18-14	1.2E-011	1.2E-011	+0.0E+000	pass
15	LOOP	18-17	8.9E-012	8.9E-012	+0.0E+000	pass
16	LOOP	18-18	1.1E-007	1.1E-007	+0.0E+000	pass
17	LOOP	18-20	2.6E-008	2.6E-008	+0.0E+000	pass
18	LOOP	18-22	5.9E-007	5.9E-007	+0.0E+000	pass
19	LOOP	19	3.1E-009	3.1E-009	+0.0E+000	pass
20	SGTR	03	4.3E-007	4.3E-007	+0.0E+000	pass
21	SGTR	04	1.6E-007	1.6E-007	+0.0E+000	pass
22	SGTR	05	3.6E-008	3.6E-008	+0.0E+000	pass
23	SGTR	08	1.8E-008	1.8E-008	+0.0E+000	pass
24	SGTR	09	6.6E-009	6.6E-009	+0.0E+000	pass
25	SGTR	10	1.4E-009	1.4E-009	+0.0E+000	pass
26	SGTR	11	4.7E-007	4.7E-007	+0.0E+000	pass
27	SGTR	13	1.0E-008	1.0E-008	+0.0E+000	pass
28	SGTR	14	8.9E-012	8.9E-012	+0.0E+000	pass
29	SGTR	16	3.2E-010	3.2E-010	+0.0E+000	pass
30	SGTR	18	9.1E-011	9.1E-011	+0.0E+000	pass
31	SGTR	21	2.0E-009	2.0E-009	+0.0E+000	pass
32	SGTR	22	7.2E-010	7.2E-010	+0.0E+000	pass
33	SGTR	23	1.6E-010	1.6E-010	+0.0E+000	pass
34	SGTR	26	7.9E-011	7.9E-011	+0.0E+000	pass
35	SGTR	27	2.9E-011	2.9E-011	+0.0E+000	pass
36	SGTR	28	6.1E-012	6.1E-012	+0.0E+000	pass
37	SGTR	29	2.2E-009	2.2E-009	+0.0E+000	pass
38	SGTR	31	4.7E-011	4.7E-011	+0.0E+000	pass
39	SGTR	34	9.0E-013	9.0E-013	+0.0E+000	pass
40	SGTR	36	2.1E-013	2.1E-013	+0.0E+000	pass
41	SGTR	39	5.4E-010	5.4E-010	+0.0E+000	pass
42	SGTR	41	1.5E-011	1.5E-011	+0.0E+000	pass
43	SGTR	42	9.0E-009	9.0E-009	+0.0E+000	pass
44	SGTR	43	7.8E-009	7.8E-009	+0.0E+000	pass
45	SGTR	44	2.0E-008	2.0E-008	+0.0E+000	pass
46	SLOCA	04	5.0E-007	5.0E-007	+0.0E+000	pass
47	SLOCA	06	1.4E-008	1.4E-008	+0.0E+000	pass
48	SLOCA	07	3.8E-007	3.8E-007	+0.0E+000	pass
49	SLOCA	11	1.4E-009	1.4E-009	+0.0E+000	pass
50	SLOCA	13	3.7E-011	3.7E-011	+0.0E+000	pass
51	SLOCA	14	1.1E-009	1.1E-009	+0.0E+000	pass
52	SLOCA	17	1.6E-010	1.6E-010	+0.0E+000	pass
53	SLOCA	19	3.3E-012	3.3E-012	+0.0E+000	pass
54	SLOCA	21	2.3E-010	2.3E-010	+0.0E+000	pass
55	SLOCA	22	4.1E-009	4.1E-009	+0.0E+000	pass
56	SLOCA	23	1.8E-008	1.8E-008	+0.0E+000	pass
57	TRANS	05	1.3E-009	1.3E-009	+0.0E+000	pass
58	TRANS	07	1.7E-011	1.7E-011	+0.0E+000	pass

59	TRANS	08	6.5E-010	6.5E-010	+0.0E+000	pass
60	TRANS	13	4.9E-011	4.9E-011	+0.0E+000	pass
61	TRANS	16	2.5E-011	2.5E-011	+0.0E+000	pass
62	TRANS	19	3.7E-008	3.7E-008	+0.0E+000	pass
63	TRANS	20	6.5E-007	6.5E-007	+0.0E+000	pass
64	TRANS	21-04	2.5E-010	2.5E-010	+0.0E+000	pass
65	TRANS	21-06	4.6E-012	4.6E-012	+0.0E+000	pass
66	TRANS	21-07	3.6E-009	3.6E-009	+0.0E+000	pass
67	TRANS	21-11	4.7E-011	4.7E-011	+0.0E+000	pass
68	TRANS	21-14	7.3E-010	7.3E-010	+0.0E+000	pass
69	TRANS	21-15	8.0E-009	8.0E-009	+0.0E+000	pass
70	TRANS	21-16	5.6E-008	5.6E-008	+0.0E+000	pass

Scenario: Condition 3TC out of service for 3 months completed at 10:11:16 PM

TEST CASE COMPLETE: at 10:11:16 PM

TEST CASE : GEM Initiating Events (IE_OCON)
DATE & TIME: 8/30/99 10:11:17 PM

TEST FOR: GEM Version 6.63

Project ocon_2qa is open

OCON-05 Scenario: Transient - No other failures started at 10:11:22 PM
Assessment TRANS created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 14 of 00014 pass
Total CCDP: 1.2E-006 1.2E-006 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	2.0E-009	pass
2	TRANS	07	3.1E-011	pass
3	TRANS	08	9.8E-010	pass
4	TRANS	13	7.8E-011	pass
5	TRANS	16	3.9E-011	pass
6	TRANS	19	5.6E-008	pass
7	TRANS	20	9.9E-007	pass
8	TRANS	21-04	3.9E-010	pass
9	TRANS	21-06	1.1E-011	pass
10	TRANS	21-07	5.5E-009	pass
11	TRANS	21-11	7.8E-011	pass
12	TRANS	21-14	1.1E-009	pass
13	TRANS	21-15	1.2E-008	pass
14	TRANS	21-16	8.5E-008	pass

Scenario: Transient - No other failures completed at 10:11:59 PM

OCON-06 Scenario: Small LOCA - No other failures started at 10:11:59 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 11 of 00011 pass
Total CCDP: 2.8E-004 2.8E-004 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	04	1.5E-004	pass
2	SLOCA	06	4.2E-006	pass
3	SLOCA	07	1.1E-004	pass
4	SLOCA	11	4.3E-007	pass
5	SLOCA	13	1.2E-008	pass
6	SLOCA	14	3.3E-007	pass
7	SLOCA	17	5.0E-008	pass
8	SLOCA	19	1.4E-009	pass
9	SLOCA	21	7.0E-008	pass
10	SLOCA	22	1.2E-006	pass
11	SLOCA	23	5.5E-006	pass

Scenario: Small LOCA - No other failures completed at 10:13:12 PM

OCON-07 Scenario: SGTR - no other failures started at 10:13:12 PM
Assessment SGTR created
Initiating event IE-SGTR selected
Assessment processed
Sequences: 26 of 00026 pass
Total CCDP: 3.3E-004 3.3E-004 pass

#	Tree	Sequence	CCDP	Status
1	SGTR	03	1.2E-004	pass
2	SGTR	04	4.4E-005	pass
3	SGTR	05	1.0E-005	pass
4	SGTR	08	5.1E-006	pass
5	SGTR	09	1.9E-006	pass
6	SGTR	10	3.8E-007	pass
7	SGTR	11	1.3E-004	pass
8	SGTR	13	2.9E-006	pass
9	SGTR	14	2.7E-009	pass
10	SGTR	16	9.1E-008	pass
11	SGTR	18	2.6E-008	pass
12	SGTR	21	5.7E-007	pass
13	SGTR	22	2.0E-007	pass
14	SGTR	23	4.6E-008	pass
15	SGTR	26	2.4E-008	pass
16	SGTR	27	8.6E-009	pass
17	SGTR	28	1.7E-009	pass
18	SGTR	29	6.1E-007	pass
19	SGTR	31	1.3E-008	pass
20	SGTR	34	4.2E-010	pass
21	SGTR	36	1.2E-010	pass
22	SGTR	39	1.5E-007	pass
23	SGTR	41	4.7E-009	pass
24	SGTR	42	2.5E-006	pass
25	SGTR	43	2.2E-006	pass
26	SGTR	44	5.5E-006	pass

Scenario: SGTR - no other failures completed at 10:14:10 PM

OCON-08 Scenario: Grid-related LOOP - no other failures started at 10:14:10 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 20 of 00020 pass
Total CCDP: 8.6E-005 8.6E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	3.7E-009	pass
2	LOOP	07	5.9E-011	pass
3	LOOP	09	8.5E-010	pass
4	LOOP	10	2.0E-009	pass
5	LOOP	13	1.4E-006	pass
6	LOOP	16	4.1E-010	pass
7	LOOP	17	2.5E-005	pass
8	LOOP	18-02	3.1E-006	pass
9	LOOP	18-05	6.8E-009	pass
10	LOOP	18-07	1.9E-010	pass
11	LOOP	18-08	5.2E-009	pass
12	LOOP	18-09	1.8E-005	pass
13	LOOP	18-11	6.0E-007	pass
14	LOOP	18-14	1.3E-009	pass
15	LOOP	18-16	3.7E-011	pass
16	LOOP	18-17	9.9E-010	pass
17	LOOP	18-18	3.4E-006	pass
18	LOOP	18-20	1.5E-006	pass
19	LOOP	18-22	3.3E-005	pass
20	LOOP	19	8.9E-008	pass

Scenario: Grid-related LOOP - no other failures completed at 10:14:57 PM

OCON-09 Scenario: Plant-centered LOOP - no other failures started at 10:14:57 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 20 of 00020 pass
Total CCDP: 3.9E-005 3.9E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	3.9E-009	pass
2	LOOP	07	6.3E-011	pass
3	LOOP	09	5.2E-011	pass
4	LOOP	10	2.0E-009	pass
5	LOOP	13	1.4E-006	pass
6	LOOP	16	3.3E-012	pass
7	LOOP	17	2.5E-005	pass
8	LOOP	18-02	5.6E-008	pass
9	LOOP	18-05	1.2E-009	pass
10	LOOP	18-07	3.3E-011	pass
11	LOOP	18-08	8.9E-010	pass
12	LOOP	18-09	1.4E-006	pass
13	LOOP	18-11	1.1E-008	pass
14	LOOP	18-14	2.2E-010	pass
15	LOOP	18-16	6.3E-012	pass
16	LOOP	18-17	1.7E-010	pass
17	LOOP	18-18	2.7E-007	pass
18	LOOP	18-20	4.6E-007	pass
19	LOOP	18-22	1.0E-005	pass
20	LOOP	19	8.9E-008	pass

Scenario: Plant-centered LOOP - no other failures completed at 10:15:40 PM

OCON-10 Scenario: Severe Weather LOOP - no other failures started at 10:15:40 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 20 of 00020 pass
Total CCDP: 8.6E-004 8.6E-004 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	1.3E-009	pass
2	LOOP	07	2.0E-011	pass
3	LOOP	09	1.1E-008	pass
4	LOOP	10	2.0E-009	pass
5	LOOP	13	9.5E-007	pass
6	LOOP	16	7.6E-007	pass
7	LOOP	17	2.5E-005	pass
8	LOOP	18-02	4.8E-004	pass
9	LOOP	18-05	5.6E-009	pass
10	LOOP	18-07	1.6E-010	pass
11	LOOP	18-08	4.3E-009	pass
12	LOOP	18-09	1.6E-004	pass
13	LOOP	18-11	9.1E-005	pass
14	LOOP	18-14	1.1E-009	pass
15	LOOP	18-16	3.0E-011	pass
16	LOOP	18-17	8.1E-010	pass
17	LOOP	18-18	3.1E-005	pass
18	LOOP	18-20	2.8E-006	pass
19	LOOP	18-22	6.3E-005	pass
20	LOOP	19	8.9E-008	pass

Scenario: Severe Weather LOOP - no other failures completed at 10:16:32 PM

OCON-11 Scenario: Extreme Severe Weather LOOP - no other failures started at 10:16:32 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 11 of 00011 pass
Total CCDP: 1.6E-003 1.6E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	09	1.6E-008	pass
2	LOOP	10	2.0E-009	pass
3	LOOP	16	2.4E-006	pass
4	LOOP	17	2.5E-005	pass
5	LOOP	18-02	1.0E-003	pass
6	LOOP	18-09	2.3E-004	pass
7	LOOP	18-11	2.0E-004	pass
8	LOOP	18-18	4.3E-005	pass
9	LOOP	18-20	3.1E-006	pass
10	LOOP	18-22	7.0E-005	pass
11	LOOP	19	8.9E-008	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 10:17:11 PM

OCON-12 Scenario: Transient - EFW failed started at 10:17:11 PM
Assessment TRANS-AFW created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 10 of 00010 pass
Total CCDP: 9.6E-005 9.6E-005 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	2.0E-009	pass
2	TRANS	07	3.1E-011	pass
3	TRANS	08	9.8E-010	pass
4	TRANS	19	5.1E-006	pass
5	TRANS	20	9.0E-005	pass
6	TRANS	21-04	3.9E-010	pass
7	TRANS	21-06	1.1E-011	pass
8	TRANS	21-07	5.5E-009	pass
9	TRANS	21-15	1.1E-006	pass
10	TRANS	21-16	8.5E-008	pass

Scenario: Transient - EFW failed completed at 10:17:49 PM

TEST CASE COMPLETE: at 10:17:49 PM

TEST CASE : SAPHIRE QA Models (CDF_OYST)
DATE & TIME: 8/30/99 10:17:54 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: oyst_2qa

OYST-01 Scenario: Solve Fault Trees started at 10:18:24 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-15)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
AC-BD	6.600E-002		pass	6.600E-02	pass	1	pass
AC-SL	+0.000E+000		pass	0.000E+00	pass	1	pass
AC-ST	3.600E-001		pass	3.600E-01	pass	1	pass
ATWS-1	1.000E+000		pass	1.000E+00	pass	1	pass
ATWS-2	1.000E+000		pass	1.000E+00	pass	1	pass
CD1	1.173E-003		pass	1.173E-03	pass	11	pass
CDS	3.513E-002		pass	3.513E-02	pass	12	pass
CR1	1.032E-002		pass	1.032E-02	pass	9	pass
CRD	1.480E-002		pass	1.480E-02	pass	8	pass
CSS	1.729E-004		pass	1.729E-04	pass	21	pass
CSS-TRAB	3.844E-004		pass	3.844E-04	pass	5	pass
CSS-TRCD	3.844E-004		pass	3.844E-04	pass	5	pass
CTS	1.040E-002		pass	1.040E-02	pass	4	pass
CVS	1.198E-002		pass	1.198E-02	pass	3	pass
DE1	1.109E-002		pass	1.109E-02	pass	6	pass
DE2	1.027E-002		pass	1.027E-02	pass	3	pass
DEP	1.268E-002		pass	1.268E-02	pass	12	pass
DG1	3.947E-002		pass	3.947E-02	pass	2	pass
DG2	3.947E-002		pass	3.947E-02	pass	2	pass
DIV-1-AC	9.000E-005		pass	9.000E-05	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
AC-BD	0.000E+00		pass
AC-SL	0.000E+00		pass
AC-ST	0.000E+00		pass
ATWS-1	0.000E+00		pass
ATWS-2	0.000E+00		pass
CD1	0.000E+00		pass
CDS	0.000E+00		pass
CR1	0.000E+00		pass
CRD	0.000E+00		pass
CSS	0.000E+00		pass
CSS-TRAB	0.000E+00		pass
CSS-TRCD	0.000E+00		pass
CTS	0.000E+00		pass
CVS	0.000E+00		pass
DE1	0.000E+00		pass
DE2	0.000E+00		pass
DEP	0.000E+00		pass
DG1	0.000E+00		pass
DG2	0.000E+00		pass
DIV-1-AC	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
DIV-2-AC	9.000E-005		pass	9.000E-05	pass	1	pass
EPS	4.898E-003		pass	4.898E-03	pass	5	pass
FW1	1.011E-002		pass	1.011E-02	pass	12	pass

FW2	6.941E-002	pass	6.941E-02	pass	8	pass
FWS	1.107E-003	pass	1.107E-03	pass	12	pass
ISO	3.588E-002	pass	3.588E-02	pass	53	pass
LCS	1.199E-003	pass	1.199E-03	pass	46	pass
LCS-3	5.406E-004	pass	5.406E-04	pass	10	pass
LVL	2.500E-002	pass	2.500E-02	pass	1	pass
MF1	1.192E-003	pass	1.192E-03	pass	21	pass
MFW	4.104E-002	pass	4.104E-02	pass	23	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
DIV-2-AC	0.000E+00		pass
EPS	0.000E+00		pass
FW1	0.000E+00		pass
FW2	0.000E+00		pass
FWS	0.000E+00		pass
ISO	0.000E+00		pass
LCS	0.000E+00		pass
LCS-3	0.000E+00		pass
LVL	0.000E+00		pass
MF1	0.000E+00		pass
MFW	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
MSV	1.000E-002		pass	1.000E-02	pass	1	pass
NX	2.500E-002		pass	2.500E-02	pass	1	pass
P1	8.000E-002		pass	8.000E-02	pass	1	pass
P2	1.300E-003		pass	1.300E-03	pass	1	pass
P3	2.000E-004		pass	2.000E-04	pass	1	pass
PC1	2.816E-002		pass	2.816E-02	pass	22	pass
PC2	3.761E-001		pass	3.761E-01	pass	26	pass
PCS	3.627E-001		pass	3.627E-01	pass	26	pass
PPR	+0.000E+000		pass	0.000E+00	pass	1	pass
RPS	1.015E-005		pass	1.015E-05	pass	7	pass
RRS	2.498E-003		pass	2.498E-03	pass	5	pass
S2-NR	5.000E-001		pass	5.000E-01	pass	1	pass
SD1	3.646E-002		pass	3.646E-02	pass	9	pass
SDC	3.549E-002		pass	3.549E-02	pass	8	pass
SEALS	+0.000E+000		pass	0.000E+00	pass	1	pass
SLC	1.085E-002		pass	1.085E-02	pass	13	pass
SRV	8.138E-002		pass	8.138E-02	pass	3	pass
TAF	2.500E-002		pass	2.500E-02	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
MSV	0.000E+00		pass
NX	0.000E+00		pass
P1	0.000E+00		pass
P2	0.000E+00		pass
P3	0.000E+00		pass
PC1	0.000E+00		pass
PC2	0.000E+00		pass
PCS	0.000E+00		pass
PPR	0.000E+00		pass
RPS	0.000E+00		pass
RRS	0.000E+00		pass
S2-NR	0.000E+00		pass
SD1	0.000E+00		pass
SDC	0.000E+00		pass
SEALS	0.000E+00		pass
SLC	0.000E+00		pass
SRV	0.000E+00		pass
TAF	0.000E+00		pass

Scenario: Solve Fault Trees completed at 10:19:33 PM

OYST-02 Scenario: Core Damage Frequency Test started at 10:19:33 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-15) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	06	6.173E-016	pass	6.173E-16	pass	2	pass
LOOP	07	6.454E-014	pass	6.454E-14	pass	37	pass
LOOP	11	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	12	6.744E-011	pass	6.744E-11	pass	62	pass
LOOP	15	1.299E-015	pass	1.299E-15	pass	3	pass
LOOP	16	1.409E-010	pass	1.409E-10	pass	335	pass
LOOP	20	1.527E-014	pass	1.527E-14	pass	2	pass
LOOP	21	2.090E-012	pass	2.090E-12	pass	23	pass
LOOP	22	5.241E-010	pass	5.241E-10	pass	43	pass
LOOP	23	1.009E-008	pass	1.009E-08	pass	6	pass
LOOP	27	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	28	3.275E-014	pass	3.275E-14	pass	10	pass
LOOP	29	8.517E-012	pass	8.517E-12	pass	21	pass
LOOP	30	1.517E-010	pass	1.517E-10	pass	3	pass
LOOP	34	0.000E+000	pass	0.000E+00	pass	0	pass
LOOP	35	3.817E-015	pass	3.817E-15	pass	2	pass
LOOP	36	1.309E-012	pass	1.309E-12	pass	12	pass
LOOP	37-2	4.755E-009	pass	4.755E-09	pass	5	pass
LOOP	37-4	+0.000E+000	pass	0.000E+00	pass	1	pass
LOOP	37-6	3.190E-010	pass	3.190E-10	pass	93	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	06	0.000E+00	pass
LOOP	07	0.000E+00	pass
LOOP	11	0.000E+00	pass
LOOP	12	0.000E+00	pass
LOOP	15	0.000E+00	pass
LOOP	16	0.000E+00	pass
LOOP	20	0.000E+00	pass
LOOP	21	0.000E+00	pass
LOOP	22	0.000E+00	pass
LOOP	23	0.000E+00	pass
LOOP	27	0.000E+00	pass
LOOP	28	0.000E+00	pass
LOOP	29	0.000E+00	pass
LOOP	30	0.000E+00	pass
LOOP	34	0.000E+00	pass
LOOP	35	0.000E+00	pass
LOOP	36	0.000E+00	pass
LOOP	37-2	0.000E+00	pass
LOOP	37-4	0.000E+00	pass
LOOP	37-6	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	37-7	6.275E-009	pass	6.275E-09	pass	5	pass
LOOP	37-8	1.020E-010	pass	1.020E-10	pass	4	pass
LOOP	37-9	1.569E-011	pass	1.569E-11	pass	4	pass
LOOP	38	5.522E-011	pass	5.522E-11	pass	7	pass
SLOCA	05	6.459E-014	pass	6.459E-14	pass	7	pass
SLOCA	08	6.653E-016	pass	6.653E-16	pass	2	pass
SLOCA	12	0.000E+000	pass	0.000E+00	pass	0	pass
SLOCA	13	0.000E+000	pass	0.000E+00	pass	0	pass
SLOCA	14	2.424E-013	pass	2.424E-13	pass	15	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	37-7	0.000E+00	pass
LOOP	37-8	0.000E+00	pass
LOOP	37-9	0.000E+00	pass
LOOP	38	0.000E+00	pass
SLOCA	05	0.000E+00	pass
SLOCA	08	0.000E+00	pass
SLOCA	12	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	14	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SLOCA	15	5.242E-012	pass	5.242E-12	pass	22	pass
SLOCA	16	5.694E-012	pass	5.694E-12	pass	7	pass
TRAN	06	5.880E-015	pass	5.880E-15	pass	56	pass
TRAN	10	4.073E-017	pass	4.073E-17	pass	8	pass
TRAN	15	1.199E-018	pass	1.199E-18	pass	1	pass
TRAN	16	2.059E-016	pass	2.059E-16	pass	13	pass
TRAN	20	0.000E+000	pass	0.000E+00	pass	0	pass
TRAN	21	1.682E-011	pass	1.682E-11	pass	150	pass
TRAN	24	8.903E-017	pass	8.903E-17	pass	2	pass
TRAN	25	6.658E-012	pass	6.658E-12	pass	297	pass
TRAN	29	1.227E-011	pass	1.227E-11	pass	36	pass
TRAN	32	8.413E-014	pass	8.413E-14	pass	14	pass
TRAN	36	3.290E-015	pass	3.290E-15	pass	2	pass
TRAN	37	4.019E-013	pass	4.019E-13	pass	11	pass
TRAN	38	1.386E-010	pass	1.386E-10	pass	46	pass
TRAN	39	2.641E-009	pass	2.641E-09	pass	45	pass
TRAN	42	5.730E-013	pass	5.730E-13	pass	10	pass
TRAN	45	9.592E-016	pass	9.592E-16	pass	2	pass
TRAN	47	0.000E+000	pass	0.000E+00	pass	0	pass
TRAN	49	0.000E+000	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	15	0.000E+00	pass
SLOCA	16	0.000E+00	pass
TRAN	06	0.000E+00	pass
TRAN	10	0.000E+00	pass
TRAN	15	0.000E+00	pass
TRAN	16	0.000E+00	pass
TRAN	20	0.000E+00	pass
TRAN	21	0.000E+00	pass
TRAN	24	0.000E+00	pass
TRAN	25	0.000E+00	pass
TRAN	29	0.000E+00	pass
TRAN	32	0.000E+00	pass
TRAN	36	0.000E+00	pass
TRAN	37	0.000E+00	pass
TRAN	38	0.000E+00	pass
TRAN	39	0.000E+00	pass
TRAN	42	0.000E+00	pass
TRAN	45	0.000E+00	pass
TRAN	47	0.000E+00	pass
TRAN	49	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	50	5.983E-015	pass	5.983E-15	pass	4	pass
TRAN	51	2.251E-012	pass	2.251E-12	pass	17	pass
TRAN	52	3.970E-011	pass	3.970E-11	pass	20	pass
TRAN	56	0.000E+000	pass	0.000E+00	pass	0	pass
TRAN	57	8.699E-014	pass	8.699E-14	pass	7	pass
TRAN	58	2.447E-011	pass	2.447E-11	pass	5	pass
TRAN	59-02	2.576E-011	pass	2.576E-11	pass	2	pass
TRAN	59-03-5	0.000E+000	pass	0.000E+00	pass	0	pass
TRAN	59-03-6	0.000E+000	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	50	0.000E+00	pass
TRAN	51	0.000E+00	pass
TRAN	52	0.000E+00	pass
TRAN	56	0.000E+00	pass
TRAN	57	0.000E+00	pass
TRAN	58	0.000E+00	pass
TRAN	59-02	0.000E+00	pass
TRAN	59-03-5	0.000E+00	pass
TRAN	59-03-6	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRAN	59-03-7	4.309E-015	pass	4.309E-15	pass	3	pass
TRAN	59-03-8	9.216E-014	pass	9.216E-14	pass	3	pass
TRAN	59-04	2.576E-013	pass	2.576E-13	pass	2	pass
TRAN	59-06	1.118E-011	pass	1.118E-11	pass	14	pass
TRAN	59-07-5	0.000E+000	pass	0.000E+00	pass	0	pass
TRAN	59-07-6	0.000E+000	pass	0.000E+00	pass	0	pass
TRAN	59-07-7	1.779E-013	pass	1.779E-13	pass	20	pass
TRAN	59-07-8	3.779E-012	pass	3.779E-12	pass	23	pass
TRAN	59-08	1.054E-011	pass	1.054E-11	pass	15	pass
TRAN	59-09	1.054E-011	pass	1.054E-11	pass	15	pass
TRAN	59-10	4.570E-012	pass	4.570E-12	pass	39	pass
TRAN	59-11	+0.000E+000	pass	0.000E+00	pass	1	pass
TRAN	59-12	7.650E-012	pass	7.650E-12	pass	10	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRAN	59-03-7	0.000E+00	pass
TRAN	59-03-8	0.000E+00	pass
TRAN	59-04	0.000E+00	pass
TRAN	59-06	0.000E+00	pass
TRAN	59-07-5	0.000E+00	pass
TRAN	59-07-6	0.000E+00	pass
TRAN	59-07-7	0.000E+00	pass
TRAN	59-07-8	0.000E+00	pass
TRAN	59-08	0.000E+00	pass
TRAN	59-09	0.000E+00	pass
TRAN	59-10	0.000E+00	pass
TRAN	59-11	0.000E+00	pass
TRAN	59-12	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 10:21:21 PM

TEST CASE COMPLETE: at 10:21:22 PM

TEST CASE : GEM Condition Assessments (COND_OYST)
DATE & TIME: 8/30/99 10:21:24 PM

TEST FOR: GEM Version 6.63

Project oyst_2qa is open

OYST-03 Scenario: Condition MFW out of service for 72 hours started at 10:21:30 PM
Assessment MFW-72HRS created
Assessment processed
Sequences: 56 of 00056 pass
Total CCDP: 6.9E-006 6.9E-006 pass
Total CDP: 1.8E-006 1.8E-006 pass
Total Importance: 5.1E-006 5.1E-006 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	06	4.4E-014	4.4E-014	+0.0E+000	pass
2	LOOP	07	4.7E-012	4.7E-012	+0.0E+000	pass
3	LOOP	12	4.9E-009	4.9E-009	+0.0E+000	pass
4	LOOP	15	9.4E-014	9.4E-014	+0.0E+000	pass
5	LOOP	16	1.0E-008	1.0E-008	+0.0E+000	pass
6	LOOP	20	1.1E-012	1.1E-012	+0.0E+000	pass
7	LOOP	21	1.5E-010	1.5E-010	+0.0E+000	pass
8	LOOP	22	3.8E-008	3.8E-008	+0.0E+000	pass
9	LOOP	23	7.3E-007	7.3E-007	+0.0E+000	pass
10	LOOP	28	2.4E-012	2.4E-012	+0.0E+000	pass
11	LOOP	29	6.1E-010	6.1E-010	+0.0E+000	pass
12	LOOP	30	1.1E-008	1.1E-008	+0.0E+000	pass
13	LOOP	35	2.8E-013	2.8E-013	+0.0E+000	pass
14	LOOP	36	9.4E-011	9.4E-011	+0.0E+000	pass
15	LOOP	37-2	3.4E-007	3.4E-007	+0.0E+000	pass
16	LOOP	37-6	2.3E-008	2.3E-008	+0.0E+000	pass
17	LOOP	37-7	4.5E-007	4.5E-007	+0.0E+000	pass
18	LOOP	37-8	7.3E-009	7.3E-009	+0.0E+000	pass
19	LOOP	37-9	1.1E-009	1.1E-009	+0.0E+000	pass
20	LOOP	38	4.0E-009	4.0E-009	+0.0E+000	pass
21	SLOCA	05	+0.0E+000	4.7E-012	-4.7E-012	pass
22	SLOCA	08	5.9E-011	4.8E-014	5.9E-011	pass
23	SLOCA	14	1.4E-008	1.8E-011	1.4E-008	pass
24	SLOCA	15	3.2E-007	3.8E-010	3.2E-007	pass
25	SLOCA	16	4.1E-010	4.1E-010	+0.0E+000	pass
26	TRAN	06	+0.0E+000	4.2E-013	-4.2E-013	pass
27	TRAN	10	4.5E-013	2.9E-015	4.4E-013	pass
28	TRAN	15	8.6E-017	8.6E-017	+0.0E+000	pass
29	TRAN	16	1.5E-014	1.5E-014	+0.0E+000	pass
30	TRAN	21	2.8E-008	1.2E-009	2.7E-008	pass
31	TRAN	24	4.0E-013	6.4E-015	4.0E-013	pass
32	TRAN	25	1.1E-008	4.8E-010	1.1E-008	pass
33	TRAN	29	+0.0E+000	8.8E-010	-8.8E-010	pass
34	TRAN	32	8.6E-010	6.1E-012	8.5E-010	pass
35	TRAN	36	2.4E-013	2.4E-013	+0.0E+000	pass
36	TRAN	37	2.9E-011	2.9E-011	+0.0E+000	pass
37	TRAN	38	2.1E-007	1.0E-008	2.0E-007	pass
38	TRAN	39	4.6E-006	1.9E-007	4.4E-006	pass
39	TRAN	42	+0.0E+000	4.1E-011	-4.1E-011	pass
40	TRAN	45	1.4E-011	6.9E-014	1.4E-011	pass
41	TRAN	50	4.3E-013	4.3E-013	+0.0E+000	pass
42	TRAN	51	3.4E-009	1.6E-010	3.2E-009	pass
43	TRAN	52	6.9E-008	2.9E-009	6.6E-008	pass
44	TRAN	57	6.3E-012	6.3E-012	+0.0E+000	pass
45	TRAN	58	1.8E-009	1.8E-009	+0.0E+000	pass
46	TRAN	59-02	+0.0E+000	1.9E-009	-1.9E-009	pass
47	TRAN	59-03-7	+0.0E+000	3.1E-013	-3.1E-013	pass
48	TRAN	59-03-8	+0.0E+000	6.6E-012	-6.6E-012	pass
49	TRAN	59-04	+0.0E+000	1.9E-011	-1.9E-011	pass
50	TRAN	59-06	+0.0E+000	8.1E-010	-8.1E-010	pass
51	TRAN	59-07-7	3.1E-011	1.3E-011	1.9E-011	pass
52	TRAN	59-07-8	6.7E-010	2.7E-010	3.9E-010	pass
53	TRAN	59-08	1.9E-009	7.6E-010	1.1E-009	pass

54	TRAN	59-09	1.9E-009	7.6E-010	1.1E-009	pass
55	TRAN	59-10	8.1E-010	3.3E-010	4.8E-010	pass
56	TRAN	59-12	5.5E-010	5.5E-010	+0.0E+000	pass

Scenario: Condition MFW out of service for 72 hours completed at 10:21:59 PM

OYST-04 Scenario: Condition EDG out of service for 3 months started at 10:21:59 PM
Assessment EDG-2190HRS created
Assessment processed Sequences: 57 of 00057 pass
Total CCDP: 2.4E-004 2.4E-004 pass
Total CDP: 5.6E-005 5.6E-005 pass
Total Importance: 1.8E-004 1.8E-004 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	06	7.2E-012	1.4E-012	5.8E-012	pass
2	LOOP	07	5.3E-010	1.4E-010	3.9E-010	pass
3	LOOP	11	6.9E-013	+0.0E+000	6.9E-013	pass
4	LOOP	12	1.5E-007	1.5E-007	+0.0E+000	pass
5	LOOP	15	+0.0E+000	2.8E-012	-2.8E-012	pass
6	LOOP	16	3.6E-006	3.1E-007	3.2E-006	pass
7	LOOP	20	1.3E-010	3.3E-011	9.2E-011	pass
8	LOOP	21	1.1E-008	4.6E-009	6.5E-009	pass
9	LOOP	22	1.2E-006	1.2E-006	5.9E-008	pass
10	LOOP	23	2.2E-005	2.2E-005	+0.0E+000	pass
11	LOOP	28	1.8E-010	7.2E-011	1.1E-010	pass
12	LOOP	29	2.0E-008	1.9E-008	9.6E-010	pass
13	LOOP	30	3.3E-007	3.3E-007	+0.0E+000	pass
14	LOOP	35	2.2E-011	8.4E-012	1.4E-011	pass
15	LOOP	36	3.0E-009	2.9E-009	1.5E-010	pass
16	LOOP	37-2	8.4E-005	1.0E-005	7.4E-005	pass
17	LOOP	37-6	5.7E-006	7.0E-007	5.0E-006	pass
18	LOOP	37-7	1.1E-004	1.4E-005	9.8E-005	pass
19	LOOP	37-8	1.8E-006	2.2E-007	1.6E-006	pass
20	LOOP	37-9	2.8E-007	3.4E-008	2.4E-007	pass
21	LOOP	38	1.2E-007	1.2E-007	+0.0E+000	pass
22	SLOCA	05	1.4E-010	1.4E-010	+0.0E+000	pass
23	SLOCA	08	1.5E-012	1.5E-012	+0.0E+000	pass
24	SLOCA	14	5.3E-010	5.3E-010	+0.0E+000	pass
25	SLOCA	15	1.2E-008	1.2E-008	+0.0E+000	pass
26	SLOCA	16	1.3E-008	1.3E-008	+0.0E+000	pass
27	TRAN	06	1.3E-011	1.3E-011	+0.0E+000	pass
28	TRAN	10	8.9E-014	8.9E-014	+0.0E+000	pass
29	TRAN	15	2.6E-015	2.6E-015	+0.0E+000	pass
30	TRAN	16	4.5E-013	4.5E-013	+0.0E+000	pass
31	TRAN	21	3.7E-008	3.7E-008	+0.0E+000	pass
32	TRAN	24	2.0E-013	2.0E-013	+0.0E+000	pass
33	TRAN	25	1.5E-008	1.5E-008	+0.0E+000	pass
34	TRAN	29	2.7E-008	2.7E-008	+0.0E+000	pass
35	TRAN	32	1.8E-010	1.8E-010	+0.0E+000	pass
36	TRAN	36	7.2E-012	7.2E-012	+0.0E+000	pass
37	TRAN	37	8.8E-010	8.8E-010	+0.0E+000	pass
38	TRAN	38	3.0E-007	3.0E-007	+0.0E+000	pass
39	TRAN	39	5.8E-006	5.8E-006	+0.0E+000	pass
40	TRAN	42	1.3E-009	1.3E-009	+0.0E+000	pass
41	TRAN	45	2.1E-012	2.1E-012	+0.0E+000	pass
42	TRAN	50	1.3E-011	1.3E-011	+0.0E+000	pass
43	TRAN	51	4.9E-009	4.9E-009	+0.0E+000	pass
44	TRAN	52	8.7E-008	8.7E-008	+0.0E+000	pass
45	TRAN	57	1.9E-010	1.9E-010	+0.0E+000	pass
46	TRAN	58	5.4E-008	5.4E-008	+0.0E+000	pass
47	TRAN	59-02	5.6E-008	5.6E-008	+0.0E+000	pass
48	TRAN	59-03-7	9.4E-012	9.4E-012	+0.0E+000	pass
49	TRAN	59-03-8	2.0E-010	2.0E-010	+0.0E+000	pass
50	TRAN	59-04	5.6E-010	5.6E-010	+0.0E+000	pass
51	TRAN	59-06	2.5E-008	2.5E-008	+0.0E+000	pass
52	TRAN	59-07-7	3.9E-010	3.9E-010	+0.0E+000	pass
53	TRAN	59-07-8	8.3E-009	8.3E-009	+0.0E+000	pass
54	TRAN	59-08	2.3E-008	2.3E-008	+0.0E+000	pass
55	TRAN	59-09	2.3E-008	2.3E-008	+0.0E+000	pass
56	TRAN	59-10	1.0E-008	1.0E-008	+0.0E+000	pass
57	TRAN	59-12	1.7E-008	1.7E-008	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 10:22:33 PM
TEST CASE COMPLETE: at 10:22:33 PM

TEST CASE : GEM Initiating Events (IE_OYST)
DATE & TIME: 8/30/99 10:22:34 PM

TEST FOR: GEM Version 6.63

Project oyst_2qa is open

OYST-05 Scenario: Transient - No other failures started at 10:22:39 PM
Assessment TRANS created
Initiating event IE-TRAN selected
Assessment processed
Sequences: 31 of 00031 . pass
Total CCDP: 9.9E-006 9.9E-006 pass

#	Tree	Sequence	CCDP	Status
1	TRAN	06	2.0E-011	pass
2	TRAN	10	1.5E-013	pass
3	TRAN	15	6.0E-015	pass
4	TRAN	16	7.1E-013	pass
5	TRAN	21	5.6E-008	pass
6	TRAN	24	8.1E-013	pass
7	TRAN	25	2.2E-008	pass
8	TRAN	29	4.1E-008	pass
9	TRAN	32	2.8E-010	pass
10	TRAN	36	1.2E-011	pass
11	TRAN	37	1.3E-009	pass
12	TRAN	38	4.6E-007	pass
13	TRAN	39	8.8E-006	pass
14	TRAN	42	1.9E-009	pass
15	TRAN	45	4.6E-012	pass
16	TRAN	50	2.2E-011	pass
17	TRAN	51	7.5E-009	pass
18	TRAN	52	1.3E-007	pass
19	TRAN	57	2.9E-010	pass
20	TRAN	58	8.2E-008	pass
21	TRAN	59-02	8.6E-008	pass
22	TRAN	59-03-7	1.5E-011	pass
23	TRAN	59-03-8	3.1E-010	pass
24	TRAN	59-04	8.6E-010	pass
25	TRAN	59-06	3.7E-008	pass
26	TRAN	59-07-7	6.0E-010	pass
27	TRAN	59-07-8	1.3E-008	pass
28	TRAN	59-08	3.5E-008	pass
29	TRAN	59-09	3.5E-008	pass
30	TRAN	59-10	1.5E-008	pass
31	TRAN	59-12	2.6E-008	pass

Scenario: Transient - No other failures completed at 10:23:19 PM

OYST-06 Scenario: Small LOCA - No other failures started at 10:23:19 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 5 of 00005 pass
Total CCDP: 3.4E-006 3.4E-006 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	05	2.0E-008	pass
2	SLOCA	08	2.5E-010	pass
3	SLOCA	14	7.4E-008	pass
4	SLOCA	15	1.6E-006	pass
5	SLOCA	16	1.7E-006	pass

Scenario: Small LOCA - No other failures completed at 10:23:39 PM

OYST-07 Scenario: Grid-related LOOP - no other failures started at 10:23:39 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 23 of 00023 pass
Total CCDP: 1.1E-003 1.1E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	06	5.6E-011	pass
2	LOOP	07	4.2E-009	pass
3	LOOP	11	2.8E-012	pass
4	LOOP	12	4.2E-006	pass
5	LOOP	15	1.5E-010	pass
6	LOOP	16	8.4E-006	pass
7	LOOP	20	1.2E-009	pass
8	LOOP	21	1.3E-007	pass
9	LOOP	22	3.3E-005	pass
10	LOOP	23	6.3E-004	pass
11	LOOP	27	1.9E-011	pass
12	LOOP	28	2.1E-009	pass
13	LOOP	29	5.3E-007	pass
14	LOOP	30	9.5E-006	pass
15	LOOP	34	2.9E-012	pass
16	LOOP	35	3.3E-010	pass
17	LOOP	36	8.2E-008	pass
18	LOOP	37-2	6.1E-006	pass
19	LOOP	37-6	2.2E-005	pass
20	LOOP	37-7	3.5E-004	pass
21	LOOP	37-8	5.7E-006	pass
22	LOOP	37-9	8.7E-007	pass
23	LOOP	38	3.5E-006	pass

Scenario: Grid-related LOOP - no other failures completed at 10:24:19 PM

OYST-08 Scenario: Plant-centered LOOP - no other failures started at 10:24:19 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 23 of 00023 pass
Total CCDP: 1.1E-003 1.1E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	06	5.5E-011	pass
2	LOOP	07	4.1E-009	pass
3	LOOP	11	2.7E-012	pass
4	LOOP	12	4.2E-006	pass
5	LOOP	15	1.5E-010	pass
6	LOOP	16	8.2E-006	pass
7	LOOP	20	1.2E-009	pass
8	LOOP	21	1.3E-007	pass
9	LOOP	22	3.3E-005	pass
10	LOOP	23	6.3E-004	pass
11	LOOP	27	1.9E-011	pass
12	LOOP	28	2.1E-009	pass
13	LOOP	29	5.3E-007	pass
14	LOOP	30	9.5E-006	pass
15	LOOP	34	2.9E-012	pass
16	LOOP	35	3.2E-010	pass
17	LOOP	36	8.2E-008	pass
18	LOOP	37-2	1.5E-006	pass
19	LOOP	37-6	1.3E-005	pass
20	LOOP	37-7	3.4E-004	pass
21	LOOP	37-8	5.5E-006	pass
22	LOOP	37-9	8.5E-007	pass
23	LOOP	38	3.5E-006	pass

Scenario: Plant-centered LOOP - no other failures completed at 10:25:00 PM

OYST-09 Scenario: Severe Weather LOOP - no other failures started at 10:25:00 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 23 of 00023 pass
Total CCDP: 3.3E-003 3.3E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	06	6.6E-011	pass
2	LOOP	07	4.8E-009	pass
3	LOOP	11	4.2E-012	pass
4	LOOP	12	4.2E-006	pass
5	LOOP	15	1.5E-010	pass
6	LOOP	16	1.4E-005	pass
7	LOOP	20	1.3E-009	pass
8	LOOP	21	1.4E-007	pass
9	LOOP	22	3.3E-005	pass
10	LOOP	23	6.3E-004	pass
11	LOOP	27	2.1E-011	pass
12	LOOP	28	2.3E-009	pass
13	LOOP	29	5.3E-007	pass
14	LOOP	30	9.5E-006	pass
15	LOOP	34	3.2E-012	pass
16	LOOP	35	3.5E-010	pass
17	LOOP	36	8.2E-008	pass
18	LOOP	37-2	1.8E-003	pass
19	LOOP	37-6	7.9E-005	pass
20	LOOP	37-7	6.8E-004	pass
21	LOOP	37-8	1.1E-005	pass
22	LOOP	37-9	1.7E-006	pass
23	LOOP	38	3.5E-006	pass

Scenario: Severe Weather LOOP - no other failures completed at 10:25:43 PM

OYST-10 Scenario: Extreme Severe Weather LOOP - no other failures started at 10:25:43 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 23 of 00023 pass
Total CCDP: 7.0E-003 7.0E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	06	7.3E-011	pass
2	LOOP	07	5.2E-009	pass
3	LOOP	11	5.0E-012	pass
4	LOOP	12	4.2E-006	pass
5	LOOP	15	1.5E-010	pass
6	LOOP	16	1.7E-005	pass
7	LOOP	20	1.4E-009	pass
8	LOOP	21	1.5E-007	pass
9	LOOP	22	3.3E-005	pass
10	LOOP	23	6.3E-004	pass
11	LOOP	27	2.2E-011	pass
12	LOOP	28	2.4E-009	pass
13	LOOP	29	5.4E-007	pass
14	LOOP	30	9.5E-006	pass
15	LOOP	34	3.4E-012	pass
16	LOOP	35	3.7E-010	pass
17	LOOP	36	8.2E-008	pass
18	LOOP	37-2	5.3E-003	pass
19	LOOP	37-6	1.2E-004	pass
20	LOOP	37-7	9.2E-004	pass
21	LOOP	37-8	1.5E-005	pass
22	LOOP	37-9	2.3E-006	pass
23	LOOP	38	3.5E-006	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 10:26:27 PM

OYST-11 Scenario: Transient - MFW failed started at 10:26:27 PM
Assessment TRAN-MFW created
Initiating event IE-TRAN selected
Assessment processed
Sequences: 27 of 00027 pass
Total CCDP: 2.3E-004 2.3E-004 pass

#	Tree	Sequence	CCDP	Status
1	TRAN	10	2.1E-011	pass
2	TRAN	15	6.0E-015	pass
3	TRAN	16	7.1E-013	pass
4	TRAN	20	3.3E-016	pass
5	TRAN	21	1.3E-006	pass
6	TRAN	24	2.0E-011	pass
7	TRAN	25	5.2E-007	pass
8	TRAN	32	4.0E-008	pass
9	TRAN	36	1.2E-011	pass
10	TRAN	37	1.3E-009	pass
11	TRAN	38	9.7E-006	pass
12	TRAN	39	2.1E-004	pass
13	TRAN	45	6.5E-010	pass
14	TRAN	49	1.9E-013	pass
15	TRAN	50	2.2E-011	pass
16	TRAN	51	1.6E-007	pass
17	TRAN	52	3.2E-006	pass
18	TRAN	57	2.9E-010	pass
19	TRAN	58	8.2E-008	pass
20	TRAN	59-07-5	4.4E-016	pass
21	TRAN	59-07-6	6.0E-014	pass
22	TRAN	59-07-7	1.5E-009	pass
23	TRAN	59-07-8	3.1E-008	pass
24	TRAN	59-08	8.6E-008	pass
25	TRAN	59-09	8.6E-008	pass
26	TRAN	59-10	3.7E-008	pass
27	TRAN	59-12	2.6E-008	pass

Scenario: Transient - MFW failed completed at 10:27:05 PM

TEST CASE COMPLETE: at 10:27:05 PM

TEST CASE : SAPHIRE QA Models (CDF_SONG)
DATE & TIME: 8/30/99 10:27:12 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: song_2qa

SONG-01 Scenario: Solve Fault Trees started at 10:27:40 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-16)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status	
ACP-ST	5.800E-01	pass		5.800E-01	pass 1	pass		
AFW	1.761E-04	pass		1.761E-04	pass 218		pass	
AFW-ATWS	1.471E-03	pass		1.471E-03	pass 48		pass	
AFW-L	1.761E-04	pass		1.761E-04	pass 218		pass	
AFW-SGTR	7.789E-04	pass		7.789E-04	pass 22		pass	
BORATION	1.000E-02	pass		1.000E-02	pass 1	pass		
COND	1.000E+00		pass	1.000E+00		pass	2	pass
COND-SGT	1.000E+00		pass	1.000E+00		pass	3	pass
COOLDOWN	3.997E-03	pass		3.997E-03	pass 2	pass		
DEP-REC	3.500E-03	pass		3.500E-03	pass 1	pass		
EP	3.871E-03	pass		3.871E-03	pass 5	pass		
HPI	1.667E-04	pass		1.667E-04	pass 736		pass	
HPI-L	1.667E-04	pass		1.667E-04	pass 736		pass	
HPR	1.675E-03	pass		1.675E-03	pass 1395		pass	
HPR-L	1.675E-03	pass		1.675E-03	pass 1395		pass	
MFW-A	2.000E-01	pass		2.000E-01	pass 1	pass		
MFW-NT	5.000E-02	pass		5.000E-02	pass 1	pass		
MFW-T	4.000E-02	pass		4.000E-02	pass 1	pass		
OP-BD	4.700E-02	pass		4.700E-02	pass 1	pass		
OP-SL	7.100E-01	pass		7.100E-01	pass 1	pass		

Compare Mean:

Fault Tree	Mean	Status	Failure
ACP-ST	0.000E+00		pass
AFW	0.000E+00		pass
AFW-ATWS	0.000E+00		pass
AFW-L	0.000E+00		pass
AFW-SGTR	0.000E+00		pass
BORATION	0.000E+00		pass
COND	0.000E+00		pass
COND-SGT	0.000E+00		pass
COOLDOWN	0.000E+00		pass
DEP-REC	0.000E+00		pass
EP	0.000E+00		pass
HPI	0.000E+00		pass
HPI-L	0.000E+00		pass
HPR	0.000E+00		pass
HPR-L	0.000E+00		pass
MFW-A	0.000E+00		pass
MFW-NT	0.000E+00		pass
MFW-T	0.000E+00		pass
OP-BD	0.000E+00		pass
OP-SL	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
RCS-DEP	3.997E-03	pass		3.997E-03	pass 2	pass	
RCS-DEP1	1.396E-02	pass		1.396E-02	pass 3	pass	
RCS-SG	3.738E-02	pass		3.738E-02	pass 3	pass	
RCS-SG1	2.766E-02	pass		2.766E-02	pass 2	pass	
RCSPRESS	1.303E-02	pass		1.303E-02	pass 2	pass	
RHR	5.029E-03	pass		5.029E-03	pass 56		pass

RHR-L	5.029E-03	pass		5.029E-03	pass 56		pass
RT	5.529E-06	pass		5.529E-06	pass 3	pass	
RT-L	8.900E-08	pass		8.900E-08	pass 1	pass	
SEALLOCA	3.300E-04	pass		3.300E-04	pass 1	pass	
SG-DEP	1.000E-05	pass		1.000E-05	pass 1	pass	

Compare Mean:

Fault Tree	Mean	Status	Failure
RCS-DEP	0.000E+00		pass
RCS-DEP1	0.000E+00		pass
RCS-SG	0.000E+00		pass
RCS-SG1	0.000E+00		pass
RCSPRESS	0.000E+00		pass
RHR	0.000E+00		pass
RHR-L	0.000E+00		pass
RT	0.000E+00		pass
RT-L	0.000E+00		pass
SEALLOCA	0.000E+00		pass
SG-DEP	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
SGISOL	1.099E-02	pass		1.099E-02	pass 2	pass	
SGISOL1	1.228E-02	pass		1.228E-02	pass 4	pass	
SLOCA-NR	4.300E-01	pass		4.300E-01	pass 1	pass	
SRV	2.000E-02	pass		2.000E-02	pass 1	pass	
SRV-A	1.900E-01	pass		1.900E-01	pass 2	pass	
SRV-L	1.600E-01	pass		1.600E-01	pass 1	pass	
SRV-RES	3.174E-02	pass		3.174E-02	pass 2	pass	
SRV-SBO	3.700E-01	pass		3.700E-01	pass 1	pass	

Compare Mean:

Fault Tree	Mean	Status	Failure
SGISOL	0.000E+00		pass
SGISOL1	0.000E+00		pass
SLOCA-NR	0.000E+00		pass
SRV	0.000E+00		pass
SRV-A	0.000E+00		pass
SRV-L	0.000E+00		pass
SRV-RES	0.000E+00		pass
SRV-SBO	0.000E+00		pass

Scenario: Solve Fault Trees completed at 10:28:43 PM

SONG-02 Scenario: Core Damage Frequency Test started at 10:28:43 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-16) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	05	1.255E-10	pass	1.255E-10	pass	206	pass
LOOP	07	9.558E-13	pass	9.558E-13	pass	88	pass
LOOP	08	3.218E-11	pass	3.218E-11	pass	48	pass
LOOP	09	1.030E-09	pass	1.030E-09	pass	169	pass
LOOP	10-02	1.798E-09	pass	1.798E-09	pass	5	pass
LOOP	10-05	9.649E-16	pass	9.649E-16	pass	2	pass
LOOP	10-07	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	10-08	4.495E-16	pass	4.495E-16	pass	4	pass
LOOP	10-09	8.967E-12	pass	8.967E-12	pass	4	pass
LOOP	10-11	1.056E-09	pass	1.056E-09	pass	5	pass
LOOP	10-14	5.667E-16	pass	5.667E-16	pass	2	pass
LOOP	10-16	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	10-17	1.641E-16	pass	1.641E-16	pass	2	pass
LOOP	10-18	5.266E-12	pass	5.266E-12	pass	4	pass
LOOP	10-20	4.172E-10	pass	4.172E-10	pass	10	pass
LOOP	10-22	4.490E-10	pass	4.490E-10	pass	73	pass
LOOP	11	1.744E-12	pass	1.744E-12	pass	1	pass
SGTR	03	9.028E-11	pass	9.028E-11	pass	50	pass
SGTR	04	7.172E-11	pass	7.172E-11	pass	4	pass
SGTR	05	1.630E-11	pass	1.630E-11	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	05	0.000E+00	pass
LOOP	07	0.000E+00	pass
LOOP	08	0.000E+00	pass
LOOP	09	0.000E+00	pass
LOOP	10-02	0.000E+00	pass
LOOP	10-05	0.000E+00	pass
LOOP	10-07	0.000E+00	pass
LOOP	10-08	0.000E+00	pass
LOOP	10-09	0.000E+00	pass
LOOP	10-11	0.000E+00	pass
LOOP	10-14	0.000E+00	pass
LOOP	10-16	0.000E+00	pass
LOOP	10-17	0.000E+00	pass
LOOP	10-18	0.000E+00	pass
LOOP	10-20	0.000E+00	pass
LOOP	10-22	0.000E+00	pass
LOOP	11	0.000E+00	pass
SGTR	03	0.000E+00	pass
SGTR	04	0.000E+00	pass
SGTR	05	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	08	3.813E-12	pass	3.813E-12	pass	231	pass
SGTR	09	3.031E-12	pass	3.031E-12	pass	24	pass
SGTR	10	6.161E-13	pass	6.161E-13	pass	3	pass
SGTR	11	2.156E-10	pass	2.156E-10	pass	3	pass
SGTR	13	2.510E-12	pass	2.510E-12	pass	27	pass
SGTR	14	2.141E-15	pass	2.141E-15	pass	3	pass
SGTR	16	7.717E-14	pass	7.717E-14	pass	34	pass
SGTR	17	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	18	2.196E-14	pass	2.196E-14	pass	11	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	08	0.000E+00	pass
SGTR	09	0.000E+00	pass

SGTR	10	0.000E+00	pass
SGTR	11	0.000E+00	pass
SGTR	13	0.000E+00	pass
SGTR	14	0.000E+00	pass
SGTR	16	0.000E+00	pass
SGTR	17	0.000E+00	pass
SGTR	18	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	21	3.539E-14	pass	3.539E-14	pass	89	pass
SGTR	22	1.431E-14	pass	1.431E-14	pass	28	pass
SGTR	23	3.211E-15	pass	3.211E-15	pass	7	pass
SGTR	26	5.927E-16	pass	5.927E-16	pass	5	pass
SGTR	27	2.048E-16	pass	2.048E-16	pass	5	pass
SGTR	28	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	29	4.356E-14	pass	4.356E-14	pass	35	pass
SGTR	31	3.903E-16	pass	3.903E-16	pass	9	pass
SGTR	32	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	34	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	35	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	36	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	39	1.216E-15	pass	1.216E-15	pass	11	pass
SGTR	40	2.235E-15	pass	2.235E-15	pass	15	pass
SGTR	42	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	43	1.667E-11	pass	1.667E-11	pass	39	pass
SGTR	44	9.012E-12	pass	9.012E-12	pass	3	pass
SLOCA	04	2.813E-10	pass	2.813E-10	pass	253	pass
SLOCA	06	6.096E-12	pass	6.096E-12	pass	66	pass
SLOCA	07	1.403E-10	pass	1.403E-10	pass	24	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	21	0.000E+00	pass
SGTR	22	0.000E+00	pass
SGTR	23	0.000E+00	pass
SGTR	26	0.000E+00	pass
SGTR	27	0.000E+00	pass
SGTR	28	0.000E+00	pass
SGTR	29	0.000E+00	pass
SGTR	31	0.000E+00	pass
SGTR	32	0.000E+00	pass
SGTR	34	0.000E+00	pass
SGTR	35	0.000E+00	pass
SGTR	36	0.000E+00	pass
SGTR	39	0.000E+00	pass
SGTR	40	0.000E+00	pass
SGTR	42	0.000E+00	pass
SGTR	43	0.000E+00	pass
SGTR	44	0.000E+00	pass
SLOCA	04	0.000E+00	pass
SLOCA	06	0.000E+00	pass
SLOCA	07	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SLOCA	11	1.254E-14	pass	1.254E-14	pass	15	pass
SLOCA	13	1.542E-16	pass	1.542E-16	pass	3	pass
SLOCA	14	6.232E-15	pass	6.232E-15	pass	20	pass
SLOCA	15	5.334E-12	pass	5.334E-12	pass	31	pass
SLOCA	16	1.288E-11	pass	1.288E-11	pass	3	pass
TRANS	05	5.103E-11	pass	5.103E-11	pass	214	pass
TRANS	07	1.104E-12	pass	1.104E-12	pass	80	pass
TRANS	08	2.545E-11	pass	2.545E-11	pass	40	pass
TRANS	13	2.036E-12	pass	2.036E-12	pass	44	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SLOCA	11	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	14	0.000E+00	pass
SLOCA	15	0.000E+00	pass
SLOCA	16	0.000E+00	pass
TRANS	05	0.000E+00	pass
TRANS	07	0.000E+00	pass
TRANS	08	0.000E+00	pass
TRANS	13	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRANS	15	4.279E-14	pass	4.279E-14	pass	24	pass
TRANS	16	1.018E-12	pass	1.018E-12	pass	24	pass
TRANS	18	2.080E-12	pass	2.080E-12	pass	42	pass
TRANS	19	5.253E-10	pass	5.253E-10	pass	118	pass
TRANS	22	4.345E-15	pass	4.345E-15	pass	10	pass
TRANS	23	6.638E-14	pass	6.638E-14	pass	34	pass
TRANS	24	1.681E-11	pass	1.681E-11	pass	90	pass
TRANS	25	2.101E-15	pass	2.101E-15	pass	20	pass
TRANS	26-04	8.655E-14	pass	8.655E-14	pass	16	pass
TRANS	26-06	1.288E-15	pass	1.288E-15	pass	6	pass
TRANS	26-07	4.327E-14	pass	4.327E-14	pass	24	pass
TRANS	26-08	1.570E-11	pass	1.570E-11	pass	3	pass
TRANS	26-12	1.702E-14	pass	1.702E-14	pass	8	pass
TRANS	26-14	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	26-15	8.199E-15	pass	8.199E-15	pass	12	pass
TRANS	26-16	3.141E-12	pass	3.141E-12	pass	3	pass
TRANS	26-17	4.608E-13	pass	4.608E-13	pass	60	pass
TRANS	26-18	2.048E-11	pass	2.048E-11	pass	6	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRANS	15	0.000E+00	pass
TRANS	16	0.000E+00	pass
TRANS	18	0.000E+00	pass
TRANS	19	0.000E+00	pass
TRANS	22	0.000E+00	pass
TRANS	23	0.000E+00	pass
TRANS	24	0.000E+00	pass
TRANS	25	0.000E+00	pass
TRANS	26-04	0.000E+00	pass
TRANS	26-06	0.000E+00	pass
TRANS	26-07	0.000E+00	pass
TRANS	26-08	0.000E+00	pass
TRANS	26-12	0.000E+00	pass
TRANS	26-14	0.000E+00	pass
TRANS	26-15	0.000E+00	pass
TRANS	26-16	0.000E+00	pass
TRANS	26-17	0.000E+00	pass
TRANS	26-18	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 10:30:35 PM

TEST CASE COMPLETE: at 10:30:36 PM

TEST CASE : GEM Condition Assessments (COND_SONG)
DATE & TIME: 8/30/99 10:30:38 PM

TEST FOR: GEM Version 6.63

Project song_2qa is open

SONG-03 Scenario: Condition AFW out of service for 72 hours started at 10:30:44 PM
Assessment AFW-72HRS created
Assessment processed
Sequences: 71 of 00071 pass
Total CCDP: 5.9E-004 5.9E-004 pass
Total CDP: 4.7E-007 4.7E-007 pass
Total Importance: 5.9E-004 5.9E-004 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	+0.0E+000	9.0E-009	-9.0E-009	pass
2	LOOP	07	+0.0E+000	6.9E-011	-6.9E-011	pass
3	LOOP	08	+0.0E+000	2.3E-009	-2.3E-009	pass
4	LOOP	09	3.7E-004	7.4E-008	3.7E-004	pass
5	LOOP	10-02	+0.0E+000	1.3E-007	-1.3E-007	pass
6	LOOP	10-05	+0.0E+000	7.0E-014	-7.0E-014	pass
7	LOOP	10-08	+0.0E+000	3.2E-014	-3.2E-014	pass
8	LOOP	10-09	+0.0E+000	6.5E-010	-6.5E-010	pass
9	LOOP	10-11	+0.0E+000	7.6E-008	-7.6E-008	pass
10	LOOP	10-14	+0.0E+000	4.1E-014	-4.1E-014	pass
11	LOOP	10-17	+0.0E+000	1.2E-014	-1.2E-014	pass
12	LOOP	10-18	+0.0E+000	3.8E-010	-3.8E-010	pass
13	LOOP	10-20	+0.0E+000	3.0E-008	-3.0E-008	pass
14	LOOP	10-22	8.6E-007	3.2E-008	8.3E-007	pass
15	LOOP	11	1.3E-010	1.3E-010	+0.0E+000	pass
16	SGTR	03	+0.0E+000	6.5E-009	-6.5E-009	pass
17	SGTR	04	+0.0E+000	5.2E-009	-5.2E-009	pass
18	SGTR	05	+0.0E+000	1.2E-009	-1.2E-009	pass
19	SGTR	08	+0.0E+000	2.8E-010	-2.8E-010	pass
20	SGTR	09	+0.0E+000	2.2E-010	-2.2E-010	pass
21	SGTR	10	+0.0E+000	4.4E-011	-4.4E-011	pass
22	SGTR	11	+0.0E+000	1.6E-008	-1.6E-008	pass
23	SGTR	13	+0.0E+000	1.8E-010	-1.8E-010	pass
24	SGTR	14	+0.0E+000	1.5E-013	-1.5E-013	pass
25	SGTR	16	+0.0E+000	5.6E-012	-5.6E-012	pass
26	SGTR	18	+0.0E+000	1.6E-012	-1.6E-012	pass
27	SGTR	21	1.7E-009	2.6E-012	1.7E-009	pass
28	SGTR	22	1.3E-009	1.0E-012	1.3E-009	pass
29	SGTR	23	3.1E-010	2.3E-013	3.1E-010	pass
30	SGTR	26	7.1E-011	4.3E-014	7.1E-011	pass
31	SGTR	27	5.7E-011	1.5E-014	5.7E-011	pass
32	SGTR	28	1.2E-011	+0.0E+000	1.2E-011	pass
33	SGTR	29	4.0E-009	3.1E-012	4.0E-009	pass
34	SGTR	31	4.7E-011	2.8E-014	4.7E-011	pass
35	SGTR	32	4.0E-014	+0.0E+000	4.0E-014	pass
36	SGTR	34	1.4E-012	+0.0E+000	1.4E-012	pass
37	SGTR	36	4.1E-013	+0.0E+000	4.1E-013	pass
38	SGTR	39	8.5E-011	8.8E-014	8.4E-011	pass
39	SGTR	40	2.4E-010	1.6E-013	2.4E-010	pass
40	SGTR	42	2.3E-012	+0.0E+000	2.3E-012	pass
41	SGTR	43	1.5E-006	1.2E-009	1.5E-006	pass
42	SGTR	44	6.5E-010	6.5E-010	+0.0E+000	pass
43	SLOCA	04	+0.0E+000	2.0E-008	-2.0E-008	pass
44	SLOCA	06	+0.0E+000	4.4E-010	-4.4E-010	pass
45	SLOCA	07	+0.0E+000	1.0E-008	-1.0E-008	pass
46	SLOCA	11	5.3E-009	9.0E-013	5.3E-009	pass
47	SLOCA	13	1.1E-010	1.1E-014	1.1E-010	pass
48	SLOCA	14	2.6E-009	4.5E-013	2.6E-009	pass
49	SLOCA	15	2.2E-006	3.8E-010	2.2E-006	pass
50	SLOCA	16	9.3E-010	9.3E-010	+0.0E+000	pass

51	TRANS	05	3.7E-009	3.7E-009	+0.0E+000	pass
52	TRANS	07	8.0E-011	8.0E-011	+0.0E+000	pass
53	TRANS	08	1.8E-009	1.8E-009	+0.0E+000	pass
54	TRANS	13	+0.0E+000	1.5E-010	-1.5E-010	pass
55	TRANS	15	+0.0E+000	3.1E-012	-3.1E-012	pass
56	TRANS	16	+0.0E+000	7.3E-011	-7.3E-011	pass
57	TRANS	18	8.5E-007	1.5E-010	8.5E-007	pass
58	TRANS	19	2.2E-004	3.8E-008	2.2E-004	pass
59	TRANS	22	1.9E-009	3.1E-013	1.9E-009	pass
60	TRANS	23	2.7E-008	4.8E-012	2.7E-008	pass
61	TRANS	24	6.9E-006	1.2E-009	6.9E-006	pass
62	TRANS	25	9.5E-010	1.5E-013	9.5E-010	pass
63	TRANS	26-04	6.2E-012	6.2E-012	+0.0E+000	pass
64	TRANS	26-06	9.3E-014	9.3E-014	+0.0E+000	pass
65	TRANS	26-07	3.1E-012	3.1E-012	+0.0E+000	pass
66	TRANS	26-08	1.1E-009	1.1E-009	+0.0E+000	pass
67	TRANS	26-12	+0.0E+000	1.2E-012	-1.2E-012	pass
68	TRANS	26-15	+0.0E+000	5.9E-013	-5.9E-013	pass
69	TRANS	26-16	+0.0E+000	2.3E-010	-2.3E-010	pass
70	TRANS	26-17	2.3E-008	3.3E-011	2.3E-008	pass
71	TRANS	26-18	1.5E-009	1.5E-009	+0.0E+000	pass

Scenario: Condition AFW out of service for 72 hours completed at 10:31:18 PM

SONG-04 Scenario: Condition EDG out of service for 3 months started at 10:31:18 PM
Assessment EDG-2190HRS created
Assessment processed
Sequences: 68 of 00068 pass
Total CCDP: 1.1E-004 1.1E-004 pass
Total CDP: 1.4E-005 1.4E-005 pass
Total Importance: 9.9E-005 9.9E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	2.4E-006	2.8E-007	2.1E-006	pass
2	LOOP	07	9.5E-009	2.1E-009	7.4E-009	pass
3	LOOP	08	7.8E-007	7.1E-008	7.1E-007	pass
4	LOOP	09	5.1E-006	2.3E-006	2.8E-006	pass
5	LOOP	10-02	4.9E-005	3.9E-006	4.5E-005	pass
6	LOOP	10-05	2.9E-011	2.1E-012	2.7E-011	pass
7	LOOP	10-07	3.1E-013	+0.0E+000	3.1E-013	pass
8	LOOP	10-08	1.4E-011	9.8E-013	1.3E-011	pass
9	LOOP	10-09	2.4E-007	2.0E-008	2.2E-007	pass
10	LOOP	10-11	2.9E-005	2.3E-006	2.6E-005	pass
11	LOOP	10-14	1.7E-011	1.2E-012	1.6E-011	pass
12	LOOP	10-16	1.9E-013	+0.0E+000	1.9E-013	pass
13	LOOP	10-17	7.7E-012	3.6E-013	7.4E-012	pass
14	LOOP	10-18	1.4E-007	1.2E-008	1.3E-007	pass
15	LOOP	10-20	1.1E-005	9.1E-007	1.0E-005	pass
16	LOOP	10-22	1.2E-005	9.8E-007	1.1E-005	pass
17	LOOP	11	3.8E-009	3.8E-009	+0.0E+000	pass
18	SGTR	03	2.0E-007	2.0E-007	+0.0E+000	pass
19	SGTR	04	1.6E-007	1.6E-007	+0.0E+000	pass
20	SGTR	05	3.6E-008	3.6E-008	+0.0E+000	pass
21	SGTR	08	8.4E-009	8.4E-009	+0.0E+000	pass
22	SGTR	09	6.6E-009	6.6E-009	+0.0E+000	pass
23	SGTR	10	1.4E-009	1.4E-009	+0.0E+000	pass
24	SGTR	11	4.7E-007	4.7E-007	+0.0E+000	pass
25	SGTR	13	5.5E-009	5.5E-009	+0.0E+000	pass
26	SGTR	14	4.7E-012	4.7E-012	+0.0E+000	pass
27	SGTR	16	1.7E-010	1.7E-010	+0.0E+000	pass
28	SGTR	18	4.8E-011	4.8E-011	+0.0E+000	pass
29	SGTR	21	7.8E-011	7.8E-011	+0.0E+000	pass
30	SGTR	22	3.1E-011	3.1E-011	+0.0E+000	pass
31	SGTR	23	7.0E-012	7.0E-012	+0.0E+000	pass
32	SGTR	26	1.3E-012	1.3E-012	+0.0E+000	pass
33	SGTR	27	4.5E-013	4.5E-013	+0.0E+000	pass
34	SGTR	29	9.5E-011	9.5E-011	+0.0E+000	pass
35	SGTR	31	8.6E-013	8.6E-013	+0.0E+000	pass
36	SGTR	39	2.7E-012	2.7E-012	+0.0E+000	pass
37	SGTR	40	4.9E-012	4.9E-012	+0.0E+000	pass
38	SGTR	43	3.7E-008	3.7E-008	+0.0E+000	pass
39	SGTR	44	2.0E-008	2.0E-008	+0.0E+000	pass
40	SLOCA	04	6.2E-007	6.2E-007	+0.0E+000	pass
41	SLOCA	06	1.3E-008	1.3E-008	+0.0E+000	pass
42	SLOCA	07	3.1E-007	3.1E-007	+0.0E+000	pass
43	SLOCA	11	2.8E-011	2.8E-011	+0.0E+000	pass
44	SLOCA	13	3.4E-013	3.4E-013	+0.0E+000	pass
45	SLOCA	14	1.4E-011	1.4E-011	+0.0E+000	pass
46	SLOCA	15	1.2E-008	1.2E-008	+0.0E+000	pass
47	SLOCA	16	2.8E-008	2.8E-008	+0.0E+000	pass
48	TRANS	05	1.1E-007	1.1E-007	+0.0E+000	pass
49	TRANS	07	2.4E-009	2.4E-009	+0.0E+000	pass
50	TRANS	08	5.6E-008	5.6E-008	+0.0E+000	pass
51	TRANS	13	4.5E-009	4.5E-009	+0.0E+000	pass
52	TRANS	15	9.4E-011	9.4E-011	+0.0E+000	pass
53	TRANS	16	2.2E-009	2.2E-009	+0.0E+000	pass
54	TRANS	18	4.6E-009	4.6E-009	+0.0E+000	pass
55	TRANS	19	1.2E-006	1.2E-006	+0.0E+000	pass
56	TRANS	22	9.5E-012	9.5E-012	+0.0E+000	pass
57	TRANS	23	1.5E-010	1.5E-010	+0.0E+000	pass
58	TRANS	24	3.7E-008	3.7E-008	+0.0E+000	pass

59	TRANS	25	4.6E-012	4.6E-012	+0.0E+000	pass
60	TRANS	26-04	1.9E-010	1.9E-010	+0.0E+000	pass
61	TRANS	26-06	2.8E-012	2.8E-012	+0.0E+000	pass
62	TRANS	26-07	9.5E-011	9.5E-011	+0.0E+000	pass
63	TRANS	26-08	3.4E-008	3.4E-008	+0.0E+000	pass
64	TRANS	26-12	3.7E-011	3.7E-011	+0.0E+000	pass
65	TRANS	26-15	1.8E-011	1.8E-011	+0.0E+000	pass
66	TRANS	26-16	6.9E-009	6.9E-009	+0.0E+000	pass
67	TRANS	26-17	1.0E-009	1.0E-009	+0.0E+000	pass
68	TRANS	26-18	4.5E-008	4.5E-008	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 10:31:45 PM

TEST CASE COMPLETE: at 10:31:45 PM

TEST CASE : GEM Initiating Events (IE_SONG)
DATE & TIME: 8/30/99 10:31:47 PM

TEST FOR: GEM Version 6.63

Project song_2qa is open

SONG-05 Scenario: Transient - No other failures started at 10:31:52 PM
Assessment TRANS created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 21 of 00021 pass
Total CCDP: 2.3E-006 2.3E-006 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	1.8E-007	pass
2	TRANS	07	3.9E-009	pass
3	TRANS	08	9.0E-008	pass
4	TRANS	13	7.2E-009	pass
5	TRANS	15	1.6E-010	pass
6	TRANS	16	3.6E-009	pass
7	TRANS	18	7.3E-009	pass
8	TRANS	19	1.9E-006	pass
9	TRANS	22	1.7E-011	pass
10	TRANS	23	2.3E-010	pass
11	TRANS	24	5.9E-008	pass
12	TRANS	25	8.3E-012	pass
13	TRANS	26-04	3.1E-010	pass
14	TRANS	26-06	6.7E-012	pass
15	TRANS	26-07	1.6E-010	pass
16	TRANS	26-08	5.5E-008	pass
17	TRANS	26-12	6.2E-011	pass
18	TRANS	26-15	3.1E-011	pass
19	TRANS	26-16	1.1E-008	pass
20	TRANS	26-17	1.6E-009	pass
21	TRANS	26-18	7.2E-008	pass

Scenario: Transient - No other failures completed at 10:32:30 PM

SONG-06 Scenario: Small LOCA - No other failures started at 10:32:30 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 8 of 00008 pass
Total CCDP: 1.9E-004 1.9E-004 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	04	1.2E-004	pass
2	SLOCA	06	2.6E-006	pass
3	SLOCA	07	6.0E-005	pass
4	SLOCA	11	5.6E-009	pass
5	SLOCA	13	1.2E-010	pass
6	SLOCA	14	2.8E-009	pass
7	SLOCA	15	2.3E-006	pass
8	SLOCA	16	5.5E-006	pass

Scenario: Small LOCA - No other failures completed at 10:33:14 PM

SONG-07 Scenario: SGTR - no other failures started at 10:33:14 PM
Assessment SGTR created
Initiating event IE-SGTR selected
Assessment processed
Sequences: 22 of 00022 pass
Total CCDP: 2.6E-004 2.6E-004 pass

#	Tree	Sequence	CCDP	Status
1	SGTR	03	5.5E-005	pass
2	SGTR	04	4.4E-005	pass
3	SGTR	05	1.0E-005	pass
4	SGTR	08	2.3E-006	pass
5	SGTR	09	1.9E-006	pass
6	SGTR	10	3.8E-007	pass
7	SGTR	11	1.3E-004	pass
8	SGTR	13	1.5E-006	pass
9	SGTR	14	1.4E-009	pass
10	SGTR	16	4.8E-008	pass
11	SGTR	18	1.4E-008	pass
12	SGTR	21	2.3E-008	pass
13	SGTR	22	8.9E-009	pass
14	SGTR	23	2.0E-009	pass
15	SGTR	26	9.5E-010	pass
16	SGTR	27	3.8E-010	pass
17	SGTR	29	2.7E-008	pass
18	SGTR	31	3.5E-010	pass
19	SGTR	39	1.1E-009	pass
20	SGTR	40	1.6E-009	pass
21	SGTR	43	1.0E-005	pass
22	SGTR	44	5.5E-006	pass

Scenario: SGTR - no other failures completed at 10:33:53 PM

SONG-08 Scenario: Grid-related LOOP - no other failures started at 10:33:53 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 17 of 00017 pass
Total CCDP: 9.3E-005 9.3E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	5.1E-006	pass
2	LOOP	07	4.4E-008	pass
3	LOOP	08	1.4E-006	pass
4	LOOP	09	5.1E-005	pass
5	LOOP	10-02	1.7E-006	pass
6	LOOP	10-05	2.1E-009	pass
7	LOOP	10-07	4.3E-011	pass
8	LOOP	10-08	1.0E-009	pass
9	LOOP	10-09	6.4E-006	pass
10	LOOP	10-11	1.0E-006	pass
11	LOOP	10-14	1.3E-009	pass
12	LOOP	10-16	2.5E-011	pass
13	LOOP	10-17	6.0E-010	pass
14	LOOP	10-18	3.8E-006	pass
15	LOOP	10-20	1.1E-005	pass
16	LOOP	10-22	1.2E-005	pass
17	LOOP	11	8.9E-008	pass

Scenario: Grid-related LOOP - no other failures completed at 10:34:29 PM

SONG-09 Scenario: Plant-centered LOOP - no other failures started at 10:34:29 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 17 of 00017 pass
Total CCDP: 1.0E-004 1.0E-004 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	5.2E-006	pass
2	LOOP	07	4.5E-008	pass
3	LOOP	08	1.4E-006	pass
4	LOOP	09	5.1E-005	pass
5	LOOP	10-02	3.5E-006	pass
6	LOOP	10-05	2.4E-009	pass
7	LOOP	10-07	4.8E-011	pass
8	LOOP	10-08	1.1E-009	pass
9	LOOP	10-09	8.7E-006	pass
10	LOOP	10-11	2.1E-006	pass
11	LOOP	10-14	1.4E-009	pass
12	LOOP	10-16	2.8E-011	pass
13	LOOP	10-17	6.7E-010	pass
14	LOOP	10-18	5.1E-006	pass
15	LOOP	10-20	1.2E-005	pass
16	LOOP	10-22	1.3E-005	pass
17	LOOP	11	8.9E-008	pass

Scenario: Plant-centered LOOP - no other failures completed at 10:35:06 PM

SONG-10 Scenario: Severe Weather LOOP - no other failures started at 10:35:06 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 17 of 00017 pass
Total CCDP: 1.2E-003 1.2E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	7.7E-006	pass
2	LOOP	07	5.4E-008	pass
3	LOOP	08	1.9E-006	pass
4	LOOP	09	5.4E-005	pass
5	LOOP	10-02	5.5E-004	pass
6	LOOP	10-05	3.8E-009	pass
7	LOOP	10-07	7.8E-011	pass
8	LOOP	10-08	1.8E-009	pass
9	LOOP	10-09	1.3E-004	pass
10	LOOP	10-11	3.2E-004	pass
11	LOOP	10-14	2.2E-009	pass
12	LOOP	10-16	4.6E-011	pass
13	LOOP	10-17	1.1E-009	pass
14	LOOP	10-18	7.6E-005	pass
15	LOOP	10-20	4.7E-005	pass
16	LOOP	10-22	5.1E-005	pass
17	LOOP	11	8.9E-008	pass

Scenario: Severe Weather LOOP - no other failures completed at 10:35:43 PM

SONG-11 Scenario: Extreme Severe Weather LOOP - no other failures started at 10:35:43 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 11 of 00011 pass
Total CCDP: 4.1E-003 4.1E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	9.9E-006	pass
2	LOOP	07	6.1E-008	pass
3	LOOP	08	2.3E-006	pass
4	LOOP	09	5.7E-005	pass
5	LOOP	10-02	2.1E-003	pass
6	LOOP	10-09	3.0E-004	pass
7	LOOP	10-11	1.2E-003	pass
8	LOOP	10-18	1.8E-004	pass
9	LOOP	10-20	8.6E-005	pass
10	LOOP	10-22	9.2E-005	pass
11	LOOP	11	8.9E-008	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 10:36:16 PM

SONG-12 Scenario: Transient - AFW failed started at 10:36:16 PM
Assessment TRANS-AFW created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 15 of 00015 pass
Total CCDP: 1.1E-002 1.1E-002 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	1.8E-007	pass
2	TRANS	07	3.9E-009	pass
3	TRANS	08	9.0E-008	pass
4	TRANS	18	4.2E-005	pass
5	TRANS	19	1.1E-002	pass
6	TRANS	22	9.3E-008	pass
7	TRANS	23	1.3E-006	pass
8	TRANS	24	3.4E-004	pass
9	TRANS	25	4.7E-008	pass
10	TRANS	26-04	3.1E-010	pass
11	TRANS	26-06	6.7E-012	pass
12	TRANS	26-07	1.6E-010	pass
13	TRANS	26-08	5.5E-008	pass
14	TRANS	26-17	1.1E-006	pass
15	TRANS	26-18	7.2E-008	pass

Scenario: Transient - AFW failed completed at 10:36:58 PM

TEST CASE COMPLETE: at 10:36:59 PM

TEST CASE : SAPHIRE QA Models (CDF_STL1)
DATE & TIME: 8/30/99 10:37:03 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: stl1_2qa

STL1-01 Scenario: Solve Fault Trees started at 10:37:35 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-16)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
ACP-ST	2.100E-01	pass		2.100E-01	pass 1	pass	
AFW	1.481E-04	pass		1.481E-04	pass 105		pass
AFW-ATWS	1.471E-03	pass		1.471E-03	pass 50		pass
AFW-L	1.481E-04	pass		1.481E-04	pass 105		pass
AFW-SGTR	5.822E-04	pass		5.822E-04	pass 39		pass
BORATION	1.000E-02	pass		1.000E-02	pass 1	pass	
COOLDOWN	3.997E-03	pass		3.997E-03	pass 2	pass	
CSR	2.256E-03	pass		2.256E-03	pass 46		pass
CSR-L	2.256E-03	pass		2.256E-03	pass 46		pass
DEP-REC	3.500E-03	pass		3.500E-03	pass 1	pass	
EP	2.461E-03	pass		2.461E-03	pass 5	pass	
F&B	1.483E-02	pass		1.483E-02	pass 26		pass
F&B-L	1.483E-02	pass		1.483E-02	pass 26		pass
HPI	8.869E-04	pass		8.869E-04	pass 23		pass
HPI-L	8.869E-04	pass		8.869E-04	pass 23		pass
HPR	1.812E-03	pass		1.812E-03	pass 48		pass
HPR-L	1.812E-03	pass		1.812E-03	pass 48		pass
LPR	2.316E-03	pass		2.316E-03	pass 38		pass
MFW-A	2.000E-01	pass		2.000E-01	pass 1	pass	
MFW-NT	5.000E-02	pass		5.000E-02	pass 1	pass	

Compare Mean:

Fault Tree	Mean	Status	Failure
ACP-ST	0.000E+00		pass
AFW	0.000E+00		pass
AFW-ATWS	0.000E+00		pass
AFW-L	0.000E+00		pass
AFW-SGTR	0.000E+00		pass
BORATION	0.000E+00		pass
COOLDOWN	0.000E+00		pass
CSR	0.000E+00		pass
CSR-L	0.000E+00		pass
DEP-REC	0.000E+00		pass
EP	0.000E+00		pass
F&B	0.000E+00		pass
F&B-L	0.000E+00		pass
HPI	0.000E+00		pass
HPI-L	0.000E+00		pass
HPR	0.000E+00		pass
HPR-L	0.000E+00		pass
LPR	0.000E+00		pass
MFW-A	0.000E+00		pass
MFW-NT	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
MFW-T	4.000E-02	pass		4.000E-02	pass 1	pass	
OP-2H	5.300E-02	pass		5.300E-02	pass 1	pass	
OP-6H	1.200E-02	pass		1.200E-02	pass 1	pass	

OP-BD	2.400E-03	pass		2.400E-03	pass 1	pass	
OP-SL	6.500E-01	pass		6.500E-01	pass 1	pass	
PORV	4.000E-02	pass		4.000E-02	pass 1	pass	
PORV-A	2.716E-01	pass		2.716E-01	pass 9	pass	
PORV-L	1.600E-01	pass		1.600E-01	pass 1	pass	
PORV-RES	1.636E-05	pass		1.636E-05	pass 6	pass	
PORV-SBO	3.700E-01	pass		3.700E-01	pass 1	pass	
PRVL-RES	1.636E-05	pass		1.636E-05	pass 6	pass	

Compare Mean:

Fault Tree	Mean	Status	Failure
MFW-T	0.000E+00		pass
OP-2H	0.000E+00		pass
OP-6H	0.000E+00		pass
OP-BD	0.000E+00		pass
OP-SL	0.000E+00		pass
PORV	0.000E+00		pass
PORV-A	0.000E+00		pass
PORV-L	0.000E+00		pass
PORV-RES	0.000E+00		pass
PORV-SBO	0.000E+00		pass
PRVL-RES	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
RCS-DEP	3.997E-03	pass		3.997E-03	pass 2	pass	
RCS-SG	3.738E-02	pass		3.738E-02	pass 3	pass	
RCS-SG1	2.766E-02	pass		2.766E-02	pass 2	pass	
RCSPRESS	1.300E-02	pass		1.300E-02	pass 2	pass	
RHR	1.147E-02	pass		1.147E-02	pass 40		pass
RT	5.529E-06	pass		5.529E-06	pass 3	pass	
RT-L	8.900E-08	pass		8.900E-08	pass 1	pass	
SEALLOCA	1.100E-04	pass		1.100E-04	pass 1	pass	
SG-DEP	1.000E-05	pass		1.000E-05	pass 1	pass	
SGCOOL	2.005E-01	pass		2.005E-01	pass 5	pass	
SGCOOL-L	3.404E-01	pass		3.404E-01	pass 5	pass	
SGISOL	1.099E-02	pass		1.099E-02	pass 2	pass	
SGISOL1	1.228E-02	pass		1.228E-02	pass 4	pass	
SLOCA-NR	4.300E-01	pass		4.300E-01	pass 1	pass	
THROTTLE	1.000E-02	pass		1.000E-02	pass 1	pass	

Compare Mean:

Fault Tree	Mean	Status	Failure
RCS-DEP	0.000E+00		pass
RCS-SG	0.000E+00		pass
RCS-SG1	0.000E+00		pass
RCSPRESS	0.000E+00		pass
RHR	0.000E+00		pass
RT	0.000E+00		pass
RT-L	0.000E+00		pass
SEALLOCA	0.000E+00		pass
SG-DEP	0.000E+00		pass
SGCOOL	0.000E+00		pass
SGCOOL-L	0.000E+00		pass
SGISOL	0.000E+00		pass
SGISOL1	0.000E+00		pass
SLOCA-NR	0.000E+00		pass
THROTTLE	0.000E+00		pass

Scenario: Solve Fault Trees completed at 10:38:41 PM

STL1-02 Scenario: Core Damage Frequency Test started at 10:38:41 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-16) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	05	1.585E-14	pass	1.585E-14	pass	18	pass
LOOP	06	1.009E-13	pass	1.009E-13	pass	96	pass
LOOP	08	1.458E-15	pass	1.458E-15	pass	4	pass
LOOP	09	1.169E-14	pass	1.169E-14	pass	22	pass
LOOP	11	2.562E-13	pass	2.562E-13	pass	14	pass
LOOP	12	1.050E-12	pass	1.050E-12	pass	76	pass
LOOP	13	6.176E-12	pass	6.176E-12	pass	68	pass
LOOP	16	1.817E-13	pass	1.817E-13	pass	107	pass
LOOP	17	1.284E-12	pass	1.284E-12	pass	456	pass
LOOP	20	1.048E-14	pass	1.048E-14	pass	43	pass
LOOP	21	5.201E-14	pass	5.201E-14	pass	203	pass
LOOP	22	3.745E-11	pass	3.745E-11	pass	523	pass
LOOP	23-02	1.995E-10	pass	1.995E-10	pass	5	pass
LOOP	23-05	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	23-06	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	23-08	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	23-09	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	23-10	2.241E-15	pass	2.241E-15	pass	4	pass
LOOP	23-11	5.945E-12	pass	5.945E-12	pass	4	pass
LOOP	23-13	1.172E-10	pass	1.172E-10	pass	5	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	05	0.000E+00	pass
LOOP	06	0.000E+00	pass
LOOP	08	0.000E+00	pass
LOOP	09	0.000E+00	pass
LOOP	11	0.000E+00	pass
LOOP	12	0.000E+00	pass
LOOP	13	0.000E+00	pass
LOOP	16	0.000E+00	pass
LOOP	17	0.000E+00	pass
LOOP	20	0.000E+00	pass
LOOP	21	0.000E+00	pass
LOOP	22	0.000E+00	pass
LOOP	23-02	0.000E+00	pass
LOOP	23-05	0.000E+00	pass
LOOP	23-06	0.000E+00	pass
LOOP	23-08	0.000E+00	pass
LOOP	23-09	0.000E+00	pass
LOOP	23-10	0.000E+00	pass
LOOP	23-11	0.000E+00	pass
LOOP	23-13	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	23-16	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	23-17	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	23-19	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	23-20	0.000E+00	pass	0.000E+00	pass	0	pass
LOOP	23-21	1.229E-15	pass	1.229E-15	pass	2	pass
LOOP	23-22	3.491E-12	pass	3.491E-12	pass	4	pass
LOOP	23-24	4.102E-11	pass	4.102E-11	pass	8	pass
LOOP	23-26	3.339E-10	pass	3.339E-10	pass	57	pass
LOOP	24	5.963E-12	pass	5.963E-12	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	23-16	0.000E+00	pass
LOOP	23-17	0.000E+00	pass
LOOP	23-19	0.000E+00	pass
LOOP	23-20	0.000E+00	pass
LOOP	23-21	0.000E+00	pass
LOOP	23-22	0.000E+00	pass
LOOP	23-24	0.000E+00	pass
LOOP	23-26	0.000E+00	pass
LOOP	24	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	03	2.066E-10	pass	2.066E-10	pass	77	pass
SGTR	04	7.172E-11	pass	7.172E-11	pass	4	pass
SGTR	05	1.630E-11	pass	1.630E-11	pass	1	pass
SGTR	08	8.728E-12	pass	8.728E-12	pass	329	pass
SGTR	09	3.031E-12	pass	3.031E-12	pass	24	pass
SGTR	10	6.161E-13	pass	6.161E-13	pass	3	pass
SGTR	11	2.156E-10	pass	2.156E-10	pass	3	pass
SGTR	13	1.336E-11	pass	1.336E-11	pass	37	pass
SGTR	14	1.205E-14	pass	1.205E-14	pass	6	pass
SGTR	16	4.143E-13	pass	4.143E-13	pass	54	pass
SGTR	17	2.243E-16	pass	2.243E-16	pass	1	pass
SGTR	18	1.178E-13	pass	1.178E-13	pass	15	pass
SGTR	21	3.018E-14	pass	3.018E-14	pass	101	pass
SGTR	22	1.060E-14	pass	1.060E-14	pass	26	pass
SGTR	23	2.396E-15	pass	2.396E-15	pass	8	pass
SGTR	26	3.194E-16	pass	3.194E-16	pass	8	pass
SGTR	27	1.597E-16	pass	1.597E-16	pass	4	pass
SGTR	28	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	29	3.236E-14	pass	3.236E-14	pass	34	pass
SGTR	31	1.730E-15	pass	1.730E-15	pass	11	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	03	0.000E+00	pass
SGTR	04	0.000E+00	pass
SGTR	05	0.000E+00	pass
SGTR	08	0.000E+00	pass
SGTR	09	0.000E+00	pass
SGTR	10	0.000E+00	pass
SGTR	11	0.000E+00	pass
SGTR	13	0.000E+00	pass
SGTR	14	0.000E+00	pass
SGTR	16	0.000E+00	pass
SGTR	17	0.000E+00	pass
SGTR	18	0.000E+00	pass
SGTR	21	0.000E+00	pass
SGTR	22	0.000E+00	pass
SGTR	23	0.000E+00	pass
SGTR	26	0.000E+00	pass
SGTR	27	0.000E+00	pass
SGTR	28	0.000E+00	pass
SGTR	29	0.000E+00	pass
SGTR	31	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	32	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	34	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	35	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	36	0.000E+00	pass	0.000E+00	pass	0	pass
SGTR	39	7.662E-15	pass	7.662E-15	pass	19	pass
SGTR	40	1.402E-16	pass	1.402E-16	pass	3	pass
SGTR	42	8.727E-17	pass	8.727E-17	pass	2	pass
SGTR	43	5.594E-17	pass	5.594E-17	pass	1	pass
SGTR	44	1.356E-13	pass	1.356E-13	pass	32	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	32	0.000E+00	pass
SGTR	34	0.000E+00	pass
SGTR	35	0.000E+00	pass
SGTR	36	0.000E+00	pass
SGTR	39	0.000E+00	pass
SGTR	40	0.000E+00	pass
SGTR	42	0.000E+00	pass
SGTR	43	0.000E+00	pass
SGTR	44	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	45	1.534E-13	pass	1.534E-13	pass	71	pass
SGTR	46	9.012E-12	pass	9.012E-12	pass	3	pass
SLOCA	04	4.245E-12	pass	4.245E-12	pass	240	pass
SLOCA	05	4.189E-11	pass	4.189E-11	pass	653	pass
SLOCA	07	1.294E-12	pass	1.294E-12	pass	32	pass
SLOCA	08	9.049E-12	pass	9.049E-12	pass	82	pass
SLOCA	09	7.465E-10	pass	7.465E-10	pass	23	pass
SLOCA	13	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	14	6.801E-16	pass	6.801E-16	pass	9	pass
SLOCA	16	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	17	8.706E-17	pass	8.706E-17	pass	2	pass
SLOCA	18	2.843E-14	pass	2.843E-14	pass	41	pass
SLOCA	21	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	22	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	24	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	25	0.000E+00	pass	0.000E+00	pass	0	pass
SLOCA	27	1.782E-16	pass	1.782E-16	pass	2	pass
SLOCA	28	1.541E-15	pass	1.541E-15	pass	13	pass
SLOCA	29	5.553E-14	pass	5.553E-14	pass	40	pass
SLOCA	30	1.288E-11	pass	1.288E-11	pass	3	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	45	0.000E+00	pass
SGTR	46	0.000E+00	pass
SLOCA	04	0.000E+00	pass
SLOCA	05	0.000E+00	pass
SLOCA	07	0.000E+00	pass
SLOCA	08	0.000E+00	pass
SLOCA	09	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	14	0.000E+00	pass
SLOCA	16	0.000E+00	pass
SLOCA	17	0.000E+00	pass
SLOCA	18	0.000E+00	pass
SLOCA	21	0.000E+00	pass
SLOCA	22	0.000E+00	pass
SLOCA	24	0.000E+00	pass
SLOCA	25	0.000E+00	pass
SLOCA	27	0.000E+00	pass
SLOCA	28	0.000E+00	pass
SLOCA	29	0.000E+00	pass
SLOCA	30	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRANS	05	1.349E-14	pass	1.349E-14	pass	4	pass
TRANS	06	5.807E-14	pass	5.807E-14	pass	30	pass
TRANS	08	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	09	4.133E-16	pass	4.133E-16	pass	2	pass
TRANS	10	1.535E-13	pass	1.535E-13	pass	40	pass
TRANS	15	4.959E-16	pass	4.959E-16	pass	2	pass

TRANS	16	1.637E-15	pass	1.637E-15	pass	6	pass
TRANS	18	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	19	0.000E+00	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRANS	05	0.000E+00	pass
TRANS	06	0.000E+00	pass
TRANS	08	0.000E+00	pass
TRANS	09	0.000E+00	pass
TRANS	10	0.000E+00	pass
TRANS	15	0.000E+00	pass
TRANS	16	0.000E+00	pass
TRANS	18	0.000E+00	pass
TRANS	19	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRANS	20	5.598E-15	pass	5.598E-15	pass	8	pass
TRANS	23	2.790E-14	pass	2.790E-14	pass	37	pass
TRANS	24	1.979E-13	pass	1.979E-13	pass	153	pass
TRANS	25	5.519E-12	pass	5.519E-12	pass	179	pass
TRANS	26-04	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	26-05	1.124E-14	pass	1.124E-14	pass	30	pass
TRANS	26-07	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	26-08	1.936E-15	pass	1.936E-15	pass	9	pass
TRANS	26-09	3.534E-13	pass	3.534E-13	pass	50	pass
TRANS	26-10	1.587E-11	pass	1.587E-11	pass	3	pass
TRANS	26-14	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	26-15	1.037E-15	pass	1.037E-15	pass	3	pass
TRANS	26-17	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	26-18	0.000E+00	pass	0.000E+00	pass	0	pass
TRANS	26-19	6.951E-14	pass	6.951E-14	pass	27	pass
TRANS	26-20	3.174E-12	pass	3.174E-12	pass	3	pass
TRANS	26-21	4.646E-13	pass	4.646E-13	pass	74	pass
TRANS	26-22	2.063E-11	pass	2.063E-11	pass	6	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRANS	20	0.000E+00	pass
TRANS	23	0.000E+00	pass
TRANS	24	0.000E+00	pass
TRANS	25	0.000E+00	pass
TRANS	26-04	0.000E+00	pass
TRANS	26-05	0.000E+00	pass
TRANS	26-07	0.000E+00	pass
TRANS	26-08	0.000E+00	pass
TRANS	26-09	0.000E+00	pass
TRANS	26-10	0.000E+00	pass
TRANS	26-14	0.000E+00	pass
TRANS	26-15	0.000E+00	pass
TRANS	26-17	0.000E+00	pass
TRANS	26-18	0.000E+00	pass
TRANS	26-19	0.000E+00	pass
TRANS	26-20	0.000E+00	pass
TRANS	26-21	0.000E+00	pass
TRANS	26-22	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 10:41:12 PM
TEST CASE COMPLETE: at 10:41:13 PM

TEST CASE : GEM Condition Assessments (COND_STL1)
DATE & TIME: 8/30/99 10:41:15 PM

TEST FOR: GEM Version 6.63

Project stl1_2qa is open

STL1-03 Scenario: Condition AFW out of service for 72 hours started at 10:41:21 PM
Assessment AFW-72HRS created
Assessment processed
Sequences: 89 of 00089 pass
Total CCDP: 2.0E-005 2.0E-005 pass
Total CDP: 1.6E-007 1.6E-007 pass
Total Importance: 2.0E-005 2.0E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	+0.0E+000	1.1E-012	-1.1E-012	pass
2	LOOP	06	+0.0E+000	7.3E-012	-7.3E-012	pass
3	LOOP	08	+0.0E+000	1.1E-013	-1.1E-013	pass
4	LOOP	09	+0.0E+000	8.4E-013	-8.4E-013	pass
5	LOOP	11	+0.0E+000	1.8E-011	-1.8E-011	pass
6	LOOP	12	+0.0E+000	7.6E-011	-7.6E-011	pass
7	LOOP	13	+0.0E+000	4.5E-010	-4.5E-010	pass
8	LOOP	16	8.0E-008	1.3E-011	8.0E-008	pass
9	LOOP	17	5.6E-007	9.2E-011	5.6E-007	pass
10	LOOP	20	3.0E-009	7.6E-013	3.0E-009	pass
11	LOOP	21	1.7E-008	3.7E-012	1.7E-008	pass
12	LOOP	22	1.6E-005	2.7E-009	1.6E-005	pass
13	LOOP	23-02	+0.0E+000	1.4E-008	-1.4E-008	pass
14	LOOP	23-10	+0.0E+000	1.6E-013	-1.6E-013	pass
15	LOOP	23-11	+0.0E+000	4.3E-010	-4.3E-010	pass
16	LOOP	23-13	+0.0E+000	8.4E-009	-8.4E-009	pass
17	LOOP	23-21	+0.0E+000	8.9E-014	-8.9E-014	pass
18	LOOP	23-22	+0.0E+000	2.5E-010	-2.5E-010	pass
19	LOOP	23-24	+0.0E+000	3.0E-009	-3.0E-009	pass
20	LOOP	23-26	6.8E-007	2.4E-008	6.5E-007	pass
21	LOOP	24	4.3E-010	4.3E-010	+0.0E+000	pass
22	SGTR	03	+0.0E+000	1.5E-008	-1.5E-008	pass
23	SGTR	04	+0.0E+000	5.2E-009	-5.2E-009	pass
24	SGTR	05	+0.0E+000	1.2E-009	-1.2E-009	pass
25	SGTR	08	+0.0E+000	6.3E-010	-6.3E-010	pass
26	SGTR	09	+0.0E+000	2.2E-010	-2.2E-010	pass
27	SGTR	10	+0.0E+000	4.4E-011	-4.4E-011	pass
28	SGTR	11	+0.0E+000	1.6E-008	-1.6E-008	pass
29	SGTR	13	+0.0E+000	9.6E-010	-9.6E-010	pass
30	SGTR	14	+0.0E+000	8.7E-013	-8.7E-013	pass
31	SGTR	16	+0.0E+000	3.0E-011	-3.0E-011	pass
32	SGTR	17	+0.0E+000	1.6E-014	-1.6E-014	pass
33	SGTR	18	+0.0E+000	8.5E-012	-8.5E-012	pass
34	SGTR	21	3.9E-009	2.2E-012	3.9E-009	pass
35	SGTR	22	1.3E-009	7.6E-013	1.3E-009	pass
36	SGTR	23	3.1E-010	1.7E-013	3.1E-010	pass
37	SGTR	26	1.6E-010	2.3E-014	1.6E-010	pass
38	SGTR	27	5.7E-011	1.2E-014	5.7E-011	pass
39	SGTR	28	1.2E-011	+0.0E+000	1.2E-011	pass
40	SGTR	29	4.0E-009	2.3E-012	4.0E-009	pass
41	SGTR	31	2.5E-010	1.3E-013	2.5E-010	pass
42	SGTR	32	2.3E-013	+0.0E+000	2.3E-013	pass
43	SGTR	34	7.7E-012	+0.0E+000	7.7E-012	pass
44	SGTR	35	4.2E-015	+0.0E+000	4.2E-015	pass
45	SGTR	36	2.2E-012	+0.0E+000	2.2E-012	pass
46	SGTR	39	1.0E-009	5.5E-013	9.9E-010	pass
47	SGTR	40	6.4E-011	1.0E-014	6.4E-011	pass
48	SGTR	42	2.6E-011	6.3E-015	2.6E-011	pass
49	SGTR	43	3.4E-011	4.0E-015	3.4E-011	pass
50	SGTR	44	1.7E-008	9.8E-012	1.7E-008	pass

51	SGTR	45	1.9E-008	1.1E-011	1.9E-008	pass
52	SGTR	46	6.5E-010	6.5E-010	+0.0E+000	pass
53	SLOCA	04	+0.0E+000	3.1E-010	-3.1E-010	pass
54	SLOCA	05	+0.0E+000	3.0E-009	-3.0E-009	pass
55	SLOCA	07	+0.0E+000	9.3E-011	-9.3E-011	pass
56	SLOCA	08	+0.0E+000	6.5E-010	-6.5E-010	pass
57	SLOCA	09	+0.0E+000	5.4E-008	-5.4E-008	pass
58	SLOCA	13	8.0E-011	+0.0E+000	8.0E-011	pass
59	SLOCA	14	7.8E-010	4.9E-014	7.8E-010	pass
60	SLOCA	16	2.4E-011	+0.0E+000	2.4E-011	pass
61	SLOCA	17	1.7E-010	6.3E-015	1.7E-010	pass
62	SLOCA	18	1.4E-008	2.1E-012	1.4E-008	pass
63	SLOCA	21	9.2E-012	+0.0E+000	9.2E-012	pass
64	SLOCA	22	9.1E-011	+0.0E+000	9.1E-011	pass
65	SLOCA	24	2.8E-012	+0.0E+000	2.8E-012	pass
66	SLOCA	25	2.0E-011	+0.0E+000	2.0E-011	pass
67	SLOCA	27	1.4E-010	1.3E-014	1.4E-010	pass
68	SLOCA	28	9.9E-010	1.1E-013	9.9E-010	pass
69	SLOCA	29	2.7E-008	4.0E-012	2.7E-008	pass
70	SLOCA	30	9.3E-010	9.3E-010	+0.0E+000	pass
71	TRANS	05	9.7E-013	9.7E-013	+0.0E+000	pass
72	TRANS	06	4.2E-012	4.2E-012	+0.0E+000	pass
73	TRANS	09	3.0E-014	3.0E-014	+0.0E+000	pass
74	TRANS	10	1.1E-011	1.1E-011	+0.0E+000	pass
75	TRANS	15	+0.0E+000	3.6E-014	-3.6E-014	pass
76	TRANS	16	+0.0E+000	1.2E-013	-1.2E-013	pass
77	TRANS	20	+0.0E+000	4.0E-013	-4.0E-013	pass
78	TRANS	23	1.4E-008	2.0E-012	1.4E-008	pass
79	TRANS	24	9.7E-008	1.4E-011	9.7E-008	pass
80	TRANS	25	2.7E-006	4.0E-010	2.7E-006	pass
81	TRANS	26-05	8.1E-013	8.1E-013	+0.0E+000	pass
82	TRANS	26-08	1.4E-013	1.4E-013	+0.0E+000	pass
83	TRANS	26-09	2.5E-011	2.5E-011	+0.0E+000	pass
84	TRANS	26-10	1.1E-009	1.1E-009	+0.0E+000	pass
85	TRANS	26-15	+0.0E+000	7.5E-014	-7.5E-014	pass
86	TRANS	26-19	+0.0E+000	5.0E-012	-5.0E-012	pass
87	TRANS	26-20	+0.0E+000	2.3E-010	-2.3E-010	pass
88	TRANS	26-21	2.3E-008	3.4E-011	2.3E-008	pass
89	TRANS	26-22	1.5E-009	1.5E-009	+0.0E+000	pass

Scenario: Condition AFW out of service for 72 hours completed at 10:42:03 PM

STL1-04 Scenario: Condition EDG out of service for 3 months started at 10:42:03 PM
Assessment EDG-2190HRS created
Assessment processed
Sequences: 83 of 00083 pass
Total CCDP: 2.6E-005 2.6E-005 pass
Total CDP: 4.7E-006 4.7E-006 pass
Total Importance: 2.1E-005 2.1E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	1.6E-010	3.5E-011	1.2E-010	pass
2	LOOP	06	1.8E-009	2.2E-010	1.6E-009	pass
3	LOOP	08	5.3E-011	3.2E-012	5.0E-011	pass
4	LOOP	09	4.0E-010	2.6E-011	3.7E-010	pass
5	LOOP	11	8.2E-009	5.6E-010	7.6E-009	pass
6	LOOP	12	3.3E-008	2.3E-009	3.1E-008	pass
7	LOOP	13	1.9E-007	1.4E-008	1.8E-007	pass
8	LOOP	16	8.9E-010	4.0E-010	4.9E-010	pass
9	LOOP	17	6.7E-009	2.8E-009	3.9E-009	pass
10	LOOP	20	2.6E-010	2.3E-011	2.4E-010	pass
11	LOOP	21	1.1E-009	1.1E-010	9.4E-010	pass
12	LOOP	22	2.4E-007	8.2E-008	1.6E-007	pass
13	LOOP	23-02	6.3E-006	4.4E-007	5.8E-006	pass
14	LOOP	23-05	7.7E-013	+0.0E+000	7.7E-013	pass
15	LOOP	23-06	5.0E-012	+0.0E+000	5.0E-012	pass
16	LOOP	23-09	2.9E-013	+0.0E+000	2.9E-013	pass
17	LOOP	23-10	7.6E-011	4.9E-012	7.1E-011	pass
18	LOOP	23-11	1.9E-007	1.3E-008	1.7E-007	pass
19	LOOP	23-13	3.7E-006	2.6E-007	3.4E-006	pass
20	LOOP	23-16	4.5E-013	+0.0E+000	4.5E-013	pass
21	LOOP	23-17	2.3E-012	+0.0E+000	2.3E-012	pass
22	LOOP	23-21	4.4E-011	2.7E-012	4.1E-011	pass
23	LOOP	23-22	1.1E-007	7.7E-009	1.0E-007	pass
24	LOOP	23-24	1.3E-006	9.0E-008	1.2E-006	pass
25	LOOP	23-26	1.1E-005	7.3E-007	9.8E-006	pass
26	LOOP	24	1.3E-008	1.3E-008	+0.0E+000	pass
27	SGTR	03	4.5E-007	4.5E-007	+0.0E+000	pass
28	SGTR	04	1.6E-007	1.6E-007	+0.0E+000	pass
29	SGTR	05	3.6E-008	3.6E-008	+0.0E+000	pass
30	SGTR	08	1.9E-008	1.9E-008	+0.0E+000	pass
31	SGTR	09	6.6E-009	6.6E-009	+0.0E+000	pass
32	SGTR	10	1.4E-009	1.4E-009	+0.0E+000	pass
33	SGTR	11	4.7E-007	4.7E-007	+0.0E+000	pass
34	SGTR	13	2.9E-008	2.9E-008	+0.0E+000	pass
35	SGTR	14	2.6E-011	2.6E-011	+0.0E+000	pass
36	SGTR	16	9.1E-010	9.1E-010	+0.0E+000	pass
37	SGTR	17	4.9E-013	4.9E-013	+0.0E+000	pass
38	SGTR	18	2.6E-010	2.6E-010	+0.0E+000	pass
39	SGTR	21	6.6E-011	6.6E-011	+0.0E+000	pass
40	SGTR	22	2.3E-011	2.3E-011	+0.0E+000	pass
41	SGTR	23	5.3E-012	5.3E-012	+0.0E+000	pass
42	SGTR	26	7.0E-013	7.0E-013	+0.0E+000	pass
43	SGTR	27	3.5E-013	3.5E-013	+0.0E+000	pass
44	SGTR	29	7.1E-011	7.1E-011	+0.0E+000	pass
45	SGTR	31	3.8E-012	3.8E-012	+0.0E+000	pass
46	SGTR	39	1.7E-011	1.7E-011	+0.0E+000	pass
47	SGTR	40	3.1E-013	3.1E-013	+0.0E+000	pass
48	SGTR	42	1.9E-013	1.9E-013	+0.0E+000	pass
49	SGTR	43	1.2E-013	1.2E-013	+0.0E+000	pass
50	SGTR	44	3.0E-010	3.0E-010	+0.0E+000	pass
51	SGTR	45	3.4E-010	3.4E-010	+0.0E+000	pass
52	SGTR	46	2.0E-008	2.0E-008	+0.0E+000	pass
53	SLOCA	04	9.3E-009	9.3E-009	+0.0E+000	pass
54	SLOCA	05	9.2E-008	9.2E-008	+0.0E+000	pass
55	SLOCA	07	2.8E-009	2.8E-009	+0.0E+000	pass
56	SLOCA	08	2.0E-008	2.0E-008	+0.0E+000	pass
57	SLOCA	09	1.6E-006	1.6E-006	+0.0E+000	pass
58	SLOCA	14	1.5E-012	1.5E-012	+0.0E+000	pass

59	SLOCA	17	1.9E-013	1.9E-013	+0.0E+000	pass
60	SLOCA	18	6.2E-011	6.2E-011	+0.0E+000	pass
61	SLOCA	27	3.9E-013	3.9E-013	+0.0E+000	pass
62	SLOCA	28	3.4E-012	3.4E-012	+0.0E+000	pass
63	SLOCA	29	1.2E-010	1.2E-010	+0.0E+000	pass
64	SLOCA	30	2.8E-008	2.8E-008	+0.0E+000	pass
65	TRANS	05	3.0E-011	3.0E-011	+0.0E+000	pass
66	TRANS	06	1.3E-010	1.3E-010	+0.0E+000	pass
67	TRANS	09	9.1E-013	9.1E-013	+0.0E+000	pass
68	TRANS	10	3.4E-010	3.4E-010	+0.0E+000	pass
69	TRANS	15	1.1E-012	1.1E-012	+0.0E+000	pass
70	TRANS	16	3.6E-012	3.6E-012	+0.0E+000	pass
71	TRANS	20	1.2E-011	1.2E-011	+0.0E+000	pass
72	TRANS	23	6.1E-011	6.1E-011	+0.0E+000	pass
73	TRANS	24	4.3E-010	4.3E-010	+0.0E+000	pass
74	TRANS	25	1.2E-008	1.2E-008	+0.0E+000	pass
75	TRANS	26-05	2.5E-011	2.5E-011	+0.0E+000	pass
76	TRANS	26-08	4.2E-012	4.2E-012	+0.0E+000	pass
77	TRANS	26-09	7.7E-010	7.7E-010	+0.0E+000	pass
78	TRANS	26-10	3.5E-008	3.5E-008	+0.0E+000	pass
79	TRANS	26-15	2.3E-012	2.3E-012	+0.0E+000	pass
80	TRANS	26-19	1.5E-010	1.5E-010	+0.0E+000	pass
81	TRANS	26-20	7.0E-009	7.0E-009	+0.0E+000	pass
82	TRANS	26-21	1.0E-009	1.0E-009	+0.0E+000	pass
83	TRANS	26-22	4.5E-008	4.5E-008	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 10:42:36 PM

TEST CASE COMPLETE: at 10:42:36 PM

TEST CASE : GEM Initiating Events (IE_STL1)
DATE & TIME: 8/30/99 10:42:37 PM

TEST FOR: GEM Version 6.63

Project stl1_2qa is open

STL1-05 Scenario: Transient - No other failures started at 10:42:42 PM
Assessment TRANS created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 19 of 00019 pass
Total CCDP: 1.6E-007 1.6E-007 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	5.0E-011	pass
2	TRANS	06	2.2E-010	pass
3	TRANS	09	6.5E-012	pass
4	TRANS	10	5.4E-010	pass
5	TRANS	15	2.0E-012	pass
6	TRANS	16	8.7E-012	pass
7	TRANS	20	2.2E-011	pass
8	TRANS	23	1.0E-010	pass
9	TRANS	24	7.0E-010	pass
10	TRANS	25	1.9E-008	pass
11	TRANS	26-05	7.1E-011	pass
12	TRANS	26-08	1.5E-011	pass
13	TRANS	26-09	1.2E-009	pass
14	TRANS	26-10	5.5E-008	pass
15	TRANS	26-15	1.4E-011	pass
16	TRANS	26-19	2.5E-010	pass
17	TRANS	26-20	1.1E-008	pass
18	TRANS	26-21	1.6E-009	pass
19	TRANS	26-22	7.2E-008	pass

Scenario: Transient - No other failures completed at 10:43:31 PM

STL1-06 Scenario: Small LOCA - No other failures started at 10:43:31 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 12 of 00012 pass
Total CCDP: 3.5E-004 3.5E-004 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	04	1.8E-006	pass
2	SLOCA	05	1.8E-005	pass
3	SLOCA	07	5.6E-007	pass
4	SLOCA	08	3.9E-006	pass
5	SLOCA	09	3.2E-004	pass
6	SLOCA	14	7.6E-010	pass
7	SLOCA	17	1.5E-010	pass
8	SLOCA	18	1.2E-008	pass
9	SLOCA	27	1.3E-010	pass
10	SLOCA	28	8.8E-010	pass
11	SLOCA	29	2.4E-008	pass
12	SLOCA	30	5.5E-006	pass

Scenario: Small LOCA - No other failures completed at 10:44:33 PM

STL1-07 Scenario: SGTR - no other failures started at 10:44:33 PM
Assessment SGTR created
Initiating event IE-SGTR selected
Assessment processed
Sequences: 26 of 00026 pass
Total CCDP: 3.4E-004 3.4E-004 pass

#	Tree	Sequence	CCDP	Status
1	SGTR	03	1.3E-004	pass
2	SGTR	04	4.4E-005	pass
3	SGTR	05	1.0E-005	pass
4	SGTR	08	5.4E-006	pass
5	SGTR	09	1.9E-006	pass
6	SGTR	10	3.8E-007	pass
7	SGTR	11	1.3E-004	pass
8	SGTR	13	8.2E-006	pass
9	SGTR	14	7.5E-009	pass
10	SGTR	16	2.6E-007	pass
11	SGTR	17	2.1E-010	pass
12	SGTR	18	7.3E-008	pass
13	SGTR	21	2.0E-008	pass
14	SGTR	22	6.7E-009	pass
15	SGTR	23	1.5E-009	pass
16	SGTR	26	8.3E-010	pass
17	SGTR	27	2.8E-010	pass
18	SGTR	29	2.0E-008	pass
19	SGTR	31	1.2E-009	pass
20	SGTR	39	5.0E-009	pass
21	SGTR	40	3.5E-010	pass
22	SGTR	42	1.3E-010	pass
23	SGTR	43	1.7E-010	pass
24	SGTR	44	8.3E-008	pass
25	SGTR	45	9.5E-008	pass
26	SGTR	46	5.5E-006	pass

Scenario: SGTR - no other failures completed at 10:45:50 PM

STL1-08 Scenario: Grid-related LOOP - no other failures started at 10:45:50 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 1.1E-005 1.1E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	2.6E-010	pass
2	LOOP	06	1.7E-009	pass
3	LOOP	08	2.8E-011	pass
4	LOOP	09	2.1E-010	pass
5	LOOP	11	2.3E-009	pass
6	LOOP	12	9.4E-009	pass
7	LOOP	13	9.0E-008	pass
8	LOOP	16	2.7E-009	pass
9	LOOP	17	1.9E-008	pass
10	LOOP	20	1.3E-010	pass
11	LOOP	21	6.2E-010	pass
12	LOOP	22	5.6E-007	pass
13	LOOP	23-02	1.7E-006	pass
14	LOOP	23-05	1.3E-011	pass
15	LOOP	23-06	7.6E-011	pass
16	LOOP	23-08	1.4E-012	pass
17	LOOP	23-09	9.4E-012	pass
18	LOOP	23-10	7.8E-010	pass
19	LOOP	23-11	2.9E-006	pass
20	LOOP	23-13	9.7E-007	pass
21	LOOP	23-16	7.4E-012	pass
22	LOOP	23-17	4.5E-011	pass
23	LOOP	23-19	8.0E-013	pass
24	LOOP	23-20	5.5E-012	pass
25	LOOP	23-21	4.6E-010	pass
26	LOOP	23-22	1.7E-006	pass
27	LOOP	23-24	2.8E-007	pass
28	LOOP	23-26	2.3E-006	pass
29	LOOP	24	8.9E-008	pass

Scenario: Grid-related LOOP - no other failures completed at 10:47:03 PM

STL1-09 Scenario: Plant-centered LOOP - no other failures started at 10:47:03 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 2.9E-005 2.9E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	2.5E-010	pass
2	LOOP	06	1.6E-009	pass
3	LOOP	08	2.9E-011	pass
4	LOOP	09	2.1E-010	pass
5	LOOP	11	5.4E-009	pass
6	LOOP	12	2.2E-008	pass
7	LOOP	13	9.5E-008	pass
8	LOOP	16	2.8E-009	pass
9	LOOP	17	2.0E-008	pass
10	LOOP	20	7.1E-012	pass
11	LOOP	21	3.5E-011	pass
12	LOOP	22	5.6E-007	pass
13	LOOP	23-02	1.3E-008	pass
14	LOOP	23-05	9.2E-011	pass
15	LOOP	23-06	5.7E-010	pass
16	LOOP	23-08	1.0E-011	pass
17	LOOP	23-09	7.0E-011	pass
18	LOOP	23-10	5.8E-009	pass
19	LOOP	23-11	8.7E-006	pass
20	LOOP	23-13	7.6E-009	pass
21	LOOP	23-16	5.4E-011	pass
22	LOOP	23-17	3.3E-010	pass
23	LOOP	23-19	6.0E-012	pass
24	LOOP	23-20	4.1E-011	pass
25	LOOP	23-21	3.4E-009	pass
26	LOOP	23-22	5.1E-006	pass
27	LOOP	23-24	1.5E-006	pass
28	LOOP	23-26	1.2E-005	pass
29	LOOP	24	8.9E-008	pass

Scenario: Plant-centered LOOP - no other failures completed at 10:48:14 PM

STL1-10 Scenario: Severe Weather LOOP - no other failures started at 10:48:14 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 6.0E-005 6.0E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	2.3E-010	pass
2	LOOP	06	1.5E-009	pass
3	LOOP	08	2.8E-011	pass
4	LOOP	09	2.1E-010	pass
5	LOOP	11	1.6E-008	pass
6	LOOP	12	6.3E-008	pass
7	LOOP	13	1.1E-007	pass
8	LOOP	16	2.8E-009	pass
9	LOOP	17	2.0E-008	pass
10	LOOP	20	1.5E-010	pass
11	LOOP	21	7.3E-010	pass
12	LOOP	22	5.7E-007	pass
13	LOOP	23-02	8.7E-007	pass
14	LOOP	23-05	1.3E-010	pass
15	LOOP	23-06	8.1E-010	pass
16	LOOP	23-08	1.5E-011	pass
17	LOOP	23-09	1.0E-010	pass
18	LOOP	23-10	8.6E-009	pass
19	LOOP	23-11	2.3E-005	pass
20	LOOP	23-13	5.1E-007	pass
21	LOOP	23-16	7.7E-011	pass
22	LOOP	23-17	4.8E-010	pass
23	LOOP	23-19	8.8E-012	pass
24	LOOP	23-20	6.1E-011	pass
25	LOOP	23-21	5.1E-009	pass
26	LOOP	23-22	1.4E-005	pass
27	LOOP	23-24	2.3E-006	pass
28	LOOP	23-26	1.9E-005	pass
29	LOOP	24	8.9E-008	pass

Scenario: Severe Weather LOOP - no other failures completed at 10:49:30 PM

STL1-11 Scenario: Extreme Severe Weather LOOP - no other failures started at 10:49:30 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 13 of 00013 pass
Total CCDP: 2.2E-003 2.2E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	11	1.7E-007	pass
2	LOOP	12	6.7E-007	pass
3	LOOP	13	2.1E-007	pass
4	LOOP	20	2.7E-008	pass
5	LOOP	21	1.2E-007	pass
6	LOOP	22	6.6E-007	pass
7	LOOP	23-02	1.1E-003	pass
8	LOOP	23-11	3.0E-004	pass
9	LOOP	23-13	6.2E-004	pass
10	LOOP	23-22	1.8E-004	pass
11	LOOP	23-24	1.1E-005	pass
12	LOOP	23-26	8.7E-005	pass
13	LOOP	24	8.9E-008	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 10:50:19 PM

STL1-12 Scenario: Transient - AFW failed started at 10:50:19 PM
Assessment TRANS-AFW created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 13 of 00013 pass
Total CCDP: 1.4E-004 1.4E-004 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	5.0E-011	pass
2	TRANS	06	2.2E-010	pass
3	TRANS	09	6.5E-012	pass
4	TRANS	10	5.4E-010	pass
5	TRANS	23	6.7E-007	pass
6	TRANS	24	4.7E-006	pass
7	TRANS	25	1.3E-004	pass
8	TRANS	26-05	7.1E-011	pass
9	TRANS	26-08	1.5E-011	pass
10	TRANS	26-09	1.2E-009	pass
11	TRANS	26-10	5.5E-008	pass
12	TRANS	26-21	1.1E-006	pass
13	TRANS	26-22	7.2E-008	pass

Scenario: Transient - AFW failed completed at 10:51:07 PM

TEST CASE COMPLETE: at 10:51:08 PM

TEST CASE : SAPHIRE QA Models (CDF_SURY)
DATE & TIME: 8/30/99 10:51:13 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: sury_2qa

SURY-01 Scenario: Solve Fault Trees started at 10:51:45 PM
Generated base case data
Fault trees solved
with prob cut off (1.0E-16)
Fault Tree base case updated

FAULT TREE RESULTS:
Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status	
ACP-ST	5.300E-001		pass		5.300E-01	pass	1	pass
AFW	3.122E-004		pass		3.122E-04	pass	17	pass
AFW-ATWS	7.919E-004		pass		7.919E-04	pass	17	pass
AFW-L	3.122E-004		pass		3.122E-04	pass	17	pass
AFW-SGTR	3.195E-004		pass		3.195E-04	pass	17	pass
BORATION	1.000E-002		pass		1.000E-02	pass	1	pass
COOLDOWN	3.997E-003		pass		3.997E-03	pass	2	pass
CSR	7.626E-004		pass		7.626E-04	pass	10	pass
CSR-L	7.626E-004		pass		7.626E-04	pass	10	pass
DEP-REC	3.500E-003		pass		3.500E-03	pass	1	pass
EP	2.194E-003		pass		2.194E-03	pass	9	pass
F&B	4.691E-002		pass		4.691E-02	pass	33	pass
F&B-L	4.691E-002		pass		4.691E-02	pass	33	pass
HPI	1.152E-003		pass		1.152E-03	pass	26	pass
HPI-L	1.152E-003		pass		1.152E-03	pass	26	pass
HPR	9.127E-003		pass		9.127E-03	pass	43	pass
HPR-L	9.127E-003		pass		9.127E-03	pass	43	pass
LPR	2.348E-003		pass		2.348E-03	pass	34	pass
MFW-A	2.000E-001		pass		2.000E-01	pass	1	pass
MFW-NT	5.000E-002		pass		5.000E-02	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
ACP-ST	0.000E+00		pass
AFW	0.000E+00		pass
AFW-ATWS	0.000E+00		pass
AFW-L	0.000E+00		pass
AFW-SGTR	0.000E+00		pass
BORATION	0.000E+00		pass
COOLDOWN	0.000E+00		pass
CSR	0.000E+00		pass
CSR-L	0.000E+00		pass
DEP-REC	0.000E+00		pass
EP	0.000E+00		pass
F&B	0.000E+00		pass
F&B-L	0.000E+00		pass
HPI	0.000E+00		pass
HPI-L	0.000E+00		pass
HPR	0.000E+00		pass
HPR-L	0.000E+00		pass
LPR	0.000E+00		pass
MFW-A	0.000E+00		pass
MFW-NT	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status	
MFW-T	7.840E-002		pass		7.840E-02	pass	2	pass
OP-2H	1.200E-001		pass		1.200E-01	pass	1	pass
OP-6H	3.600E-002		pass		3.600E-02	pass	1	pass

OP-BD	7.400E-003		pass	7.400E-03	pass	1	pass
OP-SL	6.300E-001		pass	6.300E-01	pass	1	pass
PORV	4.000E-002		pass	4.000E-02	pass	1	pass
PORV-A	2.714E-001		pass	2.714E-01	pass	9	pass
PORV-L	1.600E-001		pass	1.600E-01	pass	1	pass
PORV-RES	4.485E-003		pass	4.485E-03	pass	9	pass
PORV-SBO	3.700E-001		pass	3.700E-01	pass	1	pass
PRVL-RES	4.485E-003		pass	4.485E-03	pass	9	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
MFW-T	0.000E+00		pass
OP-2H	0.000E+00		pass
OP-6H	0.000E+00		pass
OP-BD	0.000E+00		pass
OP-SL	0.000E+00		pass
PORV	0.000E+00		pass
PORV-A	0.000E+00		pass
PORV-L	0.000E+00		pass
PORV-RES	0.000E+00		pass
PORV-SBO	0.000E+00		pass
PRVL-RES	0.000E+00		pass

Compare MinCut and No. of Cut Sets:

Fault Tree	MinCut	Status	Failure	Base	Status	Count	Status
RCS-DEP	3.997E-003		pass	3.997E-03	pass	2	pass
RCS-SG	3.738E-002		pass	3.738E-02	pass	3	pass
RCS-SG1	2.766E-002		pass	2.766E-02	pass	2	pass
RCSPRESS	1.303E-002		pass	1.303E-02	pass	2	pass
RHR	8.442E-003		pass	8.442E-03	pass	18	pass
RT	5.529E-006		pass	5.529E-06	pass	3	pass
RT-L	8.900E-008		pass	8.900E-08	pass	1	pass
SEALLOCA	1.300E-001		pass	1.300E-01	pass	1	pass
SG-DEP	1.000E-005		pass	1.000E-05	pass	1	pass
SGCOOL	2.005E-001		pass	2.005E-01	pass	5	pass
SGCOOL-L	3.404E-001		pass	3.404E-01	pass	5	pass
SGISOL	1.099E-002		pass	1.099E-02	pass	2	pass
SGISOL1	1.228E-002		pass	1.228E-02	pass	4	pass
SLOCA-NR	4.300E-001		pass	4.300E-01	pass	1	pass
THROTTLE	1.000E-002		pass	1.000E-02	pass	1	pass

Compare Mean:

Fault Tree	Mean	Status	Failure
RCS-DEP	0.000E+00		pass
RCS-SG	0.000E+00		pass
RCS-SG1	0.000E+00		pass
RCSPRESS	0.000E+00		pass
RHR	0.000E+00		pass
RT	0.000E+00		pass
RT-L	0.000E+00		pass
SEALLOCA	0.000E+00		pass
SG-DEP	0.000E+00		pass
SGCOOL	0.000E+00		pass
SGCOOL-L	0.000E+00		pass
SGISOL	0.000E+00		pass
SGISOL1	0.000E+00		pass
SLOCA-NR	0.000E+00		pass
THROTTLE	0.000E+00		pass

Scenario: Solve Fault Trees completed at 10:52:51 PM

SURY-02 Scenario: Core Damage Frequency Test started at 10:52:51 PM
Generated base case data
Sequences solved
with prob cut off (1.0E-16) and with recovery
Event Tree base case updated

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	05	1.248E-011	pass	1.248E-11	pass	420	pass
LOOP	06	2.030E-013	pass	2.030E-13	pass	73	pass
LOOP	08	4.305E-013	pass	4.305E-13	pass	132	pass
LOOP	09	3.484E-014	pass	3.484E-14	pass	21	pass
LOOP	11	2.543E-010	pass	2.543E-10	pass	143	pass
LOOP	12	1.242E-012	pass	1.242E-12	pass	29	pass
LOOP	13	3.795E-011	pass	3.795E-11	pass	207	pass
LOOP	16	2.248E-012	pass	2.248E-12	pass	213	pass
LOOP	17	1.931E-013	pass	1.931E-13	pass	28	pass
LOOP	20	9.641E-013	pass	9.641E-13	pass	135	pass
LOOP	21	1.230E-014	pass	1.230E-14	pass	16	pass
LOOP	22	6.617E-011	pass	6.617E-11	pass	327	pass
LOOP	23-02	1.139E-010	pass	1.139E-10	pass	9	pass
LOOP	23-05	1.447E-012	pass	1.447E-12	pass	88	pass
LOOP	23-06	1.495E-014	pass	1.495E-14	pass	15	pass
LOOP	23-08	3.282E-014	pass	3.282E-14	pass	27	pass
LOOP	23-09	2.447E-015	pass	2.447E-15	pass	3	pass
LOOP	23-10	8.347E-013	pass	8.347E-13	pass	68	pass
LOOP	23-11	1.449E-009	pass	1.449E-09	pass	9	pass
LOOP	23-13	6.689E-011	pass	6.689E-11	pass	9	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	05	0.000E+00	pass
LOOP	06	0.000E+00	pass
LOOP	08	0.000E+00	pass
LOOP	09	0.000E+00	pass
LOOP	11	0.000E+00	pass
LOOP	12	0.000E+00	pass
LOOP	13	0.000E+00	pass
LOOP	16	0.000E+00	pass
LOOP	17	0.000E+00	pass
LOOP	20	0.000E+00	pass
LOOP	21	0.000E+00	pass
LOOP	22	0.000E+00	pass
LOOP	23-02	0.000E+00	pass
LOOP	23-05	0.000E+00	pass
LOOP	23-06	0.000E+00	pass
LOOP	23-08	0.000E+00	pass
LOOP	23-09	0.000E+00	pass
LOOP	23-10	0.000E+00	pass
LOOP	23-11	0.000E+00	pass
LOOP	23-13	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
LOOP	23-16	8.482E-013	pass	8.482E-13	pass	60	pass
LOOP	23-17	8.452E-015	pass	8.452E-15	pass	10	pass
LOOP	23-19	1.878E-014	pass	1.878E-14	pass	18	pass
LOOP	23-20	1.365E-015	pass	1.365E-15	pass	2	pass
LOOP	23-21	4.894E-013	pass	4.894E-13	pass	49	pass
LOOP	23-22	8.510E-010	pass	8.510E-10	pass	9	pass
LOOP	23-24	2.551E-010	pass	2.551E-10	pass	42	pass
LOOP	23-26	6.784E-011	pass	6.784E-11	pass	45	pass
LOOP	24	1.424E-012	pass	1.424E-12	pass	1	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
LOOP	23-16	0.000E+00	pass
LOOP	23-17	0.000E+00	pass
LOOP	23-19	0.000E+00	pass
LOOP	23-20	0.000E+00	pass
LOOP	23-21	0.000E+00	pass
LOOP	23-22	0.000E+00	pass
LOOP	23-24	0.000E+00	pass
LOOP	23-26	0.000E+00	pass
LOOP	24	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	03	1.518E-010	pass	1.518E-10	pass	35	pass
SGTR	04	7.172E-011	pass	7.172E-11	pass	4	pass
SGTR	05	1.630E-011	pass	1.630E-11	pass	1	pass
SGTR	08	6.416E-012	pass	6.416E-12	pass	154	pass
SGTR	09	3.031E-012	pass	3.031E-12	pass	24	pass
SGTR	10	6.161E-013	pass	6.161E-13	pass	3	pass
SGTR	11	2.156E-010	pass	2.156E-10	pass	3	pass
SGTR	13	1.735E-011	pass	1.735E-11	pass	44	pass
SGTR	14	1.562E-014	pass	1.562E-14	pass	9	pass
SGTR	16	5.368E-013	pass	5.368E-13	pass	67	pass
SGTR	17	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	18	1.531E-013	pass	1.531E-13	pass	24	pass
SGTR	21	1.215E-014	pass	1.215E-14	pass	41	pass
SGTR	22	5.846E-015	pass	5.846E-15	pass	15	pass
SGTR	23	1.314E-015	pass	1.314E-15	pass	4	pass
SGTR	26	1.388E-016	pass	1.388E-16	pass	4	pass
SGTR	27	6.942E-017	pass	6.942E-17	pass	2	pass
SGTR	28	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	29	1.785E-014	pass	1.785E-14	pass	19	pass
SGTR	31	1.150E-015	pass	1.150E-15	pass	14	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	03	0.000E+00	pass
SGTR	04	0.000E+00	pass
SGTR	05	0.000E+00	pass
SGTR	08	0.000E+00	pass
SGTR	09	0.000E+00	pass
SGTR	10	0.000E+00	pass
SGTR	11	0.000E+00	pass
SGTR	13	0.000E+00	pass
SGTR	14	0.000E+00	pass
SGTR	16	0.000E+00	pass
SGTR	17	0.000E+00	pass
SGTR	18	0.000E+00	pass
SGTR	21	0.000E+00	pass
SGTR	22	0.000E+00	pass
SGTR	23	0.000E+00	pass
SGTR	26	0.000E+00	pass
SGTR	27	0.000E+00	pass
SGTR	28	0.000E+00	pass
SGTR	29	0.000E+00	pass
SGTR	31	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	32	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	34	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	35	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	36	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	39	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	40	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	42	3.179E-017	pass	3.179E-17	pass	1	pass
SGTR	43	0.000E+000	pass	0.000E+00	pass	0	pass
SGTR	44	7.442E-014	pass	7.442E-14	pass	14	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	32	0.000E+00	pass
SGTR	34	0.000E+00	pass
SGTR	35	0.000E+00	pass
SGTR	36	0.000E+00	pass
SGTR	39	0.000E+00	pass
SGTR	40	0.000E+00	pass
SGTR	42	0.000E+00	pass
SGTR	43	0.000E+00	pass
SGTR	44	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
SGTR	45	2.711E-013	pass	2.711E-13	pass	73	pass
SGTR	46	9.012E-012	pass	9.012E-12	pass	3	pass
SLOCA	04	2.511E-010	pass	2.511E-10	pass	231	pass
SLOCA	05	6.498E-012	pass	6.498E-12	pass	41	pass
SLOCA	07	3.490E-011	pass	3.490E-11	pass	42	pass
SLOCA	08	3.056E-012	pass	3.056E-12	pass	6	pass
SLOCA	09	9.694E-010	pass	9.694E-10	pass	26	pass
SLOCA	13	2.357E-014	pass	2.357E-14	pass	60	pass
SLOCA	14	3.163E-016	pass	3.163E-16	pass	5	pass
SLOCA	16	2.384E-015	pass	2.384E-15	pass	22	pass
SLOCA	17	1.720E-016	pass	1.720E-16	pass	3	pass
SLOCA	18	7.824E-014	pass	7.824E-14	pass	63	pass
SLOCA	21	2.422E-015	pass	2.422E-15	pass	16	pass
SLOCA	22	0.000E+000	pass	0.000E+00	pass	0	pass
SLOCA	24	1.418E-016	pass	1.418E-16	pass	4	pass
SLOCA	25	0.000E+000	pass	0.000E+00	pass	0	pass
SLOCA	27	1.612E-014	pass	1.612E-14	pass	38	pass
SLOCA	28	1.369E-015	pass	1.369E-15	pass	5	pass
SLOCA	29	3.787E-013	pass	3.787E-13	pass	76	pass
SLOCA	30	1.288E-011	pass	1.288E-11	pass	3	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
SGTR	45	0.000E+00	pass
SGTR	46	0.000E+00	pass
SLOCA	04	0.000E+00	pass
SLOCA	05	0.000E+00	pass
SLOCA	07	0.000E+00	pass
SLOCA	08	0.000E+00	pass
SLOCA	09	0.000E+00	pass
SLOCA	13	0.000E+00	pass
SLOCA	14	0.000E+00	pass
SLOCA	16	0.000E+00	pass
SLOCA	17	0.000E+00	pass
SLOCA	18	0.000E+00	pass
SLOCA	21	0.000E+00	pass
SLOCA	22	0.000E+00	pass
SLOCA	24	0.000E+00	pass
SLOCA	25	0.000E+00	pass
SLOCA	27	0.000E+00	pass
SLOCA	28	0.000E+00	pass
SLOCA	29	0.000E+00	pass
SLOCA	30	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRANS	05	6.297E-011	pass	6.297E-11	pass	493	pass
TRANS	06	4.172E-013	pass	4.172E-13	pass	99	pass
TRANS	08	2.205E-012	pass	2.205E-12	pass	182	pass
TRANS	09	1.760E-013	pass	1.760E-13	pass	25	pass
TRANS	10	5.648E-011	pass	5.648E-11	pass	156	pass
TRANS	15	5.948E-015	pass	5.948E-15	pass	28	pass

TRANS	16	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	18	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	19	0.000E+000	pass	0.000E+00	pass	0	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRANS	05	0.000E+00	pass
TRANS	06	0.000E+00	pass
TRANS	08	0.000E+00	pass
TRANS	09	0.000E+00	pass
TRANS	10	0.000E+00	pass
TRANS	15	0.000E+00	pass
TRANS	16	0.000E+00	pass
TRANS	18	0.000E+00	pass
TRANS	19	0.000E+00	pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Base	Status	Count	Status
TRANS	20	3.925E-015	pass	3.925E-15	pass	42	pass
TRANS	23	3.721E-012	pass	3.721E-12	pass	380	pass
TRANS	24	3.196E-013	pass	3.196E-13	pass	48	pass
TRANS	25	8.385E-011	pass	8.385E-11	pass	406	pass
TRANS	26-04	1.513E-013	pass	1.513E-13	pass	123	pass
TRANS	26-05	1.770E-015	pass	1.770E-15	pass	6	pass
TRANS	26-07	1.662E-014	pass	1.662E-14	pass	48	pass
TRANS	26-08	8.848E-016	pass	8.848E-16	pass	3	pass
TRANS	26-09	1.780E-011	pass	1.780E-11	pass	3	pass
TRANS	26-13	2.632E-014	pass	2.632E-14	pass	28	pass
TRANS	26-14	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	26-16	1.496E-015	pass	1.496E-15	pass	6	pass
TRANS	26-17	0.000E+000	pass	0.000E+00	pass	0	pass
TRANS	26-18	3.561E-012	pass	3.561E-12	pass	3	pass
TRANS	26-19	2.816E-013	pass	2.816E-13	pass	31	pass
TRANS	26-20	2.322E-011	pass	2.322E-11	pass	6	pass

Compare Mean:

Event Tree	Sequence	Mean	Status Failure
TRANS	20	0.000E+00	pass
TRANS	23	0.000E+00	pass
TRANS	24	0.000E+00	pass
TRANS	25	0.000E+00	pass
TRANS	26-04	0.000E+00	pass
TRANS	26-05	0.000E+00	pass
TRANS	26-07	0.000E+00	pass
TRANS	26-08	0.000E+00	pass
TRANS	26-09	0.000E+00	pass
TRANS	26-13	0.000E+00	pass
TRANS	26-14	0.000E+00	pass
TRANS	26-16	0.000E+00	pass
TRANS	26-17	0.000E+00	pass
TRANS	26-18	0.000E+00	pass
TRANS	26-19	0.000E+00	pass
TRANS	26-20	0.000E+00	pass

Scenario: Core Damage Frequency Test completed at 10:55:25 PM

TEST CASE COMPLETE: at 10:55:26 PM

TEST CASE : GEM Condition Assessments (COND_SURY)
DATE & TIME: 8/30/99 10:55:28 PM

TEST FOR: GEM Version 6.63

Project sury_2qa is open

SURY-03 Scenario: Condition AFW out of service for 72 hours started at 10:55:34 PM
Assessment AFW-72HRS created
Assessment processed
Sequences: 99 of 00099 pass
Total CCDP: 3.6E-005 3.6E-005 pass
Total CDP: 3.8E-007 3.8E-007 pass
Total Importance: 3.6E-005 3.6E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	+0.0E+000	9.0E-010	-9.0E-010	pass
2	LOOP	06	+0.0E+000	1.5E-011	-1.5E-011	pass
3	LOOP	08	+0.0E+000	3.1E-011	-3.1E-011	pass
4	LOOP	09	+0.0E+000	2.5E-012	-2.5E-012	pass
5	LOOP	11	+0.0E+000	1.8E-008	-1.8E-008	pass
6	LOOP	12	+0.0E+000	8.9E-011	-8.9E-011	pass
7	LOOP	13	+0.0E+000	2.7E-009	-2.7E-009	pass
8	LOOP	16	5.1E-007	1.6E-010	5.1E-007	pass
9	LOOP	17	4.4E-008	1.4E-011	4.4E-008	pass
10	LOOP	20	1.8E-007	6.9E-011	1.8E-007	pass
11	LOOP	21	2.9E-009	8.9E-013	2.9E-009	pass
12	LOOP	22	1.4E-005	4.8E-009	1.4E-005	pass
13	LOOP	23-02	+0.0E+000	8.2E-009	-8.2E-009	pass
14	LOOP	23-05	+0.0E+000	1.0E-010	-1.0E-010	pass
15	LOOP	23-06	+0.0E+000	1.1E-012	-1.1E-012	pass
16	LOOP	23-08	+0.0E+000	2.4E-012	-2.4E-012	pass
17	LOOP	23-09	+0.0E+000	1.8E-013	-1.8E-013	pass
18	LOOP	23-10	+0.0E+000	6.0E-011	-6.0E-011	pass
19	LOOP	23-11	+0.0E+000	1.0E-007	-1.0E-007	pass
20	LOOP	23-13	+0.0E+000	4.8E-009	-4.8E-009	pass
21	LOOP	23-16	+0.0E+000	6.1E-011	-6.1E-011	pass
22	LOOP	23-17	+0.0E+000	6.1E-013	-6.1E-013	pass
23	LOOP	23-19	+0.0E+000	1.4E-012	-1.4E-012	pass
24	LOOP	23-20	+0.0E+000	9.8E-014	-9.8E-014	pass
25	LOOP	23-21	+0.0E+000	3.5E-011	-3.5E-011	pass
26	LOOP	23-22	+0.0E+000	6.1E-008	-6.1E-008	pass
27	LOOP	23-24	+0.0E+000	1.8E-008	-1.8E-008	pass
28	LOOP	23-26	3.6E-007	4.9E-009	3.6E-007	pass
29	LOOP	24	1.0E-010	1.0E-010	+0.0E+000	pass
30	SGTR	03	+0.0E+000	1.1E-008	-1.1E-008	pass
31	SGTR	04	+0.0E+000	5.2E-009	-5.2E-009	pass
32	SGTR	05	+0.0E+000	1.2E-009	-1.2E-009	pass
33	SGTR	08	+0.0E+000	4.6E-010	-4.6E-010	pass
34	SGTR	09	+0.0E+000	2.2E-010	-2.2E-010	pass
35	SGTR	10	+0.0E+000	4.4E-011	-4.4E-011	pass
36	SGTR	11	+0.0E+000	1.6E-008	-1.6E-008	pass
37	SGTR	13	+0.0E+000	1.3E-009	-1.3E-009	pass
38	SGTR	14	+0.0E+000	1.1E-012	-1.1E-012	pass
39	SGTR	16	+0.0E+000	3.9E-011	-3.9E-011	pass
40	SGTR	18	+0.0E+000	1.1E-011	-1.1E-011	pass
41	SGTR	21	2.8E-009	8.8E-013	2.8E-009	pass
42	SGTR	22	1.3E-009	4.2E-013	1.3E-009	pass
43	SGTR	23	3.1E-010	9.5E-014	3.1E-010	pass
44	SGTR	26	1.2E-010	1.0E-014	1.2E-010	pass
45	SGTR	27	5.7E-011	5.0E-015	5.7E-011	pass
46	SGTR	28	1.2E-011	+0.0E+000	1.2E-011	pass
47	SGTR	29	4.0E-009	1.3E-012	4.0E-009	pass
48	SGTR	31	3.2E-010	8.3E-014	3.2E-010	pass
49	SGTR	32	2.9E-013	+0.0E+000	2.9E-013	pass
50	SGTR	34	1.0E-011	+0.0E+000	1.0E-011	pass

51	SGTR	36	2.9E-012	+0.0E+000	2.9E-012	pass
52	SGTR	39	3.3E-011	+0.0E+000	3.3E-011	pass
53	SGTR	40	9.9E-012	+0.0E+000	9.9E-012	pass
54	SGTR	42	3.5E-011	2.3E-015	3.5E-011	pass
55	SGTR	43	1.2E-011	+0.0E+000	1.2E-011	pass
56	SGTR	44	1.7E-008	5.4E-012	1.7E-008	pass
57	SGTR	45	6.1E-008	2.0E-011	6.1E-008	pass
58	SGTR	46	6.5E-010	6.5E-010	+0.0E+000	pass
59	SLOCA	04	+0.0E+000	1.8E-008	-1.8E-008	pass
60	SLOCA	05	+0.0E+000	4.7E-010	-4.7E-010	pass
61	SLOCA	07	+0.0E+000	2.5E-009	-2.5E-009	pass
62	SLOCA	08	+0.0E+000	2.2E-010	-2.2E-010	pass
63	SLOCA	09	+0.0E+000	7.0E-008	-7.0E-008	pass
64	SLOCA	13	4.7E-009	1.7E-012	4.7E-009	pass
65	SLOCA	14	1.2E-010	2.3E-014	1.2E-010	pass
66	SLOCA	16	6.5E-010	1.7E-013	6.5E-010	pass
67	SLOCA	17	5.7E-011	1.2E-014	5.7E-011	pass
68	SLOCA	18	1.8E-008	5.6E-012	1.8E-008	pass
69	SLOCA	21	5.5E-010	1.7E-013	5.5E-010	pass
70	SLOCA	22	1.4E-011	+0.0E+000	1.4E-011	pass
71	SLOCA	24	7.6E-011	1.0E-014	7.6E-011	pass
72	SLOCA	25	6.7E-012	+0.0E+000	6.7E-012	pass
73	SLOCA	27	3.9E-009	1.2E-012	3.9E-009	pass
74	SLOCA	28	3.3E-010	9.9E-014	3.3E-010	pass
75	SLOCA	29	8.7E-008	2.7E-011	8.7E-008	pass
76	SLOCA	30	9.3E-010	9.3E-010	+0.0E+000	pass
77	TRANS	05	+0.0E+000	4.5E-009	-4.5E-009	pass
78	TRANS	06	+0.0E+000	3.0E-011	-3.0E-011	pass
79	TRANS	08	+0.0E+000	1.6E-010	-1.6E-010	pass
80	TRANS	09	+0.0E+000	1.3E-011	-1.3E-011	pass
81	TRANS	10	+0.0E+000	4.1E-009	-4.1E-009	pass
82	TRANS	15	1.2E-009	4.3E-013	1.2E-009	pass
83	TRANS	16	7.8E-012	+0.0E+000	7.8E-012	pass
84	TRANS	18	4.1E-011	+0.0E+000	4.1E-011	pass
85	TRANS	19	3.3E-012	+0.0E+000	3.3E-012	pass
86	TRANS	20	1.1E-009	2.8E-013	1.1E-009	pass
87	TRANS	23	8.5E-007	2.7E-010	8.5E-007	pass
88	TRANS	24	7.4E-008	2.3E-011	7.4E-008	pass
89	TRANS	25	1.9E-005	6.0E-009	1.9E-005	pass
90	TRANS	26-04	1.1E-011	1.1E-011	+0.0E+000	pass
91	TRANS	26-05	1.3E-013	1.3E-013	+0.0E+000	pass
92	TRANS	26-07	1.2E-012	1.2E-012	+0.0E+000	pass
93	TRANS	26-08	6.4E-014	6.4E-014	+0.0E+000	pass
94	TRANS	26-09	1.3E-009	1.3E-009	+0.0E+000	pass
95	TRANS	26-13	+0.0E+000	1.9E-012	-1.9E-012	pass
96	TRANS	26-16	+0.0E+000	1.1E-013	-1.1E-013	pass
97	TRANS	26-18	+0.0E+000	2.6E-010	-2.6E-010	pass
98	TRANS	26-19	2.6E-008	2.0E-011	2.6E-008	pass
99	TRANS	26-20	1.7E-009	1.7E-009	+0.0E+000	pass

Scenario: Condition AFW out of service for 72 hours completed at 10:56:18 PM

SURY-04 Scenario: Condition EDG out of service for 3 months started at 10:56:18 PM
Assessment EDG-2190HRS created
Assessment processed
Sequences: 87 of 00087 pass
Total CCDP: 3.9E-005 3.9E-005 pass
Total CDP: 1.1E-005 1.1E-005 pass
Total Importance: 2.7E-005 2.7E-005 pass

#	Tree	Sequence	CCDP	CDP	Importance	Status
1	LOOP	05	3.5E-008	2.7E-008	7.7E-009	pass
2	LOOP	06	2.1E-009	4.5E-010	1.7E-009	pass
3	LOOP	08	4.3E-009	9.4E-010	3.4E-009	pass
4	LOOP	09	3.8E-010	7.6E-011	3.1E-010	pass
5	LOOP	11	1.7E-005	5.6E-007	1.7E-005	pass
6	LOOP	12	1.6E-008	2.7E-009	1.3E-008	pass
7	LOOP	13	1.9E-006	8.3E-008	1.9E-006	pass
8	LOOP	16	6.2E-009	4.9E-009	1.3E-009	pass
9	LOOP	17	5.4E-010	4.2E-010	1.2E-010	pass
10	LOOP	20	5.8E-008	2.1E-009	5.6E-008	pass
11	LOOP	21	5.3E-011	2.7E-011	2.6E-011	pass
12	LOOP	22	1.1E-006	1.5E-007	9.4E-007	pass
13	LOOP	23-02	5.6E-007	2.5E-007	3.1E-007	pass
14	LOOP	23-05	7.8E-008	3.2E-009	7.4E-008	pass
15	LOOP	23-06	1.4E-010	3.3E-011	1.1E-010	pass
16	LOOP	23-08	4.4E-010	7.2E-011	3.7E-010	pass
17	LOOP	23-09	1.2E-011	5.4E-012	6.5E-012	pass
18	LOOP	23-10	4.6E-009	1.8E-009	2.8E-009	pass
19	LOOP	23-11	7.1E-006	3.2E-006	3.9E-006	pass
20	LOOP	23-13	3.3E-007	1.5E-007	1.8E-007	pass
21	LOOP	23-16	4.6E-008	1.9E-009	4.4E-008	pass
22	LOOP	23-17	8.0E-011	1.9E-011	6.2E-011	pass
23	LOOP	23-19	2.6E-010	4.1E-011	2.2E-010	pass
24	LOOP	23-20	6.8E-012	3.0E-012	3.8E-012	pass
25	LOOP	23-21	2.7E-009	1.1E-009	1.6E-009	pass
26	LOOP	23-22	4.2E-006	1.9E-006	2.3E-006	pass
27	LOOP	23-24	1.3E-006	5.6E-007	6.9E-007	pass
28	LOOP	23-26	3.3E-007	1.5E-007	1.8E-007	pass
29	LOOP	24	3.1E-009	3.1E-009	+0.0E+000	pass
30	SGTR	03	3.3E-007	3.3E-007	+0.0E+000	pass
31	SGTR	04	1.6E-007	1.6E-007	+0.0E+000	pass
32	SGTR	05	3.6E-008	3.6E-008	+0.0E+000	pass
33	SGTR	08	1.4E-008	1.4E-008	+0.0E+000	pass
34	SGTR	09	6.6E-009	6.6E-009	+0.0E+000	pass
35	SGTR	10	1.4E-009	1.4E-009	+0.0E+000	pass
36	SGTR	11	4.7E-007	4.7E-007	+0.0E+000	pass
37	SGTR	13	3.8E-008	3.8E-008	+0.0E+000	pass
38	SGTR	14	3.4E-011	3.4E-011	+0.0E+000	pass
39	SGTR	16	1.2E-009	1.2E-009	+0.0E+000	pass
40	SGTR	18	3.4E-010	3.4E-010	+0.0E+000	pass
41	SGTR	21	2.7E-011	2.7E-011	+0.0E+000	pass
42	SGTR	22	1.3E-011	1.3E-011	+0.0E+000	pass
43	SGTR	23	2.9E-012	2.9E-012	+0.0E+000	pass
44	SGTR	26	3.0E-013	3.0E-013	+0.0E+000	pass
45	SGTR	27	1.5E-013	1.5E-013	+0.0E+000	pass
46	SGTR	29	3.9E-011	3.9E-011	+0.0E+000	pass
47	SGTR	31	2.5E-012	2.5E-012	+0.0E+000	pass
48	SGTR	42	7.0E-014	7.0E-014	+0.0E+000	pass
49	SGTR	44	1.6E-010	1.6E-010	+0.0E+000	pass
50	SGTR	45	5.9E-010	5.9E-010	+0.0E+000	pass
51	SGTR	46	2.0E-008	2.0E-008	+0.0E+000	pass
52	SLOCA	04	5.5E-007	5.5E-007	+0.0E+000	pass
53	SLOCA	05	1.4E-008	1.4E-008	+0.0E+000	pass
54	SLOCA	07	7.6E-008	7.6E-008	+0.0E+000	pass
55	SLOCA	08	6.7E-009	6.7E-009	+0.0E+000	pass
56	SLOCA	09	2.1E-006	2.1E-006	+0.0E+000	pass
57	SLOCA	13	5.2E-011	5.2E-011	+0.0E+000	pass
58	SLOCA	14	6.9E-013	6.9E-013	+0.0E+000	pass

59	SLOCA	16	5.2E-012	5.2E-012	+0.0E+000	pass
60	SLOCA	17	3.8E-013	3.8E-013	+0.0E+000	pass
61	SLOCA	18	1.7E-010	1.7E-010	+0.0E+000	pass
62	SLOCA	21	5.3E-012	5.3E-012	+0.0E+000	pass
63	SLOCA	24	3.1E-013	3.1E-013	+0.0E+000	pass
64	SLOCA	27	3.5E-011	3.5E-011	+0.0E+000	pass
65	SLOCA	28	3.0E-012	3.0E-012	+0.0E+000	pass
66	SLOCA	29	8.3E-010	8.3E-010	+0.0E+000	pass
67	SLOCA	30	2.8E-008	2.8E-008	+0.0E+000	pass
68	TRANS	05	1.4E-007	1.4E-007	+0.0E+000	pass
69	TRANS	06	9.1E-010	9.1E-010	+0.0E+000	pass
70	TRANS	08	4.8E-009	4.8E-009	+0.0E+000	pass
71	TRANS	09	3.9E-010	3.9E-010	+0.0E+000	pass
72	TRANS	10	1.2E-007	1.2E-007	+0.0E+000	pass
73	TRANS	15	1.3E-011	1.3E-011	+0.0E+000	pass
74	TRANS	20	8.6E-012	8.6E-012	+0.0E+000	pass
75	TRANS	23	8.2E-009	8.2E-009	+0.0E+000	pass
76	TRANS	24	7.0E-010	7.0E-010	+0.0E+000	pass
77	TRANS	25	1.8E-007	1.8E-007	+0.0E+000	pass
78	TRANS	26-04	3.3E-010	3.3E-010	+0.0E+000	pass
79	TRANS	26-05	3.9E-012	3.9E-012	+0.0E+000	pass
80	TRANS	26-07	3.6E-011	3.6E-011	+0.0E+000	pass
81	TRANS	26-08	1.9E-012	1.9E-012	+0.0E+000	pass
82	TRANS	26-09	3.9E-008	3.9E-008	+0.0E+000	pass
83	TRANS	26-13	5.8E-011	5.8E-011	+0.0E+000	pass
84	TRANS	26-16	3.3E-012	3.3E-012	+0.0E+000	pass
85	TRANS	26-18	7.8E-009	7.8E-009	+0.0E+000	pass
86	TRANS	26-19	6.2E-010	6.2E-010	+0.0E+000	pass
87	TRANS	26-20	5.1E-008	5.1E-008	+0.0E+000	pass

Scenario: Condition EDG out of service for 3 months completed at 10:56:54 PM

TEST CASE COMPLETE: at 10:56:54 PM

TEST CASE : GEM Initiating Events (IE_SURY)
DATE & TIME: 8/30/99 10:56:56 PM

TEST FOR: GEM Version 6.63

Project sury_2qa is open

SURY-05 Scenario: Transient - No other failures started at 10:57:01 PM
Assessment TRANS created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 20 of 00020 pass
Total CCDP: 7.9E-007 7.9E-007 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	05	2.0E-007	pass
2	TRANS	06	1.3E-009	pass
3	TRANS	08	6.9E-009	pass
4	TRANS	09	5.5E-010	pass
5	TRANS	10	1.8E-007	pass
6	TRANS	15	2.0E-011	pass
7	TRANS	20	1.4E-011	pass
8	TRANS	23	1.2E-008	pass
9	TRANS	24	9.9E-010	pass
10	TRANS	25	2.6E-007	pass
11	TRANS	26-04	4.9E-010	pass
12	TRANS	26-05	1.1E-011	pass
13	TRANS	26-07	6.1E-011	pass
14	TRANS	26-08	5.1E-012	pass
15	TRANS	26-09	5.5E-008	pass
16	TRANS	26-13	9.8E-011	pass
17	TRANS	26-16	1.2E-011	pass
18	TRANS	26-18	1.1E-008	pass
19	TRANS	26-19	8.8E-010	pass
20	TRANS	26-20	7.2E-008	pass

Scenario: Transient - No other failures completed at 10:57:49 PM

SURY-06 Scenario: Small LOCA - No other failures started at 10:57:49 PM
Assessment SLOCA created
Initiating event IE-SLOCA selected
Assessment processed
Sequences: 16 of 00016 pass
Total CCDP: 5.5E-004 5.5E-004 pass

#	Tree	Sequence	CCDP	Status
1	SLOCA	04	1.1E-004	pass
2	SLOCA	05	2.8E-006	pass
3	SLOCA	07	1.5E-005	pass
4	SLOCA	08	1.3E-006	pass
5	SLOCA	09	4.2E-004	pass
6	SLOCA	13	1.1E-008	pass
7	SLOCA	14	2.3E-010	pass
8	SLOCA	16	1.2E-009	pass
9	SLOCA	17	1.1E-010	pass
10	SLOCA	18	3.4E-008	pass
11	SLOCA	21	1.2E-009	pass
12	SLOCA	24	1.4E-010	pass
13	SLOCA	27	7.2E-009	pass
14	SLOCA	28	6.2E-010	pass
15	SLOCA	29	1.6E-007	pass
16	SLOCA	30	5.5E-006	pass

Scenario: Small LOCA - No other failures completed at 10:58:28 PM

SURY-07 Scenario: SGTR - no other failures started at 10:58:28 PM
Assessment SGTR created
Initiating event IE-SGTR selected Assessment processed
Sequences: 22 of 00022 pass
Total CCDP: 3.0E-004 3.0E-004 pass

#	Tree	Sequence	CCDP	Status
1	SGTR	03	9.3E-005	pass
2	SGTR	04	4.4E-005	pass
3	SGTR	05	1.0E-005	pass
4	SGTR	08	3.9E-006	pass
5	SGTR	09	1.9E-006	pass
6	SGTR	10	3.8E-007	pass
7	SGTR	11	1.3E-004	pass
8	SGTR	13	1.1E-005	pass
9	SGTR	14	9.7E-009	pass
10	SGTR	16	3.3E-007	pass
11	SGTR	18	9.4E-008	pass
12	SGTR	21	7.8E-009	pass
13	SGTR	22	3.7E-009	pass
14	SGTR	23	8.3E-010	pass
15	SGTR	26	3.3E-010	pass
16	SGTR	27	1.5E-010	pass
17	SGTR	29	1.1E-008	pass
18	SGTR	31	8.8E-010	pass
19	SGTR	42	9.6E-011	pass
20	SGTR	44	4.6E-008	pass
21	SGTR	45	1.7E-007	pass
22	SGTR	46	5.5E-006	pass

Scenario: SGTR - no other failures completed at 10:59:00 PM

SURY-08 Scenario: Grid-related LOOP - no other failures started at 10:59:00 PM
Assessment LOOP-GR created
Initiating event IE-LOOP selected Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 6.3E-005 6.3E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	8.4E-007	pass
2	LOOP	06	1.4E-008	pass
3	LOOP	08	2.9E-008	pass
4	LOOP	09	2.3E-009	pass
5	LOOP	11	6.2E-006	pass
6	LOOP	12	3.4E-008	pass
7	LOOP	13	2.2E-006	pass
8	LOOP	16	1.5E-007	pass
9	LOOP	17	1.3E-008	pass
10	LOOP	20	2.6E-010	pass
11	LOOP	21	3.8E-012	pass
12	LOOP	22	4.0E-006	pass
13	LOOP	23-02	4.2E-007	pass
14	LOOP	23-05	3.6E-008	pass
15	LOOP	23-06	4.0E-010	pass
16	LOOP	23-08	8.7E-010	pass
17	LOOP	23-09	6.6E-011	pass
18	LOOP	23-10	2.1E-008	pass
19	LOOP	23-11	2.0E-005	pass
20	LOOP	23-13	2.4E-007	pass
21	LOOP	23-16	2.1E-008	pass
22	LOOP	23-17	2.3E-010	pass
23	LOOP	23-19	5.1E-010	pass
24	LOOP	23-20	3.9E-011	pass
25	LOOP	23-21	1.3E-008	pass
26	LOOP	23-22	1.2E-005	pass
27	LOOP	23-24	1.3E-005	pass
28	LOOP	23-26	3.5E-006	pass
29	LOOP	24	8.9E-008	pass

Scenario: Grid-related LOOP - no other failures completed at 10:59:49 PM

SURY-09 Scenario: Plant-centered LOOP - no other failures started at 10:59:49 PM
Assessment LOOP-PC created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 8.1E-005 8.1E-005 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	8.2E-007	pass
2	LOOP	06	1.3E-008	pass
3	LOOP	08	2.8E-008	pass
4	LOOP	09	2.3E-009	pass
5	LOOP	11	8.7E-006	pass
6	LOOP	12	4.6E-008	pass
7	LOOP	13	2.2E-006	pass
8	LOOP	16	1.5E-007	pass
9	LOOP	17	1.3E-008	pass
10	LOOP	20	7.6E-010	pass
11	LOOP	21	1.1E-011	pass
12	LOOP	22	4.0E-006	pass
13	LOOP	23-02	8.2E-007	pass
14	LOOP	23-05	4.3E-008	pass
15	LOOP	23-06	4.7E-010	pass
16	LOOP	23-08	1.0E-009	pass
17	LOOP	23-09	7.9E-011	pass
18	LOOP	23-10	2.5E-008	pass
19	LOOP	23-11	2.9E-005	pass
20	LOOP	23-13	4.8E-007	pass
21	LOOP	23-16	2.5E-008	pass
22	LOOP	23-17	2.8E-010	pass
23	LOOP	23-19	6.0E-010	pass
24	LOOP	23-20	4.6E-011	pass
25	LOOP	23-21	1.5E-008	pass
26	LOOP	23-22	1.7E-005	pass
27	LOOP	23-24	1.4E-005	pass
28	LOOP	23-26	3.8E-006	pass
29	LOOP	24	8.9E-008	pass

Scenario: Plant-centered LOOP - no other failures completed at 11:00:37 PM

SURY-10 Scenario: Severe Weather LOOP - no other failures started at 11:00:37 PM
Assessment LOOP-SW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 29 of 00029 pass
Total CCDP: 1.4E-003 1.4E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	05	2.9E-007	pass
2	LOOP	06	5.2E-009	pass
3	LOOP	08	1.1E-008	pass
4	LOOP	09	9.0E-010	pass
5	LOOP	11	1.6E-004	pass
6	LOOP	12	4.9E-007	pass
7	LOOP	13	3.8E-006	pass
8	LOOP	16	1.0E-007	pass
9	LOOP	17	8.6E-009	pass
10	LOOP	20	9.2E-007	pass
11	LOOP	21	7.1E-009	pass
12	LOOP	22	4.9E-006	pass
13	LOOP	23-02	1.1E-004	pass
14	LOOP	23-05	1.2E-007	pass
15	LOOP	23-06	1.1E-009	pass
16	LOOP	23-08	2.5E-009	pass
17	LOOP	23-09	1.9E-010	pass
18	LOOP	23-10	6.0E-008	pass
19	LOOP	23-11	6.2E-004	pass
20	LOOP	23-13	6.6E-005	pass
21	LOOP	23-16	6.9E-008	pass
22	LOOP	23-17	6.6E-010	pass
23	LOOP	23-19	1.5E-009	pass
24	LOOP	23-20	1.1E-010	pass
25	LOOP	23-21	3.5E-008	pass
26	LOOP	23-22	3.6E-004	pass
27	LOOP	23-24	4.4E-005	pass
28	LOOP	23-26	1.2E-005	pass
29	LOOP	24	8.9E-008	pass

Scenario: Severe Weather LOOP - no other failures completed at 11:01:28 PM

SURY-11 Scenario: Extreme Severe Weather LOOP - no other failures started at 11:01:28 PM
Assessment LOOP-ESW created
Initiating event IE-LOOP selected
Assessment processed
Sequences: 13 of 00013 pass
Total CCDP: 3.0E-003 3.0E-003 pass

#	Tree	Sequence	CCDP	Status
1	LOOP	11	3.1E-004	pass
2	LOOP	12	7.9E-007	pass
3	LOOP	13	4.7E-006	pass
4	LOOP	20	3.7E-006	pass
5	LOOP	21	2.3E-008	pass
6	LOOP	22	5.4E-006	pass
7	LOOP	23-02	3.3E-004	pass
8	LOOP	23-11	1.3E-003	pass
9	LOOP	23-13	1.9E-004	pass
10	LOOP	23-22	7.5E-004	pass
11	LOOP	23-24	6.5E-005	pass
12	LOOP	23-26	1.7E-005	pass
13	LOOP	24	8.9E-008	pass

Scenario: Extreme Severe Weather LOOP - no other failures completed at 11:02:02 PM

SURY-12 Scenario: Transient - AFW failed started at 11:02:02 PM
Assessment TRANS-AFW created
Initiating event IE-TRANS selected
Assessment processed
Sequences: 15 of 00015 pass
Total CCDP: 8.8E-004 8.8E-004 pass

#	Tree	Sequence	CCDP	Status
1	TRANS	15	5.1E-008	pass
2	TRANS	16	3.4E-010	pass
3	TRANS	18	1.8E-009	pass
4	TRANS	19	1.4E-010	pass
5	TRANS	20	4.6E-008	pass
6	TRANS	23	3.7E-005	pass
7	TRANS	24	3.2E-006	pass
8	TRANS	25	8.3E-004	pass
9	TRANS	26-04	4.9E-010	pass
10	TRANS	26-05	1.1E-011	pass
11	TRANS	26-07	6.1E-011	pass
12	TRANS	26-08	5.1E-012	pass
13	TRANS	26-09	5.5E-008	pass
14	TRANS	26-19	1.1E-006	pass
15	TRANS	26-20	7.2E-008	pass

Scenario: Transient - AFW failed completed at 11:02:52 PM

TEST CASE COMPLETE: at 11:02:53 PM

TEST CASE : Project Uncertainty (UNCERT_SUR40)
DATE & TIME: 8/30/99 11:02:59 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: sur40

SUR40-01 Scenario: Solve Sequence Cutsets started at 11:03:05 PM
Generated base case data Sequences solved with recovery
Sequence cut sets updated
SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Count		Status
FA	A-2	6.974E-07	pass		371		pass
FA	A-6	7.011E-07	pass		260		pass
FA	A-7	4.191E-07	pass		33		pass
FS1	S1-2	1.395E-06	pass		408		pass
FS1	S1-3	1.396E-06	pass		223		pass
FS1	S1-9	1.096E-6	pass		576		pass
FS2	S2-20	1.096E-6	pass		576		pass
FS3	S3-41	1.425E-5	pass		967		pass
FT1S	T1S-11	2.375E-7	pass		246		pass
FT1S	T1S-12	1.243E-6	pass		1420		pass
FT1S	T1S-14	2.479E-6	pass		27		pass
FT1S	T1S-16	4.755E-7	pass		257		pass
FT1S	T1S-18	1.291E-6	pass		605		pass
FT1S	T1S-19	3.431E-7	pass		1109		pass
FT1S	T1S-21	2.073E-6	pass		54		pass
FT1S	T1S-22	3.338E-8	pass		902		pass
FT1S	T1S-24	5.722E-7	pass		54		pass
FT1S	T1S-3	8.979E-6	pass		27		pass
FT1S	T1S-5	1.723E-6	pass		488		pass
FT1S	T1S-7	4.676E-6	pass		1127		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Count		Status
FT1S	T1S-9	8.750E-8	pass		97		pass
FT1SB	T1S-10	7.464E-7	pass		1707		pass
FT1SB	T1S-12	3.152E-7	pass		60		pass
FT1SB	T1S-14	8.553E-7	pass		120		pass
FT1SB	T1S-15	2.058E-7	pass		1177		pass
FT1SB	T1S-17	2.636E-7	pass		120		pass
FT1SB	T1S-18	1.978E-8	pass		708		pass
FT1SB	T1S-20	7.276E-8	pass		120		pass
FT1SB	T1S-3	1.142E-6	pass		60		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Count		Status
FT1SB	T1S-5	3.098E-6	pass		120		pass
FT1SB	T1S-7	5.805E-8	pass		60		pass
FT1SB	T1S-9	1.575E-7	pass		120		pass
FT2	T2-11	2.080E-5	pass		2122		pass
FT2	T2-12	2.085E-5	pass		2171		pass
FT5A	T5A-11	1.104E-7	pass		314		pass
FT5B	T5B-11	1.104E-7	pass		314		pass
FT7	T7-12	8.212E-8	pass		75		pass
FT7	T7-13	2.969E-6	pass		244		pass
FT7	T7-18	3.419E-9	pass		163		pass
FT7	T7-19	1.000E-9	pass		1	pass	
FT7	T7-8	6.329E-5	pass		25		pass
FTKT	T-4	3.608E-7	pass		136		pass
FTKTN	TN-20	8.691E-7	pass		1	pass	
V	V	1.200E-6	pass		3	pass	

Scenario: Solve Sequence Cutsets completed at 11:04:48 PM

SUR40-02 Scenario: Project Uncertainty - Monte Carlo Method started at 11:04:48 PM
Uncertainty calculated
PROJECT UNCERTAINTY RESULTS:

Mincut :	1.628E-004	
Samples :	5000	
Seed :	10337	
Mean :	1.746E-4	pass
5% :	4.267E-5	pass
95% :	4.511E-4	pass

Scenario: Project Uncertainty - Monte Carlo Method completed at 11:17:59 PM

TEST CASE COMPLETE: at 11:18:00 PM

TEST CASE : Fault Tree Uncertainty Analyses (UncFTM_PROJ)
DATE & TIME: 8/30/99 11:18:07 PM
TEST FOR: SAPHIRE Version 6.63
Opened project: TstU
Generated base case data   Fault trees solved
Uncertainty calculated using Monte Carlo sampling technique
TstU-01 Scenario: Log Normal Distribution using MCS started at 11:26:36 PM

LOGNORA

Mincut :	1.000E-004	
Samples :	5000	
Seed :	4321	
Mean :	9.745E-005	pass
Median :	3.937E-005	pass
5% :	3.814E-006	pass
95% :	3.671E-004	pass
Std Dev :	2.060E-004	pass

LOGNORB

Mincut :	1.000E-006	
Samples :	5000	
Seed :	4321	
Mean :	9.745E-007	pass
Median :	3.937E-007	pass
5% :	3.814E-008	pass
95% :	3.671E-006	pass
Std Dev :	2.060E-006	pass

LOGNORC

Mincut :	9.992E-016	
Samples :	5000	
Seed :	4321	
Mean :	2.464E-016	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	1.110E-016	pass
Std Dev :	6.090E-015	pass

LOGNORD

Mincut :	1.110E-016	
Samples :	5000	
Seed :	4321	
Mean :	2.398E-017	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	6.096E-016	pass

LOGNORE

Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	2.176E-018	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	6.106E-017	pass

LOGNORF

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	9.745E-001	pass
Median :	3.937E-001	pass
5% :	3.814E-002	pass
95% :	3.671E+000	pass
Std Dev :	2.060E+000	pass

Scenario: Log Normal Distribution using MCS completed at 11:26:40 PM

TstU-02 Scenario: Normal Distribution using MCS started at 11:26:40 PM

NORA		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
NORB		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	9.935E-001	pass
Median :	8.836E-001	pass
5% :	8.821E-002	pass
95% :	2.286E+000	pass
Std Dev :	6.881E-001	pass

Uncertainty calculated using Monte Carlo sampling technique

NORA		
Mincut :	+0.000E+000	
Samples :	500	
Seed :	512	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
NORB		
Mincut :	5.000E-001	
Samples :	500	
Seed :	512	
Mean :	9.943E-001	pass
Median :	8.255E-001	pass
5% :	1.108E-001	pass
95% :	2.369E+000	pass
Std Dev :	7.197E-001	pass

Uncertainty calculated using Monte Carlo sampling technique

NORA		
Mincut :	+0.000E+000	
Samples :	1000	
Seed :	512	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
NORB		
Mincut :	5.000E-001	
Samples :	1000	
Seed :	512	
Mean :	9.999E-001	pass
Median :	8.410E-001	pass
5% :	1.149E-001	pass
95% :	2.360E+000	pass
Std Dev :	6.992E-001	pass

Uncertainty calculated using Monte Carlo sampling technique

NORA		
Mincut :	+0.000E+000	
Samples :	3000	
Seed :	512	
Mean :	+0.000E+000	pass

Median : +0.000E+000 pass
5% : +0.000E+000 pass
95% : +0.000E+000 pass
Std Dev : +0.000E+000 pass
NORB
Mincut : 5.000E-001
Samples : 3000
Seed : 512
Mean : 9.881E-001 pass
Median : 8.630E-001 pass
5% : 1.077E-001 pass
95% : 2.278E+000 pass
Std Dev : 6.814E-001 pass

Uncertainty calculated using Monte Carlo sampling technique
NORA
Mincut : +0.000E+000
Samples : 5000
Seed : 512
Mean : +0.000E+000 pass
Median : +0.000E+000 pass
5% : +0.000E+000 pass
95% : +0.000E+000 pass
Std Dev : +0.000E+000 pass
NORB
Mincut : 5.000E-001
Samples : 5000
Seed : 512
Mean : 9.962E-001 pass
Median : 8.715E-001 pass
5% : 1.055E-001 pass
95% : 2.298E+000 pass
Std Dev : 6.921E-001 pass

Uncertainty calculated using Monte Carlo sampling technique
NORA
Mincut : +0.000E+000
Samples : 10000
Seed : 512
Mean : +0.000E+000 pass
Median : +0.000E+000 pass
5% : +0.000E+000 pass
95% : +0.000E+000 pass
Std Dev : +0.000E+000 pass
NORB
Mincut : 5.000E-001
Samples : 10000
Seed : 512
Mean : 9.970E-001 pass
Median : 8.809E-001 pass
5% : 1.002E-001 pass
95% : 2.288E+000 pass
Std Dev : 6.918E-001 pass

Uncertainty calculated using Monte Carlo sampling technique
NORA
Mincut : +0.000E+000
Samples : 500
Seed : 4321
Mean : +0.000E+000 pass
Median : +0.000E+000 pass
5% : +0.000E+000 pass
95% : +0.000E+000 pass
Std Dev : +0.000E+000 pass
NORB
Mincut : 5.000E-001
Samples : 500
Seed : 4321
Mean : 9.850E-001 pass

Median :	8.650E-001	pass
5% :	7.195E-002	pass
95% :	2.262E+000	pass
Std Dev :	6.711E-001	pass

Uncertainty calculated using Monte Carlo sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	1000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	1000	
Seed :	4321	
Mean :	1.017E+000	pass
Median :	9.070E-001	pass
5% :	8.847E-002	pass
95% :	2.289E+000	pass
Std Dev :	6.757E-001	pass

Uncertainty calculated using Monte Carlo sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	3000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	3000	
Seed :	4321	
Mean :	9.989E-001	pass
Median :	8.893E-001	pass
5% :	8.982E-002	pass
95% :	2.292E+000	pass
Std Dev :	6.864E-001	pass

Uncertainty calculated using Monte Carlo sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	10000	
Seed :	4321	
Mean :	9.961E-001	pass
Median :	8.878E-001	pass
5% :	9.240E-002	pass
95% :	2.305E+000	pass
Std Dev :	6.889E-001	pass

Scenario: Normal Distribution using MCS completed at 11:28:55 PM

TstU-03 Scenario: Beta Distribution using MCS started at 11:28:55 PM

BETAA		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	4.893E-001	pass
Median :	4.802E-001	pass
5% :	5.655E-003	pass
95% :	9.930E-001	pass
Std Dev :	3.514E-001	pass
BETAB		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass
BETAC		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
BETAD		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass
Median :	5.000E-001	pass
5% :	5.000E-001	pass
95% :	5.000E-001	pass
Std Dev :	+0.000E+000	pass
BETAE		
Mincut :	1.000E-003	
Samples :	5000	
Seed :	4321	
Mean :	7.567E-004	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	2.608E-002	pass
BETAF		
Mincut :	1.000E-006	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
BETAG		
Mincut :	1.000E-006	
Samples :	5000	
Seed :	4321	
Mean :	9.985E-007	pass
Median :	6.242E-007	pass
5% :	2.688E-008	pass
95% :	3.243E-006	pass
Std Dev :	1.100E-006	pass
BETAH		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	4.892E-001	pass

Median :	4.878E-001	pass
5% :	4.655E-002	pass
95% :	9.433E-001	pass
Std Dev :	2.886E-001	pass
BETAI		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	4.996E-001	pass
Median :	5.008E-001	pass
5% :	2.537E-001	pass
95% :	7.471E-001	pass
Std Dev :	1.508E-001	pass
BETAJ		
Mincut :	1.000E+001	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+001	pass
Median :	1.000E+001	pass
5% :	1.000E+001	pass
95% :	1.000E+001	pass
Std Dev :	+0.000E+000	pass

Scenario: Beta Distribution using MCS completed at 11:29:03 PM

TstU-04 Scenario: Chi-Squared Distribution using MCS started at 11:29:03 PM

CHI-SQA		
Mincut :	2.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	2.081E+000	pass
Median :	9.833E-001	pass
5% :	8.060E-003	pass
95% :	7.946E+000	pass
Std Dev :	2.901E+000	pass
CHI-SQB		
Mincut :	5.500E+000	
Samples :	5000	
Seed :	4321	
Mean :	5.724E+000	pass
Median :	2.704E+000	pass
5% :	2.216E-002	pass
95% :	2.185E+001	pass
Std Dev :	7.979E+000	pass
CHI-SQC		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass
CHI-SQD		
Mincut :	1.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	1.011E-001	pass
Median :	8.935E-002	pass
5% :	2.253E-002	pass
95% :	2.213E-001	pass
Std Dev :	6.315E-002	pass
CHI-SQE		
Mincut :	4.000E+004	
Samples :	5000	
Seed :	4321	
Mean :	4.046E+004	pass
Median :	3.574E+004	pass
5% :	9.013E+003	pass
95% :	8.852E+004	pass
Std Dev :	2.526E+004	pass
CHI-SQF		
Mincut :	1.000E+002	
Samples :	5000	
Seed :	4321	
Mean :	1.004E+002	pass
Median :	9.980E+001	pass
5% :	7.800E+001	pass
95% :	1.252E+002	pass
Std Dev :	1.424E+001	pass
CHI-SQG		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
CHI-SQH		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass

Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
CHI-SQI		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
CHI-SQJ		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.041E+000	pass
Median :	4.917E-001	pass
5% :	4.030E-003	pass
95% :	3.973E+000	pass
Std Dev :	1.451E+000	pass
CHI-SQK		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.041E+000	pass
Median :	4.917E-001	pass
5% :	4.030E-003	pass
95% :	3.973E+000	pass
Std Dev :	1.451E+000	pass
CHI-SQL		
Mincut :	2.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.991E+000	pass
Median :	1.356E+000	pass
5% :	1.040E-001	pass
95% :	6.060E+000	pass
Std Dev :	2.002E+000	pass
CHI-SQM		
Mincut :	5.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	5.057E+000	pass
Median :	4.468E+000	pass
5% :	1.127E+000	pass
95% :	1.107E+001	pass
Std Dev :	3.158E+000	pass

Uncertainty calculated using Monte Carlo sampling technique

CHI-SQK		
Mincut :	1.000E+000	
Samples :	500	
Seed :	4321	
Mean :	1.020E+000	pass
Median :	4.545E-001	pass
5% :	3.733E-003	pass
95% :	3.792E+000	pass
Std Dev :	1.489E+000	pass
CHI-SQL		
Mincut :	2.000E+000	
Samples :	500	
Seed :	4321	
Mean :	2.097E+000	pass
Median :	1.520E+000	pass

5% :	1.396E-001	pass
95% :	6.273E+000	pass
Std Dev :	2.015E+000	pass
CHI-SQM		
Mincut :	5.000E+000	
Samples :	500	
Seed :	4321	
Mean :	4.900E+000	pass
Median :	4.217E+000	pass
5% :	1.081E+000	pass
95% :	1.111E+001	pass
Std Dev :	3.146E+000	pass

Uncertainty calculated using Monte Carlo sampling technique

CHI-SQK		
Mincut :	1.000E+000	
Samples :	1000	
Seed :	4321	
Mean :	9.902E-001	pass
Median :	4.716E-001	pass
5% :	3.765E-003	pass
95% :	3.537E+000	pass
Std Dev :	1.394E+000	pass
CHI-SQL		
Mincut :	2.000E+000	
Samples :	1000	
Seed :	4321	
Mean :	2.053E+000	pass
Median :	1.442E+000	pass
5% :	1.117E-001	pass
95% :	6.273E+000	pass
Std Dev :	2.016E+000	pass
CHI-SQM		
Mincut :	5.000E+000	
Samples :	1000	
Seed :	4321	
Mean :	5.053E+000	pass
Median :	4.343E+000	pass
5% :	1.126E+000	pass
95% :	1.119E+001	pass
Std Dev :	3.222E+000	pass

Uncertainty calculated using Monte Carlo sampling technique

CHI-SQK		
Mincut :	1.000E+000	
Samples :	3000	
Seed :	4321	
Mean :	1.050E+000	pass
Median :	5.043E-001	pass
5% :	4.115E-003	pass
95% :	3.962E+000	pass
Std Dev :	1.444E+000	pass
CHI-SQL		
Mincut :	2.000E+000	
Samples :	3000	
Seed :	4321	
Mean :	2.007E+000	pass
Median :	1.380E+000	pass
5% :	1.099E-001	pass
95% :	6.061E+000	pass
Std Dev :	1.999E+000	pass
CHI-SQM		
Mincut :	5.000E+000	
Samples :	3000	
Seed :	4321	
Mean :	5.105E+000	pass
Median :	4.505E+000	pass
5% :	1.165E+000	pass
95% :	1.111E+001	pass

Std Dev :	3.174E+000	pass

Uncertainty calculated using Monte Carlo sampling technique

CHI-SQK

Mincut :	1.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	1.026E+000	pass
Median :	4.841E-001	pass
5% :	4.044E-003	pass
95% :	3.879E+000	pass
Std Dev :	1.430E+000	pass

CHI-SQL

Mincut :	2.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	2.006E+000	pass
Median :	1.370E+000	pass
5% :	1.046E-001	pass
95% :	6.106E+000	pass
Std Dev :	2.017E+000	pass

CHI-SQM

Mincut :	5.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	5.066E+000	pass
Median :	4.441E+000	pass
5% :	1.163E+000	pass
95% :	1.106E+001	pass
Std Dev :	3.163E+000	pass

Scenario: Chi-Squared Distribution using MCS completed at 11:30:42 PM

TstU-05 Scenario: Exponential Distribution using MCS started at 11:30:42 PM

EXPA

Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

EXPB

Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

EXPC

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass

EXPD

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	9.956E-001	pass
Median :	6.782E-001	pass
5% :	5.199E-002	pass
95% :	3.030E+000	pass
Std Dev :	1.001E+000	pass

EXPE

Mincut :	5.000E+002	
Samples :	5000	
Seed :	4321	
Mean :	4.978E+002	pass
Median :	3.391E+002	pass
5% :	2.600E+001	pass
95% :	1.515E+003	pass
Std Dev :	5.005E+002	pass

EXPF

Mincut :	5.000E+003	
Samples :	5000	
Seed :	4321	
Mean :	4.978E+003	pass
Median :	3.391E+003	pass
5% :	2.600E+002	pass
95% :	1.515E+004	pass
Std Dev :	5.005E+003	pass

EXPG

Mincut :	2.000E-004	
Samples :	5000	
Seed :	4321	
Mean :	1.991E-004	pass
Median :	1.356E-004	pass
5% :	1.040E-005	pass
95% :	6.060E-004	pass
Std Dev :	2.002E-004	pass

EXPH

Mincut :	1.110E-016	
Samples :	5000	
Seed :	4321	
Mean :	1.406E-016	pass

Median :	1.110E-016	pass
5% :	+0.000E+000	pass
95% :	4.441E-016	pass
Std Dev :	1.511E-016	pass

Scenario: Exponential Distribution using MCS completed at 11:30:50 PM

TstU-06 Scenario: Uniform Distribution using MCS started at 11:30:50 PM

UNIFA

Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.012E-001	pass
Median :	5.076E-001	pass
5% :	4.832E-002	pass
95% :	9.493E-001	pass
Std Dev :	2.869E-001	pass

UNIFB

Mincut :	5.000E+004	
Samples :	5000	
Seed :	4321	
Mean :	5.012E+004	pass
Median :	5.076E+004	pass
5% :	4.832E+003	pass
95% :	9.493E+004	pass
Std Dev :	2.869E+004	pass

UNIFC

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass

UNIFD

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.003E+000	pass
Median :	1.015E+000	pass
5% :	9.665E-002	pass
95% :	1.899E+000	pass
Std Dev :	5.738E-001	pass

Scenario: Uniform Distribution using MCS completed at 11:30:53 PM

TstU-07 Scenario: Gamma Distribution using MCS started at 11:30:53 PM

GAMMAA

Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.043E-001	pass
Median :	4.743E-001	pass
5% :	1.967E-001	pass
95% :	9.156E-001	pass
Std Dev :	2.243E-001	pass

GAMMAB

Mincut :	1.000E+002	
Samples :	5000	
Seed :	4321	
Mean :	1.006E+002	pass
Median :	9.906E+001	pass
5% :	6.657E+001	pass
95% :	1.405E+002	pass
Std Dev :	2.245E+001	pass

GAMMAC

Mincut :	1.000E-004	
Samples :	5000	
Seed :	4321	
Mean :	1.000E-004	pass
Median :	1.000E-004	pass
5% :	9.838E-005	pass
95% :	1.017E-004	pass
Std Dev :	1.002E-006	pass

GAMMAD

Mincut :	1.000E-002	
Samples :	5000	
Seed :	4321	
Mean :	1.003E-002	pass
Median :	1.001E-002	pass
5% :	8.418E-003	pass
95% :	1.177E-002	pass
Std Dev :	1.013E-003	pass

GAMMAE

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.041E+000	pass
Median :	4.917E-001	pass
5% :	4.030E-003	pass
95% :	3.973E+000	pass
Std Dev :	1.451E+000	pass

GAMMAF

Mincut :	2.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.991E+000	pass
Median :	1.356E+000	pass
5% :	1.040E-001	pass
95% :	6.060E+000	pass
Std Dev :	2.002E+000	pass

Scenario: Gamma Distribution using MCS completed at 11:30:59 PM

TstU-08 Scenario: Maximum Entropy Distribution using MCS started at 11:30:59 PM

MEA		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.012E-001	pass
Median :	5.076E-001	pass
5% :	4.832E-002	pass
95% :	9.493E-001	pass
Std Dev :	2.869E-001	pass
MEB		
Mincut :	2.500E-001	
Samples :	5000	
Seed :	4321	
Mean :	2.497E-001	pass
Median :	1.894E-001	pass
5% :	1.340E-002	pass
95% :	7.143E-001	pass
Std Dev :	2.182E-001	pass
MEC		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass
MED		
Mincut :	9.992E-016	
Samples :	5000	
Seed :	4321	
Mean :	9.983E-016	pass
Median :	6.661E-016	pass
5% :	+0.000E+000	pass
95% :	2.998E-015	pass
Std Dev :	1.001E-015	pass
MEE		
Mincut :	9.999E-001	
Samples :	5000	
Seed :	4321	
Mean :	9.999E-001	pass
Median :	9.999E-001	pass
5% :	9.997E-001	pass
95% :	1.000E+000	pass
Std Dev :	1.027E-004	pass
MEF		
Mincut :	4.999E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.011E-001	pass
Median :	5.074E-001	pass
5% :	4.829E-002	pass
95% :	9.493E-001	pass
Std Dev :	2.869E-001	pass
MEG		
Mincut :	5.001E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.013E-001	pass
Median :	5.077E-001	pass
5% :	4.835E-002	pass
95% :	9.494E-001	pass
Std Dev :	2.869E-001	pass

Scenario: Maximum Entropy Distribution using MCS completed at 11:31:05 PM

TstU-09 Scenario: Constrained Noninformative Distribution using MCS started at 11:31:05 PM
Uncertainty calculated using Monte Carlo sampling technique

CNONA

Mincut :	4.000E-003	
Samples :	10000	
Seed :	4321	
Mean :	4.005E-03	pass
Median :	1.833E-03	pass
5% :	1.399E-05	pass
95% :	1.545E-02	pass
Std Dev :	5.562E-03	pass

CNONB

Mincut :	9.960E-001	
Samples :	10000	
Seed :	4321	
Mean :	9.960E-01	pass
Median :	9.982E-01	pass
5% :	9.846E-01	pass
95% :	1.000E+00	pass
Std Dev :	5.552E-03	pass

CNONC

Mincut :	1.000E-004	
Samples :	10000	
Seed :	4321	
Mean :	1.000E-04	pass
Median :	4.649E-05	pass
5% :	3.762E-07	pass
95% :	3.838E-04	pass
Std Dev :	1.381E-04	pass

Scenario: Constrained Noninformative Distribution using MCS completed at 11:31:58 PM

TstU-10 Scenario: Seismic Log Normal Distribution using MCS started at 11:31:58 PM
Fault trees solved
Uncertainty calculated using Monte Carlo sampling technique
Ground acceleration level: 1.00E+000

SEISMICA

Mincut :	5.000E-001	
Samples :	10000	
Seed :	4321	
Mean :	4.980E-01	pass
Median :	4.947E-01	pass
5% :	5.117E-02	pass
95% :	9.495E-01	pass
Std Dev :	2.863E-01	pass

SEISMICC

Mincut :	5.000E-001	
Samples :	10000	
Seed :	4321	
Mean :	4.985E-01	pass
Median :	4.957E-01	pass
5% :	9.563E-02	pass
95% :	9.052E-01	pass
Std Dev :	2.504E-01	pass

SEISMICD

Mincut :	5.000E-001	
Samples :	10000	
Seed :	4321	
Mean :	4.976E-01	pass
Median :	4.933E-01	pass
5% :	2.058E-02	pass
95% :	9.798E-01	pass
Std Dev :	3.206E-01	pass

Uncertainty calculated using Monte Carlo sampling technique
Ground acceleration level: 2.00E+000

SEISMICB

Mincut :	6.780E-001	
Samples :	10000	
Seed :	4321	
Mean :	6.272E-01	pass
Median :	6.732E-01	pass
5% :	1.207E-01	pass
95% :	9.822E-01	pass
Std Dev :	2.740E-01	pass

Scenario: Seismic Log Normal Distribution using MCS completed at 11:33:17 PM

TstU-11 Scenario: Histogram Distribution using MCS started at 11:33:17 PM

HISTA

Mincut :	5.500E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.514E-001	pass
Median :	6.000E-001	pass
5% :	1.000E-001	pass
95% :	1.000E+000	pass
Std Dev :	2.851E-001	pass

HISTB

Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass
Median :	5.000E-001	pass
5% :	5.000E-001	pass
95% :	5.000E-001	pass
Std Dev :	+0.000E+000	pass

HISTC

Mincut :	3.025E-002	
Samples :	5000	
Seed :	4321	
Mean :	3.061E-002	pass
Median :	1.243E-002	pass
5% :	1.975E-003	pass
95% :	9.106E-002	pass
Std Dev :	3.079E-002	pass

HISTD

Mincut :	3.025E-002	
Samples :	5000	
Seed :	4321	
Mean :	3.061E-002	pass
Median :	1.243E-002	pass
5% :	1.975E-003	pass
95% :	9.106E-002	pass
Std Dev :	3.079E-002	pass

Scenario: Histogram Distribution using MCS completed at 11:33:21 PM

TEST CASE COMPLETE: at 11:33:23 PM

TEST CASE : Fault Tree Uncertainty Analyses (UncFTL_PROJ)
DATE & TIME: 8/30/99 11:33:25 PM

TEST FOR: SAPHIRE Version 6.63
Project TstU is open
Generated base case data
Fault trees solved
Uncertainty calculated using Latin Hypercube sampling technique

TstU-12 Scenario: Log Normal Distribution using LHS started at 11:42:16 PM

LOGNORA		
Mincut :	1.000E-004	
Samples :	5000	
Seed :	4321	
Mean :	1.013E-004	pass
Median :	3.757E-005	pass
5% :	3.759E-006	pass
95% :	3.746E-004	pass
Std Dev :	2.885E-004	pass
LOGNORB		
Mincut :	1.000E-006	
Samples :	5000	
Seed :	4321	
Mean :	1.013E-006	pass
Median :	3.757E-007	pass
5% :	3.759E-008	pass
95% :	3.746E-006	pass
Std Dev :	2.885E-006	pass
LOGNORC		
Mincut :	9.992E-016	
Samples :	5000	
Seed :	4321	
Mean :	1.700E-015	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	1.110E-016	pass
Std Dev :	1.002E-013	pass
LOGNORD		
Mincut :	1.110E-016	
Samples :	5000	
Seed :	4321	
Mean :	1.692E-016	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	1.002E-014	pass
LOGNORE		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.665E-017	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	1.003E-015	pass
LOGNORF		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.013E+000	pass
Median :	3.757E-001	pass
5% :	3.759E-002	pass
95% :	3.746E+000	pass
Std Dev :	2.885E+000	pass

Scenario: Log Normal Distribution using LHS completed at 11:42:21 PM

TstU-13 Scenario: Normal Distribution using LHS started at 11:42:21 PM

NORA

Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	1.009E+000	pass
Median :	8.972E-001	pass
5% :	9.615E-002	pass
95% :	2.316E+000	pass
Std Dev :	6.979E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	500	
Seed :	512	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	500	
Seed :	512	
Mean :	1.010E+000	pass
Median :	8.990E-001	pass
5% :	9.968E-002	pass
95% :	2.312E+000	pass
Std Dev :	6.999E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	1000	
Seed :	512	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	1000	
Seed :	512	
Mean :	1.010E+000	pass
Median :	8.970E-001	pass
5% :	9.762E-002	pass
95% :	2.310E+000	pass
Std Dev :	6.993E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	3000	
Seed :	512	
Mean :	+0.000E+000	pass

Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
NORB		
Mincut :	5.000E-001	
Samples :	3000	
Seed :	512	
Mean :	1.009E+000	pass
Median :	8.969E-001	pass
5% :	9.632E-002	pass
95% :	2.316E+000	pass
Std Dev :	6.969E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	512	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
NORB		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	512	
Mean :	1.009E+000	pass
Median :	8.971E-001	pass
5% :	9.620E-002	pass
95% :	2.317E+000	pass
Std Dev :	6.975E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA		
Mincut :	+0.000E+000	
Samples :	10000	
Seed :	512	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
NORB		
Mincut :	5.000E-001	
Samples :	10000	
Seed :	512	
Mean :	1.009E+000	pass
Median :	8.970E-001	pass
5% :	9.606E-002	pass
95% :	2.317E+000	pass
Std Dev :	6.973E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA		
Mincut :	+0.000E+000	
Samples :	500	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
NORB		
Mincut :	5.000E-001	
Samples :	500	
Seed :	4321	
Mean :	1.009E+000	pass

Median :	9.001E-001	pass
5% :	9.971E-002	pass
95% :	2.311E+000	pass
Std Dev :	6.962E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	1000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	1000	
Seed :	4321	
Mean :	1.009E+000	pass
Median :	8.981E-001	pass
5% :	9.654E-002	pass
95% :	2.312E+000	pass
Std Dev :	6.963E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	3000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	3000	
Seed :	4321	
Mean :	1.009E+000	pass
Median :	8.975E-001	pass
5% :	9.605E-002	pass
95% :	2.316E+000	pass
Std Dev :	6.973E-001	pass

Uncertainty calculated using Latin Hypercube sampling technique

NORA

Mincut :	+0.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

NORB

Mincut :	5.000E-001	
Samples :	10000	
Seed :	4321	
Mean :	1.009E+000	pass
Median :	8.970E-001	pass
5% :	9.616E-002	pass
95% :	2.317E+000	pass
Std Dev :	6.972E-001	pass

Scenario: Normal Distribution using LHS completed at 11:44:37 PM

TstU-14 Scenario: Beta Distribution using LHS started at 11:44:37 PM

BETAA		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass
Median :	5.003E-001	pass
5% :	6.174E-003	pass
95% :	9.938E-001	pass
Std Dev :	3.536E-001	pass
BETAB		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass
BETAC		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
BETAD		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass
Median :	5.000E-001	pass
5% :	5.000E-001	pass
95% :	5.000E-001	pass
Std Dev :	+0.000E+000	pass
BETAE		
Mincut :	1.000E-003	
Samples :	5000	
Seed :	4321	
Mean :	1.023E-003	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	2.911E-002	pass
BETAF		
Mincut :	1.000E-006	
Samples :	5000	
Seed :	4321	
Mean :	1.176E-007	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	8.318E-006	pass
BETAG		
Mincut :	1.000E-006	
Samples :	5000	
Seed :	4321	
Mean :	1.001E-006	pass
Median :	6.271E-007	pass
5% :	2.742E-008	pass
95% :	3.240E-006	pass
Std Dev :	1.123E-006	pass
BETAH		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass

Median :	5.002E-001	pass
5% :	5.007E-002	pass
95% :	9.498E-001	pass
Std Dev :	2.887E-001	pass
BETAI		
Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass
Median :	5.001E-001	pass
5% :	2.515E-001	pass
95% :	7.484E-001	pass
Std Dev :	1.508E-001	pass
BETAJ		
Mincut :	1.000E+001	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+001	pass
Median :	1.000E+001	pass
5% :	1.000E+001	pass
95% :	1.000E+001	pass
Std Dev :	+0.000E+000	pass

Scenario: Beta Distribution using LHS completed at 11:44:45 PM

TstU-15 Scenario: Chi-Squared Distribution using LHS started at 11:44:45 PM

CHI-SQA		
Mincut :	2.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	2.002E+000	pass
Median :	9.107E-001	pass
5% :	7.887E-003	pass
95% :	7.672E+000	pass
Std Dev :	2.847E+000	pass
CHI-SQB		
Mincut :	5.500E+000	
Samples :	5000	
Seed :	4321	
Mean :	5.505E+000	pass
Median :	2.504E+000	pass
5% :	2.169E-002	pass
95% :	2.110E+001	pass
Std Dev :	7.830E+000	pass
CHI-SQC		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass
CHI-SQD		
Mincut :	1.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	1.000E-001	pass
Median :	8.706E-002	pass
5% :	2.293E-002	pass
95% :	2.212E-001	pass
Std Dev :	6.339E-002	pass
CHI-SQE		
Mincut :	4.000E+004	
Samples :	5000	
Seed :	4321	
Mean :	4.001E+004	pass
Median :	3.482E+004	pass
5% :	9.170E+003	pass
95% :	8.850E+004	pass
Std Dev :	2.536E+004	pass
CHI-SQF		
Mincut :	1.000E+002	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+002	pass
Median :	9.934E+001	pass
5% :	7.794E+001	pass
95% :	1.243E+002	pass
Std Dev :	1.415E+001	pass
CHI-SQG		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
CHI-SQH		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass

Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
CHI-SQI		
Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass
CHI-SQJ		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.001E+000	pass
Median :	4.553E-001	pass
5% :	3.944E-003	pass
95% :	3.836E+000	pass
Std Dev :	1.424E+000	pass
CHI-SQK		
Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.001E+000	pass
Median :	4.553E-001	pass
5% :	3.944E-003	pass
95% :	3.836E+000	pass
Std Dev :	1.424E+000	pass
CHI-SQL		
Mincut :	2.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	2.001E+000	pass
Median :	1.387E+000	pass
5% :	1.027E-001	pass
95% :	5.985E+000	pass
Std Dev :	2.008E+000	pass
CHI-SQM		
Mincut :	5.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	5.001E+000	pass
Median :	4.353E+000	pass
5% :	1.146E+000	pass
95% :	1.106E+001	pass
Std Dev :	3.170E+000	pass

Uncertainty calculated using Latin Hypercube sampling technique

CHI-SQK		
Mincut :	1.000E+000	
Samples :	500	
Seed :	4321	
Mean :	9.971E-001	pass
Median :	4.586E-001	pass
5% :	4.248E-003	pass
95% :	3.818E+000	pass
Std Dev :	1.393E+000	pass
CHI-SQL		
Mincut :	2.000E+000	
Samples :	500	
Seed :	4321	
Mean :	1.997E+000	pass
Median :	1.393E+000	pass

5% :	1.067E-001	pass
95% :	5.963E+000	pass
Std Dev :	1.982E+000	pass

CHI-SQM

Mincut :	5.000E+000	
Samples :	500	
Seed :	4321	
Mean :	4.997E+000	pass
Median :	4.364E+000	pass
5% :	1.167E+000	pass
95% :	1.103E+001	pass
Std Dev :	3.146E+000	pass

Uncertainty calculated using Latin Hypercube sampling technique

CHI-SQK

Mincut :	1.000E+000	
Samples :	1000	
Seed :	4321	
Mean :	9.979E-001	pass
Median :	4.563E-001	pass
5% :	3.977E-003	pass
95% :	3.822E+000	pass
Std Dev :	1.397E+000	pass

CHI-SQL

Mincut :	2.000E+000	
Samples :	1000	
Seed :	4321	
Mean :	1.998E+000	pass
Median :	1.389E+000	pass
5% :	1.032E-001	pass
95% :	5.969E+000	pass
Std Dev :	1.985E+000	pass

CHI-SQM

Mincut :	5.000E+000	
Samples :	1000	
Seed :	4321	
Mean :	4.997E+000	pass
Median :	4.356E+000	pass
5% :	1.149E+000	pass
95% :	1.104E+001	pass
Std Dev :	3.149E+000	pass

Uncertainty calculated using Latin Hypercube sampling technique

CHI-SQK

Mincut :	1.000E+000	
Samples :	3000	
Seed :	4321	
Mean :	9.999E-001	pass
Median :	4.556E-001	pass
5% :	3.935E-003	pass
95% :	3.837E+000	pass
Std Dev :	1.413E+000	pass

CHI-SQL

Mincut :	2.000E+000	
Samples :	3000	
Seed :	4321	
Mean :	2.000E+000	pass
Median :	1.388E+000	pass
5% :	1.026E-001	pass
95% :	5.986E+000	pass
Std Dev :	1.999E+000	pass

CHI-SQM

Mincut :	5.000E+000	
Samples :	3000	
Seed :	4321	
Mean :	5.000E+000	pass
Median :	4.354E+000	pass
5% :	1.146E+000	pass
95% :	1.106E+001	pass

Std Dev :	3.162E+000	pass

Uncertainty calculated using Latin Hypercube sampling technique

CHI-SQK

Mincut :	1.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	9.999E-001	pass
Median :	4.551E-001	pass
5% :	3.945E-003	pass
95% :	3.841E+000	pass
Std Dev :	1.412E+000	pass

CHI-SQL

Mincut :	2.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	2.000E+000	pass
Median :	1.387E+000	pass
5% :	1.028E-001	pass
95% :	5.991E+000	pass
Std Dev :	1.999E+000	pass

CHI-SQM

Mincut :	5.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	5.000E+000	pass
Median :	4.352E+000	pass
5% :	1.146E+000	pass
95% :	1.107E+001	pass
Std Dev :	3.161E+000	pass

Scenario: Chi-Squared Distribution using LHS completed at 11:46:23 PM

TstU-16 Scenario: Exponential Distribution using LHS started at 11:46:23 PM

EXPA

Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

EXPB

Mincut :	+0.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	+0.000E+000	pass
Median :	+0.000E+000	pass
5% :	+0.000E+000	pass
95% :	+0.000E+000	pass
Std Dev :	+0.000E+000	pass

EXPC

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass

EXPD

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.001E+000	pass
Median :	6.935E-001	pass
5% :	5.137E-002	pass
95% :	2.993E+000	pass
Std Dev :	1.004E+000	pass

EXPE

Mincut :	5.000E+002	
Samples :	5000	
Seed :	4321	
Mean :	5.002E+002	pass
Median :	3.468E+002	pass
5% :	2.569E+001	pass
95% :	1.496E+003	pass
Std Dev :	5.020E+002	pass

EXPF

Mincut :	5.000E+003	
Samples :	5000	
Seed :	4321	
Mean :	5.002E+003	pass
Median :	3.468E+003	pass
5% :	2.569E+002	pass
95% :	1.496E+004	pass
Std Dev :	5.020E+003	pass

EXPG

Mincut :	2.000E-004	
Samples :	5000	
Seed :	4321	
Mean :	2.001E-004	pass
Median :	1.387E-004	pass
5% :	1.027E-005	pass
95% :	5.985E-004	pass
Std Dev :	2.008E-004	pass

EXPH

Mincut :	1.110E-016	
Samples :	5000	
Seed :	4321	
Mean :	1.409E-016	pass

Median :	1.110E-016	pass
5% :	+0.000E+000	pass
95% :	4.441E-016	pass
Std Dev :	1.517E-016	pass

Scenario: Exponential Distribution using LHS completed at 11:46:30 PM

TstU-17 Scenario: Uniform Distribution using LHS started at 11:46:30 PM

UNIFA

Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass
Median :	5.002E-001	pass
5% :	5.007E-002	pass
95% :	9.498E-001	pass
Std Dev :	2.887E-001	pass

UNIFB

Mincut :	5.000E+004	
Samples :	5000	
Seed :	4321	
Mean :	5.000E+004	pass
Median :	5.002E+004	pass
5% :	5.007E+003	pass
95% :	9.498E+004	pass
Std Dev :	2.887E+004	pass

UNIFC

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass

UNIFD

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.002E-001	pass
95% :	1.900E+000	pass
Std Dev :	5.774E-001	pass

Scenario: Uniform Distribution using LHS completed at 11:46:33 PM

TstU-18 Scenario: Gamma Distribution using LHS started at 11:46:33 PM

GAMMAA

Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.001E-001	pass
Median :	4.672E-001	pass
5% :	1.971E-001	pass
95% :	9.149E-001	pass
Std Dev :	2.240E-001	pass

GAMMAB

Mincut :	1.000E+002	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+002	pass
Median :	9.835E+001	pass
5% :	6.629E+001	pass
95% :	1.394E+002	pass
Std Dev :	2.238E+001	pass

GAMMAC

Mincut :	1.000E-004	
Samples :	5000	
Seed :	4321	
Mean :	1.000E-004	pass
Median :	1.000E-004	pass
5% :	9.836E-005	pass
95% :	1.017E-004	pass
Std Dev :	9.986E-007	pass

GAMMAD

Mincut :	1.000E-002	
Samples :	5000	
Seed :	4321	
Mean :	1.000E-002	pass
Median :	9.967E-003	pass
5% :	8.415E-003	pass
95% :	1.170E-002	pass
Std Dev :	1.001E-003	pass

GAMMAE

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.001E+000	pass
Median :	4.553E-001	pass
5% :	3.944E-003	pass
95% :	3.836E+000	pass
Std Dev :	1.424E+000	pass

GAMMAF

Mincut :	2.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	2.001E+000	pass
Median :	1.387E+000	pass
5% :	1.027E-001	pass
95% :	5.985E+000	pass
Std Dev :	2.008E+000	pass

Scenario: Gamma Distribution using LHS completed at 11:46:38 PM

TstU-19 Scenario: Maximum Entropy Distribution using LHS started at 11:46:38 PM

MEA

Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass
Median :	5.002E-001	pass
5% :	5.007E-002	pass
95% :	9.498E-001	pass
Std Dev :	2.887E-001	pass

MEB

Mincut :	2.500E-001	
Samples :	5000	
Seed :	4321	
Mean :	2.500E-001	pass
Median :	1.854E-001	pass
5% :	1.389E-002	pass
95% :	7.161E-001	pass
Std Dev :	2.199E-001	pass

MEC

Mincut :	1.000E+000	
Samples :	5000	
Seed :	4321	
Mean :	1.000E+000	pass
Median :	1.000E+000	pass
5% :	1.000E+000	pass
95% :	1.000E+000	pass
Std Dev :	+0.000E+000	pass

MED

Mincut :	9.992E-016	
Samples :	5000	
Seed :	4321	
Mean :	9.999E-016	pass
Median :	6.661E-016	pass
5% :	+0.000E+000	pass
95% :	2.998E-015	pass
Std Dev :	1.005E-015	pass

MEE

Mincut :	9.999E-001	
Samples :	5000	
Seed :	4321	
Mean :	9.999E-001	pass
Median :	9.999E-001	pass
5% :	9.997E-001	pass
95% :	1.000E+000	pass
Std Dev :	1.026E-004	pass

MEF

Mincut :	4.999E-001	
Samples :	5000	
Seed :	4321	
Mean :	4.999E-001	pass
Median :	5.000E-001	pass
5% :	5.004E-002	pass
95% :	9.498E-001	pass
Std Dev :	2.887E-001	pass

MEG

Mincut :	5.001E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.001E-001	pass
Median :	5.003E-001	pass
5% :	5.010E-002	pass
95% :	9.499E-001	pass
Std Dev :	2.887E-001	pass

Scenario: Maximum Entropy Distribution using LHS completed at 11:46:44 PM

TstU-20 Scenario: Constrained Noninformative Distribution using LHS started at 11:46:44 PM
Uncertainty calculated using Latin Hypercube sampling technique

CNONA		
Mincut :	4.000E-003	
Samples :	10000	
Seed :	4321	
Mean :	3.999E-03	pass
Median :	1.810E-03	pass
5% :	1.489E-05	pass
95% :	1.541E-02	pass
Std Dev :	5.650E-03	pass
CNONB		
Mincut :	9.960E-001	
Samples :	10000	
Seed :	4321	
Mean :	9.960E-01	pass
Median :	9.982E-01	pass
5% :	9.846E-01	pass
95% :	1.000E+00	pass
Std Dev :	5.660E-03	pass
CNONC		
Mincut :	1.000E-004	
Samples :	10000	
Seed :	4321	
Mean :	9.998E-05	pass
Median :	4.551E-05	pass
5% :	3.939E-07	pass
95% :	3.842E-04	pass
Std Dev :	1.412E-04	pass

Scenario: Constrained Noninformative Distribution using LHS completed at 11:47:46 PM

TstU-21 Scenario: Seismic Log Normal Distribution using LHS started at 11:47:46 PM
Fault trees solved
Uncertainty calculated using Latin Hypercube sampling technique
Ground acceleration level: 1.00E+000

SEISMICA

Mincut :	5.000E-001	
Samples :	10000	
Seed :	4321	
Mean :	5.000E-01	pass
Median :	5.000E-01	pass
5% :	5.000E-02	pass
95% :	9.499E-01	pass
Std Dev :	2.887E-01	pass

SEISMICC

Mincut :	5.000E-001	
Samples :	10000	
Seed :	4321	
Mean :	5.000E-01	pass
Median :	5.000E-01	pass
5% :	9.411E-02	pass
95% :	9.058E-01	pass
Std Dev :	2.526E-01	pass

SEISMICD

Mincut :	5.000E-001	
Samples :	10000	
Seed :	4321	
Mean :	5.000E-01	pass
Median :	5.000E-01	pass
5% :	1.989E-02	pass
95% :	9.801E-01	pass
Std Dev :	3.231E-01	pass

Uncertainty calculated using Latin Hypercube sampling technique
Ground acceleration level: 2.00E+000

SEISMICB

Mincut :	6.780E-001	
Samples :	10000	
Seed :	4321	
Mean :	6.281E-01	pass
Median :	6.780E-01	pass
5% :	1.185E-01	pass
95% :	9.824E-01	pass
Std Dev :	2.765E-01	pass

Scenario: Seismic Log Normal Distribution using LHS completed at 11:49:06 PM

TstU-22 Scenario: Histogram Distribution using LHS started at 11:49:06 PM

HISTA

Mincut :	5.500E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.500E-001	pass
Median :	6.000E-001	pass
5% :	1.000E-001	pass
95% :	1.000E+000	pass
Std Dev :	2.873E-001	pass

HISTB

Mincut :	5.000E-001	
Samples :	5000	
Seed :	4321	
Mean :	5.000E-001	pass
Median :	5.000E-001	pass
5% :	5.000E-001	pass
95% :	5.000E-001	pass
Std Dev :	+0.000E+000	pass

HISTC

Mincut :	3.025E-002	
Samples :	5000	
Seed :	4321	
Mean :	3.006E-002	pass
Median :	1.003E-002	pass
5% :	1.914E-003	pass
95% :	9.147E-002	pass
Std Dev :	3.089E-002	pass

HISTD

Mincut :	3.025E-002	
Samples :	5000	
Seed :	4321	
Mean :	3.006E-002	pass
Median :	1.003E-002	pass
5% :	1.914E-003	pass
95% :	9.147E-002	pass
Std Dev :	3.089E-002	pass

Scenario: Histogram Distribution using LHS completed at 11:49:09 PM

TEST CASE COMPLETE: at 11:49:10 PM

TEST CASE : Sequence Uncertainty Analyses (UncSQ_PROJ)
DATE & TIME: 8/30/99 11:49:13 PM

TEST FOR: SAPHIRE Version 6.63

Project TstU is open
Generated base case data
Sequences solved

TstU-23 Scenario: Sq Constrained Noninformative Distribution using MCS started at 11:49:43 PM
Uncertainty calculated
CNON-1 2
SEQUENCE UNCERTAINTY RESULTS:

Mincut :	1.000E-008	
Samples :	10000	
Seed :	4321	
Mean :	1.026E-08	pass
Median :	4.841E-09	pass
5% :	4.044E-11	pass
95% :	3.879E-08	pass
Std Dev :	1.430E-08	pass

CNON-2 2
SEQUENCE UNCERTAINTY RESULTS:

Mincut :	1.000E+000	
Samples :	10000	
Seed :	4321	
Mean :	1.026E+00	pass
Median :	4.841E-01	pass
5% :	4.044E-03	pass
95% :	3.879E+00	pass
Std Dev :	1.430E+00	pass

Scenario: Sq Constrained Noninformative Distribution using MCS completed at 11:50:27 PM

TstU-24 Scenario: Sq Dirichlet Distribution using MCS started at 11:50:27 PM
Selected Change Sets:
DIRICHLET-1
DIRICHLET-2
DIRICHLET-3
DIRICHLET-4
Generated basic event data
Uncertainty calculated
GROUP UNCERTAINTY RESULTS:

Mincut :	7.500E-001	
Samples :	5000	
Seed :	1	
Mean :	7.479E-001	pass
Median :	7.519E-001	pass
5% :	6.248E-001	pass
95% :	8.574E-001	pass
Std Dev :	7.043E-002	pass

Uncertainty calculated
GROUP UNCERTAINTY RESULTS:

Mincut :	7.500E-001	
Samples :	5000	
Seed :	1	
Mean :	7.500E-001	pass
Median :	7.500E-001	pass
5% :	7.428E-001	pass
95% :	7.571E-001	pass
Std Dev :	4.411E-003	pass

Uncertainty calculated
GROUP UNCERTAINTY RESULTS:

Mincut :	9.000E-001	
Samples :	5000	
Seed :	1	
Mean :	7.491E-001	pass
Median :	7.538E-001	pass
5% :	6.275E-001	pass
95% :	8.564E-001	pass
Std Dev :	7.025E-002	pass

Uncertainty calculated
GROUP UNCERTAINTY RESULTS:

Mincut :	9.600E-001	
Samples :	5000	
Seed :	1	
Mean :	9.598E-001	pass
Median :	9.709E-001	pass
5% :	8.845E-001	pass
95% :	9.976E-001	pass
Std Dev :	3.812E-002	pass

Scenario: Sq Dirichlet Distribution using MCS completed at 12:08:32 AM

TEST CASE COMPLETE: at 12:08:33 AM

TEST CASE : End State Uncertainty Analyses (UncES_BV2)
DATE & TIME: 8/31/99 12:08:41 AM

TEST FOR: SAPHIRE Version 6.63

Opened project: BV2-5

BV2-5-01 Scenario: Gather End States started at 12:08:50 AM
Generated base case data
End States gathered by cut set partition

END STATE RESULTS:
Compare MinCut:

HINISO	9.926E-007	pass	66	pass
HINOHR	6.918E-005	pass	226	pass
HISBYP	6.659E-006	pass	193	pass
HIWCHR	4.310E-005	pass	323	pass
LOLBYP	3.238E-007	pass	5	pass
LONISO	2.152E-007	pass	15	pass
LONOHR	9.619E-007	pass	30	pass
LOSBYP	1.327E-006	pass	18	pass
LOWCHR	4.148E-006	pass	172	pass
MDNISO	1.664E-008	pass	6	pass
MDNOHR	3.616E-006	pass	136	pass
MDSBYP	1.557E-008	pass	7	pass
MDWCHR	1.922E-006	pass	146	pass
README	0.000E+000	pass	0	pass
SYNISO	2.963E-005	pass	209	pass
SYNOHR	1.012E-005	pass	45	pass
SYSBYP	6.720E-007	pass	7	pass
SYWCHR	3.819E-007	pass	63	pass

Scenario: Gather End States completed at 12:10:21 AM

BV2-5-02 Scenario: End State Uncertainty using MCS started at 12:10:21 AM
Uncertainty calculated

HINISO RCS PZ HI, CONT HT REMOV NO, CONT INT NOT ISOLATE		
Mincut :	9.926E-007	
Samples :	3000	
Seed :	4321	
Mean :	1.032E-006	pass
Median :	7.344E-007	pass
5% :	2.928E-007	pass
95% :	2.750E-006	pass
Std Dev :	1.046E-006	pass
HINOHR	RCS PZ HI, CONT HT REMOV NO, CONT INT ISOL/NOT BY	
Mincut :	6.918E-005	
Samples :	3000	
Seed :	4321	
Mean :	7.002E-005	pass
Median :	6.551E-005	pass
5% :	4.153E-005	pass
95% :	1.126E-004	pass
Std Dev :	2.352E-005	pass
HISBYP RCS PZ HI, CONT HT REMOV YES, CONT INT SMALL BYPA		
Mincut :	6.659E-006	
Samples :	3000	
Seed :	4321	
Mean :	6.700E-006	pass
Median :	5.269E-006	pass
5% :	2.233E-006	pass
95% :	1.578E-005	pass
Std Dev :	5.422E-006	pass
HIWCHR	RCS PZ HI, CONT HT REMOV YES, CONT INT ISOL/NOT B	
Mincut :	4.310E-005	
Samples :	3000	
Seed :	4321	
Mean :	4.304E-005	pass
Median :	3.837E-005	pass
5% :	2.011E-005	pass
95% :	7.974E-005	pass
Std Dev :	2.125E-005	pass
LOLBYP	RCS PZ LO, CONT HT REMOV YES, CONT INT LARGE BYPA	
Mincut :	3.238E-007	
Samples :	3000	
Seed :	4321	
Mean :	3.152E-007	pass
Median :	8.632E-008	pass
5% :	6.499E-009	pass
95% :	1.226E-006	pass
Std Dev :	9.923E-007	pass
LONISO RCS PZ LO, CONT HT REMOV NO, CONT INT NOT ISOLATE		
Mincut :	2.152E-007	
Samples :	3000	
Seed :	4321	
Mean :	2.163E-007	pass
Median :	1.614E-007	pass
5% :	4.862E-008	pass
95% :	5.681E-007	pass
Std Dev :	1.930E-007	pass
LONOHR	RCS PZ LO, CONT HT REMOV NO, CONT INT ISOL/NOT BY	
Mincut :	9.619E-007	
Samples :	3000	
Seed :	4321	
Mean :	9.755E-007	pass
Median :	8.756E-007	pass
5% :	4.471E-007	pass
95% :	1.876E-006	pass
Std Dev :	4.589E-007	pass
LOSBYP	RCS PZ LO, CONT HT REMOV YES, CONT INT SMALL BYPA	

Mincut :	1.327E-006	
Samples :	3000	
Seed :	4321	
Mean :	1.280E-006	pass
Median :	8.357E-007	pass
5% :	1.758E-007	pass
95% :	3.839E-006	pass
Std Dev :	1.516E-006	pass
LOWCHR	RCS PZ LO, CONT HT REMOV YES, CONT INT ISOL/NOT B	
Mincut :	4.148E-006	
Samples :	3000	
Seed :	4321	
Mean :	4.112E-006	pass
Median :	3.428E-006	pass
5% :	1.969E-006	pass
95% :	8.312E-006	pass
Std Dev :	2.612E-006	pass
MDNISO	RCS PZ MED, CONT HT REMOV NO, CONT INT NOT ISOLAT	
Mincut :	1.664E-008	
Samples :	3000	
Seed :	4321	
Mean :	1.673E-008	pass
Median :	1.304E-008	pass
5% :	4.457E-009	pass
95% :	4.059E-008	pass
Std Dev :	1.358E-008	pass
MDNOHR	RCS PZ MED, CONT HT REMOV NO, CONT INT ISOL/NOT B	
Mincut :	3.616E-006	
Samples :	3000	
Seed :	4321	
Mean :	3.608E-006	pass
Median :	3.002E-006	pass
5% :	1.267E-006	pass
95% :	7.852E-006	pass
Std Dev :	2.295E-006	pass
MDSBYP	RCS PZ MED, CONT HT REMOV YES, CONT INT SMALL BYP	
Mincut :	1.557E-008	
Samples :	3000	
Seed :	4321	
Mean :	1.536E-008	pass
Median :	1.051E-008	pass
5% :	2.744E-009	pass
95% :	4.363E-008	pass
Std Dev :	1.633E-008	pass
MDWCHR	RCS PZ MED, CONT HT REMOV YES, CONT INT ISOL/NOT	
Mincut :	1.922E-006	
Samples :	3000	
Seed :	4321	
Mean :	1.888E-006	pass
Median :	1.607E-006	pass
5% :	7.153E-007	pass
95% :	3.858E-006	pass
Std Dev :	1.195E-006	pass
README	END STATE TEXT FILES.	
Mincut :	——E——	
Samples :	——	
Seed :	——	
Mean :	pass	
Median :	pass	
5% :	pass	
95% :	pass	
Std Dev :	pass	
SYNISO RCS PZ HI, CONT HT REMOV NO, CONT INT NOT ISOLATE		
Mincut :	2.963E-005	
Samples :	3000	
Seed :	4321	
Mean :	2.964E-005	pass
Median :	1.977E-005	pass
5% :	6.838E-006	pass

95% :	8.473E-005	pass
Std Dev :	3.283E-005	pass
SYNOHR	RCS PZ HI, CONT HT REMOV NO, CONT INT ISOL/NOT BY	
Mincut :	1.012E-005	
Samples :	3000	
Seed :	4321	
Mean :	1.015E-005	pass
Median :	8.087E-006	pass
5% :	2.800E-006	pass
95% :	2.433E-005	pass
Std Dev :	7.438E-006	pass
SYSBYP	RCS PZ HI, CONT HT REMOV YES, CONT INT SMALL BYPA	
Mincut :	6.720E-007	
Samples :	3000	
Seed :	4321	
Mean :	6.484E-007	pass
Median :	4.202E-007	pass
5% :	9.505E-008	pass
95% :	2.023E-006	pass
Std Dev :	7.114E-007	pass
SYWCHR	RCS PZ HI, CONT HT REMOV YES, CONT INT ISOL/NOT B	
Mincut :	3.819E-007	
Samples :	3000	
Seed :	4321	
Mean :	3.688E-007	pass
Median :	2.324E-007	pass
5% :	6.641E-008	pass
95% :	1.131E-006	pass
Std Dev :	4.604E-007	pass

Scenario: End State Uncertainty using MCS completed at 12:20:54 AM

BV2-5-03 Scenario: End State Uncertainty using LHS started at 12:20:54 AM
Uncertainty calculated
HINISO RCS PZ HI, CONT HT REMOV NO, CONT INT NOT ISOLATE

Mincut :	9.926E-007	
Samples :	3000	
Seed :	4321	
Mean :	9.878E-007	pass
Median :	7.070E-007	pass
5% :	2.770E-007	pass
95% :	2.505E-006	pass
Std Dev :	1.048E-006	pass

HINOHR RCS PZ HI, CONT HT REMOV NO, CONT INT ISOL/NOT BY

Mincut :	6.918E-005	
Samples :	3000	
Seed :	4321	
Mean :	6.911E-005	pass
Median :	6.568E-005	pass
5% :	4.091E-005	pass
95% :	1.080E-004	pass
Std Dev :	2.174E-005	pass

HISBYP RCS PZ HI, CONT HT REMOV YES, CONT INT SMALL BYPA

Mincut :	6.659E-006	
Samples :	3000	
Seed :	4321	
Mean :	6.645E-006	pass
Median :	5.209E-006	pass
5% :	2.258E-006	pass
95% :	1.561E-005	pass
Std Dev :	5.350E-006	pass

HIWCHR RCS PZ HI, CONT HT REMOV YES, CONT INT ISOL/NOT B

Mincut :	4.310E-005	
Samples :	3000	
Seed :	4321	
Mean :	4.321E-005	pass
Median :	3.767E-005	pass
5% :	2.064E-005	pass
95% :	8.391E-005	pass
Std Dev :	2.278E-005	pass

LOLBYP RCS PZ LO, CONT HT REMOV YES, CONT INT LARGE BYPA

Mincut :	3.238E-007	
Samples :	3000	
Seed :	4321	
Mean :	3.209E-007	pass
Median :	8.731E-008	pass
5% :	6.053E-009	pass
95% :	1.243E-006	pass
Std Dev :	9.947E-007	pass

LONISO RCS PZ LO, CONT HT REMOV NO, CONT INT NOT ISOLATE

Mincut :	2.152E-007	
Samples :	3000	
Seed :	4321	
Mean :	2.165E-007	pass
Median :	1.572E-007	pass
5% :	5.087E-008	pass
95% :	5.773E-007	pass
Std Dev :	1.987E-007	pass

LONOHR RCS PZ LO, CONT HT REMOV NO, CONT INT ISOL/NOT BY

Mincut :	9.619E-007	
Samples :	3000	
Seed :	4321	
Mean :	9.615E-007	pass
Median :	8.692E-007	pass
5% :	4.337E-007	pass
95% :	1.792E-006	pass
Std Dev :	4.445E-007	pass

LOSBYP RCS PZ LO, CONT HT REMOV YES, CONT INT SMALL BYPA

Mincut :	1.327E-006
Samples :	3000
Seed :	4321

Mean :	1.325E-006	pass
Median :	8.631E-007	pass
5% :	1.897E-007	pass
95% :	3.976E-006	pass
Std Dev :	1.523E-006	pass
LOWCHR	RCS PZ LO, CONT HT REMOV YES, CONT INT ISOL/NOT B	
Mincut :	4.148E-006	
Samples :	3000	
Seed :	4321	
Mean :	4.123E-006	pass
Median :	3.439E-006	pass
5% :	1.950E-006	pass
95% :	8.481E-006	pass
Std Dev :	2.614E-006	pass
MDNISO	RCS PZ MED, CONT HT REMOV NO, CONT INT NOT ISOLAT	
Mincut :	1.664E-008	
Samples :	3000	
Seed :	4321	
Mean :	1.672E-008	pass
Median :	1.303E-008	pass
5% :	4.496E-009	pass
95% :	4.102E-008	pass
Std Dev :	1.396E-008	pass
MDNOHR	RCS PZ MED, CONT HT REMOV NO, CONT INT ISOL/NOT B	
Mincut :	3.616E-006	
Samples :	3000	
Seed :	4321	
Mean :	3.620E-006	pass
Median :	3.056E-006	pass
5% :	1.223E-006	pass
95% :	8.016E-006	pass
Std Dev :	2.339E-006	pass
MDSBYP	RCS PZ MED, CONT HT REMOV YES, CONT INT SMALL BYP	
Mincut :	1.557E-008	
Samples :	3000	
Seed :	4321	
Mean :	1.534E-008	pass
Median :	1.103E-008	pass
5% :	2.855E-009	pass
95% :	4.376E-008	pass
Std Dev :	1.546E-008	pass
MDWCHR	RCS PZ MED, CONT HT REMOV YES, CONT INT ISOL/NOT	
Mincut :	1.922E-006	
Samples :	3000	
Seed :	4321	
Mean :	1.924E-006	pass
Median :	1.639E-006	pass
5% :	7.449E-007	pass
95% :	3.961E-006	pass
Std Dev :	1.211E-006	pass
README	END STATE TEXT FILES.	
Mincut :	-----E----	
Samples :	----	
Seed :	----	
Mean :		pass
Median :		pass
5% :		pass
95% :		pass
Std Dev :		pass
SYNISO	RCS PZ HI, CONT HT REMOV NO, CONT INT NOT ISOLATE	
Mincut :	2.963E-005	
Samples :	3000	
Seed :	4321	
Mean :	2.989E-005	pass
Median :	1.994E-005	pass
5% :	6.781E-006	pass

95% :	8.396E-005	pass
Std Dev :	3.443E-005	pass
SYNOHR	RCS PZ HI, CONT HT REMOV NO, CONT INT ISOL/NOT BY	
Mincut :	1.012E-005	
Samples :	3000	
Seed :	4321	
Mean :	1.012E-005	pass
Median :	7.951E-006	pass
5% :	2.858E-006	pass
95% :	2.490E-005	pass
Std Dev :	7.728E-006	pass
SYSBYP	RCS PZ HI, CONT HT REMOV YES, CONT INT SMALL BYPA	
Mincut :	6.720E-007	
Samples :	3000	
Seed :	4321	
Mean :	6.735E-007	pass
Median :	4.361E-007	pass
5% :	9.582E-008	pass
95% :	2.007E-006	pass
Std Dev :	8.113E-007	pass
SYWCHR	RCS PZ HI, CONT HT REMOV YES, CONT INT ISOL/NOT B	
Mincut :	3.819E-007	
Samples :	3000	
Seed :	4321	
Mean :	3.785E-007	pass
Median :	2.384E-007	pass
5% :	6.725E-008	pass
95% :	1.119E-006	pass
Std Dev :	5.211E-007	pass

Scenario: End State Uncertainty using LHS completed at 12:31:11 AM

BV2-5-10 Scenario: End State Group Uncertainty using MCS started at 12:31:11 AM
Uncertainty calculated
GROUP UNCERTAINTY RESULTS:

Mincut :	1.733E-004	
Samples :	3000	
Seed :	4321	
Mean :	1.734E-004	pass
Median :	1.629E-004	pass
5% :	1.110E-004	pass
95% :	2.615E-004	pass
Std Dev :	6.480E-005	pass

Scenario: End State Group Uncertainty using MCS completed at 12:37:03 AM

BV2-5-11 Scenario: End State Group Uncertainty using LHS started at 12:37:03 AM
Uncertainty calculated
GROUP UNCERTAINTY RESULTS:

Mincut :	1.733E-004	
Samples :	3000	
Seed :	4321	
Mean :	1.735E-004	pass
Median :	1.643E-004	pass
5% :	1.120E-004	pass
95% :	2.635E-004	pass
Std Dev :	5.280E-005	pass

Scenario: End State Group Uncertainty using LHS completed at 12:43:15 AM

TEST CASE COMPLETE: at 12:43:16 AM

TEST CASE : Cut Set Comparison (CS_SURRY-50)
DATE & TIME: 8/31/99 12:43:24 AM

TEST FOR: SAPHIRE Version 6.63

Opened project: surry-50
Generated base case data

SURRY-50-01 Scenario: Check Sequence Cut Sets without Flag Sets started at 12:44:42 AM
Sequences solved
with prob cut off (1.0E-09) and with recovery
Sequence cut sets updated

SEQUENCE CUTSET RESULTS:
FA A-2 pass
FA A-6 pass
FA A-7 pass
FT1SB T1S-17 pass
Scenario: Check Sequence Cut Sets without Flag Sets completed at 12:45:11 AM

SURRY-50-02 Scenario: Check Sequence Cut Sets with Flag Sets started at 12:45:11 AM
Sequences solved
with prob cut off (1.0E-09) and with recovery
Sequence cut sets updated

SEQUENCE CUTSET RESULTS:
FA A-2 pass
FA A-6 pass
FA A-7 pass
FT1SB T1S-17 pass
Scenario: Check Sequence Cut Sets with Flag Sets completed at 12:45:40 AM

SURRY-50-03 Scenario: Check Fault Tree Cut Sets (no flag sets in this db) started at 12:45:40 AM
NRS : Alphanumeric Logic Saved
Fault tree : NRS Graphics Saved
OD : Alphanumeric Logic Saved
Fault tree : OD Graphics Saved
ODS : Alphanumeric Logic Saved
Fault tree : ODS Graphics Saved
Q-SG : Alphanumeric Logic Saved
Fault tree : Q-SG Graphics Saved
QS-SGOD : Alphanumeric Logic Saved
Fault tree : QS-SGOD Graphics Saved
SLBAR : Alphanumeric Logic Saved
Fault tree : SLBAR Graphics Saved
Fault trees solved
with prob cut off (1.0E-09) and with recovery
Fault tree cut sets updated

FAULT TREE CUTSET RESULTS:
NRS pass
OD pass
ODS pass
Q-SG pass
QS-SGOD pass
SLBAR pass
Scenario: Check Fault Tree Cut Sets (no flag sets in this db) completed at 12:47:38 AM

SURRY-50-04 Scenario: Check Fault Tree Cut Sets without Flag Sets started at 12:47:38 AM
Fault trees solved
with prob cut off (1.0E-09) and with recovery
Fault tree cut sets updated

FAULT TREE CUTSET RESULTS:
NRS pass
OD pass
ODS pass
Q-SG pass
QS-SGOD pass
SLBAR pass
Scenario: Check Fault Tree Cut Sets without Flag Sets completed at 12:48:28 AM

SURRY-50-05 Scenario: Check End State Cut Sets started at 12:48:28 AM
Sequences solved
with prob cut off (1.0E-09) and with recovery
Sequence cut sets updated
End States gathered by cut set partition
with prob cut off (1.0E-09)
End State cut sets updated

END STATE CUTSET RESULTS:
AD5 pass
AD6 pass
AH1 pass
S2D1 pass
Scenario: Check End State Cut Sets completed at 12:50:05 AM

TEST CASE COMPLETE: at 12:50:06 AM

TEST CASE : SAPHIRE QA Models (CHCLS_SURRY-50)
DATE & TIME: 8/31/99 12:50:09 AM

TEST FOR: SAPHIRE Version 6.63

Project surry-50 is open

SURRY-5O-06 Scenario: Class Change - All Events started at 12:50:11 AM
Change set ALL-EVENTS created
Class changes:
Primary name: *
Susceptibility 1
Calc Type: 1 - Probability
Prob: 1.000E-003
Selected Change Set:
ALL-EVENTS
Generated basic event data
Sequences solved
with prob cut off (1.000E-08) and with recovery
CUT SET COMPARISON:

Cut Set Number	Frequency	% Total	Events	
1	1.000E-006	33.33	LPR-CCF-PG-SUMP	pass
2	1.000E-006	33.33	LPR-XHE-FO-HOTLG	pass
3	1.000E-006	33.33	RMT-CCF-FA-MSCAL	pass
4	1.000E-009	0.03	BETA-2MOV, LPR-MOV-FT-1860A	pass
5	1.000E-009	0.03	BETA-2MOV, LPR-MOV-FT-1862A	pass
6	1.000E-009	0.03	BETA-2MOV, LPR-MOV-FT-1890A	pass

Scenario: Class Change - All Events completed at 12:50:34 AM

SURRY-5O-07 Scenario: Class Change - LPR-MOV-* Events started at 12:50:34 AM
Change set MOV-EVENTS created
Class changes:
Primary name: LPR-MOV-FT*
Susceptibility 1
Calc Type: 1 - Probability
Prob: 2.000E-002
Selected Change Set:
MOV-EVENTS
Generated basic event data
Sequences solved
with prob cut off (1.000E-08) and with recovery
CUT SET COMPARISON:

Cut Set Number	Frequency	% Total	Events	
1	8.800E-007	21.86	BETA-2MOV, LPR-MOV-FT-1860A	pass
2	8.800E-007	21.86	BETA-2MOV, LPR-MOV-FT-1862A	pass
3	8.800E-007	21.86	BETA-2MOV, LPR-MOV-FT-1890A	pass
4	2.000E-007	4.97	LPR-MOV-FT-1860A, LPR-MOV-FT-1860B	pass
5	2.000E-007	4.97	LPR-MOV-FT-1860A, LPR-MOV-FT-1862B	pass
6	2.000E-007	4.97	LPR-MOV-FT-1860B, LPR-MOV-FT-1862A	pass
7	2.000E-007	4.97	LPR-MOV-FT-1862A, LPR-MOV-FT-1862B	pass
8	2.000E-007	4.97	LPR-MOV-FT-1890A, LPR-MOV-FT-1890B	pass
9	1.500E-007	3.73	RMT-CCF-FA-MSCAL	pass
10	3.000E-008	0.75	LPI-MDP-FS-SI1A, LPR-MOV-FT-1860B	pass
11	3.000E-008	0.75	LPI-MDP-FS-SI1B, LPR-MOV-FT-1860A	pass
12	3.000E-008	0.75	LPI-MDP-FS-SI1A, LPR-MOV-FT-1862B	pass
13	3.000E-008	0.75	LPI-MDP-FS-SI1B, LPR-MOV-FT-1862A	pass
14	2.500E-008	0.62	LPR-CCF-PG-SUMP	pass
15	2.000E-008	0.50	LPI-MDP-MA-SI1A, LPR-MOV-FT-1860B	pass
16	2.000E-008	0.50	LPI-MDP-MA-SI1B, LPR-MOV-FT-1860A	pass
17	2.000E-008	0.50	LPI-MDP-MA-SI1A, LPR-MOV-FT-1862B	pass
18	2.000E-008	0.50	LPI-MDP-MA-SI1B, LPR-MOV-FT-1862A	pass
19	2.000E-008	0.50	LPR-XHE-FO-HOTLG	pass
20	1.024E-009	0.03	LPR-MOV-FT-1860A, RMT-ACT-FA-RMTSB, RMT-XHE-FO-MAN-A	pass
21	1.024E-009	0.03	LPR-MOV-FT-1860B, RMT-ACT-FA-RMTSA, RMT-XHE-FO-MAN-A	pass
22	1.024E-009	0.03	LPR-MOV-FT-1862A, RMT-ACT-FA-RMTSB, RMT-XHE-FO-MAN-A	pass
23	1.024E-009	0.03	LPR-MOV-FT-1862B, RMT-ACT-FA-RMTSA, RMT-XHE-FO-MAN-A	pass

Scenario: Class Change - LPR-MOV-* Events completed at 12:51:05 AM

SURRY-5O-08 Scenario: Single Change - 1 Event started at 12:51:05 AM
Change set SINGLE-1 created
Single changes:
Prob: 1.000E-001
Selected Change Set:
SINGLE-1
Generated basic event data
Sequences solved
with prob cut off (1.000E-08) and with recovery
CUT SET COMPARISON:

Cut Set Number	Frequency	% Total	Events	
1	4.400E-006	78.99	BETA-2MOV, LPR-MOV-FT-1862A	pass
2	2.600E-007	4.67	LPR-MOV-FT-1862A, LPR-MOV-FT-1862B	pass
3	1.500E-007	2.69	RMT-CCF-FA-MSCAL	pass
4	1.500E-007	2.69	LPI-MDP-FS-SI1B, LPR-MOV-FT-1862A	pass
5	1.500E-007	2.69	LPR-MOV-FT-1860B, LPR-MOV-FT-1862A	pass
6	1.320E-007	2.37	BETA-2MOV, LPR-MOV-FT-1860A	pass
7	1.320E-007	2.37	BETA-2MOV, LPR-MOV-FT-1890A	pass
8	1.000E-007	1.80	LPI-MDP-MA-SI1B, LPR-MOV-FT-1862A	pass
9	3.599E-008	0.65	LPI-MDP-FR-B24HR, LPR-MOV-FT-1862A	pass
10	2.500E-008	0.45	LPR-CCF-PG-SUMP	pass
11	2.189E-008	0.39	LPI-MOV-PG-1864B, LPR-MOV-FT-1862A	pass
12	2.000E-008	0.36	LPR-XHE-FO-HOTLG	pass
13	5.120E-009	0.09	LPR-MOV-FT-1862A, RMT-ACT-FA-RMTSB, RMT-XHE-FO-MAN-A	pass

Scenario: SURRY-5O-08 completed at 12:51:33 AM

SURRY-5O-09 Scenario: Marked Change Sets started at 12:51:33 AM
Selected Change Sets:
MOV-EVENTS
SINGLE-1
Generated basic event data
Sequences solved
with prob cut off (1.000E-08) and with recovery
CUT SET COMPARISON:

Cut Set Number	Frequency	% Total	Events	
1	4.400E-006	47.03	BETA-2MOV, LPR-MOV-FT-1862A	pass
2	1.000E-006	10.69	LPR-MOV-FT-1860B, LPR-MOV-FT-1862A	pass
3	1.000E-006	10.69	LPR-MOV-FT-1862A, LPR-MOV-FT-1862B	pass
4	8.800E-007	9.41	BETA-2MOV, LPR-MOV-FT-1860A	pass
5	8.800E-007	9.41	BETA-2MOV, LPR-MOV-FT-1890A	pass
6	2.000E-007	2.14	LPR-MOV-FT-1860A, LPR-MOV-FT-1860B	pass
7	2.000E-007	2.14	LPR-MOV-FT-1860A, LPR-MOV-FT-1862B	pass
8	2.000E-007	2.14	LPR-MOV-FT-1890A, LPR-MOV-FT-1890B	pass
9	1.500E-007	1.60	RMT-CCF-FA-MSCAL	pass
10	1.500E-007	1.60	LPI-MDP-FS-SI1B, LPR-MOV-FT-1862A	pass
11	1.000E-007	1.07	LPI-MDP-MA-SI1B, LPR-MOV-FT-1862A	pass
12	3.599E-008	0.38	LPI-MDP-FR-B24HR, LPR-MOV-FT-1862A	pass
13	3.000E-008	0.32	LPI-MDP-FS-SI1A, LPR-MOV-FT-1860B	pass
14	3.000E-008	0.32	LPI-MDP-FS-SI1B, LPR-MOV-FT-1860A	pass
15	3.000E-008	0.32	LPI-MDP-FS-SI1A, LPR-MOV-FT-1862B	pass
16	2.500E-008	0.27	LPR-CCF-PG-SUMP	pass
17	2.189E-008	0.23	LPI-MOV-PG-1864B, LPR-MOV-FT-1862A	pass
18	2.000E-008	0.21	LPI-MDP-MA-SI1A, LPR-MOV-FT-1860B	pass
19	2.000E-008	0.21	LPI-MDP-MA-SI1B, LPR-MOV-FT-1860A	pass
20	2.000E-008	0.21	LPI-MDP-MA-SI1A, LPR-MOV-FT-1862B	pass
21	2.000E-008	0.21	LPR-XHE-FO-HOTLG	pass
22	5.120E-009	0.05	LPR-MOV-FT-1862A, RMT-ACT-FA-RMTSB, RMT-XHE-FO-MAN-A	pass
23	1.024E-009	0.01	LPR-MOV-FT-1860A, RMT-ACT-FA-RMTSB, RMT-XHE-FO-MAN-A	pass
24	1.024E-009	0.01	LPR-MOV-FT-1860B, RMT-ACT-FA-RMTSA, RMT-XHE-FO-MAN-A	pass
25	1.024E-009	0.01	LPR-MOV-FT-1862B, RMT-ACT-FA-RMTSA, RMT-XHE-FO-MAN-A	pass

Scenario: SURRY-5O-09 completed at 12:51:58 AM

TEST CASE COMPLETE: at 12:51:58 AM

TEST CASE : Cut Set Comparison (CS_COM-PEAK)
DATE & TIME: 8/31/99 12:52:09 AM

TEST FOR: SAPHIRE Version 6.63

Opened project: com-peak
Generated base case data

COM-PEAK-01 Scenario: Check Sequence Cut Sets without Flag Sets started at 12:53:16 AM
Sequences solved
with prob cut off (1.0E-08) and with recovery
Sequence cut sets updated

SEQUENCE CUTSET RESULTS:
CW 3 pass
LOSP 6-4-3 pass
Scenario: Check Sequence Cut Sets without Flag Sets completed at 12:55:20 AM

COM-PEAK-02 Scenario: Check Sequence Cut Sets with Flag Sets started at 12:55:20 AM
Sequences solved
with prob cut off (1.0E-08) and with recovery
Sequence cut sets updated

SEQUENCE CUTSET RESULTS:
LOSP 6-3-6 pass
CW 3 pass
Scenario: Check Sequence Cut Sets with Flag Sets completed at 12:56:38 AM

COM-PEAK-03 Scenario: Check Fault Tree Cut Sets started at 12:56:38 AM
NLXX03 : Alphanumeric Logic Saved
Fault tree : NLXX03 Graphics Saved
NLXX04 : Alphanumeric Logic Saved
Fault tree : NLXX04 Graphics Saved
Fault trees solved
with prob cut off (1.0E-05) and with recovery
Fault tree cut sets updated

FAULT TREE CUTSET RESULTS:
NLXX03 pass
NLXX04 pass
Scenario: Check Fault Tree Cut Sets completed at 12:57:47 AM

COM-PEAK-04 Scenario: Check Fault Tree Cut Sets without Flag Sets started at 12:57:47 AM
Fault trees solved
with prob cut off (1.0E-05) and with recovery
Fault tree cut sets updated

FAULT TREE CUTSET RESULTS:
NLXX03 pass
NLXX04 pass
Scenario: Check Fault Tree Cut Sets without Flag Sets completed at 12:58:25 AM

COM-PEAK-05 Scenario: Check End State Cut Sets started at 12:58:25 AM
Sequences solved
 with prob cut off (1.0E-07) and with recovery
Sequence cut sets updated
End States gathered by cut set partition
 with prob cut off (1.0E-07)
End State cut sets updated

END STATE CUTSET RESULTS:
PDS1 pass
PDS2 pass
PDS3 pass
Scenario: Check End State Cut Sets completed at 1:13:03 AM

TEST CASE COMPLETE: at 1:13:04 AM

TEST CASE : SAPHIRE QA Models (LERF_SURY)
DATE & TIME: 8/31/99 1:13:12 AM

TEST FOR: SAPHIRE Version 6.63

Opened project: SURY_2QA_L23
Generated base case data

S_LERF-01 Scenario: Link Level 1 Event Trees started at 1:13:27 AM

Event tree :	LOOP	Graphics Saved
Event tree :	SGTR	Graphics Saved
Event tree :	SLOCA	Graphics Saved
Event tree :	TRANS	Graphics Saved

Event trees linked
Sequences solved
with prob cut off (1.0E-16) and with recovery

SEQUENCE RESULTS:
Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
LOOP	05-01	1.248E-011	pass	420		pass
LOOP	05-02	1.217E-011	pass	217		pass
LOOP	05-03	3.406E-016	pass	2	pass	
LOOP	05-04	2.650E-013	pass	186		pass
LOOP	05-08	7.496E-014	pass	28		pass
LOOP	05-14	1.943E-013	pass	73		pass
LOOP	06-01	2.030E-013	pass	73		pass
LOOP	06-06	2.030E-013	pass	73		pass
LOOP	08-01	4.305E-013	pass	132		pass
LOOP	08-02	3.770E-013	pass	77		pass
LOOP	08-04	2.769E-014	pass	42		pass
LOOP	08-14	2.588E-014	pass	13		pass
LOOP	09-01	3.484E-014	pass	21		pass
LOOP	09-06	3.484E-014	pass	21		pass
LOOP	11-01	2.543E-010	pass	143		pass
LOOP	11-02	2.526E-010	pass	57		pass
LOOP	11-03	9.566E-015	pass	5	pass	
LOOP	11-04	3.296E-012	pass	138		pass
LOOP	11-08	1.782E-012	pass	70		pass
LOOP	11-10	1.599E-014	pass	26		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
LOOP	11-14	1.897E-012	pass	59		pass
LOOP	11-18	7.143E-015	pass	12		pass
LOOP	12-01	1.242E-012	pass	29		pass
LOOP	12-06	1.242E-012	pass	29		pass
LOOP	12-12	1.401E-015	pass	6	pass	
LOOP	12-16	1.165E-015	pass	5	pass	
LOOP	13-01	3.795E-011	pass	207		pass
LOOP	13-02	9.204E-012	pass	49		pass
LOOP	13-03	2.868E-011	pass	141		pass
LOOP	13-04	5.869E-014	pass	40		pass
LOOP	13-05	2.166E-013	pass	118		pass
LOOP	13-06	7.159E-015	pass	15		pass
LOOP	13-07	2.297E-014	pass	34		pass
LOOP	13-08	4.163E-014	pass	30		pass
LOOP	13-09	1.561E-013	pass	83		pass
LOOP	13-11	3.627E-016	pass	3	pass	
LOOP	13-14	5.680E-014	pass	33		pass
LOOP	13-15	9.942E-014	pass	65		pass
LOOP	16-01	2.248E-012	pass	213		pass
LOOP	16-02	1.931E-012	pass	107		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
LOOP	16-04	1.712E-013	pass	99		pass
LOOP	16-08	8.222E-016	pass	14		pass

LOOP	16-14	1.481E-013	pass	31		pass
LOOP	17-01	1.931E-013	pass	28		pass
LOOP	17-06	1.931E-013	pass	28		pass
LOOP	17-12	3.178E-017	pass	1	pass	
LOOP	17-16	8.291E-017	pass	2	pass	
LOOP	20-01	9.641E-013	pass	135		pass
LOOP	20-02	9.444E-013	pass	88		pass
LOOP	20-04	1.780E-014	pass	63		pass
LOOP	20-08	5.529E-015	pass	21		pass
LOOP	20-14	1.241E-014	pass	26		pass
LOOP	21-01	1.230E-014	pass	16		pass
LOOP	21-06	1.230E-014	pass	16		pass
LOOP	22-01	1.919E-012	pass	210		pass
LOOP	22-02	5.423E-013	pass	53		pass
LOOP	22-03	1.371E-012	pass	143		pass
LOOP	22-04	1.629E-015	pass	20		pass
LOOP	22-05	5.618E-015	pass	57		pass
LOOP	22-06	3.191E-016	pass	7	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
LOOP	22-07	7.871E-016	pass	15		pass
LOOP	22-08	9.282E-016	pass	10		pass
LOOP	22-09	3.594E-015	pass	33		pass
LOOP	22-14	3.614E-015	pass	15		pass
LOOP	22-15	2.390E-015	pass	24		pass
LOOP	23-01	7.663E-011	pass	117		pass
LOOP	23-02	7.663E-011	pass	117		pass
LOOP	23-03	2.669E-013	pass	278		pass
LOOP	23-04	2.685E-013	pass	316		pass
LOOP	23-05	1.381E-015	pass	21		pass
LOOP	23-06	6.023E-014	pass	76		pass
LOOP	23-08	1.533E-013	pass	163		pass
LOOP	23-09	1.080E-015	pass	19		pass
LOOP	23-10	7.740E-016	pass	13		pass
LOOP	23-14	1.167E-013	pass	152		pass
LOOP	23-15	6.178E-016	pass	10		pass
LOOP	23-18	3.408E-016	pass	6	pass	
LOOP	24-02-01	1.139E-010	pass	9	pass	
LOOP	24-02-02	1.124E-010	pass	5	pass	
LOOP	24-02-03	1.446E-012	pass	24		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
LOOP	24-02-04	1.105E-012	pass	16		pass
LOOP	24-02-05	1.353E-014	pass	22		pass
LOOP	24-02-06	1.032E-013	pass	8	pass	
LOOP	24-02-07	1.006E-015	pass	4	pass	
LOOP	24-02-08	8.242E-013	pass	14		pass
LOOP	24-02-09	9.951E-015	pass	16		pass
LOOP	24-02-10	7.659E-015	pass	12		pass
LOOP	24-02-12	5.289E-016	pass	2	pass	
LOOP	24-02-14	5.173E-013	pass	14		pass
LOOP	24-02-15	6.135E-015	pass	11		pass
LOOP	24-02-16	2.956E-016	pass	1	pass	
LOOP	24-02-18	3.403E-015	pass	5	pass	
LOOP	24-02-19	2.958E-016	pass	1	pass	
LOOP	24-02-21	4.843E-012	pass	6	pass	
LOOP	24-05-01	1.447E-012	pass	88		pass
LOOP	24-05-02	1.425E-012	pass	55		pass
LOOP	24-05-04	2.341E-014	pass	36		pass
LOOP	24-05-08	9.258E-015	pass	14		pass
LOOP	24-05-14	1.634E-014	pass	20		pass
LOOP	24-06-01	1.495E-014	pass	15		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Count		Status
LOOP	24-06-06	1.495E-014	pass		15		pass
LOOP	24-08-01	3.282E-014	pass		27		pass
LOOP	24-08-02	2.926E-014	pass		21		pass
LOOP	24-08-04	1.729E-015	pass		4	pass	
LOOP	24-08-14	1.833E-015	pass		2	pass	
LOOP	24-09-01	2.447E-015	pass		3	pass	
LOOP	24-09-06	2.447E-015	pass		3	pass	
LOOP	24-10-01	8.347E-013	pass		68		pass
LOOP	24-10-02	2.698E-013	pass		20		pass
LOOP	24-10-03	5.585E-013	pass		45		pass
LOOP	24-10-04	2.502E-016	pass		2	pass	
LOOP	24-10-05	5.005E-016	pass		3	pass	
LOOP	24-10-06	1.289E-016	pass		1	pass	
LOOP	24-10-07	3.553E-016	pass		3	pass	
LOOP	24-10-08	6.752E-017	pass		1	pass	
LOOP	24-10-09	1.350E-016	pass		2	pass	
LOOP	24-10-14	1.958E-015	pass		2	pass	
LOOP	24-10-15	2.803E-016	pass		3	pass	
LOOP	24-10-21	2.639E-015	pass		1	pass	
LOOP	24-11-01	1.449E-009	pass		9	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Count		Status
LOOP	24-11-02	1.429E-009	pass		5	pass	
LOOP	24-11-03	1.840E-011	pass		34		pass
LOOP	24-11-04	1.406E-011	pass		22		pass
LOOP	24-11-05	1.796E-013	pass		51		pass
LOOP	24-11-06	1.315E-012	pass		11		pass
LOOP	24-11-07	1.613E-014	pass		14		pass
LOOP	24-11-08	1.049E-011	pass		22		pass
LOOP	24-11-09	1.340E-013	pass		43		pass
LOOP	24-11-10	1.022E-013	pass		28		pass
LOOP	24-11-11	5.383E-016	pass		5	pass	
LOOP	24-11-12	9.240E-015	pass		9	pass	
LOOP	24-11-14	6.584E-012	pass		24		pass
LOOP	24-11-15	8.342E-014	pass		32		pass
LOOP	24-11-16	5.672E-015	pass		6	pass	
LOOP	24-11-18	4.741E-014	pass		18		pass
LOOP	24-11-19	3.967E-015	pass		3	pass	
LOOP	24-11-21	6.161E-011	pass		6	pass	
LOOP	24-13-01	6.689E-011	pass		9	pass	
LOOP	24-13-02	6.599E-011	pass		5	pass	
LOOP	24-13-03	8.493E-013	pass		24		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure	Count		Status
LOOP	24-13-04	6.491E-013	pass		16		pass
LOOP	24-13-05	7.492E-015	pass		14		pass
LOOP	24-13-06	6.060E-014	pass		8	pass	
LOOP	24-13-07	5.335E-016	pass		3	pass	
LOOP	24-13-08	4.840E-013	pass		14		pass
LOOP	24-13-09	5.343E-015	pass		8	pass	
LOOP	24-13-10	4.193E-015	pass		7	pass	
LOOP	24-13-12	3.106E-016	pass		2	pass	
LOOP	24-13-14	3.038E-013	pass		14		pass
LOOP	24-13-15	3.374E-015	pass		7	pass	
LOOP	24-13-16	1.736E-016	pass		1	pass	
LOOP	24-13-18	1.998E-015	pass		5	pass	
LOOP	24-13-19	1.737E-016	pass		1	pass	
LOOP	24-13-21	2.844E-012	pass		6	pass	
LOOP	24-16-01	8.482E-013	pass		60		pass
LOOP	24-16-02	8.362E-013	pass		40		pass
LOOP	24-16-04	1.305E-014	pass		25		pass
LOOP	24-16-08	5.000E-015	pass		7	pass	
LOOP	24-16-14	9.103E-015	pass		12		pass
LOOP	24-17-01	8.452E-015	pass		10		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
LOOP	24-17-06	8.452E-015	pass	10		pass
LOOP	24-19-01	1.878E-014	pass	18		pass
LOOP	24-19-02	1.669E-014	pass	12		pass
LOOP	24-19-04	1.015E-015	pass	4	pass	
LOOP	24-19-14	1.077E-015	pass	2	pass	
LOOP	24-20-01	1.365E-015	pass	2	pass	
LOOP	24-20-06	1.365E-015	pass	2	pass	
LOOP	24-21-01	4.894E-013	pass	49		pass
LOOP	24-21-02	1.582E-013	pass	13		pass
LOOP	24-21-03	3.275E-013	pass	33		pass
LOOP	24-21-04	1.066E-016	pass	1	pass	
LOOP	24-21-05	2.939E-016	pass	3	pass	
LOOP	24-21-06	7.568E-017	pass	1	pass	
LOOP	24-21-07	1.514E-016	pass	2	pass	
LOOP	24-21-14	1.090E-015	pass	1	pass	
LOOP	24-21-21	1.550E-015	pass	1	pass	
LOOP	24-22-01	8.510E-010	pass	9	pass	
LOOP	24-22-02	8.394E-010	pass	5	pass	
LOOP	24-22-03	1.081E-011	pass	34		pass
LOOP	24-22-04	8.258E-012	pass	22		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
LOOP	24-22-05	1.051E-013	pass	44		pass
LOOP	24-22-06	7.723E-013	pass	11		pass
LOOP	24-22-07	9.423E-015	pass	13		pass
LOOP	24-22-08	6.159E-012	pass	22		pass
LOOP	24-22-09	7.849E-014	pass	40		pass
LOOP	24-22-10	6.001E-014	pass	28		pass
LOOP	24-22-11	9.186E-017	pass	1	pass	
LOOP	24-22-12	5.320E-015	pass	7	pass	
LOOP	24-22-14	3.867E-012	pass	24		pass
LOOP	24-22-15	4.886E-014	pass	30		pass
LOOP	24-22-16	3.259E-015	pass	5	pass	
LOOP	24-22-18	2.784E-014	pass	18		pass
LOOP	24-22-19	2.210E-015	pass	1	pass	
LOOP	24-22-21	3.618E-011	pass	6	pass	
LOOP	24-24-01	2.551E-010	pass	42		pass
LOOP	24-24-02	2.516E-010	pass	25		pass
LOOP	24-24-03	3.238E-012	pass	93		pass
LOOP	24-24-04	2.475E-012	pass	65		pass
LOOP	24-24-05	2.927E-014	pass	56		pass
LOOP	24-24-06	2.305E-013	pass	25		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
LOOP	24-24-07	2.043E-015	pass	8	pass	
LOOP	24-24-08	1.845E-012	pass	55		pass
LOOP	24-24-09	2.161E-014	pass	44		pass
LOOP	24-24-10	1.663E-014	pass	33		pass
LOOP	24-24-12	1.074E-015	pass	4	pass	
LOOP	24-24-14	1.158E-012	pass	52		pass
LOOP	24-24-15	1.347E-014	pass	31		pass
LOOP	24-24-16	6.002E-016	pass	2	pass	
LOOP	24-24-18	7.501E-015	pass	16		pass
LOOP	24-24-19	6.006E-016	pass	2	pass	
LOOP	24-24-21	1.085E-011	pass	27		pass
LOOP	24-26-01	6.784E-011	pass	45		pass
LOOP	24-26-02	6.692E-011	pass	29		pass
LOOP	24-26-03	8.609E-013	pass	72		pass
LOOP	24-26-04	6.580E-013	pass	48		pass
LOOP	24-26-05	7.855E-015	pass	23		pass
LOOP	24-26-06	6.140E-014	pass	19		pass
LOOP	24-26-07	6.408E-016	pass	6	pass	
LOOP	24-26-08	4.906E-013	pass	41		pass

LOOP	24-26-09	5.821E-015	pass	18		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
LOOP	24-26-10	4.457E-015	pass	13		pass
LOOP	24-26-12	3.731E-016	pass	4	pass	
LOOP	24-26-14	3.079E-013	pass	36		pass
LOOP	24-26-15	3.544E-015	pass	11		pass
LOOP	24-26-16	2.085E-016	pass	2	pass	
LOOP	24-26-18	1.999E-015	pass	6	pass	
LOOP	24-26-19	1.708E-016	pass	1	pass	
LOOP	24-26-21	2.884E-012	pass	28		pass
LOOP	25-01	1.424E-012	pass	1	pass	
LOOP	25-02	1.424E-012	pass	1	pass	
LOOP	25-03	1.536E-015	pass	6	pass	
LOOP	25-04	2.530E-015	pass	5	pass	
LOOP	25-06	1.011E-015	pass	1	pass	
LOOP	25-08	8.202E-016	pass	3	pass	
LOOP	25-14	9.598E-016	pass	2	pass	
SGTR	03-01	1.518E-010	pass	35		pass
SGTR	03-02	1.518E-010	pass	35		pass
SGTR	03-03	5.749E-015	pass	8	pass	
SGTR	03-04	2.761E-013	pass	99		pass
SGTR	03-06	1.156E-013	pass	33		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
SGTR	03-08	8.916E-014	pass	40		pass
SGTR	03-14	1.076E-013	pass	41		pass
SGTR	04-01	7.172E-011	pass	4	pass	
SGTR	04-02	7.172E-011	pass	4	pass	
SGTR	04-03	2.804E-015	pass	3	pass	
SGTR	04-04	1.190E-013	pass	31		pass
SGTR	04-06	5.455E-014	pass	8	pass	
SGTR	04-08	3.216E-014	pass	11		pass
SGTR	04-14	4.547E-014	pass	13		pass
SGTR	05-01	1.630E-011	pass	1	pass	
SGTR	05-02	1.630E-011	pass	1	pass	
SGTR	05-03	6.520E-016	pass	1	pass	
SGTR	05-04	2.722E-014	pass	12		pass
SGTR	05-06	1.239E-014	pass	2	pass	
SGTR	05-08	7.365E-015	pass	4	pass	
SGTR	05-14	1.041E-014	pass	5	pass	
SGTR	08-01	6.416E-012	pass	154		pass
SGTR	08-02	6.416E-012	pass	154		pass
SGTR	08-04	6.972E-015	pass	25		pass
SGTR	08-06	3.120E-015	pass	9	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
SGTR	08-08	1.737E-015	pass	9	pass	
SGTR	08-14	2.603E-015	pass	10		pass
SGTR	09-01	3.031E-012	pass	24		pass
SGTR	09-02	3.031E-012	pass	24		pass
SGTR	09-04	3.470E-015	pass	12		pass
SGTR	09-06	1.671E-015	pass	5	pass	
SGTR	09-08	8.150E-016	pass	4	pass	
SGTR	09-14	1.227E-015	pass	4	pass	
SGTR	10-01	6.161E-013	pass	3	pass	
SGTR	10-02	6.161E-013	pass	3	pass	
SGTR	10-04	6.161E-016	pass	3	pass	
SGTR	10-06	3.588E-016	pass	2	pass	
SGTR	10-08	1.273E-016	pass	1	pass	
SGTR	10-14	1.917E-016	pass	1	pass	
SGTR	11-01	2.156E-010	pass	3	pass	
SGTR	11-02	2.156E-010	pass	3	pass	
SGTR	11-03	8.626E-015	pass	3	pass	
SGTR	11-04	3.601E-013	pass	36		pass
SGTR	11-06	1.645E-013	pass	9	pass	

SGTR	11-08	9.744E-014	pass	12		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
SGTR	11-14	1.377E-013	pass	15		pass
SGTR	13-01	1.735E-011	pass	44		pass
SGTR	13-02	5.626E-012	pass	10		pass
SGTR	13-03	1.164E-011	pass	30		pass
SGTR	13-04	8.526E-015	pass	12		pass
SGTR	13-05	1.735E-014	pass	21		pass
SGTR	13-06	4.161E-015	pass	6	pass	
SGTR	13-07	8.672E-015	pass	12		pass
SGTR	13-08	2.189E-015	pass	4	pass	
SGTR	13-09	4.743E-015	pass	10		pass
SGTR	13-14	4.380E-014	pass	6	pass	
SGTR	13-15	6.708E-015	pass	10		pass
SGTR	13-21	1.109E-016	pass	1	pass	
SGTR	14-01	1.562E-014	pass	9	pass	
SGTR	14-02	5.107E-015	pass	3	pass	
SGTR	14-03	1.052E-014	pass	6	pass	
SGTR	16-01	5.368E-013	pass	67		pass
SGTR	16-02	1.744E-013	pass	20		pass
SGTR	16-03	3.603E-013	pass	43		pass
SGTR	16-14	1.028E-015	pass	2	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
SGTR	18-01	1.531E-013	pass	24		pass
SGTR	18-02	4.969E-014	pass	6	pass	
SGTR	18-03	1.027E-013	pass	14		pass
SGTR	18-14	3.597E-016	pass	2	pass	
SGTR	21-01	1.215E-014	pass	41		pass
SGTR	21-02	1.215E-014	pass	41		pass
SGTR	22-01	5.846E-015	pass	15		pass
SGTR	22-02	5.846E-015	pass	15		pass
SGTR	23-01	1.314E-015	pass	4	pass	
SGTR	23-02	1.314E-015	pass	4	pass	
SGTR	26-01	1.388E-016	pass	4	pass	
SGTR	26-02	1.388E-016	pass	4	pass	
SGTR	27-01	6.942E-017	pass	2	pass	
SGTR	27-02	6.942E-017	pass	2	pass	
SGTR	29-01	1.785E-014	pass	19		pass
SGTR	29-02	1.785E-014	pass	19		pass
SGTR	31-01	1.152E-015	pass	14		pass
SGTR	31-02	3.745E-016	pass	5	pass	
SGTR	31-03	7.775E-016	pass	9	pass	
SGTR	42-01	3.179E-017	pass	1	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status Failure	Count		Status
SGTR	42-04	3.179E-017	pass	1	pass	
SGTR	44-01	7.442E-014	pass	14		pass
SGTR	44-02	7.442E-014	pass	14		pass
SGTR	44-04	3.179E-017	pass	1	pass	
SGTR	45-01	6.253E-015	pass	27		pass
SGTR	45-02	2.039E-015	pass	9	pass	
SGTR	45-03	4.215E-015	pass	18		pass
SGTR	46-01	3.158E-013	pass	46		pass
SGTR	46-02	3.158E-013	pass	46		pass
SGTR	46-04	1.640E-016	pass	5	pass	
SGTR	46-06	5.416E-017	pass	2	pass	
SGTR	47-01	9.012E-012	pass	3	pass	
SGTR	47-02	9.012E-012	pass	3	pass	
SGTR	47-03	6.890E-015	pass	8	pass	
SGTR	47-04	1.439E-014	pass	12		pass
SGTR	47-06	6.749E-015	pass	4	pass	

SGTR	47-08	3.891E-015	pass	5	pass	
SGTR	47-14	5.347E-015	pass	4	pass	
SLOCA	04-01	2.511E-010	pass	231		pass
SLOCA	04-02	2.407E-010	pass	70		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
SLOCA	04-03	9.137E-015	pass	10		pass
SLOCA	04-04	7.396E-012	pass	160		pass
SLOCA	04-08	1.348E-012	pass	43		pass
SLOCA	04-10	1.314E-014	pass	20		pass
SLOCA	04-14	5.686E-012	pass	62		pass
SLOCA	04-18	7.180E-015	pass	14		pass
SLOCA	05-01	6.498E-012	pass	41		pass
SLOCA	05-06	6.498E-012	pass	41		pass
SLOCA	05-12	3.212E-015	pass	11		pass
SLOCA	05-16	3.760E-015	pass	8	pass	
SLOCA	07-01	3.490E-011	pass	42		pass
SLOCA	07-02	2.987E-011	pass	14		pass
SLOCA	07-03	1.082E-015	pass	5	pass	
SLOCA	07-04	2.721E-012	pass	40		pass
SLOCA	07-08	1.760E-014	pass	24		pass
SLOCA	07-10	5.904E-016	pass	2	pass	
SLOCA	07-14	2.346E-012	pass	17		pass
SLOCA	07-18	8.349E-016	pass	2	pass	
SLOCA	08-01	3.056E-012	pass	6	pass	
SLOCA	08-06	3.056E-012	pass	6	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
SLOCA	08-12	1.177E-015	pass	3	pass	
SLOCA	08-16	1.593E-015	pass	2	pass	
SLOCA	09-01	9.694E-010	pass	26		pass
SLOCA	09-02	3.144E-010	pass	5	pass	
SLOCA	09-03	6.506E-010	pass	21		pass
SLOCA	09-04	5.285E-013	pass	42		pass
SLOCA	09-05	1.097E-012	pass	97		pass
SLOCA	09-06	2.397E-013	pass	10		pass
SLOCA	09-07	4.959E-013	pass	23		pass
SLOCA	09-08	1.452E-013	pass	19		pass
SLOCA	09-09	3.032E-013	pass	46		pass
SLOCA	09-14	2.475E-012	pass	21		pass
SLOCA	09-15	4.226E-013	pass	52		pass
SLOCA	09-16	1.815E-015	pass	3	pass	
SLOCA	09-17	1.767E-016	pass	2	pass	
SLOCA	09-21	8.544E-015	pass	3	pass	
SLOCA	13-01	2.357E-014	pass	60		pass
SLOCA	13-02	2.322E-014	pass	52		pass
SLOCA	13-04	1.238E-016	pass	4	pass	
SLOCA	13-14	2.276E-016	pass	4	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
SLOCA	14-01	3.163E-016	pass	5	pass	
SLOCA	14-06	3.163E-016	pass	5	pass	
SLOCA	16-01	2.384E-015	pass	22		pass
SLOCA	16-02	2.209E-015	pass	18		pass
SLOCA	16-04	6.189E-017	pass	2	pass	
SLOCA	16-14	1.138E-016	pass	2	pass	
SLOCA	17-01	1.720E-016	pass	3	pass	
SLOCA	17-06	1.720E-016	pass	3	pass	
SLOCA	18-01	7.839E-014	pass	63		pass
SLOCA	18-02	2.544E-014	pass	18		pass
SLOCA	18-03	5.257E-014	pass	38		pass
SLOCA	18-14	1.772E-016	pass	3	pass	
SLOCA	18-21	2.304E-017	pass	1	pass	
SLOCA	21-01	2.422E-015	pass	16		pass
SLOCA	21-02	2.422E-015	pass	16		pass
SLOCA	24-01	1.418E-016	pass	4	pass	

SLOCA	24-02	1.418E-016	pass	4	pass	
SLOCA	27-01	1.612E-014	pass	38		pass
SLOCA	27-02	1.414E-014	pass	29		pass
SLOCA	27-04	9.596E-016	pass	6	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
SLOCA	27-14	1.018E-015	pass	3	pass	
SLOCA	28-01	1.369E-015	pass	5	pass	
SLOCA	28-06	1.369E-015	pass	5	pass	
SLOCA	29-01	8.810E-015	pass	28		pass
SLOCA	29-02	2.872E-015	pass	9	pass	
SLOCA	29-03	5.938E-015	pass	19		pass
SLOCA	30-01	4.412E-013	pass	48		pass
SLOCA	30-02	4.412E-013	pass	48		pass
SLOCA	30-04	3.250E-016	pass	8	pass	
SLOCA	30-06	1.665E-016	pass	5	pass	
SLOCA	30-14	6.106E-017	pass	2	pass	
SLOCA	31-01	1.288E-011	pass	3	pass	
SLOCA	31-02	1.288E-011	pass	3	pass	
SLOCA	31-03	9.955E-015	pass	9	pass	
SLOCA	31-04	2.090E-014	pass	15		pass
SLOCA	31-06	9.780E-015	pass	5	pass	
SLOCA	31-08	5.662E-015	pass	6	pass	
SLOCA	31-14	8.106E-015	pass	8	pass	
TRANS	05-01	6.297E-011	pass	493		pass
TRANS	05-02	6.238E-011	pass	229		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
TRANS	05-03	1.948E-015	pass	2	pass	
TRANS	05-04	8.931E-013	pass	249		pass
TRANS	05-08	4.311E-013	pass	40		pass
TRANS	05-10	2.748E-015	pass	8	pass	
TRANS	05-14	5.478E-013	pass	109		pass
TRANS	05-18	1.258E-015	pass	4	pass	
TRANS	06-01	4.172E-013	pass	99		pass
TRANS	06-06	4.172E-013	pass	99		pass
TRANS	08-01	2.205E-012	pass	182		pass
TRANS	08-02	1.917E-012	pass	78		pass
TRANS	08-04	1.559E-013	pass	90		pass
TRANS	08-08	9.932E-016	pass	4	pass	
TRANS	08-14	1.355E-013	pass	28		pass
TRANS	09-01	1.760E-013	pass	25		pass
TRANS	09-06	1.760E-013	pass	25		pass
TRANS	10-01	5.648E-011	pass	156		pass
TRANS	10-02	1.828E-011	pass	35		pass
TRANS	10-03	3.794E-011	pass	105		pass
TRANS	10-04	2.813E-014	pass	30		pass
TRANS	10-05	5.943E-014	pass	68		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
TRANS	10-06	1.325E-014	pass	14		pass
TRANS	10-07	2.789E-014	pass	33		pass
TRANS	10-08	8.106E-015	pass	16		pass
TRANS	10-09	1.738E-014	pass	31		pass
TRANS	10-14	1.418E-013	pass	20		pass
TRANS	10-15	2.277E-014	pass	30		pass
TRANS	10-21	4.059E-015	pass	5	pass	
TRANS	15-01	5.948E-015	pass	28		pass
TRANS	15-02	5.948E-015	pass	28		pass
TRANS	20-01	3.932E-015	pass	42		pass
TRANS	20-02	1.278E-015	pass	15		pass
TRANS	20-03	2.654E-015	pass	27		pass
TRANS	23-01	3.721E-012	pass	380		pass

TRANS	23-02	3.196E-012	pass	196		pass
TRANS	23-04	2.835E-013	pass	176		pass
TRANS	23-08	1.272E-015	pass	24		pass
TRANS	23-14	2.450E-013	pass	48		pass
TRANS	24-01	3.196E-013	pass	48		pass
TRANS	24-06	3.196E-013	pass	48		pass
TRANS	24-12	5.305E-017	pass	2	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
TRANS	24-16	1.384E-016	pass	4	pass	
TRANS	25-01	2.024E-012	pass	244		pass
TRANS	25-02	6.563E-013	pass	66		pass
TRANS	25-03	1.358E-012	pass	160		pass
TRANS	25-04	7.096E-016	pass	14		pass
TRANS	25-05	1.553E-015	pass	30		pass
TRANS	25-06	3.780E-016	pass	8	pass	
TRANS	25-07	7.560E-016	pass	12		pass
TRANS	25-08	1.436E-016	pass	4	pass	
TRANS	25-09	3.961E-016	pass	12		pass
TRANS	25-14	4.898E-015	pass	14		pass
TRANS	25-15	5.964E-016	pass	12		pass
TRANS	25-21	5.924E-016	pass	2	pass	
TRANS	26-01	9.759E-011	pass	166		pass
TRANS	26-02	9.759E-011	pass	162		pass
TRANS	26-03	7.764E-014	pass	242		pass
TRANS	26-04	1.609E-013	pass	376		pass
TRANS	26-06	7.360E-014	pass	94		pass
TRANS	26-08	4.372E-014	pass	138		pass
TRANS	26-14	6.152E-014	pass	158		pass

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
TRANS	26-21	4.231E-016	pass	4	pass	
TRANS	27-04-01	1.513E-013	pass	123		pass
TRANS	27-04-02	1.486E-013	pass	105		pass
TRANS	27-04-04	1.316E-015	pass	12		pass
TRANS	27-04-14	1.396E-015	pass	6	pass	
TRANS	27-05-01	1.770E-015	pass	6	pass	
TRANS	27-05-06	1.770E-015	pass	6	pass	
TRANS	27-07-01	1.662E-014	pass	48		pass
TRANS	27-07-02	1.526E-014	pass	39		pass
TRANS	27-07-04	6.579E-016	pass	6	pass	
TRANS	27-07-14	6.979E-016	pass	3	pass	
TRANS	27-08-01	8.848E-016	pass	3	pass	
TRANS	27-08-06	8.848E-016	pass	3	pass	
TRANS	27-09-01	1.780E-011	pass	3	pass	
TRANS	27-09-02	1.780E-011	pass	3	pass	
TRANS	27-09-03	1.401E-014	pass	11		pass
TRANS	27-09-04	2.902E-014	pass	16		pass
TRANS	27-09-06	1.352E-014	pass	5	pass	
TRANS	27-09-08	7.932E-015	pass	7	pass	
TRANS	27-09-14	1.120E-014	pass	8	pass	

Compare MinCut and No. of Cut Sets:

Event Tree	Sequence	MinCut	Status	Failure Count		Status
TRANS	27-13-01	2.632E-014	pass	28		pass
TRANS	27-13-02	2.632E-014	pass	28		pass
TRANS	27-16-01	1.496E-015	pass	6	pass	
TRANS	27-16-02	1.496E-015	pass	6	pass	
TRANS	27-18-01	3.561E-012	pass	3	pass	
TRANS	27-18-02	3.561E-012	pass	3	pass	
TRANS	27-18-03	2.661E-015	pass	7	pass	
TRANS	27-18-04	5.353E-015	pass	6	pass	
TRANS	27-18-06	2.626E-015	pass	3	pass	
TRANS	27-18-08	1.457E-015	pass	3	pass	
TRANS	27-18-14	2.073E-015	pass	3	pass	
TRANS	27-19-01	2.816E-013	pass	31		pass
TRANS	27-19-02	2.816E-013	pass	31		pass

TRANS	27-20-01	2.322E-011	pass	6	pass	
TRANS	27-20-02	2.322E-011	pass	6	pass	
TRANS	27-20-03	1.819E-014	pass	15		pass
TRANS	27-20-04	3.778E-014	pass	21		pass
TRANS	27-20-06	1.758E-014	pass	7	pass	
TRANS	27-20-08	1.022E-014	pass	8	pass	
TRANS	27-20-14	1.446E-014	pass	9	pass	

Scenario: Link Level 1 Event Trees completed at 1:33:19 AM

S_LERF-02 Scenario: Partition Sequence Cut Sets started at 1:33:19 AM
Event tree partition rules applied
End States gathered by sequence end state
Generated base case data

END STATE RESULTS:

Compare MinCut:

PDS-GGIYYNNY	3.179E-017	pass	1	pass
PDS-HHLYYNNN	6.253E-015	pass	27	pass
PDS-HHLYYNXN	1.680E-013	pass	29	pass
PDS-HHLYYNYN	1.733E-011	pass	65	pass
PDS-HHNNYNNN	5.416E-017	pass	2	pass
PDS-HHNNYNXN	1.768E-013	pass	11	pass
PDS-HHNNYNYN	1.831E-013	pass	60	pass
PDS-HHNYYNNN	3.902E-013	pass	60	pass
PDS-HHNYYNXN	2.319E-010	pass	4	pass
PDS-HHNYYNYN	2.246E-010	pass	168	pass
PDS-KAINYYNN	1.758E-014	pass	7	pass
PDS-KAIYYYNN	1.819E-014	pass	15	pass
PDS-KAIYYYNY	2.322E-011	pass	6	pass
PDS-KTINYYXY	1.352E-014	pass	5	pass
PDS-KTIYYYNY	2.816E-013	pass	31	pass
PDS-KTIYYYXN	1.401E-014	pass	11	pass
PDS-KTIYYYXY	1.780E-011	pass	3	pass
PDS-S2BYYYNN	1.414E-014	pass	29	pass
PDS-S2BYYYNY	4.412E-013	pass	48	pass
PDS-S2BYYYXN	2.848E-010	pass	269	pass

Compare MinCut:

PDS-S2BYYYYN	3.154E-010	pass	637	pass
PDS-S2LYYNXN	6.717E-013	pass	225	pass
PDS-S2LYYYNN	8.810E-015	pass	28	pass
PDS-S2LYYYXN	1.059E-009	pass	349	pass
PDS-S2NNYNXN	1.260E-014	pass	8	pass
PDS-S2NNYYNN	1.536E-015	pass	10	pass
PDS-S2NNYYXN	5.318E-012	pass	215	pass
PDS-S2NNYYYN	7.120E-012	pass	219	pass
PDS-S2NYYNXN	3.627E-016	pass	3	pass
PDS-S2NYYYNN	1.977E-015	pass	9	pass
PDS-S2NYYYXN	1.581E-011	pass	1048	pass
PDS-S2NYYYYN	1.499E-011	pass	857	pass
PDS-S2RRRRCR	2.551E-010	pass	42	pass
PDS-S3BYYYXN	4.595E-014	pass	33	pass
PDS-S3BYYYYN	2.261E-012	pass	95	pass
PDS-S3LYYNXN	2.026E-016	pass	3	pass
PDS-S3LYYYXN	1.314E-012	pass	111	pass
PDS-S3NNYNXN	4.189E-015	pass	2	pass
PDS-S3NNYYXN	4.523E-015	pass	12	pass
PDS-S3NNYYYN	2.340E-014	pass	25	pass

Compare MinCut:

PDS-S3NYYYXN	1.013E-014	pass	27	pass
PDS-S3NYYYYN	6.190E-014	pass	93	pass
PDS-S3RRRRCN	2.300E-009	pass	18	pass
PDS-TTBYYNNN	3.446E-013	pass	520	pass
PDS-TTBYYNNY	1.742E-010	pass	279	pass
PDS-TTBYYYNY	6.071E-012	pass	391	pass
PDS-TTINYNNN	4.231E-016	pass	4	pass
PDS-TTINYNNY	1.338E-013	pass	170	pass
PDS-TTINYYNY	5.250E-013	pass	92	pass
PDS-TTIYYYNY	8.779E-013	pass	443	pass
PDS-TTLYYNNN	2.729E-012	pass	303	pass
PDS-TTLYYNNY	1.199E-012	pass	119	pass
PDS-TTNNYNNN	2.135E-015	pass	29	pass
PDS-TTNNYNNY	6.971E-016	pass	15	pass
PDS-TTNYYNNN	1.016E-014	pass	123	pass
PDS-TTNYYNNY	1.085E-014	pass	63	pass
PDS-TTRRRRCR	1.808E-010	pass	18	pass
PDS-TTRRRRSR	6.784E-011	pass	45	pass

Scenario: Partition Sequence Cut Sets completed at 1:36:30 AM

S_LERF-03 Scenario: Link PDS Trees started at 1:36:30 AM
Event trees linked
Now closing Link dialog started at 1:58:36 AM
End States gathered by cut set partition
End state quantification complete using: rare event quantification method

END STATE RESULTS:
Compare MinCut:

LERF-BYPASS	4.767E-010	pass	58	pass	
LERF-ECF	4.715E-011	pass	3576		pass
LERF-ISGTR	1.835E-012	pass	19	pass	
NOLERF	4.688E-009	pass	3119		pass

Scenario: Link PDS Trees completed at 2:09:15 AM

TEST CASE COMPLETE: at 2:09:16 AM

TEST CASE : SAPHIRE QA Models (IMPFT_DEMO)
DATE & TIME: 8/31/99 2:09:21 AM

TEST FOR: SAPHIRE Version 6.63

Opened project: DEMO
Error: unable to locate SAPHIRE window...unable to Generate
TEST CASE : SAPHIRE QA Models (IMPSQ_DEMO)
DATE & TIME: 8/31/99 2:09:39 AM

TEST FOR: SAPHIRE Version 6.63

Project DEMO is open
Generated base case data
Event tree, sequence: LOSP, 3
Sequences solved
with prob cut off (1.000E-008)

DEMO-04 Scenario: Sequence Fussell-Vesely Importance started at 2:09:47 AM
FUSSELL/VESELY IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
C-CV-B	1	1.000E-004	2.612E-003	1.003E+000	2.712E+001	pass
C-MOV-1	6	1.000E-003	2.751E-002	1.028E+000	2.846E+001	pass
C-MOV-A	2	5.000E-003	5.225E-005	1.000E+000	1.010E+000	pass
C-MOV-B	3	5.000E-003	1.307E-001	1.150E+000	2.700E+001	pass
C-PUMP-A	2	3.000E-003	3.135E-005	1.000E+000	1.010E+000	pass
C-PUMP-B	3	3.000E-003	7.840E-002	1.085E+000	2.706E+001	pass
DG-A	5	2.000E-002	7.605E-001	4.176E+000	3.800E+001	pass
DG-B	5	2.000E-002	7.605E-001	4.176E+000	3.800E+001	pass
E-CV-A	1	1.000E-004	2.612E-003	1.003E+000	2.712E+001	pass
E-MOV-1	6	1.000E-003	2.751E-002	1.028E+000	2.846E+001	pass
E-MOV-A	3	5.000E-003	1.307E-001	1.150E+000	2.700E+001	pass
E-MOV-B	2	5.000E-003	5.225E-005	1.000E+000	1.010E+000	pass
E-PUMP-A	3	3.000E-003	7.840E-002	1.085E+000	2.706E+001	pass
E-PUMP-B	2	3.000E-003	3.135E-005	1.000E+000	1.010E+000	pass
LOSP	19	2.300E+000	1.000E+000	---------	4.348E-001	pass
TANK	1	1.000E-007	1.306E-004	1.000E+000	1.307E+003	pass

Scenario: Sequence Fussell-Vesely Importance completed at 2:10:09 AM

DEMO-05 Scenario: Sequence Birnbaum Importance started at 2:10:09 AM

BIRNBAUM IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
C-CV-B	1	1.000E-004	4.596E-002	4.596E-006	4.596E-002	pass
C-MOV-1	6	1.000E-003	4.836E-002	4.841E-005	4.831E-002	pass
C-MOV-A	2	5.000E-003	1.839E-005	9.193E-008	1.829E-005	pass
C-MOV-B	3	5.000E-003	4.599E-002	2.299E-004	4.576E-002	pass
C-PUMP-A	2	3.000E-003	1.839E-005	5.516E-008	1.833E-005	pass
C-PUMP-B	3	3.000E-003	4.599E-002	1.380E-004	4.585E-002	pass
DG-A	5	2.000E-002	6.645E-002	1.338E-003	6.511E-002	pass
DG-B	5	2.000E-002	6.645E-002	1.338E-003	6.511E-002	pass
E-CV-A	1	1.000E-004	4.596E-002	4.596E-006	4.596E-002	pass
E-MOV-1	6	1.000E-003	4.836E-002	4.841E-005	4.831E-002	pass
E-MOV-A	3	5.000E-003	4.599E-002	2.299E-004	4.576E-002	pass
E-MOV-B	2	5.000E-003	1.839E-005	9.193E-008	1.829E-005	pass
E-PUMP-A	3	3.000E-003	4.599E-002	1.380E-004	4.585E-002	pass
E-PUMP-B	2	3.000E-003	1.839E-005	5.516E-008	1.833E-005	pass
LOSP	19	2.300E+000	7.650E-004	1.760E-003	-9.945E-004	pass
TANK	1	1.000E-007	2.298E+000	2.298E-007	2.298E+000	pass

Scenario: Sequence Fussell-Vesely Importance completed at 2:10:31 AM

DEMO-06 Scenario: Sequence Uncertainty Importance started at 2:10:31 AM

UNCERTAINTY IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
C-CV-B	1	1.000E-004	3.446E-006	4.596E-006	4.596E-002	pass
C-MOV-1	6	1.000E-003	6.126E-005	4.841E-005	4.831E-002	pass
C-MOV-A	2	5.000E-003	1.164E-007	9.193E-008	1.829E-005	pass
C-MOV-B	3	5.000E-003	2.913E-004	2.299E-004	4.576E-002	pass
C-PUMP-A	2	3.000E-003	6.987E-008	5.516E-008	1.833E-005	pass
C-PUMP-B	3	3.000E-003	1.747E-004	1.380E-004	4.585E-002	pass
DG-A	5	2.000E-002	3.281E-003	1.338E-003	6.511E-002	pass
DG-B	5	2.000E-002	3.281E-003	1.338E-003	6.511E-002	pass
E-CV-A	1	1.000E-004	3.446E-006	4.596E-006	4.596E-002	pass
E-MOV-1	6	1.000E-003	6.126E-005	4.841E-005	4.831E-002	pass
E-MOV-A	3	5.000E-003	2.913E-004	2.299E-004	4.576E-002	pass
E-MOV-B	2	5.000E-003	1.164E-007	9.193E-008	1.829E-005	pass
E-PUMP-A	3	3.000E-003	1.747E-004	1.380E-004	4.585E-002	pass
E-PUMP-B	2	3.000E-003	6.987E-008	5.516E-008	1.833E-005	pass
LOSP	19	2.300E+000	4.344E-003	1.760E-003	-9.945E-004	pass
TANK	1	1.000E-007	1.723E-007	2.298E-007	2.298E+000	pass

Scenario: Sequence Uncertainty Importance completed at 2:10:53 AM

TEST CASE COMPLETE: at 2:10:54 AM

TEST CASE : SAPHIRE QA Models (IMPSQG_DEMO)
DATE & TIME: 8/31/99 2:10:57 AM

TEST FOR: SAPHIRE Version 6.63

Project DEMO is open
Generated base case data
Event tree LOSP: all sequences
Sequences solved
with prob cut off (1.000E-008)

DEMO-07 Scenario: Sequence Fussell-Vesely Group Importance started at 2:11:06 AM
FUSSELL/VESELY IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
C-CV-B	1	1.000E-004	9.163E-005	1.000E+000	1.916E+000	pass
C-MOV-1	6	1.000E-003	9.651E-004	1.001E+000	1.963E+000	pass
C-MOV-A	2	5.000E-003	1.833E-006	1.000E+000	1.000E+000	pass
C-MOV-B	3	5.000E-003	4.584E-003	1.005E+000	1.912E+000	pass
C-PUMP-A	2	3.000E-003	1.100E-006	1.000E+000	1.000E+000	pass
C-PUMP-B	3	3.000E-003	2.750E-003	1.003E+000	1.914E+000	pass
DG-A	6	2.000E-002	9.427E-001	1.746E+001	4.719E+001	pass
DG-B	5	2.000E-002	2.668E-002	1.027E+000	2.298E+000	pass
E-CV-A	4	1.000E-004	1.280E-004	1.000E+000	2.279E+000	pass
E-CV-B	3	1.000E-004	3.636E-005	1.000E+000	1.363E+000	pass
E-MOV-1	7	1.000E-003	4.590E-002	1.048E+000	4.685E+001	pass
E-MOV-A	6	5.000E-003	6.402E-003	1.006E+000	2.273E+000	pass
E-MOV-B	5	5.000E-003	1.820E-003	1.002E+000	1.361E+000	pass
E-PUMP-A	6	3.000E-003	3.841E-003	1.004E+000	2.276E+000	pass
E-PUMP-B	5	3.000E-003	1.092E-003	1.001E+000	1.362E+000	pass
LOSP	30	2.300E+000	1.000E+000	———	4.348E-001	pass
TANK	1	1.000E-007	4.582E-006	1.000E+000	4.682E+001	pass

Scenario: Sequence Fussell-Vesely Group Importance completed at 2:11:30 AM

DEMO-08 Scenario: Sequence Birnbaum Group Importance started at 2:11:30 AM
BIRNBAUM IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
C-CV-B	1	1.000E-004	4.596E-002	4.596E-006	4.596E-002	pass
C-MOV-1	6	1.000E-003	4.836E-002	4.841E-005	4.831E-002	pass
C-MOV-A	2	5.000E-003	1.839E-005	9.193E-008	1.829E-005	pass
C-MOV-B	3	5.000E-003	4.599E-002	2.299E-004	4.576E-002	pass
C-PUMP-A	2	3.000E-003	1.839E-005	5.516E-008	1.833E-005	pass
C-PUMP-B	3	3.000E-003	4.599E-002	1.380E-004	4.585E-002	pass
DG-A	6	2.000E-002	2.364E+000	4.729E-002	2.317E+000	pass
DG-B	5	2.000E-002	6.645E-002	1.338E-003	6.511E-002	pass
E-CV-A	4	1.000E-004	6.417E-002	6.420E-006	6.416E-002	pass
E-CV-B	3	1.000E-004	1.820E-002	1.824E-006	1.820E-002	pass
E-MOV-1	7	1.000E-003	2.302E+000	2.302E-003	2.300E+000	pass
E-MOV-A	6	5.000E-003	6.419E-002	3.211E-004	6.387E-002	pass
E-MOV-B	5	5.000E-003	1.822E-002	9.128E-005	1.813E-002	pass
E-PUMP-A	6	3.000E-003	6.419E-002	1.927E-004	6.400E-002	pass
E-PUMP-B	5	3.000E-003	1.822E-002	5.477E-005	1.817E-002	pass
LOSP	30	2.300E+000	2.181E-002	5.016E-002	-2.835E-002	pass
TANK	1	1.000E-007	2.298E+000	2.298E-007	2.298E+000	pass

Scenario: Sequence Fussell-Vesely Group Importance completed at 2:11:54 AM

DEMO-09 Scenario: Sequence Uncertainty Group Importance started at 2:11:54 AM

UNCERTAINTY IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
C-CV-B	1	1.000E-004	3.446E-006	4.596E-006	4.596E-002	pass
C-MOV-1	6	1.000E-003	6.126E-005	4.841E-005	4.831E-002	pass
C-MOV-A	2	5.000E-003	1.164E-007	9.193E-008	1.829E-005	pass
C-MOV-B	3	5.000E-003	2.913E-004	2.299E-004	4.576E-002	pass
C-PUMP-A	2	3.000E-003	6.987E-008	5.516E-008	1.833E-005	pass
C-PUMP-B	3	3.000E-003	1.747E-004	1.380E-004	4.585E-002	pass
DG-A	6	2.000E-002	1.167E-001	4.729E-002	2.317E+000	pass
DG-B	5	2.000E-002	3.281E-003	1.338E-003	6.511E-002	pass
E-CV-A	4	1.000E-004	4.811E-006	6.420E-006	6.416E-002	pass
E-CV-B	3	1.000E-004	1.365E-006	1.824E-006	1.820E-002	pass
E-MOV-1	7	1.000E-003	2.916E-003	2.302E-003	2.300E+000	pass
E-MOV-A	6	5.000E-003	4.065E-004	3.211E-004	6.387E-002	pass
E-MOV-B	5	5.000E-003	1.154E-004	9.128E-005	1.813E-002	pass
E-PUMP-A	6	3.000E-003	2.439E-004	1.927E-004	6.400E-002	pass
E-PUMP-B	5	3.000E-003	6.924E-005	5.477E-005	1.817E-002	pass
LOSP	30	2.300E+000	1.238E-001	5.016E-002	-2.835E-002	pass
TANK	1	1.000E-007	1.723E-007	2.298E-007	2.298E+000	pass

Scenario: Sequence Uncertainty Group Importance completed at 2:12:18 AM

TEST CASE COMPLETE: at 2:12:19 AM

TEST CASE : SAPHIRE QA Models (CHCLS_DEMO)
DATE & TIME: 8/31/99 2:12:22 AM

TEST FOR: SAPHIRE Version 6.63

Project DEMO is open

DEMO-10 Scenario: Class Change - All Events started at 2:12:24 AM
Change set ALL-EVENTS created
Class changes:
 Primary name: *
 Susceptibility 1
 Calc Type: 1 - Probability
 Prob: 1.000E-001
Selected Change Set:
 ALL-EVENTS
Generated basic event data
Sequences solved
 with prob cut off (1.000E-015) and with recovery
CUT SET COMPARISON:

Cut Set Number	Frequency	% Total	Events	
1	1.000E-002	38.45	DG-A	pass
2	1.000E-002	38.45	E-MOV-1	pass
4	1.000E-003	3.85	E-CV-A, E-MOV-B	pass
11	1.000E-003	3.85	E-PUMP-A, E-PUMP-B	pass
3	1.000E-003	3.85	E-CV-A, E-CV-B	pass
10	1.000E-003	3.85	E-MOV-B, E-PUMP-A	pass
7	1.000E-003	3.85	E-CV-B, E-PUMP-A	pass
8	1.000E-003	3.85	E-MOV-A, E-MOV-B	pass
5	1.000E-003	3.85	E-CV-B, E-MOV-A	pass
9	1.000E-003	3.85	E-MOV-A, E-PUMP-B	pass
6	1.000E-003	3.85	E-CV-A, E-PUMP-B	pass

Scenario: Class Change - All Events completed at 2:12:42 AM

DEMO-11 Scenario: Class Change - ?-MOV-1 Events started at 2:12:42 AM
Change set MOV-1-EVENTS created
Class changes:
 Primary name: ?-MOV-1
 Susceptibility 1
 Calc Type: 1 - Probability
 Prob: 5.000E-001
Selected Change Set:
 MOV-1-EVENTS
Generated basic event data
Sequences solved
 with prob cut off (1.000E-015) and with recovery
CUT SET COMPARISON:

Cut Set Number	Frequency	% Total	Events	
1	1.150E+000	98.03	E-MOV-1	pass
2	4.600E-002	3.92	DG-A	pass
3	5.750E-005	0.00	E-MOV-A, E-MOV-B	pass
5	3.450E-005	0.00	E-MOV-B, E-PUMP-A	pass
4	3.450E-005	0.00	E-MOV-A, E-PUMP-B	pass
6	2.070E-005	0.00	E-PUMP-A, E-PUMP-B	pass
7	1.150E-006	0.00	E-CV-A, E-MOV-B	pass
8	1.150E-006	0.00	E-CV-B, E-MOV-A	pass
10	6.900E-007	0.00	E-CV-B, E-PUMP-A	pass
9	6.900E-007	0.00	E-CV-A, E-PUMP-B	pass
11	2.300E-008	0.00	E-CV-A, E-CV-B	pass

Scenario: Class Change - ?-MOV-1 Events completed at 2:12:58 AM

DEMO-12 Scenario: Single Change - 1 Event started at 2:12:58 AM
Change set SINGLE-1 created
Single changes:
 Prob: 1.000E-001
Selected Change Set:
 SINGLE-1
Generated basic event data
Sequences solved
 with prob cut off (1.000E-015) and with recovery
CUT SET COMPARISON:

Cut Set Number	Frequency	% Total	Events	
1	4.600E-002	95.04	DG-A	pass
2	2.300E-003	4.75	E-MOV-1	pass
3	5.750E-005	0.12	E-MOV-A, E-MOV-B	pass
5	3.450E-005	0.07	E-MOV-B, E-PUMP-A	pass
4	3.450E-005	0.07	E-MOV-A, E-PUMP-B	pass
6	2.070E-005	0.04	E-PUMP-A, E-PUMP-B	pass
7	1.150E-006	0.00	E-CV-A, E-MOV-B	pass
8	1.150E-006	0.00	E-CV-B, E-MOV-A	pass
10	6.900E-007	0.00	E-CV-B, E-PUMP-A	pass
9	6.900E-007	0.00	E-CV-A, E-PUMP-B	pass
11	2.300E-008	0.00	E-CV-A, E-CV-B	pass

Scenario: DEMO-12 completed at 2:13:18 AM

DEMO-13 Scenario: Marked Change Sets started at 2:13:18 AM
Selected Change Sets:
ALL-EVENTS
MOV-1-EVENTS
SINGLE-1
Generated basic event data
Sequences solved
with prob cut off (1.000E-015) and with recovery
CUT SET COMPARISON:

Cut Set Number	Frequency	% Total	Events	
1	5.000E-002	84.90	E-MOV-1	pass
2	1.000E-002	16.98	DG-A	pass
11	1.000E-003	1.70	E-PUMP-A, E-PUMP-B	pass
10	1.000E-003	1.70	E-MOV-B, E-PUMP-A	pass
7	1.000E-003	1.70	E-CV-B, E-PUMP-A	pass
3	1.000E-003	1.70	E-CV-A, E-CV-B	pass
9	1.000E-003	1.70	E-MOV-A, E-PUMP-B	pass
5	1.000E-003	1.70	E-CV-B, E-MOV-A	pass
6	1.000E-003	1.70	E-CV-A, E-PUMP-B	pass
8	1.000E-003	1.70	E-MOV-A, E-MOV-B	pass
4	1.000E-003	1.70	E-CV-A, E-MOV-B	pass

Scenario: DEMO-13 completed at 2:13:31 AM

TEST CASE COMPLETE: at 2:13:32 AM

TEST CASE : SAPHIRE QA Models (IMPES_BV2)
DATE & TIME: 8/31/99 2:13:42 AM

TEST FOR: SAPHIRE Version 6.63

Opened project: BV2-5
Generated base case data
End state: HINISO
End States gathered by cut set partition
with prob cut off (1.000E-008)

BV2-5-04 Scenario: End State Fussell-Vesely Importance started at 2:17:04 AM
FUSSELL/VESELY IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
AF1	4	1.072E-005	-9.115E-007	1.000E+000	9.150E-001	pass
AF4	2	4.967E-002	-6.308E-003	9.937E-001	8.793E-001	pass
AFF	9	1.000E+000	7.943E-001	4.861E+000	1.000E+000	pass
AO1	9	9.545E-004	-5.501E-004	9.995E-001	4.243E-001	pass
AO2	4	1.082E-001	1.425E-001	1.166E+000	2.174E+000	pass
AOF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000	pass
BK1	4	9.049E-002	-1.761E-002	9.827E-001	8.230E-001	pass
BK2	11	5.031E-004	-4.143E-004	9.996E-001	1.770E-001	pass
BP4	9	8.655E-004	-4.987E-004	9.995E-001	4.243E-001	pass
BP5	2	1.493E-001	1.018E-001	1.113E+000	1.580E+000	pass
BP6	2	9.939E-002	1.717E-002	1.017E+000	1.156E+000	pass
BPF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000	pass
BV1	9	1.724E-007	-9.988E-008	1.000E+000	4.243E-001	pass
BV4	2	1.348E-004	5.628E-002	1.060E+000	4.184E+002	pass
BVF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000	pass
BVS	2	0.000E+000	0.000E+000	1.000E+000	8.793E-001	pass
BVX	2	2.350E-005	2.473E-001	1.329E+000	1.051E+004	pass
CC1	3	2.856E-005	-2.013E-006	1.000E+000	9.295E-001	pass
CCF	12	1.000E+000	9.295E-001	1.419E+001	1.000E+000	pass
CD7	4	7.268E-002	-6.664E-003	9.934E-001	9.150E-001	pass
CDF	2	1.000E+000	1.207E-001	1.137E+000	1.000E+000	pass
CI1	4	5.167E-003	8.503E-002	1.093E+000	1.737E+001	pass
CI6	2	1.188E-002	1.207E-001	1.137E+000	1.104E+001	pass
CIF	9	1.000E+000	7.943E-001	4.861E+000	1.000E+000	pass
CS1	1	5.472E-005	-7.550E-007	1.000E+000	9.862E-001	pass
CS2	7	3.834E-003	-2.062E-003	9.979E-001	4.643E-001	pass
CS3	4	8.572E-003	-1.530E-003	9.985E-001	8.230E-001	pass
CS4	3	1.139E-001	-3.370E-003	9.966E-001	9.738E-001	pass
DO1	9	8.353E-005	-4.810E-005	1.000E+000	4.243E-001	pass
DO2	2	4.876E-004	-7.133E-005	9.999E-001	8.538E-001	pass
DO3	2	5.737E-004	-1.765E-005	1.000E+000	9.693E-001	pass
DOF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000	pass
DP1	9	8.499E-005	-4.894E-005	1.000E+000	4.243E-001	pass
DP2	2	5.083E-004	-6.458E-005	9.999E-001	8.730E-001	pass
DP3	2	5.678E-004	-2.840E-005	1.000E+000	9.500E-001	pass
DPF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000	pass
EA0	10	0.000E+000	0.000E+000	1.000E+000	4.057E-001	pass
EA2	1	1.044E-001	1.223E-002	1.012E+000	1.105E+000	pass
EAF	4	1.000E+000	3.935E-001	1.649E+000	1.000E+000	pass
EB0	10	0.000E+000	0.000E+000	1.000E+000	3.865E-001	pass
EB6	1	7.706E-001	1.223E-002	1.012E+000	1.004E+000	pass
EBF	4	1.000E+000	3.743E-001	1.598E+000	1.000E+000	pass
FA1	9	1.298E-003	-7.483E-004	9.993E-001	4.243E-001	pass
FA2	2	3.428E-002	1.157E-002	1.012E+000	1.326E+000	pass
FAF	4	1.000E+000	3.935E-001	1.649E+000	1.000E+000	pass
FB3	9	1.303E-003	-7.512E-004	9.992E-001	4.243E-001	pass
FB6	1	9.965E-002	1.223E-002	1.012E+000	1.110E+000	pass
FB8	1	3.868E-002	-1.519E-003	9.985E-001	9.622E-001	pass
FBF	4	1.000E+000	3.743E-001	1.598E+000	1.000E+000	pass
HC1	1	5.899E-004	1.569E-002	1.016E+000	2.758E+001	pass
HCF	6	1.000E+000	5.181E-001	2.075E+000	1.000E+000	pass
HH1	3	5.875E-004	1.561E-002	1.016E+000	2.755E+001	pass
HH7	5	1.393E-003	-6.845E-004	9.993E-001	5.093E-001	pass

HHF	7	1.000E+000	4.505E-001	1.820E+000	1.000E+000		pass
IA1	10	3.424E-004	-2.723E-004	9.997E-001	2.051E-001		pass
IA2	4	5.865E-004	-1.039E-004	9.999E-001	8.230E-001		pass
IAF	1	1.000E+000	2.817E-002	1.029E+000	1.000E+000		pass
IB1	10	2.027E-005	-1.205E-005	1.000E+000	4.057E-001		pass
IB2	3	5.287E-004	-8.382E-005	9.999E-001	8.415E-001		pass
IBF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000		pass
IC1	1	1.834E-004	-2.530E-006	1.000E+000	9.862E-001		pass
ICF	14	1.000E+000	9.862E-001	7.250E+001	1.000E+000		pass
IMSIV	1		6.960E-002	4.298E-002	1.045E+000	1.575E+000	pass
IR1	10	6.009E-005	-3.571E-005	1.000E+000	4.057E-001		pass
IR2	3	3.391E-004	-5.375E-005	9.999E-001	8.415E-001		pass
IRF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000		pass
ISI	1	2.220E-002	1.371E-002	1.014E+000	1.604E+000		pass
IW1	10	5.872E-005	-3.603E-005	1.000E+000	3.865E-001		pass
IW2	3	3.421E-004	-4.764E-005	1.000E+000	8.608E-001		pass
IWF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000		pass
IY1	10	2.020E-005	-1.239E-005	1.000E+000	3.865E-001		pass
IY2	3	5.283E-004	-7.358E-005	9.999E-001	8.608E-001		pass
IYF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000		pass
LC2	2	2.487E-007	-1.055E-008	1.000E+000	9.581E-001		pass
LC3	7	1.911E-005	-1.020E-005	1.000E+000	4.662E-001		pass
LCF	6	1.000E+000	4.243E-001	1.737E+000	1.000E+000		pass
LH1	4	6.896E-004	-5.868E-005	9.999E-001	9.150E-001		pass
LHF	11	1.000E+000	9.150E-001	1.176E+001	1.000E+000		pass
LOSP	4		6.240E-002	1.770E-001	1.215E+000	3.659E+000	pass
MS0	15	0.000E+000	0.000E+000	1.000E+000	0.000E-010		pass
NMF	15		1.000E+000	1.000E+000	0.000E+000	1.000E+000	pass
NRF	15	1.000E+000	1.000E+000	0.000E+000	1.000E+000		pass
OBF	9	1.000E+000	7.943E-001	4.861E+000	1.000E+000		pass
OD6	4	1.356E-003	-1.155E-004	9.999E-001	9.150E-001		pass
OFF	9	1.000E+000	7.943E-001	4.861E+000	1.000E+000		pass
OG1	11	1.275E-003	-1.051E-003	9.990E-001	1.770E-001		pass
OGF	4	1.000E+000	1.770E-001	1.215E+000	1.000E+000		pass
OR1	4	3.600E-004	-3.062E-005	1.000E+000	9.150E-001		pass
OS0	6	0.000E+000	0.000E+000	1.000E+000	7.943E-001		pass
OS1	2	1.048E-002	5.669E-002	1.060E+000	6.353E+000		pass
OS2	2	1.722E-002	4.202E-001	1.725E+000	2.498E+001		pass
OS6	1	1.000E-003	1.379E-002	1.014E+000	1.478E+001		pass
OSF	4	1.000E+000	3.036E-001	1.436E+000	1.000E+000		pass
OT1	15	1.306E-003	-1.308E-003	9.987E-001	1.287E-010		pass
PI1	4	1.812E-004	-1.541E-005	1.000E+000	9.150E-001		pass
PR4	2	9.113E-003	2.473E-001	1.329E+000	2.789E+001		pass
PR7	1	4.946E-002	3.776E-002	1.039E+000	1.726E+000		pass
PR8	1	2.507E-002	1.852E-002	1.019E+000	1.720E+000		pass
PR9	3	7.671E-002	1.345E-001	1.155E+000	2.619E+000		pass
PRF	6	1.000E+000	5.053E-001	2.021E+000	1.000E+000		pass
PRV	2	2.989E-001	5.669E-002	1.060E+000	1.133E+000		pass
QS1	4	1.632E-004	-1.388E-005	1.000E+000	9.150E-001		pass
QSF	11	1.000E+000	9.150E-001	1.176E+001	1.000E+000		pass
RC1	3	2.470E-002	-1.488E-003	9.985E-001	9.413E-001		pass
RCF	1	1.000E+000	2.629E-002	1.027E+000	1.000E+000		pass
RD2	3	2.343E-002	-1.409E-003	9.986E-001	9.413E-001		pass
RDF	1	1.000E+000	2.629E-002	1.027E+000	1.000E+000		pass
RE2	1	1.212E-001	1.085E-001	1.122E+000	1.786E+000		pass
REF	14	1.000E+000	8.915E-001	9.220E+000	1.000E+000		pass
RRF	4	1.000E+000	8.503E-002	1.093E+000	1.000E+000		pass
RS1	3	1.433E-004	-8.419E-006	1.000E+000	9.413E-001		pass
RSF	1	1.000E+000	2.629E-002	1.027E+000	1.000E+000		pass
RT1	9	9.773E-005	-5.627E-005	9.999E-001	4.243E-001		pass
RT3	4	3.578E-006	-6.335E-007	1.000E+000	8.230E-001		pass
RT5	2	5.151E-004	-1.274E-004	9.999E-001	7.527E-001		pass
RW1	15		4.786E-005	-4.786E-005	1.000E+000	9.010E-010	pass
SA1	7	7.601E-003	6.913E-002	1.074E+000	1.003E+001		pass
SA2	6	1.147E-002	4.192E-001	1.722E+000	3.713E+001		pass
SAF	2	1.000E+000	2.473E-001	1.329E+000	1.000E+000		pass

SB1	4	7.232E-003	-1.289E-003		9.987E-001	8.230E-001	pass	
SB2	3	2.340E-002	7.049E-002	1.076E+000		3.942E+000	pass	
SB4	4	1.121E-002	-9.640E-004		9.990E-001	9.150E-001	pass	
SB6	2	8.321E-002	4.202E-001	1.725E+000		5.630E+000	pass	
SBF	2	1.000E+000	2.473E-001	1.329E+000		1.000E+000	pass	
SLOCI	1		1.820E-002	3.220E-001		1.475E+000	1.837E+001	pass
SLOCN	5		5.550E-003	1.832E-001		1.224E+000	3.383E+001	pass
SM1	4	1.607E-004	-1.367E-005		1.000E+000	9.150E-001	pass	
SMF	11	1.000E+000	9.150E-001	1.176E+001		1.000E+000	pass	
TB1	1	1.446E-003	-1.997E-005		1.000E+000	9.862E-001	pass	
TB3	2	2.976E-002	-1.739E-003		9.983E-001	9.433E-001	pass	
TB4	5	3.347E-002	-1.659E-002		9.837E-001	5.210E-001	pass	
TBF	7	1.000E+000	4.505E-001	1.820E+000		1.000E+000	pass	
TT	1	8.830E-001	1.379E-002	1.014E+000		1.002E+000	pass	
TT1	14	5.056E-005	-4.987E-005		1.000E+000	1.379E-002	pass	
TTS	1	0.000E+000	0.000E+000		1.000E+000	9.862E-001	pass	
VL1	9	1.030E-003	2.685E-002	1.028E+000		2.704E+001	pass	
VLF	6	1.000E+000	4.243E-001	1.737E+000		1.000E+000	pass	
WA1	4		4.279E-008	-4.119E-009		1.000E+000	9.110E-001	pass
WA2	6		1.297E-002	2.000E-002		1.020E+000	2.522E+000	pass
WAF	5		1.000E+000		4.057E-001	1.683E+000	1.000E+000	pass
WB1	4		3.999E-008	-4.376E-009		1.000E+000	8.917E-001	pass
WB3	5		1.222E-002	-5.925E-003		9.941E-001	5.210E-001	pass
WB4	1		7.685E-002	2.629E-002		1.027E+000	1.316E+000	pass
WBF	5		1.000E+000		3.865E-001	1.630E+000	1.000E+000	pass

Scenario: End State Fussell-Vesely Importance completed at 2:19:50 AM

BV2-5-05 Scenario: End State Birnbaum Importance started at 2:19:50 AM

BIRNBAUM IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
AF1	4	1.072E-005	-7.334E-008	-7.863E-013	-7.334E-008	pass
AF4	2	4.967E-002	-1.095E-007	-5.441E-009	-1.041E-007	pass
AFF	9	1.000E+000	6.851E-007	6.851E-007	0.000E-000	pass
AO1	9	9.545E-004	-4.971E-007	-4.745E-010	-4.966E-007	pass
AO2	4	1.082E-001	1.136E-006	1.229E-007	1.013E-006	pass
AOF	2	1.000E+000	2.133E-007	2.133E-007	0.000E-000	pass
BK1	4	9.049E-002	-1.678E-007	-1.519E-008	-1.526E-007	pass
BK2	11	5.031E-004	-7.103E-007	-3.573E-010	-7.099E-007	pass
BP4	9	8.655E-004	-4.970E-007	-4.302E-010	-4.966E-007	pass
BP5	2	1.493E-001	5.883E-007	8.784E-008	5.005E-007	pass
BP6	2	9.939E-002	1.490E-007	1.481E-008	1.342E-007	pass
BPF	2	1.000E+000	2.133E-007	2.133E-007	0.000E-000	pass
BV1	9	1.724E-007	-4.966E-007	-8.615E-014	-4.966E-007	pass
BV4	2	1.348E-004	3.601E-004	4.855E-008	3.600E-004	pass
BVF	2	1.000E+000	2.133E-007	2.133E-007	0.000E-000	pass
BVS	2	0.000E+000	-1.041E-007	0.000E+000	-1.041E-007	pass
BVX	2	2.350E-005	9.068E-003	2.133E-007	9.068E-003	pass
CC1	3	2.856E-005	-6.080E-008	-1.737E-012	-6.080E-008	pass
CCF	12	1.000E+000	8.018E-007	8.018E-007	0.000E-000	pass
CD7	4	7.268E-002	-7.909E-008	-5.748E-009	-7.334E-008	pass
CDF	2	1.000E+000	1.041E-007	1.041E-007	0.000E-000	pass
CI1	4	5.167E-003	1.419E-005	7.334E-008	1.412E-005	pass
CI6	2	1.188E-002	8.763E-006	1.041E-007	8.659E-006	pass
CIF	9	1.000E+000	6.851E-007	6.851E-007	0.000E-000	pass
CS1	1	5.472E-005	-1.190E-008	-6.513E-013	-1.190E-008	pass
CS2	7	3.834E-003	-4.638E-007	-1.778E-009	-4.620E-007	pass
CS3	4	8.572E-003	-1.540E-007	-1.320E-009	-1.526E-007	pass
CS4	3	1.139E-001	-2.552E-008	-2.906E-009	-2.261E-008	pass
DO1	9	8.353E-005	-4.967E-007	-4.149E-011	-4.966E-007	pass
DO2	2	4.876E-004	-1.262E-007	-6.153E-011	-1.261E-007	pass
DO3	2	5.737E-004	-2.653E-008	-1.522E-011	-2.652E-008	pass
DOF	2	1.000E+000	2.133E-007	2.133E-007	0.000E-000	pass
DP1	9	8.499E-005	-4.967E-007	-4.221E-011	-4.966E-007	pass
DP2	2	5.083E-004	-1.096E-007	-5.570E-011	-1.095E-007	pass
DP3	2	5.678E-004	-4.314E-008	-2.450E-011	-4.312E-008	pass
DPF	2	1.000E+000	2.133E-007	2.133E-007	0.000E-000	pass
EA0	10	0.000E+000	-5.126E-007	0.000E+000	-5.126E-007	pass
EA2	1	1.044E-001	1.010E-007	1.055E-008	9.046E-008	pass
EAF	4	1.000E+000	3.394E-007	3.394E-007	0.000E-000	pass
EB0	10	0.000E+000	-5.292E-007	0.000E+000	-5.292E-007	pass
EB6	1	7.706E-001	1.368E-008	1.055E-008	3.139E-009	pass
EBF	4	1.000E+000	3.228E-007	3.228E-007	0.000E-000	pass
FA1	9	1.298E-003	-4.973E-007	-6.454E-010	-4.966E-007	pass
FA2	2	3.428E-002	2.911E-007	9.978E-009	2.811E-007	pass
FAF	4	1.000E+000	3.394E-007	3.394E-007	0.000E-000	pass
FB3	9	1.303E-003	-4.973E-007	-6.479E-010	-4.966E-007	pass
FB6	1	9.965E-002	1.058E-007	1.055E-008	9.528E-008	pass
FB8	1	3.868E-002	-3.388E-008	-1.311E-009	-3.257E-008	pass
FBF	4	1.000E+000	3.228E-007	3.228E-007	0.000E-000	pass
HC1	1	5.899E-004	2.294E-005	1.353E-008	2.292E-005	pass
HCF	6	1.000E+000	4.469E-007	4.469E-007	0.000E-000	pass
HH1	3	5.875E-004	2.291E-005	1.346E-008	2.290E-005	pass
HH7	5	1.393E-003	-4.239E-007	-5.904E-010	-4.233E-007	pass
HHF	7	1.000E+000	3.886E-007	3.886E-007	0.000E-000	pass
IA1	10	3.424E-004	-6.858E-007	-2.348E-010	-6.856E-007	pass
IA2	4	5.865E-004	-1.527E-007	-8.958E-011	-1.526E-007	pass
IAF	1	1.000E+000	2.430E-008	2.430E-008	0.000E-000	pass
IB1	10	2.027E-005	-5.126E-007	-1.039E-011	-5.126E-007	pass
IB2	3	5.287E-004	-1.367E-007	-7.230E-011	-1.367E-007	pass
IBF	2	1.000E+000	2.133E-007	2.133E-007	0.000E-000	pass
IC1	1	1.834E-004	-1.190E-008	-2.182E-012	-1.190E-008	pass
ICF	14	1.000E+000	8.507E-007	8.507E-007	0.000E-000	pass

IMSIV	1		6.960E-002	5.327E-007		3.708E-008	4.956E-007	pass
IR1	10	6.009E-005	-5.126E-007		-3.080E-011	-5.126E-007		pass
IR2	3	3.391E-004	-1.367E-007		-4.636E-011	-1.367E-007		pass
IRF	2	1.000E+000	2.133E-007	2.133E-007		0.000E-000		pass
ISI	1	2.220E-002	5.327E-007	1.183E-008		5.209E-007		pass
IW1	10	5.872E-005	-5.292E-007		-3.108E-011	-5.292E-007		pass
IW2	3	3.421E-004	-1.201E-007		-4.109E-011	-1.201E-007		pass
IWF	2	1.000E+000	2.133E-007	2.133E-007		0.000E-000		pass
IY1	10	2.020E-005	-5.292E-007		-1.069E-011	-5.292E-007		pass
IY2	3	5.283E-004	-1.201E-007		-6.347E-011	-1.201E-007		pass
IYF	2	1.000E+000	2.133E-007	2.133E-007		0.000E-000		pass
LC2	2	2.487E-007	-3.616E-008		-9.104E-015	-3.616E-008		pass
LC3	7	1.911E-005	-4.605E-007		-8.800E-012	-4.605E-007		pass
LCF	6	1.000E+000	3.659E-007	3.659E-007		0.000E-000		pass
LH1	4	6.896E-004	-7.339E-008		-5.061E-011	-7.334E-008		pass
LHF	11	1.000E+000	7.892E-007	7.892E-007		0.000E-000		pass
LOSP	4		6.240E-002	2.446E-006		1.526E-007	2.294E-006	pass
MS0	15	0.000E+000	-8.626E-007		0.000E+000	-8.626E-007		pass
NMF	15		1.000E+000		8.626E-007	8.626E-007	0.000E+000	pass
NRF	15	1.000E+000	8.626E-007	8.626E-007		0.000E+000		pass
OBF	9	1.000E+000	6.851E-007	6.851E-007		0.000E-000		pass
OD6	4	1.356E-003	-7.344E-008		-9.959E-011	-7.334E-008		pass
OFF	9	1.000E+000	6.851E-007	6.851E-007		0.000E-000		pass
OG1	11	1.275E-003	-7.108E-007		-9.063E-010	-7.099E-007		pass
OGF	4	1.000E+000	1.526E-007	1.526E-007		0.000E-000		pass
OR1	4	3.600E-004	-7.337E-008		-2.641E-011	-7.334E-008		pass
OS0	6	0.000E+000	-1.774E-007		0.000E+000	-1.774E-007		pass
OS1	2	1.048E-002	4.666E-006	4.890E-008		4.617E-006		pass
OS2	2	1.722E-002	2.105E-005	3.625E-007		2.069E-005		pass
OS6	1	1.000E-003	1.190E-005	1.190E-008		1.189E-005		pass
OSF	4	1.000E+000	2.618E-007	2.618E-007		0.000E-000		pass
OT1	15	1.306E-003	-8.637E-007		-1.128E-009	-8.626E-007		pass
PI1	4	1.812E-004	-7.335E-008		-1.329E-011	-7.334E-008		pass
PR4	2	9.113E-003	2.341E-005	2.133E-007		2.319E-005		pass
PR7	1	4.946E-002	6.586E-007	3.257E-008		6.260E-007		pass
PR8	1	2.507E-002	6.371E-007	1.597E-008		6.211E-007		pass
PR9	3	7.671E-002	1.512E-006	1.160E-007		1.396E-006		pass
PRF	6	1.000E+000	4.358E-007	4.358E-007		0.000E-000		pass
PRV	2	2.989E-001	1.636E-007	4.890E-008		1.147E-007		pass
QS1	4	1.632E-004	-7.335E-008		-1.197E-011	-7.334E-008		pass
QSF	11	1.000E+000	7.892E-007	7.892E-007		0.000E-000		pass
RC1	3	2.470E-002	-5.195E-008		-1.283E-009	-5.067E-008		pass
RCF	1	1.000E+000	2.268E-008	2.268E-008		0.000E-000		pass
RD2	3	2.343E-002	-5.188E-008		-1.216E-009	-5.067E-008		pass
RDF	1	1.000E+000	2.268E-008	2.268E-008		0.000E-000		pass
RE2	1	1.212E-001	7.719E-007	9.355E-008		6.783E-007		pass
REF	14	1.000E+000	7.690E-007	7.690E-007		0.000E-000		pass
RRF	4	1.000E+000	7.334E-008	7.334E-008		0.000E-000		pass
RS1	3	1.433E-004	-5.067E-008		-7.262E-012	-5.067E-008		pass
RSF	1	1.000E+000	2.268E-008	2.268E-008		0.000E-000		pass
RT1	9	9.773E-005	-4.967E-007		-4.854E-011	-4.966E-007		pass
RT3	4	3.578E-006	-1.526E-007		-5.465E-013	-1.526E-007		pass
RT5	2	5.151E-004	-2.134E-007		-1.099E-010	-2.133E-007		pass
RW1	15		4.786E-005	-8.626E-007		-4.128E-011	-8.626E-007	pass
SA1	7	7.601E-003	7.845E-006	5.963E-008		7.785E-006		pass
SA2	6	1.147E-002	3.153E-005	3.616E-007		3.117E-005		pass
SAF	2	1.000E+000	2.133E-007	2.133E-007		0.000E-000		pass
SB1	4	7.232E-003	-1.538E-007		-1.112E-009	-1.526E-007		pass
SB2	3	2.340E-002	2.598E-006	6.080E-008		2.537E-006		pass
SB4	4	1.121E-002	-7.417E-008		-8.315E-010	-7.334E-008		pass
SB6	2	8.321E-002	4.356E-006	3.625E-007		3.994E-006		pass
SBF	2	1.000E+000	2.133E-007	2.133E-007		0.000E-000		pass
SLOCI	1		1.820E-002	1.526E-005		2.778E-007	1.498E-005	pass
SLOCN	5		5.550E-003	2.848E-005		1.580E-007	2.832E-005	pass
SM1	4	1.607E-004	-7.335E-008		-1.179E-011	-7.334E-008		pass
SMF	11	1.000E+000	7.892E-007	7.892E-007		0.000E-000		pass
TB1	1	1.446E-003	-1.192E-008		-1.723E-011	-1.190E-008		pass
TB3	2	2.976E-002	-5.040E-008		-1.500E-009	-4.890E-008		pass
TB4	5	3.347E-002	-4.274E-007		-1.431E-008	-4.131E-007		pass

TBF	7	1.000E+000	3.886E-007	3.886E-007		0.000E-000		pass
TT	1	8.830E-001	1.347E-008	1.190E-008		1.577E-009		pass
TT1	14	5.056E-005	-8.507E-007		-4.301E-011	-8.507E-007		pass
TTS	1	0.000E+000	-1.190E-008		0.000E+000	-1.190E-008		pass
VL1	9	1.030E-003	2.249E-005	2.316E-008		2.246E-005		pass
VLF	6	1.000E+000	3.659E-007	3.659E-007		0.000E-000		pass
WA1	4		4.279E-008	-7.677E-008		-3.553E-015	-7.677E-008	pass
WA2	6		1.297E-002	1.330E-006		1.725E-008	1.313E-006	pass
WAF	5		1.000E+000		3.500E-007	3.500E-007	0.000E-000	pass
WB1	4		3.999E-008	-9.337E-008		-3.775E-015	-9.337E-008	pass
WB3	5		1.222E-002	-4.182E-007		-5.111E-009	-4.131E-007	pass
WB4	1		7.685E-002	2.951E-007		2.268E-008	2.724E-007	pass
WBF	5		1.000E+000		3.334E-007	3.334E-007	0.000E-000	pass

Scenario: End State Fussell-Vesely Importance completed at 2:22:36 AM

BV2-5-06 Scenario: End State Uncertainty Importance started at 2:22:36 AM

UNCERTAINTY IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
AF1	4	1.072E-005	-1.237E-012	-7.863E-013	-7.334E-008	pass
AF4	2	4.967E-002	-3.657E-009	-5.441E-009	-1.041E-007	pass
AFF	9	1.000E+000	0.000E+000	6.851E-007	0.000E-000	pass
AO1	9	9.545E-004	-2.963E-010	-4.745E-010	-4.966E-007	pass
AO2	4	1.082E-001	7.300E-008	1.229E-007	1.013E-006	pass
AOF	2	1.000E+000	0.000E+000	2.133E-007	0.000E-000	pass
BK1	4	9.049E-002	-8.738E-009	-1.519E-008	-1.526E-007	pass
BK2	11	5.031E-004	-2.898E-010	-3.573E-010	-7.099E-007	pass
BP4	9	8.655E-004	0.000E+000	-4.302E-010	-4.966E-007	pass
BP5	2	1.493E-001	0.000E+000	8.784E-008	5.005E-007	pass
BP6	2	9.939E-002	0.000E+000	1.481E-008	1.342E-007	pass
BPF	2	1.000E+000	0.000E+000	2.133E-007	0.000E-000	pass
BV1	9	1.724E-007	-1.322E-013	-8.615E-014	-4.966E-007	pass
BV4	2	1.348E-004	6.867E-008	4.855E-008	3.600E-004	pass
BVF	2	1.000E+000	0.000E+000	2.133E-007	0.000E-000	pass
BVS	2	0.000E+000	0.000E+000	0.000E+000	-1.041E-007	pass
BVX	2	2.350E-005	3.520E-007	2.133E-007	9.068E-003	pass
CC1	3	2.856E-005	-1.460E-012	-1.737E-012	-6.080E-008	pass
CCF	12	1.000E+000	0.000E+000	8.018E-007	0.000E-000	pass
CD7	4	7.268E-002	-6.985E-009	-5.748E-009	-7.334E-008	pass
CDF	2	1.000E+000	0.000E+000	1.041E-007	0.000E-000	pass
CI1	4	5.167E-003	4.220E-008	7.334E-008	1.412E-005	pass
CI6	2	1.188E-002	8.866E-008	1.041E-007	8.659E-006	pass
CIF	9	1.000E+000	0.000E+000	6.851E-007	0.000E-000	pass
CS1	1	5.472E-005	-8.438E-013	-6.513E-013	-1.190E-008	pass
CS2	7	3.834E-003	-2.520E-009	-1.778E-009	-4.620E-007	pass
CS3	4	8.572E-003	-8.361E-010	-1.320E-009	-1.526E-007	pass
CS4	3	1.139E-001	-3.067E-009	-2.906E-009	-2.261E-008	pass
DO1	9	8.353E-005	-2.764E-011	-4.149E-011	-4.966E-007	pass
DO2	2	4.876E-004	-4.682E-011	-6.153E-011	-1.261E-007	pass
DO3	2	5.737E-004	-1.102E-011	-1.522E-011	-2.652E-008	pass
DOF	2	1.000E+000	0.000E+000	2.133E-007	0.000E-000	pass
DP1	9	8.499E-005	-2.661E-011	-4.221E-011	-4.966E-007	pass
DP2	2	5.083E-004	-4.894E-011	-5.570E-011	-1.095E-007	pass
DP3	2	5.678E-004	-1.809E-011	-2.450E-011	-4.312E-008	pass
DPF	2	1.000E+000	0.000E+000	2.133E-007	0.000E-000	pass
EA0	10	0.000E+000	0.000E+000	0.000E+000	-5.126E-007	pass
EA2	1	1.044E-001	8.753E-009	1.055E-008	9.046E-008	pass
EAF	4	1.000E+000	0.000E+000	3.394E-007	0.000E-000	pass
EB0	10	0.000E+000	0.000E+000	0.000E+000	-5.292E-007	pass
EB6	1	7.706E-001	0.000E+000	1.055E-008	3.139E-009	pass
EBF	4	1.000E+000	0.000E+000	3.228E-007	0.000E-000	pass
FA1	9	1.298E-003	-3.833E-010	-6.454E-010	-4.966E-007	pass
FA2	2	3.428E-002	2.623E-009	9.978E-009	2.811E-007	pass
FAF	4	1.000E+000	0.000E+000	3.394E-007	0.000E-000	pass
FB3	9	1.303E-003	0.000E+000	-6.479E-010	-4.966E-007	pass
FB6	1	9.965E-002	0.000E+000	1.055E-008	9.528E-008	pass
FB8	1	3.868E-002	0.000E+000	-1.311E-009	-3.257E-008	pass
FBF	4	1.000E+000	0.000E+000	3.228E-007	0.000E-000	pass
HC1	1	5.899E-004	8.490E-009	1.353E-008	2.292E-005	pass
HCF	6	1.000E+000	0.000E+000	4.469E-007	0.000E-000	pass
HH1	3	5.875E-004	3.251E-008	1.346E-008	2.290E-005	pass
HH7	5	1.393E-003	-5.061E-010	-5.904E-010	-4.233E-007	pass
HHF	7	1.000E+000	0.000E+000	3.886E-007	0.000E-000	pass
IA1	10	3.424E-004	-1.186E-010	-2.348E-010	-6.856E-007	pass
IA2	4	5.865E-004	-5.348E-011	-8.958E-011	-1.526E-007	pass
IAF	1	1.000E+000	0.000E+000	2.430E-008	0.000E-000	pass
IB1	10	2.027E-005	-1.086E-011	-1.039E-011	-5.126E-007	pass
IB2	3	5.287E-004	-5.298E-011	-7.230E-011	-1.367E-007	pass
IBF	2	1.000E+000	0.000E+000	2.133E-007	0.000E-000	pass
IC1	1	1.834E-004	-1.228E-012	-2.182E-012	-1.190E-008	pass
ICF	14	1.000E+000	0.000E+000	8.507E-007	0.000E-000	pass
IMSIV	1	6.960E-002	0.000E+000	3.708E-008	4.956E-007	pass
IR1	10	6.009E-005	-3.227E-011	-3.080E-011	-5.126E-007	pass
IR2	3	3.391E-004	-2.653E-011	-4.636E-011	-1.367E-007	pass

IRF 2 1.000E+000 0.000E+000 2.133E-007 0.000E-000 pass
ISI 1 2.220E-002 0.000E+000 1.183E-008 5.209E-007 pass
IW1 10 5.872E-005 -3.129E-011 -3.108E-011 -5.292E-007 pass
IW2 3 3.421E-004 -2.261E-011 -4.109E-011 -1.201E-007 pass
IWF 2 1.000E+000 0.000E+000 2.133E-007 0.000E-000 pass
IY1 10 2.020E-005 -1.169E-011 -1.069E-011 -5.292E-007 pass
IY2 3 5.283E-004 -5.164E-011 -6.347E-011 -1.201E-007 pass
IYF 2 1.000E+000 0.000E+000 2.133E-007 0.000E-000 pass
LC2 2 2.487E-007 0.000E+000 -9.104E-015 -3.616E-008 pass
LC3 7 1.911E-005 0.000E+000 -8.800E-012 -4.605E-007 pass
LCF 6 1.000E+000 0.000E+000 3.659E-007 0.000E-000 pass
LH1 4 6.896E-004 -2.880E-011 -5.061E-011 -7.334E-008 pass
LHF 11 1.000E+000 0.000E+000 7.892E-007 0.000E-000 pass
LOSP 4 6.240E-002 0.000E+000 1.526E-007 2.294E-006 pass
MS0 15 0.000E+000 0.000E+000 0.000E+000 -8.626E-007 pass
NMF 15 1.000E+000 0.000E+000 8.626E-007 0.000E+000 pass
NRF 15 1.000E+000 0.000E+000 8.626E-007 0.000E+000 pass
OBF 9 1.000E+000 0.000E+000 6.851E-007 0.000E-000 pass
OD6 4 1.356E-003 -1.176E-010 -9.959E-011 -7.334E-008 pass
OFF 9 1.000E+000 0.000E+000 6.851E-007 0.000E-000 pass
OG1 11 1.275E-003 -4.957E-010 -9.063E-010 -7.099E-007 pass
OGF 4 1.000E+000 0.000E+000 1.526E-007 0.000E-000 pass
OR1 4 3.600E-004 -2.142E-011 -2.641E-011 -7.334E-008 pass
OS0 6 0.000E+000 0.000E+000 0.000E+000 -1.774E-007 pass
OS1 2 1.048E-002 6.122E-008 4.890E-008 4.617E-006 pass
OS2 2 1.722E-002 4.689E-007 3.625E-007 2.069E-005 pass
OS6 1 1.000E-003 0.000E+000 1.190E-008 1.189E-005 pass
OSF 4 1.000E+000 0.000E+000 2.618E-007 0.000E-000 pass
OT1 15 1.306E-003 -2.024E-009 -1.128E-009 -8.626E-007 pass
PI1 4 1.812E-004 -1.178E-011 -1.329E-011 -7.334E-008 pass
PR4 2 9.113E-003 3.574E-007 2.133E-007 2.319E-005 pass
PR7 1 4.946E-002 2.122E-008 3.257E-008 6.260E-007 pass
PR8 1 2.507E-002 1.143E-008 1.597E-008 6.211E-007 pass
PR9 3 7.671E-002 8.134E-008 1.160E-007 1.396E-006 pass
PRF 6 1.000E+000 0.000E+000 4.358E-007 0.000E-000 pass
PRV 2 2.989E-001 3.386E-008 4.890E-008 1.147E-007 pass
QS1 4 1.632E-004 -2.149E-011 -1.197E-011 -7.334E-008 pass
QSF 11 1.000E+000 0.000E+000 7.892E-007 0.000E-000 pass
RC1 3 2.470E-002 -5.789E-010 -1.283E-009 -5.067E-008 pass
RCF 1 1.000E+000 0.000E+000 2.268E-008 0.000E-000 pass
RD2 3 2.343E-002 0.000E+000 -1.216E-009 -5.067E-008 pass
RDF 1 1.000E+000 0.000E+000 2.268E-008 0.000E-000 pass
RE2 1 1.212E-001 0.000E+000 9.355E-008 6.783E-007 pass
REF 14 1.000E+000 0.000E+000 7.690E-007 0.000E-000 pass
RRF 4 1.000E+000 0.000E+000 7.334E-008 0.000E-000 pass
RS1 3 1.433E-004 -1.092E-011 -7.262E-012 -5.067E-008 pass
RSF 1 1.000E+000 0.000E+000 2.268E-008 0.000E-000 pass
RT1 9 9.773E-005 -5.730E-011 -4.854E-011 -4.966E-007 pass
RT3 4 3.578E-006 -5.916E-013 -5.465E-013 -1.526E-007 pass
RT5 2 5.151E-004 -7.420E-011 -1.099E-010 -2.133E-007 pass
RW1 15 4.786E-005 -9.488E-011 -4.128E-011 -8.626E-007 pass
SA1 7 7.601E-003 4.216E-008 5.963E-008 7.785E-006 pass
SA2 6 1.147E-002 2.812E-007 3.616E-007 3.117E-005 pass
SAF 2 1.000E+000 0.000E+000 2.133E-007 0.000E-000 pass
SB1 4 7.232E-003 -7.604E-010 -1.112E-009 -1.526E-007 pass
SB2 3 2.340E-002 5.600E-008 6.080E-008 2.537E-006 pass
SB4 4 1.121E-002 -6.879E-010 -8.315E-010 -7.334E-008 pass
SB6 2 8.321E-002 1.672E-007 3.625E-007 3.994E-006 pass
SBF 2 1.000E+000 0.000E+000 2.133E-007 0.000E-000 pass
SLOCI 1 1.820E-002 0.000E+000 2.778E-007 1.498E-005 pass
SLOCN 5 5.550E-003 0.000E+000 1.580E-007 2.832E-005 pass
SM1 4 1.607E-004 -1.135E-011 -1.179E-011 -7.334E-008 pass
SMF 11 1.000E+000 0.000E+000 7.892E-007 0.000E-000 pass
TB1 1 1.446E-003 -9.697E-012 -1.723E-011 -1.190E-008 pass
TB3 2 2.976E-002 -7.672E-010 -1.500E-009 -4.890E-008 pass
TB4 5 3.347E-002 -7.176E-009 -1.431E-008 -4.131E-007 pass

TBF	7	1.000E+000	0.000E+000	3.886E-007	0.000E-000	pass
TT	1	8.830E-001	0.000E+000	1.190E-008	1.577E-009	pass
TT1	14	5.056E-005	-5.427E-011	-4.301E-011	-8.507E-007	pass
TTS	1	0.000E+000	0.000E+000	0.000E+000	-1.190E-008	pass
VL1	9	1.030E-003	1.282E-008	2.316E-008	2.246E-005	pass
VLF	6	1.000E+000	0.000E+000	3.659E-007	0.000E-000	pass
WA1	4	4.279E-008	-5.990E-015	-3.553E-015	-7.677E-008	pass
WA2	6	1.297E-002	1.008E-008	1.725E-008	1.313E-006	pass
WAF	5	1.000E+000	0.000E+000	3.500E-007	0.000E-000	pass
WB1	4	3.999E-008	-4.718E-016	-3.775E-015	-9.337E-008	pass
WB3	5	1.222E-002	0.000E+000	-5.111E-009	-4.131E-007	pass
WB4	1	7.685E-002	0.000E+000	2.268E-008	2.724E-007	pass
WBF	5	1.000E+000	0.000E+000	3.334E-007	0.000E-000	pass

Scenario: End State Uncertainty Importance completed at 2:25:24 AM

TEST CASE COMPLETE: at 2:25:25 AM

TEST CASE : SAPHIRE QA Models (IMPESG_BV2)
DATE & TIME: 8/31/99 2:25:28 AM

TEST FOR: SAPHIRE Version 6.63

Project BV2-5 is open
Generated base case data
End states: HIN*
End States gathered by cut set partition
with prob cut off (1.000E-008)

BV2-5-07 Scenario: End State Fussell-Vesely Group Importance started at 2:26:07 AM
FUSSELL/VESELY IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
AF1	42	1.072E-005	-3.778E-006	1.000E+000	6.476E-001	pass
AF2	10	4.858E-004	-2.115E-005	1.000E+000	9.565E-001	pass
AF3	28	5.150E-002	-1.225E-003	9.988E-001	9.774E-001	pass
AF4	107	4.967E-002	-1.656E-002	9.837E-001	6.832E-001	pass
AF5	9	6.819E-004	-8.645E-006	1.000E+000	9.873E-001	pass
AF6	32	1.934E-004	8.935E-004	1.001E+000	5.619E+000	pass
AFB	3	1.248E-005	-7.352E-008	1.000E+000	9.941E-001	pass
AFC	1	4.867E-004	-3.212E-007	1.000E+000	9.993E-001	pass
AFF	9	1.000E+000	9.707E-003	1.010E+000	1.000E+000	pass
AMSIV	2	1.830E-002	4.932E-004	1.000E+000	1.026E+000	pass
AO1	116	9.545E-004	1.163E-001	1.132E+000	1.223E+002	pass
AO2	93	1.082E-001	2.600E-001	1.351E+000	3.143E+000	pass
AOF	32	1.000E+000	1.425E-001	1.166E+000	1.000E+000	pass
AOX	30	3.190E-002	1.395E-001	1.162E+000	5.233E+000	pass
BK1	82	9.049E-002	-2.480E-003	9.975E-001	9.751E-001	pass
BK2	159	5.031E-004	-3.689E-004	9.996E-001	2.672E-001	pass
BP3	34	5.933E-003	2.885E-002	1.030E+000	5.833E+000	pass
BP4	68	8.655E-004	1.450E-002	1.015E+000	1.773E+001	pass
BP5	52	1.493E-001	2.027E-001	1.254E+000	2.155E+000	pass
BP6	24	9.939E-002	1.344E-002	1.014E+000	1.122E+000	pass
BP7	27	8.703E-004	4.518E-002	1.047E+000	5.284E+001	pass
BP8	3	1.047E-001	2.500E-003	1.003E+000	1.021E+000	pass
BPA	14	1.700E-004	3.247E-003	1.003E+000	2.010E+001	pass
BPF	19	1.000E+000	6.991E-002	1.075E+000	1.000E+000	pass
BPX	17	3.190E-002	6.689E-002	1.072E+000	3.030E+000	pass
BV1	55	1.724E-007	-6.912E-008	1.000E+000	5.993E-001	pass
BV2	63	5.297E-005	-1.069E-005	1.000E+000	7.982E-001	pass
BV4	2	1.348E-004	6.878E-004	1.001E+000	6.101E+000	pass
BVF	2	1.000E+000	3.022E-003	1.003E+000	1.000E+000	pass
BVS	119	0.000E+000	0.000E+000	1.000E+000	6.063E-001	pass
BVX	2	2.350E-005	3.022E-003	1.003E+000	1.295E+002	pass
CC1	15	2.856E-005	-3.268E-007	1.000E+000	9.886E-001	pass
CCF	224	1.000E+000	9.872E-001	7.795E+001	1.000E+000	pass
CCG	2	2.803E-004	-3.889E-007	1.000E+000	9.986E-001	pass
CD2	1	1.027E-003	-4.857E-007	1.000E+000	9.995E-001	pass
CD6	67	1.956E-002	1.784E-002	1.018E+000	1.894E+000	pass
CD7	64	7.268E-002	-1.072E-003	9.989E-001	9.863E-001	pass
CD8	41	1.495E-001	-7.985E-004	9.992E-001	9.955E-001	pass
CDF	49	1.000E+000	1.641E-001	1.196E+000	1.000E+000	pass
CI1	56	5.167E-003	-1.046E-003	9.990E-001	7.986E-001	pass
CI2	13	1.696E-002	-5.094E-004	9.995E-001	9.705E-001	pass
CI3	44	1.124E-002	-1.870E-003	9.981E-001	8.355E-001	pass
CI6	119	1.188E-002	-3.241E-003	9.968E-001	7.304E-001	pass
CIF	9	1.000E+000	9.707E-003	1.010E+000	1.000E+000	pass
CPEXC	1	2.390E-002	1.733E-004	1.000E+000	1.007E+000	pass
CS1	3	5.472E-005	-3.497E-008	1.000E+000	9.994E-001	pass
CS2	31	3.834E-003	-3.259E-004	9.997E-001	9.153E-001	pass
CS3	67	8.572E-003	-6.891E-004	9.993E-001	9.203E-001	pass
CS4	125	1.139E-001	-2.890E-003	9.971E-001	9.775E-001	pass
CSF	15	1.000E+000	2.192E-002	1.022E+000	1.000E+000	pass

DO1	74	8.353E-005	-3.659E-005	1.000E+000	5.620E-001	pass
DO2	141	4.876E-004	-8.919E-005	9.999E-001	8.172E-001	pass
DO3	22	5.737E-004	1.545E-003	1.002E+000	3.692E+000	pass
DOF	4	1.000E+000	3.803E-003	1.004E+000	1.000E+000	pass
DOX	2	1.400E-002	7.808E-004	1.001E+000	1.055E+000	pass
DP1	100	8.499E-005	4.894E-002	1.051E+000	5.697E+002	pass
DP2	107	5.083E-004	-4.237E-005	1.000E+000	9.167E-001	pass
DP3	25	5.678E-004	1.814E-003	1.002E+000	4.193E+000	pass
DPF	9	1.000E+000	2.562E-002	1.026E+000	1.000E+000	pass
DPX	7	1.400E-002	2.260E-002	1.023E+000	2.592E+000	pass
EA0	54	0.000E+000	0.000E+000	1.000E+000	6.405E-001	pass
EA1	11	2.557E-002	1.512E-002	1.015E+000	1.576E+000	pass
EA2	16	1.044E-001	3.481E-002	1.036E+000	1.299E+000	pass
EAF	160	1.000E+000	5.903E-001	2.441E+000	1.000E+000	pass
EB0	69	0.000E+000	0.000E+000	1.000E+000	5.703E-001	pass
EB3	1	2.533E-002	-6.690E-006	1.000E+000	9.997E-001	pass
EB4	3	3.833E-002	7.064E-004	1.001E+000	1.018E+000	pass
EB6	10	7.706E-001	2.202E-002	1.023E+000	1.007E+000	pass
EB7	21	2.159E-002	7.775E-002	1.084E+000	4.523E+000	pass
EB8	7	9.895E-002	1.434E-002	1.015E+000	1.131E+000	pass
EBF	130	1.000E+000	4.552E-001	1.835E+000	1.000E+000	pass
EXFW	5	2.410E-001	2.981E-003	1.003E+000	1.009E+000	pass
FA1	63	1.298E-003	1.492E-002	1.015E+000	1.248E+001	pass
FA2	18	3.428E-002	3.479E-002	1.036E+000	1.980E+000	pass
FAF	160	1.000E+000	5.903E-001	2.441E+000	1.000E+000	pass
FB3	49	1.303E-003	-2.085E-004	9.998E-001	8.402E-001	pass
FB4	6	1.907E-002	6.886E-004	1.001E+000	1.035E+000	pass
FB5	1	3.214E-002	-6.727E-006	1.000E+000	9.998E-001	pass
FB6	10	9.965E-002	2.202E-002	1.023E+000	1.199E+000	pass
FB7	38	5.986E-003	7.747E-002	1.084E+000	1.386E+001	pass
FB8	8	3.868E-002	1.433E-002	1.015E+000	1.356E+000	pass
FBF	129	1.000E+000	4.550E-001	1.835E+000	1.000E+000	pass
HC1	1	5.899E-004	1.917E-004	1.000E+000	1.325E+000	pass
HC3	2	1.309E-002	-1.840E-005	1.000E+000	9.986E-001	pass
HCF	21	1.000E+000	2.067E-002	1.021E+000	1.000E+000	pass
HH1	10	5.875E-004	1.871E-004	1.000E+000	1.318E+000	pass
HH3	2	5.897E-004	-8.185E-007	1.000E+000	9.986E-001	pass
HH6	8	6.764E-007	-5.575E-009	1.000E+000	9.918E-001	pass
HH7	5	1.393E-003	-8.365E-006	1.000E+000	9.940E-001	pass
HHF	216	1.000E+000	9.776E-001	4.457E+001	1.000E+000	pass
IA1	127	3.424E-004	-2.266E-004	9.998E-001	3.384E-001	pass
IA2	65	5.865E-004	-1.431E-004	9.999E-001	7.562E-001	pass
IAF	49	1.000E+000	9.453E-002	1.104E+000	1.000E+000	pass
IB1	75	2.027E-005	-8.883E-006	1.000E+000	5.618E-001	pass
IB2	164	5.287E-004	-1.328E-004	9.999E-001	7.489E-001	pass
IBF	2	1.000E+000	3.022E-003	1.003E+000	1.000E+000	pass
IC1	5	1.834E-004	-3.717E-007	1.000E+000	9.980E-001	pass
ICF	236	1.000E+000	9.980E-001	4.935E+002	1.000E+000	pass
IMSIV	5	6.960E-002	3.010E-003	1.003E+000	1.040E+000	pass
IR1	72	6.009E-005	-2.610E-005	1.000E+000	5.656E-001	pass
IR2	159	3.391E-004	-1.887E-004	9.998E-001	4.438E-001	pass
IRF	10	1.000E+000	9.399E-003	1.009E+000	1.000E+000	pass
IRX	3	6.100E-003	3.865E-003	1.004E+000	1.630E+000	pass
ISI	3	2.220E-002	7.658E-004	1.001E+000	1.034E+000	pass
IW1	103	5.872E-005	-3.345E-005	1.000E+000	4.304E-001	pass
IW2	127	3.421E-004	-1.440E-004	9.999E-001	5.793E-001	pass
IWF	11	1.000E+000	9.701E-003	1.010E+000	1.000E+000	pass
IWX	3	6.100E-003	3.901E-003	1.004E+000	1.636E+000	pass
IY1	106	2.020E-005	-1.158E-005	1.000E+000	4.265E-001	pass
IY2	133	5.283E-004	-2.238E-004	9.998E-001	5.765E-001	pass
IYF	2	1.000E+000	3.022E-003	1.003E+000	1.000E+000	pass
LB2A	15	1.140E-001	3.835E-002	1.040E+000	1.298E+000	pass
LC2	39	2.487E-007	-9.644E-008	1.000E+000	6.124E-001	pass
LC3	22	1.911E-005	-3.986E-007	1.000E+000	9.791E-001	pass
LC6	2	2.499E-007	-3.460E-010	1.000E+000	9.986E-001	pass
LCF	178	1.000E+000	5.901E-001	2.440E+000	1.000E+000	pass
LCV	2	1.010E-001	9.600E-004	1.001E+000	1.009E+000	pass
LH1	41	6.896E-004	-2.679E-004	9.997E-001	6.118E-001	pass
LH2	41	1.162E-002	-7.941E-004	9.992E-001	9.325E-001	pass

LHF	159	1.000E+000	4.886E-001	1.955E+000	1.000E+000	pass
LOSP	45	6.240E-002	2.460E-001	1.326E+000	4.696E+000	pass
LPRF	2	1.010E-001	1.021E-003	1.001E+000	1.009E+000	pass
MFF	10	1.000E+000	7.157E-003	1.007E+000	1.000E+000	pass
MS0	238	0.000E+000	0.000E+000	1.000E+000	6.195E-003	pass
MS1	3	7.101E-004	-4.402E-006	1.000E+000	9.938E-001	pass
MUF	2	1.000E+000	1.387E-003	1.001E+000	1.000E+000	pass
NMF	239	1.000E+000	9.986E-001	7.208E+002	1.000E+000	pass
NMS	2	0.000E+000	0.000E+000	1.000E+000	9.986E-001	pass
NRF	241	1.000E+000	1.000E+000	1.060E+011	1.000E+000	pass
OB2	1	5.518E-003	-5.075E-006	1.000E+000	9.991E-001	pass
OBF	18	1.000E+000	1.595E-002	1.016E+000	1.000E+000	pass
OD3	2	1.290E-003	-6.077E-007	1.000E+000	9.995E-001	pass
OD6	42	1.356E-003	-2.315E-004	9.998E-001	8.295E-001	pass
OD7	20	1.647E-003	-1.312E-004	9.999E-001	9.205E-001	pass
ODB	9	2.296E-003	-6.063E-005	9.999E-001	9.737E-001	pass
ODF	58	1.000E+000	2.636E-001	1.358E+000	1.000E+000	pass
OF1	10	1.210E-003	-8.670E-006	1.000E+000	9.928E-001	pass
OFF	9	1.000E+000	9.707E-003	1.010E+000	1.000E+000	pass
OG1	196	1.275E-003	2.024E-002	1.021E+000	1.684E+001	pass
OGF	45	1.000E+000	2.460E-001	1.326E+000	1.000E+000	pass
OR1	40	3.600E-004	-1.397E-004	9.999E-001	6.120E-001	pass
OR2	1	1.792E-003	-3.401E-007	1.000E+000	9.998E-001	pass
OR3	40	1.153E-002	6.184E-004	1.001E+000	1.053E+000	pass
OS0	191	0.000E+000	0.000E+000	1.000E+000	3.486E-002	pass
OS1	2	1.048E-002	6.928E-004	1.001E+000	1.065E+000	pass
OS2	11	1.722E-002	5.018E-003	1.005E+000	1.286E+000	pass
OS6	33	1.000E-003	1.501E-004	1.000E+000	1.150E+000	pass
OSF	4	1.000E+000	3.710E-003	1.004E+000	1.000E+000	pass
OT1	232	1.306E-003	-8.786E-004	9.991E-001	3.282E-001	pass
OTS	9	0.000E+000	0.000E+000	1.000E+000	9.849E-001	pass
PI1	27	1.812E-004	-6.501E-005	9.999E-001	6.413E-001	pass
PI2	42	2.547E-002	-5.426E-004	9.995E-001	9.792E-001	pass
PIS	2	0.000E+000	0.000E+000	1.000E+000	9.995E-001	pass
PLMFW	7	5.530E-001	7.137E-003	1.007E+000	1.006E+000	pass
PR0	50	0.000E+000	0.000E+000	1.000E+000	7.430E-001	pass
PR1	5	5.021E-004	2.671E-004	1.000E+000	1.532E+000	pass
PR4	2	9.113E-003	3.022E-003	1.003E+000	1.329E+000	pass
PR5	6	2.593E-002	9.578E-005	1.000E+000	1.004E+000	pass
PR6	22	5.096E-002	8.826E-004	1.001E+000	1.016E+000	pass
PR7	10	4.946E-002	4.496E-004	1.000E+000	1.009E+000	pass
PR8	5	2.507E-002	6.167E-004	1.001E+000	1.024E+000	pass
PR9	87	7.671E-002	1.522E-001	1.180E+000	2.832E+000	pass
PRA	18	2.001E-003	-1.088E-004	9.999E-001	9.457E-001	pass
PRF	28	1.000E+000	9.357E-002	1.103E+000	1.000E+000	pass
PRJ	5	3.034E-001	1.043E-003	1.001E+000	1.002E+000	pass
PRV	2	2.989E-001	6.928E-004	1.001E+000	1.002E+000	pass
QS1	41	1.632E-004	-6.336E-005	9.999E-001	6.118E-001	pass
QS2	41	6.160E-003	-5.134E-004	9.995E-001	9.172E-001	pass
QSF	159	1.000E+000	4.886E-001	1.955E+000	1.000E+000	pass
RC1	3	2.470E-002	-1.818E-005	1.000E+000	9.993E-001	pass
RCF	74	1.000E+000	5.084E-001	2.034E+000	1.000E+000	pass
RD2	3	2.343E-002	-1.722E-005	1.000E+000	9.993E-001	pass
RDF	74	1.000E+000	5.084E-001	2.034E+000	1.000E+000	pass
RE1	9	5.042E-003	6.393E-002	1.068E+000	1.361E+001	pass
RE2	22	1.212E-001	1.348E-001	1.156E+000	1.977E+000	pass
RE3	2	8.136E-002	4.265E-003	1.004E+000	1.048E+000	pass
RE4	1	1.382E-001	1.431E-004	1.000E+000	1.001E+000	pass
RE5A	39	1.226E-001	1.722E-001	1.208E+000	2.232E+000	pass
RE6A	13	1.654E-001	6.380E-003	1.006E+000	1.032E+000	pass
RE7	14	2.367E-002	2.072E-002	1.021E+000	1.855E+000	pass
RE9	2	1.147E-002	2.702E-003	1.003E+000	1.233E+000	pass
REA	8	1.360E-001	7.116E-003	1.007E+000	1.045E+000	pass
REF	131	1.000E+000	5.878E-001	2.426E+000	1.000E+000	pass
RRF	71	1.000E+000	4.790E-001	1.919E+000	1.000E+000	pass
RS1	3	1.433E-004	-1.029E-007	1.000E+000	9.993E-001	pass

RSF	74	1.000E+000	5.084E-001	2.034E+000	1.000E+000	pass
RT	9	1.140E+000	1.507E-002	1.015E+000	9.981E-001	pass
RT1	163	9.773E-005	-6.482E-005	9.999E-001	3.368E-001	pass
RT3	45	3.578E-006	-8.803E-007	1.000E+000	7.540E-001	pass
RT4	22	4.300E-006	-3.125E-007	1.000E+000	9.273E-001	pass
RT5	2	5.151E-004	-1.557E-006	1.000E+000	9.970E-001	pass
RTS	9	0.000E+000	0.000E+000	1.000E+000	9.849E-001	pass
RW1	241	4.786E-005	1.429E-002	1.014E+000	2.969E+002	pass
SA1	187	7.601E-003	-1.175E-003	9.988E-001	8.466E-001	pass
SA2	40	1.147E-002	4.614E-003	1.005E+000	1.398E+000	pass
SA4	1	1.166E-002	-4.201E-006	1.000E+000	9.996E-001	pass
SA5	3	1.391E-002	-8.738E-005	9.999E-001	9.938E-001	pass
SAF	10	1.000E+000	9.399E-003	1.009E+000	1.000E+000	pass
SB1	167	7.232E-003	-2.018E-003	9.980E-001	7.230E-001	pass
SB2	11	2.340E-002	7.931E-004	1.001E+000	1.033E+000	pass
SB3	8	7.606E-003	-4.887E-005	1.000E+000	9.936E-001	pass
SB4	33	1.121E-002	-4.136E-004	9.996E-001	9.635E-001	pass
SB6	7	8.321E-002	5.038E-003	1.005E+000	1.056E+000	pass
SB9	1	1.181E-002	-4.256E-006	1.000E+000	9.996E-001	pass
SBC	3	1.355E-002	-8.509E-005	9.999E-001	9.938E-001	pass
SBF	11	1.000E+000	9.701E-003	1.010E+000	1.000E+000	pass
SE4	6	1.000E+000	7.766E-003	1.008E+000	1.000E+000	pass
SEF	142	1.000E+000	7.230E-001	3.610E+000	1.000E+000	pass
SGTR	1	2.050E-002	3.561E-004	1.000E+000	1.017E+000	pass
SL1	1	3.097E-002	-1.138E-005	1.000E+000	9.996E-001	pass
SLB1	3	4.640E-004	6.195E-003	1.006E+000	1.434E+001	pass
SLOCI	25	1.820E-002	2.599E-001	1.351E+000	1.502E+001	pass
SLOCN	15	5.550E-003	8.255E-002	1.090E+000	1.579E+001	pass
SM1	81	1.607E-004	-8.216E-005	9.999E-001	4.888E-001	pass
SMF	160	1.000E+000	4.888E-001	1.956E+000	1.000E+000	pass
TB1	5	1.446E-003	-2.934E-006	1.000E+000	9.980E-001	pass
TB3	6	2.976E-002	2.321E-003	1.002E+000	1.076E+000	pass
TB4	8	3.347E-002	3.681E-005	1.000E+000	1.001E+000	pass
TBF	222	1.000E+000	9.853E-001	6.816E+001	1.000E+000	pass
TLMFW	2	1.200E-001	1.141E-003	1.001E+000	1.008E+000	pass
TT	13	8.830E-001	1.293E-002	1.013E+000	1.002E+000	pass
TT1	228	5.056E-005	-4.991E-005	1.000E+000	1.293E-002	pass
TTS	13	0.000E+000	0.000E+000	1.000E+000	9.871E-001	pass
VL1	46	1.030E-003	1.380E-004	1.000E+000	1.134E+000	pass
VL2	44	1.330E-002	-5.535E-004	9.994E-001	9.589E-001	pass
VL3	13	1.300E-002	-9.218E-005	9.999E-001	9.930E-001	pass
VLF	138	1.000E+000	4.118E-001	1.700E+000	1.000E+000	pass
WA1	18	4.279E-008	-5.600E-010	1.000E+000	9.869E-001	pass
WA2	37	1.297E-002	3.370E-001	1.508E+000	2.663E+001	pass
WAF	186	1.000E+000	6.402E-001	2.780E+000	1.000E+000	pass
WAX	7	1.010E-002	1.456E-002	1.015E+000	2.427E+000	pass
WB1	31	3.999E-008	-3.294E-009	1.000E+000	9.175E-001	pass
WB3	8	1.222E-002	-1.189E-004	9.999E-001	9.904E-001	pass
WB4	30	7.685E-002	3.374E-001	1.509E+000	5.053E+000	pass
WB5	1	1.308E-002	4.293E-004	1.000E+000	1.032E+000	pass
WBF	171	1.000E+000	5.700E-001	2.326E+000	1.000E+000	pass
WBX	6	3.560E-006	4.954E-002	1.052E+000	1.180E+004	pass
WXB	9	1.010E-002	1.626E-002	1.017E+000	2.593E+000	pass

Scenario: End State Fussell-Vesely Group Importance completed at 2:30:39 AM

BV2-5-08 Scenario: End State Birnbaum Group Importance started at 2:30:39 AM
BIRNBAUM IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
AF1	42	1.072E-005	-2.487E-005	-2.667E-010	-2.487E-005	pass
AF2	10	4.858E-004	-3.074E-006	-1.493E-009	-3.072E-006	pass
AF3	28	5.150E-002	-1.678E-006	-8.644E-008	-1.592E-006	pass
AF4	107	4.967E-002	-2.353E-005	-1.169E-006	-2.236E-005	pass
AF5	9	6.819E-004	-8.948E-007	-6.102E-010	-8.942E-007	pass
AF6	32	1.934E-004	3.261E-004	6.307E-008	3.260E-004	pass
AFB	3	1.248E-005	-4.158E-007	-5.190E-012	-4.158E-007	pass
AFC	1	4.867E-004	-4.658E-008	-2.267E-011	-4.656E-008	pass
AFF	9	1.000E+000	6.851E-007	6.851E-007	1.247E-018	pass
AMSIV	2	1.830E-002	1.902E-006	3.481E-008	1.867E-006	pass
AO1	116	9.545E-004	8.566E-003	8.206E-006	8.558E-003	pass
AO2	93	1.082E-001	1.696E-004	1.835E-005	1.513E-004	pass
AOF	32	1.000E+000	1.006E-005	1.006E-005	-4.586E-017	pass
AOX	30	3.190E-002	3.086E-004	9.846E-006	2.988E-004	pass
BK1	82	9.049E-002	-1.934E-006	-1.751E-007	-1.759E-006	pass
BK2	159	5.031E-004	-5.175E-005	-2.603E-008	-5.172E-005	pass
BP3	34	5.933E-003	3.431E-004	2.036E-006	3.411E-004	pass
BP4	68	8.655E-004	1.182E-003	1.023E-006	1.181E-003	pass
BP5	52	1.493E-001	9.581E-005	1.431E-005	8.151E-005	pass
BP6	24	9.939E-002	9.542E-006	9.484E-007	8.594E-006	pass
BP7	27	8.703E-004	3.662E-003	3.189E-006	3.659E-003	pass
BP8	3	1.047E-001	1.685E-006	1.765E-007	1.509E-006	pass
BPA	14	1.700E-004	1.348E-003	2.292E-007	1.348E-003	pass
BPF	19	1.000E+000	4.935E-006	4.935E-006	-9.194E-017	pass
BPX	17	3.190E-002	1.480E-004	4.721E-006	1.433E-004	pass
BV1	55	1.724E-007	-2.828E-005	-4.879E-012	-2.828E-005	pass
BV2	63	5.297E-005	-1.425E-005	-7.546E-010	-1.425E-005	pass
BV4	2	1.348E-004	3.601E-004	4.855E-008	3.600E-004	pass
BVF	2	1.000E+000	2.133E-007	2.133E-007	-4.180E-017	pass
BVS	119	0.000E+000	-2.779E-005	0.000E+000	-2.779E-005	pass
BVX	2	2.350E-005	9.068E-003	2.133E-007	9.068E-003	pass
CC1	15	2.856E-005	-8.075E-007	-2.306E-011	-8.075E-007	pass
CCF	224	1.000E+000	6.968E-005	6.968E-005	-6.240E-017	pass
CCG	2	2.803E-004	-9.794E-008	-2.745E-011	-9.791E-008	pass
CD2	1	1.027E-003	-3.338E-008	-3.428E-011	-3.335E-008	pass
CD6	67	1.956E-002	6.438E-005	1.259E-006	6.312E-005	pass
CD7	64	7.268E-002	-1.040E-006	-7.563E-008	-9.648E-007	pass
CD8	41	1.495E-001	-3.770E-007	-5.636E-008	-3.206E-007	pass
CDF	49	1.000E+000	1.158E-005	1.158E-005	2.515E-017	pass
CI1	56	5.167E-003	-1.429E-005	-7.383E-008	-1.421E-005	pass
CI2	13	1.696E-002	-2.120E-006	-3.596E-008	-2.084E-006	pass
CI3	44	1.124E-002	-1.175E-005	-1.320E-007	-1.161E-005	pass
CI6	119	1.188E-002	-1.926E-005	-2.288E-007	-1.903E-005	pass
CIF	9	1.000E+000	6.851E-007	6.851E-007	1.247E-018	pass
CPEXC	1	2.390E-002	5.119E-007	1.224E-008	4.997E-007	pass
CS1	3	5.472E-005	-4.511E-008	-2.468E-012	-4.510E-008	pass
CS2	31	3.834E-003	-6.000E-006	-2.300E-008	-5.977E-006	pass
CS3	67	8.572E-003	-5.674E-006	-4.864E-008	-5.626E-006	pass
CS4	125	1.139E-001	-1.790E-006	-2.040E-007	-1.586E-006	pass
CSF	15	1.000E+000	1.547E-006	1.547E-006	-5.079E-017	pass
DO1	74	8.353E-005	-3.092E-005	-2.583E-009	-3.092E-005	pass
DO2	141	4.876E-004	-1.291E-005	-6.295E-009	-1.290E-005	pass
DO3	22	5.737E-004	1.901E-004	1.091E-007	1.900E-004	pass
DOF	4	1.000E+000	2.684E-007	2.684E-007	-9.080E-017	pass
DOX	2	1.400E-002	3.936E-006	5.511E-008	3.881E-006	pass
DP1	100	8.499E-005	4.014E-002	3.454E-006	4.014E-002	pass
DP2	107	5.083E-004	-5.883E-006	-2.990E-009	-5.880E-006	pass
DP3	25	5.678E-004	2.255E-004	1.281E-007	2.254E-004	pass
DPF	9	1.000E+000	1.808E-006	1.808E-006	-9.145E-017	pass
DPX	7	1.400E-002	1.139E-004	1.595E-006	1.123E-004	pass
EA0	54	0.000E+000	-2.537E-005	0.000E+000	-2.537E-005	pass
EA1	11	2.557E-002	4.175E-005	1.068E-006	4.068E-005	pass

EA2	16	1.044E-001	2.353E-005	2.457E-006	2.108E-005	pass	
EAF	160	1.000E+000	4.166E-005	4.166E-005	-1.746E-017	pass	
EB0	69	0.000E+000	-3.033E-005	0.000E+000	-3.033E-005		pass
EB3	1	2.533E-002	-1.864E-008	-4.722E-010	-1.817E-008	pass	
EB4	3	3.833E-002	1.301E-006	4.986E-008	1.251E-006	pass	
EB6	10	7.706E-001	2.017E-006	1.554E-006	4.627E-007	pass	
EB7	21	2.159E-002	2.542E-004	5.488E-006	2.487E-004	pass	
EB8	7	9.895E-002	1.023E-005	1.012E-006	9.219E-006	pass	
EBF	130	1.000E+000	3.213E-005	3.213E-005	-7.486E-017	pass	
EXFW	5	2.410E-001	8.732E-007	2.104E-007	6.627E-007	pass	
FA1	63	1.298E-003	8.110E-004	1.053E-006	8.099E-004	pass	
FA2	18	3.428E-002	7.163E-005	2.456E-006	6.918E-005	pass	
FAF	160	1.000E+000	4.166E-005	4.166E-005	-1.746E-017	pass	
FB3	49	1.303E-003	-1.129E-005	-1.471E-008	-1.128E-005	pass	
FB4	6	1.907E-002	2.549E-006	4.860E-008	2.500E-006	pass	
FB5	1	3.214E-002	-1.477E-008	-4.748E-010	-1.430E-008	pass	
FB6	10	9.965E-002	1.560E-005	1.554E-006	1.404E-005	pass	
FB7	38	5.986E-003	9.132E-004	5.468E-006	9.078E-004	pass	
FB8	8	3.868E-002	2.614E-005	1.011E-006	2.513E-005	pass	
FBF	129	1.000E+000	3.212E-005	3.212E-005	-6.695E-017	pass	
HC1	1	5.899E-004	2.294E-005	1.353E-008	2.292E-005	pass	
HC3	2	1.309E-002	-9.921E-008	-1.299E-009	-9.791E-008	pass	
HCF	21	1.000E+000	1.459E-006	1.459E-006	1.973E-017	pass	
HH1	10	5.875E-004	2.248E-005	1.321E-008	2.247E-005	pass	
HH3	2	5.897E-004	-9.797E-008	-5.777E-011	-9.791E-008	pass	
HH6	8	6.764E-007	-5.813E-007	-3.935E-013	-5.813E-007	pass	
HH7	5	1.393E-003	-4.239E-007	-5.904E-010	-4.233E-007	pass	
HHF	216	1.000E+000	6.900E-005	6.900E-005	-4.705E-017	pass	
IA1	127	3.424E-004	-4.671E-005	-1.599E-008	-4.670E-005	pass	
IA2	65	5.865E-004	-1.722E-005	-1.010E-008	-1.721E-005	pass	
IAF	49	1.000E+000	6.672E-006	6.672E-006	-5.958E-017	pass	
IB1	75	2.027E-005	-3.093E-005	-6.270E-010	-3.093E-005	pass	
IB2	164	5.287E-004	-1.773E-005	-9.375E-009	-1.772E-005	pass	
IBF	2	1.000E+000	2.133E-007	2.133E-007	-4.180E-017	pass	
IC1	5	1.834E-004	-1.430E-007	-2.623E-011	-1.430E-007	pass	
ICF	236	1.000E+000	7.044E-005	7.044E-005	8.186E-018	pass	
IMSIV	5	6.960E-002	3.053E-006	2.125E-007	2.840E-006	pass	
IR1	72	6.009E-005	-3.066E-005	-1.842E-009	-3.066E-005	pass	
IR2	159	3.391E-004	-3.927E-005	-1.332E-008	-3.926E-005	pass	
IRF	10	1.000E+000	6.634E-007	6.634E-007	-1.084E-018	pass	
IRX	3	6.100E-003	4.472E-005	2.728E-007	4.445E-005	pass	
ISI	3	2.220E-002	2.435E-006	5.405E-008	2.381E-006	pass	
IW1	103	5.872E-005	-4.021E-005	-2.361E-009	-4.020E-005	pass	
IW2	127	3.421E-004	-2.970E-005	-1.016E-008	-2.969E-005	pass	
IWF	11	1.000E+000	6.847E-007	6.847E-007	-8.896E-017	pass	
IWX	3	6.100E-003	4.513E-005	2.753E-007	4.486E-005	pass	
IY1	106	2.020E-005	-4.048E-005	-8.177E-010	-4.048E-005	pass	
IY2	133	5.283E-004	-2.991E-005	-1.580E-008	-2.989E-005	pass	
IYF	2	1.000E+000	2.133E-007	2.133E-007	-4.180E-017	pass	
LB2A	15	1.140E-001	2.374E-005	2.707E-006	2.104E-005	pass	
LC2	39	2.487E-007	-2.736E-005	-6.807E-012	-2.736E-005	pass	
LC3	22	1.911E-005	-1.472E-006	-2.814E-011	-1.472E-006	pass	
LC6	2	2.499E-007	-9.791E-008	-2.442E-014	-9.791E-008	pass	
LCF	178	1.000E+000	4.165E-005	4.165E-005	5.768E-017	pass	
LCV	2	1.010E-001	6.709E-007	6.776E-008	6.031E-007	pass	
LH1	41	6.896E-004	-2.742E-005	-1.891E-008	-2.740E-005	pass	
LH2	41	1.162E-002	-4.823E-006	-5.605E-008	-4.767E-006	pass	
LHF	159	1.000E+000	3.448E-005	3.448E-005	-8.256E-017	pass	
LOSP	45	6.240E-002	2.782E-004	1.736E-005	2.609E-004	pass	
LPRF	2	1.010E-001	7.134E-007	7.206E-008	6.414E-007	pass	
MFF	10	1.000E+000	5.051E-007	5.051E-007	4.960E-017	pass	
MS0	238	0.000E+000	-7.014E-005	0.000E+000	-7.014E-005		pass
MS1	3	7.101E-004	-4.375E-007	-3.107E-010	-4.372E-007	pass	
MUF	2	1.000E+000	9.791E-008	9.791E-008	3.421E-017	pass	
NMF	239	1.000E+000	7.048E-005	7.048E-005	3.415E-017	pass	
NMS	2	0.000E+000	-9.791E-008	0.000E+000	-9.791E-008		pass
NRF	241	1.000E+000	7.058E-005	7.058E-005	0.000E-000	pass	
OB2	1	5.518E-003	-6.492E-008	-3.582E-010	-6.456E-008	pass	
OBF	18	1.000E+000	1.126E-006	1.126E-006	-2.505E-017	pass	

OD3	2	1.290E-003	-3.325E-008	-4.289E-011	-3.321E-008	pass
OD6	42	1.356E-003	-1.205E-005	-1.634E-008	-1.204E-005	pass
OD7	20	1.647E-003	-5.624E-006	-9.262E-009	-5.614E-006	pass
ODB	9	2.296E-003	-1.864E-006	-4.280E-009	-1.860E-006	pass
ODF	58	1.000E+000	1.861E-005	1.861E-005	-2.331E-017	pass
OF1	10	1.210E-003	-5.058E-007	-6.120E-010	-5.051E-007	pass
OFF	9	1.000E+000	6.851E-007	6.851E-007	1.247E-018	pass
OG1	196	1.275E-003	1.120E-003	1.428E-006	1.118E-003	pass
OGF	45	1.000E+000	1.736E-005	1.736E-005	4.196E-017	pass
OR1	40	3.600E-004	-2.739E-005	-9.861E-009	-2.738E-005	pass
OR2	1	1.792E-003	-1.340E-008	-2.400E-011	-1.337E-008	pass
OR3	40	1.153E-002	3.786E-006	4.365E-008	3.742E-006	pass
OS0	191	0.000E+000	-6.812E-005	0.000E+000	-6.812E-005	pass
OS1	2	1.048E-002	4.666E-006	4.890E-008	4.617E-006	pass
OS2	11	1.722E-002	2.057E-005	3.542E-007	2.021E-005	pass
OS6	33	1.000E-003	1.059E-005	1.059E-008	1.058E-005	pass
OSF	4	1.000E+000	2.618E-007	2.618E-007	2.499E-017	pass
OT1	232	1.306E-003	-4.748E-005	-6.201E-008	-4.742E-005	pass
OTS	9	0.000E+000	-1.064E-006	0.000E+000	-1.064E-006	pass
PI1	27	1.812E-004	-2.532E-005	-4.589E-009	-2.532E-005	pass
PI2	42	2.547E-002	-1.504E-006	-3.830E-008	-1.465E-006	pass
PIS	2	0.000E+000	-3.321E-008	0.000E+000	-3.321E-008	pass
PLMFW	7	5.530E-001	9.110E-007	5.038E-007	4.072E-007	pass
PR0	50	0.000E+000	-1.814E-005	0.000E+000	-1.814E-005	pass
PR1	5	5.021E-004	3.755E-005	1.886E-008	3.754E-005	pass
PR4	2	9.113E-003	2.341E-005	2.133E-007	2.319E-005	pass
PR5	6	2.593E-002	2.607E-007	6.760E-009	2.540E-007	pass
PR6	22	5.096E-002	1.222E-006	6.230E-008	1.160E-006	pass
PR7	10	4.946E-002	6.416E-007	3.174E-008	6.099E-007	pass
PR8	5	2.507E-002	1.736E-006	4.353E-008	1.693E-006	pass
PR9	87	7.671E-002	1.401E-004	1.075E-005	1.293E-004	pass
PRA	18	2.001E-003	-3.837E-006	-7.678E-009	-3.829E-006	pass
PRF	28	1.000E+000	6.604E-006	6.604E-006	-9.324E-018	pass
PRJ	5	3.034E-001	2.427E-007	7.363E-008	1.690E-007	pass
PRV	2	2.989E-001	1.636E-007	4.890E-008	1.147E-007	pass
QS1	41	1.632E-004	-2.740E-005	-4.472E-009	-2.740E-005	pass
QS2	41	6.160E-003	-5.883E-006	-3.624E-008	-5.847E-006	pass
QSF	159	1.000E+000	3.448E-005	3.448E-005	-8.256E-017	pass
RC1	3	2.470E-002	-5.195E-008	-1.283E-009	-5.067E-008	pass
RCF	74	1.000E+000	3.589E-005	3.589E-005	6.733E-017	pass
RD2	3	2.343E-002	-5.188E-008	-1.216E-009	-5.067E-008	pass
RDF	74	1.000E+000	3.589E-005	3.589E-005	6.733E-017	pass
RE1	9	5.042E-003	8.948E-004	4.512E-006	8.903E-004	pass
RE2	22	1.212E-001	7.850E-005	9.515E-006	6.899E-005	pass
RE3	2	8.136E-002	3.700E-006	3.011E-007	3.399E-006	pass
RE4	1	1.382E-001	7.308E-008	1.010E-008	6.298E-008	pass
RE5A	39	1.226E-001	9.911E-005	1.215E-005	8.696E-005	pass
RE6A	13	1.654E-001	2.723E-006	4.503E-007	2.272E-006	pass
RE7	14	2.367E-002	6.180E-005	1.463E-006	6.033E-005	pass
RE9	2	1.147E-002	1.663E-005	1.907E-007	1.644E-005	pass
REA	8	1.360E-001	3.693E-006	5.022E-007	3.191E-006	pass
REF	131	1.000E+000	4.149E-005	4.149E-005	-4.770E-017	pass
RRF	71	1.000E+000	3.381E-005	3.381E-005	-5.611E-017	pass
RS1	3	1.433E-004	-5.067E-008	-7.262E-012	-5.067E-008	pass
RSF	74	1.000E+000	3.589E-005	3.589E-005	6.733E-017	pass
RT	9	1.140E+000	9.330E-007	1.064E-006	-1.306E-007	pass
RT1	163	9.773E-005	-4.681E-005	-4.575E-009	-4.681E-005	pass
RT3	45	3.578E-006	-1.736E-005	-6.213E-011	-1.736E-005	pass
RT4	22	4.300E-006	-5.130E-006	-2.206E-011	-5.130E-006	pass
RT5	2	5.151E-004	-2.134E-007	-1.099E-010	-2.133E-007	pass
RTS	9	0.000E+000	-1.064E-006	0.000E+000	-1.064E-006	pass
RW1	241	4.786E-005	2.089E-002	1.009E-006	2.088E-002	pass
SA1	187	7.601E-003	-1.091E-005	-8.293E-008	-1.083E-005	pass
SA2	40	1.147E-002	2.839E-005	3.257E-007	2.807E-005	pass
SA4	1	1.166E-002	-2.543E-008	-2.965E-010	-2.513E-008	pass
SA5	3	1.391E-002	-4.434E-007	-6.168E-009	-4.372E-007	pass

SAF	10	1.000E+000	6.634E-007	6.634E-007	-1.084E-018	pass
SB1	167	7.232E-003	-1.970E-005	-1.424E-007	-1.955E-005	pass
SB2	11	2.340E-002	2.392E-006	5.598E-008	2.336E-006	pass
SB3	8	7.606E-003	-4.535E-007	-3.450E-009	-4.501E-007	pass
SB4	33	1.121E-002	-2.604E-006	-2.920E-008	-2.575E-006	pass
SB6	7	8.321E-002	4.273E-006	3.556E-007	3.918E-006	pass
SB9	1	1.181E-002	-2.543E-008	-3.004E-010	-2.513E-008	pass
SBC	3	1.355E-002	-4.432E-007	-6.006E-009	-4.372E-007	pass
SBF	11	1.000E+000	6.847E-007	6.847E-007	-8.896E-017	pass
SE4	6	1.000E+000	5.481E-007	5.481E-007	4.125E-017	pass
SEF	142	1.000E+000	5.103E-005	5.103E-005	4.337E-018	pass
SGTR	1	2.050E-002	1.226E-006	2.513E-008	1.201E-006	pass
SL1	1	3.097E-002	-2.594E-008	-8.032E-010	-2.513E-008	pass
SLB1	3	4.640E-004	9.422E-004	4.372E-007	9.417E-004	pass
SLOCI	25	1.820E-002	1.008E-003	1.835E-005	9.895E-004	pass
SLOCN	15	5.550E-003	1.050E-003	5.826E-006	1.044E-003	pass
SM1	81	1.607E-004	-3.609E-005	-5.799E-009	-3.608E-005	pass
SMF	160	1.000E+000	3.450E-005	3.450E-005	1.312E-017	pass
TB1	5	1.446E-003	-1.432E-007	-2.071E-010	-1.430E-007	pass
TB3	6	2.976E-002	5.505E-006	1.638E-007	5.342E-006	pass
TB4	8	3.347E-002	7.763E-008	2.598E-009	7.504E-008	pass
TBF	222	1.000E+000	6.955E-005	6.955E-005	1.301E-018	pass
TLMFW	2	1.200E-001	6.709E-007	8.051E-008	5.904E-007	pass
TT	13	8.830E-001	1.034E-006	9.128E-007	1.209E-007	pass
TT1	228	5.056E-005	-6.967E-005	-3.523E-009	-6.967E-005	pass
TTS	13	0.000E+000	-9.128E-007	0.000E+000	-9.128E-007	pass
VL1	46	1.030E-003	9.454E-006	9.737E-009	9.444E-006	pass
VL2	44	1.330E-002	-2.937E-006	-3.907E-008	-2.898E-006	pass
VL3	13	1.300E-002	-5.005E-007	-6.506E-009	-4.940E-007	pass
VLF	138	1.000E+000	2.906E-005	2.906E-005	-1.350E-017	pass
WA1	18	4.279E-008	-9.214E-007	-3.952E-014	-9.214E-007	pass
WA2	37	1.297E-002	1.833E-003	2.378E-005	1.809E-003	pass
WAF	186	1.000E+000	4.519E-005	4.519E-005	3.036E-018	pass
WAX	7	1.010E-002	1.018E-004	1.028E-006	1.007E-004	pass
WB1	31	3.999E-008	-5.826E-006	-2.325E-013	-5.826E-006	pass
WB3	8	1.222E-002	-6.867E-007	-8.391E-009	-6.783E-007	pass
WB4	30	7.685E-002	3.099E-004	2.381E-005	2.860E-004	pass
WB5	1	1.308E-002	2.316E-006	3.030E-008	2.286E-006	pass
WBF	171	1.000E+000	4.023E-005	4.023E-005	-3.079E-017	pass
WBX	6	3.560E-006	8.329E-001	3.496E-006	8.329E-001	pass
WXB	9	1.010E-002	1.136E-004	1.147E-006	1.124E-004	pass

Scenario: End State Birnbaum Group Importance completed at 2:35:12 AM

BV2-5-09 Scenario: End State Uncertainty Group Importance started at 2:35:12 AM
UNCERTAINTY IMPORTANCE:

Event Name	Num Occur	Probability	Importance	RRR/RRI	RIR/RII	Status
AF1	42	1.072E-005	-4.194E-010	-2.667E-010	-2.487E-005	pass
AF2	10	4.858E-004	-2.370E-009	-1.493E-009	-3.072E-006	pass
AF3	28	5.150E-002	-5.936E-008	-8.644E-008	-1.592E-006	pass
AF4	107	4.967E-002	-7.855E-007	-1.169E-006	-2.236E-005	pass
AF5	9	6.819E-004	-6.563E-010	-6.102E-010	-8.942E-007	pass
AF6	32	1.934E-004	9.134E-008	6.307E-008	3.260E-004	pass
AFB	3	1.248E-005	-8.769E-012	-5.190E-012	-4.158E-007	pass
AFC	1	4.867E-004	-3.289E-011	-2.267E-011	-4.656E-008	pass
AFF	9	1.000E+000	0.000E+000	6.851E-007	1.247E-018	pass
AMSIV	2	1.830E-002	0.000E+000	3.481E-008	1.867E-006	pass
AO1	116	9.545E-004	5.106E-006	8.206E-006	8.558E-003	pass
AO2	93	1.082E-001	1.090E-005	1.835E-005	1.513E-004	pass
AOF	32	1.000E+000	0.000E+000	1.006E-005	-4.586E-017	pass
AOX	30	3.190E-002	6.616E-006	9.846E-006	2.988E-004	pass
BK1	82	9.049E-002	-1.007E-007	-1.751E-007	-1.759E-006	pass
BK2	159	5.031E-004	-2.111E-008	-2.603E-008	-5.172E-005	pass
BP3	34	5.933E-003	0.000E+000	2.036E-006	3.411E-004	pass
BP4	68	8.655E-004	0.000E+000	1.023E-006	1.181E-003	pass
BP5	52	1.493E-001	0.000E+000	1.431E-005	8.151E-005	pass
BP6	24	9.939E-002	0.000E+000	9.484E-007	8.594E-006	pass
BP7	27	8.703E-004	2.086E-006	3.189E-006	3.659E-003	pass
BP8	3	1.047E-001	9.313E-008	1.765E-007	1.509E-006	pass
BPA	14	1.700E-004	0.000E+000	2.292E-007	1.348E-003	pass
BPF	19	1.000E+000	0.000E+000	4.935E-006	-9.194E-017	pass
BPX	17	3.190E-002	3.145E-006	4.721E-006	1.433E-004	pass
BV1	55	1.724E-007	-7.530E-012	-4.879E-012	-2.828E-005	pass
BV2	63	5.297E-005	-1.024E-009	-7.546E-010	-1.425E-005	pass
BV4	2	1.348E-004	6.867E-008	4.855E-008	3.600E-004	pass
BVF	2	1.000E+000	0.000E+000	2.133E-007	-4.180E-017	pass
BVS	119	0.000E+000	0.000E+000	0.000E+000	-2.779E-005	pass
BVX	2	2.350E-005	3.520E-007	2.133E-007	9.068E-003	pass
CC1	15	2.856E-005	-1.939E-011	-2.306E-011	-8.075E-007	pass
CCF	224	1.000E+000	0.000E+000	6.968E-005	-6.240E-017	pass
CCG	2	2.803E-004	-1.764E-011	-2.745E-011	-9.791E-008	pass
CD2	1	1.027E-003	-5.696E-011	-3.428E-011	-3.335E-008	pass
CD6	67	1.956E-002	1.623E-006	1.259E-006	6.312E-005	pass
CD7	64	7.268E-002	-9.188E-008	-7.563E-008	-9.648E-007	pass
CD8	41	1.495E-001	-3.804E-008	-5.636E-008	-3.206E-007	pass
CDF	49	1.000E+000	0.000E+000	1.158E-005	2.515E-017	pass
CI1	56	5.167E-003	-4.248E-008	-7.383E-008	-1.421E-005	pass
CI2	13	1.696E-002	-1.135E-008	-3.596E-008	-2.084E-006	pass
CI3	44	1.124E-002	-4.823E-008	-1.320E-007	-1.161E-005	pass
CI6	119	1.188E-002	-1.948E-007	-2.288E-007	-1.903E-005	pass
CIF	9	1.000E+000	0.000E+000	6.851E-007	1.247E-018	pass
CPEXC	1	2.390E-002	0.000E+000	1.224E-008	4.997E-007	pass
CS1	3	5.472E-005	-3.199E-012	-2.468E-012	-4.510E-008	pass
CS2	31	3.834E-003	-3.260E-008	-2.300E-008	-5.977E-006	pass
CS3	67	8.572E-003	-3.081E-008	-4.864E-008	-5.626E-006	pass
CS4	125	1.139E-001	-2.152E-007	-2.040E-007	-1.586E-006	pass
CSF	15	1.000E+000	0.000E+000	1.547E-006	-5.079E-017	pass
DO1	74	8.353E-005	-1.721E-009	-2.583E-009	-3.092E-005	pass
DO2	141	4.876E-004	-4.791E-009	-6.295E-009	-1.290E-005	pass
DO3	22	5.737E-004	7.899E-008	1.091E-007	1.900E-004	pass
DOF	4	1.000E+000	0.000E+000	2.684E-007	-9.080E-017	pass
DOX	2	1.400E-002	3.239E-008	5.511E-008	3.881E-006	pass
DP1	100	8.499E-005	2.151E-006	3.454E-006	4.014E-002	pass
DP2	107	5.083E-004	-2.627E-009	-2.990E-009	-5.880E-006	pass
DP3	25	5.678E-004	9.456E-008	1.281E-007	2.254E-004	pass
DPF	9	1.000E+000	0.000E+000	1.808E-006	-9.145E-017	pass
DPX	7	1.400E-002	9.227E-007	1.595E-006	1.123E-004	pass
EA0	54	0.000E+000	0.000E+000	0.000E+000	-2.537E-005	pass
EA1	11	2.557E-002	4.252E-007	1.068E-006	4.068E-005	pass

EA2	16	1.044E-001	2.039E-006	2.457E-006	2.108E-005	pass
EAF	160	1.000E+000	0.000E+000	4.166E-005	-1.746E-017	pass
EB0	69	0.000E+000	0.000E+000	0.000E+000	-3.033E-005	pass
EB3	1	2.533E-002	0.000E+000	-4.722E-010	-1.817E-008	pass
EB4	3	3.833E-002	0.000E+000	4.986E-008	1.251E-006	pass
EB6	10	7.706E-001	0.000E+000	1.554E-006	4.627E-007	pass
EB7	21	2.159E-002	0.000E+000	5.488E-006	2.487E-004	pass
EB8	7	9.895E-002	0.000E+000	1.012E-006	9.219E-006	pass
EBF	130	1.000E+000	0.000E+000	3.213E-005	-7.486E-017	pass
EXFW	5	2.410E-001	0.000E+000	2.104E-007	6.627E-007	pass
FA1	63	1.298E-003	6.252E-007	1.053E-006	8.099E-004	pass
FA2	18	3.428E-002	6.456E-007	2.456E-006	6.918E-005	pass
FAF	160	1.000E+000	0.000E+000	4.166E-005	-1.746E-017	pass
FB3	49	1.303E-003	0.000E+000	-1.471E-008	-1.128E-005	pass
FB4	6	1.907E-002	0.000E+000	4.860E-008	2.500E-006	pass
FB5	1	3.214E-002	0.000E+000	-4.748E-010	-1.430E-008	pass
FB6	10	9.965E-002	0.000E+000	1.554E-006	1.404E-005	pass
FB7	38	5.986E-003	0.000E+000	5.468E-006	9.078E-004	pass
FB8	8	3.868E-002	0.000E+000	1.011E-006	2.513E-005	pass
FBF	129	1.000E+000	0.000E+000	3.212E-005	-6.695E-017	pass
HC1	1	5.899E-004	8.490E-009	1.353E-008	2.292E-005	pass
HC3	2	1.309E-002	-7.553E-010	-1.299E-009	-9.791E-008	pass
HCF	21	1.000E+000	0.000E+000	1.459E-006	1.973E-017	pass
HH1	10	5.875E-004	3.190E-008	1.321E-008	2.247E-005	pass
HH3	2	5.897E-004	-1.185E-010	-5.777E-011	-9.791E-008	pass
HH6	8	6.764E-007	-5.268E-013	-3.935E-013	-5.813E-007	pass
HH7	5	1.393E-003	-5.061E-010	-5.904E-010	-4.233E-007	pass
HHF	216	1.000E+000	0.000E+000	6.900E-005	-4.705E-017	pass
IA1	127	3.424E-004	-8.076E-009	-1.599E-008	-4.670E-005	pass
IA2	65	5.865E-004	-6.030E-009	-1.010E-008	-1.721E-005	pass
IAF	49	1.000E+000	0.000E+000	6.672E-006	-5.958E-017	pass
IB1	75	2.027E-005	-6.553E-010	-6.270E-010	-3.093E-005	pass
IB2	164	5.287E-004	-6.869E-009	-9.375E-009	-1.772E-005	pass
IBF	2	1.000E+000	0.000E+000	2.133E-007	-4.180E-017	pass
IC1	5	1.834E-004	-1.476E-011	-2.623E-011	-1.430E-007	pass
ICF	236	1.000E+000	0.000E+000	7.044E-005	8.186E-018	pass
IMSIV	5	6.960E-002	0.000E+000	2.125E-007	2.840E-006	pass
IR1	72	6.009E-005	-1.930E-009	-1.842E-009	-3.066E-005	pass
IR2	159	3.391E-004	-7.620E-009	-1.332E-008	-3.926E-005	pass
IRF	10	1.000E+000	0.000E+000	6.634E-007	-1.084E-018	pass
IRX	3	6.100E-003	2.830E-007	2.728E-007	4.445E-005	pass
ISI	3	2.220E-002	0.000E+000	5.405E-008	2.381E-006	pass
IW1	103	5.872E-005	-2.377E-009	-2.361E-009	-4.020E-005	pass
IW2	127	3.421E-004	-5.590E-009	-1.016E-008	-2.969E-005	pass
IWF	11	1.000E+000	0.000E+000	6.847E-007	-8.896E-017	pass
IWX	3	6.100E-003	2.856E-007	2.753E-007	4.486E-005	pass
IY1	106	2.020E-005	-8.939E-010	-8.177E-010	-4.048E-005	pass
IY2	133	5.283E-004	-1.285E-008	-1.580E-008	-2.989E-005	pass
IYF	2	1.000E+000	0.000E+000	2.133E-007	-4.180E-017	pass
LB2A	15	1.140E-001	0.000E+000	2.707E-006	2.104E-005	pass
LC2	39	2.487E-007	0.000E+000	-6.807E-012	-2.736E-005	pass
LC3	22	1.911E-005	0.000E+000	-2.814E-011	-1.472E-006	pass
LC6	2	2.499E-007	0.000E+000	-2.442E-014	-9.791E-008	pass
LCF	178	1.000E+000	0.000E+000	4.165E-005	5.768E-017	pass
LCV	2	1.010E-001	0.000E+000	6.776E-008	6.031E-007	pass
LH1	41	6.896E-004	-1.076E-008	-1.891E-008	-2.740E-005	pass
LH2	41	1.162E-002	-2.392E-008	-5.605E-008	-4.767E-006	pass
LHF	159	1.000E+000	0.000E+000	3.448E-005	-8.256E-017	pass
LOSP	45	6.240E-002	0.000E+000	1.736E-005	2.609E-004	pass
LPRF	2	1.010E-001	0.000E+000	7.206E-008	6.414E-007	pass
MFF	10	1.000E+000	0.000E+000	5.051E-007	4.960E-017	pass
MS0	238	0.000E+000	0.000E+000	0.000E+000	-7.014E-005	pass
MS1	3	7.101E-004	-3.729E-010	-3.107E-010	-4.372E-007	pass
MUF	2	1.000E+000	0.000E+000	9.791E-008	3.421E-017	pass
NMF	239	1.000E+000	0.000E+000	7.048E-005	3.415E-017	pass
NMS	2	0.000E+000	0.000E+000	0.000E+000	-9.791E-008	pass
NRF	241	1.000E+000	0.000E+000	7.058E-005	0.000E-000	pass
OB2	1	5.518E-003	-3.862E-010	-3.582E-010	-6.456E-008	pass
OBF	18	1.000E+000	0.000E+000	1.126E-006	-2.505E-017	pass

OD3	2	1.290E-003	-7.452E-011	-4.289E-011	-3.321E-008	pass
OD6	42	1.356E-003	-1.929E-008	-1.634E-008	-1.204E-005	pass
OD7	20	1.647E-003	-1.057E-008	-9.262E-009	-5.614E-006	pass
ODB	9	2.296E-003	-3.645E-009	-4.280E-009	-1.860E-006	pass
ODF	58	1.000E+000	0.000E+000	1.861E-005	-2.331E-017	pass
OF1	10	1.210E-003	-1.136E-009	-6.120E-010	-5.051E-007	pass
OFF	9	1.000E+000	0.000E+000	6.851E-007	1.247E-018	pass
OG1	196	1.275E-003	7.809E-007	1.428E-006	1.118E-003	pass
OGF	45	1.000E+000	0.000E+000	1.736E-005	4.196E-017	pass
OR1	40	3.600E-004	-7.997E-009	-9.861E-009	-2.738E-005	pass
OR2	1	1.792E-003	-2.792E-011	-2.400E-011	-1.337E-008	pass
OR3	40	1.153E-002	3.035E-008	4.365E-008	3.742E-006	pass
OS0	191	0.000E+000	0.000E+000	0.000E+000	-6.812E-005	pass
OS1	2	1.048E-002	6.122E-008	4.890E-008	4.617E-006	pass
OS2	11	1.722E-002	4.582E-007	3.542E-007	2.021E-005	pass
OS6	33	1.000E-003	0.000E+000	1.059E-008	1.058E-005	pass
OSF	4	1.000E+000	0.000E+000	2.618E-007	2.499E-017	pass
OT1	232	1.306E-003	-1.113E-007	-6.201E-008	-4.742E-005	pass
OTS	9	0.000E+000	0.000E+000	0.000E+000	-1.064E-006	pass
PI1	27	1.812E-004	-4.068E-009	-4.589E-009	-2.532E-005	pass
PI2	42	2.547E-002	-2.641E-008	-3.830E-008	-1.465E-006	pass
PIS	2	0.000E+000	0.000E+000	0.000E+000	-3.321E-008	pass
PLMFW	7	5.530E-001	0.000E+000	5.038E-007	4.072E-007	pass
PR0	50	0.000E+000	0.000E+000	0.000E+000	-1.814E-005	pass
PR1	5	5.021E-004	1.586E-008	1.886E-008	3.754E-005	pass
PR4	2	9.113E-003	3.574E-007	2.133E-007	2.319E-005	pass
PR5	6	2.593E-002	4.544E-009	6.760E-009	2.540E-007	pass
PR6	22	5.096E-002	4.688E-008	6.230E-008	1.160E-006	pass
PR7	10	4.946E-002	2.067E-008	3.174E-008	6.099E-007	pass
PR8	5	2.507E-002	3.115E-008	4.353E-008	1.693E-006	pass
PR9	87	7.671E-002	7.535E-006	1.075E-005	1.293E-004	pass
PRA	18	2.001E-003	-7.472E-009	-7.678E-009	-3.829E-006	pass
PRF	28	1.000E+000	0.000E+000	6.604E-006	-9.324E-018	pass
PRJ	5	3.034E-001	5.395E-008	7.363E-008	1.690E-007	pass
PRV	2	2.989E-001	3.386E-008	4.890E-008	1.147E-007	pass
QS1	41	1.632E-004	-8.026E-009	-4.472E-009	-2.740E-005	pass
QS2	41	6.160E-003	-2.707E-008	-3.624E-008	-5.847E-006	pass
QSF	159	1.000E+000	0.000E+000	3.448E-005	-8.256E-017	pass
RC1	3	2.470E-002	-5.789E-010	-1.283E-009	-5.067E-008	pass
RCF	74	1.000E+000	0.000E+000	3.589E-005	6.733E-017	pass
RD2	3	2.343E-002	0.000E+000	-1.216E-009	-5.067E-008	pass
RDF	74	1.000E+000	0.000E+000	3.589E-005	6.733E-017	pass
RE1	9	5.042E-003	0.000E+000	4.512E-006	8.903E-004	pass
RE2	22	1.212E-001	0.000E+000	9.515E-006	6.899E-005	pass
RE3	2	8.136E-002	0.000E+000	3.011E-007	3.399E-006	pass
RE4	1	1.382E-001	0.000E+000	1.010E-008	6.298E-008	pass
RE5A	39	1.226E-001	0.000E+000	1.215E-005	8.696E-005	pass
RE6A	13	1.654E-001	0.000E+000	4.503E-007	2.272E-006	pass
RE7	14	2.367E-002	0.000E+000	1.463E-006	6.033E-005	pass
RE9	2	1.147E-002	0.000E+000	1.907E-007	1.644E-005	pass
REA	8	1.360E-001	0.000E+000	5.022E-007	3.191E-006	pass
REF	131	1.000E+000	0.000E+000	4.149E-005	-4.770E-017	pass
RRF	71	1.000E+000	0.000E+000	3.381E-005	-5.611E-017	pass
RS1	3	1.433E-004	-1.092E-011	-7.262E-012	-5.067E-008	pass
RSF	74	1.000E+000	0.000E+000	3.589E-005	6.733E-017	pass
RT	9	1.140E+000	0.000E+000	1.064E-006	-1.306E-007	pass
RT1	163	9.773E-005	-5.401E-009	-4.575E-009	-4.681E-005	pass
RT3	45	3.578E-006	-6.729E-011	-6.213E-011	-1.736E-005	pass
RT4	22	4.300E-006	-2.367E-011	-2.206E-011	-5.130E-006	pass
RT5	2	5.151E-004	-7.420E-011	-1.099E-010	-2.133E-007	pass
RTS	9	0.000E+000	0.000E+000	0.000E+000	-1.064E-006	pass
RW1	241	4.786E-005	2.297E-006	1.009E-006	2.088E-002	pass
SA1	187	7.601E-003	-5.863E-008	-8.293E-008	-1.083E-005	pass
SA2	40	1.147E-002	2.533E-007	3.257E-007	2.807E-005	pass
SA4	1	1.166E-002	-2.281E-010	-2.965E-010	-2.513E-008	pass
SA5	3	1.391E-002	-4.467E-009	-6.168E-009	-4.372E-007	pass

SAF	10	1.000E+000	0.000E+000	6.634E-007	-1.084E-018	pass
SB1	167	7.232E-003	-9.741E-008	-1.424E-007	-1.955E-005	pass
SB2	11	2.340E-002	5.156E-008	5.598E-008	2.336E-006	pass
SB3	8	7.606E-003	-2.449E-009	-3.450E-009	-4.501E-007	pass
SB4	33	1.121E-002	-2.415E-008	-2.920E-008	-2.575E-006	pass
SB6	7	8.321E-002	1.641E-007	3.556E-007	3.918E-006	pass
SB9	1	1.181E-002	-2.493E-010	-3.004E-010	-2.513E-008	pass
SBC	3	1.355E-002	-5.050E-009	-6.006E-009	-4.372E-007	pass
SBF	11	1.000E+000	0.000E+000	6.847E-007	-8.896E-017	pass
SE4	6	1.000E+000	0.000E+000	5.481E-007	4.125E-017	pass
SEF	142	1.000E+000	0.000E+000	5.103E-005	4.337E-018	pass
SGTR	1	2.050E-002	0.000E+000	2.513E-008	1.201E-006	pass
SL1	1	3.097E-002	-5.863E-010	-8.032E-010	-2.513E-008	pass
SLB1	3	4.640E-004	0.000E+000	4.372E-007	9.417E-004	pass
SLOCI	25	1.820E-002	0.000E+000	1.835E-005	9.895E-004	pass
SLOCN	15	5.550E-003	0.000E+000	5.826E-006	1.044E-003	pass
SM1	81	1.607E-004	-5.584E-009	-5.799E-009	-3.608E-005	pass
SMF	160	1.000E+000	0.000E+000	3.450E-005	1.312E-017	pass
TB1	5	1.446E-003	-1.166E-010	-2.071E-010	-1.430E-007	pass
TB3	6	2.976E-002	8.380E-008	1.638E-007	5.342E-006	pass
TB4	8	3.347E-002	1.303E-009	2.598E-009	7.504E-008	pass
TBF	222	1.000E+000	0.000E+000	6.955E-005	1.301E-018	pass
TLMFW	2	1.200E-001	0.000E+000	8.051E-008	5.904E-007	pass
TT	13	8.830E-001	0.000E+000	9.128E-007	1.209E-007	pass
TT1	228	5.056E-005	-4.445E-009	-3.523E-009	-6.967E-005	pass
TTS	13	0.000E+000	0.000E+000	0.000E+000	-9.128E-007	pass
VL1	46	1.030E-003	5.388E-009	9.737E-009	9.444E-006	pass
VL2	44	1.330E-002	-2.260E-008	-3.907E-008	-2.898E-006	pass
VL3	13	1.300E-002	-3.824E-009	-6.506E-009	-4.940E-007	pass
VLF	138	1.000E+000	0.000E+000	2.906E-005	-1.350E-017	pass
WA1	18	4.279E-008	-7.189E-014	-3.952E-014	-9.214E-007	pass
WA2	37	1.297E-002	1.390E-005	2.378E-005	1.809E-003	pass
WAF	186	1.000E+000	0.000E+000	4.519E-005	3.036E-018	pass
WAX	7	1.010E-002	0.000E+000	1.028E-006	1.007E-004	pass
WB1	31	3.999E-008	-2.944E-014	-2.325E-013	-5.826E-006	pass
WB3	8	1.222E-002	0.000E+000	-8.391E-009	-6.783E-007	pass
WB4	30	7.685E-002	0.000E+000	2.381E-005	2.860E-004	pass
WB5	1	1.308E-002	0.000E+000	3.030E-008	2.286E-006	pass
WBF	171	1.000E+000	0.000E+000	4.023E-005	-3.079E-017	pass
WBX	6	3.560E-006	0.000E+000	3.496E-006	8.329E-001	pass
WXB	9	1.010E-002	0.000E+000	1.147E-006	1.124E-004	pass

Scenario: End State Uncertainty Group Importance completed at 2:39:44 AM

TEST CASE COMPLETE: at 2:39:45 AM

TEST CASE : Fault Tree Solve/Page/MAR-D (FTUTIL_CR3)
DATE & TIME: 9/23/99 4:17:11 PM

TEST FOR: SAPHIRE Version 6.63

Opened project: CR3-MOD699
Data base recovered

CR3-01 Scenario: Solve Fault tree started at 4:17:25 PM
Generated base case data
Fault trees solved
with prob cut off (2.0E-8) and with recovery
with zone cut off (1)
Fault tree cut sets updated
Fault Tree base case updated

FAULT TREE RESULTS:

FAULT TREE CUTSET RESULTS:
COREDAMAGE pass
Scenario: Solve Fault tree completed at 4:23:33 PM

CR3-02 Scenario: Extract,Delete,Load,Solve started at 4:23:33 PM
FTL extracted
BEI extracted
BED extracted
Deleted all Fault trees
Deleted unused events
BED loaded
BEI loaded
FTL loaded
Generated base case data
Fault trees solved
with prob cut off (2.0E-8) and with recovery
with zone cut off (1)
Fault tree cut sets updated
Fault Tree base case updated

FAULT TREE RESULTS:

FAULT TREE CUTSET RESULTS:
COREDAMAGE pass
Scenario: Extract,Delete,Load,Solve completed at 4:31:47 PM

CR3-03 Scenario: Auto page, Solve started at 4:31:47 PM
Fault tree auto paged
Generated base case data
Fault trees solved
 with prob cut off (2.0E-8) and with recovery
 with zone cut off (1)
Fault tree cut sets updated
Fault Tree base case updated

FAULT TREE RESULTS:

FAULT TREE CUTSET RESULTS:
COREDAMAGE pass
Scenario: Auto page, Solve completed at 4:39:28 PM

CR3-04 Scenario: Save cutsets to end state started at 4:39:29 PM
Cut sets saved to end state COREDAMAGE

END STATE RESULTS:

END STATE CUTSET RESULTS:
COREDAMAGE pass
Scenario: Save cutsets to end state completed at 4:39:41 PM

TEST CASE COMPLETE: at 4:39:42 PM

NRC FORM 335 (2-89) NRCM 1102, 3201, 3202 — U.S. NUCLEAR REGULATORY COMMISSION — **BIBLIOGRAPHIC DATA SHEET** *(See instructions on the reverse)*	1. REPORT NUMBER (Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.) NUREG/CR-6688 INEEL/EXT-99-00876
2. TITLE AND SUBTITLE Testing, Verifying and Validating SAPHIRE Versions 6.0 and 7.0	3. DATE REPORT PUBLISHED MONTH: October — YEAR: 2000 4. FIN OR GRANT NUMBER L1429
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10. SUPPLEMENTARY NOTES

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11. ABSTRACT *(200 words or less)*

This report describes a testing-based verification and validation (TV&V) process created for SAPHIRE (systems analysis Program for Hands-on Integrated Reliability Evaluation), version 6.0 and subsequent versions. The TV&V process comprises a set of specially designed software models used to test each major version of SAPHIRE (such as versions 6.0 and 7.0) and individual interim releases (6.1, 6.2, etc.). SAPHIRE is a probabilistic risk assessment (PRA) software tool developed at the Idaho National Engineering and Environmental Laboratory (INEEL) for use by the U.S. Nuclear Regulatory Commission (NRC). SAPHIRE was created to provide a means for depicting a nuclear power plant's response to an accident; evaluating and quantifying the risk represented by those models; and performing sensitivity analyses associated with the attributes of the models. SAPHIRE is best suited for quantifying sequences leading to core damage (Level 1 PRA); estimating radioactive released to the environment (Level 2 PRA); and, to a limited degree, to quantify risk in terms of evaluating release consequences to the environment and the public (Level 3 PRA). The TV&V process was engineered to provide a dynamic verification and validation process for testing all releases and versions of SAPHIRE. The process allows for an increase in the software quantification quality to a high level, as dictated by the nature of the testing models. This document comprises a main report and three appendices. The main report presents an overall perspective on the TV&V approach; specifics on the testing, verification and validation process; and the results of the TV&V process. Appendix A provides the background, including the history of SAPHIRE; prior verification and validation efforts; the SAPHIRE code development control process; and minimum PC requirements. Appendix B details the test reference descriptions. Appendix C presents test results from a sample case.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*	13. AVAILABILITY STATEMENT
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