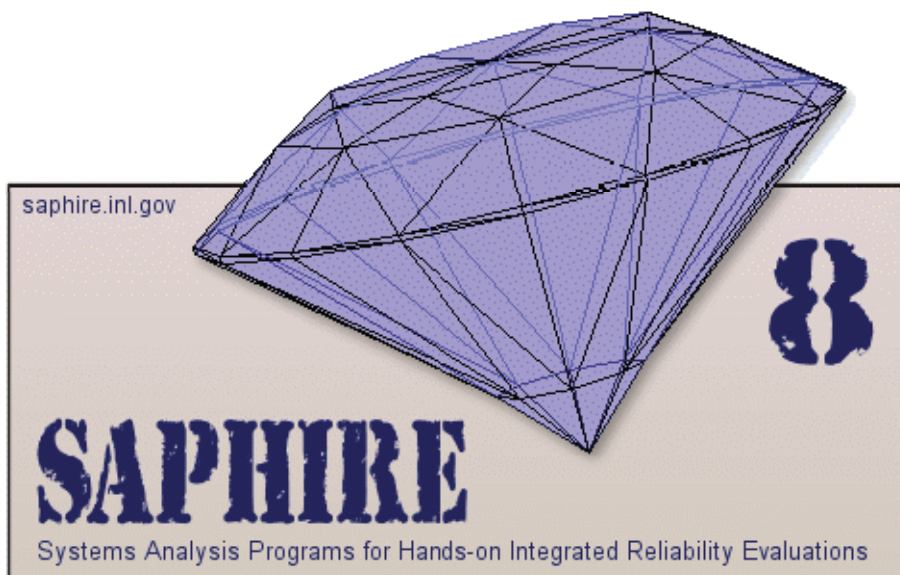


# Independent Verification and Validation of SAPHIRE 8 Risk Management

November 2009



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# **Independent Verification and Validation of SAPHIRE 8 Risk Management**

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## **1.0 Executive Summary**

The purpose of the Independent Verification and Validation (IV&V) role in the evaluation of the SAPHIRE risk management is to assess the activities that results in the process to identify, assess, document, and rank technical, cost, resource, and schedule risks associated with the SAPHIRE software product. The IV&V team began this endeavor after the software engineering and software development of SAPHIRE had already been in production.

The requirements for IV&V review were extracted primarily from the NUREG but also included an examination of best software engineering methods provided in the IEEE Standard for Software Verification and Validation. IV&V developed a checklist that mapped these requirements with these standards which was used in the evaluation. The evaluation criteria and the results of the assessment are identified in section 3 of this document.

Per the requirements and document outline provided in the SAPHIRE IV&V Plan, this report and all subsequent reports will be included as attachments and/or background evidence of the evaluation as well as the results of the assessment.

## **2.0 Background Information**

NUREG/BR-0167, Software Quality Assurance Program and Guidelines, requires the development of risk management activities that:

1. Identify, assess, document, and rank technical, cost, resource, and schedule risks.
2. Develop a risk mitigation plan.
3. Formalize the risk management program.
4. Review the risk management program regularly.

This report provides an evaluation of the risk management. Risk management is intended to ensure a methodology for conducting risk management planning, identification, analysis, responses, and monitoring and control activities associated with the SAPHIRE project work, and to meet the contractual commitments prepared by the sponsor; the Nuclear Regulatory Commission.

Independent Verification and Validation (IV&V) evaluates and assesses the processes and products developed during each phase of the Software Development Life Cycle (SDLC). The SAPHIRE 8 development team is implementing a “spiral” rapid application approach to the product development. One of the roles that IV&V performs, regardless of the development methodology, is to analyze products developed throughout the development process. The intent is to provide a level of confidence to the sponsor that the quality of the software product and supporting documentation is built into the software, not tested in. Evaluating the supporting documentation for each product is one aspect of providing this level of confidence.

IV&V supports and is complementary to the Quality Assurance, Project Management, and product development activities. To achieve this support, IV&V must also evaluate the processes identified in the documentation to ensure that the development team is implementing the processes and methodology that ensures a high-level software product.

Due to the spiral approach implemented for the software development, it is expected that the risk management will evolve as the SAPHIRE 8 product matures. Therefore, IV&V will evaluate each iteration of the risk management.

To provide direction in the evaluation process, IV&V has developed a checklist to support the requirements for the SDLC. The Project Plan requirements used for the analysis of the risk management is contained in a checklist that is included in the SAPHIRE 8 Software Independent Verification and Validation Plan (INL/EXT-09-15649, Revision ID: 0, Effective Date: April 1, 2009). The evaluation criteria for the risk management have been extracted from the checklist contained in the “IV&V Plan” and included in section 4 of this report. A summary of the findings is provided in section 3.

### 3.0 Summary of Findings

An Independent Verification and Validation evaluation of the SAPHIRE 8 risk management was performed using the check list contained in section 4.0. The check list was extracted from the SAPHIRE 8 Software Independent Verification and Validation Plan Document ID: INL/EXT-09-15649. A summary of the findings are provided below.

The Project Execution Plan (PEP) for U.S. Nuclear Regulatory Commission (NRC) Projects Assigned to Departments C210 and C220, Document ID: PLN-2468, section 3.2 Activity Work Authorization, paragraph two states *“Projects determined to be low or medium risk do not require a separate Risk Management Plan, but may stipulate risk mitigation activities in the NRC Form 189, as deemed appropriate.”*

The INL Proposal Risk Evaluation and Preparation System (PREPS) was used to establish the risk level for the SAPHIRE 8 project. The Category of Risks evaluated includes:

1. Environmental
2. Safety and Health
3. Radiological Control
4. INL Quality Assurance
5. Specific Customer Quality Assurance
6. Corporate and Legal Sensitivities
7. Security
8. Project Management

The Software Project Plan, Project Number: N6423, for U.S. Nuclear Regulatory Commission (NRC) Project: SAPHIRE 8, Document ID: INL/EXT-09-15853, section 2.2 Risk Management states *“Prior to starting the SAPHIRE 8 development project, an INL Proposal Risk and Evaluation Preparation System (PREPS) entry was created (PREPS ID: 0807-C.C-41-000454). The results of this evaluation indicated that the SAPHIRE 8 development project was low management risk. The applicable original PREPS document is stored in the INL electronic documentation system – in addition a copy has been stored in the SAPHIRE 8 RCS. The PREPS for SAPHIRE 8 was approved by INL management on October 31, 2007.”*

The Idaho National Laboratory Project Risk Management procedure LWP-7350 section 2 Scope, first paragraph states *“The risk management approach is tailored based on risk levels established during the preliminary risk assessment within the Proposal Risk Evaluation and Preparation System (PREPS) process. However, initial risk determination using conceptual information in the PREPS application is not sufficient nor adequate to fully meet Laboratory expectations for risk management. An essential part of work scope planning is ensuring that all risks and uncertainties are identified, analyzed, and managed.”*

It is the recommendation of IV&V that a Risk Management and Risk Mitigation plan be developed for the SAPHIRE 8 software development.

## 4.0 IV&V Evaluation Checklist

RISK MANAGEMENT		
Criteria Priority: 3	Is a Risk Management Plan established? NUREG/BR-167, Section 5.8	
Pass	X	Comments
Fail		Risk Management is addressed in section 2.2 of the Software Project Plan, Project Number: N6423, for U.S. Nuclear Regulatory Commission (NRC) Project: SAPHIRE 8, Document ID: INL/EXT-09-15853.
N/A		
		Refer to section 3.0 Summary of Findings.
Criteria Priority: 3	Does the Risk Management Plan identify, assess, document, and rank resources and schedule risks? NUREG/BR-167, Section 5.8.1	
Pass	X	Comments
Fail		An INL Proposal Risk and Evaluation Preparation System (PREPS) entry was created (PREPS ID: 0807-C.C-41-000454).
N/A		
		Refer to section 3.0 Summary of Findings.
Criteria Priority: 3	Has a Risk Mitigation Plan been developed (or incorporated into a Risk management Plan) and is it under CM Control? NUREG/BR-167, Section 5.8.2	
Pass	X	Comments
Fail		Risk mitigation activities are stipulated in the NRC Form 189, as deemed appropriate.
N/A		
		Refer to section 3.0 Summary of Findings.