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Volume 1

# Integrated Safety Management System Verification - Pacific Northwest National Laboratory

## Volume 1

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# Integrated Safety Management System Verification - Pacific Northwest National Laboratory

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# memorandum

DATE: 17 July 1998

REPLY TO ATTN OF: (DP-3)

SUBJECT: Verification of the Integrated Safety Management (ISM) System description of Pacific Northwest National Laboratory (PNNL)

TO: John D. Wagoner, Manager, Richland Operations Office

Ref: (a) Richland memo no. 98-STO-055 dated April 29, 1998

1. Reference (a) directed me to form a team and verify the ISM system description and its implementation at PNNL.

2. The subject verification was conducted from June 8-19, 1998. The results of the verification are forwarded. Volume one contains the results of the verification. Volume II contains administrative and background material.

Emil D. Morrow
Office of the Assistant Secretary
DP-3, Headquarters

PNNL ISMSV *DRAFT*

I, by signature here, acknowledge that I concur with the TEAM LEADER and SENIOR ADVISOR in the issues and conclusions of this report of the Integrated Safety Management System Verification in my assigned functional area.

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Emil Morrow – Team Leader

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## VOLUME II

## EXECUTIVE SUMMARY

Department of Energy (DOE) Policy (P) 450.4, *Safety Management System Policy*, commits to institutionalizing an Integrated Safety Management System (ISMS) throughout the DOE complex. The DOE Acquisition Regulations (DEAR, 48 CFR 970) requires contractors to manage and perform work in accordance with a documented Integrated Safety Management System.

The Manager, Richland Operations Office (RL), initiated a combined Phase I and Phase II Integrated Safety Management Verification review to confirm that PNNL had successfully submitted a description of their ISMS and had implemented ISMS within the laboratory facilities and processes. A combined review was directed by the Manager, RL, based upon the progress PNNL had made in the implementation of ISM.

This report documents the results of the review conducted to verify: (1) that the PNNL integrated safety management system description and enabling documents and processes conform to the guidance provided by the Manager, RL; (2) that corporate policy is implemented by line managers; (3) that PNNL has provided tailored direction to the facility management; and (4) the Manager, RL, has documented processes that integrate their safety activities and oversight with those of PNNL. The general conduct of the review was consistent with the direction provided by the Under Secretary's Draft Safety Management System Review and Approval Protocol.

The purpose of this review was to provide the Manager, RL, with a recommendation to the adequacy of the ISMS description of the Pacific Northwest Laboratory based upon compliance with the requirements of 49 CFR 970.5204(-2 and –78); and, to provide an evaluation of the extent and maturity of ISMS implementation within the Laboratory. Further, this review was intended to provide a model for other DOE Laboratories.

In an effort to reduce the time and travel costs associated with ISM verification, the team agreed to conduct preliminary training and orientation electronically and by phone. These activities are normally conducted during a pre-visit trip to the site.

The Team recommends approval of the Integrated Safety Management System Description subject to the resolution of the Areas of Concerns noted below.

## AREAS OF CONCERN

There are three significant issues that would indicate that the objective of ISMS has not been fully met. These relate to the development of Authorization Agreements, the Unreviewed Safety Question (USQ) process, and the maintenance program.

**Authorization Agreements**
The current Authorization Agreement in place for PNNL facilities is not consistent with the definition in the DOE Corporate Functions, Responsibilities, and Authorities Manual (FRAM). Additionally, the guidance in the Corporate FRAM requires improvement. The current practice at

PNNL is not systematic in identifying the key terms and conditions under which the contractor is authorized to perform work. Any changes to these terms and conditions require RL approval. The RL FRAM has committed to developing guidance on the development of Authorization Agreements for RL facilities. This guidance has not been issued. Following issuance and implementation of this guidance as it relates to PNNL, this Area of Concern would be resolved.

**Unreviewed Safety Question Process**
The Unreviewed Safety Question program has not been implemented as written and the written procedures for PNNL and Building 325 do not meet the guidelines of DOE O 5480.21. This process has not been approved by DOE. The written procedure for the USQ process should be approved by DOE.

The formality in implementing USQ screenings and evaluations needs improvement. PNL-MA-44, Section 8.3 identifies an initial review process that is not described in DOE O 5480.21. This process represents a departure from the formal approach defined in the order. PNNL's screening criteria (PNL-MA-44, Section 8.4) screens out activities which modify a nuclear facility but would not involve or impact a safety class structure, system, or component or operational safety requirement/technical safety requirement.

**Maintenance**
The maintenance program as defined by the Maintenance Implementation Plan (MIP) and Site Maintenance Management Plan is significantly outdated. The MIP and Site Maintenance Management Plan were approved by RL and issued in 1995. The MIP still refers to nuclear facilities that no longer exist. The self-assessment program identified in Section 2.3 of the MIP has not been implemented. The maintenance program has undergone change since initial DOE approval. For example, a critical procedure (MA-761) in demonstrating PNNL's ability to meet the requirements of DOE O 4330.4B has been revised since 1995. RL has not reviewed the changes to the maintenance program to demonstrate continued compliance with DOE O 4330.4B.

The Standards Based Management System description (SBMS) of the Site Maintenance Plan has informally replaced the RL approved plans without the required DOE review and approval. The Maintenance Program described in the SBMS does not address the DOE O 4330.4B objectives for programs that manage and govern the performance of maintenance and repair activity at DOE property

The Team was tasked, at the request of the RL Manager, with identifying Areas for Improvement in the ISMS. The key Areas for Improvement are noted below.

## AREAS FOR IMPROVEMENT

**Independent Oversight Validation**
The PNNL Independent Oversight Organization does not validate self assessments as specified in DOE P 450.5 (Line Environment, Safety And Health Oversight) under Key Elements of Line ES&H Oversight Process. PNNL staff said this element is not chartered to conduct independent validation of line self-assessments results. They do conduct process and methodology

assessments to ensure Self Assessments are conducted as required and in accordance with approved procedures.

**Improve Worker Participation in Self-Assessment Process**
Worker participation in the self assessment process should be strengthened. Interviews with RL and PNNL staff confirmed this point.

**ES&H Ownership in Critical Outcomes**
The four critical outcomes related to mission excellence functions do not contain written ES&H objectives. Performance indicators for ES&H are not incorporated into mission excellence functions such as science and technology, environmental quality, national security, energy resources, scientific excellence, and leadership and management. The incorporation of ES&H objectives and performance indicators into the mission Critical Outcomes would foster line accountability and responsibility for ES&H.

**Middle Manager Awareness of ES&H**
There is a lack of organizational structure for assuring a uniform level of competence regarding ES&H for research and development projects. This knowledge is especially important to the development and approval authorization of the Prep and Risk Approval Form which is used to conduct work safely. This was evidenced by inconsistency among PNNL line managers in performing research and development activities to assure and validate that all applicable ES&H requirements were understood and communicated by bench scale research staff.

**Facility Chemical Inventory Limit**
The PNNL does not have a formal Laboratory-wide system that provides the Building Manager with real-time information on whether the aggregate of the various Research and Development (R&D) projects conducted in the building has caused the Facility Use Agreements (FUA) operational boundary limits for hazard sources to be exceeded. This condition has been identified in a PNNL self-assessment. A compensatory measure, of having the Building Managers query the Chemical Management System on a monthly basis to compare chemical inventories to FUA operational boundary limits, was established during this ISMS verification review.

The team identified practices that they consider noteworthy.

## NOTEWORTHY PRACTICES

A notable practice is the Core Team approach that assigns matrix support personnel to the Building Manager, with all of the necessary types of expertise to plan the work, identify and analyze the hazards, select the appropriate hazard controls, and execute the work within the controls. As the Core Team works together on a permanent basis, they identify ways to improve their performance, resulting in safer and more efficient work performance.

The Integrated Operations System provides value added to doing work safely.

The Prep and Risk form contributes to the correct identification of hazards.

Responsibilities and Authorities (R2A2s) are supported by management plans, position descriptions and staff development reviews.

The Standards Based Management System, wherein all manuals and procedures are kept electronically, is an excellent system.

## 1.0 INTRODUCTION

The Integrated Safety Management System Verification is a review of the adequacy of the Integrated Safety Management System (ISMS) description in fulfilling the requirements of the Department of Energy (DOE) Policy (P) 450.4, *Safety Management System Policy*, and DOE Acquisition Regulations (DEAR, 48 CFR 970). The DEAR rule requires contractors to manage and perform work in accordance with a documented ISMS. Guidance and expectations were provided to PNNL by their incorporation in the operating contract (Contract DE-AC06-76RLO 1830). The contract requires that the contractor submit a description of their ISMS for approval by DOE. Pacific Northwest National Laboratory (PNNL) submitted their proposed Safety Management System Description for approval on November 25, 1997. The Manager, Richland Operations Office (RL), tentatively approved acceptance of the description pursuant to a favorable recommendation from this verification review.

This Integrated Safety Management System Verification, Phase I and Phase II, was conducted to assess the adequacy of the ISMS description in fulfilling the requirements of the DEAR and the DOE Policy, and to determine the degree of its implementation at the site. It was conducted in support of the site Manager and in accordance with the protocol for the verification process specified by Under Secretary of Energy Memorandum of March 1997, "Protocol for Review and Approval of Documented Safety Management System Descriptions Associated with Defense Nuclear Facilities."

## 2.0 PURPOSE

The purpose of this review was to provide the Manager, RL, with a recommendation for approval of the ISMS description of the PNNL based upon compliance with the requirements of 49 CFR 970.5204(-2 and –78); and, to verify the extent and maturity of ISMS implementation within the Laboratory. Further, this review was intended to provide a model for other DOE Laboratories.

## 3.0 SCOPE

The scope of the review was to verify that the Laboratory had met the letter and intent of the following policy statement:

*"The Department and Contractors must systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. This is to be accomplished through effective integration of safety management into all facets of work planning and execution. In other words, the overall management of safety functions and activities becomes an integral part of mission accomplishment." DOE P 450.4*

This was determined by reviewing the institutional program for the site as it met the requirements of 49 CFR 970.5204(-2 and –78) and by verifying that implementation had occurred across PNNL's work activities. Although all facilities maintained by the contract and all processes managed by Battelle on behalf of the Department of Energy were open for review, a set of facilities and inherent programs were selected to maintain consistency in approach and provide cohesion to the final analysis. The business processes of the contract that provide ISMS and as

managed through the Standards Based Management System were examined to determine the breadth and level of implementation as well as the robustness of the system.

The Laboratory ISMS as implemented was expected to demonstrate the full deployment of systematic integration of ES&H activities into management and work practices at all levels so that the Laboratory's mission could efficiently and effectively be accomplished while protecting the worker, public, and the environment. The review considered the depth and breadth of this system against the backdrop of the core functions and guiding principles of DOE P 450.4. The verification was conducted to demonstrate that the contractor's ISMS had been implemented using the legal and contractual requirements established for doing work safely.

## 4.0 PREREQUISITES

Few prerequisites were identified for this review. The contractor had been instructed to receive team members within any facilities maintained by the DOE contract and to make available on-going projects and activities as well as pertinent records and data. The main prerequisite was an understanding of the unique management concept represented by the Laboratory's operating system. Organization of ISMS as well as the Laboratory's Business model is based on functional systems rather than on the general facility model common throughout the complex. The Laboratory operates numerous facilities as multiple-use in nature. Experiments and projects are often scattered through any number of buildings and may be of short or long duration. Some buildings are designated as "User Facilities" where visiting scientists and researchers are permitted to operate equipment. To adequately manage the tremendous flux of activity, PNNL is organized into R&D Directorates that provide the services necessary to support the BMI Customer Service Model (Product Lines, Expert Delivery [Project Management], and Technical Resources). These R&D Directorates provide the Line Management function (as normally recognized by DOE) within the Laboratory through their Technical Resource Management activities. Facilities are operated as a part of a support organization, Facilities and Operations (F&O). There are exceptions to this rule where F&O maintains Line Management authority. For more information on this, refer to Appendix A of the ISMS Verification Plan in Volume II of this report.

The PNNL ISMS provides a management scheme that is advertised as meeting the needs of a multiple function laboratory. Concepts and programs that parallel standard DOE systems have been developed over a number of years but do not adhere strictly to those models. Tailoring has been used extensively to manage the complex range of hazards; however, the expectation imposed by DOE through the contract is that the vigor with which the Laboratory operates those systems will be consistent throughout operations.

## 5.0 REVIEW APPROACH

This review was performed in the context of the process flow, functional area model provided in DOE G 450.4. A set of Criteria and Review Approach Documents (CRADS) were developed to support this effort. These CRADS are organized around the approach provided in DOE G 450.4, Chapter 3, combining the ISMS Core Functions with the appropriate Guiding Principle.
A set of these CRADS were developed for each ISMS level (Institutional, Facility, R&D Activity, and Functional Areas). CRADS with the prefix 1.X provide the criteria for determining if the PNNL Institutional-level systems and processes were established and implemented to meet the

stated Objective of each Institutional CRAD. Similarly, CRADS with the prefix 2.X provide the criteria for determining if the PNNL Facility-level systems and processes were established and implemented to meet the stated Objective of each Facility CRAD. The R&D Activity-level CRADS are numbered 3.X. These three levels are the horizontal review. The Functional Areas are numbered 4.X-10.X. Sampling was the method used to review the Functional Areas.

### 5.1 Institutional Level

The Institutional Level review was approached by examining the general structure of the ISMS and comparing this with the criteria and expectations outlined in DOE 450.4 policy and guidance to understand the systems provided through Management System Descriptions. These descriptions contain information about individual management systems including purpose, ownership, requirements and drivers, customers and outputs, system operations and responsibilities. Key Management Systems were reviewed that provide an overview of the PNNL system. Management System Descriptions specifically examined: Integrated Environment, Safety and Health; Integrated Assessment Program; Project Management; Facility Operations, and Standards-Based Management System.

### 5.2 Facility Level

The review approach for the Facility Level functions was shaped by the landlord/tenant relationship between F&O and the R&D organizations. Facility operations work is governed by several key management systems, including Facility Operations, Maintenance, Facility Safety, Integrated ES&H, Worker Safety and Health, and Life-Cycle Asset Management. The authorization envelope for each facility is established in the Facility Use Agreement (FUA). The management system descriptions, several FUAs, as well as PNNL's manuals for Maintenance Services (MA-761), Operations (MA-50), and Safety Analysis (MA-44) were reviewed. The Authorization Agreements established for the PNNL facilities were explored for adequacy of coverage and linkage to the overall principles and function of ISM. The relationship between the various portions of the authorization envelope were verified to determine if they met the intent of a tailored ISM as prescribed by guidance to DOE 450.4. Building 325, a Category II nuclear facility, was reviewed for the higher level controls and accountability commensurate with that designation.

Several facilities were selected as the primary targets for review. All facilities were open to the team and examined as time allowed or as inquiries directed. However, in order to develop the broadest and most complete view of the PNNL F&O system, several high, intermediate and low hazard facilities were pre-selected by the RL Line organization. The depth of implementation within each of these facilities was examined and compared against the CRADS and governing principles and values. A top down approach was used following the trail of requirement and implementation from top levels of facility management to the basic working levels. The ties or connections between the facilities team and the R&D groups was also examined. Aspects of work control, authorization agreements and configuration management were reviewed to show they existed between these functional lines.

### 5.3 Research and Development Activity Level

The R&D Activity Level for the Laboratory consists of individual projects that are undertaken to accomplish the missions and objective of the organization. Individual projects range is size from bench-top, day long projects to large, pilot scale activities. PNNL's project management is described in both a Management System Description and in Subject Areas. The team approached the Activity Level review by examining the project management system and tracking individual projects through their life cycle, and mapping performance against the established criteria in the CRADS.

Projects for review were selected from a listing of new, ongoing, and completed projects. This listing was supplied by the contractor and included a categorization of the projects as to general size, complexity, and hazard potential. Selecting some projects that were in various stages of the business process allowed the reviewers to ascertain the degree to which the ISMS functions and values had been implemented. Since many projects were functionally located in several facilities, beyond those pre-scheduled, the team reviewing the R&D activities had the opportunity to view an expanded view of facility operations and the relationship between the line (R&D) organizations and F&O.

The various tools and programs used to manage and control projects were reviewed. Emphasis was placed on exploring the maturity of the governing ISM processes controlling project life cycles. Work controlling and authorizing mechanisms were explored including the Prep and Risk form and Project Management Plans as described in the Project Management Subject Area. Due to their crosscutting nature, some of these processes were examined by more than one sub-team.

Interviews were held with key line management as well as the individual project managers and their staff, when needed, to track against the business process. As the Laboratory places great importance on the cognizance and authority of individual managers, roles and responsibilities were examined as well as staff qualification and competence.

Project work control is exercised and maintained through the Project Management System Description.

### 5.4 Functional Areas

Six functional areas were chosen to provide vertical slices through the ISM levels described above. Some of these areas represent topics of current interest while others cover basic elements of the work within the Laboratory. The areas covered were: Chemical Safety, Environmental Compliance, Radiation Protection, Hazards Analysis, Self-Assessment (450.5), and Operational Discipline. Single subject matter experts were assigned to follow each functional area.

The intent was to examine the flow of the ISMS processes through and against a background represented by the individual Functional Areas. The focus was on exploring process rather than compliance by adhering to the line of questioning provided by the CRADS.

### 5.5 Preparation

The preparation for this review was vital to producing a robust, credible product. The variation between a multi-purpose laboratory and general production facilities is significant enough to warrant additional preparatory effort. Team members prepared for the assessment through study of the following documents: The PNNL ISMS Verification Plan, DOE P 450.4, DOE G 450.4, PNNL ISMS Program Description, PNNL Self Assessment.

Additionally, the Team Leader conducted the Executive Course on ISM and training on the DEAR clause for all team members on the first day of the verification review.

The team leader reviewed qualifications and training prior to the verification. The team leader finalized preparations by recommending to the RL Manager specific dates and provided the final verification plan for approval.

### 5.6 Process

The team used the criteria set forth by the Criteria Review and Approach Documents (CRADS) found in Volume II of this report for ascertaining the Laboratory's adherence to the functions and principles of an integrated Safety Management process and the field implementation of that program. Sub-team leaders were responsible for conducting their investigations, for ensuring that all assigned CRADS were fully evaluated, and that the appropriate documentation was prepared.

## 6.0 ADMINISTRATION

**Team Composition and Organization**
Emil D. Morrow, Senior Technical Advisor, Office of the Assistant Secretary, Defense Programs, was named Team Leader for the PNNL ISMS Verification Review.

Team members were selected based upon the following criteria established by the Under Secretary of Energy Memorandum of 21 February 1997:

- established expertise in one or more functional areas
- appraisal experience
- familiarity with the site
- knowledge, understanding, and training on Integrated Safety Management

Team qualification was validated by the Team Leader and documented in accordance with the Qualification Summary which is attached to this report.

### 6.1 Site Coordinator and Support

RL and contractor staff assisted the team and provided support as needed during the visit. The Science and Technology Operations Division (STO) hosted the team and provided the primary support. Roger Christensen was the STO Director. Craig Richins was the principle point-of-contact. PNNL provided hosts for each of the sub-teams. These hosts coordinated interviews, gathered requested documentation, and provided transportation and ready access to facilities. Office and conferencing space was set aside for the visiting team.

### *6.2 Schedule*

The review was conducted from June 8 and continued through June 19, 1998. The first two days were spent receiving the requisite ISMS training and in gaining on-site training, familiarization and instruction.

The daily schedule included a brief morning kickoff with team members. Close-outs were held at 5 p.m. each day with an emphasis being placed on sharing crosscutting issues and exploring potential avenues for the next day's review. The close-outs included participation by the Laboratory. A final close-out briefing was conducted with the Laboratory and with the RL manager and staff.

## 7.0 CONCLUSION

The team found that the PNNL ISMS Description and enabling documents and processes conform to the guidance provided by the Manager, DOE-RL, and the requirements of the DEAR clause. The team recommends that the ISMS Description be approved contingent on the satisfactory resolution of the three areas of concern, namely, Authorization Agreements, maintenance deficiencies, and USQ deficiencies.

Managers have effectively tailored corporate policy and enabling documents and processes for the specific mission and hazards of their facilities. Safety management has been implemented by a Standards Based Management System and supplementing procedures and processes. The degree of implementation varied across the Laboratory. The team expressed concern about the lack of consistency of implementation. There are areas for improvement as noted in this report. PNNL has a robust self-assessment program, supported by senior management which should drive improvement in implementation.

## 8.0 LIST OF DEFICIENCIES

The numbers that precede the deficiency correspond to the Assessment Forms and associated Criteria Review and Approach Document.

1.5 PNNL's Independent Oversight Organization does not validate Self Assessments as specified in DOE P 450.5 (Line Environment, Safety And Health Oversight) under Key Elements Of Line ES&H Oversight Process (Line and independent evaluations).

1.7 There is a lack of organizational structure for ensuring a uniform level of competency regarding ES&H for research and development projects.

4.3 The PNNL and Building 325 USQ procedures do not meet the guidelines of Order 5480.21. Additionally, DOE approval of the PNNL USQ procedure has not been obtained.

4.3 The USQ process is not being implemented according to the procedures defined by PNNL. Formality in implementing USQ screens/evaluations needs improvement.

5.3 The self-assessment program implementation at Bldg. 331 has not been effective in the area of radiological control. Line management at 331 should request assistance from the radiological control organization. Several examples are cited in Assessment Forms 5.1 and 5.2.

7.1 The clear understanding of responsibility and authority for ES&H performance by line management is not always clear and unambiguous in all areas as required by DOE ISMS requirements.

8.1-
8.5 The implementation of chemical safety into planning, hazards analysis, and work practices is being met in some facilities but not all. Chemical controls and feedback systems require improvement at some facilities.

10.1 The Authorization Agreement developed for PNNL was not consistent with the intent of the Corporate FRAM. RL has committed to developing guidance on when an Authorization Agreement is required and what is expected of an Authorization Agreement, but has not yet issued this guidance. Additionally, guidance in the Corporate FRAM required improvement.

## 9.0 LIST OF AREAS FOR IMPROVEMENT

The numbers that precede the deficiency correspond to the Assessment Forms and associated Criteria Review and Approach Document.

1.5 PNNL Line Managers should use Self Assessment results to identify Root Causes and Trends which can be utilized to make improvements and for closure of Self Assessment deficiencies.

1.5 DOE/RL has noted in a previous assessment that there has been improvement in this area.

1.5 Worker participation in PNNL's Self Assessment Program needs to be strengthened.

1.7 There appears to be laboratory-wide inconsistency amongst PNNL line managers in performing research and development activities for "assuring and validating" that all applicable ES&H requirements are clearly understood and communicated by bench scale research.

1.7 There appears to be an over-reliance and dependence by PNNL line supervisors to define ES&H training requirements for bench scale research staff without conducting a detailed job task analysis to better understand and define all ES&H risks and vulnerabilities.

2.2 There is a need for a formal Lab-wide system that provides the building Manager with real-time information on whether the aggregate of the various R&D projects conducted in the building has caused the FUA operational boundary limits for hazard sources to be exceeded.

2.5 Building managers do not receive adequate feedback information from Chemical Management and Prep and Risk programs. Improvement is needed at both the programmatic and implementation levels. PNNL has noted this as a gap.

2.5 The ability of the building Manager to effect change within a resident R&D program was tenuous in some cases. It is unclear whether this is solely a function of the respective R2A2s or whether the system of feedback and analysis is not providing sufficient data to the decision makers.

2.5 The lessons learned program does not adequately follow-up on how line organizations use the information provided.

3.1 Additional detail needs to be provided for parts of the ISMS documentation (i.e., Management System Description for Project Management, LDRD Subject Area, Occupant/Facility Mission Statements).

3.2 Complete implementation of the use of Project Management Plans needs to occur.

3.2 Project Managers do not consistently utilize the ES&H resources during the development of all project plans and associated Prep and Risk approval forms for assistance in hazard identification and analysis. Evidence indicated that ES&H resources are generally utilized for reviewing high ES&H risk projects, however not usually utilized for routine or repetitive projects perceived as having lower ES&H risks.

3.3 Cognizant Space Manager (CSM) roles and responsibilities are identified in the EMSL Integrated Operations System, PNNL EMSL Practice, General Requirements & Guidelines, dated April 30, 1998. The CSM is charged with the responsibility of ensuring that all activities within the workspace laboratory have been evaluated for risk and that adequate mitigating controls are identified and utilized. The CSM has a key interface role between the facility operations management and the appropriate Technical Group Manager. Because of this unique responsibility to ensure safe, effective and compliant operations, it is suggested that the CSM role be included in the SBMS R2A2.

3.3 Specific administrative controls related to some hazardous operations are informally communicated to laboratory workers instead of being formally documented in the project work package or procedures. Examples of this situation were identified as follows: 1) electronic mail was used to communicate change in operation of laboratory fume hood, and the change was not documented in the procedure (Plutonium Immobilization Project, 325 Facility); 2) informal communication among hot cell operators was used regarding

access controls for high radiation areas associated with hot cell operation (Radioisotope Production Project, 325 Facility).

3.3 Currently, Environmental Compliance Representatives are electronically notified if answers to the environmentally related questions in the Prep and Risk are answered in the affirmative. Other than for facilities operating with the Integrated Operations System, PNNL should consider electronic notification of S&H representatives when S&H related questions in the Prep and Risk are answered in the affirmative.

3.4 Consider establishing a more formal standard work authorization approval process and documentation for resumption of research project work after a building outage or dormant period.

3.6 Improve consistency between the R2A2s in SBMS and the Project Management Subject Area.

3.6 As MA-50 is sunsetted, clearly document R2A2s for Laboratory Monitors.

3.7 Formal structure for determining training for the PM and CSM positions should be documented and understood to help in the identification of hazards associated with their R&D activities and work conducted in a laboratory space.

4.1 Limitations described in Facility Use Agreements should be routinely included with the engineering documents transmitted by a letter of instruction. This would make the external organization aware of the limits and provide a means for the Field Engineer to familiarize himself/herself with the facility specific limitations as the work is being performed.

4.2 As discussed under the results of record reviews, the function and responsibilities of the Facility Core Team need to be better institutionalized.

4.5 Identifying key safety responsibilities could enhance the R2A2 descriptions for senior managers (e.g., Level 1 and Level 2).

4.5 Section 3 of the Facility Operations Management System Description should be revised to include the Core Team function.

5.1 Not all Facility Use Agreement (FUA) identify numerical limitations on quantities of radionuclides that can be handled at the facility.

5.1 Radiological control training for Project Managers, Principle Investigators or other line management personnel needs to be improved to meet the criteria that personnel competence is commensurate with their assigned responsibilities.

5.1 The EMSL GERT film needs to be modified to correctly state appropriate response to a CAM alarm.

5.2 The High Radiation Area controls for the hot cell in Bldg. 325, Lab 23, do not meet applicable guidance from the Department of Energy.

7.1 The assignment of responsibility and authority for ES&H performance to line management is not clear and unambiguous in all areas as required by DOE's ISMS requirements.

9.5 The Independent Assessment program needs to include a validation of the implementation of safety programs by the Line organizations.

9.5 Line organizations need to be more proactive in the identification of PAAA issues during their self-assessment program. Currently, the significant majority are identified through deficiency tracking systems.

10.1 There is an issue related to the DOE implementation of the readiness review process. This issue was previously identified and the RL Manager has committed to addressing it with his staff and taking corrective action.

10.2 The FR program has been understaffed for three years. The under staffing has contributed to a lack of performance of required oversight activities.

## 10.0 NOTEWORTHY AND GOOD PRACTICES

The numbers preceding the noteworthy and good practices correspond to the Assessment Form associated Criteria Review and Approach Document.

1.4 The 325 building has instituted an independent review committee for authorizations of facility activities and an integrated operations manual is currently in draft.

2.7 The Building Managers are to receive budgetary control of their facilities in FY99. As the Building Managers assume new roles within the Laboratory business strategy, care should be taken to provide for the additional knowledge base and resources that will be required.

3.1 The documentation of an ISMS for the scope of work and balancing of priorities is sufficiently detailed.

3.1 The implementation of ISMS for the scope of work and balancing of priorities is generally good.

3.3 The EMSL Integrated Operations System provides additional tools for the laboratory staff and visitors to use in understanding and mitigating the hazards specific to each of the EMSL laboratories. This system provides tools to conduct laboratory self assessments, manage laboratory access and determine training requirements related to laboratory specific hazards. Additionally, each EMSL laboratory has a laboratory handbook that contains the following

information tailored to the specific laboratory hazards and hazard mitigation: a hazardous awareness summary, a self-assessment checklist, necessary permits, and standard practices and guidelines for working with the laboratory hazards. The Integrated Operations System is in full operation in the EMSL. The transition to such a system across PNNL has not yet been decided. However, the Facility Managers for other facilities, such as the 325, 331, and PDL-E facilities, within the Environmental Technology Division recognize the value of the system and are choosing to transition to the Integrated Operations System.

3.5 Of the four PNNL Divisions, the NSD appears to be the leader in integrating ES&H into the self-assessment process with the establishment of an ES&H self-assessment program. In the past year, the EHSD has made significant improvements in its overall self-assessment program.

3.5 As defined in the ISMS Description, self-assessment programs, a peer review process, independent oversight, and internal auditing are in place and are effectively operating at the Associate Laboratory Director (ED, EHSD, ETC, and NSD) level.

3.5 Both Technical Group Managers (TGM) and Project Managers (PM) appear to be implementing frequent (often daily) walkthroughs of their laboratories.

3.5 As required in the Verification of Execution if Responsibilities & Accountabilities in Building Facility Use Agreements, most line managers are not only conducting annual ES&H walkthroughs, they are doing them on a quarterly basis.

3.6 R2A2s for specific tasks were further defined in some project management plans, position descriptions and staff development and performance reviews.

3.6 Laboratory Handbooks identifying hazards, controls, training, and R2A2s for CSMs, specific to a laboratory space are available in EMSL laboratories.

3.6 The Cognizant Space Manager is a good concept and implementation of this concept should continue to be expanded in a timely manner.

3.7 The National Security Division should continue developing and testing the computer-based project management training program. If successful, the program should be incorporated into the training and qualification program as well as the SBMS. This training program will help provide Project Managers and Product Line Managers an understanding of the project management system, their R2A2 and the identification of project risks prior to filling out the Risk and Prep.

6.3 The review of the Project Management Form, the discussions with the TRMs, TGMs, Research Group Leaders, and Researchers, their levels of education/training and their years of experience showed a very high level of competence in the performance of R&D work at PNNL and the identification and control of hazards.

## 11.0 LESSONS LEARNED

Pre-Visit Elimination

The use of the electronic means is essential for effective coordination and preparation of the review when no pre-visit is planned.

The Team should participate on at least two conference calls with the possibility of additional conference calls amongst the sub-teams. This would lead to an early understanding of assigned areas and assist in the development of the line of inquiry and interview list prior to the review.

The Team should complete the Team Member Qualification Summary at least one week prior to the visit.

Each team member should complete as much of the required training for site access and review participation prior to the visit. (i.e., ISMS Course, DOE General Employee Radiation Training).

The PNNL ISMSV Team was formed one month in advance of the review. A longer lead time of two months is recommended.

A majority of the team should be well versed in the verification process.

Phase I and II Combination

The development of final CRADS, a draft line of inquiry, performance evolutions and preliminary interview lists should be prepared by the Team and provided to the Team Leader for action at least one week prior to the visit.

The sub-teams must ensure that they stay focused on the Phase I (written description) portion of the review before entering the field and beginning the Phase II (implementation) portion of the review.

The contractor's presentation of the Integrated Safety Management System Description (ISMSD) is critical in providing an understanding of the systems, processes, facilities and points of contact to the entire Team. This assisted in the coordination of review activities by Team members.

General

The horizontal and vertical structure of the review was beneficial in ensuring the verification of the ISMS. The Institutional, Facilities and Activity sub-teams provided a horizontal perspective while the subject matter experts provided a vertical perspective.

Care must be taken to ensure that the Institutional, Facility and Activity Teams stay focused on the appropriate areas of review and do not duplicate effort by straying out of their assigned level for review. This may be accomplished by effective communication between sub-team leads and the Team Leader.

Consideration should be given to providing a general site tour to provide the Team with a common understanding regarding the nature and extent of site related activities and associated facilities.

The contractor and DOE hosts being assessed should be given an opportunity to provide feedback on the verification process. A survey questionnaire is one method.

## TEAM LIST AND ASSIGNMENT AREAS

| TEAM MEMBER | ASSIGNMENT |
|---|---|
| Emil Morrow | Team Leader |
| Roger Christensen | Support / Assistant Team Leader |
| Jack Zimmerman | Technical Advisor |
| George Detsis | Technical Advisor |
| John Muhlestein | Institutional Sub Team Lead |
| Ed Parsons | Institutional ISMS |
| Ray Schwartz | Institutional ISMS |
| Devaughn Nelson | Facility Sub Team Lead |
| Craig Richins | Facility ISMS |
| John Adachi | Facility ISMS |
| Paul Bayer | R&D Activity Lead |
| Diane Clark | R&D Activity ISMS |
| Ed Blackwood | R&D Activity ISMS |
| Julie Turner | R&D Activity ISMS |
| Jim Poppitti | Chemical Safety Functional Area |
| Cliff Clark | Environmental Compliance Functional Area |
| Brenda Pangborn | Radiation Protection Functional Area |
| Harold Monroe | Hazards Analysis Functional Area |
| Bill Smoot | Self-Assessment Functional Area |
| Mike Mikolanis | Operations and Maintenance Functional Area |

# ATTACHMENT

# TEAM MEMBER QUALIFICATION SUMMARIES

ATTACHMENT

*Team Member Qualification Summary*

***Name***: John K. Adachi

***Objectives Assigned***: Facilities Subteam

***Employer / Normal Work Assignment***: DOE CH Safety and Technical Services/Lead QA Engineer and CH SMIT Representative

***Summary of Technical Qualifications***:

- B.S. Civil Engineering, Illinois Institute of Technology, 1976
- M.S. Management of Technology, National Technological University, 1995
- 22 years QA/QC experience
- Soil Testing Supervisor, Braidwood Nuclear Station construction project, Illinois, Pittsburgh Testing Laboratory (PTL) 1976-1978
- Construction Materials Inspection/Testing Laboratory Manager, Forked River Nuclear Station construction project, New Jersey, PTL, 1978-1979
- Construction Materials Inspection/Testing Laboratory Manager, Satsop Nuclear Station construction project, Washington, PTL, 1979-1981
- Civil/Structural QA Engineering Supervisor, South Texas Nuclear Station construction project, Texas, Brown & Root, Inc. (B&R), 1981-1982
- QA Engineer, Brown & Root corporate office, Texas, 1982-1983
- Civil/Structural QA Engineer, Midland Nuclear Station construction project, Michigan, B&R, 1983-1984
- QA/QC Supervisor, Great Man-Made River Project, Libya, B&R, 1984-1986
- Regulatory Compliance Engineer, Comanche Peak Nuclear Station construction project, Texas, B&R, 1986-1987
- QA Engineer, Brown & Root corporate office, Texas, 1987-1988
- QA Engineer, CER Corp., Illinois, 1988-1989
- QA Engineer, DOE Chicago Operations Office, Illinois, 1989-1992
- Lead QA Engineer & Team Leader, DOE CH, Illinois, 1992 to present
- DOE TQP General Technical Base, 1997
- DOE Accident Investigation training, 1998

***Summary of Facility Familiarization***:

PNNL New-hire safety orientation
PNNL GERT
PNNL briefings on site and management systems

| ***Required Reading:*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management System Policy | JBA |
| DOE G 450.4 Integrated Safety Management System Guide | JBA |
| PNNL ISMS Program Description | JBA |
| PNNL ISMS Verification Review Plan | JBA |

| ***Training***: | ***Initials*** |
|---|---|
| ISMS Introduction | JBA |
| PNNL ISMS Verification Review Plan | JBA |
| PNNL Tour/Orientation | JBA |

***Team Leader Signature***: Earl D Morrow

*Team Member Qualification Summary*

***Name:*** Paul Bayer

***Objectives Assigned:*** Activity Subteam lead

***Employer/Normal Work Assignment:*** U.S. DOE, Environmental Biologist, ER-74, Office of Biological and Environmental Research

***Summary of Technical Qualifications:***

- MS, Biology, Western Kentucky University, 1984
- Certificate, Environmental Issues, US Dept. Of Agriculture Graduate School, 1988
- 14 years research, consulting, and management experience in biological/health sciences
- 10 years environmental compliance experience (industrial wastewater, explosives management, biological research waste)
- 7+ years private sector project management experience
- 3+ years DOE-HQ line management ES&H experience
- 2 years experience managing electron microscope facility

***Summary of Facility Familiarization:***

3 + years experience managing basic research projects at PNNL - Richland/Sequim
3 years experience providing DOE-HQ management of the EMSL construction project
3 years experience with DOE-HQ line management for ES&H (e.g., ORPS, etc.)
2 years experience managing GPP and GPE funding for PNNL facilities

| ***Required Reading:*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management System Policy | PB |
| DOE G 450.4 Integrated Safety Management System Guide | PB |
| PNNL ISMS Program Description | PB |
| PNNL ISMS Verification Review Plan | PB |

| ***Training:*** | ***Initials*** |
|---|---|
| ISMS Introduction | PB |
| PNNL Tour/Orientation | PB |
| PNNL ISMS Verification Review Plan | PB |

***Team Leader Signature:*** Eric D. Morrow

*Team Member Qualification Summary*

***Name:*** Edward B. Blackwood

***Objectives Assigned:*** R&D (Activity) Subteam Technical Support

***Employer/Normal Work Assignment:*** Director, Radiological Protection Staff, Office of Nuclear and Facility Safety, (EH-3) Office of Environment, Safety and Health. Manage technical radiological assistance as a corporate ES&H function at DOE sites: Richland, Rocky Flats, Idaho, Mound, Fernald, Oak Ridge Y-12, Savannah River, and Nevada.

***Summary of Technical Qualifications:***

- BS Engineering - Nuclear Science, U.S. Naval Academy 1967
- Graduate Naval Nuclear Propulsion 1968
- MBA, University of Maryland 1980
- Qualified DOE-EH Senior Technical Safety Manager Qualification Program 1997
- Chairperson Type A Accident Investigation Team Brookhaven Construction Fatality June1997
- Qualified Engineering Duty Officer (1445), Naval Reserve 1984

***Summary of Facility Familiarization:***

Radiological Oversight visit at PNNL 1993
Radiological Assistance visits at PNNL - 1994-97

| ***Required Reading*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management System Policy | EBB |
| DOE G 450.4 Integrated Safety Management System Guide | EBB |
| PNNL ISMS Program Description | EBB |
| PNNL ISMS Verification Review Plan | EBB |
| ISMS Verification Process Team Leaders Handbook | EBB |
| ISMS DEAR Clauses | |

| ***Training*** | ***Initials*** |
|---|---|
| ISMS Introduction, Executive Course, Train the Trainer Course | EBB |
| PNNL Tour/Orientation | EBB |
| PNNL ISMS Verification Review Plan | EBB |

***Team Leader Signature*** Emil D Morrow

## *Team Member Qualification Summary*

***Name:*** Roger F. Christensen

***Objectives Assigned:*** Assist Verification Team Leader

***Employer/Normal Work Assignment:*** DOE RL/ Director for Science and Technology Operations

***Summary of Technical Qualifications:***

- BSME, University of Washington, 1979
- 19 years professional engineering experience
- 13 years supervisory engineering experience
- US Navy, Radioactive Material Worker, 1975
- US Navy, Reactor Power Plant Operator, 1976
- US Navy, Shift Refueling Engineer, PSNS, 1983
- US Navy, Chief Refueling Engineer, PSNS, 1986
- DOE, Hazardous Waste Operations, (40Hr), 1990
- DOE, TQP General Technical Base, 1995
- DOE, TQP Technical Manager, 1995
- DOE, TQP Senior Technical Safety Manager, 1997
- DOE, ESH&QA training exceeds 600 hours
- DOE, Program/project management training exceeds 200 hours
- DOE, Supervisory/management training exceeds 200 hours
- USCGR, Commander, Emergency Preparedness Liaison Officer, FEMA X

***Summary of Facility Familiarization:***

- 11 years Hanford Site engineering experience
- 8 years Hanford Site supervisory engineering experience
- 6 years DOE oversight/direction of PNNL
- ISMSV team member on Hanford/K-Basins phase 1 review, 1998

| ***Required Reading*** | ***Initials*** |
|---|---|
| ***DOE P 450.4 Safety Management System Policy*** | Roger |
| ***DOE G 450.4 Integrated Safety Management System Guide*** | Roger |
| ***PNNL ISMS Program Description*** | Roger |
| ***PNNL ISMS Verification Review Plan*** | Roger |

| ***Training*** | ***Initials*** |
|---|---|
| ***ISMS Introduction*** | Roger |
| ***PNNL Tour/Orientation*** | Roger |
| ***PNNL ISMS Verification Review Plan*** | Roger |

***Team Leader Signature*** Earl D Morrow

*Team Member Qualification Summary*

*Name:* Clifford E. Clark

*Objectives Assigned:* Environmental Compliance

*Employer/Normal Work Assignment:* U.S. Dept of Energy/ Team Leader – Permits and Compliance Assurance

*Summary of Technical Qualifications:*

- B.S. Chemistry and Mathematics
- M.S Environmental Science
- 25+ years experience in environmental field - public and private sector
  - municipal water treatment and distribution
  - municipal waste water treatment
  - environmental planner with regional planning agency
  - compliance inspector with EPA
  - environmental adviser for Hawaiian sugar company
  - 15 years experience with DOE in environmental field
    - environmental program manager at INEL
    - permit and compliance assurance team leader at Hanford
    - participant in several environmental inspections/audits of DOE facilities

*Summary of Facility Familiarization:*

- 9 years at Hanford
- Several previous visits to 305-B, 324, 325 and other 300 Area buildings and facilities

| *Required Reading* | *Initials* |
|---|---|
| *DOE P 450.4 Safety Management System Policy* | CEC |
| *DOE G 450.4 Integrated Safety Management System Guide* | CEC |
| *PNNL ISMS Program Description* | |
| *PNNL ISMS Verification Review Plan* | |

| *Training* | *Initials* |
|---|---|
| *ISMS Introduction* | CEC |
| *PNNL Tour/Orientation* | CEC |
| *PNNL ISMS Verification Review Plan* | CEC |

*Team Leader Signature* Emil W Morrow

*Team Member Qualification Summary*

***Name:*** Diane L. Clark

***Objectives Assigned:*** Activity Level Subteam

***Employer/Normal Work Assignment:*** U.S. Department of Energy, Richland Operations Office/ Safety Team Lead, Tank Waste Remediation Systems

***Summary of Technical Qualifications:***

- BS, Environmental Health, Colorado State University, 1981
- MS, Radiology & Radiation Biology, Colorado State University, 1982
- 17 years professional experience in the areas of environmental, safety and health
- 4 years supervisory experience of technical professionals
- US DOE, Radiation Worker, 1982-1998
- US DOE, Hazardous Waste Operations, (40 hr) 1988-1998
- US DOE TQP General Technical Base, 1998
- US DOE TQP Radiation Protection, 1998
- US DOE TQP Occupational Safety, 1998
- US DOE TQP Industrial Hygiene, 1998
- US DOE TQP Environmental Compliance, 1998
- US DOE TQP Waste Management, 1998
- US DOE TQP TWRS Office/Facility Specific, 1998
- US DOE Radiological Assessment Program Team Leader, Region 8, 1996-1998

***Summary of Facility Familiarization:***

- 8 years Hanford Site environmental, safety and health oversight experience of PNNL
- 2 years Hanford Site line management oversight/direction of the RL Management and Integration Contractor, Tank Waste Remediation Systems Project

| ***Required Reading*** | ***Initials*** |
|---|---|
| Letter of Appointment | |
| DOE P 450.4, Safety Management Policy | |
| PNNL Verification Review Plan | |
| PNNL ISMS Plan | |

| ***Training*** | |
|---|---|
| Hanford General Employee Training | |
| GERT Training | |
| ISMS Introduction | |
| Facility/Site Indoctrination | |

***Team Leader Signature*** Earl D Morrow

*Team Member Qualification Summary*

***Name:*** George E. Detsis

***Employer/Normal Work Assignment:*** U. S. Department of Energy (DOE), Headquarters, Office of Worker Safety and Health, Office of Field Support, EH-53, Physical Scientist

***Objectives Assigned:*** Technical Advisor to Team Leader, Technical Advisor to Institutional Sub-team Leader

***Summary of Technical Qualifications:***

- Master of Science, Environmental Sciences (University of Washington); Bachelor of Science, Natural Resource Management (University of Maryland)
- 21 years of professional environment, safety and health experience within the Federal Government
- DOE, EH Technical Standards Program Manager for the Assistant Secretary for Environment, Safety and Health (ES&H)
- DOE, Co-lead for Technical Standard 1120-98, "Integrating ES&H into Facility Disposition Activities"
- DOE, Team Leader of ES&H Progress Assessment Reviews, Environmental Audits, Management Subteams
- DOE, Environmental Compliance Officer, Office of Defense Programs, Office of Military Applications
- DOE, Certified Auditor, and Certified Accident Investigator
- U.S. Department of the Interior (DOI), Team Leader of Environmental Impact Statements/Environmental Assessments
- DOI, Bureau of Land Management, Oregon State Office, Policy Analyst for Land Use Planning/Natural Resource Management
- Legislative Assistant for Energy and Environment, U. S. Congressman Lloyd Meeds

***Summary of Facility Familiarization:***

- Hanford Site Tiger Team Assessment, Technical Coordinator (1990)
- DOE, Office of Field Support, technical assistance on enhanced work planning (job hazard analysis), (1996-97)

| ***Required Reading*** | **Initials** |
|---|---|
| Letter of Appointment | G. E. D. |
| DOE P 450.4 Safety Management Policy | G. E. D. |
| PNNL Verification Review Plan | G. E. D. |
| PNNL ISMS Plan | G. E. D. |

| ***Training*** | **Initials** |
|---|---|
| Hanford General Employee Training | J.E.D. |
| GERT Training | J.E.D. |
| ISMS Introduction | J.E.D. |
| Facility/Site Indoctrination | J.E.D. |

***Team Leader Signature*** Emil D Morrow

Team Member Qualification Summary

***Name:*** Michael A. Mikolanis

***Employer/Normal Work Assignment:*** DOE Headquarters, Office of the Departmental Representative to the DNFSB, S-3.1

***Objectives Assigned:*** Functional Area of Conduct of Operations and Maintenance

***Summary of Technical Qualifications:***

- B.S. Nuclear Engineering
- M.S. Environmental Engineering (A.B.T.)
- Licensed Professional Engineer (Maryland)
- 14 years experience with nuclear operations and maintenance
- 10 years supervisory experience
- 3 years overhaul experience
- 3 years in licensing operations at commercial nuclear utilities
- Bechtel Power Corporation Nuclear Engineer of the Year, 1993
- Certified Master Training Specialist

***Summary of Facility Familiarization:***

Operations and maintenance subject matter expert for ISMS verification at K-Basins
3 years Hanford Issue Lead experience, S-3.1

| ***Required Reading*** | ***Initials*** |
|---|---|
| Letter of Appointment | |
| DOE P 450.4 Safety Management Policy | |
| PNNL Verification Review Plan | |
| PNNL ISMS Plan | |

| ***Training*** | ***Initials*** |
|---|---|
| Hanford General Employee Training | |
| RADWORKER II Qualification | |
| ISMS Introduction | |
| Facility/Site Indoctrination | |

***Team Leader Signature:*** Cindy S. Mercier

*Team Member Qualification Summary*

***Name:*** Harold J. Monroe, III

***Objectives Assigned:*** Hazards Identification/Analysis

***Employer/Normal Work Assignment:*** DOE - Oak Ridge Operations (ORO) / ES&H Team Leader at the Oak Ridge National Laboratory (ORNL)

***Summary of Technical Qualifications:***

- Health Physicist
- ES&H Team Leader, at the ORNL site office(Feb. 1995- Present)
- DOE Chief, Nuclear Safety Branch (Dec. 1990- Feb. 1995) Supervised health physics, fire protection, criticality safety, transportation safety, ORPS and performance indicator activities for all of Oak Ridge Operations
- DOE representative in the LMER (ORNL) ISMS Steering Committee, LMER ES&H Reengineering Task Group, and the LMER Work Smart Standards (WSS) Confirmation Team
- DOE-ORO Radiological Control Manager (1992 - 1996)

***Summary of Facility Familiarization:***

PNNL GERT
PNNL site presentations

***Required Reading*** ***Initials***

DOE P 450.4 Safety Management System Policy
DOE G 450.4 Integrated Safety Management System Guide
PNNL ISMS Program Description
PNNL ISMS Verification Review Plan

***Training*** ***Initials***

ISMS Introduction
PNNL Tour/Orientation
PNNL ISMS Verification Review Plan

***Team Leader Signature*** Emil d Monroe

*Team Member Qualification Summary*

*Name:* Emil D. Morrow

***Employer/Normal Work Assignment*:** DOE/ Senior Technical Advisor, Defense Programs

***Objectives Assigned*:** Verification Team Leader

***Summary of Technical Qualifications*:**

- ☐ B.S. U.S. Naval Academy
- ☐ M.S. The George Washington University
- ☐ DOE – three years
- ☐ Assistant Director, Safety Management Implementation Team
  - ☐ Directed efforts to develop several ISM tools
- ☐ Member, two previous verification teams
- ☐ U.S. Navy; Nuclear Power; 30 years
  - ☐ Founding Director of a nuclear technical school
  - ☐ Commanded 2 nuclear submarines
  - ☐ Member, Nuclear Power Examining Board

***Summary of Facility Familiarization*:**

- ☐ One day of briefs
- ☐ Two tours
- ☐ Self study

***Required Reading*** **Initials**

Letter of Appointment
DOE P 450.4 Safety Management Policy
PNNL Verification Review Plan
PNNL ISMS Plan

***Training*** **Initials**

Hanford General Employee Training
GERT
ISMS Introduction
Facility/Site Indoctrination

***Team Leader Signature*** _____

*Team Member Qualification Summary*

*Name:* John S. Muhlestein

***Employer/Normal Work Assignment***: U.S. Dept. Of Energy/ Oakland Operations Office, Stanford Site Office Director (SLAC)

***Objectives Assigned***: Institutional Sub Team

***Summary of Technical Qualifications***:

- B.S. in Chemistry (Physics & Math Minors) from B.Y.U., Provo, Utah
- MBA in Management from Calif. State Univ., Hayward, CA
- Director, DOE/OAK Stanford Site Office (SLAC) since 1990 DOE/ERDA/AEC (OAK) Program/Project Mgmt since 1973 including:
- Breeder Reactors, Light Water Reactors, High Temperature Gas Cooled Reactors, Waste Management, Fusion Energy (Doublet III, TMX, MFTF-B) , Atomic Vapor Laser Isotope Separation (U/Pu-AVLIS)
- ES&H On-Site Representative at Rocky Flats, CO from 3/88 to 7/88
- Nuclear Safeguards Inspector for International Atomic Energy Agency in Vienna, Austria from 1981 to 1985
- Naval Officer aboard U.S.S. Enterprise (CVAN-65) from 1968 to 1971
- Analytical Chemist with U.S. Steel in Orem, Utah and Lost River Alaska in 1965 and 1967

***Summary of Facility Familiarization***:

LMFBR Research and Components Development related to the FFTF

***Required Reading*** **Initials**

Letter of Appointment
DOE P 450.4 Safety Management Policy
PNNL Verification Review Plan
PNNL ISMS Plan

***Training*** ***Initials***

Hanford General Employee Training
GERT Training
ISMS Introduction
Facility/Site Indoctrination

***Team Leader Signature*** Emil D Morrow

*Team Member Qualification Summary*

***Name:*** DeVaughn R. Nelson

***Objectives Assigned:*** Facility Subteam Lead

***Employer/Normal Work Assignment:*** DOE ER/Senior Health Physicist

***Summary of Technical Qualifications:***

- BA, St. John's University, 1956
- MS, Vanderbilt University, 1958
- PhD, University of Tennessee, 1968
- 12 years research experience
- 25 years ES&H regulatory and radiation protection standards experience
- US Army, Reactor Safety, 1959
- Physics Instructor, St John's University, 1959-60
- Physics Research, Oak Ridge National Laboratory, 1960-72
- USAEC, Directorate of Licensing, Environmental Project Manager, 1972-74
- USEPA, Federal Radiation Council (FRC), Presidential Guidance: Radiation Protection Guidance to Federal Agencies, Occupational Workers & Use of Diagnostic X Rays
- USDOE, EH Coordinator, Advisory Panel on Accelerator Radiation Safety (APARS)
- USDOE, EH Manager, DOE 5480.11, Radiation Protection for Occupational Workers
- USDOE, ER Manager, DOE 5480.25, Safety of Accelerator Facilities
- USDOE, ER Manager, ER Emergency Management Program
- USDOE, ER Member, DSC SPAT 12 - Attributes of Effective Implementation

***Summary of Facility Familiarization:***

- ER Manager, Approval - EMSL Accelerator Hazard Classification
- ER Team, PNNL Institutional Review - 1995

| ***Required Reading*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management System Policy | |
| DOE G 450.4 Integrated Safety Management System Guide | |
| PNNL ISMS Program Description | |
| PNNL ISMS Verification Review Plan | |

| ***Training*** | ***Initials*** |
|---|---|
| ISMS Introduction | |
| PNNL Tour/Orientation | |
| PNNL ISMS Verification Review Plan | |

***Team Leader Signature*** _____

## *Team Member Qualification Summary*

***Name:*** Brenda M. Pangborn

***Employer/Normal Work Assignment:*** Radiological Control Manager

***Objectives Assigned:*** Radiation Protection

***Summary of Technical Qualifications:***

- BSCE, University of Washington, 1980
- DOE, TQP General Technical Base 1997
- DOE, TQP Radiation Protection, 1997
- American Board of Health Physics, Part I, 1996
- ESH Hazardous Waste Operations, 1994
  - Health Physics for DOE Facility Representatives
  - Radiological Worker II
  - Health Physics Fundamentals
  - Operations Radiation Protection
- Root Cause Analysis, Introduction and Techniques
- Auditing Methods for Lead Auditors, 1994
- Conduct of Operations Assessment – Classroom and Field
- Nuclear Chemistry
- Project Planning

***Summary of Facility Familiarization:***
2 years experience at DOE RL in Performance Assessment Division
2 years as DOE-RL Radiological Control Manager

| ***Required Reading*** | ***Initials*** |
|---|---|
| Letter of Appointment | BP |
| DOE P 450.4 Safety Management Policy | BP |
| PNNL Verification Review Plan | BP |
| PNNL ISMS Plan | BP |

| ***Training*** | ***Initials*** |
|---|---|
| Hanford General Employee Training | BP |
| RADWORKER II Qualification | BP |
| ISMS Introduction | BP |
| Facility/Site Indoctrination | BP |

***Team Leader Signature*** _____

*Team Member Qualification Summary*

***Name:*** Ed Parsons

***Objectives Assigned:*** Member - Institutional Team

***Employer/Normal Work Assignment:*** DOE RL/ Senior Technical Advisor, Environment, Safety and Health

***Summary of Technical Qualifications:***

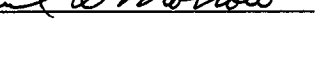
- Certified Health Physicist, Comprehensive, American Board of Health Physics
- 23 years professional experience in the nuclear industry
- 20 years professional supervisory experience
- 17 years commercial nuclear power experience
- 8 years decommissioning experience
- 3 years business development for a waste management company
- 2 years private consultant
- 2 years consulting health physicist for a medical physics company
- Technical expert to IAEA for ratification of the International Basic Radiation Safety Standards
- Member IAEA Technical Council, Radiation Protection in Decommissioning of Nuclear Facilities
- Project Radiation Protection Manager for decommissioning of a commercial nuclear power plant
- DOE, TQP General Technical Base
- DOE, TQP Radiation Protection

***Summary of Facility Familiarization:***

Member, DOE training audit team for PNNL, 1997
1½ years Hanford Site technical advisory experience, ES&H

| ***Required Reading*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management System Policy | |
| DOE G 450.4 Integrated Safety Management System Guide | |
| PNNL ISMS Program Description | |
| PNNL ISMS Verification Review Plan | |

| ***Training*** | ***Initials*** |
|---|---|
| ISMS Introduction | |
| PNNL Tour/Orientation | |
| PNNL ISMS Verification Review Plan | |

***Team Leader Signature*** 

## *Team Member Qualification Summary*

***Name:*** James A. Poppiti

***Objectives Assigned:*** Chemical Safety

***Employer/Normal Work Assignment:*** RL/TWRS/SCD

***Summary of Technical Qualifications:***

- PhD in Chemistry, 1987, The George Washington University
- TWRS Waste Characterization Project Manager since 1996
- DOE HQ Hanford Waste Characterization 1994
- DOE Manager for Sampling and Analysis Chemical and Physical Methods Compendium 1992
- SAIC Staff and Laboratory Chemist Supervisor 1988
- Finnigan MAT Environmental Marketing Manager and Engineering Manager 1986
- EPA Delisting Program Manager 1980
- FDA Mass Spectroscopist 1978
- Passed Part I for Certification by ABHP

***Summary of Facility Familiarization:***

TWRS 18 months

| ***Required Reading*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management System Policy | JAP |
| DOE G 450.4 Integrated Safety Management System Guide | JAP |
| PNNL ISMS Program Description | JAP |
| PNNL ISMS Verification Review Plan | JAP |

| ***Training*** | ***Initials*** |
|---|---|
| ISMS Introduction | JAP |
| PNNL Tour/Orientation | JAP |
| PNNL ISMS Verification Review Plan | JAP |

***Team Leader Signature*** E M Donnow

***Team Member Qualification Summary***

***Name:*** Craig Richins

***Objectives Assigned:*** Facilities sub-team

***Employer/Normal Work Assignment:*** Team Lead- Science and Technology Operations Division, DOE-RL

***Summary of Technical Qualifications:***

- 14 years government operations and programs
- 10 years Qualified Facility Representative
- 8 years as program manager for nuclear fuel and material production, isotopic separations, space reactors, and facility decommissioning
- 4 years as Team Lead overseeing PNNL operations and ES&H
- 3 years chemical and biological weapons test officer
- 10 years as member of emergency preparedness and response units
- 10 years managing facility SARs and environmental documentation
- 10 years ORR lead and support
- BS Chemical Engineering 1985

***Summary of Facility Familiarization:***

- DOE manager of the 325 SAR
- Operations Lead for the Operational Improvement Program
- Qualified Facility Representative:
    - Building 324, PNNL-General (1993-1997)
    - FFTF, Buildings 308, 308, UO3 (1989-1993)
    - H-Canyon, HB-Line, 237 (1987-1989)

| ***Required Reading*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management System Policy | CK |
| DOE G 450.4 Integrated Safety Management System Guide | CK |
| PNNL ISMS Program Description | CK |
| PNNL ISMS Verification Review Plan | CK |

| ***Training*** | ***Initials*** |
|---|---|
| ISMS Introduction | CK |
| PNNL Tour/Orientation | CK |
| PNNL ISMS Verification Review Plan | CK |

***Team Leader Signature*** Emil D Morton

## *Team Member Qualification Summary*

***Name:*** Ferdinand LoRay Schwartz

***Employer/Normal Work Assignment*:** DOE HQ, Office of Energy Research (ER), Office of Environment, Safety and Health and Laboratory Operations, General Engineer

***Objectives Assigned*:** Member – Institutional Team

***Summary of Technical Qualifications*:**

- BS Degree, US Military Academy, West Point, NY, 1967
- MEM (Masters Engineering Management), George Washington University, 1997
- Professional Engineer (Nuclear – Pennsylvania PE-033435-E)
- 25 years in government and commercial nuclear power industry:
  - Lead ER Engineer: Conduct of Operations, Nuclear Safety Rules, Nuclear Safety Analysis Reports, Natural Phenomena Hazards
  - 7 years EPRI TMI-2 Site Office Manager: R&D and Technology Transfer Project Coordination
  - 2 years (1 as Lead) Licensing Engineer at Beaver Valley Power Station (and 6 months Licensing Engineer Clinch River Breeder Reactor, Project Management Corporation, Oak Ridge, TN)
  - 6 years Reactor Design: 4 at Westinghouse Bettis Atomic Power Laboratory, West Mifflin, PA and 2 at DOE New Production Reactors, MHTGR, Reactor Design Division
  - 3 years as Bettis Member Joint Test Group at Norfolk Naval Shipyard
- Specialized Training:
  - Westinghouse Bettis Nuclear Power School, Idaho National Engineering Laboratory, 1974
  - Qualified Reactor Plant Test Engineer, 1974-1980
  - Qualified Reactor Startup and Physics Test Engineer, 1978-1980
- DOE Courses and Training completed: MORT Based Root Cause Analysis, Personnel Management Supervision, Cost and Schedule Control Systems Criteria, Conduct of Operations, Readiness Review, Management Assessment Training, Safety Analysis Reports and Technical Safety Requirements Preparation
- ISM Experience: Participated as Working Group member in development of DOE response and action plan for DNFSB Recommendation 95-2. One of two backup individuals for ER SMIT representative.
- Publications: 8 (4 EPRI Reports as principal investigator on TMI-2 robotics, decontamination, and technology transfer and 4 in technical journals)
- Military, 5 years: Includes Battery Commander HQ Battery, Vietnam; Cannon Weapons R&D, Field Artillery School, Ft. Sill, OK

***Summary of Facility Familiarization*:**

ORNL – OR Management Appraisal 1993, PAAA Investigation Team HFIR 1998
BNL – Accident Investigation Team, Payloader Accident 1997
ANL – ER Observer EH Management Assessment 1995

PNNL – EMSL KD#4 Review Team
Familiarization Tours of PPPL, FERMI, SLAC, ANL, BNL, ORNL of either nuclear facilities for conduct of operations and/or for Executive Order on Seismic Safety

| ***Required Reading*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management Policy | |
| DOE G 450.4 Integrated Safety Management System Guide | |
| PNNL ISMS Program Description | |
| PNNL ISMS Verification Review Plan | |

| ***Training*** | ***Initials*** |
|---|---|
| ISMS Introduction | |
| PNNL Tour/Orientation | |
| PNNL ISM Verification Review Plan | |

***Team Leader Signature*** Emil D Morneau

*Team Member Qualification Summary*

***Name:*** William L. Smoot

***Objectives Assigned:*** Feedback and Continuos Improvement

***Employer/Normal Work Assignment:*** DOE RL/Senior Technical Advisor; AMW-Operations Start-up

***Summary of Technical Qualifications:***

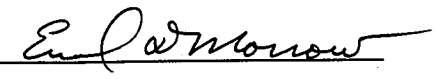
- 30 years professional experience in the nuclear industry
- 20 years professional supervisory experience
- 10 years regulatory oversight experience
- 10 years radiological program oversight experience
- 2 years WHC interpretive authority for Radiological controls program
- 5 years Manager WHC Safety Compliance Assurance

***Summary of Facility Familiarization:***

8 years Hanford Site experience

| ***Required Reading:*** | ***Initials*** |
|---|---|
| DOE P 450.4, Safety Management System Policy | |
| DOE G 450.4, Integrated safety Management System Guide | |
| PNNL ISMS Program Description | |
| PNNL ISMS Verification Review Plan | |

| ***Training*** | ***Initials*** |
|---|---|
| ISMS Introduction | |
| PNNL Tour/Orientation | |
| PNNL ISMS Verification Review Plan | |

***Team Leader Signature*** 

## *Team Member Qualification Summary*

***Name:*** Julie K. Turner

***Objectives Assigned:*** Activity Subteam

***Employer/Normal Work Assignment:*** DOE RL/General Engineer, Science and Technology Programs Division

***Summary of Technical Qualifications:***

- BSME, Washington State University, 1990
- 8 Years Program/project management experience
- DOE, TQP General Technical Base, 1998
- DOE, TQP Laboratory Management, 1998
- DOE, TQP Waste Management, 1998
- DOE, Hazardous Waste Operations training
- DOE, Project management training, 240 hours
- DOE, ESH & QA training, 270 hours

***Summary of Facility Familiarization:***

- 8 years Hanford Site engineering experience
- 3 years DOE oversight/direction of PNNL

| ***Required Reading*** | ***Initials*** |
|---|---|
| DOE P 450.4 Safety Management System Policy | |
| DOE G 450.4 Integrated Safety Management System Guide | |
| PNNL ISMS Program Description | |
| PNNL ISMS Verification Review Plan | |

| ***Training*** | ***Initials*** |
|---|---|
| ISMS Introduction | |
| PNNL Tour/Orientation | |
| PNNL ISMS Verification Review Plan | |

***Team Leader Signature*** Emil D Morrow

*Team Member Qualification Summary*

*Name:* John P. Zimmerman

***Employer/Normal Work Assignment:*** U.S. Department of Energy, Ohio Field Office, Lead Nuclear Engineer

***Objectives Assigned:*** Department of Energy

***Summary of Technical Qualifications:***

- Master of Science, Health Physics, University of Cincinnati, 1991
- Bachelor of Science, Nuclear Engineering, University of Cincinnati, 1988
- Registered Professional Engineer in State of Ohio (Nuclear Engineer) 1994
- American Board of Health Physics, Certified Health Physicist, 1995
- 10 years professional engineering experience
- 4 years experience in nuclear plant startup and testing
- Nuclear Engineer, 1995-present
- Senior Engineer, Radian Corporation, 1994-1995
- Senior Engineer, Engineering Science Corporation, 1993-1994
- Engineer, Engineering Science Corporation, 1991-1992
- Independent Consultant, Environmental Pathway Analysis and Dose Modeling, 1989-1992
- Nuclear Test Engineer, General Dynamics Corporation, Electric Boat Division, 1988-1989
- Assistant Engineer (part-time) Plant Engineering Support, Pennsylvania Power & Light, 1984-1987
- DOE, Hazardous Waste Operations, (40 hr), 1991
- DOE, TQP General Technical Base, 1995
- DOE, TQP Nuclear Safety Systems, 1998
- DOE, TQP Radiation Protection, 1998
- DOE, Program/project management training exceeds 100 hours

***Summary of Facility Familiarization:***

Hanford General Employee Radiological Training
ISMS Introduction
Facility/Site Indoctrination

| ***Required Reading*** | ***Initials*** |
|---|---|
| Letter of Appointment | |
| DOE P 450.4 Safety Management Policy | |
| PNNL Verification Review Plan | |
| PNNL ISMS Plan | |

| ***Training*** | ***Initials*** |
|---|---|
| Hanford General Employee Radiological Training | |
| ISMS Introduction | |
| Facility/Site Indoctrination | |

***Team Leader Signature*** Emil D Morrow