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Office of Civilian Radioactive Waste Management
Program Management System

Performance Assessment Management Plan for the Geologic Repository Program

January 1990

U.S. Department of Energy
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Washington, DC 20585

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1.0 INTRODUCTION

The Office of Civilian Radioactive Waste Management (OCRWM) of the U.S. Department of Energy (DOE) has the responsibility for a geology repository system for high-level waste and spent fuel resulting from operation of nuclear reactors in the United States. This responsibility extends to the characterization of sites, the recommendation of a site suitable for a geologic repository to the President, design of the waste packages and the repository, development of an environmental impact statement (EIS) and the license application (LA), and, upon authorization by the U.S. Nuclear Regulatory Commission (NRC), construction, operation, and permanent closure and decommissioning of the facility. The role of the geologic repository performance assessment program is to provide evaluations of the preclosure safety and postclosure performance of the repository system to support these activities.

This plan has been developed to define the management of the geologic repository performance assessment program to support site characterization, repository design, licensing, and the other aspects of the program requiring performance assessments. It defines the roles and responsibilities of the Yucca Mountain Project Office (YMPO) and the Office of Systems Integration and Regulations (OSIR) with respect to the geologic repository performance assessments.

Section 2 of this plan describes the organization and responsibilities for management and coordination of the activities in the geologic repository performance assessment program as currently defined. Section 3 describes the strategy and implementation plans and the management of work according to these plans that will be applied to the performance assessment program. Section 4 outlines the technical basis for the performance assessment program. The current status of the quality assurance requirements that are to be applied to the activities in the performance assessment program is described in Section 5.

2.0 ORGANIZATION AND RESPONSIBILITIES

2.1 ORGANIZATION

The responsibility for performance assessment of the geologic repository currently resides with two organizations. The Yucca Mountain Project Office (YMPO) is responsible for site characterization and assessment and design for the repository system. In this regard YMPO is responsible for performance assessments that will be conducted to support these efforts. The Office of Systems Integration and Regulations (OSIR) is responsible for for all matters of regulatory compliance and licensing; therefore, OSIR is reponsible for ensuring the acceptability of the performance assessments that will be presented in the Environmental Impact Statement and the Safety Analysis Report for the geologic repository. OSIR is responsible for day-to-day interactions with other DOE organizations, such as defense programs, for interactions with the Nuclear Regulatory Commission, and for interactions with international performance assessment programs; OSIR is supported in these interactions by YMPO. YMPO is responsible for interactions with the Nuclear Waste Technical Review Board.

To provide an integrated program, the Director of the Office of Civilian Radioactive Waste Management (OCRWM) has assigned the responsibility for the conduct of all geologic repository performance assessment activities to the YMPO Project Manager and has assigned the responsibility for oversight of these activities to the Associate Director of OSIR.

The organizational structure for the geologic repository performance assessment program is shown in Figure 1. The Project Manager of YMPO has delegated the responsibility for the conduct of the performance assessments to the Director of the Regulatory and Site Evaluation Division (RSED) within YMPO who has in turn delegated these responsibilities to the Chief of the Performance Assessment Branch (PAB) within RSED. The performance assessment analyses are performed for PAB by a number of national laboratories and contractors and PAB is supported in the management and integration of its performance assessment activities by the YMPO technical and management support services contractor.

The Associate Director of OSIR has delegated the responsibility for oversight of the performance assessment program to the Director of the Licensing and Compliance Division (LCD) within OSIR. The Director of LCD has, in turn, delegated this responsibility to the Chief of the Regulatory Compliance Branch (RCB) within LCD. The RCB Chief is assisted in his responsibilities by several contractors and by the technical support contractor for OCRWM.

Because of the number of areas in which performance assessments must be performed and because of the large number of disciplines involved in each of these areas, a cooperative organization has been established to coodinate and integrate the various performance assessment activities. The structure of this organization is shown in Figure 2. The organization includes a Program Overview Group (POG) consisting of the DOE managers directly responsible for the performance assessment activities, various performance assessment Working Groups, and a Technical Integration Group that advises the POG on the integration of the overall performance assessment program.

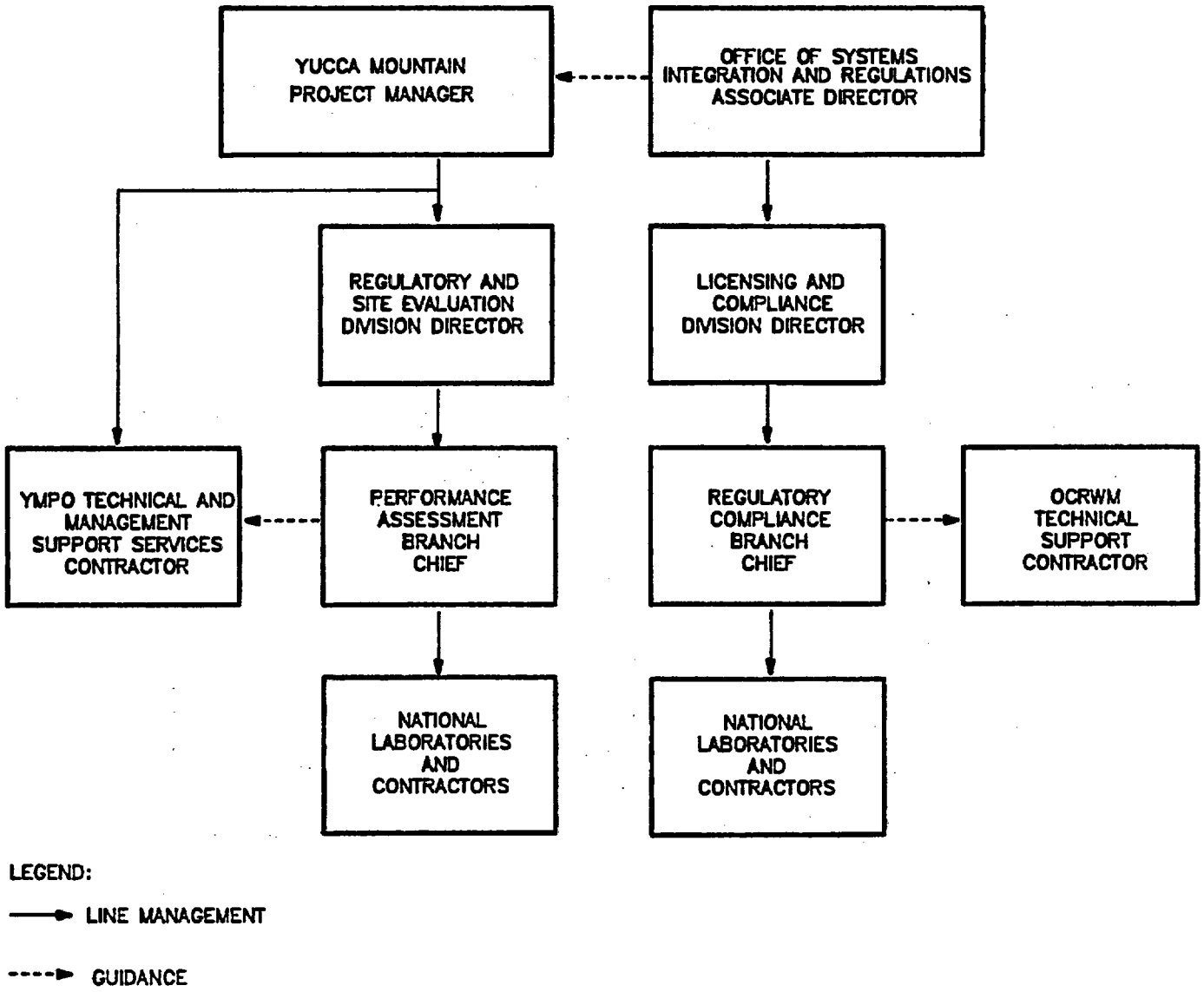

Figure 1. Management structure for the geologic repository performance assessment program.

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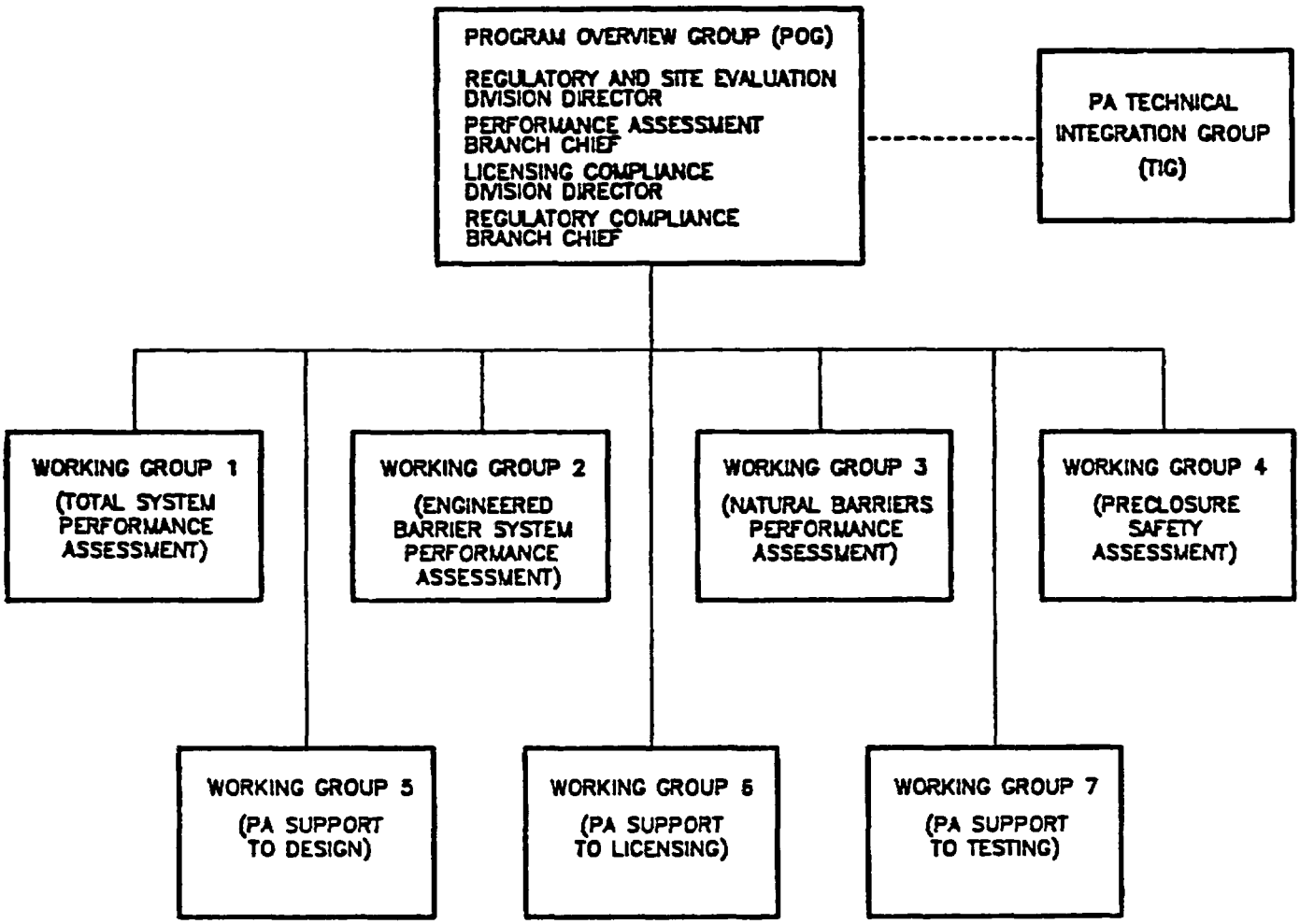

Figure 2. Coordination and integration structure of the geologic repository performance assessment program.

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2.2 RESPONSIBILITIES AND AUTHORITY

2.2.1 Project Manager for the Yucca Mountain Project Office

The Project Manager of the Yucca Mountain Project Office (YMPO) is responsible for implementing the program, policy, and technical guidance for all performance assessment activities for the geologic repository program. The Project Manager has delegated the responsibility for the conduct of the performance assessments to the Director of the Regulatory and Site Evaluation Division within YMPO.

2.2.2 Director of the Regulatory and Site Evaluation Division

The Director of the Regulatory and Site Evaluation Division (RSED) in YMPO is responsible for the performance assessment activities under the auspices of the YMPO Project Manager. He has delegated the responsibility for the technical planning and day-to-day management of these activities to the Chief of the Performance Assessment Branch within RSED. The RSED Director implements changes in scope and direction in the program.

2.2.3 Chief of the Performance Assessment Branch

The Chief of the Performance Assessment Branch (PAB) in RSED is responsible for the direction and management of the performance assessment activities under the auspices of the RSED Director. The PAB Chief is responsible for developing the performance assessment input to technical documents. He plans technical developments and performance assessments to provide this input, directs national laboratories and contractors to conduct the activities, monitors progress against performance assessment activity milestones, and evaluates the results of the performance assessments.

2.2.4 Associate Director for the Office of Systems Integration and Regulations

The Associate Director for the Office of Systems Integration and Regulations (OSIR) is responsible for ensuring, through overview, development of regulatory compliance guidance, audits, and surveillance, the acceptability of the performance assessments needed for licensing and regulatory compliance. The Associate Director has delegated this responsibility to the Director of the Licensing and Compliance Division. The Associate Director of OSIR is responsible for issuing guidance to the Project Manager of YMPO for performance assessments as they relate to regulatory compliance.

2.2.5 Director of the Licensing and Compliance Division

The Director of the Licensing and Compliance Division (LCD) in OSIR has been delegated responsibility for oversight of all geologic repository performance assessment activities within OCRWM, including the development of guidance to YMPO for the performance assessments as they relate to regulatory compliance. The Director has delegated this oversight responsibility to the Chief of the Regulatory Compliance Branch (RCB). The Director reviews and approves any guidance developed by the RCB Chief as a part of this responsibility and transmits guidance for YMPO to the Associate Director of OSIR.

2.2.6 Chief of the Regulatory Compliance Branch

The Chief of the Regulatory Compliance Branch (RCB) in LCD has been delegated the responsibility for the oversight of the geologic repository performance assessment program with regard to the acceptability of the performance assessments with respect to regulatory compliance. This oversight may include verification of results and review of the status of validation and verification of performance assessment models. The RCB Chief develops guidance for performance assessment regarding regulatory compliance for approval by the Director of LCD. The RCB Chief may utilize contractors to assist him in these efforts; where such contractors may be used, the RCB Chief is responsible for the direction and oversight of these contractors.

2.2.7 DOE Performance Assessment Contractors and National Laboratories

Contractors and national laboratories assigned by DOE are responsible for the conduct of technical work associated with the assigned performance assessment activities. The principal investigator for a given activity is responsible for the quality of the work performed. He is responsible for the implementation of any quality assurance requirements and for independent technical reviews required of him.

2.3 PERFORMANCE ASSESSMENT INTEGRATION AND COORDINATION

The organization for the integration and coordination of the geologic repository performance assessment program consists of the Program Overview Group, various performance assessment Working Groups, and the Technical Integration Group.

2.3.1 Program Overview Group

The Program Overview Group (POG) consists of DOE management personnel directly responsible for the performance assessment program including the Director of the Regulatory and Site Evaluation Division (RSED) of YMPO , the Chief of the Performance Assessment Branch (PAB) within RSED, the Director of the Licensing and Compliance Division (LCD) of OSIR, and the Chief of the Regulatory Compliance Branch of LCD. The POG consults with other Branch Chiefs and Division Directors of OCRWM to ensure that all relevant geologic repository program concerns are properly addressed in the performance assessment program. The responsibilities of the POG are to:

- Provide management review of all geologic repository performance assessment activities.
- Ensure that resources are adequate for these activities.
- Provide OCRWM management with status reports of progress in the performance assessment development and analyses.
- Conduct programmatic reviews of all performance assessment final products prior to publication.

2.3.2 Performance Assessment Working Groups

The Working Groups are organized to coordinate performance-assessment work activities in specific areas. Areas currently being addressed include postclosure total system performance; engineered barrier system performance, natural barriers performance, including, in particular, ground-water travel time; preclosure radiological safety; performance assessments in support of repository and Exploratory Shaft Facility design; performance assessments in support of licensing activities; and performance assessments to guide and evaluate site characterization and laboratory testing. Other Working Groups may be organized for specific tasks as needed.

A Working Group consists of a representative from the Performance Assessment Branch of YMPO, who is the leader of the Working Group, a representative of the Regulatory Compliance Branch of OSIR, and representatives from the national laboratories and contractor organizations involved in the performance assessment activities assigned to the Working Group. The responsibilities of the Working Groups are to:

- Coordinate and integrate the work activities assigned to the Working Group.
- Serve as a focal point for discussions and integration of work in the area addressed by the activities assigned to the Working Group.
- Provide a source of information to the POG, through the DOE representatives on the Working Group, regarding progress in the activities assigned to the Working Group.
- Periodically review and evaluate the performance assessment capabilities of the participating national laboratories and contractors and provide status reports to the POG.

2.3.3 Technical Integration Group

The Technical Integration Group (TIG) consists of three performance assessment experts selected by OCRWM. The responsibilities of the TIG are to:

- Advise the POG on the overall integration of the performance assessment activities in the geologic repository program, in particular, in the integration of activities of different Working Groups.
- Periodically review and evaluate the progress and effectiveness of the Working Groups and provide recommendations to the POG.
- Implement, by direction of the POG, internal and external reviews of performance assessment work activities for the purpose of evaluation of the performance assessment program.

3.0 PERFORMANCE ASSESSMENT PLANS AND MANAGEMENT

3.1 PERFORMANCE ASSESSMENT PLANS

The technical strategy and activities that will be conducted to implement the technical strategy for the performance assessment program are described in the Performance Assessment Strategy Plan (PASP) and Performance Assessment Implementation Plans (PAIPs). The PASP describes the general technical strategy for the preclosure safety and postclosure performance assessments needed to support the major program milestones. Because the strategy depends upon the characteristics of the site and the design of the repository system, the PASP will be modified appropriately as significant changes occur in site and design information.

The PAIPs describe the specific activities to be conducted to implement the strategy described in the PASP. A PAIP will be issued each year to describe the specific activities to be conducted in the year and will provide a description of the way these activities fit into the overall schedule to meet the milestones. If the plan for the performance assessment activities needs to be revised in response to the results of site characterization or the performance assessments themselves or in response the changes in direction of the overall program, the annual PAIP will be updated accordingly.

All performance assessment plans will be controlled. Distribution will be controlled and modifications to these plans will be provided to those on the controlled distribution list so that the program participants will be thoroughly appraised of the direction of the performance assessment program. In addition, the performance assessment strategy will be entered into the OCRWM program baseline so that changes to the strategy can be properly controlled according to standard change control procedures.

3.2 MANAGEMENT

The activities specified in the PAIPs will be focussed toward accomplishing specific short-term and long-term milestones of the OCRWM program cost and schedule baseline. The products of these activities will generally be in the form of data packages or reports and will be controlled by the appropriate YMPO or OSIR manager. All performance assessment data packages and reports by contractors and national laboratories reporting to the Performance Assessment Branch or the Regulatory Compliance Branch (RCB) will be issued to the Chiefs of both branches. Progress with respect to the YMPO performance assessment milestones will be reviewed by the RCB Chief as a part of his oversight responsibility. Guidance to YMPO may be issued by OSIR as a result of this review.

Technical management for an activity will be provided by the principal investigator specified for the activity. In addition, the YMPO and OSIR managers will provide technical guidance, as appropriate. In developing the guidance and in managing the performance assessment activities, the principal investigators and the YMPO and OSIR managers will utilize information provided by the performance assessment Working Groups and the Technical Integration Group. However, neither the Working Groups nor the Technical Integration Group have any management authority.

4.0 TECHNICAL BASIS FOR THE PERFORMANCE ASSESSMENT PROGRAM

The objective of the geologic repository program is to isolate spent nuclear fuel and high-level waste in a suitable geologic formation such that human health and safety will be preserved. Performance assessments of the geologic repository system are integral components of the efforts to meet this objective and will be conducted in support of each of the major milestones of the program. The technical program described in this plan is intended to ensure that the performance assessments needed for these efforts are adequate and are completed on a schedule consistent with the major program milestones and within the resources allocated for them.

The major milestones of the geologic repository program include the Safety Analysis Report (SAR); the Environmental Impact Statement (EIS) including a draft EIS (DEIS) and a final EIS (FEIS); design milestones including the Advanced Conceptual Design (ACD) and the License Application Design (LAD); and the Site Recommendation Report (SRR) which gives the recommendation of a site to the President. These milestones will be supported by performance assessment of different types: (1) assessments for the SAR; (2) assessments for the EIS; (3) assessments regarding site suitability; (4) assessments to support design; (5) assessments to support the testing programs; (6) assessments to support the interface of other programs with the geologic repository program; and (7) assessments to support interactions of the U.S. geologic repository program with the programs of other nations.

The performance assessments for each of the major milestones will be conducted in a sequence of stages: problem definition, methodology development, and execution of activities dictated by the methodology. In the problem-definition stage, the specific performance objectives for the milestones associated with the area are identified, the repository system is described suitably for the assessments, and the measures of performance are specified. For example, for the SAR assessments, the applicable technical criteria of the NRC regulations are identified, the elements of the system that are to be evaluated are specified, and performance measures for these elements appropriate for evaluation against the technical criteria are selected. When the problem is defined for a particular set of performance assessments, the information in the Performance Assessment Strategy Plan can be updated.

In the methodology-development stage, the set of analyses needed to evaluate the performance measures is specified and the models needed to conduct these analyses are identified. These models include both conceptual models and computational models such as computer codes.

In the final stage, the activities dictated by the required analyses are executed. These activities include model development, testing of models, calculation of performance measures, sensitivity and uncertainty analyses, and evaluations of alternative design features.

5.0 QUALITY ASSURANCE

The general quality assurance (QA) requirements for the Civilian Radioactive Waste Management Program are specified in the Quality Assurance Requirements Document (DOE/RW-0214). The actual QA controls that will be applied to the performance assessment activities in the program will be identified in accordance with the requirements as implemented at OSIR and YMPO. This section gives an overview of the expected QA requirements for the performance assessments conducted in the geologic repository program.

5.1 QUALITY ASSURANCE FOR YMPO PERFORMANCE ASSESSMENT ACTIVITIES

The QA program for the Yucca Mountain Project Office (YMPO) is implemented in the YMPO Quality Assurance Plan (NNWSI/88-9), the YMPO QA Program Plan (WMPO/88-1), and the associated QA program plans (QAPPs) for the participating organizations. Section 1.4.1 of the YMPO Quality Assurance Plan describes the controls to be placed on the scientific investigation, data interpretation, and analysis that fall under this plan. All these activities are to be documented with regard to requirements, purpose, method, assumptions, input, and references such that a technically qualified person may review, understand, and verify the analysis without recourse to the originator. Use of computer programs for performance assessments subject to the QA requirements is controlled by specifics provided in Section III of the YMPO Quality Assurance Plan.

The YMPO Quality Assurance Plan specifies two methods for documentation and control of the scientific work: a scientific notebook system and a technical implementing procedure system. The scientific notebook system is to be used when a high degree of professional judgement is employed through trial and error methods, and when developing methodologies. Alternatively, the technical implementing procedure system is used when repetitive work is being performed that does not include the use or a high-degree of professional judgement or trial and error methods in performance of the work.

Responsibilities for performance assessment activities for the YMPO are assigned to the Performance Assessment Branch (PAB). The Chief of PAB is responsible for implementing the QA program in his area of responsibility.

5.2 QUALITY ASSURANCE FOR OSIR PERFORMANCE ASSESSMENT OVERSIGHT

The quality assurance program for OSIR is implemented in the OCRWM Quality Assurance Program Description Document (DOE/RW-0215). This document calls for QA administrative procedures (QAAPs) and implementing line procedures (ILPs) for appropriate control of the functions and responsibilities of OSIR.

The responsibility for regulatory compliance oversight of the performance assessment program has been delegated to the Chief of the Regulatory Compliance Branch (RCB) as discussed in Section 2.2. In this capacity the RCB Chief is responsible for the review of performance assessments and the development of regulatory compliance guidance for the performance assessment activities conducted throughout the program. Any reviews of technical documents produced by YMPO would be subject to the QA program. The RCB Chief may enlist the help of contractors in reviews or in the development of regulatory compliance guidance and some of this assistance could involve development of computational models. None of these developments would be directly used in licensing or in the design control process. Therefore, these activities are not expected to be subject to the QA requirements. If any of the developments or analyses are adopted for licensing by YMPO, they would need to be qualified according to the QA procedures within YMPO.

5.3 QUALITY ASSURANCE FOR THE INTEGRATION FUNCTION

The integration and coordination structure does not perform any line management function and its activities are not directly used in licensing or design control. Therefore, no QA controls are specified for its integration and coordination function. If members of the Technical Integration Group or the Working Groups are directed through line management to participate in quality-affecting work (e.g. preparation of computer codes or performance assessments that would be used in licensing or in the design control process), this work would be subject to the QA program that is applicable.

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