



Department of Energy

Nevada Operations Office
P. O. Box 98518
Las Vegas, NV 89193-8518

APR 14 1988



Paul T. Prestholt
Site Representative
U.S. Nuclear Regulatory Commission
1050 East Flamingo
Las Vegas, NV 89119

TRANSMITTAL OF NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) DOCUMENTS

As per your request, the Waste Management Project Office is transmitting to the U.S. Nuclear Regulatory Commission, Las Vegas, Nevada Office, the following NNWSI documents:

1. "Annual Performance Assessment Support Services Interaction Report," Sandia National Laboratories (SNL), Level I Milestone P132.
2. "Report on the Use of Performance Allocation in the NNWSI Site Characterization Plan," SNL, Level I Milestone M730/R108.

If you have any further questions about NNWSI documents, please contact Stephen H. Leedom at 295-8942.



Carl P. Gertz, Project Manager
Waste Management Project Office

WMPO:SHL-1795

Enclosures:

1. Annual Performance Assessment Interaction Report
2. Report on Use of Performance Allocation

cc w/o encls:

V. J. Cassella, HQ (RW-222) FORS
T. O. Hunter, SNL, Albuquerque, NM
J. J. Lorenz, PSDO/RECo, Las Vegas, NV
Richard Belyea, SAIC, Las Vegas, NV
M. P. Kunich, WMPO, NV
M. B. Blanchard, WMPO, NV

8804260370 880419
PDR WASTE
WM-11 DCD

**Report on the Use of Performance
Allocation in the NNWSI
Site-Characterization Plan**

During the early preparation of site-characterization plans (SCPs), the national waste-management program decided to use a process called performance allocation as an organizing principle in the plans. In order to ensure that all three repository projects carried out the process correctly, the DOE Headquarters management requested that each project submit a report on its use of performance allocation in its SCP. During the later preparation of the plans, the Headquarters management adopted a different and more effective method of ensuring the correct use of performance allocation: the project staffs were directed to develop the SCPs in close consultation with Headquarters staff and the contractors to Headquarters. In this way, the Headquarters management achieved the main objective of the request for a report. Furthermore, the information that the request called for--namely, extensive discussion of performance allocation and its results--is now contained in the SCPs themselves.

Because that information is now in the plans and Headquarters is thoroughly familiar with it, this report closes out the original request by reviewing (1) the process that the Nevada Nuclear Waste Investigations (NNWSI) Project used to develop its performance allocations and (2) the plans and formats in which the performance allocations appear in the SCP.

NNWSI process for allocating performance

The NNWSI Project developed its performance allocations through a long series of workshops and reviews. From the beginning, the project adopted a policy of using multidisciplinary teams to make the required decisions. This policy was based on an intention to treat performance allocation as a technical need of the NNWSI program--a need so important that the full technical resources of the project should be brought to bear on it. The following paragraphs briefly summarize the steps by which the project made performance allocations that meet this intention.

The NNWSI first became a participant in formal performance allocation in 1985. Personnel from the project supported DOE Headquarters in meetings with the Nuclear Regulatory Commission to agree on performance allocation--what it should consist of and how, generally speaking, it should be carried out. These negotiations produced a written agreement on September 27, 1985, calling for the DOE to use performance allocation in preparing its plans for characterizing potential repository sites. Guided by this agreement, the NNWSI Project formulated an approach to preparing formal performance allocations. The approach was presented to DOE Headquarters management in December 1985 and to representatives of the other two repository projects in January of 1986. In January the three projects and DOE Headquarters agreed to use performance allocation as an important part of the issue-resolution strategy that would appear in the SCPs.

To implement this agreement, the NNWSI Project began a series of workshops in February 1986. These workshops began the first step in performance allocation--the detailed formulation of licensing strategies. The workshops were effective in this process because they brought together

experts in many disciplines who could choose, on technical grounds, the features of the site to be relied on for demonstrating compliance with regulations. Among these experts were persons who were planning data-collection activities and persons who were planning repository-design and performance-assessment activities. The workshops, like the SCP itself, were organized according to issues; a sequence of one to three workshops was scheduled for each of the issues. The licensing strategies developed at these workshops were the basis for the remaining steps in performance allocation.

After a number of these workshops had been held and preliminary licensing strategies had been formulated, the project moved to a different format for dealing with performance allocation. In response to a request for accelerated production of the SCP, the project wrote draft text. All the sections of text that required performance allocations adopted the licensing strategies and developed them into detailed allocations. Review and revision of these allocations took place in a series of workshops at which "permanent internal-review committees" (PIRCs) criticized and revised all the draft text. These committees included representatives of all the organizations that participate in the NNWSI Project; the committees that reviewed performance allocations were multidisciplinary teams. Also appearing at PIRC reviews were representatives of DOE Headquarters, who played an active role in the reviews of the draft text in general and the performance allocations in particular. The PIRC reviews took place during the time from August to November of 1986.

After the PIRC reviews, a series of reviews by "project overview committees" (POCs) examined the SCP text to ensure that it was suitable for submittal to DOE Headquarters. Because the role of these committees was to scrutinize the SCP in all its detail, they again reviewed the performance allocations. The POC reviews took place in November and December of 1986.

During the year between the agreements of January 1986 and the submittal of the SCP to DOE Headquarters, the performance-allocation process received much thought. Putting the process into practice brought fresh insights into the original suggestions for how to carry it out effectively. Moreover, the framework for the process--the issues hierarchy--changed significantly during this time. The work of the first workshops, the PIRCs, and the POCs incorporated the developing insights and the changed framework. By the end of 1986 the allocations were complete except for a detailed explanation of the site-characterization work in terms of the information needs of the design and performance issues.

In February 1987 the first full review of the SCPs at DOE Headquarters, produced among many other requirements for revision of the SCP, a request for the needed explanation. Extensive discussions among the staffs of NNWSI, DOE Headquarters, and Weston produced agreement on a particular format that would show how the site-characterization programs were derived. The NNWSI Project agreed to provide a series of special tables. These tables would begin with the parameters that the licensing strategies had already identified as important for resolving the design and performance issues. They would then show explicitly the linkage between the parameters and the characterization activities that would supply values for the parameters.

The project produced these tables in a new series of workshops. These workshops once again brought together experts in repository design, performance assessment, and site-characterization disciplines; the workers

came from NNWSI participant organizations and from contractors to DOE Headquarters, principally Weston. Beginning in March 1987, these workshops supplied the tables that were incorporated in the SCP draft reviewed at DOE Headquarters in June 1987.

The June review--the final large-scale review at DOE Headquarters--produced agreement on the remaining details of the performance allocation. The participants in those reviews fixed the exact form of the performance-allocation tables, making the linkage as explicit as possible. With these tables and the accompanying text, a reader can learn what information is needed for resolving each performance and design issue and what characterization work will supply that information. The reader can also learn, for each effort in the characterization program, the particular information needs that make the effort necessary.

During the June review the performance allocations reached their final form. Further reviews took place at DOE Headquarters before the SCP was finally issued as a consultation draft, but they produced only minor changes in the text describing performance allocations.

Where performance allocations appear in the NNWSI SCP

The NNWSI Project has used performance allocation as a primary organizing principle in the planning of site-characterization activities. The consultation draft of the SCP contains both an explanation of the performance-allocation process and extensive sets of tables displaying performance allocations.

The principal explanation of the general performance-allocation process is Section 8.1.2.2. This explanation places the process in the context of the general issue-resolution strategy, pointing out that performance allocation consists of several steps in the issue-resolution strategy. Each step is then described by explaining the work that must be done to carry out the step, defining the special terms that describe the products of that work, and explaining the reasons for carrying out the step. Section 8.1.2.2 should be read by anyone who wishes to understand performance allocation in general or the particular implementations of it that appear in the rest of Chapter 8.

The actual results of the performance-allocation process described in Section 8.1.2.2 appear in later sections of Chapter 8. The full allocations appear in text and in scores of tables throughout Section 8.3; these detailed tables are in the formats decided upon at the 1987 workshops at DOE Headquarters. Other tables that summarize the principal features of the detailed performance allocations are in Section 8.2.2, which also contains text summarizing the issue-resolution strategies, including the steps that are called performance allocation.

The remainder of this report is a list of the sections within Section 8.3 that present detailed results of performance allocation. The list also describes the principal performance-allocation tables in each of those sections. The descriptions of the tables use the special performance-allocation terms defined in Section 8.1.2.2 of the SCP. For brevity, the phrase "tentative goals" in the descriptions generally includes the features that formal performance allocation calls "confidences" of various types. Some tables that contain tentative goals also present "expected values" and "current confidences" as well.

- 8.3.1.2 Table listing geohydrology activities and parameters and stating the issues to which the activities will supply needed data.
- 8.3.1.3 Table listing geochemistry activities and parameters and stating the issues to which the activities will supply needed data.
- 8.3.1.4 Table listing rock-characteristics activities and parameters and stating the issues to which the activities will supply needed data.
- 8.3.1.5 Table listing climate activities and parameters and stating the issues to which the activities will supply needed data.
- 8.3.1.6 Table listing erosion studies and parameters and stating the performance and design parameters for which the studies will supply values.
- 8.3.1.8 Tables listing postclosure-tectonics studies, activities, and parameters and stating the performance and design parameters for which the activities will supply values.
- 8.3.1.9 Table listing human-interference activity parameters and stating the issues and performance parameters for which the program will supply initiating-event data.
- 8.3.1.12 Table listing meteorology studies, activities, and characterization parameters and stating the performance and design parameters for which the program will supply values.
- 8.3.1.14 Table listing surface-characteristics studies, activities, and characterization parameters and stating the performance and design parameters for which the activities will supply values.
- 8.3.1.15 Table listing thermal-and-mechanical-properties activities and parameters and stating the performance and design parameters for which the activities will supply values.
- 8.3.1.16 Table listing preclosure-hydrology studies, activities, and parameters and stating the design parameters for which the program will supply values.

- 8.3.1.17 Tables listing preclosure-tectonics studies, activities, and parameters and stating the performance and design parameters for which the activities will supply values.
- 8.3.2.2 Tables summarizing the licensing strategy for resolving Issue 1.11: processes to be relied on, performance measures, parameters, and tentative goals.
- 8.3.2.3 Tables summarizing the licensing strategy for resolving Issue 2.7: functions, processes, performance measures, parameters, and tentative goals.
- 8.3.2.4 Tables summarizing the licensing strategy for resolving Issue 4.2: functions, processes, performance measures, and tentative goals.
- 8.3.2.5 Tables summarizing the licensing strategy for resolving Issue 4.4: functions, processes, performance measures, parameters, and tentative goals.
- 8.3.3.2 Tables summarizing the licensing strategy for resolving Issue 1.12: sealing components, functions, processes, performance measures, parameters, and tentative goals.
- 8.3.4.2 Tables summarizing the licensing strategy for resolving Issue 1.10: system elements to be relied on, performance measures and parameters, characterization parameters, test bases, tentative goals, and references to activities that will supply needed information.
- 8.3.4.3 Reference to Section 8.3.4.2 for tables summarizing the licensing strategy for resolving Issue 2.6.
- 8.3.5.2 Tables summarizing the licensing strategy for resolving Issue 2.4: processes and retrieval activities, performance measures, and tentative goals.
- 8.3.5.3 Tables summarizing the licensing strategy for resolving Issue 2.1: system elements, functions, processes, performance measures, parameters, and tentative goals.

- 8.3.5.4 Tables summarizing the licensing strategy for resolving Issue 2.2: system elements, functions, processes, performance measures, parameters, and tentative goals.
- 8.3.5.5 Tables summarizing the licensing strategy for resolving Issue 2.3: system elements, processes, performance measures, parameters, and tentative goals.
- 8.3.5.6 Reference to Sections 8.3.5.3 and 8.3.5.4 for tables summarizing the licensing strategy for resolving Issue 2.5.
- 8.3.5.7 Reference to tables in Sections 8.3.2.4, 8.3.2.5, and 8.3.4.4 for tables summarizing the licensing strategy for resolving Issue 4.1.
- 8.3.5.9 Tables summarizing the licensing strategy for resolving Issue 1.4: system elements, performance measures, parameters, and tentative goals.
- 8.3.5.10 Tables summarizing the licensing strategy for resolving Issue 1.5: system elements, performance measures, parameters, and tentative goals.
- 8.3.5.12 Tables summarizing the licensing strategy for resolving Issue 1.6: hydrogeologic units to be relied on, performance measures, parameters, and tentative goals. Additional table in Section 8.3.5.12.5.
- 8.3.5.13 Tables summarizing the licensing strategy for resolving Issue 1.1: scenarios, system elements and processes to be relied on, performance measures, parameters, and tentative goals.
- 8.3.5.14 Tables summarizing the licensing strategy for resolving Issue 1.2: system elements and processes to be relied on, performance measures, parameters, and tentative goals.
- 8.3.5.15 Tables summarizing the licensing strategy for resolving Issue 1.3: performance measures, parameters, and tentative goals.

8.3.5.17 Tables summarizing the licensing strategy for resolving Issue 1.8: scenario classes, performance parameters, tentative goals, and references to other SCP sections for additional information.

8.3.5.18 Tables summarizing the licensing strategy for resolving Issue 1.9: scenario classes, performance parameters, tentative goals, and reference to Section 8.3.5.13 for additional allocations.

**NNWSI PROJECT
ANNUAL REPORT ON INTERACTIONS WITH PASS**

During FY87 the NNWSI Project has had significant interactions with the PASS program in four areas. The following list describes these interactions.

Hydrocoin

Staff from SNL communicated primarily with PASS staff member C. Cole during the year. Informal exchanges of information by telephone covered various aspects of the Hydrocoin work; an exchange of trip reports covered participation in the November 1986 Hydrocoin meeting in the Netherlands. The SNL staff reviewed Cole's report to DOE headquarters on the results of the Hydrocoin Level 1 verification and benchmarking analyses.

COVE2A

The SNL staff worked with R. Brockhaus of PASS on the COVE2A benchmarking exercise. The PASS program began its participation in COVE2A in FY86. Brockhaus and others were using unsaturated-flow codes available at PNL. In January 1987 the SNL staff received formal word that PASS would end its participation in COVE2A. The reason for the withdrawal was that DOE headquarters had "changed the PASS Program emphasis." The other COVE2A participants were disappointed at the loss of the PASS work, which they felt to be a valuable addition to the exercise.

Model Validation

The PASS and SNL staff exchanged information on validation strategies during the year. C. Cole and A. Van Luik were the principal PASS members participating in the exchanges. They supplied a literature survey of the U.S. validation and verification efforts in waste disposal, an unpublished report containing information on developing validation strategies, and information needed in preparing for participation in the INTRAVAL project.

The SNL staff supplied input to a paper for GEOVAL-87 on validating flow and transport models for performance assessment. A. Van Luik was the principal PASS author of that paper.

Risk Assessment

In March 1987 PASS asked SNL to supply an undocumented computer code for use in preparing risk assessments for the three sites selected for characterization. Although this code was still under development, it was sent to PASS as requested. It was LLUVIA, a 1-D, steady-flow code using an ordinary-differential-equation solver.

ENCLOSURE /

Staff from LLNL and SNL attended a review of the PASS risk-assessment program and participated in the discussions of the program and its results. Arrangements are being made for a more detailed presentation and review by the staff who are directly performing hydrological calculations for the Yucca Mountain site.

Waste Package
(no interactions)

Meetings of the Waste-Package Coordination Group normally bring LLNL and PASS staff together for presentations and informal discussions. These meetings did not take place this year. Future interactions between LLNL and PASS staff, if desired, will probably require either a resumption of these meetings or specific requests from PASS.