Chapter 6.0 Overall System Performance Assessment

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6.0 OVERALL SYSTEM PERFORMANCE ASSESSMENT

The purpose of this chapter is to describe whether quantitative analyses of the postclosure system performance demonstrate compliance with the requirements of 40 CFR 191 and 10 CFR 60.112. [It will also describe or refer to such additional information as is necessary to support those analyses.]

[The descriptions in this chapter will indicate what conceptual models will be incorporated into the computational models used in the Total System Performance Assessment (TSPA), the processes to be incorporated into those models, and the events and scenarios to be evaluated using those models. The results obtained will be discussed in relation to the demonstration of compliance with requirements of 40 CFR 191 and 10 CFR 60.112. Justification for the exclusion of processes from the models, or of events and scenarios from the assessment will be included either in the text or in references cited. Non-quantitative information will be referenced, if needed, to support the quantitative analyses. Verification of codes and validation of models will be incorporated primarily by reference.]

[The assessment of compliance with the pre-waste emplacement ground water travel time criterion of 10 CFR 60.113(b) will be discussed in Section 3.3.5. Preclosure performance with respect to compliance with the criteria of 10 CFR 60.111 will be discussed in Section 4.5. Compliance with the performance criteria of 10 CFR 60.113 for the engineered barrier system will be discussed in Section 5.2.]

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **6.0 OVERALL SYSTEM PERFORMANCE ASSESSMENT**

2. Lead Author & Phone No. Jim Duguid
   703-204-8851

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This chapter describes the quantitative analyses of overall system performance that demonstrate compliance with the regulatory requirements of 10 CFR 60.112 (post-closure performance). This description includes or refers to such additional non-quantitative information as may be necessary to support the quantitative analyses. Pre-closure performance is discussed in Section 4.5 in accordance with requirements of 10 CFR 60.111. Performance of the engineered barrier system is discussed in Section 5.2 per requirements of 10 CFR 60.113.

6. Opening Statement: None.

7. Main Body Outline: TBD.

8. Conclusion: TBD.

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **6.0 OVERALL SYSTEM PERFORMANCE ASSESSMENT**

Lead Author & Phone No. Jim Duguid
703-204-8851

A. Figure/Table No.

Caption/Title:

Content:

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **6.0 OVERALL SYSTEM PERFORMANCE ASSESSMENT**

Lead Author & Phone No. Jim Duguid
703-204-8851

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

2.

3.

4.

5.

6.

7.

8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **6.0 OVERALL SYSTEM PERFORMANCE ASSESSMENT**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **6.0 OVERALL SYSTEM PERFORMANCE ASSESSMENT**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver 702-794-1871

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

Section 6.1 Basic Approach

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6.1 BASIC APPROACH

The purpose of this section is to discuss whether Performance Assessments demonstrate that the repository complies with the requirements of 10 CFR 60.112. [The Performance Assessments that will be conducted for this Potential License Application will consist of a sequence of assessments, each of which constitutes a nested collection of analyses integrated through a comprehensive top-level model. These iterative assessments, each of which incorporates site characteristics, design data, and other relevant information available at the time of the analysis, will demonstrate successive stages in the development of understanding of the system. The scope of each iteration of the Total System Performance Assessment will be summarized and documented in Table 6.1A.]

[The results of each iteration in the sequence of assessments will be presented to the NRC staff for comment. Comments from NRC and other concerned parties will be considered in developing successive performance assessments. Each iteration will focus on resolution of selected issues in regulatory compliance. Table 6.1B will show a complete list of issues, the status of their resolution, and will cite topical reports addressing those issues.] With respect to compliance, the most prominent features of each iteration of performance assessment are the products of computational models. However, reasonable assurance of compliance depends substantially upon information from evaluation of natural analogs and confirmatory tests. Underlying the selection of data, of alternate conceptual models, of processes and events, and of all supporting analyses and evaluations, lies the judgment of experts. [To the extent possible,

the elicitation of judgment will be documented. The input data set for each assessment will be cited in Table 6.1C. Iterative assessment and review enables resolution of issues at successive stages of development, and the status of resolution of issues that will be tabulated in Table 6.1B will indicate the extent to which issues have been resolved prior to submission of the Safety Analysis Report (SAR).]

6.1.1 Conceptual Background for the Assessment of Overall System Performance

The overall system performance will be evaluated through modeling of the following components:

- Radionuclide release from the engineered barrier system
- Fluid flow in the geologic units
- Radionuclide transport to the accessible environment
- Dose to man and radionuclide release to the accessible environment.

The relationship among these components is shown in Figure 6.1.1A. [Each of these components will be modeled at more than one level of detail. Models used to understand processes are not likely to be used to evaluate performance, because to do so, they would have to incorporate so many processes as to become unwieldy. Given the complexity of processes involved, process models and performance models are likely to be separated. Indeed, the common approach has been to insert a wide variety of intermediate codes at widely varying levels in between detailed

models and performance models are likely to be separated. Indeed, the common approach has been to insert a wide variety of intermediate codes at widely varying levels in between detailed process models which attempt to capture all relevant details of individual suites of processes, and performance models, which attempt to capture all relevant processes in a way legitimated by lower models. The PA models form an hierarchy like that depicted in Figure 6.1.1.B, with the most detailed models forming the base, and the most comprehensive models at the apex. Intermediate to the process and performance (or system) models are subsystem or domain models which integrate by abstraction all the processes relevant to the performance of some major segment of the system. (Abstraction in this case is the process of simplifying the description of more complex processes, retaining those aspects that to which higher-level performance is sensitive.) For the purposes of visualization, the hierarchy of models is divided into three levels, but the boundaries, especially between process and subsystem models, are not necessarily distinct. For this reason, the boundary between process and subsystem models has been shown as a dashed line.

Process models are usually deterministic numerical codes that incorporate coupled interactions such as water, water vapor, gas, and heat flow. These models closely represent the physical (chemical) processes that occur and are used to evaluate the effects of parameter uncertainty by conducting parameter sensitivity analyses over the ranges of model input parameters that exist at the site.

Subsystem models are either deterministic or probabilistic models which are used in analysis of

individual scenarios, bounding analyses, or determinations of process uncertainty. [An example of a subsystem model is the waste package model that will incorporate chemical/geochemical, flow, stress, and thermal processes in an abstracted (simplified) form.] Subsystem models are used to investigate process uncertainty through incorporation of the range of expected processes which could occur at the site.

System models are probabilistic codes which combine potential site scenarios. They are the least complex models which are used to demonstrate compliance with regulations (i.e., calculation of the complementary cumulative distribution function to meet 40 CFR 191). They represent the most abstracted models and are used primarily for bounding analyses of scenarios and combinations of scenarios.

The hierarchy of models used in PA (Figure 6.1.1B) is thought of as containing models which are more complete and more sensitive at the base. Toward the apex, models contain all of the major components of models at the base, but process descriptions are in an abstracted (less detailed) form. For this reason, models near the apex produce results with greater uncertainty, and are generally constructed with additional degrees of conservatism, whereas parameter uncertainty increases toward the base of the hierarchy.

Iterative PA can be envisioned as beginning at the base of the triangle and conducting sensitivity analyses over the existing range of parameters and scenarios required to comply with regulations. Transfer between hierarchy levels is accomplished by using the results of process models to

formulate input for subsystem models, and using subsystem results as a basis for input for system models. The results of the system models are then compared with those of the subsystem and process models to ensure that the total system of results is consistent. In other words, one iteration would include beginning at the base of the triangle and working upwards toward the apex (e.g., generating the transfer functions between process and subsystem and between subsystem and system models); then looking back down the levels of detail in the triangle to ensure that the results of the system models are consistent with the less abstracted models toward the triangle base. For the second iteration, the process model results would only need to be recalculated if new site data or a change in a scenario extended a parameter range beyond that of the sensitivity analyses conducted for the first iteration. This vision of exercising the hierarchy of models to yield reasonable assurance in the results of the overall system performance is a tool to aid in understanding the interrelationships among the levels of model complexity.

The iterative performance assessment at the Yucca Mountain site began in 1991 with a total system PA which exercised primarily system and subsystem models (SAND 91-2795, 1992) (Information Need Log No. JOD-3). [The complexity of the modeling approach will increase with each iteration and results will be used to guide site characterization and design, to guide model development, and to provide a basis for interactions with the NRC and concerned parties.]

[For each iteration, PA information from other components of the MGDS programs will be used; the PA will be conducted, and the results will be disseminated among the components of the program.] Figure 6.1.1C shows the interactions between PA and the other components of the

MGDS program (e.g., regulation, design, site characterization, model development, and concerned parties). This process can be thought of as information being fed into PA, analyses being conducted, and information being fed out of PA to MGDS components with each iteration (Figure 6.1.1C). [In this way, the results of PA will be used to influence design and site characterization and to present results to the NRC and concerned parties with each iteration. NRC and concerned party comments will be considered in developing the scope of the next iteration. As shown in Figure 6.1.1B, results at each level will be calculated with each iteration, where necessary, as new data, scenarios, and models become available during the iterative process.]

6.1.2 Mathematical Background for the Assessment of Overall System Performance

Note: This section will be completed using Information Need Log No. JOD-4.

Table 6.1A. Summary and Documentation of Each Iteration of Performance Assessment

Iteration	Models Used	Scenarios	Documentation
1	Primarily based on systems models with input from subsystem models and a limited input from process models.	Human Intrusion Seismicity Volcanism	SAND_____, 1992.
2			
3			
.			
.			
.			
.			

Note: This table will be completed using Information Need Log No. JOD-1.

Table 6.1B. Status of Issue Resolution Using Performance Assessment

Issue	Status		Topical Report (Reference)
	Resolved	Open	
1. Erosion		x	
2. Volcanism		x	
.			
.			
.			

Note: This table will be completed using Information Need Log No. JOD-2.

Table 6.1C Performance Assessment Input Data for Each Iteration

Iteration	Data Documentation
1	(References(s))
2	
3	
.	
.	
.	

Note: This table will be completed using Information Need Log No. JOD-1.

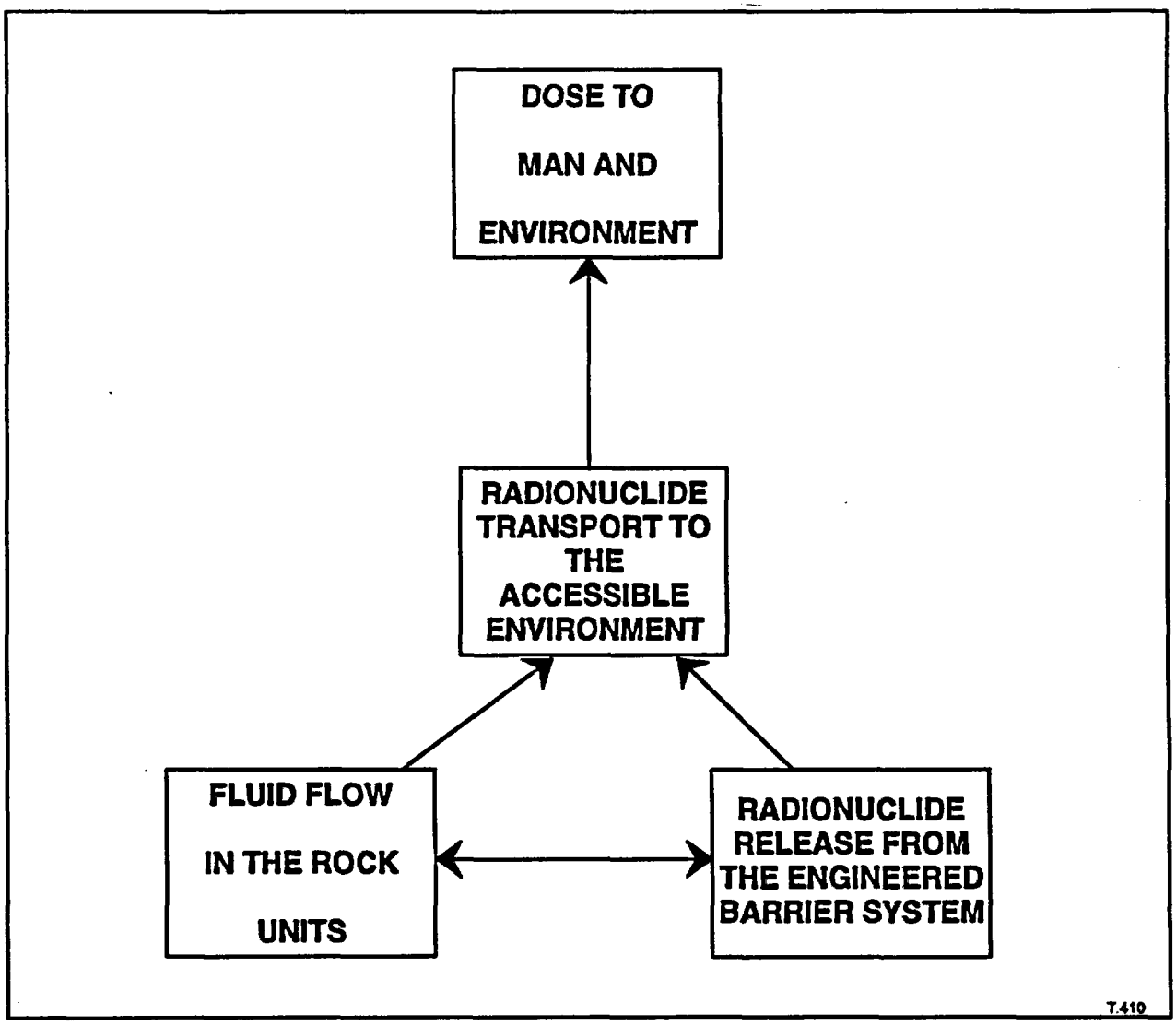

Figure 6.1.1A. Components of Overall System Performance Assessment

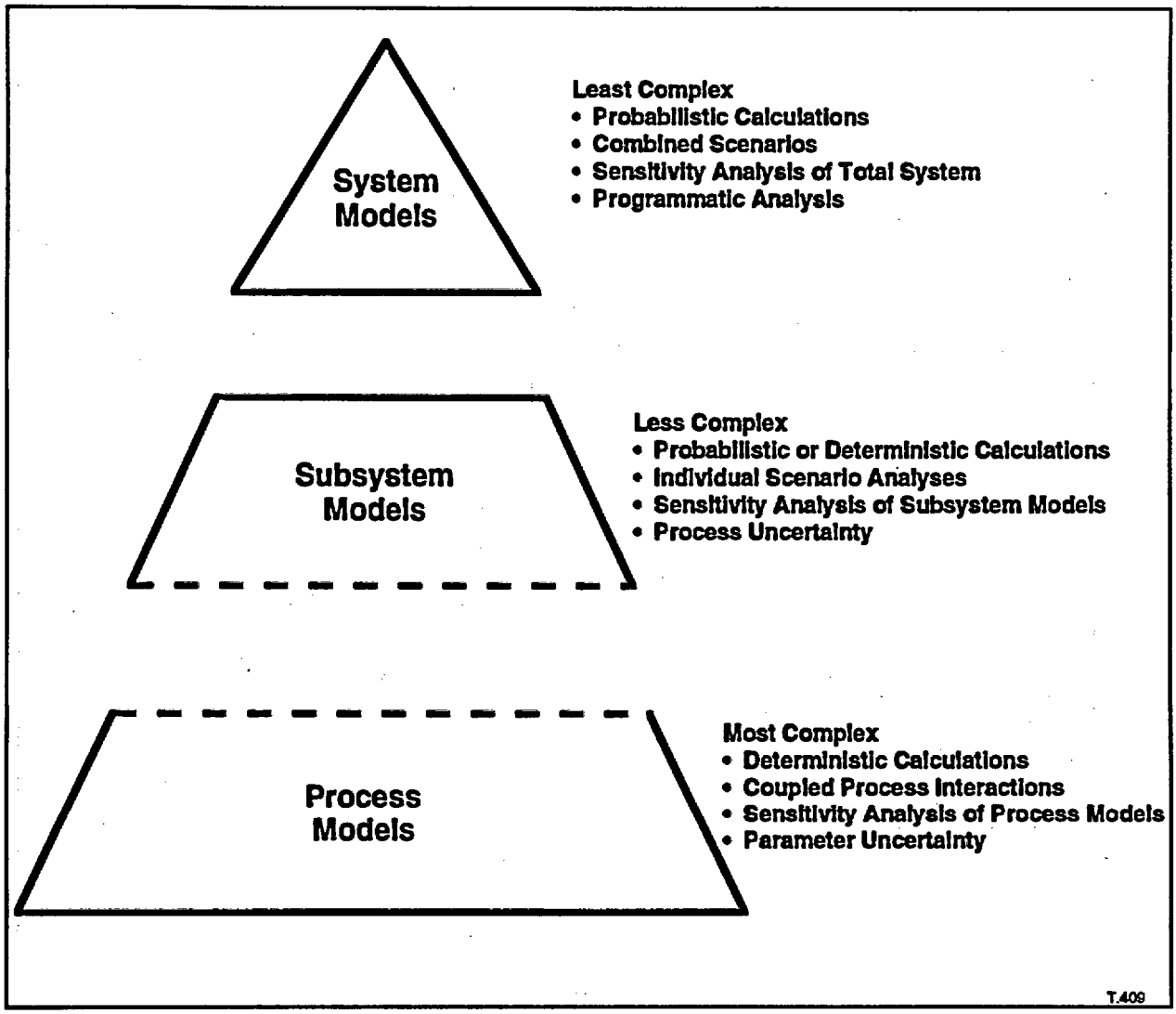

Figure 6.1.1B Hierarchy of Models Used in Performance Assessment

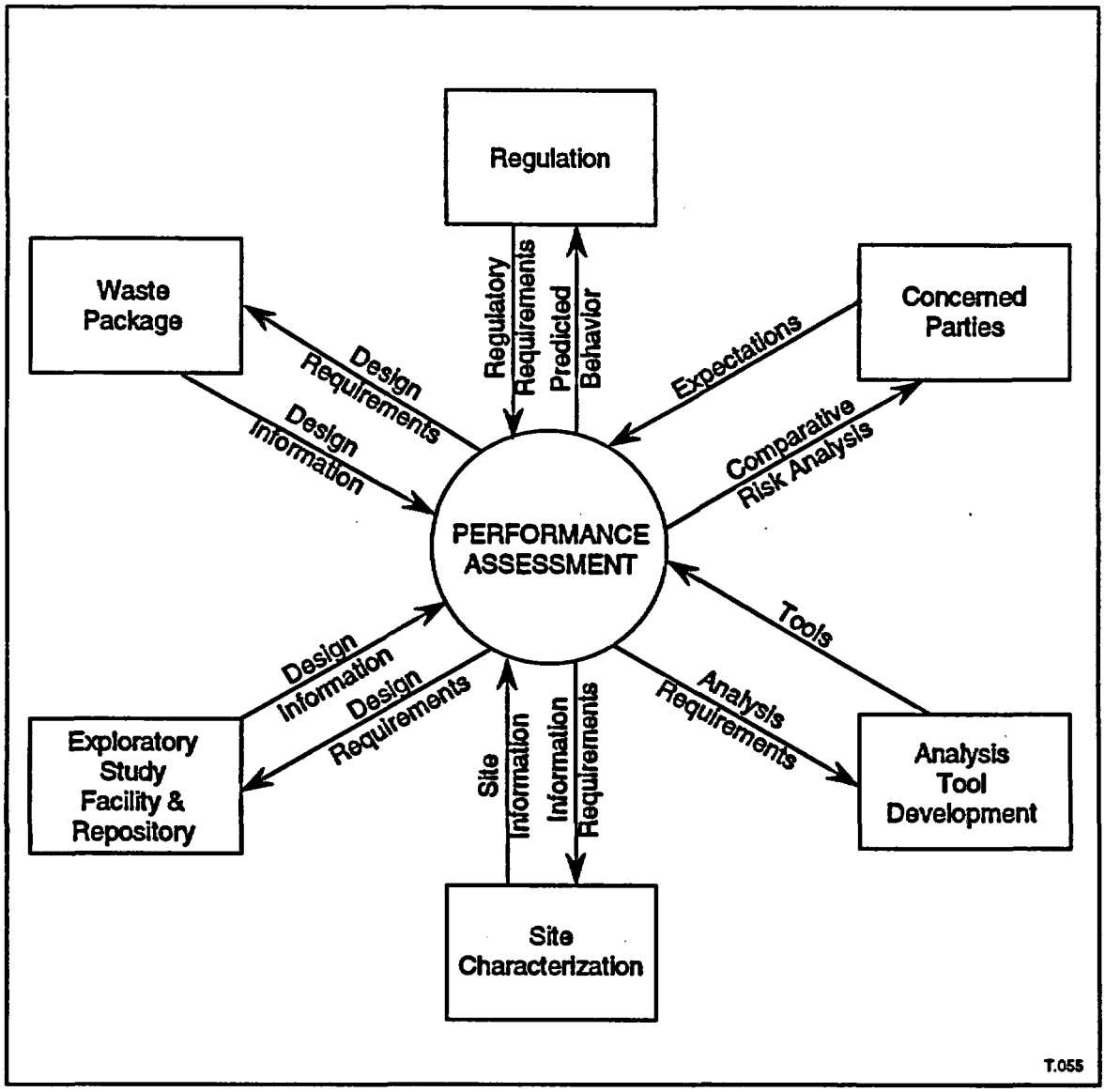

Figure 6.1.1C. Interactions Between PA and Other Components of the MGDS Program for Each Iteration

REFERENCE

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **6.1 BASIC APPROACH (OVERALL SYSTEM PERFORMANCE ASSESSMENT)**

2. Lead Author & Phone No. Jim Duguid
703-204-8851

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

This section describes the conceptual and mathematical background for the assessments of overall system performance.

6. Opening Statement:

7. Main Body Outline:

6.1.1 Conceptual Background for the Assessment of Overall System Performance

6.1.2 Mathematical Background for the Assessment of Overall System Performance

This section should contain a brief discussion of the types of mathematical models used in performance assessment with examples of models which use each type (e.g., Integrated Finite Difference; TRACR3D). Types of probabilistic methods used in the analyses should be described. Also included should be a discussion of how the CCDF was formed and how uncertainties are incorporated (e.g., mean CCDF or uncertainty of the uncertainty).

8. Conclusion:

9. Support Authors & Their Assignments:

Section No. & Title: 6.1 BASIC APPROACH (OVERALL SYSTEM PERFORMANCE ASSESSMENT)

Lead Author & Phone No. Jim Duguid
703-204-8851

A. Table No. 6.1A

Title: Summary of Performance Assessment Iterations Completed

Content:

Iteration	Models Used	Scenarios	Documentation
0	Primarily Systems Models	Human intrusion, seismicity, volcanism	SAND _____, 1992
2	-	-	-

[Will be completed as per information need Log no. JOD-1]

B. Table No. 6.1B

Title: Status of Issue Resolution using Performance Assessment

Content:

Issue	Status		Topical Report Reference
	Resolved	Open	
1. Erosion		x	(none)
2. Volcanism		x	
3.			

[Will be completed as per information need Log no. JOD-2]

Section No. & Title: 6.1 BASIC APPROACH (OVERALL SYSTEM PERFORMANCE ASSESSMENT)

Lead Author & Phone No. Jim Duguid
(703) 204-8851

C. Table No. 6.1C

Title: Performance Assessment Data Input for each Iteration

Content:

Iteration	Data Documentation
1 2 3	SAND ____, 1992

[Will be completed as per information need Log no. JOD-1]

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **6.1 BASIC APPROACH (OVERALL SYSTEM PERFORMANCE ASSESSMENT)**

Lead Author & Phone No. Jim Duguid
703-204-8851

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. U.S. Department of Energy, 1988, Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada. DOE/RN-0199, Office of Civilian Radioactive Waste Management, December 1988.

2.

3.

4.

5.

6.

7.

8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-1**

2. Section no. & title: **6.1 BASIC APPROACH (OVERALL SYSTEM PERFORMANCE ASSESSMENT)**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Data input documentation and results (documentation) for each iteration of PA.

7. What is the information needed for?

   Input to Chapter 6 of SAR, and input to Table 6.1A and 6.1C.

8. What group is the probable information supplier?

   Performance Assessment, Bob Andrews, M&O.

9. When is the information needed?

   At the end of each PA iteration, Iteration 2, Sept. 1993, and annually thereafter.

10. What kind of related information is already available in references, etc.?

    Iteration 1, Total System Performance, Assessment SAND 91-2795, 1992. Holly Dockery SNL. YMP SCP.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-2**

2. Section no. & title: **6.1 BASIC APPROACH (OVERALL SYSTEM PERFORMANCE ASSESSMENT)**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Listing of current issues where PA will be used in their resolution, listing of issues resolved, and topical report references for resolved issues.

7. What is the information needed for?

   Completion of Table 6.1B.

8. What group is the probable information supplier?

   Licensing, Bill Griffin, M&O.

9. When is the information needed?

   Annually at the end of each fiscal year (September 30) until SAR is complete.

10. What kind of related information is already available in references, etc.?

    Currently DOE has a preliminary issue list. YMP SCP.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-3**

2. Section no. & title: **6.1.1 CONCEPTUAL BACKGROUND FOR THE ASSESSMENT OF OVERALL SYSTEM PERFORMANCE**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Reference.

7. What is the information needed for?

   Final documentation of Iteration 1 of Total System PA.

8. What group is the probable information supplier?

   SNL, Holly Dockery.

9. When is the information needed?

   September 30, 1992.

10. What kind of related information is already available in references, etc.?

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11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-4**

2. Section no. & title: **6.1.2 MATHEMATICAL BACKGROUND FOR THE ASSESSMENT OF OVERALL SYSTEM PERFORMANCE**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Description of types of models used in Iteration 1 of PA, and description of how the CCDF was formed and an interpretation of the uncertainty incorporated in the CCDF.

7. What is the information needed for?

   Completing a first draft of Section 6.1.2.

8. What group is the probable information supplier?

   Jim Duguid, Scientific Models, and Bob Andrews, PA.

9. When is the information needed?

   September 30, 1993.

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: 6.1 **BASIC APPROACH (OVERALL SYSTEM PERFORMANCE ASSESSMENT)**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Jim Duguid 703-204-8851

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

Section 6.2 System Description

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6.2 SYSTEM DESCRIPTION

[This section will describe the conceptual models, and processes and events that will be analyzed to assess the overall repository system performance.] The system, as used in this Section, consists of the geologic units and the hydrogeologic units within the controlled zone and the influence (on the system) of natural processes and events, thermal loading, and human-initiated processes and events over the next 10,000 years and beyond. The fluid flow within the controlled zone is related to the regional flow system (described in Chapter 3) where necessary to define boundary conditions for analyses and is influenced by events and process that occur both within the controlled zone and the region.

6.2.1 Conceptual Models

[The potential conceptual model alternatives that could be used for evaluation of system performance will be developed and documented (M&O Information Need Log No. JOD-5, 1992). The categories in which conceptual models will be considered are related directly to the engineered barrier system (waste package), the repository as influenced by thermal loading (rock mechanics), water and gas flow in the unsaturated zone, water flow in the saturated zone, radionuclide transport in both the unsaturated and saturated zones, and the biosphere. The potential conceptual models that will be considered will be screened and either rejected or incorporated into the calculational models that will be used in the overall system performance assessment that will be presented in the SAR.]

[Tables 6.2.A through 6.2.F will provide a summary of the remaining conceptual models in the categories of waste package, rock mechanics, unsaturated flow, saturated flow, radionuclide transport and biosphere, respectively. Table 6.2.G will provide the references for each category that justify elimination of the potential conceptual models that will not be considered in the SAR. (Discussion to be completed per information, need Log Nos. JOD-6 and JOD-7).]

6.2.2 Potentially Disruptive Processes and Events

The credible potentially disruptive processes and events that could reasonably affect the geologic repository over the next 10,000 years are presented in Table 6.2H. These processes and events are categorized by their causes which are tectonic, geomorphic, climatic, and anthropogenic. Anthropogenic effects are either intentional (repository related) or inadvertent (due to human intrusion). Table 6.2H also indicates the location in which each of the processes and events are a consideration (e.g., could potentially affect the long term behavior of the repository), and the general effects that could be expected from the process or event. Each of the processes and events is discussed by the category of its root cause.

Processes and events that are caused by tectonics are uplift/subsidence/tilting, folding, faulting, seismicity, and volcanism. Each of these could alter the ground water flow pathways or hydraulic conductivity which could effect ground water flow, gas flow, and radionuclide transport to the accessible environment. Volcanism could affect the repository through magmatic intrusion into the emplacement area, entrainment of waste, and ejection of radionuclides into the biosphere. Intrusion of magma into an aquifer could cause steam that could travel along faults, fracture

zones, or zones of higher hydraulic conductivity to reach the repository. The steam could increase corrosion rates, leaching, and radionuclide transport. The tectonic processes and events, uplift/subsidence/tilting, folding, faulting, and seismicity within the region could alter flow paths from the repository through changes in the regional ground water flow patterns or local changes in the water table elevation. Seismicity in the region and faulting within the controlled zone could increase hydraulic conductivities and release perched ground water or decrease travel time from the repository to the accessible environment.

Geomorphic processes and events which were considered are erosion and mass gravity movements such as landslides. Erosion could expose waste over long periods of time (millions of years) or cause oversteepening of slopes which would make them more succeptable to mass gravity movements. Mass gravity movements can create dams and ponds which would increase infiltration and water percolation through the repository. A reduction of depth of the repository caused by erosion or mass gravity movement could also alter flow paths in the unsaturated zone which could affect the repository. For erosion or mass gravity movements to affect the repository significantly, they would have to occur above or nearly above the emplacement area within the controlled zone. [Because of the potential for lateral flow associated with perched ground water zones, erosion and mass gravity movements within the controlled zone will be considered.]

Repository caused processes and events include thermomechanical response of the rock mass surrounding the emplacement area, and thermally induced geochemical changes that could increase hydraulic conductivity. Increased hydraulic conductivity could increase ground water flow, gas flow, and radionuclide transport. Geochemical alteration associated with the long-term

thermal pulse could change fracture fillings and/or matrix minerals and potentially reduce sorption of radionuclides in the repository near field. Geochemical changes could potentially extend beyond the emplacement area and into the controlled zone. [For this reason, geochemical changes will be considered within the controlled zone in order to examine the potential significance of these smaller effects beyond the emplacement area.]

Climate change could cause increased precipitation and increased infiltration which would increase the amount of water and water vapor moving through the repository. This increase could cause an increase in water table elevation and changes in ground water flow paths. As discussed previously increased precipitation could result in increased erosion. Increased infiltration could decrease ground water travel time, increase leaching, and cause water table rise; all of which are important within the controlled zone. Increased infiltration in the region could alter regional ground water flow patterns which could affect flow paths.

The undisturbed repository behavior could be changed through future human actions. Human activities considered are intrusion, induced infiltration, ground water withdrawal and weapons testing. Intrusion could result from drilling (either vertical or lateral) into the emplacement area or from mining into contaminated rock within a contaminated ground water plume which could extend from the emplacement area. [In order to meet the requirements of 40 CFR 191, and because drilling and mining in search of natural resources could alter flow paths, intrusion will be considered within the controlled zone.] Human activities could increase infiltration from water spreading, underground injection of water, or construction of dams and ponds within the controlled zone. Ground water withdrawal could alter the direction of flow and/or the rate of

flow along flow paths. Weapons testing within the controlled zone could also alter water and gas flow paths.

6.2.3 Processes and Events for Undisturbed Performance

The processes for undisturbed performance are thought of as those naturally occurring processes at the Yucca Mountain site and its vicinity and are influenced by the construction of the facility, the thermal pulse, and any release of radioactive materials over the next 10,000 years and beyond. The processes include physical and chemical processes such as underground flow of fluids and transport of contaminants. These processes are affected by thermal loading and geochemical/chemical behavior of waste and waste package materials interacting with rock, gas, and water over long periods of time. The natural processes are affected by repository induced processes and are also influenced by events that will occur over the next 10,000 years such as seismicity and climatic change.

The undisturbed performance waste package undisturbed processes and events that are considered for performance are presented in Table 6.2I. To provide insight into the level of detail being considered for that the waste package processes and Table 6.2J presents the potential data requirements necessary for analysis of these processes and events. Each entry in Table 6.2J and in subsequent data Tables (in this section) may represent either a single value for each material or an entire data set (e.g., the number of data points represented for each line of the data Tables is not constant; the radionuclide inventory represented by the first line of Table 6.2J contains the number of curies over time of each radionuclide in the repository for each waste form).

The repository and near field undisturbed processes and events that are considered for performance are presented in Table 6.2K. They include the mechanical, hydrologic, and geochemical responses of the repository and the near field host rock to the thermal and chemical effects of the waste. For insight into the level of detail of analyses of these processes and events, the potential sets of data required are presented in Table 6.2L. Because of the similarity of these data sets for waste package gap filler and backfill to the data necessary for seals, the data sets necessary for evaluation of repository seals are also presented in Table 6.2J.

The biosphere undisturbed processes and events that are considered for performance are presented in Table 6.2M. Potential data sets necessary for analysis of processes and events have been partially compiled (Table 6.2N). The remaining data for Table 6.2N will be supplied through information need JOD-8. Because of the importance of fluid flow and transport processes between the waste and the accessible environment, these processes and events are presented in greater detail in Table 6.2O and 6.2P, respectively. The potential data sets required for analysis of fluid flow and transport are presented in Tables 6.2Q and 6.2R, respectively. For both fluid flow and transport, the data sets for unsaturated conditions are presented in Tables 6.2O-6.2R and these data sets will be simplified for saturated conditions.

The processes and events considered for undisturbed performance at the Yucca Mountain site are summarized in Table 6.2S. They are categorized by cause and expected location of consideration (i.e., within the emplacement area, repository disturbed zone, controlled zone, etc.). The potential effects of the processes and events are also tabulated. [Table 6.2S and other Tables in this section will be completed or updated through information need JOD-9.]

Table 6.2.C. Conceptual Models Used for Analysis of Unsaturated Flow

Calculational Model	Conceptual Models
TOUGH2 . . .	Porous Media Double Porosity Dual Continuum

Note: Tables 6.2A through 6.2F are similar in design and only 6.2C is shown here. These tables will be completed using Information Need Log No. JOD-6.

Table 6.2G. Justification of Conceptual Models Not Included in the Performance Assessment

Area	Conceptual Models Eliminated	Documentation
Waste Package	Examples	Reference for each area which justifies elimination
Rock Mechanics		
Unsaturated Flow	Discrete Fracture (etc)	
Saturated Flow		
Radionuclide Transport		
Biosphere		

Note: This table will be completed using Information Need Log No. JOD-7.

Table 6.2H. Location and General Effects of Potential Disruptive Processes and Events

Cause	Process/Event	Location	General Effects
Tectonic	• Uplift/Subsidence/Tilting	Region	Alteration of flow paths
	• Folding	Region	Alteration of flow paths
	• Faulting	Controlled zone and region	Alteration of flow paths
	• Seismicity	Region	Alternation of flow paths
	• Volcanism		
	- magmatic intrusion	Emplacement Area	Waste entrainment
	- hydrothermal intrusion	Controlled zone	Corrosional/leaching/migration
Geomorphic	• Erosion	Controlled zone	Reduced depth to waste, increased infiltration
	• Mass Gravity Movements		Reduced travel time
	- Dams & Ponds		
Repository	• Thermomechanical	Disturbed zone	Alteration of flow paths
	• Geochemical	Disturbed zone and controlled zone	Alteration of flow path and alteration of sorption
Climatic	• Infiltration	Controlled zone and region	Decreased travel time, increased leaching, and water table rise
	• Erosion/Mass Gravity - Dams & Ponds	Controlled zone	Increased infiltration
Human	• Intrusion		
	- Drilling	Controlled zone	Waste exhumation, alteration of flow paths, and drinking water wells
	- Mining	Controlled zone	Exhumation of contaminated rock
	• Infiltration		
	- Ground-water injection/water spreading	Controlled zone	Increased infiltration, alteration of flow paths
	- Dams & Ponds	Controlled zone	Increased infiltration
	• Weapons Testing	Controlled zone	Alteration of flow paths

Table 6.2I. Waste Package Processes and Events for Undisturbed Performance

Waste Package Environment Processes

- Thermal
- Mechanical
- Radiation
- Geochemical
- Hydrodynamic

Waste Package Failure Processes

- Uniform corrosion
- Pitting corrosion
- Stress crack corrosion
- Mechanical
- Hydrogen cracking
- Oxidation

Waste Form Release Processes

- Gaseous release
  - Instantaneous
  - Gradual
- Aqueous release processes
  - Solubility controlled
  - Alteration controlled

Table 6.2J. Potential Waste Package Data Requirements

Waste Form

- Radionuclide Inventory
  - Percent in matrix
  - Percent in gap
  - Percent in grain and grain boundary
  - Percent in cladding
  - Fission history
- Chemical properties
  - Percent of fuel/waste wet
  - Radiolysis
  - Colloid formation
  - Solubility
  - Fuel and glass alteration rate
  - Fuel and glass composition
  - Radiation induced changes
  - Thermally induced changes
  - Corrosion induced changes
- Thermal properties
  - Density
  - Specific heat
  - Thermal conductivity
- Radiation properties
  - Densities
  - Alteration cross sections

Table 6.2J. Potential Waste Package Data Requirements (Continued)

Waste Package

- Thermal properties
  - Density
  - Specific heat
  - Thermal conductivity
- Radiation properties
  - Densities
  - Attenuation cross sections
- Mechanical properties
  - In-situ stresses
  - Moduli (elasticity, etc.)
  - Poison's ratio
- Corrosion properties
  - Uniform corrosion parameters
  - Pitting parameters
  - Stress cracking parameters
  - Oxidation parameters
  - Chemical properties
  - Corrosion depth to failure
  - Electrochemical properties
  - Microbiological properties

Table 6.2J. Potential Waste Package Data Requirements (Continued)

Gap Filler, Backfill, and Seals[1]

- Hydrodynamic properties
  - Porosity
  - Tortuosity
  - Permeability
  - Saturation
  - Retardation
  - Diffusion coefficients
- Water chemistry
  - Radiolysis
  - Radiation induced changes
  - Temperature induced changes
  - Colloid formation
  - Corrosion induced changes
- Thermal properties
  - Density
  - Specific heat
  - Thermal conductivity
- Radiation properties
  - Density
  - Specific heat
  - Thermal conductivity

Geometry

- Waste package
- Gap, gap filler, and backfill
- Placement

[1] Technically, data sets for evaluation of repository seals should be presented in Table 6.2L but are presented here because of their similarity to filler and backfill.

Table 6.2J. Potential Waste Package Data Requirements (Continued)

Boundary and Initial Conditions

- Temperature
- Manufactured defects
- Mechanical failure
- Chemical composition
- In-situ stress
- Water saturation
- Fluid flux
- Thermal flux
- Radiation flux

Table 6.2K. Repository and Near Field Processes and Events for Undisturbed Performance

Heat Transfer

- Convection
- Radiation
- Conduction

Mechanical Response

- Rock mass deformation
- Joint deformation
- Rock failure
- Seal deformation[2] see Table 6.2J.

Hydrologic Response

- Water and water vapor flow
- Gas flow
- Permeability change

Geochemical Response

- Precipitation/dissolution reactions
- Colloid formation
- Aqueous reactions
- Ion exchange
- Redox reactions
- Adsorption/desorption
- Rock/water interactions

[2] For data sets needed for evaluation of repository seals, see Table 6.2J under Gap Filler, Backfill, and Seals

Table 6.2L. Potential Repository and Near Field Data Requirements

Heat Transfer

- Heat transfer as a function of time
- Convective heat transfer as a function of temperature
- Radiative heat transfer
- Conduction

  - Rock mass bulk properties
  - Rock mass heat capacity as a function of saturation
  - Rock mass thermal conductivity
  - Air density
  - Air heat capacity
  - Air thermal conductivity
  - Water density
  - Water heat capacity
  - Water thermal conductivity

Mechanical Response

- Intact rock and rock mass properties

  - Density
  - Elastic constants (anisotropy)
  - Internal friction properties
  - Deformation modulus (time, temperature, stresses)
  - Compressive strength (time, temperature, stresses)
  - Tensile strength (time, temperature, stresses)

- Effects of damage function on rock mass properties
- Rock mass properties under dynamic loading

Table 6.2L. Potential Repository/Near Field Data Requirements (Continued)

Hydrologic Response

- Saturated water intrinsic permeability
- Permeability vs water saturation
- Capillary pressure vs water saturation
- Total porosity
- Liquid fracture matrix coupling function
- Thermal expansion
- Thermal conductivity
- Specific heat

Geochemical Response

- Dispensivity
- Minerals/petrology
- Diffusion coefficients
- Equilibrium distribution coefficients
- Chemical thermodynamic database
- Fluid chemistry

Boundary Conditions

- Pressure or hydraulic potential
- Water saturation
- Water and gas flux
- Overburden loading
- Temperature
- Thermal flux

Initial Conditions

- Ambient stresses
- Ambient temperature
- Fluid pore pressure
- Joint geometry

Table 6.2M. Biosphere Processes and Events for Undisturbed Performance

- Unsaturated Flow
- Unsaturated transport
- Saturated flow
- Saturated transport
- Thermal effects
- Conduction
- Convection
- Geochemical Effects
  - Precipitation/dissolution
- Tectonic effects
  - Changes in hydraulic conductivity due to seismicity
- Climate change
  - Infiltration
- Surface Water
  - Rivers and streams
  - Lakes and ponds
- Dose to man and environment
  - Inhalation
  - Ingestion
  - Immersion
  - Direct radiation
  - Food chain transport
  - Population

Table 6.2N. Potential Biosphere Data Requirements

Fluid Flow
(See Table 6.2P)

Radionuclide Transport
(See Table 6.2R)

Remaining portion of table will be supplied through Information Need JOD-8.

Table 6.2O. Fluid Flow Processes and Events for Undisturbed Performance

Porous Flow

- Gas, vapor, liquid

Fracture flow

- Gas, vapor, liquid

Fracture/matrix coupling

- Equilibrium and disequilibrium

Gas, vapor, liquid

Thermal effects

- Thermal expansion
- Block slip (hydraulic conductivity change)

Geochemical effects

- Precipitation/dissolution reactions

Table 6.2P. Potential Fluid Flow Data Requirements

Matrix and Fracture Material Properties

- •Liquid fluid phases
  - -Saturated water intrinsic permeability
  - -Relative permeability vs. water saturation
  - -Capillary pressure vs. water saturation
  - -Total porosity
  - -Liquid fracture - matrix coupling term
  - -Fracture water saturation delay
- •Gas fluid phases
  - -Saturated gas intrinsic permeability
  - -Relative permeability vs. gas saturation
  - -Capillary pressure vs. gas saturation
  - -Gas fracture - matrix coupling function
  - -Fracture gas saturation delay
  - -Dissolved gas in liquid vs. temperature and pressure
  - -Base vapor - gas diffusion coefficients
  - -Temperature dependent diffusion exponent
  - -Tortuosity and related factors
  - -Mass fraction phase factor
- •Thermal effects of porous medium for water and gas
  - -Thermal expansion vs. saturation
  - -Thermal conductivity vs. saturation
  - -Specific heat vs. saturation
- •Fracture properties (individual and sets)
  - -Dimensions
  - -Orientations
  - -Connectivity

Table 6.2P. Potential Fluid Flow Data Requirements (Continued)

Fluid Properties

- Liquid densities vs. temperature, pressure, concentration
- Gas densities vs. temperature, pressure, concentration
- Vapor densities vs. temperature and pressure
- Dynamic liquid viscosities vs. temperature, pressure, concentration
- Dynamic gas viscosities vs. temperature, pressure, concentration
- Dynamic vapor viscosities vs. temperature and pressure
- Thermal conductivity vs. temperature and pressure
- Specific heat vs. temperature, pressure, concentration
- Thermophysical water properties (steam tables)

Boundary Conditions

- Pressure or hydraulic potential conditions
- Temperature conditions
- Fluid saturations
- Flux of fluid and temperature

Initial Conditions

- (same as boundary conditions)

Geometry

- Hydrologic unit contacts
- Fault geometry
- Discrete fracture geometry

Table 6.2Q. Transport Processes and Events for Undisturbed Performance

- Diffusion
- Dispersion
- Retardation
  - Ion exchange
  - Adsorption/desorption
  - Precipitation/dissolution
  - Matrix diffusion
  - Chelation
- Geochemical reactions
- Radioactive decay

Table 6.2R. Potential Transport Data Requirements

Material Characteristics (matrix and fracture)

- Dispersivities
- Total porosity
- Effective porosity
- Diffusivity
- Specific density
- Fracture configuration from flow model

Fluid Properties

- Liquid densities vs. temperature, pressure, concentration
- Dynamic liquid viscosities vs. temperature, pressure, concentration
- Thermal conductivity vs. temperature, pressure, concentration
- Diffusion coefficient vs. temperature, pressure, concentration

Geochemistry

- Mineralogy/petrology
- Sorption coefficients
- Matrix diffusion coefficients
- Equilibrium distribution coefficient
- Chemical thermodynamic database
- Sorption isotherms
- Natural colloids, organics
- Actinide polymerization
- Reaction rates

Liquid Phase

- Flow vector fields
- Saturation distribution
- Temperature distributions
- Condensed water vapor fields

Table 6.2R. Potential Transport Data Requirements (Continued)

Gas Phase

- Water vapor vector fields
- Flow vector fields
- Saturation distributions
- Temperature distribution

Boundary Conditions

- Concentrations
- Contaminant fluxes

Initial Conditions

- Concentrations
- Contaminant fluxes
- Radionuclide inventory

Geometry

- From flow model

Table 6.2S. Summary of Processes and Events for Undisturbed Performance[3]

Cause	Process/Event	Where Considered	General Effects
Waste	• Heat transfer	Emplacement area and controlled	Thermally induced fluid glow
	• Radiolysis	Emplacement area	Geochemical changes
	• Heat transfer	Disturbed zone	Stress/strain alterations
Corrosion/Geochemical	• Waste package degration	Emplacement area	Gaseous release and/or exposure
Underground Opening	• Creep	Disturbed zone	Spalling and/or structural collapse
Geochemical	• Waste leaching	Complacement area	Mobilization of radionuclides
	• Sorption	Between the waste foam and the accessible environment	Retardation of radionuclides
	• Colloid formation	Complacement area	Mobilization of radionuclides
	• Precipitation/dissolution	Along flow paths from waste foam to accessible environment	Changes in fluid conductivity
Tectonic	• Seismicity	Within the controlled zone	Alteration of flow paths
Climatic change	• Infiltration	Within the controlled zone	Increased fluid flow and water table raise
		Within the region	Alteration of flow paths
	• Flooding	Within the controlled zone	Increased fluid flow
Radionuclide Migration	• Dose-to-man	At the accessible environment	Increased health effects
Fluid Flow	• Gaseous and/or liquid transport of radionuclides	Within the controlled area	Migration of contaminants to accessible environment
Diffusion	• Matrix diffusion	Within the controlled area	Retardation of containment migration

[3] Table will be updated through information need JOB-9.

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 6.2 SYSTEM DESCRIPTION

2. Lead Author & Phone No. Jim Duguid
703-204-8851

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

This section describes the conceptual models, processes, and events used to assess overall repository system performance. Because the supporting bases for the conceptual models, processes, and events are presented in other chapters, cross-references will be indicated where appropriate.

6. Opening Statement:

7. Main Body Outline:

6.2 SYSTEM DESCRIPTION

This section describes the conceptual models, processes, and events that were used to assess overall repository system performance. In general, the supporting bases for the conceptual models, processes, and events are presented in other chapters. In this section, they should be summarized in sufficient detail to provide a basis for the PAs of this chapter. To the extent that processes and events have previously been identified and described in Sections 3.2.1 and 3.2.2, only a listing of these processes and events need be presented in this section. If the identification of processes and events presented here is more (or less) extensive than that of Sections 3.2.1 and 3.2.2, the reasons for the differences should be presented.

7. Main Body Outline (Continued)

6.2.1 Conceptual Models

Describe the conceptual models (and reasonable alternatives) applicable to the assessment of overall system performance (see Tables 6.2A-6.2F). Provide the basis for excluding an alternative concept from the PA (see Table 6.2G).

6.2.2 Potentially Disruptive Processes and Events

This section identifies all credible potentially disruptive processes and events that could significantly and adversely affect the post-closure performance of the overall repository system. Each process or event is described in terms of its cause (if known), its expected location or locations of occurrence, and, in general terms, its effects on the post-closure performance of the overall repository system (see Table 6.2H).

6.2.3 Processes and Events for Undisturbed Performance

This section identifies all processes and events expected to affect the predicted post-closure behavior of the overall repository system in its undisturbed state. Processes and events and supporting data sets are described (see Tables 6.2I-6.2R). Each process or event is described in terms of its cause (if known), its expected location or locations of occurrence, and in general terms, its effects on the post-closure performance of the overall repository systems (see Table 6.2S).

8. Conclusion:

9. Support Authors & Their Assignments:

Section No. & Title: 6.2 SYSTEM DESCRIPTION

Lead Author & Phone No. Jim Duguid
703-204-8851

A. Table No. 6.2A

Title: **Conceptual Models Used for Analysis of Waste Package Water Flow**

Content:

Calculation/Model	Conceptual Models
"AREST"	Uniform corrosion, etc.

B. Table No. 6.2B

Title: **Conceptual Models Used for Analysis of Repository Thermomechnanical Effects**

Content:

Calculation/Model	Conceptual Models

Section No. & Title: **6.2 SYSTEM DESCRIPTION**

Lead Author & Phone No. Jim Duguid
(703) 204-8851

C. Table No. **6.2C**

Title: **Conceptual Flow Models Used for Analysis of the Unsaturated Zone**

Content:

Calculation/Model	Conceptual Models
TOUGH2	Porous Media
	Double Porosity
	Dual Continuum

D. Table No. **6.2D**

Title: **Conceptual Models Used for Analysis of Saturated Ground Water Flow**

Content:

Calculation/Model	Conceptual Models

Section No. & Title: 6.2 SYSTEM DESCRIPTION

Lead Author & Phone No. Jim Duguid
(703) 204-8851

E. Table No. 6.2E

Title: Conceptual Models Used for Analysis of Radionuclides Transport

Content:

Calculation/Model	Conceptual Models

F. Table No. 6.2F

Title: Conceptual Models Used for Analysis of the Biosphere

Content:

Calculation/Model	Conceptual Models
GENII	Standard Man, etc.

Section No. & Title: **6.2 SYSTEM DESCRIPTION**

Lead Author & Phone No. Jim Duguid
(703) 204-8851

G. Table No. **6.2G**

Title: **Justification of Conceptual Models Not Included in the Overall Performance Assessment**

Content:

Area	Conceptual Models Eliminated	Documentation
Waste Package		Reference

Section No. & Title: 6.2 SYSTEM DESCRIPTION

Lead Author & Phone No. Jim Duguid
703-204-8851

A. Table No. 6.2H

Title: **Potentially Disruptive Processes and Events**

Content:

Cause	Credible Potentially Disruptive Processes & Events that Could Significantly and Adversely Affect of the Post-Closure Performance of the Overall Repository System	Expected Location or Location Occurrence	Effects on the Post-Closure Performance (In general terms)
Cause Statement	Process	Here	Schedule Delay
Cause Statement	Process	There	Contamination
Unknown Cause	Process	Everywhere	Potential Worker Safety

Section No. & Title: **6.2 SYSTEM DESCRIPTION**

Lead Author & Phone No. Jim Duguid
(703) 204-8851

I. Table No. **6.2I**

Title: **Waste Pack Processes and Events for Undisturbed Performance**

Content: Listing waste package environment, failure, and release processes and events

---

J. Table No. **6.2J**

Title: **Potential Waste Package Data Requirements**

Content: Listing of parameters required for analysis of the waste package

---

K. Table No. **6.2K**

Title: **Repository and Near Field Processes and Events for Undisturbed Performance**

Content: Listing of Repository and Near Field Processes and Events

---

L. Table No. **6.2L**

Title: **Potential Repository and Near Field Data Requirements**

Content: Listing of Repository and Near Field Data needed for analysis

Section No. & Title: 6.2 SYSTEM DESCRIPTION

Lead Author & Phone No. Jim Duguid
(703) 204-8851

M. Table No. 6.2M

Title: **Biosphere Processes and Events for Undisturbed Performance**

Content: Listing of biosphere processes and events

N. Table No. 6.2N

Title: **Potential Biosphere Data Requirements**

Content: Listing of data necessary for analysis

O. Table No. 6.2O

Title: **Fluid Flow Processes and Events for Undisturbed Performance**

Content: Listing of fluid flow processes and events

P. Table No. 6.2P

Title: **Potential Fluid Flow Data Requirements**

Content: Listing of data required for analysis of fluid flow

Section No. & Title: **6.2 SYSTEM DESCRIPTION**

Lead Author & Phone No. Jim Duguid
(703) 204-8851

Q. Table No. **6.2Q**

Title: **Transport Process and Events for Undisturbed Performance**

Content: Listing of transport processes and events

R. Table No. **6.2R**

Title: **Potential Transport Data Requirements**

Content: Listing of data required for transport analysis

S. Table No. **6.2S**

Title: **Summary of Processes and Events for Undisturbed Performance**

Content:

Cause	Process and Events Expected to Affect the Predicted Post-Closure Behavior of the Overall Repository System in its Undisturbed State	Expected Location or Locations of Occurrence	Effects on the Post-Closure Performance (In general terms)
Cause Statement	Process		Potential Collapse
Cause Statement	Process		Contamination
Cause Statement	Process		Excessive Heat

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: 6.2 SYSTEM DESCRIPTION

Lead Author & Phone No. Jim Duguid 703-204-8851

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

2.

3.

4.

5.

6.

7.

8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-5**

2. Section no. & title: **6.2 SYSTEM DESCRIPTION**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Documentation of potential conceptual models, M&O _____, 1992.

7. What is the information needed for?

   As a reference to demonstrate that all potentially conceptual models for Yucca Mountain were considered.

8. What group is the probable information supplier?

   Performance Assessment, Bob Andrews, M&O.

9. When is the information needed?

   September 30, 1992.

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-6**

2. Section no. & title: **6.2 SYSTEM DESCRIPTION**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Listing of calculational models used for PA Iteration 3 and conceptual models they contain.

7. What is the information needed for?

   Completion of Tables 6.2A through Table 6.2F.

8. What group is the probable information supplier?

   Performance Assessment, Bob Andrews, M&O.

9. When is the information needed?

   September 30, 1994.

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-7**

2. Section no. & title: **6.2 SYSTEM DESCRIPTION**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Listing of calculational models used for PA Iteration 3 and conceptual models they contain.

7. What is the information needed for?

   Completion of Table 6.2G.

8. What group is the probable information supplier?

   Performance Assessment, Bob Andrews, M&O.

9. When is the information needed?

   September 30, 1994.

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-8**

2. Section No. & Title: **6.2 SYSTEM DESCRIPTION**

3. Lead Author & Phone No.: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work Location: **Vienna, Virginia**

6. Type of information needed:

   Potential Data requirements for biosphere processes and events

7. What is the information needed for? (e.g., Safety Analysis Section 3.2):

   Completion of Table 6.2N

8. What group is the probable information supplier?

   Performance Assessment Group, Bob Andrews

9. When is the information needed?

   September 30, 1993

10. What kind of related information is already available in references, etc.? (List any known, related information sources):

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-9**

2. Section No. & Title: **6.2 SYSTEM DESCRIPTION**

3. Lead Author & Phone No.: **Jim Duguid (703) 204-8851**

4. Information request date: **2/21/92**

5. Work Location: **Vienna, Virginia**

6. Type of information needed:

   Processes and events considered for undisturbed performance in iteration 2 of performance assessment.

7. What is the information needed for? (e.g., Safety Analysis Section 3.2):

   Completing Table 6.2S and updating Tables 6.2I-6.2M and 6.2O-6.2R.

8. What group is the probable information supplier?

   Performance Assessment

9. When is the information needed?

   September 30, 1993

10. What kind of related information is already available in references, etc.? (List any known, related information sources):

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **6.2 SYSTEM DESCRIPTION**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Jim Duguid 703-204-8851

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 6.3 Assessment of Compliance: Cumulative Release of Radioactive Materials

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Page

6.3 ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIONUCLIDES

The purpose of this section is to discuss whether the overall performance of the repository system at Yucca Mountain complies with 10CFR60.112. [The performance of the overall repository system at the Yucca Mountain site will be evaluated in terms of cumulative releases of radioactive materials to the accessible environment for 10,000 years after repository closure.] [This entire Section will be completed using Information need JOD-11] These analyses will be used to demonstrate compliance with 10CFR60.112. In addition, analyses will be carried out to determine peak releases. Although these longer-term analyses are highly uncertain, they provide some degree of assurance that rapid degradation of the overall repository system will not occur beyond the required 10,000 year analysis period. Screening of processes and events, development of scenarios, and screening of scenarios will be summarized and references will be provided to fully document selected processes and events and the resulting scenarios, which are analyzed. Sensitivity analyses will be presented to provide an understanding of parameters, conceptual models, and process uncertainty. Sensitivity analyses will be performed to identify those elements of the overall system that affect the performance of the repository for each of the scenarios. Deterministic analyses combined with sensitivity analyses will be conducted with process and subsystem models to demonstrate that the systems models, which were used to produce the complementary cumulative distribution function (CCDF), yield conservative results. Two approaches to developing the CCDF will be discussed to demonstrate compliance with the requirements of 40CFR191. In addition, CCDFs will be presented for both the disturbed and undisturbed scenarios of repository behavior. For the undisturbed case, concentrations of

radionuclides reaching the accessible environment by gaseous and ground-water pathways for the first 10,000 years will be analyzed. Analyses will also be included that demonstrate compliance with the individual protection requirements (dose from all pathways) and the ground-water protection requirements (dose from drinking water) of 40CFR191. The models used in the analyses will be listed and their characteristics will be summarized. The status of model verification and validation will be summarized and references will be provided that describe model verification and validation in detail. In addition, confirmatory testing (presented in Chapter 8) is cross referenced where results are expected to provide data for further validation of models.

6.3.1 Screening of Processes and Events

6.3.1.1 Screening Criteria

Screening of processes and events is based on criteria that eliminate those that do not contribute to the CCDF, since they are physically or logically unrealistic and are expected to have trivial consequences. Initially, processes and events will be eliminated from those identified in Sections 6.2.2 and 6.2.3 based on site characterization results that indicate whether a particular process or event was not present in the vicinity of the site. At this stage, processes and events that are known to occur in the region but had not been found at the site will be retained. Processes and events that clearly have probabilities lower than 10^{-8} occurrence in a given year will be

eliminated. Where the uncertainties in the probability of occurrence are high, processes and events will be retained. The criteria for a given process or event altering the release of radionuclides over 10,000 years will be applied and processes and events showing no significant change in release will be eliminated. For example, climatic change increases infiltration, which increases flow through the repository and potentially increases radionuclide transport. Therefore, climatic change will be retained. Remaining processes and events will be combined into scenarios and included in the CCDF. Where no effect on the position of the CCDF is observed, additional processes and events will be eliminated. The criteria used in screening processes and events are presented in Table 6.3A (see information need JOD-10). [Section will be rewritten based on information needs JOD-10 and JOD-11.]

Table 6.3A Screening Criteria for Retention of Processes and Events*

CRITERION	EXPLANATION
Presence	Site characterization data indicates presence of process/event at the site or within the region
Probability	Probability of occurrence is greater than 10^{-8} per year
Consequence	Process and event potentially increases radionuclide release
Consequence	Incorporation of process and event changes CCDF

*Processes and events that are physically or logically unrealistic and are expected to produce trivial consequences will be eliminiated.

REFERENCES

1. Section No. & Title: 6.3 ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS

2. Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (Placeholder)
702-794-1821

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

This section provides an evaluation of the performance of the overall repository system in terms of cumulative releases of radioactive materials to the accessible environment for 10,000 years after repository closure.

6. Opening Statement:

Same as item 5 above.

7. Main Body Outline:

6.3.0 Introduction

This section provides an evaluation of overall repository system performance in terms of cumulative releases of radioactive materials to the accessible environment for 10,000 years after repository closure. The description characterizes the predicted release resulting from each scenario that can materially affect repository performance and the combined release caused by all scenarios. This section also includes the results of sensitivity analyses identifying the features of the overall system that most significantly affect performance for each of the most significant scenarios.

7. Main Body Outline (Continued)

6.3.1 Screening of Processes and Events

6.3.1.1 Screening of processes and events identified in Sections 6.2.2 and 6.2.3, above, using screening criteria specified in Table 6.3A, to eliminate those that are physically or logically unrealistic or are expected to have trivial consequences.

6.3.1.2 Listing of processes and events that are retained after completion of screening (see Table 6.3B). The listing includes all processes and events that may materially affect the PA.

6.3.1.3 Reasoned explanation, justified by data, demonstrating the absence of material affect on PA, for processes and events that have been eliminated from the postscreening listing (see Table 6.3C).

6.3.2 Scenario Development and Screening

6.3.2.1 The processes and events retained after the screening activity of section 6.3.1, above, have been used to formulate scenarios consisting of credible combinations and sequence of processes and events. One or more scenarios consist of the behavior of the overall system not disrupted by human intrusion or by the occurrence of unlikely natural events ("undisturbed performance").

6.3.2.2 The full set of scenarios were then screened to eliminate those physically or logically unrealistic, or did not pass the probability or consequence screens, not sufficiently credible to warrant further consideration or expected to have trivial consequences.

6.3.2.2.1 The method used for forming scenarios (see Figure 6.3A).

6.3.2.2.2 The criteria used for scenario screening (see Table 6.3D).

6.3.2.2.3 The scenarios retained in the analysis after completion of screening (see Table 6.3E).

7. Main Body Outline (Continued)

6.3.3 Consequence Analysis: Estimates of Cumulative Releases

6.3.3.1 This section describes the results of analyses projecting the performance of the overall repository system as influenced by the scenarios described (see Section 6.3.2, above, and Table 6.3E).

6.3.3.2 The results of the analyses are expressed in terms of the cumulative releases of radioactive materials to the accessible environment. (see Figures 6.3F through 6.3Gn.)

6.3.3.3 Description of the analytical methods (e.g., computer codes) used for these analyses. (see Table 6.3H.)

6.3.4 Probability Estimates

6.3.4.1 The probability of occurrence of each individual process and event identified in Section 6.3.1 that might lead to a significant release of radionuclides from the overall system (see Table 6.3-I).

6.3.4.2 Estimated probabilities or frequencies of occurrence for each of the scenarios described in Section 6.3.2 (see Table 6.3I).

6.3.4.3 Description of techniques used to estimate probabilities (e.g., predictive modeling or estimates from site characterization activities) and the criteria used for each technique (see Table 6.3K).

6.3.4.4 Explanation of how time-dependent probabilities have been assessed for scenarios that involve transient phenomena (see Table 6.3L).

6.3.4.5 Identification and discussion of uncertainties in the probabilities and the sources of uncertainty (see Tables 6.3I through 6.3L).

6.3.4.6 Discussion of alternate approaches used for estimating probabilities when little or no theoretical, experimental, or historical data are available. The factual bases and rationale for the values adopted are discussed.

7. Main Body Outline (Continued)

6.3.5 Compliance Assessment for Cumulative Releases

6.3.5.1 This section demonstrates that the overall system performance objective for cumulative releases in 10 CFR 60.112 is met. The scenario probabilities described in Section 6.3.4 and the estimates of overall repository system performance described in Section 6.3.3 are combined into a single "complementary cumulative distribution function" (CCDF) displaying the likelihood that cumulative releases of radioactive material to the accessible environment over 10,000 years will not exceed the release limits of the EPA standards (40 CFR 191).

6.3.5.2 Description of the means used to produce the CCDF (see Table 6.3M).

6.3.5.3 Presentation of the CCDF (see Figure 6.3N) shows that the performance of the overall repository system satisfies the requirements of EPA standards concerning cumulative releases of radioactive material to the accessible environment.

6.3.5.4 Discussion of the uncertainties, both qualitative and quantitative, that bear on the CCDF (see Table 6.3O).

6.3.5.5 Alternative representations of the CCDF.

6.3.6 Model and Code Verification and Validation

A description of models and computer codes used to assess the cumulative releases to the accessible environment and the programs used to verify and validate them. See Table 6.3P.

8. Conclusion:

[A statement similar to the following should be made in a potential license application: The cumulative release of radioactive materials following permanent closure is in compliance with requirements 10 CFR 60.112 for both anticipated and unanticipated processes and events.]

9. Support Authors & Their Assignments:

Section No. & Title: 6.3 ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS

Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (placeholder)
702-794-1821

A. Table No. 6.3A

Title: **Screening Criteria for Processes and Events to Eliminate those that are Physically or Logically Unrealistic or are Expected to have Trivial Consequences**

Content: (See Section 6.3.1.1)

Criterion	Explanation
1. Probability	1. Probability of occurrence is less than 10^{-8}
2.	2.
3.	3.
4.	4.

[Table will be completed as per information, need JOD-10.]

B. Table No. 6.3B

Title: **Listing of Processes and Events Retained After Screening, Including those that may Materially Affect the Performance Assessment**

Content: (See Section 6.3.1.2)

Process/Event	Discussion/Impact
1. Process	1.
2. Event	2.
3. Process	3.
4. Event	4.

[Table will be completed as per information, need _____.]

Section No. & Title: **6.3** **ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS**

Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (placeholder)
(702) 794-1821

C. Table No. **6.3C**

Title: **Reasoned Explanation, Justified by Data, Demonstrating the Absence of Material Effect on Performance Assessment, for Processes or Events that have been Eliminated from Post-Screening Listing**

Content: (See Section 6.3.1.3)

Process/Event	Reasoned Explanation, Justified by Data
1. Process	1.
2. Process	2.
3. Process	3.
4. Event	4.

[Table will be completed as per information, need _____.]

A. Figure No. **6.3A**

Caption: **Method Used for Forming Scenarios (Logic Flow)**

Content: (Reference 6.3.2.2.1)

Section No. & Title: 6.3 ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS

Lead Author & Phone No. Scott Sinnock (Sandia)
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B. Table No. 6.3D

Title: **Criteria Used for Scenario Screening**

Content: (Reference 6.3.2.2.2)

Criteria Title	Explanation
1. Probability	1. Probability of occurrence is less than 10^{-6}
2.	2.
3.	3.

C. Table No. 6.3E

Title: **List of Scenarios Retained in the Analysis after Completion of Screening**

Content: (References 6.3.2.2.3, 6.3.3.1)

Scenario	Discussion
1. Scenario 1	1.
2. Scenario 2	2.

A. Figure No. 6.3B

Caption: **Cumulative Release of Radioactive Materials to the Accessible Environment - Scenario 1, Downward Movement of Water Through the Unsaturated Zone to the Saturated Zone and then Laterally to the Accessible Environment**

Content: (Reference 6.3.3.2)

Section No. & Title: 6.3 **ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS**

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(702) 794-1821

B. Figure No. **6.3Ga through Gn**

Caption: **Cumulative Release of Radioactive Materials to the Accessible Environment - Scenarios 2 through n**

Content: (Reference 6.3.3.2)

C. Figure/Table No.

Caption/Title:

Content:

A. Table No. **6.3H**

Title: **Description of the Analytical Methods Used for Scenario Analyses**

Content: (See 6.3.3.3)

Analytical Method	Application and Remarks
Computer Code....	.....
Etc....	.....

Section No. & Title: 6.3 ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS

Lead Author & Phone No. Scott Sinnock (Sandia)
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B. Table No. 6.3I

Title: **Probability of Occurrence of Each Process and Event Identified in 6.3.1 That Might Lead to a Significant Release of Radionuclides from the Overall System**

Content: (See 6.3.4.1, 6.3.4.5)

Process/Event	Probability of Occurrence	Uncertainty	Source
1. Process			
2. Process			
3. Event			

C. Table No. 6.3J

Title: **Probability or Frequency of Occurrence Estimated for Each Scenario Identified in 6.3.2**

Content: (See 6.3.4.2)

Scenario	Probability/Frequency of Occurrence	Uncertainty	Source
1. Scenario			
2. Scenario			
3. Scenario			

Section No. & Title: **6.3** **ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS**

Lead Author & Phone No. Scott Sinnock (Sandia)
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A. Table No. **6.3K**

Title: **Techniques Used to Estimate Probabilities and the Criteria Used for Each Technique**

Content: (See 6.3.4.3)

Technique Used	Criteria Used	Uncertainty	Source
1.Technique/Scenario	Criteria		
2.Technique/Scenario	Criteria		
3.Technique/Scenario	Criteria		

B. Table No. **6.3L**

Title: **How Time-Dependent Probabilities Have Been Assessed for Scenarios That Involve Transient Phenomena**

Content: (See 6.3.4.4)

Scenario	Explanation Regarding Time-Dependent Probability	Uncertainty	Source
1. Scenario			
2. Scenario			
3. Scenario			

Section No. & Title: 6.3 ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS

Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (placeholder)
(702) 794-1821

C. Table No. 6.3M

Title: **Means Used to Produce the Complementary Cumulative Distribution Function (CCDF)**

Content: (See 6.3.5.2)

Computer Code/ Model	Source	Resultant Output and Application

A. Figure No. 6.3N

Caption: **Complementary Cumulative Distribution Function (CCDF)**

Content: (See 6.3.5.3)

B. Table No. 6.3O

Title: **Uncertainties Bearing on the CCDF**

Content: (See 6.3.5.4)

Uncertainty	Discussion
1.	1.
2.	2.
3.	3.

Section No. & Title: **6.3** **ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS**

Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (placeholder)
(702) 794-1821

C. Table No. **6.3P**

Title: **Verification and Validation of Computer Codes and Models Used to Assess the Cumulative Release to the Accessible Environment**

Content: (See 6.3.6)

Computer Codes/Model Used in Assessment	Computer Codes Used in Validation and Verification, with Simplifying Notes
1.	
2.	
3.	
4.	

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **6.3** **ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS**

Lead Author & Phone No. Scott Sinnock (Sandia)
W.S. Leonard (Placeholder)
702-794-1821

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-10**

2. Section no. & title: **6.3 ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **02/21/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Screening Criteria for Processes and Events to modify Table 6.3-A.

7. What is the information needed for?

   To modify Table 6.3A.

8. What group is the probable information supplier?

   SNL, George Barr

9. When is the information needed?

   September 30, 1993

10. What kind of related information is already available in references, etc.?

    Development of Scenarios by SNL

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **JOD-11**

2. Section no. & title: **6.3 ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS**

3. Lead author & phone no: **Jim Duguid (703) 204-8851**

4. Information request date: **07/24/92**

5. Work location: **Vienna, Virginia**

6. Type of information needed:

   Documentation of the second iteration of total System Performance Assessment

7. What is the information needed for?

   To modify Section 6.3 and update Chapter 6 in general

8. What group is the probable information supplier?

   Performance Assessment, Bob Andrews

9. When is the information needed?

   September 30, 1993

10. What kind of related information is already available in references, etc.? (List any known, related information sources):

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: 6.3 **ASSESSMENT OF COMPLIANCE: CUMULATIVE RELEASE OF RADIOACTIVE MATERIALS**

2. Person Supplying Information: Scott Sinnock (Sandia)
W.J. Leonard (Placeholder)
702-794-1821

3. Phone No.:

4. Lead Author (Requester):

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 6.4 Assessment of Compliance: Undisturbed Performance

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6.4 ASSESSMENT OF COMPLIANCE: UNDISTURBED PERFORMANCE

Skeleton Text for Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 6.4 ASSESSMENT OF COMPLIANCE: UNDISTURBED PERFORMANCE

2. Lead Author & Phone No.
Scott Sinnock (Sandia)
W. J. Leonard (Placeholder)
(702) 794-1821

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

This section will provide an assessment, as required by EPA standards, of the predicted behaviors of the overall repository system (including a discussion of the uncertainties in these behaviors), when the system is not disrupted by human intrusion or the occurrence of unlikely natural events.

6. Opening Statement:

7. Main Body Outline:

   6.4.0 Introduction

   6.4.1 Individual Protection Requirements

   This section contains a description of all potential pathways involved in the transport of radionuclides from the repository to members of the public residing in the accessible environment and the radiation dose rates projected to be received by those persons. This includes each scenario of "undisturbed performance" identified in 6.3.2 (see Tables 6.4A through An). Also identified are the concentrations of radionuclides in potential sources of drinking water (outside the controlled area) that might be obtained from a "significant source" of groundwater that has been contaminated by a release of radionuclides from the repository.

7. Main Body Outline (Continued)

6.4.2 Ground Water Protection Requirements

This section identifies the concentrations of radionuclides in potential sources of drinking water that might be obtained from a "special source" of ground water that has been contaminated by a release of radionuclides from the repository. This includes each scenario of "undisturbed performance" identified in 6.3.2. Also identified are individual exposures that could result from ingestion of this water. (See tables 6.4B through Bn).

6.4.3 Model and Code Verification and Validation

This section contains a description of the models and computer codes used to assess the concentrations and dose rates in Sections 6.4.1 and 6.4.2 and the programs used to verify and validate them. (See Table 6.4C.)

8. Conclusion:

9. Support Authors & Their Assignments:

Section No. & Title: 6.4 ASSESSMENT OF COMPLIANCE: UNDISTURBED PERFORMANCE

Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (placeholder)

A. Table No. 6.4A through 6.4An

Title: **Potential Pathways for Transport of Radionuclides from the Repository to Members of the Public Residing in the Accessible Environment**

Content: (See Section 6.4.1)

Scenarios 1 through n

Potential Pathways	Projected Dose Rate Received
1. Pathway	
2. Pathway	
.	
.	
n. Pathway to and identification of drinking water "significant source"	

B. Table No. 6.4B through 6.4Bn

Title: **Concentrations of Radionuclides in Potential Drinking Water from "Special Sources" of Ground Water Contaminated by Radionuclide Release from the Repository**

Content: (See Section 6.4.2)

Scenarios 1 through n

"Special Source"	Concentration	Individual Potential Exposure
1. Source		
2. Source		

C. Table No. 6.4C

Title: **Models and Computer Codes Used to Assess Concentrations and Dose Rates**

Content: (Reference 6.4.3)

Model/ Computer Code	Used to Determine (Concentration/ Dose Rate)	Program Used to Verify/Validate
1. Model		
2. Model		
3. Code		

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **6.4** **ASSESSMENT OF COMPLIANCE: UNDISTURBED PERFORMANCE**

Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (placeholder)

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. TBD
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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **6.4 ASSESSMENT OF COMPLIANCE: UNDISTURBED PERFORMANCE**

3. Lead author & phone no: **Scott Sinnock (Sandia); W. J. Leonard (Placeholder) (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location:

6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **6.4 ASSESSMENT OF COMPLIANCE: UNDISTURBED PERFORMANCE**

2. Person Supplying Information: Scott Sinnock (Sandia)
   W. J. Leonard (placeholder)

3. Phone No.:

4. Lead Author (Requester):

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 6.5 10 CFR Part 60 Criteria

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6.5 10 CFR PART 60 CRITERIA

Skeleton Text Has Not Been Developed For This Section

REFERENCES

1. Section No. & Title: 6.5 10 CFR PART 60 CRITERIA

2. Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (Placeholder)
702-794-1821

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W,R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

This section will provide an assessment to demonstrate whether site conditions present at the proposed repository are consistent with the performance objectives in 10 CFR 60.112 relating to isolation of waste.

6. Opening Statement:

7. Main Body Outline:

6.5.0 Introduction

6.5.1 Favorable Conditions

6.5.1.1 A summary of favorable conditions that are present at the proposed repository site. See Table 6.5A.

6.5.1.2 Demonstration that the favorable conditions are sufficient to provide reasonable assurance that the performance objectives in 10 CFR 60.112 relating to isolation of waste are met. This is accomplished by incorporating the favorable conditions into the conceptual models and descriptions of processes and events that could affect the repository (see Sections 6.2.2 and 6.2.3).

7. Main Body Outline (Continued)

6.5.1.3 Description of how each favorable condition analyzed through incorporation into conceptual models and descriptions of processes and events, as indicated in Section 6.5.1.2 above, has been incorporated into a scenario of Section 6.3.2 or a model.

6.5.2 Potentially Adverse Conditions

6.5.2.1 A summary of potentially adverse conditions that are present at the proposed repository site. (see Table 6.5B).

6.5.2.2 For any potentially adverse condition which could significantly affect the ability of the repository to meet the objectives of 10 CFR 60.112 (and it cannot be demonstrated that the condition is compensated by favorable conditions and the condition cannot be remedied), the condition is incorporated into the conceptual design models and descriptions of processes and events that could affect the repository (see Section 6.3.1). The intent of 10 CFR 60.122 has been complied with through performance assessment results.

6.5.2.3 Description of how each potentially adverse condition which was analyzed as outlined in Section 6.5.2.2, above, was incorporated into a scenario of Section 6.3.2 or a conceptual model.

8. Conclusion:

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **6.5 10 CFR PART 60 CRITERIA**

Lead Author & Phone No. Scott Sinnock (Sandia)
W. J. Leonard (placeholder)
702-794-1821

A. Table No. **6.5A**

Title: **Summary of Favorable Conditions That Are Present at the Proposed Repository Site**

Content: (See Section 6.5.1.1)

Favorable Condition	Discussion - How 10 CFR 60.112 is Met
1. Zeolite screening	

B. Table No. **6.5B**

Title: **Summary of Potentially Adverse Conditions that are Present at the Proposed Repository Site**

Content: (See Section 6.5.2.1)

Potentially Adverse Condition	Significant Effect Regarding Ability of Repository to Meet 10 CFR 60.112
1.	1. No
2.	2. No
3.	3. No

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **6.5 10 CFR PART 60 CRITERIA**

3. Lead author & phone no: **Scott Sinnock (Sandia); W. J. Leonard (Placeholder) (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location:

6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Chapter 7.0 Conduct of Repository Operations

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7.0 CONDUCT OF REPOSITORY OPERATIONS

[This chapter will present information describing the conduct of repository operations and the associated procedures, including planned activities and processes, security and safeguards, maintenance, radiation protection, plant organizational plan, personnel, procedure generation package, inspection and testing, and records and reports. This chapter must fulfill the regulatory requirements pertaining to a description of the conduct of repository operations (10 CFR 60.21(c)(15) and 10 CFR 60.111).]

NOTE: The reference to security and safeguards information should be deleted if the FCRG is modified as recommended in the FCRG comment. [TCG-50]

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **7 CONDUCT OF REPOSITORY OPERATIONS**
7.0 INTRODUCTION

2. Lead Author & Phone No. Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

This chapter will present information describing the conduct of repository operations and the associated procedures, including planned activities and processes, security and safeguards, maintenance, radiation protection, plant organizational plan, personnel, procedure generation package, inspection and testing, and records and reports.

6. Opening Statement:

[A statement similiar to the following should be made in a potential license application: This chapter presents information describing the conduct of repository operations and the associated procedures, including planned activities and processes, maintenance, radiation protection, plant organizational plan, personnel, procedure generation package, inspection and testing, and records and reports.]

7. Main Body Outline

7.0 Introduction. Note: It is inappropriate to request safeguards and security information in this section since details cannot be presented and an overview/certification is already requested in Sections 1.4 and 1.5. An FCRG comment form will be generated for this item.

Inspection and testing will be addressed in a new section, 7.11, not outlined in the FCRG. This section will present information describing inspection and testing activities during repository operation, including processes and procedures. An FCRG comment form will be generated for this item.

8. Conclusion:

[A statement similiar to the following should be made in a potential license application: This section fulfills regulatory requirements pertaining to a description of the conduct of repository operations [10 CFR 60.21(c)(15) and 10 CFR 60.111].]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

A. Figure/Table No.

Caption/Title:

Content:

B. Figure No./Table No.

Caption:

Content:

C. Figure No./Table No.

Caption:

Content:

D. Figure No./Table No.

Caption:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **7 CONDUCT OF REPOSITORY OPERATIONS**
7.0 INTRODUCTION

Lead Author & Phone No. Tom Geer, 702/794-7868

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-50**

2. Section no. & title: **7 CONDUCT OF REPOSITORY OPERATIONS**
7.0 INTRODUCTION

3. Lead author & phone no: **Tom Geer (702) 794-7868, placeholder for TBD.**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

A non-compromising summary of safeguards and security plans pursuant to Section 1.4 and 1.5 of the MGDS License Application FCRG. Also include information describing the planned activites, processes and procedures as requested in the introduction to Section 7 of the MGDS Safety Analysis Sections FCRG.

Note: This will not be needed for this seciton if FCRG comment is adopted.

7. What is the information needed for?

Safety Analysis Section 7, Introduction. This information would not be expected to be submitted within the Safety Analysis Sections.

8. What group is the probable information supplier?

9. When is the information needed?

TBD.

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date: 1/31/92

Lead Author: Tom Geer

Log No.	Section	Date Issued	Date Response Received
TCG-01	7.2	12/15/91	
TCG-02	7.2	12/15/91	
TCG-03	7.2	12/15/91	
TCG-04	7.2	12/15/91	
TCG-05	7.2	12/15/91	
TCG-06	7.2	12/15/91	
TCG-07	7.2	12/15/91	
TCG-08	7.2	12/15/91	
TCG-09	7.2	12/15/91	
TCG-10	7.2	12/15/91	
TCG-11	7.2	12/15/91	
TCG-12	7.2	12/15/91	
TCG-13	7.2	12/15/91	
TCG-14	7.2	12/15/91	
TCG-15	7.2	12/15/91	
TCG-16	7.2	12/15/91	
TCG-17	7.2	12/15/91	
TCG-18	7.2	12/15/91	
TCG-19	7.2	12/15/91	
TCG-20	7.2	12/15/91	
TCG-21	7.3	12/15/91	
TCG-22	7.3	12/15/91	
TCG-23	7.3	12/15/91	
TCG-24	7.3	12/15/91	
TCG-25	7.3	12/15/91	
TCG-26	7.3	12/15/91	
TCG-27	7.3	12/15/91	
TCG-28	7.3	12/15/91	
TCG-29	7.3	12/15/91	

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date: 1/31/92

Lead Author: Tom Geer

Log No.	Section	Date Issued	Date Response Received
TCG-30	7.3	12/15/91	
TCG-31	7.3	12/15/91	
TCG-32	7.3	12/15/91	
TCG-33	7.3	12/15/91	
TCG-34	7.3	12/15/91	
TCG-35	7.3	12/15/91	
TCG-36	7.3	12/15/91	
TCG-37	7.3	12/15/91	
TCG-38	7.3	12/15/91	
TCG-39	7.3	12/15/91	
TCG-40	7.5	12/15/91	
TCG-41	7.5	12/15/91	
TCG-42	7.6	12/15/91	
TCG-43	7.6	12/15/91	
TCG-44	7.6	12/15/91	
TCG-45	7.6	12/15/91	
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TCG-47	7.10	12/15/91	
TCG-48	7.2	1/29/92	
TCG-49	7.2	1/29/92	
TCG-50	7.0	2/21/92	
TCG-51	7.6	3/23/92	

Section 7.1 Maintenance

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7.1 MAINTENANCE

Skeleton Text Has Not Been Developed For This Section

Table 7.1A. Surface Facilities Maintenance

Table 7.1B. Shaft and Ramp Maintenance

Table 7.1C. Underground Facility Maintenance

Table 7.1D. Underground Opening Maintenance

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **7.1 MAINTENANCE**

2. Lead Author & Phone No.: Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section will identifiy and describe the plans, schedules, and operational procedures for maintenance of structures, systems, and components important to safety, retrievability, and waste isolation at the GROA, both surface and underground, including shafts and ramps.

6. Opening Statement: (See summary.)

7. Main Body Outline:

   7.1.1 Surface Facilities

   Identify and describe plans, schedules, and operating procedures for maintenance of all GROA surface facilities identified in Section 4.1.1. Highlight structures, systems, and components important to safety and retrievability. Use Table 7.1A.

   7.1.2 Shafts And Ramps

   Identify and describe plans, schedules, and operating procedures for maintenance of GROA shafts and ramps identified in Section 4.1.2. Highlight structures, systems, and components important to safety, retrievability, and waste isolation. Use Table 7.1B.

7. Main Body Outline (Continued)

7.1.3 Underground Facilities

Identify and describe plans, schedules, and operating procedures for maintenance of the underground facility identified in Section 4.1.3. Highlight structures, systems, and components important to safety, retrievability, and waste isolation. Use Table 7.1C.

7.1.4 Underground Openings

Identify and describe plans, schedules, and operating procedures for maintenance of the underground openings. Highlight structures, systems, and components important to safety, retrievability, and waste isolation. Use Table 7.1D.

8. Conclusion:

The maintenance plans, schedules, and operating procedures identified above ensure operation of structures, systems, and components important to safety, retrievability, and waste isolation.

9. Support Authors & Their Assignments:

Section No. & Title: **7.1 MAINTENANCE**

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Table No. **7.1A**

Title: **Surface Facilities Maintenance**

Content:

- Itemize surface facility components having maintenance plans.
- Indicate maintenance schedule for each component.
- Indicate maintenance procedure or type for each component.

B. Table No. **7.1B**

Title: **Shaft and Ramp Maintenance**

Content: Same data as for Table 7.1A.

C. Table No. **7.1C**

Title: **Underground Facility Maintenance**

Content: Same data as for Table 7.1A.

D. Table No. **7.1D**

Title: **Underground Opening Maintenance**

Content: Same data as for Table 7.1A.

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **7.1 MAINTENANCE**
3. Lead author & phone no: **Tom Geer (702) 794-7868**
4. Information request date: **2/21/92**
5. Work location:
6. Type of information needed:
7. What is the information needed for?
8. What group is the probable information supplier?
9. When is the information needed?
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.2 Radiation Protection

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7.2 RADIATION PROTECTION

This section describes the Radiation Protection Program at the Geologic Repository Operations Area (GROA). An overview of the organizational responsibilities relevant to radiation protection at the GROA is presented. [The facilities, equipment, and instrumentation used to monitor and control the internal and external exposure to workers and the public during normal operations, anticipated operational occurrences, and radiological emergencies as required by 10 CFR Part 20 and Part 60 will also be presented. The Radiation Protection Program for the GROA will be designed to protect personnel, and the public in compliance with all applicable regulations.] The goal of the Radiation Protection Program [TCG-01] is to maintain radiation exposures as low as reasonably achievable (ALARA) by maintaining the annual dose to individual GROA personnel ALARA, and keeping the annual collective dose to GROA personnel (i.e., the sum of annual doses to all GROA personnel) ALARA. [In order to satisfy this goal, the facility management will be committed to maintaining exposures ALARA, and the personnel responsible for implementing the program will proactively search for ways to reduce exposures.]

7.2.1 Organization

Regulatory Position 1 of Regulatory Guide 8.8 identifies two key positions important to maintaining occupational exposures ALARA. These are the Repository Manager and the Radiation Protection Manager. Establishing the positions and responsibilities of the Repository Manager and Radiation Protection Manager satisfies the guidance presented in Regulatory Guide 8.8. An overview of the responsibilities of each of these positions at the GROA is presented

below. The location of these positions in the GROA organization is depicted in Figure [TCG-02].

7.2.1.1 Repository Manager

The Repository Manager is responsible for all aspects of GROA operations including the Radiation Protection Program. In order to satisfy this general responsibility, the following specific responsibilities are assigned to the Repository Manager:

A. Supporting the Radiation Protection Manager in formulating and implementing a Radiation Protection Program for maintaining GROA occupational radiation exposures ALARA

B. Participating in the selection of specific ALARA goals and objectives for the repository

C. Ensuring support for the Radiation Protection Program from all repository personnel

D. Expediting the collection and dissemination of data and information concerning the Radiation Protection Program to DOE management.

7.2.1.2 Radiation Protection Manager

The Radiation Protection Manager has a safety function and responsibility to both employees and management. Therefore, the Radiation Protection Manager will report directly to the Repository Manager since the Radiation Protection Manager's primary duties may sometimes conflict with other groups whose primary responsibilities are related to the continuity of GROA operations. The administrative organization reporting to the Radiation Protection Manager is responsible for ensuring that Radiation Protection Program goals are achieved. [The personnel comprising the radiation protection staff will have appropriate qualifications and authority to ensure the goals are achieved.]

Some of the responsibilities of the Radiation Protection Manager with respect to the ALARA program are:

A. Participating in design reviews for facilities and equipment that can affect potential radiation exposures

B. Identifying locations, operations, and conditions that have the potential for causing significant exposures to radiation

C. Initiating and implementing an exposure control program

D. Developing plans, procedures, and methods for keeping radiation exposures of repository personnel ALARA

E. Reviewing and recommending changes in job procedures to maintain exposures ALARA

F. Participating in the development and approval of training programs related to work in radiation areas or involving radioactive materials

G. Supervising the radiation surveillance program to maintain data on exposures of, and doses to, GROA personnel by specific job function and type of work

H. Supervising the collection, analysis, and evaluation of data and information attained from radiological surveys and monitoring activities

I. Supervising, training, and qualifying the radiation protection staff of the repository

J. Ensuring that adequate radiation protection coverage is provided for repository personnel during all working hours.

7.2.2 Facilities, Instrumentation, and Equipment

Skeleton text has not been developed for this section.

7.2.3 Procedures

[This section will describe the procedures to be used in the Radiation Protection Program to ensure contamination levels and radiation exposures will be ALARA. Procedures will be established for radiation surveys, personnel dosimetry, decontamination of surface facilities, and ALARA practices. Where appropriate, cost-benefit analyses will be discussed to justify the development of procedures [TCG-06].]

7.2.3.1 Radiation Surveys

Radiation surveys will be conducted, according to the methods and frequencies discussed below to ensure that occupational exposures will be maintained ALARA during these surveys [TCG-07]. [The radiation survey methods and frequencies will be summarized in Table 7.2A.]

7.2.3.2 Personnel Dosimetry

[A personnel dosimetry program will be developed to aid in operational planning as part of maintaining occupational radiation exposures ALARA. The methods and plans for personnel dosimetry, including recording and reporting requirements, and criteria for whole body and lung counting, and bioassays will be discussed below [TCG-08]. Table 7.2B will describe the personnel dosimetry reporting requirements. Whole body counting and bioassay requirements will be presented in Table 7.2C.]

7.2.3.3 Decontamination of Surface Facilities

[Procedures will be established for decontamination of the GROA facilities. These procedures will support assessment of individual and collective exposures for repository workers as well as the public. The operating features and limitations of the systems used for decontamination of personnel will be discussed, and plans will be presented for the safe disposal of residual radioactive material after decontamination efforts are completed [TCG-10]. Table 7.2E will summarize the features and limitations of the decontamination systems.]

7.2.3.4 ALARA Procedures

[Procedures will be established to ensure that occupational radiation exposures are ALARA and residual contamination levels for all systems that contain, collect, store, or transport radioactive solids and liquids are also ALARA (including radioactive waste treatment, handling, and storage systems) [TCG-11]. The target contamination limits will be presented in Table 7.2F.]

7.2.4 Effluent Monitoring Programs

The Effluent Monitoring Program provides for measurement, analysis, and control of airborne and liquid effluents, as well as movement of solid wastes from all GROA facilities, during normal, off-normal, and emergency conditions. [This section will describe the program and the analytical approaches to monitor the radioactive material content of effluent streams from the GROA facilities [TCG-12]. Descriptions of the systems and subsystems will be given, including

appropriate process flow diagrams. Instrumentation used to maintain control over all releases, in accordance with applicable requirements and limits, will also be described. The effluent monitoring programs to be described in this section should provide assurance that all radioactive effluents from the GROA facility are effectively monitored, measured, and controlled during all operational conditions. [TCG-49]]

7.2.4.1 Gaseous and Particulate Monitoring System

[The systems and subsystems comprising the gaseous and particulate monitoring system will be described in this subsection. Selection of systems and major instruments will be discussed and justified where appropriate. The major features of the system (e.g., expected reliability and sensitivity) will be presented in Table 7.2G. The sampling frequency and action limits will be described in Table 7.2H. The process flow diagram of the gaseous and particulate monitoring system, including sampling locations, will be given in Figure 7.2B. [TCG-13]]

7.2.4.2 Liquid Effluent Monitoring System

[The systems and subsystems comprising the liquid waste monitoring system will be described in this subsection. Selection of systems and major instruments will be discussed and justified where appropriate. The major features of the system (e.g., expected reliability and sensitivity) will be presented in Table 7.2I. The sampling frequency and action limits will be given in Table 7.2J. The process flow diagram of the liquid waste monitoring system, including sampling locations, will be given in Figure 7.2C. [TCG-14]]

7.2.4.3 Solid Waste Monitoring

[The systems and subsystems comprising the solid waste monitoring system will be described in this subsection. Selection of systems and major instruments will be discussed and justified where appropriate. The major features of the system (e.g., expected reliability and sensitivity) will be presented in Table 7.2K. The sampling frequency and action limits will be given in Table 7.2L. The process flow diagram of the solid waste monitoring system, including sampling locations, will be given in Figure 7.2D. [TCG-15]]

7.2.4.4 Plans for Maintaining Continuing Analysis Integrity

The integrity of analyses relevant to the Effluent Monitoring Program is dependent on the following elements of the program:

A. Use of controlled radiation monitoring equipment with known calibrations

B. Use of qualified procedures to monitor and calculate the magnitude of activity levels

C. Use of qualified technical personnel to perform equipment calibrations, complete procedures, and perform calculations related to the program.

Each specific type of radiation monitoring instrument will be initially calibrated with isotopic sources traceable to the National Bureau of Standards (NBS). A secondary source will then be

applied to the detectors after the isotopic calibration and its response is recorded. The secondary sources will then be applied to all other identical instruments in a fixed repeatable geometry in order to ensure equivalent response to the instrument initially calibrated to the NBS source.

[Procedures will be developed to ensure that monitoring activities will be performed in a consistent, repeatable manner with calibrated instruments.] Therefore, results from monitoring activities performed during any given period may be directly compared to results obtained during another period so that trends can be monitored and corrective actions initiated if necessary.

Personnel authorized to complete procedures and perform calculations relevant to the waste monitoring activities will be qualified by a combination of education and training for the specific tasks in accordance with the training program described in section 7.6.

7.2.5 Environmental Monitoring Program

[The Environmental Monitoring Program will be designed to ensure that the GROA complies with the performance objectives of 10 CFR 60.111 until permanent closure, and to provide reasonable assurance that the engineered barriers are functioning as anticipated.] During repository operations, small amounts of radioactive materials may be released into the environment from releases of low level gaseous and liquid wastes in accordance with NRC regulations and the license specifications. The design and operation of the radioactive waste systems maintain the quantities of any such releases ALARA. The Environmental Monitoring

Program will be used to document existing radiation levels and to ensure that releases from repository operations remain within acceptable limits.

7.2.5.1 Critical Pathways

[The possible critical exposure pathways to man will be evaluated in accordance with Regulatory Guide 1.109 in order to estimate the dose to the hypothetical maximum exposed individual and to establish the sampling requirements for the Environmental Monitoring Program.] These critical pathways are [TCG-16].

7.2.5.2 Pre-Operational Radiological Monitoring Program

Background radiation and radioactivity levels from natural and manmade sources vary considerably from place to place throughout the country. This variation occurs since the terrestrial component of natural background depends on the local geology including the various mixtures of naturally occurring radionuclides. The cosmic ray component is dependent on altitude above sea level and also varies with latitude. Local meteorological conditions can influence background levels to various degrees from time to time.

[The pre-operational phase of the Environmental Monitoring Program will provide data on the existing environmental radioactivity levels for the GROA and vicinity. These data will form the basis for evaluating radioactivity levels subsequent to the beginning of GROA operations in order to determine if any increases in radioactivity levels in the vicinity of the GROA are attributable

to the GROA.] The pre-operational phase of the Environmental Monitoring Program observed background levels over a period of [TCG-17]. [The locations monitored and the average background results will be presented in Table 7.2M. [TCG-48]]

7.2.5.3 Operational Radiological Monitoring Program

The Operational Radiological Monitoring Program will provide surveillance and backup support to the effluent monitoring as discussed in section 7.2.4. This support will be necessary to evaluate individual and population exposures, and the ecological significance of any contributions to the existing radioactivity levels from GROA operations. This program will provide surveillance of all appropriate critical exposure pathways to man, and satisfies legitimate interests of the public and state and federal agencies. [The Operational Radiological Monitoring Program will be described in the GROA license specifications and the Offsite Dose Calculation Manual. [TCG-18] Table 7.2N will show the type, number, location, collection frequency, and analysis frequency of environmental samples collected under this program. Sampling locations will be depicted in Figure 7.2E.]

7.2.5.4 Expected GROA Contributions to Radioactivity Levels

[Anticipated releases of radioactive material from GROA operations will be used to estimate the expected contribution of the GROA to environmental radioactivity levels. The natural background levels and expected contribution from GROA operations will be presented in Table 7.2O. [TCG-19]]

7.2.5.5 Operational Meteorological Data Collection

Meteorological conditions can affect offsite doses from GROA releases and will be monitored in a continuing program to assess the impact of any meteorological changes on previous estimates of doses. [The locations of meteorological monitoring stations will be given in Figure 7.2F. The collection frequency and analysis frequency will be given in Table 7.2P. [TCG-20]]

Table 7.2A. Radiation Survey Methods and Frequencies

Table 7.2B. Personnel Dosimetry Reporting Requirements

Table 7.2C. Whole Body Counting and Bioassay Criteria

Table 7.2E. Decontamination System Features

Table 7.2-F. Target Contamination Limits

Table 7.2G. Gaseous and Particulate Monitoring System Features

Table 7.2H. Gaseous and Particulate Monitoring Sampling Frequency and Action Limits

Table 7.2I. Liquid Waste Monitoring System Features

Table 7.2J. Liquid Waste Monitoring Sampling Frequency and Action Limits

Table 7.2K. Solid Waste Monitoring System Features

Table 7.2L. Solid Waste Monitoring Sampling Frequency and Action Limits

Table 7.2M. Pre-Operational Monitoring Locations and Results

Table 7.2N. Environmental Sampling Information

Table 7.2O. Expected Radioactivity Levels

Table 7.2P. Meteorological Data Collection

Figure 7.2B. Gaseous and Particulate Monitoring System Process Flow Diagram

Figure 7.2C. Liquid Waste Monitoring System Process Flow Diagram

Figure 7.2D. Solid Waste Monitoring System Process Flow Diagram

Figure 7.2E. Operational Radiological Monitoring Program Sampling Locations

Figure 7.2F. Operational Meteorological Monitoring Station Locations

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **7.2 RADIATION PROTECTION**

2. Lead Author & Phone No. Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section will describe the Radiation Protection Program at the repository. It will describe the facilities, equipment, and instrumentation used to monitor and control the internal and external exposure to workers and the public during normal operations, anticipated operational occurrences, and radiological emergencies as required by 10 CFR Part 20 and Part 60.

6. Opening Statement:

   [A statement similiar to the following should be made in a potential license application: This section describes the Radiation Protection Program at the Geologic Repository Operations Area (GROA). An overview of the organizational responsibilities relevant to radiation protection at the GROA is presented. The facilities, equipment, and instrumentation used to monitor and control the internal and external exposure to workers and the public during normal operations, anticipated operational occurrences, and radiological emergencies as required by 10 CFR Part 20 and Part 60 are also presented.]

7. Main Body Outline:

   7.2 Introduction

   7.2.1 Organization

   7.2.2 Facilities, Instrumentation, and Equipment

   7.2.3 Procedures

   7.2.4 Effluent Monitoring Programs

7.2.5 Environmental Monitoring Program

8. Conclusion:

[A statement similiar to the following should be made in a potential license application: The Radiation Protection Program at the repository is designed to comply with all regulatory requirements. It will be conducted in such a manner as to provide assurance that the exposure of all persons will be maintained ALARA within regulatory limits.]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Table No. **7.2A**

Title: **Radiation Survey Methods and Frequencies**

Content: (Reference 7.2.3)

B. Table No. **7.2B**

Title: **Personnel Dosimetry Reporting Requirements**

Content: (Reference 7.2.3)

C. Table No. **7.2C**

Title: **Whole Body Counting and Bioassay Criteria**

Content: (Reference 7.2.3)

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702/794-7868

D. Table No. **7.2D DELETED**

Title:

Content: (Reference 7.2.3)

E. Table No. **7.2E**

Title: **Decontamination System Features**

Content: (Reference 7.2.3)

F. Table No. **7.2.F**

Title: **Target Contamination Limits**

Content: (Reference 7.2.3)

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702/794-7868

G. Table No. **7.2G**

Title: **Gaseous and Particulate Monitoring System Features**

Content: (Reference 7.2.4)

H. Table No. **7.2H**

Title: **Gaseous and Particulate Monitoring Sampling Frequency and Action Limits**

Content: (Reference 7.2.4)

I. Table No. **7.2I**

Title: **Liquid Waste Monitoring System Features**

Content: (Reference 7.2.4)

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702/794-7868

J. Table No. **7.2J**

Title: **Liquid Waste Monitoring Sampling Frequency and Action Limits**

Content: (Reference 7.2.4)

K. Table No. **7.2K**

Title: **Solid Waste Monitoring System Features**

Content: (Reference 7.2.4)

L. Table No. **7.2L**

Title: **Solid Waste Monitoring Sampling Frequency and Action Limits**

Content: (Reference 7.2.4)

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702/794-7868

M. Table No. **7.2M**

Title: **Pre-Operational Monitoring Locations and Results**

Content: (Reference 7.2.5)

N. Table No. **7.2N**

Title: **Environmental Sampling Information**

Content: (Reference 7.2.5)

O. Table No. **7.2O**

Title: **Expected Radioactivity Levels**

Content: (Reference 7.2.5)

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702/794-7868

P. Table No. **7.2P**

Title: **Meteorological Data Collection**

Content: (Reference 7.2.5)

Q. Table No. **7.2Q**

Title:

Content:

R. Table No. **7.2R**

Title:

Content:

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Figure No. **7.2A** **DELETED**

Caption:

Content: **DELETED**

B. Figure No. **7.2.B**

Caption: **Gaseous and Particulate Monitoring System Process Flow Diagram**

Content: (Reference 7.2.4)

C. Figure No. **7.2C**

Caption: **Liquid Waste Monitoring System Process Flow Diagram**

Content: (Reference 7.2.4)

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702/794-7868

D. Figure No. **7.2D**

Caption: **Solid Waste Monitoring System Process Flow Diagram**

Content: (Reference 7.2.4)

E. Figure No. **7.2E**

Caption: **Operational Radiological Monitoring Program Sampling Locations**

Content: (Reference 7.2.5)

F. Figure No. **7.2F**

Caption: **Operational Meteorological Monitoring Station Locations**

Content: (Reference 7.2.5)

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **7.2 RADIATION PROTECTION**

Lead Author & Phone No. Tom Geer, 702-794-7868

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Latest revisions of Regulatory Guides: 8.4, 8.8, 8.9, 8.10, 8.15.

   - Regulatory Guide 8.4, Direct-Reading and Indirect-Reading Pocket Dosimeters
   - Regulatory Guide 8.8, Radiation Protection Facilities, Instrumentation, and Equipment
   - Regulatory Guide 8.9, Acceptable concepts, Models, Equations, and Assumptions for a Bioassay Program", and Regulatory Position 4
   - Regulatory Guide 8.10, Occupational radiation exposures are ALARA (such as those pertinent procedures in Regulatory Position 4 of Regulatory 8.8
   - Regulatory Guide 8.15, Acceptable Programs for Respiratory Protection.

2. Draft Regulatory Guide OP-032-5. (Final, if available.)

   Test and Calibration of Radiation Protection Instrumentation.

3. Latest revisions of 10 CFR 20, 10 CFR 60.

4. NRC document stating requirements for Offsite Dose Calculational Program.

5. Copy of Offsite Dose Calculational Manual for the Catawba Nuclear Station - Duke Power Co.

6. Design report containing descriptions of engineered systems, structures, and components in the GROA.

7. Design report containing preliminary description of site, proposed buildings, facilities, and of activities to be conducted.

8. Report containing preliminary description of administrative organization for operation of the repository.

9. Latest revision of Duke Power Co - Health Physics Manual.

10. Latest revision of Duke Power Co - ALARA Manual.

11. Latest edition of Duke Power Co. Training Manual sections concerning (1) General Employee Health Physics Training), and (2) Health Physics Technical Training Programs.

12. Latest revision of NRC BTP 4.8 concerning environmental radioactivity monitoring.

13. Latest edition of Duke Power Co. Respiratory Protective Equipment fitting and training program description.

14. Design report containing information concerning all planned radioactive waste collection, treatment, handling, and storage systems.

15. Design report containing information concerning all planned radioactive effluent streams from the GROA facilities - gases and particulates.

16. Meteorological data report containing collection and evaluation for the repository.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-1**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   A formal Radiation Protection Program needs to be developed in a document separate from the SAR. The name of this document needs to be available for reference in the SAR.

7. What is the information needed for?

   SAR Section 7.2.

8. What group is the probable information supplier?

   MGDS Radiation Protection Group when established.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    Sample Health Physics Plan and ALARA manuals from Duke.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-2**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   GROA organization chart needs to be defined and located within Section 7.3 for reference in this section.

7. What is the information needed for?

   SAR Section 7.2.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-6**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Cost/Benefit method use during procedure development needs to be established in light of existing regulatory guidance.

7. What is the information needed for?

   SAR Section 7.2.3.

8. What group is the probable information supplier?

   MGDS Radiation Protection Group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    NRC Regulatory Guide 10.110 which has kind of dated values.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-7**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Radiation Survey methods and frequencies need to be identified.

7. What is the information needed for?

   SAR Table 7.2A.

8. What group is the probable information supplier?

   MGDS Radiation Protection group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-8**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Personnel dosimetry plans need to be established including whole body criteria, etc.

7. What is the information needed for?

   SAR Section 7.2.3.2 and Tables 7.2B and 7.2C.

8. What group is the probable information supplier?

   MGDS Radiation Protection group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-10**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Features of personnel decontamination systems.

7. What is the information needed for?

   SAR Section 7.2.3.4 and Table 7.2E.

8. What group is the probable information supplier?

   MGDS Radiation Protection group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-11**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Target contamination limits for systems that contain, collect, store, or transport radioactive solids and liquids.

7. What is the information needed for?

   SAR Section 7.2.3.5 and Table 7.2F.

8. What group is the probable information supplier?

   MGDS Design Organization and Radiation Protection group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-12**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   An environmental monitoring program must be developed and may be summarized in portions of the SAR.

7. What is the information needed for?

   SAR Section 7.2.4.

8. What group is the probable information supplier?

   MGDS Radiation Protection group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-13**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Details of the Gaseous and Particulate Monitoring System including major features, justification of systems and major instruments, sampling frequencies and action limits, and process flow diagrams.

7. What is the information needed for?

   SAR Section 7.2.4.1, and Tables 7.2G and 7.2H, and Figure 7.2B.

8. What group is the probable information supplier?

   MGDS Design Organization and Radiation Protection group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-14**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Details of the Liquid Waste Monitoring System including major features, justification of systems and major instruments, sampling frequencies and action limits, and process flow diagrams.

7. What is the information needed for?

   SAR Section 7.2.4.2, and Tables 7.2I and 7.2J, and Figure 7.2C.

8. What group is the probable information supplier?

   MGDS Design Organization and Radiation Protection group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-15**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Details of the Solid Waste Monitoring System including major features, justification of systems and major instruments, sampling frequencies and action limits, and process flow diagrams.

7. What is the information needed for?

   SAR Section 7.2.4.3, Tables 7.2K and 7.2L, and Figure 7.2D.

8. What group is the probable information supplier?

   MGDS Design Organization and Radiation Protection group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-16**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Program for identifying and monitoring critical pathways relevant to the GROA needs to be identified and summarized. The critical pathways need to be identified.

7. What is the information needed for?

   SAR Section 7.2.5.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-17**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Need to identify the preoperation program to acquire background radiation information for the GROA. Timeframe over which study is conducted needs to be identified as well as the locations monitored and results observed.

7. What is the information needed for?

   SAR Section 7.2.5.2 and Table 7.2M.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-18**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Need to develop an Offsite Dose Calculation Manual to provide details of operational radiological monitoring program as a separate document from the SAR. Identify details of environmental samples collected and summarize parts of program that show compliance with 60.111 and provide assurance that SSCs are functioning properly.

7. What is the information needed for?

   SAR Section 7.2.5.3, Table 7.2N, and Figure 7.2E.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-19**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Need to summarize background levels of radiation and expected contribution form GROA activities.

7. What is the information needed for?

   SAR Section 7.2.5.4 and Table 7.2O.

8. What group is the probable information supplier?

   MGDS design organization.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-20**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Details of operational meteorological program including collection and analysis frequencies and locations of monitoring stations.

7. What is the information needed for?

   SAR Section 7.2.5.5, Table 7.2P and Figure 7.2F.

8. What group is the probable information supplier?

   MGDS meteorological group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-48**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Information concerning radioactive waste disposal measures followed by other activities presently located near the repository site, (e.g., at the Nevada test site).

7. What is the information needed for?

   SAR Section 7.2.5.2.

8. What group is the probable information supplier?

   MGDS meteorological group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-49**

2. Section no. & title: **7.2 RADIATION PROTECTION**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of:

   - **All radioactive materials processing and handling within GROA facilities, both qualitative and quantitative**
   - **Other in-plant area and process monitoring systems**
   - **Text, tabular data, schematics for effluent monitoring systems.**

7. What is the information needed for?

   SAR Section 7.2.4.

8. What group is the probable information supplier?

   MGDS meteorological group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date:9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.3 Organizational Structure, Management, and Administrative Controls

TABLE OF CONTENTS

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LIST OF FIGURES

7.3 ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND ADMINISTRATIVE CONTROLS

This section identifies and describes the structure, functions, qualifications, and responsibilities of the Geologic Repository Operations Area (GROA) organization. [The organizational structure, management, and administrative controls presented in this section must comply with requirements of 10 CFR 60.21(c)(15).]

The Department of Energy (DOE) is the Cabinet-level department responsible for the safe disposal of high-level nuclear waste from both civilian nuclear power programs and defense programs. Responsibility for the design, construction, and operation of the GROA is delegated within DOE to the Office of Civilian Radioactive Waste Management (OCRWM). [The OCRWM organization chart, showing direct reporting responsibility to the Secretary of Energy, will be shown in Figure 7.3A [TCG-21].] Various divisions within OCRWM have responsibility for design, construction, quality assurance, and operation of the GROA. DOE contracts with a Management and Operating (M&O) contractor to manage the various aspects of constructing and operating this facility.

[The M&O contractor, as well as the M&O support contractors, will be shown together with their areas of responsibility in Figure 7.3B [TCG-22]. Representatives from across the M&O are brought together to design, construct, and operate the GROA in an organization which reports directly to [TCG-23] as will be depicted in Figure 7.3C.]

7.3.1 Organization

The emphasis of the repository organization shifts during the course of licensing the facility. Initially, the [TCG-24] is the focus as the facility progresses through the initial design and construction phase. Later, the [TCG-25] is the major part of the organization as receipt of high-level waste and other operations become the focus of the GROA. The [TCG-24] continues to provide support as the initial facility capacity is increased and other modifications to the facility need to be designed.

7.3.1.1 Organization for Construction and Design

The [TCG-26] has overall responsibility for the design of the GROA as well as the specific responsibility for design of structures and systems, specification of materials and equipment and preparation of construction and installation drawings for the GROA. [The organizational structure of the [TCG-27] will be shown in Figure 7.3D.]

7.3.1.2 Organization for Operations

[The organization of the GROA operations staff will be designed with the philosophy that the onsite GROA staff is fully capable and equipped to handle all situations involving safety of the facility and the public.] The Repository Manager will have overall responsibility of the

operation of the repository with respect to waste emplacement operations, radiation protection, and maintenance. [The organizational structure of the [TCG-28] will be shown in Figure 7.3E.]

7.3.1.3 Organization for Technical Support

The [TCG-29] provides support to the design and construction organization and the operations organization in the areas of quality assurance (QA), safety assurance, regulatory and licensing support, training, and computer resources. [The organizational structure of the [TCG-30] will be shown in Figure 7.3F.]

7.3.2 Personnel Functions, Responsibilities, and Authorities

The functions and responsibilities of the onsite repository management staff are described in this subsection. The delegations of authority, including succession to responsibility for facility operations is also defined.

7.3.2.1 Repository Manager

The Repository Manager reports to [TCG-31] and has direct responsibility for operating the GROA in a safe, reliable, and efficient manner. The Repository Manager is also responsible for protection of the station staff and the general public from radiation exposure and/or any other

consequences of an accident at the repository, as well as being responsible for compliance with the facility license and its conditions.

7.3.2.2 Operations Manager

The Operations Manager has the responsibility for directing the actual day-to-day waste emplacement and cask handling operations, and reports directly to the Repository Manager. The Operations Manager may assume the responsibilities and authority of the Repository Manager, if so designated, during the absence or incapacitation of the Repository Manager.

7.3.2.3 Radiation Protection Manager

The Radiation Protection Manager has the responsibility for conducting the Radiation Protection Program, with duties including the training of personnel in use of equipment, control of radiation exposure of personnel, continuous determination of the radiological status of the GROA, surveillance of radioactive waste disposal operations, conducting the environmental monitoring program and maintaining all required records. The Radiation Protection Manager reports directly to the Repository Manager, and may assume the responsibilities and authority of the Repository Manager, if so designated, during the absence or incapacitation of the Repository Manager.

7.3.2.4 Performance Manager

The Performance Manager has the responsibility for directing the activities related to performance monitoring and testing, post-maintenance testing, and special system testing performed to show that the GROA systems are functioning as designed. The Performance Manger reports directly to the Repository Manager and may assume the responsibilities and authority of the Repository Manager, if so designated, during the absence or incapacitation of the Repository Manager.

7.3.2.5 Compliance Manager

The Compliance Manager has the responsibility for ensuring that GROA operations are conducted in accordance with the provisions of the facility license and its conditions. The Compliance Manager has responsibility for onsite QA functions and performs independent safety evaluations, as required. The Compliance Manager reports directly to the Repository Manager. However, due to the oversight nature of many of his responsibilities, may not assume the responsibilities and authority of the Repository Manager.

7.3.2.6 Maintenance Manager

The Maintenance Manager has the responsibility for directing activities associated with mechanical and electrical maintenance, and instrumentation and control. The Maintenance Manager reports directly to the Repository Manager, and may assume the responsibilities and

authority of the Repository Manager, if so designated, during the absence or incapacitation of the Repository Manager.

7.3.2.7 Repository Services Manager

The Repository Services Manager has the responsibility for directing activities associated with repository support activities such as security, records management, human resources, fire protection, and industrial safety. The Repository Services Manager reports directly to the Repository Manager, and may assume the responsibilities and authority of the Repository Manager, if so designated, during the absence or incapacitation of the Repository Manager.

7.3.3 Personnel Qualification Requirements

The qualifications of personnel in the operating staff are defined in accordance with [TCG-32]. Replacement personnel for all positions will be fully trained and qualified to fill their appointed positions. [The minimum education and experience requirements for the various management positions at the repository will be given in Table 7.3A, and the resumes of the repository management staff demonstrating their qualifications will be presented in the following subsections.]

7.3.3.1 Repository Manager

[TCG-33], the Repository Manager, ...

7.3.3.2 Operations Manager

[TCG-34], the Operations Manager, ...

7.3.3.3 Radiation Protection Manager

[TCG-35], the Radiation Protection Manager, ...

7.3.3.4 Performance Manager

[TCG-36], the Performance Manager, ...

7.3.3.5 Compliance Manager

[TCG-37], the Compliance Manager, ...

7.3.3.6 Maintenance Manager

[TCG-38], the Maintenance Manager, ...

7.3.3.7 Repository Services Manager

[TCG-39], the Repository Services Manager, ...

Table 7.3A. GROA Management Staff Minimum Qualifications

POSITION	EDUCATION REQUIREMENTS	YEARS OF APPLICABLE EXPERIENCE	PROFESSIONAL CERTIFICATIONS
REPOSITORY MANAGER			
OPERATIONS MANAGER			
RADIATION MANAGER			
PERFORMANCE MANAGER			
COMPLIANCE MANAGER			
MAINTENANCE MANAGER			
REPOSITORY SERVICES MANAGER			

Figure 7.3A. OCRWM Organization Chart

Figure 7.3B. M&O Contractor Companies

Figure 7.3C. GROA Organization

Figure 7.3D. Organization for Construction and Design

Figure 7.3E. Organization for Operations

Figure 7.3F. Organization for Technical Support

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 7.3 **ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND ADMINISTRATIVE CONTROLS**

2. Lead Author & Phone No. Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words): See Section 7.3.0.

6. Opening Statement: Not applicable.

7. Main Body Outline:

7.3 ORGANIZATION

7.3 Introduction

This section identifies and describes the structure, functions, qualifications and responsibilities of the operating organization.

7.3.1 Organization

7.3.2 Personnel Functions, Responsibilities, and Authorities

7.3.3 Personnel Qualification Requirements

8. Conclusion:

[A statement similar to the following should be made in a potential license application: The organizational structure, management, and administrative controls presented in this section comply with requirements of 10 CFR 60.21(c)(15).]

9. Support Authors & Their Assignments:

Section No. & Title: 7.3 ORGANIZATIONAL STRUCTURE, MANAGEMENT AND ADMINISTRATIVE CONTROLS

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Table No. 7.3A

Title: GROA Management Staff Minimum Qualifications

Content: (Reference 7.3.3)

Material to consider for Table 7.3A:

A. ANSI/ANS-3.1-1978. "American National Standard for Selection and Training of Nuclear Plant Personnel", shall be used to provide bases for personnel qualifications except where clarified in Table 7.3A.

B. As one such clarifier, Reactor Operator (RO) licenses are not required for any staff occupation.

C. The following should be required of a Radiation Protection Manager (RPM):

- The Radiation Protection Manager (RPM) should be an experienced professional in applied radiation protection at nuclear facilities dealing with radiation protection problems and programs similar to those at nuclear power stations. The RPM should be familiar with the design features of the GROA which affect the potential for exposures of persons to radiation. The RPM should have the technical competence to establish radiation protection programs and the supervisory capability to direct the work of professionals, technicians, and journeymen required to implement the radiation protection programs. The RPM should be an ABHP Certified Health Physicist.

D. Some generic staff positions are:

- Repository Manager
- Operations Manager
- Radiation Protection Manager
- Performance Manager
- Compliance Manager
- Maintenance Manager
- Station Services Manager

Section No. & Title: 7.3 ORGANIZATIONAL STRUCTURE, MANAGEMENT AND ADMINISTRATIVE CONTROLS

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Figure No. 7.3A

Caption: **OCRWM Organization Chart**

Content: (Reference 7.3)

B. Figure No. 7.3B

Caption: **M&O Contractor Companies**

Content: (Reference 7.3)

C. Figure No. 7.3C

Caption: **GROA Organization**

Content: (Reference 7.3)

Section No. & Title: 7.3 ORGANIZATIONAL STRUCTURE, MANAGEMENT AND ADMINISTRATIVE CONTROLS

Lead Author & Phone No. Tom Geer, 702/794-7868

D. Figure No. 7.3D

Caption: **Organization for Construction and Design**

Content: (Reference 7.3.1)

E. Figure No. 7.3E

Caption: **Organization for Operations**

Content: (Reference 7.3.1)

F. Figure No. 7.3F

Caption: **Organization for Technical Support**

Content: (Reference 7.3.1)

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

2.

3.

4.

5.

6.

7.

8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-21**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   OCRWM organization chart.

7. What is the information needed for?

   SAR Section 7.3 and Figure 7.3A.

8. What group is the probable information supplier?

   YMPO.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-22**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   M&O Contractors and areas of responsibility.

7. What is the information needed for?

   SAR Section 7.3 and Figure 7.3B.

8. What group is the probable information supplier?

   Regulatory and Licensing.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-23**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   M&O organization assembled to manage design, construction, and operation of the GROA.

7. What is the information needed for?

   SAR Section 7.3 and Figure 7.3C.

8. What group is the probable information supplier?

   Regulatory and Licensing.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-24**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Name of the design engineering group responsible for design and construction.

7. What is the information needed for?

   SAR Section 7.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-25**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Name of the operations group responsible for GROA operations.

7. What is the information needed for?

   SAR Section 7.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-26**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the management position responsible for the design and construction of the GROA.

7. What is the information needed for?

   SAR Section 7.3.1.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-27**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Organizational chart of the design group.

7. What is the information needed for?

   SAR Section 7.3.1.1 and Figure 7.3D.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-28**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Organizational chart of the onsite GROA organization responsibile for repository operations.

7. What is the information needed for?

   SAR Section 7.3.1.2.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-29**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the position responsible for technical support activities in support of the GROA.

7. What is the information needed for?

   SAR Section 7.3.1.3.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-30**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Organization chart for the technical support group.

7. What is the information needed for?

   SAR Section 7.3.1.3.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-31**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the direct supervisor of the Repository Manager.

7. What is the information needed for?

   SAR Section 7.3.2.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-32**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify any position qualification standards that may apply. A review of the Privacy Act requirements is also required to support the level of documentation of personnel qualifications.

7. What is the information needed for?

   SAR Section 7.3.3 and Table 7.3A.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-33**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the name of the Repository Manager and summarize his resume of qualifications.

7. What is the information needed for?

   SAR Section 7.3.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-34**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the name of the Operations Manager and summarize his resume of qualifications.

7. What is the information needed for?

   SAR Section 7.3.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-35**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the name of the Radiation Protection Manager and summarize his resume of qualifications.

7. What is the information needed for?

   SAR Section 7.3.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-36**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the name of the Performance Manager and summarize his resume of qualifications.

7. What is the information needed for?

   SAR Section 7.3.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-37**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the name of the Compliance Manager and summarize his resume of qualifications.

7. What is the information needed for?

   SAR Section 7.3.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-38**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the name of the Maintenance Manager and summarize his resume of qualifications.

7. What is the information needed for?

   SAR Section 7.3.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-39**

2. Section no. & title: **7.3 ORGANIZATIONAL STRUCTURE**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the name of the Repository Services Manager and summarize his resume of qualifications.

7. What is the information needed for?

   SAR Section 7.3.3.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.4 Procedure Development

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7.4 PROCEDURE DEVELOPMENT

Skelton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 7.4 PROCEDURE DEVELOPMENT

2. Lead Author & Phone No. Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   [A statement similiar to the following should be made in a potential license application: This section identifies and describes the various procedures needed for the Geologic Repository Operations Areas (GROA) operations. Also, the program that will be used for generating additional procedures is presented. The various procedures included in this section are general operating procedures, emergency procedures, start-up and testing procedures, performance confirmation procedures, etc.]

6. Opening Statement:

   Same as summary.

7. Main Body Outline:

7.4 PROCEDURE DEVELOPMENT

7.4.0 Introduction

7.4.1 Program For Development Of GROA Operations Porcedures

7.4.1.1 Program Introduction

Purpose - To provide consistency amongst facility procedures and to implement guidance directly based on human factors principles of information exchange.

- Human Factors Considerations and principles:

7. Main Body Outline: (Continued)

- Training and experience of personnel performing procedures
- Level of comprehension of personnel performing procedures
- Environment procedures will be performed in
- Paths of communication.

7.4.1.2 Guidelines for Procedure Preparation

- Task analysis
  - Training and Experience required for procedure tasks
  - Task Frequency
  - Task Complexity
  - Time Factor to complete task
  - Task Criticality - the consequences of errors of omission.
- Procedure Format

1.0 Purpose
2.0 References
3.0 Time and Personnel Required
4.0 Prerequisite Tests
5.0 Test Equipment Required
6.0 Limits and Precautions
7.0 Prerequisite System Conditions
8.0 Test Method Described
9.0 Data Required
10.0 Acceptance Criteria
11.0 Procedure Signoff Steps
12.0 Restoration of equipment and system
13.0 Enclosures.

7.4.1.3 Procedure Review, Validation/Verification and Approval

- Review
  - Reviewer Qualifications
  - Review Process, 10 CFR 50.59 (or equivalent regulation).

7. Main Body Outline (Continued)

- Validation/Verification
  - Validator/Verifier Qualifications
  - Validation/Verification Process.
- Approval
  - Approver Qualifications
  - Approval Process.

7.4.1.4 Procedure Amendment Process

- Procedure Change Preparation
- 10 CFR 60.44 Review (or equivalent regulation)
- Cross Disciplinary Review
- Management Approval.

7.4.2 GROA Operations Procedures

7.4.2.1 Operating Procedures

This subsection lists and describes the various procedures which address normal operations of the GROA.

7.4.2.2 Emergency Procedures

This subsection lists and describes the various procedures which address abnormal or emergency conditions such as fire, explosion, earthquake, etc.

7.4.2.3 Startup Procedures

This subsection lists and describes the various procedures which address startup and startup testing activities.

7.4.2.4 Performance Confirmation Procedures

This subsection lists and describes the various procedures which address performance confirmation activities.

7. Main Body Outline (Continued)

7.4.2.5 Retrieval and Alternate Storage Procedures

This subsection lists and describes the various procedures which address retrieval and alternate storage of HLW in the event the repository is deemed unsuitable after emplacement begins.

8. Conclusion:

[A statement similiar to the following should be made in a potential license application: The procedures developed and described in this section comply with the requirements of 10 CFR 60.21(c)(9), (12), and (15) and 10 CFR 60, Subpart F.]

9. Support Authors & Their Assignments:

Paul Childress: Waste Package Procedures
Paul McKie: subsurface procedures
Mark Ceraldi (DE & S)

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

A. Figure/Table No.

Caption/Title:

Content:

B. Figure No./Table No.

Caption:

Content:

C. Figure No./Table No.

Caption:

Content:

D. Figure No./Table No.

Caption:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **7.4 PROCEDURE DEVELOPMENT**
3. Lead author & phone no: **Tom Geer (702) 794-7868**
4. Information request date: **2/21/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.5 Records and Reports

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7.5 RECORDS AND REPORTS

This section identifies and describes the program and procedures for Geologic Repository Operations Area (GROA) recordkeeping activities, and outlines the reporting requirements for the facility. [The records management system will be required to satisfy the requirements of 10 CFR 60 Subpart D, 10 CFR 50 Appendix B, and will follow the guidance presented in NRC Regulatory Guide 10.1.]

7.5.1 Records Management System

The GROA records will be maintained and controlled in a systematic manner in order to adequately document repository operations. The Repository Manager will have final responsibility for the proper management of GROA records. Various repository managers will be responsible to the Repository Manager for assuring records within their purview are properly managed.

7.5.1.1 Master File System

GROA records will be organized into a record hierarchy and filed with cross references to subjects and keywords to facilitate retrieval at future times during GROA operations. Ultimately, this file system will enable the appropriate GROA records to be consolidated for long term retention in a form useable to future generations after permanent closure of the repository.

7.5.1.2 Records Protection and Security

During the life of the GROA, records important to the construction and operation of the facility, as well as those that pertain to the handling and disposition of radioactive waste, are stored and protected in accordance with the guidance provided in [TCG-40]. The security and protection of the records will be provided to ensure their availability at the time of permanent closure so that they may be retained, for the long-term, in a form useable to future generations.

7.5.2 Records Requirements

Records of licensed activities at the GROA will be maintained as appropriate. The following subsections discuss the specific records that are to be maintained.

7.5.2.1 Construction Records

Records that pertain to the construction of the safety related structures, systems, and components of the GROA, including as-built documentation will be retained for the life of the repository so that these records may be used by future generations. The construction records will include the following documentation:

A. Surveys of the underground facility excavations, shafts, and boreholes referenced to readily identifiable surface features or monuments

B. A description of the materials encountered during construction and excavation

C. Geologic maps and geologic cross sections

D. Location and amount of seepage

E. Details of equipment, methods, progress, and sequence of work

F. Construction problems encountered and solutions applied

G. Anomalous conditions encountered

H. Instrument locations, readings, and analysis

I. Location and description of structural support systems

J. Details, methods of emplacement, and location of seals used.

7.5.2.2 Site Deficiency Records

Reports of deficiencies made by DOE to the NRC, as required by 10 CFR 60.73, will be maintained. These reports will address deficiencies in the characteristics of the site or design and construction of the GROA which, if uncorrected, could be a substantial safety hazard, represent a significant deviation from the design criteria and design bases stated in this license application, or represent a deviation from the conditions stated in the terms of construction authorization or the license, including the license specifications.

7.5.2.3 Records of Tests Conducted Using Radioactive Waste

Records of any tests conducted with radioactive waste during construction or waste emplacement will be maintained for the life of the GROA.

7.5.2.4 Inspection Records

Safety-related inspections, such as equipment in-service inspections, cleanliness inspections, and procedure compliance inspections will be documented in such a manner as to allow identification of the individual(s) performing the inspection, when the inspection was performed, the type and purpose of the inspection, and the results of the inspection. These records will be retained for a minimum of six years.

7.5.2.5 Radioactive Waste Receipt, Handling, Storage and Disposition Records

Records of radioactive waste receipt, handling, storage, and disposition, including final emplacement, will be maintained in sufficient detail so as to provide a complete history of the movement of waste from the shipper through all phases of storage and disposal. These records will be maintained for the life of the GROA so that they may be used by future generations.

7.5.2.6 Permanent Closure Records

Records related to permanent closure include all records retained for the life of the GROA, records describing the permanent markers and their locations, and details of sealing methods used for permanent closure. These records will be consolidated, duplicated, distributed to various locations likely to be consulted by future generations, and retained in accordance with state-of-the-art methods at the time application is made for an amendment to the license allowing permanent closure of the repository.

7.5.3 Other Records

[A tabulation of other records to be retained during GROA operations, including retention requirements, will be presented in Table 7.5A. This table will also present a summary of the records described in the preceding sections. [TCG-41]]

Table 7.5A. Record and Retention Requirements

RECORD TYPE	6 YR RETENTION	LIFETIME RETENTION	PERMANENT RETENTION
Deficiency Report		X	X
Inspection	X		

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 7.5 RECORDS AND REPORTS

2. Lead Author & Phone No.: Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section will identify and describe the program for keeping records of activities at the Geological Repository Operations Area (GROA), including maintaining records of the licensed activity with a complete history of receipt, handling, storage, and disposition of radioactive waste; construction records; reports of deficiencies of the site; records of permanent closure; records of tests using radioactive waste that are conducted during construction or emplacement; and records of inspections.

6. Opening Statement: [A statement similiar to the following should be made in a potential license application: This section identifies and describes the program and procedures for GROA record keeping activities, and it outlines the reporting requirements for the facility.]

7. Main Body Outline:

7.5 RECORDS AND REPORTS

- 7.5.1 Records Management System
  - 7.5.1.1 Master File System
  - 7.5.1.2 Records Protection and Security
- 7.5.2 Records Requirements
  - 7.5.2.1 Construction Records
  - 7.5.2.2 Site Deficiency Records

7. Main Body Outline (Continued)

7.5.2.3 Records of Tests Conducted Using Radioactive Waste

7.5.2.4 Inspection Records

7.5.2.5 Radioactive Waste Receipt, Handling, Storage and Disposition Records

7.5.2.6 Permanent Closure Records

7.5.3 Other Records

8. Conclusion:

[A statement similiar to the following should be made in a potential license application: The records management system described above satisfies the requirements of 10 CFR 60 Subpart D.]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **7.5 RECORDS AND REPORTS**

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Table No. **7.5A**

Title: **Record and Retention Requirements**

Content: Based on content and format of NRC Regulatory Guide 10.1, Appendix A.

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

Section No. & Title:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.:

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-40**

2. Section no. & title: **7.5 RECORDS AND REPORTS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify sources of guidance relative to protection and security of records.

7. What is the information needed for?

   SAR Section 7.5.1.2.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-41**

2. Section no. & title: **7.5 RECORDS AND REPORTS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify all types of records, and retention requirements, that must be retained by DOE for the repository.

7. What is the information needed for?

   SAR Section 7.5.3 and Table 7.5A.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.6 Training Programs

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7.6 TRAINING PROGRAMS

The principal objective of the GROA Training and Qualification Program [TCG-42] is to ensure job proficiency of all repository personnel involved in work that is important to safety. [The program will be designed to accommodate future growth and comply with applicable regulations and accreditation standards [TCG-43].]

Employee qualification will be established by successfully completing prescribed training, demonstrating the ability to correctly perform tasks, and maintaining current professional certification or licenses where required by specific job description.

The [TCG-44] will have overall responsibility for the administration of the Training and Qualification Program. The Repository Manager will be responsible for the quality of work performed by individuals at the GROA. The Support Services Manager will be assigned responsibility for ensuring the timely and effective development of GROA personnel.

Training will be designed, developed, and implemented according to a systematic approach to training. Employees will be provided with formal training to supplement any formal education already required in order to establish the required knowledge foundation. On-the-job training is used to develop work performance skills. Continuing training will be provided, as required, to provide further employee development. The program will be designed to prepare initial and replacement GROA personnel for safe, reliable, and efficient operation of the repository.

Appropriate training for personnel of various training and experience backgrounds will be provided. The level at which an employee initially enters the Training and Qualification Program will be determined by an evaluation of past experience, and demonstration of ability by examination, where appropriate. [Specific training which will be required for key repository positions prior to commencement of waste emplacement operations is given in Table 7.6A [TCG-45].]

7.6.1 Program Approach

GROA personnel will be trained and qualified through participation in prescribed parts of the Training and Qualification Program that is comprised of General Employee Training, technical training, and employee development and management training.

7.6.1.1 General Employee Training

General Employee Training (GET) encompasses the general administrative, safety, emergency, and administrative procedures established by repository management and applicable regulations. A general description of GROA systems and equipment is provided. All persons under the supervision of repository management must participate in GET; however, certain repository support personnel, depending on their normal work assignment, may not participate in all topics. Certain portions of GET may be included in an employee orientation program. Temporary maintenance and service personnel shall receive GET to the extent necessary to ensure safe execution of their duties.

All persons regularly employed at the GROA and under the supervision of repository management will receive training in the following areas, commensurate with their job duties:

A. General administrative control and QA policies and procedures

B. GROA systems and equipment

C. Radiological safety, including the nature and sources of radiation, methods of controlling contamination, interactions of radiation with matter, biological effects of radiation, use of monitoring equipment, use of protective clothing and equipment, and principles of criticality hazards control

D. Industrial health, safety, and first aid

E. Emergency plan and procedures

F. GROA security program and procedures

G. Fire protection program and procedures

H. Using procedures and performing independent verification

I. New employee orientation, including a tour of the GROA and the various work groups

J. Communications training.

7.6.1.2 Technical Training

Technical training will be designed to assist GROA employees in gaining an understanding of applicable fundamentals, procedures, and practices in order to perform assigned tasks in a competent manner. The development of necessary manipulative skills is included where appropriate to the job function. At a minimum, technical training will be developed to support personnel proficiency in the following areas of GROA activities:

A. Design

B. Construction

C. Waste emplacement operations

D. Instrumentation and control

E. Ventilation system operation and maintenance

F. Methods of dealing with operating malfunctions

G. Decontamination procedures

H. Emergency procedures

I. Mining practices and safety

J. Radiation protection.

7.6.1.3 Development and Management Training

Specialized training will be developed for special skills or to develop the management effectiveness of repository staff as needed. This training may be conducted using in-house resources or by hiring consultants with specific expertise, as appropriate.

7.6.2 Continuing and Refresher Training

Continuing training is any training not provided as initial training and includes requalification training and other training designed to expand or improve job-related knowledge and skills. Requalification training will be specifically required for specialized operations skills necessary to ensure the safe, reliable, and efficient operation of the repository. [Table 7.6B will present

a description of the skills requiring requalification training and their required frequency [TCG-46].]

7.6.3 Training Program Evaluation

Training and qualification activities will be monitored by the Technical Support organization. The QA organization will audit the repository Training and Qualification Program to ensure compliance with stated objectives and requirements. Trainees will be solicited for input regarding program effectiveness through the use of surveys, questionnaires, performance appraisals, staff evaluations, etc. Classes that will be conducted frequently will be evaluated on a periodic basis to ensure the continued applicability of training material and methods to present job functions.

7.6.4 Training and Qualification Program Records

Records of employee participation in the Training and Qualification Program, course outlines, and course descriptions are maintained as [TCG-51].

Table 7.6A. Initial Training Requirements for Key Repository Positions

MONTHS PRIOR TO WASTE EMPLACEMENT	36	33	30	27	24	21	18	15	12	9	6	3
REPOSITORY MANAGER												
OPERATIONS MANAGER												
RADIATION PROTECTION MANAGER												
PERFORMANCE MANAGER												
COMPLIANCE MANAGER												
MAINTENANCE MANAGER												
SUPPORT SERVICES MANAGER												
fill in other posts positio...												

NOTE: Need to add a description of training type with a letter designation within each block to indicate required training and timeframe.

Table 7.6B. Positions Requiring Requalification Training

REQUALIFICATION FREQUENCY	EVERY QUARTER	SEMI-ANNUALLY	ANNUALLY
REPOSITORY MANAGER			
OPERATIONS MANAGER			
RADIATION PROTECTION MANAGER			
PERFORMANCE MANAGER			
COMPLIANCE MANAGER			
MAINTENANCE MANAGER			
SUPPORT SERVICES MANAGER			
add other positions...			

NOTE: Need to add a description of training type with a letter designation within each block to indicate required training and frequency.

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **7.6 TRAINING PROGRAMS**

2. Lead Author & Phone No. Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section describes the purpose, function, and operating philosophy of the GROA training program and how this training integrates into the repository program. The systematic approach to training doctrine is explained as well as how it applies to the required training.

6. Opening Statement:

   The principal objective of the GROA Training and Qualification Program is to ensure job proficiency of all repository personnel involved in safety-related work. The program is designed to accommodate future growth and comply with applicable regulations and accreditation standards.

7. Main Body Outline:

   7.6 TRAINING PROGRAMS

   7.6.1 Program Approach

   7.6.1.1 General Employee Training

   7.6.1.2 Technical Training

   7.6.1.3 Development and Management Training

   7.6.2 Continuing and Refresher Training

   7.6.3 Training Program Evaluation

7. Main Body Outline (Continued)

   7.6.4 Training and Qualification Program Records

8. Conclusion:

   [A statement similar to the following should be made in a potential license application: This training program adheres to the systematic approach to training and follows the guidelines of the DOE Training Accreditation Program. As required, it is performance-based, consistent with training practices delineated by the DOE, and in compliance with 10 CFR 60, Subpart H.]

9. Support Authors & Their Assignments: TBD.

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **7.6 TRAINING PROGRAMS**

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Table No. **7.6A**

Title: **Initial Training Requirements for Key Repository Positions**

Content: (Reference 7.6)

B. Table No. **7.6B**

Title: **Positions Requiring Requalification Training**

Content: (Reference 7.6.2)

C. Table No.

Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **7.6 TRAINING PROGRAMS**

Lead Author & Phone No. Tom Geer, 702/794-7868

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. DOE Training Accreditation Manuals Volumes 1, 2, 3; Final, published.
2.
3.
4.
5.
6.
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8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-42**

2. Section no. & title: **7.6 TRAINING PROGRAMS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   A Training and Qualification Program must be developed for the GROA personnel.

7. What is the information needed for?

   SAR Section 7.6.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-43**

2. Section no. & title: **7.6 TRAINING PROGRAMS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify all regulations and accreditation standards pertinent to a training program at the GROA.

7. What is the information needed for?

   SAR Section 7.6.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-44**

2. Section no. & title: **7.6 TRAINING PROGRAMS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify the management position within the technical support organization that is responsible for training.

7. What is the information needed for?

   SAR Section 7.6.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-45**

2. Section no. & title: **7.6 TRAINING PROGRAMS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify all specific training to be completed by key repository personnel prior to receipt of the first high level waste for emplacement.

7. What is the information needed for?

   SAR Section 7.6 and Table 7.6A.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-46**

2. Section no. & title: **7.6 TRAINING PROGRAMS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identify GROA positions and job descriptions requiring requalification training and the required frequencies.

7. What is the information needed for?

   SAR Section 7.6.2 and Table 7.6B.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.7 Schedules

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7.7 SCHEDULES

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 7.7 SCHEDULES

2. Lead Author & Phone No. Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words)

   This section describes the various schedules, the major tasks, activities and durations for the design and construction of the HLW repository. Critical paths are shown and major milestones identified.

6. Opening Statement: See item 5, above. [Coordinate with Section 1.3 of the license application.]

7. Main Body Outline:

7.7 INTRODUCTION

7.8 OVERALL PROJECT SCHEDULE (Reference Figure 7.7A, Table 7.7A)

7.9 DESIGN ACTIVITIES (Reference Table 7.7B, C)

7.10 CONSTRUCTION ACTIVITIES (Reference Table 7.7D)

7.11 CRITICAL PATHS

7.12 MAJOR MILESTONES

8. Conclusion:

   TBD. Note: Must determine if schedule is in accordance with NWPA as amended.

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **7.7 SCHEDULES**

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Figure No. **7.7A**

Caption: **Project Schedule**

Content: (Reference Section 7.7.1)

Overall project schedule in bar graph form with separate bars for design, procurement and construction phases.

C. Table No. **7.7B**

Title: **Design Schedule**

Content: (Reference Section 7.7.2)

Major design functions.

Section No. & Title: **7.7 SCHEDULES**

Lead Author & Phone No. J. M. Taipale, 702-794-1831

A. Table No. **7.7C**

Title: **Procurement Schedule**

Content: (Reference Section 7.7.2)

Major equipment items; critical lead times

B. Table No. **7.7D**

Title: **Construction Schedule**

Content: (Reference Section 7.7.3)

Major excavations; site work; buildings; etc.

C. Figure No. **7.7B**

Caption: **Waste Emplacement Schedule and Retrievability Period**

Content:

Waste emplacement schedule up to closure; include retrievability period.

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

2.

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8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **7.7 SCHEDULES**
3. Lead author & phone no: **Tom Geer (702) 794-7868**
4. Information request date: **2/21/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed:
7. What is the information needed for?
8. What group is the probable information supplier?
9. When is the information needed?
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.8 Identification of Operating Controls and Limits

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7.8 IDENTIFICATION OF OPERATING CONTROLS AND LIMITS

Skeleton Text Has Not Been Developed For This Section

REFERENCES

1. Section No. & Title: **7.8 IDENTIFICATION OF OPERATING CONTROLS AND LIMITS**

2. Lead Author & Phone No. Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words): This section contains the operating controls and limits for the repository and includes all aspects of operation that are important to safety, retrievability, and isolation. Numerical control or limit values and other pertinent data are provided to the fullest extent possible. The systems or operations to which the control applies, and the reasons for the control or limit with the specific unsafe conditions it is intended to prevent, are fully defined. Actions to be taken if the control or limit is exceeded are described. Maintenance, tests, and surveillance activities to be performed and the basis for the frequency of these activities are given.

   This section contains all pertinent information and an explicit detailed assessment supporting the choice of the item and its specific value or characteristics. Included in the bases as appropriate for each item is a description of: technical analyses, computations, experiments, a description of safety related equipment and the means by which the variable is monitored and controlled, and a description of the roles of operating procedures and protective systems in guarding against exceeding a limit or condition.

6. Opening Statement: [A statement similar to the following should be made in a potential license application. Operating controls and limits for the repository are established to prevent or mitigate the consequences of design basis accidents, facilitate retrievability and ensure waste isolation.]

7. Main Body Outline: [Coordinate with Section 2.6.]

   7.8.0 Introduction

   This section systematically reviews the operating controls and limits for the following GROA subsystems.

7. Main Body Outline (Continued)

7.8.0.1 Regulatory Design Criteria and Performance Objectives

7.8.1 Surface Facilities

7.8.1.1 Hot Cell
7.8.1.2 On-Site Radioactive Waste Management System
7.8.1.3 Fire and Explosion Protection System
7.8.1.4 Emergency Systems
7.8.1.5 Communication Systems
7.8.1.6 Utility Systems
7.8.1.7 Instrumentation and Control Systems
7.8.1.8 On-Site Transportation Systems
7.8.1.9 Ventilation Systems
7.8.1.10 Operations Support Systems
7.8.1.11 Decommissioning System
7.8.1.12 Other Surface Systems

7.8.2 Shafts and Ramps

7.8.2.1 Waste Ramp
7.8.2.2 Muck Ramp
7.8.2.3 Ventilation Intake Shafts
7.8.2.4 Ventilation Exhaust Shafts
7.8.2.5 Personnel and Materials Shafts
7.8.2.6 Decommissioning System
7.8.2.7 Other Shaft or Ramp Systems

7.8.3 Underground Facility

7.8.3.1 Excavation and Ground Support Systems
7.8.3.2 Muck Handling System
7.8.3.3 Ventilation System
7.8.3.4 Waste Emplacement System
7.8.3.5 Waste Retrieval System
7.8.3.6 Emergency System
7.8.3.7 Communication System
7.8.3.8 Operations Support System
7.8.3.9 Decommissioning System
7.8.3.10 Other Underground Systems

7. Main Body Outline (Continued)

7.8.4 Radiation Protection

7.8.4.1 Radiological Areas and Facilities
7.8.4.2 ALARA Limits and Controls Considerations
7.8.4.3 Shielding Limits and Controls
7.8.4.4 Radiological Monitoring Instrumentation

7.8.5 Interface of Structures, Systems, and Components

8. Conclusion: [A statement similar to the following should be made in a potential license application: Operating controls and limits for the repository are established to prevent or mitigate the consequences of design basis accidents, facilitate retrievability and ensure waste isolation. The health and safety of the public and operating personnel are protected during operations by adhering to these established limits.]

9. Support Authors and Their Assignments:

7.8.1 Jerry Fredrickson
7.8.2 Paul McKie
7.8.3 Paul McKie
7.8.4 Tom Williamson (Duke)

Section No. & Title: **7.8 IDENTIFICATION OF OPERATING CONTROLS AND LIMITS**

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Table No. **7.8x [General Format]**

Title: **Operating Limit/Control for [Name of GROA subsystem]**

Content:

1. Title

2. Specification (limits)

3. Applicability: systems or operations to which the control or limit applies should be clearly defined.

4. Objective: The reasons for the control or limit and the specific unsafe conditions it is intended to prevent.

5. Action: What is to be done if the control or limit is exceeded. Clearly define specific actions.

6. Surveillance Requirements: What maintenance and tests are to be performed and when.

7. Bases: The SAR should contain all pertinent information and an explicit detailed analysis and assessment supporting the choice of the item and its specific value or characteristics. The bases for each control or limit should contain a summary of the information in sufficient depth to indicate the completeness and validity of the supporting information and to provide justification for the control or limits. The following subjects may be appropriate for discussion in the bases section:

   - Technical Basis. The technical basis is derived from technical knowledge of the process and its characteristics and should support the choice of the particular variable as well as the value of the variable. The results of computations, experiments, or judgments should be stated, and analysis and evaluation should be summarized. (Refer to the applicable Safety Analysis Section(s).)

- Equipment. A safety limit often is protected by or closely related to certain equipment. Such a relation- ship should be noted, and the means by which the variable is monitored and controlled should be stated. The function of the equipment and how and why the requirement is selected should be noted here. In addition, the means by which surveillance is accomplished should be noted. If periodic surveillance is required, the basis for frequency of required action should be given.

- Operation. The margins and the bases that relate to the safety limits and the normal operating zones should be stated. The roles of operating procedures and of protective systems in guarding against exceeding a limit or condition should be stated. Include a brief discussion of such factors as system responses, process or operational transients, malfunctions, and procedural errors. Reference to related controls or limits should be made.

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

Section No. & Title: 7.8 IDENTIFICATION OF OPERATING CONTROLS AND LIMITS

Lead Author & Phone No.: Tom Geer, 702/794-7868

Instructions: List all books, articles, or other references which are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer' Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

	Document Identifier	Document Description
1.	29 USC 651 et.seq.	Occupational Safety and Health Act
2.	30 USC 801 et.seq.	Mine Safety and Health Act
3.	33 USC 1251 et.seq.	Clean Water Act
4.	42 USC 300f et.seq.	Safe Drinking Water Act
5.	NWPA-42 USC 10101 et.seq.	Nuclear Waste Policy Act of 1982
6.	10 CFR 60	Disposal of High-Level Radioactive Wastes in Geologic Repositories
7.	10 CFR 73	Physical Protection of Plants and Materials
8.	10 CFR 960	General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories
9.	10 CFR 961	Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste
10.	40 CFR 191	Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes
11.	DOE/RW-0247	Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program
12.	DOE Order 3790.1A	Federal Employee Occupational Safety and Health Program

13. DOE Order 5480.11 Radiation Protection for Occupational Workers

14. MOA RW/DP Memorandum of 7/14/86 on Policy for Shipping Defense High-Level Waste (DHLW) to a Civilian Radioactive Waste Repository

15. Physical System Requirements "Dispose of Waste" (Draft)

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **7.8 IDENTIFICATION OF OPERATING CONTROLS AND LIMITS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.9 Preservation of Records

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7.9 PRESERVATION OF RECORDS

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **7.9 PRESERVATION OF RECORDS**

2. Lead Author & Phone No.: Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section discusses the system and procedures that DOE uses for the permanent preservation of site records. Those records include site data prior to the SCP; data from the SCP experiments and in situ tests; design records, construction records and performance records.

6. Opening Statement: [A statement similar to the following should be made in a potential license application: This section discusses the system and procedures used by DOE for the permanent preservation of site records.]

7. Main Body Outline: (Record keeping activity is covered in Section 7.5. This Section 7.9 covers only the permanent preservation of those records. Consideration should be given to combining these two sections)

   Include a discussion on compliance with 10 CFR 60.51(a)(2)(ii). This paragraph states,

   > Placement of records in the archives and land record systems of local, State and Federal government agencies, and archives elsewhere in the world, that would likely to be consulted by potential human intruders--such records to identify the location of the geologic repository operations area, including the underground facility, boreholes and shafts, and the boundaries of the controlled area, and the nature and hazard of the waste.

   [10 CFR 60.51 applies to the license amendment submitted prior to permanent closure, therefore, the discussion need not be definitive at this time].

   7.9.1 Records to be archived
   7.9.2 Record preservation methods

7.9.3 Probable archive locations

8. Conclusion:

[A statement similar to the following should be made in a potential license application: The information discussed above and in Section 7.5 provides assurance that the project will comply with requirements of 10 CFR 60, Subpart D and 10 CFR 60.51(a)(2)(ii) prior to permanent closure of the repository.]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

A. Figure/Table No.

Caption/Title:

Content:

B. Figure/Table No.

Caption:

Content:

C. Figure/Table No.

Caption:

Content:

D. Figure/Table No.

Caption:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title:

Lead Author & Phone No.

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

2.

3.

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6.

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8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **7.9 PRESERVATION OF RECORDS**
3. Lead author & phone no: **Tom Geer (702) 794-7868**
4. Information request date: **2/21/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed:
7. What is the information needed for?
8. What group is the probable information supplier?
9. When is the information needed?
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

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5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 7.10 Site Markers

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7.10 SITE MARKERS

[This section will describe the design and construction of site markers or monuments for the period following repository permanent closure. The Geologic Repository Operations Area (GROA), controlled area, and monuments will be identified and located. Compliance with 10 CFR 60.21 (c) (8), 10 CFR 60.51 (a) (2) (i), and 40 CFR 191.14 (c) requirements must be shown. The controlled area and GROA will be identified by monuments which have been designed, fabricated, and emplaced to be as permanent as practicable.]

7.10.1 Site Marker Design Basis

[Site markers will be designed to be as permanent as practicable as part of a program to permanently identify the repository location for future generations.] The design basis for the site markers is to provide a local indication that the site presents unique hazards, and that the area should not be disturbed. The form and characteristics of government and civilization are difficult to project over the length of time the repository must safely contain the spent fuel and high level waste. Therefore, the site markers are also intended to indicate that further research is necessary before disturbing the site in the case where the marker warnings themselves are not understood.

7.10.2 Site Marker Description

[TCG-47]

7.10.3 Compliance of Site Markers with Regulations

[The GROA site monuments will be designed to be as permanent as practicable. It will be shown that these monuments, in conjunction with the provisions for record preservation of Section 7.9, will satisfy the regulatory requirements to minimize the potential for intrusion into the repository by human intruders.]

Figure 7.10A. Site Marker Used After Permanent Closure

Figure 7.10B. Locations of Permanent Site Markers

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **7.10 SITE MARKERS**

2. Lead Author & Phone No. Tom Geer, 702/794-7868

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section will describe the design and construction of site markers or monuments for the period following repository permanent closure. The GROA, controlled area, and monuments will be identified and located. Compliance with 10CFR21 (C) (8) and 10CFR60.51 (a) (2) (1) requirements will be shown.

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: This section describes the design and construction of site markers or monuments for the period following repository permanent closure. The GROA, controlled area, and monuments are identified and located. Compliance with 10 CFR 21 (C) (8) and 10 CFR 60.51 (a) (2) (1) requirements is shown. This controlled area and geologic repository operations area are identified by monuments which have been designed, fabricated, and emplaced to be as permanent as practicable. Therefore, the site markers comply with regulatory requirements.]

7. Main Body Outline:

   7.10 INTRODUCTION

   7.10.1 Site Marker Design Basis

   7.10.2 Site Marker Description [Refer to Section 4.1 for controlled area and GROA identification]

   7.10.3 Compliance Of Site Markers With Regulations

8. Conclusion:

[A statement similar to the following should be made in a potential license application: This controlled area and geologic repository operations area are identified by monuments which have been designed, fabricated, and emplaced to be as permanent as practicable. Therefore, the site markers comply with regulatory requirements.]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **7.10 SITE MARKERS**

Lead Author & Phone No. Tom Geer, 702/794-7868

A. Figure No. **7.10A**

Caption: **Site Marker Used After Permanent Closure**

Content: (Reference 7.10.2)

B. Figure No. **7.10B**

Caption: **Locations of Permanent Site Markers**

Content: (Reference 7.10.2)

C. Figure No./Table No.

Caption:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **7.10 SITE MARKERS**

Lead Author & Phone No. Tom Geer, 702/794-7868

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. 10 CFR 60
2. 10 CFR 21
3. Applicable code/standard for monument design
4.
5.
6.
7.
8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **TCG-47**

2. Section no. & title: **7.10 SITE MARKERS**

3. Lead author & phone no: **Tom Geer (702) 794-7868**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   A physical description of the permanent site markers is required including a drawing(s) of the marker demonstrating its design(s) and a figure showing a map of the marker locations relative to the repository site.

7. What is the information needed for?

   SAR Section 7.10.2 and Figures 7.10A and 7.10B

8. What group is the probable information supplier?

   MGDS Design Organization.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    None identified.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver (702) 794-1871

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Chapter 8.0 Performance Confirmation Program

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8.0 PERFORMANCE CONFIRMATION PROGRAM

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **8.0 PERFORMANCE CONFIRMATION PROGRAM**

2. Lead Author & Phone No. **W.J. Leonard (Placeholder) 702-794-1861**

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This chapter will describe the performance confirmation program, started during site characterization and continuing until permanent closure. This program provides data indicating whether subsurface conditions and changes during construction and waste emplacement operations are within limits assumed in the license review. The program will demonstrate whether natural and engineered systems and components required are functioning as intended. The program includes in sites monitoring, laboratory and field tests, and in sites experiments.

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: This chapter describes the program for performance confirmation to demonstrate that initial subsurface conditions and changes thereto during construction and emplacement operations are within limits assumed in the license review.]

7. Main Body Outline:

8.0 INTRODUCTION

- Describe the performance confirmation program applicable to subsurface conditions and changes thereto during construction and emplacement.
- Describe any additional performance confirmation activities that need to be carried out as a result of sensitivity analysis and model validation described in Chapter 6.

7. Main Body Outline (Continued)

8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING

- Refer to Planning Package for Section 8.1.

8.2 PERFORMANCE CONFIRMATION FOR THE STRUCTURES, SYSTEMS, AND COMPONENTS OF THE GEOLOGIC REPOSITORY OPERATIONS AREA (GROA)

- Refer to Planning Package for Section 8.2.

8.3 PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM (EBS)

- Refer to Planning Package for Section 8.3.

8.4 (PERFORMANCE CONFIRMATION FOR) RADIATION PROTECTION

- Refer to Planning Package for Section 8.4.

8.5 ANALYSIS OF CHANGES FROM PERFORMANCE CONFIRMATION BASELINE

- Refer to Planning Package for Section 8.5.

8.6 UNRESOLVED SAFETY QUESTIONS

- Refer to Planning Package for Section 8.6.

8. Conclusion:

[A statement similar to the following should be made in a potential license application: The performance confirmation program demonstrates that the natural and engineered systems and components required for repository operation, or those which are designed or assumed to operate as barriers after permanent closure, are functioning as intended and anticipated.]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **8.0 PERFORMANCE CONFIRMATION PROGRAM**

Lead Author & Phone No. W.J. Leonard (Placeholder) 702-794-1861

A. Figure/Table No.

Caption/Title:

Content:

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **8.0 PERFORMANCE CONFIRMATION PROGRAM**

Lead Author & Phone No. W.J. Leonard (Placeholder) 702-794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Title 10, code of Federal Regulations, Part 60, Subpart F, 60.140 (U.S. Nuclear Regulatory Commission).

2. Title 10, Code of Federal Regulations, Part 60, Subpart F, 60.141 (U.S. Nuclear Regulatory Commission).

3. Title 10, Code of Federal Regulations, Part 60, Subpart F, 60.142 (U.S. Nuclear Regulatory Commission).

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **8.0 PERFORMANCE CONFIRMATION PROGRAM**
3. Lead author & phone no: **W. J. Leonard (Placeholder) (702) 794-1861**
4. Information request date:
5. Work location:
6. Type of information needed:
7. What is the information needed for?
8. What group is the probable information supplier?
9. When is the information needed?
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **8.0 PERFORMANCE CONFIRMATION PROGRAM**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): W. J. Leonard (Placeholder) 702-794-1861

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

Section 8.1 Performance Confirmation for the Natural Systems of the Geologic Setting

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8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING

Skeleton Text Has Not Been Developed For This Section

REFERENCES

1. Section No. & Title: 8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING

2. Lead Author & Phone No. Clem Goewert 702-794-1859

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

This section will describe the performance confirmation program for the natural systems including the geologic, hydrologic, geochemical, climatological, and meteorological systems. Sufficient background information will be supplied, to permit evaluation of the confirmation program for each of the natural systems.

6. Opening Statement:

[A statment similar to the following should be made in a potential license application: The performance confirmation program is used to evaluate each of the natural systems during site characterization, construction, and operation through permanent closure. These natural systems include the geologic, hydrologic, geochemical, climatological, and meteorological systems.]

7. Main Body Outline:

8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SYSTEM

- Summary of the Performance Confirmation Program (See Table 8.1A and Figure 8.1A).

8.1.1 Geologic System

- Summary of the Performance Confirmation Program for the Geologic System

7. Main Body Outline (Continued)

- Summary of Geologic System presented in the Safety Analysis Section (located in Section 3.3.1) (See Table 8.1.1A) including:

  - Limits of subsurface conditions
  - Geotechnical and design parameters
  - Design basis and assumptions
  - Parameters of the geologic system that may be changed by site characterization, construction, and operation
  - Parameters that could affect the performance of the repository.

- Field studies and analyses should be summarized (See Table 8.1.1B) including:

  - Description and summary of results of in-situ monitoring, geologic mapping, laboratory and field testing, and in-situ experiments used to confirm design assumptions and parameters and to evaluate changes from the baseline conditions.

8.1.2 Hydrologic System

- Summary of the performance confirmation program for the hydrologic system
- Summary of hydrologic system presented in the Safety Analysis Sections (See Table 8.1.2A) including:

  - Limits of subsurface conditions
  - Geotechnical and design parameters
  - Design basis and assumptions
  - Parameters of the geologic system that may be changed by site characterization, construction, and operation
  - Parameters that could affect the performance of the repository.

- Field studies and analysis should be summarized (See Table 8.1.2B) including:

  Description and summary of results of in-situ monitoring, geologic mapping, laboratory and field testing, and in-situ experiments used to confirm design assumptions and parameters and to evaluate changes from the baseline conditions.

7. Main Body Outline (Continued)

8.1.3 Geochemical System

- Summary of the performance confirmation program for the geochemical system
- Summary of geochemical system presented in the Safety Analysis Sections (See Table 8.1.3A) including:
  - Limits of subsurface conditions
  - Geotechnical and design parameters
  - Design basis and assumptions
  - Parameters of the geologic system that may be changed by site characterization, construction, and operation
  - Parameters that could affect the performance of the repository.
- Field studies and analysis should be summarized (See Table 8.1.3B) including:
  - Description and summary of results of in-situ monitoring, geologic mapping, laboratory and field testing, and in-situ experiments used and plan to confirm design assumptions and parameters and to evaluate changes from the baseline conditions.

8.1.4. Climatological and Meteorological Systems

- Summary of the performance confirmation program for the climatological and meteorological systems
- Summary of climatological and meteorological system presented in the Safety Analysis Sections (See Table 8.1.4A) including:
  - Climatological and meteorological design parameters
  - Design basis and assumptions relevant to the meteorological and climatological systems
  - Parameters that could affect the performance of the repository
- Details of any monitoring, testing, and experiments planned to confirm design assumptions and parameters, or to monitor and evaluate changes from the baseline conditions (See Table 8.1.4B).

8. Conclusion:

[A statement similar to the following should be made in a potential license application: The performance confirmation program has been used to evaluate each of the natural systems during site characterization and during construction and will be used through construction until permanent construction. The program will demonstrate the natural systems consisting of the geologic, hydrologic, geochemical, climatological, and meteorological systems, can function as intended.]

9. Support Authors & Their Assignments:

Section 8.1.1 Bill Distell_____
Section 8.1.2 _____
Section 8.1.3 _____
Section 8.1.4 _____

Section No. & Title: 8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING

Lead Author & Phone No. Clem Goewert 702-794-1859

A. Table No. **8.1A**

Title: **Outline of the Performance Confirmation Program for the Geologic Setting**

Content:

This table presents a general summary of the performance confirmation program for the geologic systems.

B. Figure No. **8.1A**

Caption: **Logic Diagram of the Performance Confirmation Diagram**

Content:

This figure presents the flow diagram of the confirmation process for evaluating programs in the process.

C. Table No. **8.1.1A**

Title: **Summary Table of the Geologic System**

Content:

This table summarizes the geologic system and program activities.

Section No. & Title: **8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING**

Lead Author & Phone No. Clem Goewert 702-794-1859

A. Table No. **8.1.1B**

Title: **Summary of Geologic Systems Programs**

Content:

This table summarizes the programs, field studies, design parameters, etc.

B. Table No. **8.1.2A**

Title: **Summary Table of the Hydrologic System**

Content:

This table summarizes the Hydrologic system and program activities.

C. Table No. **8.1.2B**

Title: **Summary Hydrologic Systems Programs**

Content:

This table summarizes the programs, field studies, design parameter, etc.

D. Table No. **8.1.3A**

Title: **Summary Table of the Geochemical System**

Content:

This table summarizes the Geochemical system and program activities.

Section No. & Title: 8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING

Lead Author & Phone No. Clem Goewert 702-794-1859

A. Figure No. **8.1.3B**

Caption: **Summary of Geochemical Systems Programs**

Content:

This table summarizes the programs, field studies, design parameters, etc.

B. Table No. **8.1.4A**

Title: **Summary Table of the Climatological and Meteorological System and Program Activities**

Content:

This table summarizes the climatological and meteorological system and program activities.

C. Table No. **8.1.4B**

Title: **Summary of Climatological and Meteorological Confirmation Programs**

Content:

This table summarizes the programs, field studies, design parameters, etc.

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: 8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING

Lead Author & Phone No. Clem Goewert 702-794-1859

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

2.

3.

4.

5.

6.

7.

8.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **8.1 PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING**

3. Lead author & phone no: **Clem Geowert 702-794-1859**

4. Information request date:

5. Work location:

6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: 8.1 **PERFORMANCE CONFIRMATION FOR THE NATURAL SYSTEMS OF THE GEOLOGIC SETTING**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Clem Goewert 702-794-1859

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

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Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

Section 8.2 Performance Confirmation for the Structures, Systems, and Components of the Geologic Repository Operations Area

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8.2 PERFORMANCE CONFIRMATION FOR THE STRUCTURES, SYSTEMS, AND COMPONENTS OF THE GEOLOGIC REPOSITORY OPERATIONS AREA

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 8.2 **PERFORMANCE CONFIRMATION FOR THE STRUCTURES, SYSTEMS, AND COMPONENTS OF THE GEOLOGIC REPOSITORY OPERATIONS AREA**

2. Lead Author & Phone No. W.J. Leonard (Placeholder) 702-794-1861

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section will describe the performance confirmation program, conducted on the Geologic Repository Operations Area (GROA) post-closure natural and engineered structures, systems, and components. It is applicable to those structures, systems, and components classified "important to isolation."

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: The performance confirmation program applicable to GROA post-closure natural and engineered structures, systems, and components classified "important to isolation" is described in the following sub-sections.]

7. Main Body Outline:

   8.2.1 Surface Facilities

   - Specific performance confirmation program for surface facilities is not needed
   - Performance confirmation program for other parts of the program which could affect surface facilities design

7. Main Body Outline (Continued)

8.2.2 Shafts and Ramps

- Description of performance confirmation testing for shafts and ramps through all phases of planning and implementation (see Table 8.2A)

  Phase 1 - Collection of baseline data for the penetrated strata and the shaft and ramp engineered components

  Phase 2 - Initial performance assessments for the shaft and ramp

  Phase 3 - Revision of performance confirmation plans based on data selected during construction

  Phase 4 - Revision of performance confirmation plans based on data collected during subsequent operations

  Phase 5 - Full-scale testing to evaluate the effectiveness of seals, grout, plugs, and backfill and to evaluate the effectiveness of drainage

  Phase 6 - Performance assessments supporting permanent closure.

- Description and discussion of computer codes used for performance confirmation, including those used in assessment of interaction effects of the thermal load on the liners, scale, and backfill.
- Description of the facilities where performance confirmation testing is accomplished.
- Description of the component in which testing is conducted and parameters measured.
- Durations of the tests.
- Description of nuclear material use, if any.

8.2.3 Underground Facility

- Description of performance confirmation testing for the underground facility (see Table 8.2B)

  Phase 1 - Collection of baseline data for the host rock and engineered components

  Phase 2 - Initial performance assessments for the underground facility

7. Main Body Outline (Continued)

Phase 3 - Revision of performance confirmation plans based on data collected during construction

Phase 4 - Revision of performance confirmation plans based on data collected during subsequent operation

Phase 5 - Full-scale testing to evaluate the effectiveness of employment area seals, grouts, plugs, and backfill

Phase 6 - Performance assessments supporting permanent closure

- Description and discussion of component codes used for performance confirmation, including those used in assessment of interaction effects of the thermal load on the liners, seals, and backfill. Validation of codes and models.
- Description of the facilities where performance confirmation testing is accomplished.
- Description of the component in which testing is conducted and parameters measured.
- Duration and sequencing of tests.
- Description of nuclear material used, if any.

8. Conclusion:

[A statement similar to the following should be made in a potential license application: The performance confirmation program applies to GROA post-closure natural and engineered structures systems and components classified "important to isolation" and provides sufficient confidence that the requirements of 10 CFR 60.140, 141, and 142 are met or exceeded.]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: 8.2 PERFORMANCE CONFIRMATION FOR THE STRUCTURES, SYSTEMS, AND COMPONENTS OF THE GEOLOGIC REPOSITORY OPERATIONS AREA

Lead Author & Phone No. W.J. Leonard, (Placeholder)
702-794-1861

A. Table No. **8.2A**

Title: **Performance Confirmation Testing for Shafts and Ramps**

Content:

A table, spanning the period from site characterization to just prior to permanent closure, with column headings (horizontal) and information (vertical). The column headings are (from left to right):

PHASE/COMPONENT/PARAMETERS/TEST/CODE USED/
TEST FACILITY/DURATION/DISCUSSION

B. Table No. **8.2B**

Title: **Performance Confirmation Testing for the Underground Facility**

Content:

A table, spanning the period from site characterization to just prior to permanent closure, with column headings (horizontal) and information (vertical). The column headings are (from left to right):

PHASE/COMPONENT/PARAMETERS/TEST/CODE USED/
TEST FACILITY/DURATION/SEQUENCING/DISCUSSION

Date: 9/30/92

Section No. & Title: 8.2 **PERFORMANCE CONFIRMATION FOR THE STRUCTURES, SYSTEMS, AND COMPONENTS OF THE GEOLOGIC REPOSITORY OPERATIONS AREA**

Lead Author & Phone No. W.J. Leonard (Placeholder)
702-794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer' Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Title 10, Code of Federal Regulations, Part 60, Subpart F, 60.140 (U.S. Nuclear Regulatory Commission)

2. Title 10, Code of Federal Regulations, Part 60, Subpart F, 60.141 (U.S. Nuclear Regulatory Commission)

3. Title 10, Code of Federal Regulations, Part 60, Subpart F, 60.142 (U.S. Nuclear Regulatory Commission)

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **8.2 PERFORMANCE CONFIRMATION FOR THE STRUCTURES, SYSTEMS, AND COMPONENTS OF THE GEOLOGIC REPOSITORY OPERATIONS AREA**

3. Lead author & phone no: **W. J. Leonard (Placeholder) (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location:

6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: 8.2 PERFORMANCE CONFIRMATION FOR THE STRUCTURES, SYSTEMS, AND COMPONENTS OF THE GEOLOGIC REPOSITORY OPERATIONS AREA

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Marshall Weaver 702-794-1871

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

Section 8.3 Performance Confirmation for the Engineered Barrier System

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8.3 PERFORMANCE CRITERIA FOR THE ENGINEERED BARRIER SYSTEM

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 8.3 **PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM**

2. Lead Author & Phone No. Paul Childress 702-794-1824

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   [A statement similar to the following should be made in a potential license application: This section identifies potential mechanisms for the Engineered Barrier System (EBS) failure that are anticipated, analyzes the effects of such failures, presents the rationale for EBS performance, and outlines the series of confirmatory tests and monitoring required to provide regulatory and public confidence.]

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: Confirmation of performance for the EBS is required for anticipated processes and events.]

7. Main Body Outline:

8.3 INTRODUCTION

8.3.1 Waste Package Monitoring

8.3.1.1 Describe effects on waste form of overall performance confirmation program

8.3.1.2 Description of program to monitor representative in-situ waste pack

- Radiation
- Temperature
- Water

7. Main Body Outline (Continued)

- Package Integrity.

8.3.1.3 Description of program to monitor near-field environment

- Temperature
- Ground Water.

8.3.1.4 Waste Package Lab Test Program

- Component
- Prototype.

8.3.1.5 Duration of Post-Emplacement Monitoring Program

8.3.1.6 Demonstration of Compliance

- Review of expected environment
- Review of environmental assumptions for analysis
- Review of monitoring program to ensure consistency of environmental assumptions.

8.3.2 EBS/Waste Package Performance Objectives

8.3.2.1 Failure Mode and Effects Analysis

- List anticipated and unlikely scenarios
- List effects of each scenario.

8.3.2.2 Environmental Conditions for Confirmatory Tests and Analyses

- Document conditions and relate to scenarios in Section 8.3.2.1

8.3.2.3 Confirmatory Tests and Analysis

- Describe methodology
- Document tests and analyses.

8.3.2.4 EBS Performance Allocation

- Discuss role of each component in EBS to overall performance.

7. Main Body Outline (Continued)

8.3.2.5 EBS Performance Confirmation Results

- Discuss results of tests and analyses.

8. Conclusion:

TBD.

9. Support Authors & Their Assignments:

Paul McKie - Support
Marshall Weaver - Support
Tom Statton - Support

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: 8.3 **PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM**

Lead Author & Phone No. Paul Childress 702-794-1824

A. Figure No. 8.3A

Caption: **Engineered Barrier System**

Content:

Pictorial schematic of EBS components.

B. Figure No. 8.3B

Caption: **Waste Package**

Content:

Pictorial schematic of Waste Package components.

C. Figure No. 8.3C

Caption: **Engineered Barrier System Performance Sequence**

Content:

Flow chart of functions.

Section No. & Title: 8.3 PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM

Lead Author & Phone No. Paul Childress 702-794-1824

A. Figure No. 8.3D

Caption: **Engineered Barrier System Performance Versus Requirements**

Content:

Graph of radionuclide release versus time.

B. Table No. 8.3A

Title: **Waste Package In-Situ Monitoring Program**

Content:

C. Table No. 8.3B

Title: **Engineered Barrier System Environmental Monitoring Program**

Content:

Section No. & Title: 8.3 PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM

Lead Author & Phone No. Paul Childress 702-794-1824

A. Table No. 8.3C

Title: **Waste Package Testing Program**

Content:

B. Table No. 8.3D

Title: **Potential Mechanisms for Unacceptable Engineered Barrier System Performance**

Content:

C. Table No. 8.3E

Title: **Engineered Barrier System Performance Scenarios**

Content:

Section No. & Title: **8.3 PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM**

Lead Author & Phone No. Paul Childress 702-794-1824

A. Table No. **8.3F**

Title: **Engineered Barrier System Performance Analyses**

Content:

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **8.3 PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM**

Lead Author & Phone No.: Paul Childress 702-794-1824

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan, for guidance on formatting reference information.

1. Waste Acceptance Specifications
2. 10 CFR 60
3. EPA Regulations
4. Waste Form Compliance Plans
5. Waste Qualification Tests
6. Waste Package Test Reports
7. Site Characterization
8. Waste Form Test Reports
9. Performance Acceptance

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **8.3 PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM**

3. Lead author & phone no: **Paul Childress**

4. Information request date:

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Environmental Monitoring Techniques

7. What is the information needed for?

   Section 8.3.1.3.

8. What group is the probable information supplier?

   Woodward-Clyde and Morrison Knudsen - Lead TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    Unknown.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **8.3 PERFORMANCE CONFIRMATION FOR THE ENGINEERED BARRIER SYSTEM**

3. Lead author & phone no: **Paul Childress**
4. Information request date:

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   1) **Schematic of EBS components**
   2) **Schematic of Waste package components**
   3) **Flowchart of EBS function**
   4) **Comparison EBS modeled performance versus performance requirements. (Radionuclide release versus time)**
   5) **Listing of waste package ____ monitoring system, locations, data to be provided, etc.**
   6) **Listing of EBS Environmental Monitoring systems, location, data to be provided, etc.**
   7) **Listing of Waste package tests, types of tests, data to be provided.**

7. What is the information needed for?

   Section 8.3

8. What group is the probable information supplier?

   Performance Assessment group.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    YMP SCP

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **8.3 PERFORMANCE CONFIRMATION FOR ENGINEERED BARRIER SYSTEM**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Paul Childress

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

MGDS Annotated Outline

Section 8.4 Radiation Protection

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8.4 RADIATION PROTECTION

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **8.4 RADIATION PROTECTION**

2. Lead Author & Phone No. W.J. Leonard (Placeholder)
   702-794-1861

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section will describe the plans to monitor and control internal and external radiological exposure to workers and to members of the public that might result from tests and experiments conducted during the performance confirmation period.

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: This section provides a description of the measures established to safeguard workers and the public from radiation hazards during the performance confirmation period.]

7. Main Body Outline:

8.4 RADIATION PROTECTION

- Describe plans to monitor and control radiological exposure to workers and to members of the public that might result from tests and experiments conducted during the performance confirmation period.

- Internal exposure

  - Fixed facilities
  - Portable facilities
  - Equipment
  - Instrumentation.

7. Main Body Outline (Continued)

- External exposure
  - Fixed facilities
  - Portable facilities
  - Equipment
  - Instrumentation.
- Follow format of Section 4.1.4 for the GROA
- Provide the analysis required to show compliance of plans with established requirements
- 10 CFR 20
- Other generally applicable environmental standards for radioactivity as established by Environmental Protection Agency (EPA)
- Follow formats given in Section 4.2 for restricted areas and in Section 4.5.1 for unrestricted areas
- Discuss health physics program for aspects unique to the performance confirmation program, referencing Section 8.2 as necessary.

8. Conclusion:

[A statement similar to the following should be made in a potential license application: Adequate measures have been established to assure that workers and the public are safeguarded from radiation hazards during the construction period.]

9. Support Authors & Their Assignments:

Mark Fortsch, logical lead author

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **8.4 RADIATION PROTECTION**

Lead Author & Phone No. W.J. Leonard (Placeholder)
702-794-1861

A. Figure/Table No.

Caption/Title:

Content:

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **8.4 RADIATION PROTECTION**

Lead Author & Phone No.:

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan, for guidance on formatting reference information.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **8.4 RADIATION PROTECTION**
3. Lead author & phone no: **W. J. Leonard (Placeholder) (702) 794-1861**
4. Information request date:
5. Work location:
6. Type of information needed:
7. What is the information needed for?
8. What group is the probable information supplier?
9. When is the information needed?
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **8.4 RADIATION PROTECTION**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): W.J. Leonard 702-794-1861

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

Section 8.5 Analysis of Changes from Performance Confirmation Baseline

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8.5 ANALYSIS OF CHANGES FROM PERFORMANCE CONFIRMATION BASELINE

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date 9/30/92

1. Section No. & Title: **8.5 ANALYSIS OF CHANGES FROM PERFORMANCE CONFIRMATION BASELINE**

2. Lead Author & Phone No. W.J. Leonard (Placeholder)
   702-794-1861

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section will describe the plan for monitoring and analyzing changes from the baseline condition of parameters that could affect the performance of the geologic repository. It will include a specific discussion of the process for feedback, analysis of data, and implementation of appropriate action.

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: Changes from the baseline condition of parameters that could affect the performance of the repository are monitored and analyzed. Appropriate action determined to be necessary is implemented.]

7. Main Body Outline:

   - Monitoring system (See Table 8.5A)
   - Data feedback
   - Data analysis
   - Determination of appropriate action, based on results of analysis
   - Implementation of appropriate action

     - Immediate action
     - Delayed action.

8. Conclusion:

[A statement similar to the following should be made in a potential license application: Through monitoring of changes from the baseline condition of parameters that could affect the performance of the repository, and through analysis of such changes, followed by appropriate action, acceptably safe performance of the repository can be assured regarding safety of the public and workers and preservation of the environment.]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **8.5 ANALYSIS OF CHANGES FROM PERFORMANCE CONFIRMATION BASELINE**

Lead Author & Phone No. W.J. Leonard, (Placeholder)
702-794-1861

A. Table No. **8.5A**

Title: **Monitoring System**

Content:

PERFORMANCE CONFIRMATION BASELINE PARAMETER	METHOD OF MONITORING
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **8.5 ANALYSIS OF CHANGES FROM PERFORMANCE CONFIRMATION BASELINE**

Lead Author & Phone No. W.J. Leonard (Placeholder) 702-794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer' Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **8.5 ANALYSIS OF CHANGES FROM PERFORMANCE CONFIRMATION BASELINE**

3. Lead author & phone no: **W. J. Leonard (Placeholder) (702) 794-1861**

4. Information request date:

5. Work location:

6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: 8.5 ANALYSIS OF CHANGES FROM PERFORMANCE CONFIRMATION BASELINE

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester):

   Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

Section 8.6 Unresolved Safety Questions

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8.6 UNRESOLVED SAFETY QUESTIONS

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **8.6 UNRESOLVED SAFETY QUESTIONS**

2. Lead Author & Phone No. W.J. Leonard (Placeholder)
   702-794-1861

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section will identify all unresolved safety questions and will provide a schedule indicating when they will be resolved.

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: The following is a description of all unresolved safety questions. Each question is identified, explained concerning scope, depth, and specifics of the question. A schedule for resolution is provided.]

7. Main Body Outline: (See attached Table 8.6A).

   - Unresolved Safety Questions (Ranked by level of severity)-See Table 8.6B

     - Questions (first and subsequent questions repeat outline sequence)
     - Background
     - Discussion

       -- Scope, depth
       -- Status (partial resolution accomplished, etc.)

     - Schedule for resolution.

8. Conclusion:

[A statement similar to the following should be made in a potential license application: All unresolved safety questions will be resolved in accordance with the resolution schedule contained herein. The repository performance will be expected to be within acceptable safety parameters upon completion of these resolutions.]

9. Support Authors & Their Assignments:

Section No. & Title: **8.6 UNRESOLVED SAFETY QUESTIONS**

Lead Author & Phone No. W.J. Leonard, (Placeholder)
702-794-1861

A. Table No. **8.6A**

Title: **Unresolved Safety Questions**

Content:

SAFETY QUESTION	LEVEL OF SEVERITY	STATUS	SCHEDULED RESOLUTION BY
1. 2. 3. 4.	I I II III		June 30, 2004

B. Table No. **8.6B**

Title: **Levels of Severity for Unresolved Safety Questions**

Content:

LEVEL	DEFINITION
I II III	A safety question, which if not resolved could result in...

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **8.6 UNRESOLVED SAFETY QUESTIONS**

Lead Author & Phone No. W.J. Leonard (Placeholder)
702-794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1.

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MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **8.6 UNRESOLVED SAFETY QUESTIONS**
3. Lead author & phone no: **W.J. Leonard (Placeholder) 703-794-1861**
4. Information request date:
5. Work location:
6. Type of information needed:
7. What is the information needed for?
8. What group is the probable information supplier?
9. When is the information needed?
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **8.6 UNRESOLVED SAFETY QUESTIONS**

2. Person Supplying Information: W.J. Leonard (Placeholder)
   703-794-1861

3. Phone No.:

4. Lead Author (Requester):

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log No. on this form should be identical to the Log No. of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received

Chapter 9.0 Land Ownership and Control

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9.0 LAND OWNERSHIP AND CONTROL

[This chapter will describe the interests in real property that have been or will be obtained by the Department of Energy (DOE) to demonstrate compliance with the regulatory requirements of 10 CFR 60. The descriptions of the specific interests will be detailed in Sections 9.1 and 9.2, and compliance with 10 CFR 60 will be explicitly detailed in Section 9.3. This chapter discusses whether DOE now has, or will have, sufficient and appropriate interests in real property to be in compliance with 10 CFR 60.]

The provisions of 10 CFR 60.121 (a) require that "(1) both the Geologic Repository Operations Area (GROA) and the controlled area shall be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use." These provisions further require, under (2) that "these lands shall be held free and clear of all encumbrances, if significant, such as: (i) rights arising under the general mining laws; (ii) easements for right-of-way; and (iii) all other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise." 10CFR60.121 (b) requires that "appropriate controls shall be established outside of the controlled area. DOE shall exercise any jurisdiction and control over surface and subsurface estates necessary to prevent adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation." 10CFR60.121 (c) requires that (1) DOE shall also have obtained such water rights as may be needed to accomplish the purpose of the geologic repository operations area." It is also specified that "(2) water rights are included in the additional controls to be established under 10 CFR 60.121(b)."

The parameters of the controlled area are defined in 40 CFR 191 and are based on information about the subsurface. [Utilizing the outline of the proposed repository site, the information gathering process of the land ownership program will occurr in three phases. The first phase will define the boundaries of the parcel for which the DOE must obtain control and seek withdrawal. Inherent in this phase is applying the information gained during site characterization that would influence the boundaries at the controlled area and accessible environment. The second phase will be to ascertain the status of any pre-existing outside rights with respect to the land at the site. Investigations to date have identified no such rights (e.g., mineral, grazing, or water rights) at or in the vicinity of Yucca Mountain. The third phase will involve the actual process by which information was obtained for purposes of supporting a withdrawal application as set forth in the Federal Land Management Policy Act (FLMPA) and implementing Bureau of Land Management (BLM) regulations.]

As established in the environmental assessment for the Yucca Mountain site (DOE, 1986), the land area of interest to the DOE for the GROA and controlled area is entirely on Federal lands controlled by three Federal agencies. These lands include the Nellis Air Force Range (NAFR) controlled by the U. S. Department of the Air Force (DAF), the Nevada Test Site (NTS) controlled by the DOE, and public lands controlled by the U. S. Department of the Interior (DOI), BLM. The Military Lands Withdrawal Act of 1986 (Public Law 99-606; MLWA, 1986) withdrew the 2.9 million acre NAFR for defense-related use by the DAF. Management of these lands remains the responsibility of the BLM.

The ownership and control status of the land area of interest is important to the DOE for a variety of reasons. These include the land management plans and agreements, and the public domain status of the BLM controlled lands. The DOE will monitor not only actions taken by the BLM or DAF with regard to the land areas of interest to the DOE, but also the current or proposed laws and regulations that may impact land ownership and control, or the rights to access such lands.

Pursuant to 10 CFR 60.121, it is necessary for the DOE to withdraw the land that would comprise the repository operations area and controlled area and reserve this land for its use. Such a withdrawal action, under current law, must be made pursuant to applicable implementing regulations. To initiate a withdrawal action, FLMPA and the implementing regulations define the data and information required to be provided at the time of application to Congress to support the review of the application. [Much of the required data and information will be collected as part of the site characterization activities and other programmatic activities conducted by the DOE. The programmatic activities include the repository land withdrawal and control process and the environmental program effort for the Yucca Mountain site. To ensure proper acquisition and documentation of the data and information relevant and necessary to support withdrawal action, site characterization activities will be reviewed and withdrawal information and documentation requirements will be conducted in parallel with the site characterization program.

REFERENCES

9.0-A Rautman, C.A., Whittet, B.C., and South, D.L., Definitions of Reference Boundaries for the Proposed Geologic Repository at Yucca Mountain, Nevada, SAND86-2157, 1987

9.0-B Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

9.0-C Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

9.0-D United States Department of Energy, "Site Characterization Program Baseline," Revision 1, March, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

9.0-E United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **9.0 LAND OWNERSHIP AND CONTROL**

2. Lead Author & Phone No. Bill Leonard
(702) 794-1861

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

[A statement similar to the following should be made in a potential license application: This chapter describes the interests in real property that have been, or will be, obtained by DOE to demonstrate compliance with the regulatory requirements of 10 CFR 60.]

6. Opening Statement:

[A statement similar to the following should be made in a potential license application: This chapter describes the interests in real property that have been or will be obtained by DOE to demonstrate compliance with the regulatory requirements of 10 CFR 60. The descriptions of the specific interests are detailed in Sections 9.1 and 9.2, and compliance with 10 CFR 60 is explicitly detailed in Section 9.3. This chapter demonstrates that DOE now has, or will have, sufficient and appropriate interests in real property to be in compliance with 10 CFR 60.]

7. Main Body Outline:

- Description of interests - Reference 9.1, 9.2
- Compliance with 10CFR60 - Detail explicitly in 9.3

8. Conclusion:

[A statement similar to the following should be made in a potential license application: DOE now has, or will have, sufficient interest in real property to be in compliance with 10 CFR 60.]

9. Support Authors & Their Assignments:

None yet assigned

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **9.0 LAND OWNERSHIP AND CONTROL**

Lead Author & Phone No. Bill Leonard
(702) 794-1861

A. Figure/Table No. None at this time.

Caption/Title:

Content:

B. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **9.0 LAND OWNERSHIP AND CONTROL**

Lead Author & Phone No.: Bill Leonard
(702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Rautman, C.A., Whittet, B.C., and South, D.L., Definitions of Reference Boundaries for the Proposed Geologic Repository at Yucca Mountain, Nevada, SAND86-2157, 1987

2. Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

3. Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

4. United States Department of Energy, "Site Characterization Program Baseline," Revision 2, October, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

5. United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **9.0 LAND OWNERSHIP AND CONTROL**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **2/21/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed:
7. What is the information needed for?
8. What group is the probable information supplier?
9. When is the information needed?
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **9.0 LAND OWNERSHIP AND CONTROL**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): W. J. Leonard (702) 794-1861

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Oultine Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 9.1 Plans for Restricting Controlled Area Access

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9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS

This section identifies the controlled area, the existing legal interests, legal interests to be obtained, and water rights. The Physical Security Plan, published separately as Section 1.5 of the License Application, provides information on the methods to be used for controlling access at the site.

9.1.1 Identification of Controlled Area

The controlled area, as specified in 40 CFR 191.12 (g) (EPA, 1987), is a surface location (and the underground area beneath that location) that encompasses no more than 100 square kilometers (38.6 square miles) and extends horizontally no more than 5 kilometers (3.1 miles) in any direction from the outer boundary of the original location of the emplaced radioactive wastes in a repository.

The planned area enclosed by a 5 km boundary from the proposed repository area is larger than 100 square kilometers because it was based on waste isolation considerations. [The location of the controlled area will be chosen to provide maximum possible isolation of the waste in the event of subsurface releases from waste packages and to ensure maximum permanence of the "passive institutional controls" referred to in 40 CFR 191.12. (Reference 9.1A).] According to Rautman, et al, the water table slopes to the southeast, and the ground water flow that might carry released radioactivity toward the accessible environment will most likely be in a southerly

to easterly direction. Therefore, the controlled area boundary to the southeast would be the maximum distance, i.e., 5 kilometers. The northeastern and northwestern boundaries of the controlled area would be chosen to follow topographic high ground, where permanent markers would be more stable, anchored in relatively flat bedrock areas, than if situated in alluvial fill, which typically occurs in topographically low areas. Loose rock debris on steep slopes and the potential for landslides from steep bedrock areas makes these areas undesirable for the location of monuments. Also, markers on high ground should be more readily visible at a distance than markers in valley areas, thus accentuating the intended purpose of calling attention to the boundaries of the site. [The resultant boundary, which encloses an area of about 88.93 square kilometers or 21975.4 acres, will be illustrated in Figure 9.1A.] It is planned, therefore, that the proposed boundary between the controlled area and the accessible environment will be permanently marked with monuments, based on the topography, saturated zone flow directions, and maximum extent of the controlled boundary area, and will be documented. Marking and documentation will be as specified in 10 CFR 60.51, 60.102, and 40 CFR 191.14.

The limits of the controlled area define the beginning of the accessible environment and become the benchmark location at which releases of radioactivity following permanent closure of the repository must meet the regulatory limits established by the EPA in 40 CFR 191.13. [The controlled area boundary identifies the location from which the integrated releases of radionuclides for a period of 10,000 years after closure will be calculated in order to determine compliance with 40 CFR 191.13, and establishes a minimum region that must be protected from the conduct of incompatible activities for 100 years. The restricted

area refers to the area controlled by the licensee for purposes of protecting individuals from exposure to radiation and radioactive materials during preclosure activities, as defined by 10 CFR 60.2 since this restricted area may include accidental releases, as well as shipping and handling exposures to radiation. The restricted area is chosen to be identical to the controlled area.

9.1.1.1 Legal Description of Controlled Area, Stating Nevada State Coordinate System Limits and Area

The controlled area is situated at the junction of lands under three jurisdictions: the DOE's Nevada Test Site (NTS), the Department of Defense's Nellis Air Force Range, and the Department of Interior's (DOI) Bureau of Land Management (BLM) land. It is centered approximately at Township 12 South, Range 49 East, Mount Diablo Meridian, Nevada.

The controlled area boundary extends from approximately E550000 to E581600 on an East-West axis and from about N783500 to N740800 on a north-south axis (Nevada State Coordinate System). The controlled area is approximately _____ square miles or _____ acres.

9.1.1.2 Relevant Features Within and Outside the Controlled Area

The relevant features within and outside the controlled area consist of the natural systems of the geologic setting, the physical facilities of the geologic repository operations area, and the

engineered barrier systems. [These features will be discussed in Chapters 3, 4, and 5, respectively. Figure 9.1B will show the limits of the underground facility.]

9.1.1.3 Description of Limits of the Underground Facility and Maximum Horizontal Distance to Boundary of the Controlled Area

[The map location of the design repository, defined by the perimeter drift, will be shown in Figure 9.1A.] The design area of the repository is _____ square kilometers or _____ acres.

9.1.2 Identification of Existing Legal Interests

The DOE has jurisdiction over the NTS. Access permits have been obtained from the DOI, BLM, and the DOD's Nellis Air Force Range, for site characterization activities in specified locations within candidate site areas under their jurisdiction. Repository activities other than those specifically defined under site characterization activities have been explicitly excluded, however.

9.1.2.1 Existing Present Surface Interests of Record in Lands Within the Controlled Area

The existing present surface interests of record in lands within the controlled area are limited to the part of the controlled area within the NTS (DOE jurisdiction).

9.1.2.1.1 Rights Arising Under the General Mining Laws

Specific rights under the general mining laws are as follows: WJL-1.

9.1.2.1.2 Easements for Right-of-Way

Specific easements for right-of-way are as follows: WJL-2

9.1.2.1.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

Other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise are as follows: WJL-3

9.1.2.2 Existing Future Surface Interests of Record in Lands Within the Controlled Area

Existing future surface interests of record in lands within the controlled area are as follows:

9.1.2.2.1 Rights Arising Under the General Mining Laws

Rights arising under the general mining laws are as follows: WJL-4

9.1.2.2.2 Easements for Right-of-Way

Easements for right-of-way are as follows: **WJL-5**

9.1.2.2.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise are as follows: **WJL-6**

9.1.2.3 Existing Present Subsurface Interests of Record in Lands Within the Controlled Area

Existing present subsurface interests of record in lands within the controlled area are as follows:

9.1.2.3.1 Rights Arising Under the General Mining Laws

Rights arising under the general mining laws are as follows: **WJL-7**

9.1.2.3.2 Easements for Right-of-Way

Easements for right-of-way are as follows: **WJL-8**

9.1.2.3.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise are as follows: **WJL-9**

9.1.2.4 Existing Future Subsurface Interests of Record in Lands Within the Controlled Area

Existing present subsurface interests of record in lands within the controlled area are as follows:

9.1.2.4.1 Rights Arising Under the General Mining Laws

Rights arising under the general mining laws are as follows: **WJL-10**

9.1.2.4.2 Easements for Right-of-Way

Easements for right-of-way are as follows: **WJL-11**

9.1.2.4.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise are as follows: **WJL-12**

9.1.2.5 Acquired Lands Within the Controlled Area that are Under the Jurisdiction and Control of DOE

Acquired lands within the controlled area that are under the jurisdiction and control of DOE are as follows: **WJL-13**

9.1.2.6 Lands Within the Controlled Area that have been Permanently Withdrawn and Reserved for DOE Use

Lands within the controlled area that have been permanently withdrawn and reserved for DOE use are as follows: **WJL-14**

9.1.3 IDENTIFICATION OF LEGAL INTERESTS TO BE OBTAINED (See Figure 9.1C, WJL-69)

9.1.3.1 Legal Authority

The following legal authority pertains to identification of legal interests to be obtained within the controlled area:

9.1.3.1.1 Statutes

The following statutes pertain to identification of legal interests to be obtained: **WJL-15**

9.1.3.1.2 Judicial Decisions

The following judicial decisions pertain to identification of legal interests to be obtained within the controlled area. **WJL-16**

9.1.3.2 Encumbrances That DOE Proposes Not to Acquire

The following explanation pertains to encumbrances that DOE proposes not to acquire:

9.1.3.2.1 Identification

The following identifies the legal interests that DOE proposes not to acquire:

WJL-17

9.1.3.2.2 Why They are Not Significant to Achievement of the Purpose of 10 CFR 60

The following represents the rationale for identifying encumbrances that DOE proposes not to acquire, or are insignificant to achieving the purpose of 10 CFR 60: **WJL-18**

9.1.3.3 Identification of Relevant Legal Records and Their Locations (See Table 9.1A WJL-68)

Identification of relevant legal records and their locations is as follows: **WJL-19**

9.1.4 Water Rights Within the Controlled Area

Water rights within the controlled area are as follows: **WJL-20**

9.1.4.1 Identification of Water Rights Needed to Accomplish the Purpose of the Geologic Repository Operating Area (GROA)

The identification of water rights needed to accomplish the purpose of the geologic repository operating area is as follows: **WJL-21**

9.1.4.1.1 Water for Personnel Needs

Water for personnel needs consists of the following: **WJL-22**

9.1.4.1.2 Water for Equipment Needs

Water for equipment needs consists of the following: **WJL-23**

9.1.4.1.3 Fire Protection Water

Water needed for fire protection is as follows: **WJL-24**

9.1.4.2 Quantitative Information by Water Category

The following is pertinent quantitative information by water category: **WJL-25**

9.1.4.3 Qualitative Information by Water Category

The following is pertinent qualitative information by water category: **WJL-26**

Table 9.1A. Relevant Legal Records and Their Locations

Relevant Legal Record (Title)	Location

Map of controlled area and outside of controlled area, extending two miles beyond controlled area boundary. Map must show the area of the controlled area stated both in terms of acres and square kilometers.

Figure 9.1A Relevant Features Within the Controlled Area and Outside the Controlled Area

An illustration showing the location of the repository within the controlled area and the horizontal distance from the repository to the boundary of the controlled area at the nearest point and at other selected points, showing its situation within the controlled area.

Figure 9.1B Limits of the Underground Facility

Map showing:

1. Existing legal interests defined in Section 9.1.2
2. Legal interests to be obtained, as defined in Section 9.1.3
3. Water rights (legal interests), as defined in Sections 9.1.2, 9.1.3, and 9.1.4

Note: May require more than one figure to show legal interests.

Figure 9.1C. Existing Legal Interests to be Obtained

REFERENCES

9.1A Rautman, C.A., Whittet, B.C., and South, D.L., Definitions of Reference Boundaries for the Proposed Geologic Repository at Yucca Mountain, Nevada, SAND86-2157, 1987

9.1B Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

9.1C Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

9.1D United States Department of Energy, "Site Characterization Program Baseline," Revision 1, March, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

9.1E United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS

2. Lead Author & Phone No. Bill Leonard
(702) 794-1861

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

This section identifies the controlled area, the existing legal interests, legal interests to be obtained, and water and mining rights. The Physical Security Plan, published separately as Section 1.5 of the license application, provides information on the means to be used for controlling access to the site.

6. Opening Statement:

[A statement similar to the following should be made in a potential license application: All legal interests in real property and water and mining rights within the controlled area which are necessary for development of the geologic repository have either been obtained by DOE or will be obtained.]

7. Main Body Outline:

9.1.1 Identification of Controlled Area

9.1.1.1 Legal Description of Controlled Area, Stating Nevada State Coordinate System Limits and Area

9.1.1.2 Relevant Features Within and Outside the Controlled Area

9.1.1.3 Description of Limits of the Underground Facility and Maximum Horizontal Distance to Boundary of the Controlled Area

7. Main Body Outline (Continued):

9.1.2 Identification of Existing Legal Interests

9.1.2.1 Existing Present Surface Interests of Record in Lands Within the Controlled Area

9.1.2.1.1 Rights Arising Under the General Mining Laws
9.1.2.1.2 Easements for Right-of-way
9.1.2.1.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription or Otherwise

9.1.2.2 Existing Future Surface Interests of Record in Lands Within the Controlled Area

9.1.2.2.1 Rights Arising Under the General Mining Laws
9.1.2.2.2 Easements for Right-of-way
9.1.2.2.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription or Otherwise

9.1.2.3 Existing Present Subsurface Interests of Record in Lands Within the Controlled Area

9.1.2.3.1 Rights Arising Under the General Mining Laws
9.1.2.3.2 Easements for Right-of-way
9.1.2.3.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription or Otherwise

9.1.2.4 Existing Future Subsurface Interests of Record in Lands Within the Controlled Area

9.1.2.4.1 Rights Arising Under the General Mining Laws
9.1.2.4.2 Easements for Right-of-way
9.1.2.4.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

9.1.2.5 Acquired Lands within the Controlled Area that are under the Jurisdiction and Control of DOE

7. Main Body Outline (Continued):

9.1.2.6 Lands Within the Controlled Area that have been permanently withdrawn and reserved for DOE use

9.1.3 Identification of Legal Interests to be Obtained

9.1.3.1 Legal Authority

9.1.3.1.1 Statutes
9.1.3.1.2 Judicial decisions

9.1.3.2 Encumbrances that DOE proposes not to acquire

9.1.3.2.1 Identification
9.1.3.2.2 Why They are not Significant to Achievement of the Purpose of 10 CFR 60

9.1.3.3 Identification of Relevant Legal Records and Their Locations (See Table 9.1A)

9.1.4 Water Rights within the Controlled Area

9.1.4.1 Identification of Water Rights Needed to Accomplish the Purpose of the Geologic Repository Operating Area (GROA)

9.1.4.1.1 Water for Personnel Needs
9.1.4.1.2 Water for Equipment Needs
9.1.4.1.3 Fire Protection Water

9.1.4.2 Quantitative Information by Water Category

9.1.4.3 Qualitative Information by Water Category

8. Conclusion:

[A statement similar to the following should be made in a potential license application: This section demonstrates that adequate provisions have been made or have been planned for the acquisition of surface, subsurface, water, and mining rights needed for the controlled area.]

9. Support Authors & Their Assignments:

None yet assigned.

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: 9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS

Lead Author & Phone No. Bill Leonard
(702) 794-1861

A. Figure No. **9.1A**

Caption: **Relevant Features Within the Controlled Area and Outside the Controlled Area**

Content:

Map of controlled area and outside of controlled area, extending two miles beyond controlled area boundary. Map must show the area of the controlled area stated both in terms of acres and square kilometers.

B. Figure No. **9.1B**

Caption: **Limits of the Underground Facility**

Content:

An illustration showing the location of the repository within the controlled area and the horizontal distance from the repository to the boundary of the controlled area at the nearest point and at other selected points, showing its situation within the controlled area.

C. Figure No. **9.1C**

Caption: **Existing Legal Interests to be Obtained [WJL-69]**

Content:

Map showing:

1. Existing legal interests defined in Section 9.1.2
2. Legal interest to be obtained, as defined in Section 9.1.3
3. Water rights (legal interests), as defined in Sections 9.1.2, 9.1.3, and 9.1.4

Note: May require more than one figure to show legal interests.

Section No. & Title: 9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS

Lead Author & Phone No. Bill Leonard
(702) 794-1861

A. Table No. 9.1A

Title: **Relevant Legal Records and Their Locations [WJL-68]**

Content:

Relevant Legal Record (Title)	Location

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

Lead Author & Phone No.: Bill Leonard
(702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Rautman, C.A., Whittet, B.C., and South, D.L., Definitions of Reference Boundaries for the Proposed Geologic Repository at Yucca Mountain, Nevada, SAND86-2157, 1987

2. Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

3. Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

4. United States Department of Energy, "Site Characterization Program Baseline," Revision 2, October, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

5. United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-1**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing present surface interests of record consisting of rights arising under the general mining laws within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.2.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

The above Annotated Outline text is guidance that may be used for the future development of an MODS License Application.

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-2**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing present surface interests of record consisting of easements for right-of-way within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.2.1.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-3**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing present surface interests of record consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise within the controlled area. (Other than rights under the general mining laws and easements for right-of-way).

7. What is the information needed for?

   SAR Section 9.1.2.1.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-4**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing future surface interests of record consisting of rights arising under the general mining laws within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.2.2.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-5**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing future surface interests of record consisting of easements for right-of-way within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.2.2.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-6**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing future surface interests of record consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise within the controlled area (other than rights under the general mining laws and easements for right-of-way).

7. What is the information needed for?

   SAR Section 9.1.2.2.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-7**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing present subsurface interests of record consisting of rights arising under the general mining laws within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.2.3.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-8**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing present subsurface interests of record consisting of easement for right-of-way within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.2.3.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-9**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing present subsurface interests of record consisting of all rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise within the controlled area (other than rights under the general mining laws and easements for right-of-way).

7. What is the information needed for?

   SAR Section 9.1.2.3.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-10**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing future subsurface interests of record consisting of rights arising under the general mining laws within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.2.4.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-11**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing future subsurface interests of record consisting of easement for right-of-way within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.2.4.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-12**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of existing future subsurface interests of record consisting of all rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise within the controlled area (other than rights under the general mining laws and easements for right-of-way).

7. What is the information needed for?

   SAR Section 9.1.2.4.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-13**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of acquired lands within the controlled area that are under the jurisdiction and control of DOE.

7. What is the information needed for?

   SAR Section 9.1.2.5.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-14**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of lands within the controlled area that have been permanently withdrawn and reserved for DOE use.

7. What is the information needed for?

   SAR Section 9.1.2.5.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-15**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of statutes that pertain to identification of legal interest to be obtained within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.3.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-16**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Description of judicial decisions that pertain to identification of legal interests to be obtained within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.3.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-17**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of encumbrances that DOE proposes not to acquire within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.3.2.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-18**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Explanation of why identified encumbrances that DOE proposes not to acquire within the controlled area are not significant to achievement of the purpose of 10 CFR 60.

7. What is the information needed for?

   SAR Section 9.1.3.2.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-19**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of relevant legal records pertaining to rights within the controlled area and their locations.

7. What is the information needed for?

   SAR Section 9.1.3.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-20**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights within the controlled area.

7. What is the information needed for?

   SAR Section 9.1.4.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-21**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights needed to accomplish the purpose of the Geologic Repository Operating Area (GROA).

7. What is the information needed for?

   SAR Section 9.1.4.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-22**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights needed to assure an adequate amount for personnel needs within the Geologic Repository Operating Area (GROA).

7. What is the information needed for?

   SAR Section 9.1.4.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-23**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights needed to assure an adequate amount for equipment needs within the Geologic Repository Operating Area (GROA).

7. What is the information needed for?

   SAR Section 9.1.4.1.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-24**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights needed to assure an adequate amount for fire protection within the Geologic Repository Operating Area (GROA).

7. What is the information needed for?

   SAR Section 9.1.4.1.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-25**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Pertinent quantative information by water category regarding water needed within the Geologic Repository Operating Area (GROA).

7. What is the information needed for?

   SAR Section 9.1.4.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-26**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Pertinent qualitative information by water category regarding water needed within the Geologic Repository Operating Area (GROA).

7. What is the information needed for?

   SAR Section 9.1.4.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-68**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Table 9.1A (suggested caption: Relevant Legal Records and Their Locations) listing relevant records concerning controlled area real property legal interests and their locations.

7. What is the information needed for?

   SAR Section 9.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

The above Annotated Outline text is guidance that may be used for the future development of an MODS License Application.

MODS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-69**

2. Section no. & title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Table 9.1C, a map, (suggested caption: Existing Legal Interest to be Obtained), showing 1. existing legal interests defined in 9.1.2; 2. legal interests to be obtained, as defined in 9.1.3; and 3. water rights (legal interests), as defined in 9.1.2, 9.1.3, and 9.1.4 -- Note: May require more than one figure to show legal interests.

7. What is the information needed for?

   SAR Section 9.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **9.1 PLANS FOR RESTRICTING CONTROLLED AREA ACCESS**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Bill Leonard (702) 794-1861

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Oultine Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 9.2 Plans for Regulating Land Use Outside the Controlled Area

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9.2 INTRODUCTION

This section identifies the areas of concern adjacent to the controlled area, the existing present and future legal interests, and the legal interests to be obtained and discusses whether the repository project is in compliance with 10 CFR 60.121.

9.2.1 Identification of Adjacent Areas of Concern

(See Figure 9.2A).

9.2.1.1 Legal Description of Areas of Concern (Outside the Controlled Area), Stating Nevada State Coordinate System Limits and Area

The legal description of areas of concern (outside the controlled area) are as follows: WJL-27

9.2.1.2 Human Actions (Outside the Controlled Area) Considered to Have the Potential to Affect the Geologic Repository

Human actions (outside the controlled area) considered to have the potential to affect the geologic repository are: WJL-28

9.2.2 Identification of Existing Legal Interests

Map showing areas, outside the controlled area, within which DOE must exercise jurisdiction and control of surface and subsurface estates so as to prevent adverse human actions that could significantly reduce the geologic repository's capability for isolation. Map to show relevant features. **WJL-70**

9.2.2.1 Existing Present Surface Interests of Record in Lands Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.2.1.1 Rights Arising Under the General Mining Laws

Existing present surface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of rights arising under the general mining laws are as follows: **WJL-29**

9.2.2.1.2 Easements for Right-of-Way

Existing present surface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of easements for right-of-way are: **WJL-30**

9.2.2.1.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

Existing present surface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise (excluding rights arising under the general mining laws and easements for right-of-way) are as follows: WJL-31

9.2.2.2 Existing Future Surface Interests of Record in Lands Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.2.1 Rights Arising Under the General Mining Laws

Existing future surface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of rights arising under the general mining laws are as follows: WJL-32

9.2.2.2.2 Easements for Right-of-Way

Existing future surface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of easements for right-of-way are as follows: WJL-33

9.2.2.2.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

Existing future surface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise (excluding rights arising under the general mining laws and easements for right-of-way) are as follows: WJL-34

9.2.2.3 Existing Present Subsurface Interests of Record Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.3.1 Rights Arising Under the General Mining Laws

Existing present subsurface interests of record within the adjacent areas of concern (outside the controlled area) consisting of rights arising under the general mining laws are as follows: WJL-35

9.2.2.3.2 Easements for Right-of-Way

Existing present subsurface interests of record within the adjacent areas of concern (outside the controlled area) consisting of easements for right-of-way are as follows: WJL-36

9.2.2.3.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

Existing present subsurface interests of record within the adjacent areas of concern (outside the controlled area) consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise (excluding rights arising under the general mining laws and easements for right-of-way) are as follows: WJL-37

9.2.2.4 Existing Future Subsurface Interests of Record in Lands Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.4.1 Rights Arising Under the General Mining Laws

Existing future subsurface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of rights arising under the general mining laws are as follows: WJL-38

9.2.2.4.2 Easements for Right-of-Way

Existing future subsurface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of easements for right-of-way are as follows: WJL-39

9.2.2.4.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

Existing future subsurface interests of record in lands within the adjacent areas of concern (outside the controlled area) consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise (except for rights arising under the general mining laws and easements for right-of-way) are as follows: **WJL-40**

9.2.2.5 Water Rights Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.5.1 Identification of Existing Water Rights

9.2.2.5.1.1 Water for Personnel Needs

Water rights for personnel needs within the adjacent areas of concern (outside the controlled area) are identified as follows: **WJL-41**

9.2.2.5.1.2 Water for Equipment Needs

Water rights for equipment needs within the adjacent areas of concern (outside the controlled area) are identified as follows: **WJL-42**

9.2.2.5.1.3 Fire Protection Water

Water rights for fire protection needs within the adjacent areas of concern (outside the controlled area) are identified as follows: WJL-43

9.2.2.5.2 Quantitative Information by Water Category

Quantitative information by water category regarding water rights within the adjacent areas of concern (outside the controlled area) are identified as follows: WJL-44

9.2.2.5.3 Qualitative Information by Water Category

Qualitative information by water category regarding water rights within the adjacent areas of concern (outside the controlled area) are identified as follows: WJL-45

9.2.2.6 Evaluation of the Extent to Which, in the Absence of Unanticipated Processes and Events, DOE's Jurisdiction and Control of the Legal Interests Defined in 9.2.2.1 through 9.2.2.5, above, Would Serve to Prevent Adverse Human Actions that Could Significantly Reduce the Geologic Repository's Capability for Isolation. (See Table 9.2A - WJL-72).

Evaluation of the extent to which, in the absence of unanticipated processes and events, DOE's jurisdiction and control of the legal interests defined in 9.2.2.1 through 9.2.2.5, above, would serve to prevent adverse human actions that could significantly reduce the geologic repository's capability for isolation is as follows, and is summarized in Table 9.2A **WJL-46**

9.2.2.7 Identification of Existing Relevant Legal Records and Their Locations - (See Table 9.2B - WJL-73)

Relevant existing legal records pertaining to the legal interests defined in Sections 9.2.2.1 through 9.2.2.5, above, and their locations are identified as follows, and are summarized in Table 9.2B. **WJL-47**

9.2.3 Identification of Legal Interests to be Obtained Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.3.1 Legal Authority

9.2.3.1.1 Statutes

Statutes applicable to the legal interests to be obtained within the adjacent areas of concern (outside the controlled area) are as follows: **WJL-48**

9.2.3.1.2 Judicial Decisions

Judicial decisions applicable to the legal interests to be obtained within the adjacent areas of concern (outside the controlled area) are as follows: **WJL-49**

9.2.3.2 Encumbrances that DOE Proposes Not to Acquire

9.2.3.2.1 Identification

Identification of encumbrances that DOE proposes not to acquire within the adjacent areas of concern (outside the controlled area) is as follows: **WJL-50**

9.2.3.2.2 Why They Are Not Significant to Achievement of the Purposes of 10 CFR 60

An explanation of why the identified encumbrances that DOE proposes not to acquire within the adjacent areas of concern (outside the controlled area) are not significant to the achievement of the purposes of 10 CFR 60 is as follows: **WJL-51**

9.2.3.3 Identification of Relevant Legal Records to be Obtained and Their Locations (See Table 9.2B - WJL-73)

Relevant legal records to be obtained pertaining to the legal interests to be obtained within the adjacent areas of concern (outside the controlled area) and their locations are identified as follows, and summarized in Table 9.2B. **WJL-52**

9.2.3.4 Water Rights Within the Adjacent Areas of Concern Needed to Accomplish the Purpose of the GROA or Needed to Preclude Potential Adverse Human Actions that Could Significantly Reduce the Geologic Repository's Capability for Isolation (See Figure 9.2B - WJL-71)

9.2.3.4.1 Water for Personnel Needs

Identification of water rights needed to satisfy personnel needs within the scope of Section 9.2.3.4 is as follows: **WJL-53**

9.2.3.4.2 Water for Equipment Needs

Identification of water rights to satisfy equipment needs within the scope of Section 9.2.3.4 is as follows: **WJL-54**

9.2.3.4.3 Fire Protection Water

Identification of water rights to satisfy fire protection needs within the scope of Section 9.2.3.4 is as follows: **WJL-55**

9.2.3.4.4 Water Rights to Control Potential Adverse Human Actions Detrimental to the Achievement of the Purposes of 10 CFR 60

Identification of water rights to satisfy the requirement to control potential adverse human actions detrimental to the achievement of the purposes of 10 CFR 60 within the scope of Section 9.2.3.4 is as follows: **WJL-56**

9.2.3.4.5 Quantitative Information for Water by Category

Quantitative information for water by category within the scope of Section 9.2.3.4 is as follows: **WJL-57**

9.2.3.4.6 Qualitative Information for Water by Category

Qualitative information for water by category within the scope of Section 9.2.3.4 is as follows: **WJL-58**

Table 9.2A. Prevention of Adverse Human Actions that Could Significantly Reduce Repository Isolation Capability Through DOE Jurisdiction and Control of Legal Interests Outside the Controlled Area

Potential Human Adverse Action	Possible Adverse Consequences	DOE Jurisdiction/ Control to Prevent (Legal Interest)	DOE Preventive Action

WJL-72

Table 9.2B. Relevant Legal Records and Their Locations

Relevant Legal Record (Title)	Location	Existing	To Be Determined

WJL-73

Map showing areas, outside the controlled area, within which DOE must exercise jurisdiction and control of surface and subsurface estates so as to prevent adverse human actions tht could significantly reduce the geologic repository's capability for isolation. Map to show relevant features. **WJL-70**

Figure 9.2A. Areas of DOE Concern Outside the Controlled Area

Map showing:

1. Existing legal interests defined in Section 9.2.2
2. Legal interests to be obtained, as defined in Section 9.2.3
3. Water rights (legal interests), existing and to be obtained

Note: More than one figure may be needed.

WJL-71

Figure 9.2B. Existing Legal Interests in Areas of DOE Concern Outside the Controlled Area

REFERENCES

9.2A Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

9.2B Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

9.2C United States Department of Energy, "Site Characterization Program Baseline," Revision 1, March, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

9.2D United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 9.2 PLANS FOR REGULATING LAND USE AAT THE GROA

2. Lead Author & Phone No. Bill Leonard
(702) 794-1861

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

[A statement similar to the following should be made in a potential license application: This section describes interests in land that DOE has obtained or will obtain with respect to any "restricted area", as define in 10 CFR 60. This section demonstrates that DOE can control access as necessary to protect individuals from radiation and radioactive materials. Also identified are those lands constituting the geologic repository and adjacement areas for which DOE has rights of access and that are, accordingly, available to NRC to carry out its inspection activities.]

6. Opening Statement:

See item 5 above.

7. Main Body Outline:

9.2.1 Identification Of Adjacent Areas Of Concern

9.2.1.1 Legal Description of Areas of Concern (Outside the Controlled Area), Stating Nevada State Coordinate System Limits and Area

9.2.1.2 Human Actions (outside the controlled area) Considered to have the Potential to Affect the Geologic Repository (See Table 9.2A).

9.2.2 Identification Of Existing Legal Interests

9.2.2.1 Existing Present Surface Interests of Record in Lands Within the Adjacent Areas of Concern (Outside the Controlled Area)

7. Main Body Outline (Continued)

9.2.2.1.1 Rights Arising under the General Mining Laws
9.2.2.1.2 Easements for Right-of-way
9.2.2.1.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

9.2.2.2 Existing Future Surface Interests of Record in Lands Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.2.1 Rights Arising under the General Mining Laws
9.2.2.2.2 Easements for Right-of-way
9.2.2.2.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

9.2.2.3 Existing Present Subsurface Interests of Record in Lands Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.3.1 Rights Arising under the General Mining Laws
9.2.2.3.2 Easements for Right-of-way
9.2.2.3.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

9.2.2.4 Existing Future Subsurface Interests of Record in Lands Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.4.1 Rights Arising under the General Mining Laws
9.2.2.4.2 Easements for Right-of-way
9.2.2.4.3 All Other Rights Arising Under Lease, Rights of Entry, Deed, Patent, Mortgage, Appropriation, Prescription, or Otherwise

9.2.2.5 Water Rights Within the Adjacent Areas of Concern (Outside the Controlled Area)

9.2.2.5.1 Identification of Existing Water Rights

9.2.2.5.1.1 Water for Personnel Needs
9.2.2.5.1.2 Water for Equipment Needs
9.2.2.5.1.3 Fire Protection Water

7. Main Body Outline (Continued)

9.2.2.5.2 Quantitative Information by Water Category
9.2.2.5.3 Qualitative Information by Water Category

9.2.2.6 Evaluation of the Extent to which, in the Absence of Unanticipated Processes and Events, DOE's Jurisdiction and Control of the Legal Interests Defined in Sections 9.2.2.1 through 9.2.2.5, above, would Serve to Prevent Adverse Human Actions that could Significantly Reduce the Geologic Repository's Capability for Isolation. See Table 9.2A.

9.2.2.7 Identification of Existing Relevant Legal Records and Their Locations - See Table 9.2B

9.2.3 Identification of Legal Interests to be Obtained within the Adjacent Areas Of Concern (Outside the Controlled Area)

9.2.3.1 Legal Authority

9.2.3.1.1 Statutes
9.2.3.1.2 Judicial Decisions

9.2.3.2 Encumbrances that DOE Proposes Not to Acquire

9.2.3.2.1 Identification

9.2.3.2.2 Why They Are Not Significant to Achievement of the Purposes of 10 CFR 60

9.2.3.3 Identification of Relevant Legal Records and Their Locations (See Table 9.2B)

9.2.3.4 Water Rights Within the Adjacent Areas of Concern Needed to Accomplish the Purpose of the GROA or Needed to Preclude Potential Adverse Human Actions that Could Significantly Reduce Geologic Repository's Capability for Isolation (See Figure 9.2B)

9.2.3.4.1 Water for Personnel Needs
9.2.3.4.2 Water for Equipment Needs
9.2.3.4.3 Fire Protection Water

7. Main Body Outline (Continued)

9.2.3.4.4 Water Rights to Control Potential Adverse Human Actions Detrimental to the Achievement of the Purposes of 10 CFR 60
9.2.3.4.5 Quantitative Information for Water Category
9.2.3.4.6 Qualitative Information by Water Category

8 Conclusion:

[A statement similar to the following should be made in a potential license application: The regulatory land use plans presented in this section comply with requirements of 10 CFR 60.121.]

9. Support Authors & Their Assignments:

Section No. & Title: 9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA

Lead Author & Phone No. Bill Leonard
(702) 794-1861

A. Figure No. 9.2A

Caption: **Areas of DOE Concern Outside the Controlled Area**

Content: Map showing areas, outside the controlled area, within which DOE must exercise jurisdiction and control of surface and subsurface estates so as to prevent adverse human actions that could significantly reduce the geologic repository's capability for isolation. Map to show relevant features. (See Section 9.2.1)

B. Figure No. 9.2B

Caption: **Existing Legal Interests in Areas of DOE Concern Outside the Controlled Area**

Content:

Map showing:

1. Existing legal interests defined in Section 9.2.2
2. Legal interests to be obtained, as defined in Section 9.2.3
3. Water rights (legal interests), existing and to be obtained

Note: More than one figure may be needed.

Section No. & Title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

Lead Author & Phone No. Bill Leonard
(702) 794-1861

A. Table No. **9.2A**

Title: **Prevention of Adverse Human Actions that Could Significantly Reduce Repository Isolation Capability Through DOE Jurisdiction and Control of Legal Interests Outside the Controlled Area**

Content:

Potential Human Adverse Action	Possible Adverse Consequences	DOE Jurisdiction/ Control to Prevent (Legal Interest)	DOE Preventive Action

---

B. Table No. **9.2B**

Title: **Relevant Legal Records and Their Locations**

Content:

Relevant Legal Record (Title)	Location	Existing	To Be Determined

---

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: 9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA

Lead Author & Phone No. Bill Leonard
(702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

2. Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

3. United States Department of Energy, "Site Characterization Program Baseline," Revision 2, October, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

4. United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-27**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   The legal description of the (legal) interests of concern outside the controlled area.

7. What is the information needed for?

   SAR Section 9.2.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-28**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Human actions (outside the controlled area) considered to have the potential to affect the geologic repository.

7. What is the information needed for?

   SAR Section 9.2.1.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-29**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702)794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing present surface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of rights arising under the general mining laws.

7. What is the information needed for?

   SAR Section 9.2.2.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-30**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing present surface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of easements for right-of-way.

7. What is the information needed for?

   SAR Section 9.2.2.1.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-31**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing present surface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise (excluding rights arising under the general mining laws and easements for right-of-way).

7. What is the information needed for?

   SAR Section 9.2.2.1.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-32**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing future surface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of rights arising under the general mining laws.

7. What is the information needed for?

   SAR Section 9.2.2.2.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-33**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing future surface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of easements for right-of-way.

7. What is the information needed for?

   SAR Section 9.2.2.2.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-34**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing future surface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise (excluding rights arising under the general mining laws and easements for right-of-way).

7. What is the information needed for?

   SAR Section 9.2.2.2.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-35**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing present subsurface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of rights arising under the general mining laws.

7. What is the information needed for?

   SAR Section 9.2.2.3.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-36**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing present subsurface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of easements for right-of-way.

7. What is the information needed for?

   SAR Section 9.2.2.3.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-37**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing present subsurface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise (excluding rights arising under the general mining laws and easements for right-of-way).

7. What is the information needed for?

   SAR Section 9.2.2.3.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-38**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing future subsurface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of rights arising under the general mining laws.

7. What is the information needed for?

   SAR Section 9.2.2.4.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-39**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing future subsurface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of easements for right-of-way.

7. What is the information needed for?

   SAR Section 9.2.2.4.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-40**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Existing future subsurface legal interests of record in lands within the adjacent areas of concern (outside the Controlled Area) consisting of rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise (except for rights arising under the general mining laws and easements for right-of-way).

7. What is the information needed for?

   SAR Section 9.2.2.4.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-41**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights for personnel needs within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.2.5.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-42**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights for equipment needs within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.2.5.1.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-43**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights for fire protection needs within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.2.5.1.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-44**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Quantitative information by water category regarding water rights within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.2.5.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-45**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Qualitative information by water category regarding water rights within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.2.5.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-46**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Evaluation of the extent to which, in the absence of unanticipated processes and events, DOE's jurisdiction and control of the legal interests defined in Sections 9.2.2.1 through 9.2.2.5 (see Information Need Forms WJL-29 through WJL-45) would serve to prevent adverse human actions that could significantly reduce the geologic repository's capability for isolation.

7. What is the information needed for?

   SAR Section 9.2.2.6.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-47**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of relevant existing legal records pertaining to the legal interests defined in Sections 9.2.2.1 through 9.2.2.5 (see Information Need Forms WJL-29 through WJL-45) and their locations.

7. What is the information needed for?

   SAR Section 9.2.2.7.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-48**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Statutes applicable to the legal interests to be obtained within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.3.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-49**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Judicial decisions applicable to the legal interests to be obtained within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.3.1.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-50**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of encumbrances the DOE proposes not to acquire within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.3.2.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: WJL-51

2. Section no. & title: 9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA

3. Lead author & phone no: W. J. Leonard (702) 794-1861

4. Information request date: 2/21/92

5. Work location: M&O - Las Vegas

6. Type of information needed:

   Explanation of why the identified encumbrances that DOE proposes not to acquire within the adjacent areas of concern, outside the Controlled Area, (see Information Need Form WJL-50) are not significant to achievement of the purposes of 10 CFR 60.

7. What is the information needed for?

   SAR Section 9.2.3.2.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-52**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of relevant legal records to be obtained pertaining to the legal interests to be obtained within the adjacent areas of concern (outside the Controlled Area).

7. What is the information needed for?

   SAR Section 9.2.3.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-53**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights (legal interests) needed to satisfy personnel needs within the scope of Section 9.2.3.4 (water rights within the adjacent areas of concern needed to accomplish the purpose of the GROA or needed to preclude potential adverse human actions that could significantly reduce the geologic repository's capability for isolation).

7. What is the information needed for?

   SAR Section 9.2.3.4.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-54**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights (legal interests) needed to satisfy equipment needs within the scope of Section 9.2.3.4 (water rights within the adjacent areas of concern needed to accomplish the purpose of the GROA or needed to preclude potential adverse human actions that could significantly reduce the geologic repository's capability for isolation).

7. What is the information needed for?

   SAR Section 9.2.3.4.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-55**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights (legal interests) needed to satisfy fire protection needs within the scope of Section 9.2.3.4 (water rights within the adjacent areas of concern needed to accomplish the purpose of the GROA or needed to preclude potential adverse human actions that could significantly reduce the geologic repository's capability for isolation).

7. What is the information needed for?

   SAR Section 9.2.3.4.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-56**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Identification of water rights (legal interests) needed to satisfy the requirement to control potential adverse human actions detrimental to the achievement of the purposes of 10 CFR 60 within the scope of Section 9.2.3.4 (water rights within the adjacent areas of concern needed to accomplish the purpose of the GROA or needed to preclude potential adverse human actions that could significantly reduce the geologic repository's capability for isolation).

7. What is the information needed for?

   SAR Section 9.2.3.4.4.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-57**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Quantitative information by water category within the scope of Section 9.2.3.4 (water rights within the adjacent areas of concern needed to accomplish the purpose of the GROA or needed to preclude potential adverse human actions that could significantly reduce the geologic repository's capability for isolation).

7. What is the information needed for?

   SAR Section 9.2.3.4.5.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

The above Annotated Outline text is guidance that may be used for the future development of an MGDS License Application.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-58**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Qualitative information by water category within the scope of Section 9.2.3.4 (water rights within the adjacent areas of concern needed to accomplish the purpose of the GROA or needed to preclude potential adverse human actions that could significantly reduce the geologic repository's capability for isolation).

7. What is the information needed for?

   SAR Section 9.2.3.4.6.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-70**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Map (suggested caption: Areas of DOE Concern Outside the Controlled Area) showing areas, outside the Controlled Area, within which DOE must exercise jurisdiction and control of surface and subsurface estates so as to prevent adverse human actions that could significantly reduce the geologic repository's capability for isolation. Map to show relevant features. (See Section 9.2.1).

7. What is the information needed for?

   SAR Section 9.2.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-71**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Map (suggested title: Existing Legal Interests in Areas of DOE Concern Outside the Controlled Area) showing:

   1. **Existing legal interests defined in Section 9.2.2**
   2. **Legal interests to be obtained, as defined in Section 9.2.3**
   3. **Water rights (legal interests), existing and to be obtained.**

   Note: More than one figure may be needed.

7. What is the information needed for?

   SAR Section 9.2.2 and 9.2.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

The above Annotated Outline text is guidance that may be used for the future development of an MGDS License Application.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-72**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Table (suggested caption: Prevention of Adverse Human Actions That Could Significantly Reduce Repository Isolation Capability Through DOE Jurisdiction and Control of Legal Interests Outside the Controlled Area), showing potential adverse human actions that could significantly reduce repository isolation capability through DOE jurisdiction and control of legal interests outside the Controlled Area. Suggested column headings are: 1) Potential Human Adverse Action, 2) Possible Adverse Consequences, 3) DOE Jurisdiction/Control to Prevent (Legal Interest), and 4) DOE Preventive Action, Including Jurisdiction and Control.

7. What is the information needed for?

   SAR Section 9.2.1.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-73**

2. Section no. & title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Table (suggested caption: Relevant Legal Records and Their Locations), showing relevant legal records and their locations. Suggested column heading are: 1) Relevant Legal Record (Title), and 2) Location.

7. What is the information needed for?

   SAR Section 9.2.3.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **9.2 PLANS FOR REGULATING LAND USE OUTSIDE THE CONTROLLED AREA**

2. Person Supplying Information: Bill Leonard
(702) 794-1861

3. Phone No.:

4. Lead Author (Requester):

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Oultine Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 9.3 Plans for Regulating Land Use at the GROA

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9.3 PLANS FOR REGULATING LAND USE AT THE GROA

This section describes interests that DOE has obtained or will obtain with respect to the "restricted area" as defined in 10 CFR 60. [This section must demonstrate that DOE can control access as necessary to protect individuals from radiation and radioactive materials. Also to be identified are those lands constituting the geologic repository and adjacent areas for which DOE has rights of access that are, accordingly, available to NRC to accomplish its inspection activities. It will be necessary to develop the regulatory land use plans to be presented in this section to comply with requirements of 10 CFR 60.121.]

9.3.1 "Restricted Area" Land that DOE has Obtained (See Figure 9.3A - WJL-74)

9.3.1.1 Access Control Measures

Access control measures established within the "restricted area" land that DOE has obtained are as follows: WJL-59

9.3.1.2 Specific Measures to Protect Individuals

Specific measures to protect individuals within the "restricted area" land that DOE has obtained are as follows: WJL-60

9.3.2 "Restricted Area" Land that DOE Will Obtain (See Figure 9.3A - WJL-74)

9.3.2.1 Access Control Measures

Access control measures within the "restricted area" land that DOE will obtain are as follows: **WJL-63**

9.3.2.2 Specific Measures to Protect Individuals

Specific measures to protect individuals within the "restricted area" lands that DOE will obtain are as follows: **WJL-64**

9.3.3 Land to Which DOE Has Rights of Access and Which Are Available to NRC Inspections (See Figure 9.3A - WJL-74)

Land to which DOE has rights of access which are available to NRC inspections are described as follows: **WJL-67**

Map showing:

1, "Restricted Area" Land DOE Has Obtained

2. "Restricted Area" Land DOE Will Obtain

3. Land to which DOE has Rights of Access

Figure 9.3A. "Restricted Area" Land and Land to Which DOE Has Rights of Access

REFERENCES

9.3A Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

9.3B Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

9.3C United States Department of Energy, "Site Characterization Program Baseline," Revision 1, March, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

9.3D United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: 9.3 PLANS FOR REGULATING LAND USE AT THE GROA

2. Lead Author & Phone No. Bill Leonard
(702) 794-1861

3. First Phase Planning Package Due: 6/21/91

Second Phase Planning Package Due: 10/18/91

First Phase Skeleton Draft Due: 12/30/91

Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
(Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

[A statement similar to the following should be made in a potential license application: This section describes interests in land that DOE has obtained or will obtain with respect to any "restricted area", as defined in 10 CFR 60. The section demonstrates that DOE can control access as necessary to protect individuals from radiation and radioactive materials. Also identified are those lands constituting the geologic repository and adjacent areas for which DOE has rights of access and that are, accordingly, available to NRC to carry out its inspection activities.]

6. Opening Statement:

7. Main Body Outline:

9.3.1 "Restricted Area" Land that DOE has Obtained

9.3.1.1 Access Control Measures
9.3.1.2 Specific Measures to Protect Individuals

9.3.2 "Restricted Area" Land that DOE will Obtain

9.3.2.1 Access Control Measures
9.3.2.2 Specific Measures to Protect Individuals

7. Main Body Outine (Continued)

   9.3.3 Land to which DOE has Rights of Access and which are Available to NRC Inspections

8. Conclusion:

   [A statement similar to the following should be made in a potential license application: The regulatory land use plans presented in this section comply with requirements of 10 CFR 60.121.]

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: 9.3 PLANS FOR REGULATING LAND USE AT THE GROA

Lead Author & Phone No. Bill Leonard
(702) 794-1861

A. Figure No. 9.3A

Caption: "Restricted Area" Land and Land to Which DOE Has Rights of Access

---

Content: (See Section 9.3.1)

Map showing:

1. "Restricted Area" Land DOE Has Obtained
2. "Restricted Area" Land DOE Will Obtain
3. Land to Which DOE Has Rights of Access

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: 9.3 PLANS FOR REGULATING LAND USE AT THE GROA

Lead Author & Phone No.: Bill Leonard
(702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

2. Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

3. United States Department of Energy, "Site Characterization Program Baseline," Revision 2, October, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

4. United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-59**

2. Section no. & title: **9.3 PLANS FOR REGULATING LAND USE AT THE GROA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Access control measures established within the "restricted area" land that DOE has obtained.

7. What is the information needed for?

   SAR Section 9.3.1.1.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 4/17/92

1. Log number: **WJL-60**

2. Section no. & title: **9.3 PLANS FOR REGULATING LAND USE AT THE GROA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Specific measures to protect individuals within the "restricted area" land that DOE has obtained.

7. What is the information needed for?

   SAR Section 9.3.1.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 4/17/92

1. Log number: **WJL-63**

2. Section no. & title: **9.3 PLANS FOR REGULATING LAND USE AT THE GROA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Access control measures within the "restricted area" land that DOE will obtain.

7. What is the information needed for?

   SAR Section 9.3.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 4/17/92

1. Log number: **WJL-64**

2. Section no. & title: **9.3 PLANS FOR REGULATING LAND USE AT THE GROA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Specific measures to protect individuals within the "restricted area" land that DOE has obtained.

7. What is the information needed for?

   SAR Section 9.3.2.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 4/17/92

1. Log number: **WJL-67**

2. Section no. & title: **9.3 PLANS FOR REGULATING LAND USE AT THE GROA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Land to which DOE has rights of access which are available to NRC inspections.

7. What is the information needed for?

   SAR Section 9.3.3.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

11. Response by (name):

12. Response date:

13. Response:

The above Annotated Outline text is guidance that may be used for the future development of an MGDS License Application.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 4/17/92

1. Log number: **WJL-74**

2. Section no. & title: **9.3 PLANS FOR REGULATING LAND USE AT THE GROA**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Access control measures established within the "restricted area" land that DOE has obtained.

7. What is the information needed for?

   SAR Section 9.3.2.

8. What group is the probable information supplier?

   Yucca Mountain Project Office.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

    TBD.

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **9.3 PLANS FOR REGULATING LAND USE AT THE GROA**

2. Lead Author & Phone No. Bill Leonard
(702) 794-1861

3. Phone No.:

4. Lead Author (Requester):

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Chapter 10.0 Quality Assurance

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10.0 INTRODUCTION

10CFR60.150 states that "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that the geologic repository and its subsystems or components will perform satisfactorily in service. The section further states that quality assurance includes quality control, which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system to predetermined requirements.

10CFR60.151 defines applicability of the quality assurance program, stating that the quality assurance program applies to all systems, structures, and components important to safety, to design and characterization of barriers important to waste isolation and to activities related thereto. The section specifies that these activities include: site characterization, facility and equipment construction, facility operation, performance confirmation, permanent closure, and decontamination and dismantling of surface facilities.

10CFR60.152 prescribes that DOE shall implement a quality assurance program based on the criteria of Appendix B of 10CFR50, as applicable, and appropriately supplemented by additional criteria as required by 10CFR60.151.

The OCRWM Quality Assurance Program Description Document (QAPD), serves as the quality assurance program description document for program activities performed by OCRWM. The

QAPD and the Quality Assurance Requirements and Description Document (QARD) reflect OCRWM policies and serve as the principal documents of the MGDS quality assurance (QA) program. Sections 1 through 19 of the QAPD, including the appendices, describe the provisions established by OCRWM to meet the requirements of the QARD. Appendix A of the QARD describes amplifications to the QA program requirements which are specific to the geologic repository.

[The DOE plans a stand alone QA document which combines the QAPD and QARD into a single document. The new QA document will be submitted to the NRC for review and acceptance.]

[The geologic repository will be designed, constructed, operated, and closed pursuant to an approved QA program.] Subcontractor QA programs are subordinate to and consistent with the requirements of the DOE OCRWM QARD.

[The QA programs applicable to each phase (Site Characterization, Design and Construction, Operations, Permanent Closure, Decontamination, and Decommissioning) will evolve from phase to phase and within the overall OCRWM QARD umbrella requirements, and are specific to each phase and subcontractor's workscope. The QA program criteria which will be applicable to each phase will be defined in each subcontractor's documented, OCRWM-approved QA program. Applicability specifics are discussed in Section 10.1.]

10.0.1 Application of Quality Assurance Programs to Structures, Systems, and Components Important to Safety and Waste Isolation

10.0.1.1 Identification of Structures, Systems, and Components Important to Safety (See also section 4.2).

10.0.1.2 Description of Analyses Used To Determine Structures, Systems, and Components Important to Safety

10.0.1.3 Engineered Barriers Important to Waste Isolation That Are Subject to Quality Assurance Programs

10.0.1.4 Evaluations That Were Used to Identify Engineered Barriers Important to Waste Isolation and Subject to Quality Assurance Programs

10.0.1.5 Structures, Systems, Components, and Engineered Barriers Identified Above and Their Descriptions Are Incorporated into the 10 CFR 60, Subpart G Quality Assurance Programs for Site Characterization (See Section 10.1.1), Design, and Construction (See Section 10.1.2), and Operations (See Section 10.1.4).

10.0.2 Activities Related to Items on the Q-List (See also Chapter 4).

10.0.3 Quality Assurance Program Description for 10 CFR 60.131(a) Items Other than Those Important to Safety or Waste Isolation

This quality assurance program applies to 10CFR60.131 (a) items included in the category of "radiological protection," and responds to the provisions that "The geologic repository operations area shall be designed to maintain radiation doses, levels, and concentrations of radioactive material in the air in restricted areas within the limits specified in 10CFR20. Items and activities related to radiological protection are covered by the quality assurance program in place during each phase (site characterization, design and construction, etc.) and these items and activities are evaluated and placed on a Q-List in a manner similar to that used for items important to safety and waste isolation. See Section 10.1 for specifics of how this evaluation is accomplished.

10.0.4 Assessment of Activities During Site Characterization and Their Compliance with Quality Assurance Program Requirements (See Section 10.2).

REFERENCES

10.0-A Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

10.0-B Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

10.0-C United States Department of Energy, "Site Characterization Program Baseline," Revision 1, March, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

10.0-D United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

10.0-E United States Department of Energy, "Quality Assurance Program Description Document," DOE/RW 0215,

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **10.0 QUALITY ASSURANCE**

2. Lead Author & Phone No. Bill Leonard (702) 794-1861

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This describes the QA programs to be established and executed for various activities associated with the geologic repository to meet the requirements of Subpart G of 10 CFR 60.

   The DOE plans a stand alone quality assurance document which combines the QAPD and QARD into a single document. The new QA document will be submitted to the NRC for review and approval as a Topical Report. Following NRC approval, this QA document will be applied throughout all phases of the Program.

   This section will reference the standalone QA document.

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: The geologic repository is designed, constructed, and operated pursuant to a QA program.]

7. Main Body Outline:

   10.0 INTRODUCTION

      10.0.1 Application of QA Programs to Structures, Systems, and Components Important to Safety and Waste Isolation

         10.0.1.1 Identification of Structures, Systems, and Components Important to Safety (See also Section 4.2).

7. Main Body Outline (Continued):

10.0.1.2 Description of Analyses Used to Determine Structures, Systems, and Components Important to Safety.

10.0.1.3 Engineered Barriers Important to Waste Isolation Which are Subject to QA Programs.

10.0.1.4 Evaluations Used to Identify Barriers Important to Waste Isolation which are Subject to QA Programs.

10.0.1.5 Structures, Systems, Components, and Engineered Barriers Identified Above and Their Descriptions are Incorporated into the 10 CFR 60, Subpart G QA Programs for Site Characterization (See Section 10.1.1), Design and Construction (See Section 10.1.2), and Operations (See Section 10.1.4).

10.0.2 Quality Activities List (Q List). See also Chapter 4.

10.0.3 QA Program Description for 10 CFR 60.13(a) Items Other than those Important to Safety or Waste Isolation (Protection of Occupational Health and Safety, for example).

10.0.4 Assessment of Activities During Site Characterization and their Compliance with QA Program Requirements (See Section 10.2).

8. Conclusion:

[A statement similar to the following should be made in a potential license application: The QA programs described in this chapter have been established to assure that quality affecting structures, systems, components, and activities have been adequately controlled to assure a safe repository.]

9. Support Authors & Their Assignments:

None at this time.

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **10.0 QUALITY ASSURANCE**

Lead Author & Phone No. Bill Leonard, (702) 794-1861

A. Table No. **10.0-A**

Title: **Quality Assurance Programs for Various Activities Associated with the Geologic Repository**

Content:

	QA Program	Text Reference
QA Program for:	Site Characterization	10.1.1
	Design and Construction	10.1.2
	Performance Confirmation	10.1.3
	Operations, Permanent	
	Closure, Decontamination, and Decommissioning	10.1.4
	Other Items (e.g., non-nuclear occupational safety)	10.0.3

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **10.0 INTRODUCTION TO QUALITY ASSURANCE PROGRAM FOR THE GEOLOGIC REPOSITORY**

Lead Author & Phone No.: Bill Leonard, (702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

2. Nuclear Regulatory Commission, "Review Plan for High-Level Waste Repository Quality Assurance Program Descriptions," Revision 2, March 1989, U. S. Government Printing Office, Washington, D. C.

3. United States Department of Energy, "Site Characterization Program Baseline," Revision 2, October, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

4. United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

5. Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:
2. Section no. & title: **10.0 QUALITY ASSURANCE**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **2/21/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed:

   Data and assessments collected without approved QA program.
7. What is the information needed for?
8. What group is the probable information supplier?
9. When is the information needed?
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **10.0 QUALITY ASSURANCE**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Bill Leonard (702) 794-1861

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Section 10.1 Quality Assurance Program for Various Activities Associated with the Geologic Repository

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10.1.1.1.1 QA Program for Yucca Mountain Project Office (YMPO)

10.1.1.1.1.1 QA Program for Management and Operating Contractor (M&O)

10.1.1.1.1.2 QA Program for the Technical and Management Support Systems (T&MSS) Contractor

10.1.1.1.1.3 QA Program for Raytheon Services Nevada (RSN)

10.1.1.1.1.4 QA Program for Reynolds Electrical & Engineering Company (REECO)

10.1.1.1.1.5 QA Program for United States Geological Survey (USGS)

10.1.1.1.1.6 QA Program for Los Alamos National Laboratory (LANL)

10.1.1.1.1.7 QA Program for Lawrence Livermore National Laboratory (LLNL)

10.1.1.1.1.8 QA Program for Sandia National Laboratories (SNL)

10.1.1.2 Provisions Sufficiently Detailed to Respond to NRC "Review Plan for High-Level Waste Repository Quality Assurance Program Descriptions" (See Table 10.1-B)

10.1.1.3 Existing Data That Has Not Been Gathered Under 10 CFR 60, Subpart G and Requires Qualification for Use in Licensing (See Table 10.1-C)

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10.1.2.2 Provisions of 10 CFR 50, Appendix B (as specified in the QARD) That Are Applicable to Design and Construction Activities and That Have Not Previously Been Applied for the Site Characterization Quality Assurance Program (With Sufficient Detail to Permit Evaluation by NRC of Compliance With 10 CFR 50, Appendix B)

10.1.3 Quality Assurance Program for Performance Confirmation

10.1.3.1 Particular Quality Assurance Program Provisions That Are the Same as Those Previously Described for the Site Characterization Program (Cross Reference to 10.1.1)

10.1.3.2 Provisions of 10 CFR 50, Appendix B (as specified in the QARD) That Will Be Applied to the Performance Confirmation Program and That Have Not Been Previously Applied for the Site Characterization Quality Assurance Program (In Sufficient Detail to Permit Evaluation by NRC of 10 CFR 50, Appendix B Compliance) See Table 10.1D.

10.1.4 Quality Assurance Program for Operations, Permanent Closure, Decontamination, and Decommissioning

10.1.4.1 Provisions That Are the Same as Those Previously Described for the Site Characterization Quality Assurance Program (Cross Reference to 10.1.1)

10.1.4.2 Provisions of 10 CFR 50, Appendix B (as specified in the QARD) That Will Be Applied to the Operations, Permanent Closure, Decontamination, and Decommissioning Phases of the Geologic Repository. See Table 10.1E.

Table 10.1A. Provisions of 10 CFR 50, Appendix B (as specified in the QARD) Applied to Activities Affecting Quality During Site Characterization of the Geologic Repository

Appendix B Criteria	Remarks Regarding Applicability	Remarks Regarding Non-Applicability

Table 10.1B. Details of QA Program Responsiveness to NRC Review Plan for High-Level Waste Repository Quality Program Descriptions

NRC Review Plan Item	Where Found in QA Program

Table 10.1C. Existing Data By Activity That Has Not Been Gathered Under 10 CFR 60, Subpart G and Which Requires Qualification for Use in Licensing

Data	Activity

Table 10.1D. Provisions of 10 CFR 50, Appendix B (as specified in the QARD) Applied to Activities Affecting Quality During the Performance Confirmation Program of the Repository

Appendix B Criteria	Remarks Regarding Applicability	Remarks Regarding Non-Applicability

Table 10.1E. Provisions of 10 CFR 50, Appendix B (as specified in the QARD) Applied to Activities Affecting Quality During the Operation, Permanent Closure, Decontamination, and Decommissioning Phases of the Geologic Repository

Appendix B Criteria	Remarks Regarding Applicability	Remarks Regarding Non-Applicability

REFERENCES

10.1A Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

10.1B Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

10.1C Nuclear Regulatory Commission, "Review Plan for High-Level Waste Repository Quality Assurance Program Descriptions," Revision 2, March 1989, U. S. Government Printing Office, Washington, D. C.

10.1D United States Department of Energy, "Site Characterization Program Baseline," Revision 1, March, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

10.1E United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **10.1 DESCRIPTION OF THE QUALITY ASSURANCE (QA) PROGRAMS**

2. Lead Author & Phone No. Bill Leonard, (702) 794-1861

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

6. Opening Statement:

   TBD.

7. Main Body Outline:

   10.1.0 Introduction

   10.1.1 QA Program For Site Characterization

   - 10.1.1.1 Applicable Provisions of 10 CFR 50, Appendix B (as specified in the QARD) that have been Applied to Activities Affecting Quality During Site Characterization of the Geologic Repository
   - 10.1.1.2 Provisions Sufficiently Detailed to Respond to NRC "Review Plan for High-Level Waste Repository Quality Assurance Program Descriptions"
   - 10.1.1.3 Existing Data that has not been Gathered Under 10 CFR 60, Subpart G and Requires Qualification for Use in Licensing

7. Main Body Outline (Continued)

10.1.2 QA Program For Design And Construction

10.1.2.1 Provisions of 10 CFR 50, Appendix B (as specified in the QARD) that are Applicable to Design and Construction Activities which have been Previously Detailed for the Site Characterization QA Program

10.1.2.2 Provisions of 10 CFR 50, Appendix B (as specified in the QARD) that are Applicable to Design and Construction Activities and Which Have Not Previously been Applied for the Site Characterization QA Program with Sufficient Detail to Permit Evaluation by NRC of Compliance with 10 CFR 50, Appendix B Compliance.

10.1.3 QA Program For Performance Confirmation

10.1.3.1 Provisions of 10 CFR 50, Appendix B (as specified in the QARD) that will be Established and Implemented for Quality Affecting Activities Associated with the Performance Confirmation Program of the Repository

10.1.3.2 Particular QA Program Provisions which are the Same as Those Previously Described for the Site Characterization Program

10.1.3.3 Provisions of 10 CFR 50, Appendix B (as specified in the QARD) that will be Applied to the Performance Confirmation Program and which have Not been Previously Applied for the Site Characterization QA Program (in Sufficient Detail to Permit Evaluation by NRC of 10 CFR 50, Appendix B).

10.1.4 QA Program for Operations, Permanent Closure, Decontamination, and Decommissioning

10.1.4.1 Provisions of 10 CFR 50, Appendix B (as specified in the QARD) that will be Established and Implemented for Quality Affecting Activities Associated with Operations, Permanent Closure, Decontamination, and Decommissioning Phases of the Geologic Repository

7. Main Body Outline (Continued)

10.1.4.2 Provisions which are the Same as those Previously Described for the Site Characterization Program

10.1.4.3 Provisions of 10 CRF 50, Appendix B (as specified in the QARD) that will be Applied to the Operation, Permanent Closure, Decontamination, and Decommissioning Phases of the Geologic Repository

8. Conclusion:

9. Support Authors & Their Assignments:

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **10.1 DESCRIPTION OF THE QUALITY ASSURANCE (QA) PROGRAMS**

Lead Author & Phone No. Bill Leonard, (702) 794-1861

A. Table No. **10.1A**

Title: **Provisions of 10 CFR 50, Appendix B (as specified in the QARD) Applied to Activities Affecting Quality During Site Characterization of the Geologic Depository**

Content: (See Section 10.1.1.1)

Appendix B Criteria	Remarks Regarding Applicability/Non-Applicability
I. Organization	
II. QA Program	
III. Design Control	
IV. P.D. Control	
V. I, P, D	
VI. Document Control, etc.	

B. Table No. **10.1B**

Title: **Details of QA Program Responsiveness to NRC Review Plan for High-Level Waste Repository Quality Program Descriptions**

Content: (See Section 10.1.1.2)

NRC Review Plan Item	Where Found in QA Program
Item	Procedure ____, Para. ____
Item	Procedure ____, Para. ____

C. Table No. **10.1C**

Title: **Existing Data By Activity that has not been Gathered Under 10 CFR 60, Subpart G and Requires Qualification for Use in Licensing**

Content: (See Section 10.1.1.3)

Data	Activity

Section No. & Title: **10.1 DESCRIPTION OF THE QUALITY ASSURANCE (QA) PROGRAMS**

Lead Author & Phone No. Bill Leonard, (702) 794-1861

A. Table No. **10.1D**

Title: **Provisions of 10 CFR 50, Appendix B (as specified in QARD) Applied to Activities Affecting Quality During Site Characterization of the Geologic Depository**

Content: (See Section 10.1.3.1 and 10.1.3.3.)

Appendix B Criteria	Remarks Regarding Applicability/Non-Applicability
I. Organization	
II. QA Program	
III. Design Control, etc.	

B. Table No. **10.1E**

Title: **Provisions of 10 CFR 50, Appendix B (as specified in QARD) Applied to Activities Affecting Quality During the Operation, Permanent Closure, Decontamination, and Decommissioning Phases of the Geologic Repository**

Content:

Appendix B Criteria	Remarks Regarding Applicability/Non-Applicability
I. Organization	
II. QA Program	
III. Design Control, etc.	

C. Figure/Table No.

Caption/Title:

Content:

Section No. & Title: **10.1 DESCRIPTION OF THE QUALITY ASSURANCE (QA) PROGRAMS**

Lead Author & Phone No.: Bill Leonard, (702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

2. Nuclear Regulatory Commission, "Review Plan for High-Level Waste Repository Quality Assurance Program Descriptions," Revision 2, March 1989, U. S. Government Printing Office, Washington, D. C.

3. United States Department of Energy, "Site Characterization Program Baseline," Revision 2, October, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

4. United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

5. Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **10.1 DESCRIPTION OF THE QUALITY ASSURANCE (QA) PROGRAMS**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Data and assessments collected without approved QA program.

7. What is the information needed for?

   Section 10.1.

8. What group is the probable information supplier?

   TBD.

9. When is the information needed?

   TBD.

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title: **10.1 DESCRIPTION OF THE QUALITY ASSURANCE (QA) PROGRAMS**

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester): Bill Leonard (702) 794-1861

Instructions: Information suppliers may use this form to communicate information that has been requested by lead authors via Information Request Forms. The Log Number on this form should be identical to the Log Number of the Information Request Form.

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

MGDS Annotated Outline

Section 10.2 Implementation of the Quality Assurance Program for Site Characterization

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10.2 IMPLEMENTATION OF THE QA PROGRAM FOR SITE CHARACTERIZATION

Skeleton Text Has Not Been Developed For This Section

REFERENCES

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **10.2 IMPLEMENTATION OF THE QA PROGRAM FOR SITE CHARACTERIZATION**

2. Lead Author & Phone No. Bill Leonard

   (702) 794-1861

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This section describes how the completed and ongoing quality affecting activities comply with the QA requirements of the QA program for site characterization (described in section 10.1.1).

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: This section describes how the completed and ongoing quality affecting activities comply with the QA program requirements for site characterization. The description is in sufficient detail to enable NRC staff to determine whether and how applicable requirements of 10 CFR 50, Appendix B (as specified in the QARD) are satisfied. See Table 10.2A.]

7. Main Body Outline:

8. Conclusion:

   [A statement similar to the following should be made in a potential license application: This section demonstrates that completed and ongoing quality affecting activities comply with the QA program requirements for site characterization.]

9. Support Authors & Their Assignments:

   None assigned at this time

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **10.2 IMPLEMENTATION OF THE QA PROGRAM FOR SITE CHARACTERIZATION**

Lead Author & Phone No. Bill Leonard

(702) 794-1861

A. Table No. **10.2A**

Title: **Implementation of 10 CFR 50, Appendix B (as specified in the QARD) Criteria During Site Characterization**

Content:

Applicable 10 CFR 50, Appendix B Criteria	Discussion of How the Criteria Were Implemented or Are Being Implemented at the Time of License Application
I	Sufficiently detailed to allow for NRC staff evaluation to determine compliance
II	
III	
etc.	

B. Figure/Table No.

Caption/Title:

Content:

C. Figure/Table No.

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **10.2 IMPLEMENTATION OF THE QUALITY ASSURANCE (QA) PROGRAM FOR SITE CHARACTERIZATION**

Lead Author & Phone No.: Bill Leonard, (702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

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2. Nuclear Regulatory Commission, "Review Plan for High-Level Waste Repository Quality Assurance Program Descriptions," Revision 2, March 1989, U. S. Government Printing Office, Washington, D. C.

3. United States Department of Energy, "Site Characterization Program Baseline," Revision 2, October, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

4. United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

5. Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number:

2. Section no. & title: **10.2 IMPLEMENTATION OF THE QA PROGRAM FOR SITE CHARACTERIZATION**

3. Lead author & phone no: **W.J. Leonard (702) 794-1861**

4. Information request date: **2/21/92**

5. Work location: **Las Vegas, Nevada**

6. Type of information needed:

7. What is the information needed for?

8. What group is the probable information supplier?

9. When is the information needed?

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

Section No. & Title: **10.2** **IMPLEMENTATION OF THE QUALITY ASSURANCE (QA) PROGRAM FOR SITE CHARACTERIZATION**

Lead Author & Phone No.: Bill Leonard, (702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. Nuclear Regulatory Commission, 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings," U. S. Government Printing Office, Washington, D. C.

2. Nuclear Regulatory Commission, "Review Plan for High-Level Waste Repository Quality Assurance Program Descriptions," Revision 2, March 1989, U. S. Government Printing Office, Washington, D. C.

3. United States Department of Energy, "Site Characterization Program Baseline," Revision 1, March, 1991, YMP/CM-0011,Yucca Mountain Site Characterization Project

4. United States Department of Energy, "Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada," DOE/RW-0199, December, 1988

5. Nuclear Regulatory Commission, 10 CFR 60, "Disposal of High Level Waste in Geologic Repositories," U. S. Government Printing Office, Washington, D. C.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log No.	Section	Date Issued	Date Response Received

Chapter 11.0 Emergency Planning

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11.0 EMERGENCY PLANNING

[This chapter presents the emergency plan for the MGDS facility. It provides measures for planned, appropriate responsive action applicable to postulated accidents and emergency conditions. The regulatory basis for this section is contained in 10CFR60, Subpart I - Emergency Planning Criteria, to be developed. This section has been formatted against criteria of Regulatory Guide 3.67, Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities. It will be reformatted, as necessary, to meet the specified criteria of Subpart I, when issued. The facility and organization described in this chapter are based on nuclear power plant experience. The titles, structure, duties, and physical arrangements do not necessarily reflect the actual situation to be established.]

11.1 SITE DESCRIPTION

11.1.1 Description of Licensed Activity

The United States Department of Energy (DOE) is the Owner of the Mined Geologic Disposal System (MGDS) facility. WJL-75 is the contractor to DOE for the operation of the facility. The MGDS facility consists of a subterranean repository complex and surface receiving, processing, temporary storage, and support buildings which receive spent nuclear fuel (SNF) and defense high-level waste (DHLW). The facility has the capability to receive and store up to 70 thousand metric tons of material.

11.1.2 Location

The MGDS facility is located in southern Nevada, approximately 80 miles from Las Vegas, to the south, which is the nearest large city. Las Vegas has a population of (WJL-113). Three other communities are within 30 miles of the facility. Mercury, a base camp type community for the Nevada Test Site, with an average population of about WJL-76, is about 25 miles away to the southeast. Beatty, with a population of around WJL-77, is closest, about ten miles to the west, and Amargosa Valley, with a population of only WJL-78, is approximately 12 miles south of the facility. The state map, shown in Figure 11.0F, shows the relationship of the MGDS facility to these population centers and within the state.

Figure 11.0G shows the location of the facility within Nye County and the relationship of the facility to the nearest towns and cities. The topography in the facility area (within a five mile radius of the repository) ranges in elevation from about 4750 feet above mean sea level, at the top of Yucca Mountain (within which, at an elevation of about 3550 feet above sea level, the repository is located) to about 3600 feet above sea level at the surface facilities site in Midway Valley, about a mile to the east of the repository.

As shown by Figures 11.0F and 11.0G, the facility is located away from densely populated metropolitan areas. Major highways and a rail line provide excellent transportation routes for the receipt of spent fuel and other high-level nuclear waste. [The site characterization process will determine whether the site meets regulatory prerequisites for hydrology, geology, seismology, and meteorology.]

Nye County has a population of about WJL-79 within a twenty-five mile radius of the facility. The population concentration is highest in the county seat, Tonopah, about 95 miles north and west of the repository site. Tonopah's population is about WJL-80.

11.1.2.1 Demography

The population of Nye County is WJL-113 was 17,781. Population growth within a twenty-five mile radius of the facility site over the next 50 years is projected to be WJL-81.

11.1.2.1.1 Permanent Population

The distance from the MGDS facility site to the nearest permanent civilian (non site) residence is approximately 10 miles (west of the site). Population estimates are based on projections made by WJL-82.

11.1.2.1.2 Transient Population

A. Estimated annual population WJL-89

B. Recreational uses of land and water within 50 miles of the site WJL-90

C. Schools, day care centers, hospitals, etc. WJL-91

11.1.2.2 Land Use Census

A. Residential WJL-92

B. Industrial WJL-93

C. Agricultural WJL-94

D. Water WJL-95

11.1.3 Facility and Site Description

The MGDS facility is located on 21975.4 acres, as illustrated in Figure 9.1A. The facility complex consists of the surface facilities, the subsurface repository, the transportation network, and the repository access ramps. The facility is self-sufficient in support facilities and equipment.

11.2 TYPES OF ACCIDENTS

[The following sections will be developed when the design and technology for the MGDS facility is completed and a hazards analysis is performed for the specific systems and functions of the facility.]

11.2.1 Postulated Accidents and Abnormal Operational Events

WJL-96

11.2.1.1 Postulated Accidents

WJL-97

11.2.1.1.1 Natural Phenomena

WJL-98

11.2.1.1.2 Nuclear Criticality

WJL-99

11.2.1.1.3 Failure of Equipment

WJL-100

11.2.1.1.4 Fires in Critical Areas

WJL-101

11.2.1.2 Abnormal Operational Events

WJL-102

11.2.2 Detection of Emergency Conditions

WJL-103

11.2.2.1 Process System

WJL-104

11.2.2.2 Alarm System and Release Prevention

WJL-105

11.3 CLASSIFICATION OF ACCIDENTS

Three classification categories have been established for postulated accidents at the MGDS facility. Classification categories and their descriptions are listed below. The postulated accidents to which the classifications relate are described in 11.2.1.1., above.

11.3.1 Classification System

11.3.1.1 Unusual Event

An "Unusual Event" is defined as a situation in which no release of radioactive or other hazardous material is imminent, but which could require non-routine actions or augmentation

staff. Examples of such events are a tornado watch, explosion or gunfire near the site, and transportation of a radioactively contaminated injured individual to an off-site medical facility.

11.3.1.2 Alert

An "Alert" is defined as an incident that has led to, or could lead to, a release of radioactive or other hazardous material, but the release did not or is not expected to require a response by an off site agency to protect persons off site. An alert reflects mobilization of the licensee's emergency response organization, either on alert status or full mobilization, but does not indicate an expectation of off site consequences. It may, however, require off site response organization support for on site situations such as fire.

11.3.1.3 Site Area Emergency

A "Site Area Emergency" is defined as an incident that has led to, or could lead to, a release of radioactive or other hazardous material and could require a response by an off site response organization to protect persons off site.

11.3.1.4 Initiating Conditions/Emergency Action Levels

The postulated accidents described in 11.2 are the basis for the initiating conditions. Emergency Action levels for each initiating condition within the three classifications of postulated accidents are used to provide guidance as to the classification into which each incident would fall.

11.3.2 Notification and Coordination

The MGDS Facility Shift Supervisor is responsible for coordinating the notification of all personnel on site and for notifying the state and county 24 hour contact points upon declaration of any of the three emergency classifications. The Shift Supervisor may also receive Process or Area alarms that would indicate a potential for one of the three emergency classifications. MGDS facility personnel are responsible for notifying the Shift Supervisor of any incident which has the potential of being one of the three emergency classifications. The Shift Supervisor determines the level of response needed from the on site Emergency Response Organization and from the off site support agencies. For Alert and Site Area Emergency classifications, the Shift Supervisor evaluates the need to make off site protective action recommendations to the state and county emergency management agencies. (WJL-123)

Implementing procedures for each emergency classification contain specific guidance for:

A. On site response

B. Emergency response organization activation

C. Off site protective action recommendations

D. Off site notification

In the event of an emergency classification at the MGDS facility, the off site notification network is utilized to notify the state and county 24 hour contact points. All communication methods are available from the Shift Supervisor's area and from the primary and alternate Emergency

Operation Centers. Section 11.6.2 describes the communications capability on site to the off site state and county contact points.

11.3.3 Information to be Communicated

11.3.3.1 Emergency Message Form

A standardized emergency message format has been established for use between the MGDS facility and the federal, state, and county emergency management personnel. The standardized message form is shown in Figure 11.0A. The MGDS facility Emergency Plan Implementing Procedures address notification requirements consistent with the emergency classification and the action level schedule.

11.3.3.2 Supporting Information

Figure 11.0H shows off site protective action recommendations the MGDS facility personnel make to assist the state and local off site authorities in preparing emergency messages for public information. (WJL-123)

11.4 RESPONSIBILITIES

11.4.1 Normal Facility Organization

The normal facility operating organization is shown in Figure 11.0B. Detailed information regarding the normal facility organization is provided in Chapter 2.

11.4.2 Facility Organization During Emergency Conditions

Figure 11.0C shows the facility organization during emergency conditions. The relationship of these personnel to their normal responsibilities and duties is unchanged during and emergency condition. Special responsibilities for each position are outlined below.

11.4.2.1 Emergency Coordinator

Initial activities at the MGDS facility during any emergency condition are directed by the Shift Supervisor from the Central Control Room. The Shift Supervisor assumes the functions of the Emergency Coordinator until the arrival of the MGDS Facility Manager or his designee, at which time the MGDS Facility Manager or his designee assumes the functions of the Emergency Coordinator. The Emergency Coordinator has the authority and the responsibility to immediately and unilaterally initiate any emergency actions, including:

A. Provide protective action recommendations to authorities responsible for implementing off site emergency measures. This authority shall not be delegated to other members of the emergency organizations.

B. Notification and activation of the facility, county, state, Department of Energy (DOE), Department of the Air Force (DAF), and Nuclear Regulatory Commission (NRC) emergency organizations having a response role.

C. Continued assessment of actual or potential consequences both on site and off site throughout the evolution of the emergency condition.

D. Effective implementation of counter measures in the environs, including protective actions for affected areas, implementation of monitoring teams, and facilities to evaluate the environmental consequences of the emergency condition, and prompt notification of and communications with off site authorities.

E. Continued maintenance of an adequate state of emergency preparedness until the emergency situation has been effectively resolved and the facility is returned to a normal and safe condition.

11.4.2.2 Shift Manager

[Note: The nuclear power industry typically utilizes the Shift Manager (Shift Technical Advisor) to assist the Shift Supervisor during non-routine events. The MGDS facility organization may or may not use this position.]

The Shift Manager on duty ensures that all actions required during any emergency condition have been performed and that all action necessary for the protection of persons and property are being taken. The Shift Manager continues to take all actions necessary to ensure that any emergency condition is brought under control.

11.4.2.3 MGDS Facility Manager

The MGDS Facility Manager (Emergency Coordinator), or in his absence a designated alternate, has responsibility and authority for activation of the Emergency Operations Center (EOC). The MGDS Facility Manager staffs the EOC with those personnel deemed necessary to allow the Central Control Room to gain immediate control of the emergency condition. The MGDS Facility Manager has direct communications via telephone and radio with off site Response Teams, and via telephone to DOE, DAF, and NRC representatives. The MGDS Facility Manager maintains lines of communication and consultation with these agencies to ensure that they are informed of the emergency condition at all times, in accordance with this Emergency Plan.

11.4.2.4 Operations Manager

The Operations Manager, when designated, assumes the duties of the MGDS Facility Manager. The Operations Manager provides technical expertise to the MGDS Facility Manager and the Shift Supervisor regarding solutions to operational problems. The Operations Manager ensures that each operating shift is staffed with competent personnel who are trained and are prepared to manage all abnormal conditions, and augments personnel resources as necessary to accomplish

this goal. The Operations Manager provides technical expertise to other members of the Emergency Operations Center (EOC) and works closely with the Maintenance Manager in restoring facility equipment to operational status during and after the abnormal condition.

11.4.2.5 Technical Support Manager

The Technical Support Manager, when designated, assumes the duties of the MGDS Facility Manager. The Technical Support Manager provides expertise to the MGDS Facility Manager and the Shift Supervisor regarding solutions to technical problems and provides technical expertise to the other members of the EOC in Chemistry and Engineering. The Technical Support Manager's duties include responsibility for communications with off site emergency response groups. The Technical Support Manager ensures that all areas of responsibility under the Technical Support Manager's direction are staffed with competent personnel who are properly trained and are prepared to support resolution of any abnormal emergency condition.

11.4.2.6 Maintenance Manager

The Maintenance Manager, when designated, assumes the duties of the MGDS Facility Manager. The Maintenance Manager provides expertise to the MGDS Facility Manager and the Shift Supervisor regarding solutions to maintenance problems. The Maintenance Manager provides technical and engineering expertise to the other members of the EOC in area of mechanical maintenance, planning, instrument and electrical maintenance, and materials support. The Maintenance Manager ensures that all areas of responsibility under the Maintenance Manager's

direction are staffed with competent personnel who are properly trained and are prepared to support resolution of any abnormal condition.

11.4.2.7 Compliance Manager

[Note: The nuclear power industry typically utilizes a Compliance Manager to interface with the regulatory organizations (NRC, EPA, etc.) This position may be combined with another at the MGDS facility.]

The Compliance Manager, when designated, assumes the duties of the MGDS Facility Manager. The Compliance Manager provides technical expertise to the MGDS Facility Manager and the Shift Supervisor regarding conditions at the facility. The Compliance Manager provides technical expertise to other members of the EOC in the areas of licensing and emergency preparedness. This includes responsibilities for communications with the NRC Emergency Operations Center. The Compliance Manager ensures that all areas under the Manager's direction are staffed with competent personnel who are properly trained and are prepared to support resolution of any abnormal condition.

11.4.2.8 Evacuation Coordinator

The designated Evacuation Coordinator, when designated, assumes the duties of the MGDS Facility Manager. The designated Evacuation Coordinator is also responsible for providing administrative support for the EOC. When designated, the Evacuation Coordinator controls

security personnel in coordinating evacuation of affected areas of the facility and in accounting for facility personnel.

11.4.2.9 Radiation/Chemical Protection Manager

The Radiation/Chemical Protection Manager is responsible for providing EOC personnel information and recommendations to the Emergency Coordinator concerning actions at the facility and off site which are deemed necessary for limiting exposures to facility personnel and members of the general public. This individual also has prime responsibility for decontamination activities, with assistance from others as necessary.

11.4.2.10 Community Relations Coordinator

The Community Relations Coordinator is responsible for coordinating news releases to the public. This includes ensuring that news releases about the MGDS facility are coordinated with other agencies making similar releases. The Emergency Coordinator MGDS Manager) has approval authority for all news releases regarding emergencies at the MGDS facility.

11.4.3 Local Off Site Assistance to the MGDS Facility

On an annual basis, the MGDS facility establishes and maintains formal written emergency assistance agreements with the following agencies/groups:

A. Hospital

B. Fire Department

C. Local and State law enforcement agencies

D. Local Emergency Planning Committee

Copies of these emergency assistance agreements, if applicable, and other related correspondence are presented as Figures 11.0D, E, and H.

A current telephone listing of all off site organizations which might be needed during site emergency situations is maintained as part of the facility's Emergency Response Plan Implementing Procedures. The facility Emergency Coordinator or his designee is responsible for contacting and requesting assistance from local off site emergency organizations when required during emergency situations.

WJL-83 Hospital, located approximately WJL-84 miles from the facility, is used for treatment of personnel who cannot be satisfactorily treated at the facility. Physicians at the hospital, as well as other local physicians, are notified in writing by the MGDS staff of potential chemical and radiological hazards associated with facility operations. This provides a basis for the physicians' planning for potential cases they may be asked to treat.

[Note: In the utility industry, nuclear power plant staff has customarily provided required training to community support agencies. The MGDS facility staff also provides such training.]

Coordination and interaction of the facility with off site agencies/organizations in an emergency response situation is illustrated in Table 11.0B. Facility emergency response personnel meet at least annually with each designated participant off site assistance group to accomplish training and to review items of mutual interest.

11.5 EMERGENCY RESPONSE MEASURES

11.5.1 Activation of Emergency Response Organization

The Emergency Operations Center (EOC) is activated as required by the appropriate implementing procedures. Activation of the EOC is required for the Alert and Site Area classifications. Should conditions warrant, the Shift Supervisor may elect to partially activate the EOC. This would only occur if the event is of short duration and is easily managed by a few personnel.

11.5.2 Assessment and Corrective Actions

The emergency classification scheme outlined in Section 11.3 is used to classify initiating events.

11.5.2.1 Dose Assessment

A dose assessment methodology provides the capability to calculate the dose from actual release following an accidental release of radioactive materials (WJL-114). The dose assessment model uses local meteorology in conjunction with the amount of radioactive material released.

11.5.2.2 Hazardous Material Release

Determinations are made as to the extent of planning for a hazardous material release, based on the technology chosen and the hazardous materials involved.

11.5.3 Mitigating Actions

Abnormal operations or emergency procedures provide mitigating actions for emergency events at the MGDS facility.

11.5.4 Protective Actions

The MGDS facility on site paging system (loudspeakers and local radio network) provides the principal means to alert and notify site personnel of an emergency situation. Facility employees not having emergency assignments, visitors, and contractor personnel who are in the area of concern are conducted to assembly areas. Evacuation of on site personnel to off site locations is detailed in implementing procedures.

11.5.4.1 Provisions

Provisions for emergency equipment for the Emergency Response Organization are provided for. MGDS facility kits are made immediately available. Specific contents of the emergency kits are listed in the MGDS facility Radiation Protection Procedures.

11.5.4.2 Contamination Control

Radiation Protection Procedures outline the contamination control measures to be taken during emergency events. Radiation Protection personnel that are members of the Emergency Response Organization provide specific guidance and direction for contamination control for the emergency event.

11.5.5 Exposure Control in Radiological Emergencies

11.5.5.1 Emergency Radiation Exposure Control Program

11.5.5.1.1 Exposure and Monitoring

For emergency incidents involving personnel radiation exposure, efforts are made to maintain exposure limits As Low As Reasonably Achievable (ALARA). The MGDS facility Emergency Coordinator is responsible for authorization of emergency workers receiving radiation exposure in excess of prescribed limits.

11.5.5.1.2 Emergency Worker Exposure Guidelines

WJL-106

11.5.5.1.3 Monitoring

Dose estimation techniques are subdivided into several categories:

A. TLD badges are worn by MGDS facility employees to monitor beta and gamma exposure.

[Note: The following may or may not be required, pending the accident analyses for the MGDS facility.]

B. Criticality dosimeters are located within the surface headquarters building. When recovered and evaluated, the dosimeters provide spectrum information and assist in reconstruction of any criticality incident.

C. Air sampling is used in situations involving airborne dispersal of radionuclides.

D. Bioassay sample collection (fecal, urine, and nose smears) also are used for assessing internal exposure.

Dose records are evaluated and maintained by the Radiation Protection Group.

11.5.5.2 Decontamination of Personnel

In the event of a minor or localized incident not involving facility evacuation, personnel decontamination is accomplished by using standard radiation protection practices. Available facilities in this situation include personnel showers for whole body decontamination and a decontamination kit for localized contamination involving a limited body area. Effectiveness of decontamination efforts are evaluated by Radiation Protection personnel. Procedures are available which specify the extent of decontamination efforts which may be undertaken without medical supervision. To support personnel decontamination during a facility evacuation, a decontamination kit, including selected decontamination agents is included with the emergency supplies. This kit enables prompt gross decontamination where low levels are involved. Action levels for determining the need for personnel decontamination and the means for decontamination

of personnel, wounds, supplies, instruments, and equipment is specified in facility response procedures.

11.5.6 Medical Transportation

In the event of an injury to facility personnel who may also be radiologically contaminated, WJL-85 is contacted and provides for ambulance transportation from the MGDS facility to WJL-83 Hospital.

[An ambulance and/or helicopter may be maintained on the MGDS site for evacuation.]

11.5.7 Medical Treatment

WJL-83 Hospital, located approximately WJL-84 miles from the MGDS facility, provides support services to the facility in the event of a medical emergency. Physicians associated with the hospital participate in annual emergency training involving the transportation and treatment of radiologically contaminated patients and those patients exposed to hazardous substances. Details regarding medical treatment arrangements between the MGDS facility and the off site hospital are described in letters of agreement (see Figures 11.0E and 11.0E).

11.6 EMERGENCY RESPONSE EQUIPMENT AND FACILITIES

11.6.1 Central Control Room

11.6.2 On Site Communications Equipment

The communications methods consist of the following:

A. Direct telephone system to the established state and county 24-hour contact points

B. Radio net, which includes the established state and county 24-hour contact points

C. Normal telephone system

D. Electronic facsimile net, which includes the established state and county 24-hour contact points

E. Emergency Notification System (ENC) to the NRC

F. Direct communication link with the DOE

11.6.3 On Site Medical Facilities

The MGDS medical facility is located in the WJL-87 building and has the following dedicated medical equipment: WJL-88

11.6.4 Emergency Monitoring Equipment

Specific MGDS facility implementing procedures list the equipment available for use during emergencies, as well as the frequency of inspection, inventory, and operational checks. The MGDS facility Radiation Protection Manual defines the criteria for calibration of all monitoring equipment for emergency use.

[Note: The following sections will be developed, based upon the specific technology chosen, the facility layout, and regulatory requirements. Typically, monitoring of liquid and air effluents is performed by process and area monitors. Meteorological monitoring could be performed from instrumentation located on a tower located at the MGDS facility site.]

11.6.4.1 Liquid Effluent Monitors

WJL-107

11.6.4.2 Air Monitors

WJL-108

11.6.4.3 Meteorological Monitors

WJL-109

11.7 MAINTENANCE OF EMERGENCY PREPAREDNESS CAPABILITY

11.7.1 Written Emergency Plan Implementation Procedures

The MGDS facility Emergency Preparedness Manager develops and maintains a formal set of "Emergency Plan Implementing Procedures" applicable to the MGDS facility. These documents provide the guidance necessary for implementing specific emergency procedures for accident conditions and for all other categorized non-routine operational events. The guidance indicates responsibility for preparing and implementing emergency plans for management of the facility and provides review and annual update of procedures. Individuals and groups assigned responsibilities in an emergency are informed of any changes in procedural requirements. A copy of all emergency instructions pertinent to each specific accident scenario and other categorized non-routine operational events are developed and included in the Emergency Plan Implementing Procedures.

11.7.2 Training

11.7.2.1 General Aspects

The Training Program is designed specifically to train the operating and maintenance personnel in the use and effective operation of equipment while performing the intended tasks at the facility. The training consists of both classroom instruction and in-facility training in four basic program elements:

A. Radiation Safety

B. Facility Operations

C. Equipment Operation

D. Emergency Procedures.

11.7.2.2 Training Period

Initial training for emergency response personnel is provided and annual retraining is accomplished and documented in facility training files. Training for Local Law Enforcement Agency personnel will be conducted in accordance with the Facility Security Plan, Section 1.5. Training for all emergency personnel complies with applicable DOE Orders and NRC regulations.

11.7.2.3 Facility Organization Training

Emergency Training for emergency response personnel is conducted in accordance with applicable MGDS facility procedures for the Emergency Response Training Program. Specific lesson outlines for this training and documentation of the training is available at the MGDS facility.

Practical drills are conducted for each group within the organization to allow the individuals to perform their assigned functions. Makeup sessions are given and documentation (objective evidence) that all persons received training is provided in facility training files. Drill action items are developed to make enhancements in areas identified.

11.7.2.4 Training Radiological Protection Monitoring Team Personnel

Training for Radiological Protection Monitoring Team personnel is conducted by the Radiation Protection Group. Specific lesson plans for this training and documentation of training is maintained by the Radiation Protection Group.

11.7.2.5 First Aid Training

A Medical Emergency Response Team is comprised of MGDS facility personnel from various internal work groups.

11.7.2.6 Emergency Response Training (Off Site Agency)

Emergency response training is provided to those organizations who may be called upon to respond to the MGDS facility emergencies by providing information necessary to allow them to protect themselves and others in providing fire, governmental, law enforcement, and medical support services. This program is further defined in the Emergency Response Training Program. Specific lesson guides for these presentations and documentation of training is available at the MGDS facility.

11.7.2.7 Off Site Support

Figures 11.0D and 11.0E illustrate letters of agreement with off site support organizations which provide support to the MGDS facility during emergencies. The letters of agreement also address training for off site support organizations.

11.7.3 Drills and Exercises

Planning, developing, scheduling, and conducting emergency response exercises and drills for the MGDS facility is the responsibility of the Emergency Preparedness Manager. Exercises are conducted in accordance with applicable DOE Orders, NRC requirements, and FEMA requirements. Scenarios are varied from year-to-year to ensure that all major elements of the emergency plan are tested over a six year period. Some exercises are unannounced to

participants and are conducted during off normal hours to ensure a continued high level of readiness to cope with emergency events.

11.7.4 Exercise Critiques

Evaluation and critiques of all emergency response exercises are made by non-participating observers as soon after the conclusion of the exercise as possible. The findings are forwarded to the facility Emergency Preparedness Manager. Changes (needed corrective action, etc.) identified by the observers and concurred in by the facility Emergency Preparedness Manager are communicated to participating organizations and groups as soon as possible following the exercise. All plans are revised to reflect necessary changes.

11.7.5 Critique Action Items

The oral evaluations made during the critique and any follow-up written evaluation are compiled into a "Critique Action Item List". The list is transmitted to persons designated to have lead responsibility in resolution of the items. Completion dates are established during development of the action item list. The MGDS facility Emergency Preparedness Manager ensures that all action items are resolved satisfactorily.

11.7.6 Review and Updating of the Plan and Procedures

At least every 12 months, the MGDS facility Emergency Preparedness Manager arranges for an independent review of the Emergency Preparedness Program. The review is conducted by the Quality Assurance organization and will include plans, procedures, training programs, drills/exercises, equipment, and state/local plan interfaces. The documented review report is submitted to the appropriate facility management. Appropriate portions of the review results are reported to concerned federal, state, and local organizations. MGDS facility management evaluates the findings and ensures effective corrective action is taken, as appropriate. The results of the review, along with recommendations for improvement, are documented and retained by Quality Assurance.

11.7.7 Maintenance and Inventory of Emergency Equipment, Instrumentation, and Supplies

All equipment described in the Plan is inventoried and inspected for operability in accordance with applicable MGDS facility procedures. Corrective action is effected, as necessary, to remedy deficiencies.

11.7.8 Verification of Emergency Telephone Numbers

Emergency telephone numbers contained in the facility's Emergency Plan or its implementing procedures are verified and updated periodically as required by DOE Orders, NRC requirements, and MGDS facility periodic test procedures.

11.8 RECORDS AND REPORTS

11.8.1 Records of Incidents

Records of emergency events are documented as completed procedures and are maintained in the completed procedures section of the document control area. These records are maintained permanently.

11.8.2 Records of Preparedness Assurance

Records are kept on file at the MGDS facility that confirm the Emergency Preparedness Program is designed to assure the proper response to radiological incidents and other emergencies. These records include training, drills, emergency equipment inventories and inspections, maintenance agreements with off site organizations, and reviews and updates of the Emergency Plan. These records are maintained for a minimum of five years.

11.9 RECOVERY DESCRIPTION

Recovery from an emergency incident begins when the emergency incident is under control and more deliberate planning can be made. It is the MGDS facility (Emergency Coordinator's) responsibility to determine when it is appropriate to enter into the recovery phase and terminate the emergency [Note: Determine if DOE and/or NRC should be included in the decision process]. Required activities may be performed prior to termination of the emergency, or they may be conducted as part of the recovery phase of response. Any facility or building reentry actions conducted prior to the termination of the emergency must be authorized by the MGDS facility Emergency Coordinator. Prior to facility or building reentry, the following actions are considered:

A. Assessment of radiological/hazardous material surveillance data to determine areas potentially affected.

B. Review of exposure histories of personnel required to participate in reentry operations.

C. Determination of adequacy of monitoring and survey instrumentation and equipment (i.e., type, range number, calibration).

D. Plan survey team activities to include:

   1) areas to be surveyed

   2) anticipated radiation and contamination levels

3) survey equipment required

4) shielding requirements and availability

5) protective clothing and equipment required

6) access control procedures, including exposure control limits and personnel dosimetry requirements

7) decontamination requirements

8) communications requirements.

E. Review and revise security access lists to prevent unauthorized or unintentional entry into hazardous areas.

F. Reentry teams should be tasked with as many of the following tasks as practicable:

1) determination of the initial required recovery operations

2) observation of hazards or potential hazards associated with the recovery operations

3) conduct of comprehensive surveillance of facilities

4) isolation and posting of areas

5) assessing conditions of equipment and areas.

In the period immediately following an incident, initial radiation/hazardous material monitoring involves only gross hazard assessment. This immediate surveillance is used to provide the basic initial information for recovery operations to begin.

11.9.1 Downgrade/Termination of an Emergency

Downgrading or terminating from an Alert or higher hazardous material emergency requires approval of the MGDS facility Emergency Coordinator. The following criteria for downgrading or terminating an emergency and beginning recovery operations shall be met:

A. Hazardous material/radiation exposure levels are stable or decreasing.

B. Affected facility is in a stable condition and can be maintained in that condition indefinitely.

C. Fire or other similar emergency conditions no longer constitute a hazard.

D. Releases of hazardous materials to the environment have ceased or are controlled.

E. Incident scene can be preserved until cognizant investigative authority concurs that recovery or normal operations may be resumed.

F. Discussions have been held with all off site agencies and agreement has been reached to terminate the emergency.

The extent of recovery activities will dictate the framework of the recovery organization:

A. For events of a minor nature, the facility organization should be adequate to perform necessary recovery actions.

B. For events involving damage to facility systems, the facility emergency response organization, or portions thereof, should be adequate to coordinate the necessary recovery actions.

C. For events involving significant damage to facilities, a formal recovery organization will be established to manage the recovery actions. (WJL 115)

11.9.2 Recovery Organization

Upon termination of an emergency, the Emergency Response Organization (WJL-115) is deactivated and a Recovery Organization is established to implement recovery plans. This organization is comprised of a Recovery Manager and key operating and security management positions representing broad functional areas. The Recovery Organization operates from the Emergency Operations Center.

11.9.3 Resumption of Normal Operations

A final briefing of all Recovery Organization personnel and the DOE site representative is held to discuss resumption of normal operations and requirements for final reports on recovery operations. All documentation of recovery operations is collected and processed for permanent storage.

Table 11.0A Off Site Communications

Table 11.0B Coordination and Interaction of the MGDS Facility with Off Site Agenices/Organizations

Figure 11.0A Standardized Emergency Notification Message Form

Figure 11.0B MGDS Facility Organization

Figure 11.0C Off Site Emergency Support

Figure 11.0D Letter of Agreement (Hospital)

Figure 11.0E Letter of Agreement (Fire Department)

Figure 11.0F Southern Nevada Map

Figure 11.0G Local Site Map

Figure 11.0H Off Site Protective Action Recommendations Form

REFERENCES

11.0A Regulatory Guide 3.67, Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities, NRC, 1992

11.0B NUREG-0654 FEMA REP-1 Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants

11.0C NUREG-0396 EPA 520/1-78-016 (Planning Basis for Development of State and Local Government Radiological Emergency Plans in Support of Light Water Nuclear Power Plants)

(NOTE: The following DOE Orders are not applicable to DOE facilities licensed by the NRC, but are referenced for information purposes.)

11.0D DOE Order 5000.3A, Occurrence Reporting and Processing of Operations Information

11.0E DOE Order 5500, Planning for Operations Emergencies

11.0F DOE Order 5500.2B, Emergency Notification, Reporting and Response

11.0G DOE Order 5500.3A, Emergency Planning and Preparedness

11.0H DOE Order 5500.6A, Readiness Assurance for Emergency Management

MGDS Annotated Outline Planning Package
Form 1: Text

Date: 9/30/92

1. Section No. & Title: **11.0 EMERGENCY PLANNING**

2. Lead Author & Phone No.: Bill Leonard
(702) 794-1861

3. First Phase Planning Package Due: 6/21/91

   Second Phase Planning Package Due: 10/18/91

   First Phase Skeleton Draft Due: 12/30/91

   Second Phase Skeleton Draft Due: 3/15/92

4. Plan Approved: W.R. Griffin 8/27/91
   (Licensing Mgr & Lead Author)

5. Section Summary (Approximately 100 Words):

   This chapter describes emergency planning for the Mined Geologic Disposal System (MGDS) facility in response to 10CFR60, Subpart I.

6. Opening Statement:

   [A statement similar to the following should be made in a potential license application: This chapter describes the planning for response to emergency conditions at the MGDS facility.]

7. Main Body Outline:

11.1 SITE DESCRIPTION

11.1.1 Description of Licensed Activity

11.1.2 Location

11.1.2.1 Demography

11.1.2.1.1 Permanent Population

11.1.2.1.2 Transient Population

11.1.2.2 Land Use Census

11.1.3 Facility and Site Description

7. Main Body Outline (Continued)

11.2 TYPES OF ACCIDENTS

11.2.1 Description of Postulated Accidents

11.2.1.1 Postulated Accidents

11.2.1.1.1 Natural Phenomena

11.2.1.1.2 Nuclear Criticality

11.2.1.1.3 Failure of Equipment

11.2.1.1.4 Fires in Critical Areas

11.2.1.2 Abnormal Operational Events

11.2.2 Detection of Emergency Conditions

11.2.2.1 Process System

11.2.2.2 Alarm System and Release Prevention

11.3 CLASSIFICATION OF ACCIDENTS

11.3.1 Classification System

11.3.1.1 Unusual Event

11.3.1.2 Alert

11.3.1.3 Site Area Emergency

11.3.1.4 Initiating Conditions/Emergency Action Levels

11.3.2 Notification and Coordination

11.3.3 Information to be Communicated

11.3.3.1 Emergency Message Form

11.3.3.2 Supporting Information

7. Main Body Outline (Continued)

11.4 RESPONSIBILITIES

11.4.1 Normal Facility Organization

11.4.2 Facility Organization During Emergency Conditions

11.4.2.1 Emergency Coordinator

11.4.2.2 Shift Manager

11.4.2.3 MGDS Facility Manager

11.4.2.4 Operations Manager

11.4.2.5 Technical Support Manager

11.4.2.6 Maintenance Manager

11.4.2.7 Compliance Manager

11.4.2.8 Evacuation Coordinator

11.4.2.9 Radiation/Chemical Protection Manager

11.4.2.10 Community Relations Coordinator

11.4.3 Local Off Site Assistance to the MGDS Facility

11.4.4 Coordination with Participating Government Agencies

11.5 EMERGENCY RESPONSE MEASURES

11.5.1 Activation of Emergency Response Organization

11.5.2 Assessment and Corrective Actions

11.5.2.1 Dose Assessment

11.5.2.2 Hazardous Material Release

11.5.3 Mitigating Actions

7. Main Body Outline (Continued)

- 11.5.4 Protective Actions
  - 11.5.4.1 Provisions
  - 11.5.4.2 Contamination Control
- 11.5.5 Exposure Control in Radiological Emergencies
  - 11.5.5.1 Emergency Radiation Exposure Control Program
    - 11.5.5.1.1 Exposure and Monitoring
    - 11.5.5.1.2 Emergency Worker Exposure Guidelines
    - 11.5.5.1.3 Monitoring
  - 11.5.5.2 Decontamination of Personnel
- 11.5.6 Medical Transportation
- 11.5.7 Medical Treatment

11.6 EMERGENCY RESPONSE EQUIPMENT AND FACILITIES

- 11.6.1 Control Room
- 11.6.2 On Site Communications Equipment
- 11.6.3 On Site Medical Facilities
- 11.6.4 Emergency Monitoring Equipment
  - 11.6.4.1 Liquid Effluent Monitors
  - 11.6.4.2 Air Monitors
  - 11.6.4.3 Meteorological Monitors

11.7 MAINTENANCE OF RADIOLOGICAL CONTINGENCY PREPAREDNESS CAPABILITY

- 11.7.1 Written Emergency Plan Implementation Procedures

7. Main Body Outline (Continued)

11.7.2 Training

11.7.2.1 General Aspects

11.7.2.2 Training Period

11.7.2.3 Facility Organization Training

11.7.2.4 Training Radiological Protection Monitoring Team Personnel

11.7.2.5 First Aid Training

11.7.2.6 Emergency Response Training (Off Site Agency)

11.7.2.7 Off Site Support

11.7.3 Drills and Exercises

11.7.4 Exercise Critiques

11.7.5 Critique Action Items

11.7.6 Review and Updating of the Plan and Procedures

11.7.7 Maintenance and Inventory of Emergency Equipment, Instrumentation, and Supplies

11.7.8 Verification of Emergency Telephone Numbers

11.8 RECORDS AND REPORTS

11.8.1 Records of Incidents

11.8.2 Records of Preparedness Assurance

11.9 RECOVERY

11.9.1 Recovery Description

11.9.2 Downgrade/Termination of an Emergency

11.9.3 Recovery Organization

7. Main Body Outline (Continued)

11.9.4 Resumption of Normal Operations

8. Conclusion:

[A statement similar to the following should be made in a potential license application: This chapter demonstrates compliance with 10CFR60, Subpart I.]

9. Support Authors & Their Assignments:

None assigned at this time

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **11.0 EMERGENCY PLANNING**

Lead Author & Phone No. Bill Leonard
(702) 794-1861

A. Figure No. **11.0A**

Caption/Title: **Standardized Emergency Notification Message Form**

Content: Message format & content TBD- WJL-110

B. Figure No. **11.0B**

Caption: **MGDS Facility Organization for Normal Operations**

Content: An organization chart indicating the MGDS facility organization structure for normal operations -WJL-111

C. Figure No. **11.0C**

Caption: **Off Site Emergency Support**

Content: An organization chart indicating the on site and off site emergency support relationships -WJL-112

D. Figure No. **11.0D**

Caption/Title: **Letter of Agreement (Hospital)**

Content: A letter of agreement between the MGDS facility and off site hospital(s), detailing emergency interface and assistance.

Section No. & Title: **11.0 EMERGENCY PLANNING**

Lead Author & Phone No. Bill Leonard
(702) 794-1861

E. Figure No. **11.0E**

Caption: **Letter of Agreement (Fire Department)**

Content: A letter of agreement between the MGDS facility and off site fire department(s), detailing emergency interface and assistance.

F. Figure No. **11.0F**

Caption: **Southern Nevada**

Content: A map of southern Nevada, showing the location of the MGDS facility.

G. Figure No. **11.0G**

Caption/Title: **Local Site Map**

Content: A map of the MGDS facility site.

H. Figure No. **11.0H**

Caption: **Off Site Protective Action Recommendations Form**

Content: A form used for recommending protective action for off site agencies/organizations.

MGDS Annotated Outline Planning Package
Form 2: Figures & Tables

Date: 9/30/92

Section No. & Title: **11.0 EMERGENCY PLANNING**

Lead Author & Phone No. Bill Leonard
(702) 794-1861

A. Table No. **11.0A**

Caption/Title: **Off Site Communications**

Content: A table indicating the primary and back-up means of communication with off site agencies/organizations.

B. Table No. **11.0B**

Caption: **Coordination and Interaction of the MGDS Facility With Off Site Agencies/Organizations**

Content: A table outlining coordination and interaction relationships between the MGDS facility and outside agencies/organizations.

C. Figure/Table No.:

Caption/Title:

Content:

D. Figure/Table No.:

Caption/Title:

Content:

MGDS Annotated Outline Planning Package
Form 3: References

Date: 9/30/92

Section No. & Title: **11.0 EMERGENCY PLANNING**

Lead Author & Phone No. Bill Leonard
(702) 794-1861

Instructions: List all books, articles, or other references that are expected to be used for the section. Indicate whether references are draft or final, and whether they are publicly available (i.e., published). Refer to the Writer's Guide, Appendix D of the Annotated Outline Management Plan for guidance on formatting reference information.

1. NUREG-0654 FEMA REP-1 Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants

2. NUREG-0396 EPA 520/1-78-016 (Planning Basis for Development of State and Local Government Radiological Emergency Plans in Support of Light Water Nuclear Power Plants)

(NOTE: The following DOE Orders are not applicable to DOE facilities licensed by the NRC, but are referenced for information purposes.)

3. DOE Order 5000.3A, Unusual Occurence

4. DOE Order 5500, Planning for Operations Emergencies

5. DOE Order 5500.2B, Emergency Notification, Reporting and Response

6. DOE Order 5500.3A, Emergency Planning and Preparedness

7. DOE Order 5500.6A, Readiness Assurance for Emergency Management

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-75**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The name of the contractor to DOE for the operation of the MGDS facility.**
7. What is the information needed for? **Section 11.1.1**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After DOE selection of the contractor.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-76**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The average population of Mercury, Nevada for the last 10 years (2000 census).**
7. What is the information needed for? **Section 11.1.2.**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. **What kind of related information is already available in references, etc.?**

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-77**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The population of Beatty, Nevada (2000 census).**
7. What is the information needed for? **Section 11.1.2.**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-78**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The population of Amargosa Valley, Nevada (2000 census).**
7. What is the information needed for? **Section 11.1.2.**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-79**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The population of Nye County, Nevada within a 25-mile radius of the MGDS facility (based on the 2000 census).**
7. What is the information needed for? **Section 11.1.2.**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-80**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The population of Tonopah, Nevada (2000 census).**
7. What is the information needed for? **Section 11.1.2.**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-81**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Projection of the population growth within a 25-mile radius of the MGDS facility in the 50-year time span from 2000 to 2050.**

7. What is the information needed for? **Section 11.1.2.**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **After release of 2000 census results.**

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-82**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The basis of the population estimate projections.**
7. What is the information needed for? **Section 11.1.2.1.1**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-89**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **The estimated annual transient population within a 25-mile radius of the MGDS facility beginning in the year 2000 and projected for 50 years.**

7. What is the information needed for? **Section 11.1.2.1.2**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **After release of 2000 census results.**

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-90**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The recreational uses of land and water within a 50-mile radius of the MGDS facility.**
7. What is the information needed for? **Section 11.1.2.1.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-91**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **The numbers of schools, day care centers, hospitals, etc. within a 50-mile radius of the MGDS facility.**
7. What is the information needed for? **Section 11.1.2.1.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-92**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Discussion of residential land use within a 50-mile radius of the MGDS facility.**
7. What is the information needed for? **Section 11.1.2.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

The above Annotated Outline text is guidance that may be used for the future development of an MGDS License Application.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-93**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Discussion of industrial land uses within a 50-mile radius of the MGDS site.**
7. What is the information needed for? **Section 11.1.2.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

The above Annotated Outline text is guidance that may be used for the future development of an MGDS License Application.

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-94**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Discussion of agricultural land use within a 50-mile radius of the MGDS facility.**
7. What is the information needed for? **Section 11.1.2.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-95**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Discussion of water use within a 50-mile radius of the MGDS facility.**
7. What is the information needed for? **Section 11.1.2.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After release of 2000 census results.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-96**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Description and discussion of postulated accidents at the MGDS facility.**

7. What is the information needed for? **Section 11.2.1**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **After accident projection methodology has been established.**

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-97**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Description of postulated accidents.**
7. What is the information needed for? **Section 11.2.1.1**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After accident projection methodology has been established.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-98**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Description of postulated natural phenomena type accidents.**

7. What is the information needed for? **Section 11.2.1.1.1**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **After methodology for accident projection has been established.**

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-99**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Description of postulated nuclear criticality type accidents.**
7. What is the information needed for? **Section 11.2.1.1.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After methodology for accident projection has been established.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-100**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Description of postulated failure of equipment type accidents.**
7. What is the information needed for? **Section 11.2.1.1.3**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After accident projection methodology has been established.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-101**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Description of postulated fires in critical areas type accidents.**
7. What is the information needed for? **Section 11.2.1.1.4**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After methodology for accident projection has been established.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-102**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Description of abnormal operational events.**
7. What is the information needed for? **Section 11.2.1.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After methodology for identifying abnormal operational events has been established.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-103**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Discussion of methodology for detection of emergency conditions.**
7. What is the information needed for? **Section 11.2.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After methodology for detection of emergency conditions has been established.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-104**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Description of process system emergency conditions.**
7. What is the information needed for? **Section 11.2.2.1**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After methodology for detection of emergency conditions has been established.**
10. What kind of related information is already available in references, etc.?

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11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-105**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Description of alarm system and release prevention emergency conditions.**
7. What is the information needed for? **Section 11.2.2.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After methodology for detection of emergency conditions has been established.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-83**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **The name of the nearest full-service hospital to the MGDS facility.**

7. What is the information needed for? **Section 11.4.3.**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

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11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-106**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Description of exposure guidelines for emergency workers involved in emergency radiation incidents.**
7. What is the information needed for? **Section 11.5.5.1.2**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After establishment of emergency worker exposure guidelines.**
10. What kind of related information is already available in references, etc.?

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11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-84**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Distance from the MGDS facility to the nearest full-service hospital.**

7. What is the information needed for? **Section 11.4.3**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-85**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Identity of the organization to contact to provide ambulance transportation from the MGDS facility to the nearest full-service hospital in the event of injury to facility personnel requiring such service.**

7. What is the information needed for? **Section 11.5.6**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

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11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-86**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Identity of the facility building in which the Control Room (for emergency responses) is located.**

7. What is the information needed for? **Section 11.6.1**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

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11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-87**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Identity of the facility building in which the MGDS medical facility is located.**
7. What is the information needed for? **Section 11.6.3**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **Before the end of the century.**
10. What kind of related information is already available in references, etc.?

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11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-88**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Identification of the dedicated medical equipment located in the MGDS medical facility.**

7. What is the information needed for? **Section 11.6.3**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

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11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-107**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Discussion of Liquid Effluent Monitors used at the MGDS facility as part of the emergency monitoring equipment, including numbers and types.**

7. What is the information needed for? **Section 11.6.4.1**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-108**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **Discussion of Air Monitors used at the MGDS facility as part of the emergency monitoring equipment, including numbers and types.**

7. What is the information needed for? **Section 11.6.4.2**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

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11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-109**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Discussion of Meteorological Monitors used at the MGDS facility as part of the emergency monitoring equipment, including numbers and types.**
7. What is the information needed for? **Section 11.6.4.3**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **Before the end of the century.**
10. What kind of related information is already available in references, etc.?

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11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-110**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **The text of a standard emergency notification message form to be used by MGDS facility management to notify concerned organizations regarding an emergency situation.**

7. What is the information needed for? **Figure 11.0A**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

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11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-111**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **An organization chart showing the MGDS facility organization for normal (non-emergency) operations.**
7. What is the information needed for? **Figure 11.0B**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **Before the end of the century.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-112**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed: **An organization chart showing on site and off site emergency support relationships.**

7. What is the information needed for? **Figure 11.0C**

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-113**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **U. S. decennial census report for the year 2000.**
7. What is the information needed for? **Section 11.1.2.1**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **After the end of the century.**
10. What kind of related information is already available in references, etc.?

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11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-114**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Radiation dose assessment methodology.**
7. What is the information needed for? **Section 11.5.2.1**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **Before the end of CY 1997.**
10. What kind of related information is already available in references, etc.?

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11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-115**
2. Section no. & title: **11.0 EMERGENCY PLANNING**
3. Lead author & phone no: **W. J. Leonard (702) 794-1861**
4. Information request date: **6/22/92**
5. Work location: **M&O - Las Vegas**
6. Type of information needed: **Formal recovery organization (chart)**
7. What is the information needed for? **Section 11.9.3**
8. What group is the probable information supplier? **Yucca Mountain Project Office**
9. When is the information needed? **Before the end of CY 1997.**
10. What kind of related information is already available in references, etc.?

---

11. Response by (name):
12. Response date:
13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-123**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Conditions which would require notification to and involvement of off site support agencies and examples of off site protective action recommendations which would be made to off site agencies.

7. What is the information needed for?

   Sections 11.3.2 and 11.3.3

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

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11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form A: Information Request

Date: 9/30/92

1. Log number: **WJL-124**

2. Section no. & title: **11.0 EMERGENCY PLANNING**

3. Lead author & phone no: **W. J. Leonard (702) 794-1861**

4. Information request date: **6/22/92**

5. Work location: **M&O - Las Vegas**

6. Type of information needed:

   Alternate locations for use in central control in the event the Central Control Room is not available.

7. What is the information needed for?

   Section 11.6.1

8. What group is the probable information supplier? **Yucca Mountain Project Office**

9. When is the information needed? **Before the end of the century.**

10. What kind of related information is already available in references, etc.?

---

11. Response by (name):

12. Response date:

13. Response:

MGDS Annotated Outline Information Need Form
Form B: Information Response

Date: 9/30/92

1. Section No. & Title:

2. Person Supplying Information:

3. Phone No.:

4. Lead Author (Requester):

5. Response by Information Supplier:

Note: Attach additional sheets if necessary.

MGDS Annotated Outline Information Need Form
Form C: Information Request Tracking Log

Date: 9/30/92

Note: This is a recommended format for a manual tracking system. Other tracking methods such as a simple computer data base are also acceptable.

Date:

Lead Author:

Log. No.	Section	Date Issued	Date Response Received