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PRELIMINARY REPORT ON THE FEASIBILITY OF PRIORITY LOADING OF THE LICENSING SUPPORT SYSTEM (LSS)

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CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

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1 BACKGROUND

The Nuclear Waste Policy Act provides for the licensing, construction, operation and closure of a geologic repository for High-Level Waste. As mandated by Congress, a single potential site for this geologic repository is being studied and characterized at this time at Yucca Mountain, Nevada, by the Department of Energy. If the site characterization is favorable, it is currently anticipated that the DOE will submit an application for a license to construct a geologic repository for high-level radioactive waste to the Nuclear Regulatory Commission in 2001.

Following initial review and acceptance for docketing of the License Application, the formal NRC review and hearing will be held on whether or not to issue authorization to construct the repository. Congress has mandated that the NRC review of the license application and the hearing process be concluded within a three year period. With the approval of Congress this period may be extended to four years. The period during which the hearing process must be concluded is substantially less time than has been required historically to conduct reviews and hearings for power reactor licensing. Therefore, the NRC has established special rules for the conduct of the hearing, using a negotiated rulemaking with the anticipated parties to the licensing proceeding. These special rules, in part, call for the development and implementation of the Licensing Support System (LSS), a computerized information system which will provide an electronic means of discovery, technical review and filing of hearing documents. The LSS is intended to contain all documentary materials that may be pertinent to the hearing, an anticipated volume of approximately 20 million pages[1] by the time that the hearing begins. Some of these materials are already accumulating in a backlog which will ultimately be loaded into the LSS along with documentary materials that are currently being produced.

1.1 APPROACH

The LSS Administrator has tasked the Center for Nuclear Waste Regulatory Analyses (Center) to investigate the feasibility of loading documentary materials into the LSS in a priority sequence and to prepare a preliminary report based upon the results of these investigations and analyses. Following the preparation of this Preliminary Report on the Feasibility of Priority Loading of the LSS, the Center is to conduct interviews with potential users of the LSS in order to validate and further refine the initial findings. Upon completion of the interviews with potential users, the Center is to prepare a final recommendation on the feasibility of priority loading. Following this final determination of the feasibility of priority loading, a Priority Document Loading Model will be designed and implemented to provide a Priority Document Loading Schedule.

The analyses and conclusions in this preliminary report are based primarily upon the experience and expertise of the Center staff as well as comments and observations received from representatives of prospective LSS participants in the course of the LSS Task 1 investigations. Current HLW schedule information was collected through a limited review of documents pertaining to the HLW schedule and anticipated programmatic activities. Some of the most recent DOE projections pertaining to the anticipated volumes and the types of documentary

materials which will be produced and loaded into the LSS were requested but have not been made available. Therefore, the information contained in these DOE projections is not reflected in this report. Due to the preliminary nature of this report, no validation or refinement of its characterizations and conclusions, beyond review and comment by the Center staff, have been performed at this time.

In making a preliminary determination of the feasibility of priority loading of the LSS it is necessary to address several basic issues:

- The reality and urgency of the need for priority loading.

  There are many possible approaches to determining the sequence for loading documentary materials into the LSS, ranging from simple accession sequence to some more complex loading sequence based upon a combination of document date, topic and other attributes. Ideally, the loading sequence should be that which best meets the anticipated information needs of the users. However, some determination should be made as to the reality and urgency of the requirement for priority loading from the user's perspective.

- The feasibility of priority loading.

  If priority loading is found to be a real and urgent requirement from the user's perspective, then it must be determined whether or not such priority loading is feasible. Determining the feasibility of priority loading requires that three additional topics be addressed:

  - An appropriate characterization and projection must be made of user information needs.
  - The timing of those information needs must be projected and characterized.
  - It must be possible to identify and load documentary materials into the LSS in anticipation of those information needs.

This paper addresses each of these topics and illustrates the need for priority loading and the preliminary indications that such priority loading is feasible.

1.2 THE NEED FOR PRIORITY LOADING

In order to make the LSS as useful as possible, it is important that documentary materials be loaded and made available to the potential parties to the licensing proceeding as quickly as possible. However, during the time required to develop and implement the LSS, a considerable backlog of documentary materials is expected to accumulate. Therefore, it will be very important

to prioritize the loading of documentary material into the LSS in some way which will permit the most important documents to be loaded into the LSS and made available to the users at the earliest possible time following their identification and capture.

Regardless of the approach that is taken to loading the LSS, there will be a loading priority. If no intentional priority is imposed, then the loading priority will, in fact, be the one defined by the physical organization and sequence of the input documents. The DOE is planning to implement a comprehensive document management system known as Infostreams, an overview of which was presented to the Licensing Support System Advisory Review Panel in July of 1991[2]. If DOE begins loading data into the Infostreams system with the intention of submitting electronic copies of the documentary materials to the LSS, then the loading priority for much of the LSS may very well be influenced by the availability of these electronic copies. In that case, the loading priority of the LSS would be driven by the loading priorities applied to the Infostreams system. In a very real sense, the question is not whether to have priority loading, but which approach to priority loading will best meet the needs of the LSS users.

The need for an appropriate priority loading approach is further illustrated by issues associated with the accumulating backlog of documentary materials. These materials, dating back to the early 1980's and late 1970's, will ultimately have to be loaded into the LSS. The LSS is not expected to be operational before 1996, but some loading could begin as early as 1994 if the implementation of the system is expedited. Infostreams, however, is anticipated to be operational well before the LSS. Therefore, when the LSS becomes available for document loading, there is expected to be a considerable backlog of materials, some in electronic form and some in hard copy. Some of these materials will be quite old and some will be relatively current. How, then, should this backlog be managed and loaded? If an approach to priority loading were based upon reverse date sequence, then current information would be loaded upon receipt and the more recent documents from the backlog would be loaded afterwards. This approach would keep the LSS relatively current and the backlog would be reduced gradually over a period of years. However, this approach may not be appropriate for geophysical data which, unlike correspondence and some other document classes, does not become less relevant with time. Similarly, if loading of the LSS begins in 1996, concurrent with the completion of the advanced conceptual design and the beginning of the license application design, then the information needs of the users might be better served by loading older documents pertaining to site characterization and repository design issues while delaying the loading of documents related to other subject matters.

Potential LSS users within the Center, representing the anticipated concerns and interests of management, technical and legal staff, have expressed the opinion that the LSS could play an important role in their current and future work. They also have expressed a desire for the system to be made available at the earliest possible time. A common thread in their comments was that they could use the LSS now and that its potential usefulness and the urgency of their need for it would only increase with time. It is recognized that the completeness and comprehensiveness of information in the LSS will be a major factor in the acceptance and effective utilization of the system during the license review and hearing phases of the HLW schedule. However, these

potential users felt that during the early pre-license application phases of the schedule, the issue of the completeness of the information in the LSS was less important than the issue of the timely availability of the system itself. In general, they were prepared to accept limited information in the LSS when it is first implemented, but they strongly indicated that the LSS, even with limited information, would be needed at the earliest possible time during the pre-license application phase of the schedule.

A general consensus was voiced with respect to priority loading which was intuitively obvious, yet profound: **the information most desired by potential users of the LSS would be that information which was not already available to them**. Such information tends to take the form of unpublished documentary materials. Of course, if adequate capture station capacity and performance can be achieved, then the information already available to the user in the form of published reports should also be loaded to provide complete document access.

Thus, priority loading of the LSS will be very important to potential users if this priority loading is guided by the objective of first providing information which is not readily available by other means or from other sources.

2 THE FEASIBILITY OF PRIORITY LOADING OF THE LSS

The analyses summarized in the body of this preliminary report support the conclusion that an approach to priority loading of the LSS can be developed which will provide the information most needed by potential users in a timely and effective manner. Developing this approach to priority loading will involve the steps outlined below.

- CHARACTERIZATION OF THE GENERAL PARAMETERS OF LSS USE
  - Characterization of the anticipated uses of the LSS;
  - Characterization of the potential users of the LSS;
  - Characterization of the information needs of those users and reconciliation of conflicting needs where possible.
- CHARACTERIZATION OF THE EFFECT OF THE HLW SCHEDULE ON THE LSS
  - Characterization of user information needs by schedule phase
- CHARACTERIZATION OF INFORMATION NEEDS WHICH ONLY THE LSS CAN ADDRESS
  - Characterization of user information needs which would not easily be satisfied from information sources other than the LSS
- CHARACTERIZATION OF CATEGORIES FOR PRIORITY LOADING
  - Identification of document categories which would satisfy these information needs

Based on its preliminary assessment, the Center concludes that the early implementation of the LSS coupled with the development of an effective approach to priority loading is essential to its acceptance and utilization by the full population of potential users.

- If the LSS is not implemented on a timely basis, it will not be available for use in many important tasks during the pre-license application phase.
- When implemented, if the LSS does not contain information to satisfy specific needs, the potential users will not utilize it.
- If the potential users do not actively utilize the LSS, there will be little opportunity to gain real-world experience to refine the system to meet identified needs.

Therefore, the immediate development of the LSS on a limited scale or pilot basis, coupled with the development of an approach to priority loading of documentary materials, is recommended as the best way to achieve timely and effective implementation and user acceptance of the system as a whole.

3 ASSUMPTIONS

The preliminary conclusion that priority loading of the LSS is both feasible and essential is based upon the following underlying assumptions.

1. In accordance with the recommendations made in the Center's September 1991 report entitled "Alternative Ways of Making Packaged Documentary Materials Accessible Within the Licensing Support System"[3], it is assumed that:

   - All scannable documentary material will be converted to image form;
   - All textual information which can be converted to ASCII text will be converted and processed to permit full text searching;
   - Package table of contents will be processed to permit users to search them as ASCII full text;
   - Package table of contents will be processed to permit users to select component documentary materials directly from the table of contents and then directly retrieve the image and/or text of the selected materials.

2. The LSS will have both header and full text search and retrieval facilities which will permit the user to find most materials by either of these two search methods. This dual search capability is intended to provide a balanced approach to identifying and retrieving documentary materials and it overcomes the limitations that would be encountered if either header or full-text searching were used exclusively. It is assumed that this balanced, multiple path search facility will be implemented, where possible, for all documentary materials entered in the LSS.

3. It is assumed that the loading of documentary materials into the LSS will not be decoupled from the implementation of full search and retrieval capabilities for those documentary materials. Following the capture of images of the documentary materials and the entering of the bibliographic headers for those materials, the full-text search facilities will be implemented within a reasonable period of time.

4. It is anticipated that the overriding desire of all LSS users will be to obtain information from the LSS which they do not already possess. This desire is expected to prevail uniformly, whether users are addressing the LSS from the perspective of the DOE, the NRC, the State of Nevada, intervenors or other interested parties.

5. It is expected that the early users of the LSS during the pre-license application phase of the HLW schedule will be primarily technical staff from all participants who are engaged in technical review activities. In addition to these technical staff users it is expected that there will be management and legal staff users who will access the LSS to help focus

technical review activities. These users are expected to be reasonably computer literate and experienced in the use of document retrieval systems. They are also expected to have well defined information needs and tightly focused queries. As such, these early users are expected to be well equipped to use the LSS effectively.

An indication of the existence of such potential early users of the LSS has been found in comments received from the Center and NRC technical staffs which expressed the desire to have the LSS available at the earliest possible time so that it can be used in performing technical review and assessment tasks during the pre-license application phase of the schedule. It is anticipated, therefore, that at the time the LSS becomes available (either as a prototype or as a full-scale system) there will be a population of potential users who (a) will represent all participants, (b) will be computer literate and (c) will have a backlog of very specific and focused queries which they wish to pursue.

6. It is expected that the information needs of these initial users during the pre-license application phase will be tightly focused on specific subject matters and will be heavily biased toward material such as peer-review documents, raw data, laboratory notebooks, etc. which would be difficult to retrieve and examine apart from the LSS.

7. It is expected that the availability of published reports through the LSS will be relatively less important to these initial users because such published reports are readily available from other sources.

8. It is anticipated that as the LSS grows and matures, the population of potential users will reflect a wider range of computer literacy and familiarity with document retrieval systems. An increasing proportion of the new LSS users is expected to be relatively less sophisticated in their approach to the system, less computer literate and less focused in their information needs. Therefore, as the system matures, the importance of the availability of published reports in the LSS is expected to increase, as is the importance of the breadth of subject matter.

9. It is expected that the use of topical searches will predominate throughout the life of the system. The users are expected to search through the LSS looking for information about specific subjects, issues, or studies, moving from document to document as information is found and new potentially fruitful queries are suggested. Thus, from the perspective of the user, it would be desirable to load all available information on a given topic, without regard for source, date, document type or media type.

4 CHARACTERIZATION OF USES, USERS, CURRENT SCHEDULE AND INFORMATION NEEDS

4.1 CHARACTERIZATION OF THE ANTICIPATED USES OF THE LSS

A preliminary characterization of the anticipated uses of the LSS has been prepared. No final determination of the ways in which individual users will access the LSS to satisfy their information requirements can be made at this time, but a preliminary characterization can reasonably be projected. Fifteen different uses of the LSS have been identified. These anticipated uses are independent of the individual classes of anticipated users in that it is expected that all parties to the licensing proceedings will access the LSS to one degree or another in all of these ways.

1. Retrieving known documentary materials
2. Searching for the existence of information
3. Searching for responses triggered by events
4. Comparing information
5. Concurrent referencing of documentary materials by colleagues
6. Looking for inconsistencies
7. Looking for evidence to substantiate a position
8. Looking for unsubstantiated conclusions
9. Retrieving technical information
10. Technical review and assessment
11. Reviewing compliance with statutes and regulations
12. Discovery
13. Litigation support
14. Electronic submission of hearing documents
15. Access to official record of hearing(s)

Many of these anticipated uses of the LSS involve the use of both images and searchable ASCII text. Particularly with regard to those uses such as technical review and assessment, discovery, litigation support and access to official record of hearing(s), the performance of the LSS would be seriously compromised by omission of ASCII text or by decoupling the header and full-text search capabilities. Therefore, it will be important to implement the full capabilities of the LSS as early as possible to support these anticipated uses.

4.2 CHARACTERIZATION OF THE ANTICIPATED USERS OF THE LSS

A preliminary analysis and characterization has been prepared of all of the known and anticipated classes of LSS users. Additional work will be performed prior to the final recommendation on priority loading to extend these analyses and to characterize the information requirements and activities expected within each user class. A projection will also be made of the ways in which each class of user and each functional area within that class is expected to employ the LSS[4].

The anticipated users of the LSS fall into two groups: those known users identified in the LSS rule and the others who are alluded to in a general way by the Rule or who may be reasonably inferred. The known users of the LSS, as defined by 10 CFR Part 2 Subpart J include the Department of Energy (DOE), the Nuclear Regulatory Commission (NRC), the host state (State of Nevada), Affected Indian Tribes, Interested Governmental Participants, environmental groups, other potential parties admitted to the licensing proceeding, and public access users. In addition to the known users, the LSS Rule identifies some general classes of potential users such as "environmental groups" which could include a wide variety of individuals, possibly with somewhat diverse interests. Therefore, a relatively large number of possible participants were identified in order to characterize their full range of information needs. It is recognized that some of the individuals, organizations and groups which have been identified will not ultimately become parties to the licensing proceeding, but the interests, concerns, and issues which are characteristic of these potential parties are likely to be raised and represented in the hearing.

4.3 CHARACTERIZATION OF THE CURRENT SCHEDULE

The current HLW schedule[5] has been reviewed and collated with other schedule information, such as the most recent development and implementation schedule for the LSS[6]. The major events in this HLW schedule are listed in Table 4-1. Major milestones have been identified in this composite HLW schedule and annotated in the table with the character "*". The schedule has been divided into phases based upon the provisions of the LSS Rule and the major milestones.

A number of fundamental assumptions underlying the current HLW schedule have been identified and listed in Table 4-2. No attempt was made to assess the validity of these underlying assumptions, but they were noted to indicate potential vulnerabilities. Clearly, if one or more of the assumptions underlying the current schedule turns out to be incorrect, there could be major impacts on the LSS implementation schedule as well as on the timing of information needs of potential LSS users.

Certain events in the schedule are expected to trigger responses, activities and information requests from the various users of the LSS. These events have been identified and annotated in Table 4-1 with the character "+".

Other events, activities and conditions could be expected to potentially have an adverse effect upon the entire HLW schedule. Some of these potentially adverse events, activities and conditions have been listed in Table 4-3. Thus, it is recognized that there are a number of ways in which the current schedule and the consequent information requirements of the potential users of the LSS could change prior to the hearing in response to triggering events and activities. Some of these potential changes have been identified and briefly discussed here, along with their underlying assumptions. Additional work will be performed prior to the final recommendation on priority loading to extend these analyses of triggering events and to characterize their potential effects[4].

Table 4-1. ANTICIPATED HLW SCHEDULE

Responsible Party	Date	Task
DOE	12/1988	ISSUE SITE CHARACTERIZATION PLAN
DOE	06/1989	REVIEW AND COMMENT ON SCP
NRC	06/1989	ISSUE SITE CHARACTERIZATION ANALYSIS
OTHERS		STATE AND OTHERS' COMMENTS ON SCP
DOE	01/1990-12/1991	LEGAL ACTION AGAINST NEVADA TO OBTAIN PERMITS
DOE	1990-2001	SEMIANNUAL SITE CHARACTERIZATION PROGRESS REPORT
DOE	07/1991	BEGIN ADVANCED CONCEPTUAL WASTE PACKAGE DESIGN STAGE
DOE	07/1991	BEGIN ADVANCED CONCEPTUAL REPOSITORY DESIGN STAGE
LSS	07/01/91-11/30/92	LSS REQUIREMENTS DEFINITION - Obtain acquisition support contractor, define balance of requirements.
DOE	10/1991	START FINAL ESF TITLE II DESIGN
DOE	12/1991	OBTAIN PERMITS FROM STATE OF NEVADA
* +DOE	01/1992	START NEW SURFACE BASED TESTING
* +EPA	06/1992	ISSUE REVISED 40 CFR 191
DOE	06/1992	START ESF SITE PREPARATION
* +DOE	10/1992	START ADVANCED CONCEPTUAL DESIGN
* DOE	11/1992	START ESF COLLAR/PORTAL CONSTRUCTION

* Major milestones + Activities expected to trigger information requests

Table 4-1. ANTICIPATED HLW SCHEDULE (Continued)

Responsible Party	Date	Task
LSS	12/01/92-03/31/95	LSS PROCUREMENT Prepare and issue RFP, evaluate proposals, and award contract for development, operation and maintenance of LSS.
NEVADA	TBD	NEVADA SUBMITS "IMPACTS" REPORT TO DOE
* +NRC	09/1994	FINAL FORMAT AND CONTENT GUIDE FOR LICENSE APPLICATION
* NRC	TBD	RULEMAKING - CONFORM 10 CFR 60 TO EPA HIGH-LEVEL WASTE STANDARD
LSS	04/01/95-12/31/95	LSS SOFTWARE AND PROCEDURES DEVELOPMENT - Acquire commercial off-the-shelf (COTS) software and develop LSS-specific application software and procedures.
DOE	TBD	(EIS) - REQUEST OTHER AFFECTED FEDERAL AGENCIES TO SERVE AS COOPERATING AGENCIES
* +DOE	06/1995	COMPLETE DEEP UNSATURATED ZONE HYDROLOGIC HOLE DRILLING
* +DOE	09/1995	COMPLETE ESF SHAFT CONNECTION
LSS	01/01/96 12/31/96	LSS SMALL-SCALE SYSTEM - Install, perform acceptance testing, perform operational testing and refinement of Small-Scale System.
* +DOE	06/1996	START REPOSITORY LICENSE APPLICATION DESIGN
* +DOE	06/1996	START WASTE PACKAGE LICENSE APPLICATION DESIGN
* +LSS	01/01/97-03/31/01	LSS EXPANDED SYSTEM - Expand the LSS and load approximately 19,000 pages per day into the LSS database.
DOE	05/1997	ISSUE REPOSITORY ENVIRONMENTAL IMPACT STATEMENT (EIS) NOTICE OF INTENT
DOE	11/1997	COMPLETE GEOLOGIC DRIFTING

* Major milestones + Activities expected to trigger information requests

Table 4-1. ANTICIPATED HLW SCHEDULE (Continued)

Responsible Party	Date	Task
* +NRC	1998	ISSUE LICENSE APPLICATION REVIEW PLAN (LARP)
* +DOE	02/1998	ISSUE REPOSITORY EIS IMPLEMENTATION PLAN
* DOE	07/1998	PROVIDE ENGINEERING BARRIER SYSTEM DATA TO WASTE PACKAGE LICENSE APPLICATION DESIGN
* +DOE	10/1999	ISSUE DRAFT EIS
+DOE	10/1999	NOTIFY AFFECTED STATE AND/OR INDIAN TRIBES OF PROPOSED SITE SELECTION
* +DOE	11/1999	PUBLIC HEARINGS ON SITE RECOMMENDATIONS
+DOE	01/2000	LAND ACQUISITION-BEGIN PREPARING APPLICATION AND SUPPORTING DOCUMENTATION FOR SECRETARIAL REVIEW OF REQUEST TO EXTEND TEMPORARY WITHDRAWAL FOR ADDITIONAL 12-YEAR PERIOD.
NRC	02/2000	END OF 90 DAY COMMENT PERIOD ON DRAFT EIS
* +DOE	TBD	COMPLETE WASTE PACKAGE LICENSE APPLICATION DESIGN
* +DOE	09/2000	ASSESS AND REVIEW TOPICAL REPORTS FOR LICENSE APPLICATION
* +NRC	01/2001	NRC ISSUES COMMENTS ON SUFFICIENCY OF SITE CHARACTERIZATION ANALYSIS AND WASTE FORM PROPOSAL
* +DOE	01/2001	LAND ACQUISITION - SUBMIT APPLICATION AND SUPPORTING DOCUMENTATION TO EXTEND TEMPORARY WITHDRAWAL FOR ADDITIONAL 12-YEAR PERIOD.
DOE	03/2001	NOTIFY AFFECTED STATE AND/OR INDIAN TRIBES OF SITE SELECTION

* Major milestones + Activities expected to trigger information requests

Table 4-1. ANTICIPATED HLW SCHEDULE (Continued)

Responsible Party	Date	Task
* +DOE	03/2001	COMPLETE SITE CHARACTERIZATION
* +DOE	03/2001	ISSUE FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS)
* +DOE	03/2001	COMPLETE REPOSITORY LICENSE APPLICATION DESIGN
+DOE	04/2001	ISSUE SITE RECOMMENDATION REPORT TO PRESIDENT
DOE	04/2001	ISSUE RECORD OF DECISION
+DOE	04/2001	LSS CERTIFICATION
+PRES.	07/2001	PRESIDENT RECOMMENDS SITE TO CONGRESS
CONGRESS	10/2001	SITE DESIGNATION EFFECTIVE
* +DOE	10/2001	SUBMIT LICENSE APPLICATION TO NRC
* +NRC	10/2001	FORMAL DISCOVERY BEGINS
* +NRC	12/2001	NRC COMPLETES ACCEPTANCE REVIEW OF LICENSE APPLICATION AND MAKES DECISION ON DOCKETING
* +NRC	10/2001-10/2004	NRC REVIEW OF LICENSE APPLICATION
+NRC	10/2002	NRC STATUS REPORT ON LICENSE APPLICATION REVIEW TO CONGRESS
DOI	01/2003	LAND ACQUISITION - TEMPORARY WITHDRAWAL EXTENDED BY SECRETARY OF INTERIOR.
* +NRC	03/2003	ISSUE THE SAFETY EVALUATION REPORT
* +NRC	06/2003	INITIAL DECISION

* Major milestones + Activities expected to trigger information requests

Table 4-1. ANTICIPATED HLW SCHEDULE (Continued)

Responsible Party	Date	Task
+NRC	10/2003	NRC STATUS REPORT ON LICENSE APPLICATION REVIEW TO CONGRESS
NRC	10/2004	NRC ADOPTION OF DOE FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS)
NRC	10/2004	NRC ISSUES CONSTRUCTION AUTHORIZATION
DOE	04/2008	LAND ACQUISITION - PREPARE PROPOSAL FOR CONGRESSIONAL ACTION ON PERMANENT LEGISLATIVE WITHDRAWAL
DOE	04/2008	SUBMIT UPDATED LICENSE APPLICATION TO RECEIVE AND POSSESS HLW
NRC	04/2008 - 01/2010	NRC REVIEW OF UPDATED LICENSE APPLICATION
CONGRESS	01/2010	LAND ACQUISITION - CONGRESS ENACTS PERMANENT LEGISLATIVE WITHDRAWAL
NRC	01/2010	NRC ISSUES LICENSE TO RECEIVE AND POSSESS HIGH-LEVEL-WASTE

* Major milestones + activities expected to trigger information requests

In the course of performing Systematic Regulatory Analyses (SRA) analyses, the Center staff has identified and considered a number of regulatory uncertainties, and technical uncertainties and issues which could potentially affect the HLW schedule. A summary of some of the technical uncertainties and issues is included in Table 4-4. NRC's proactive program is designed to ensure that all necessary regulatory guidance is provided sufficiently early in the process to preclude negative impacts. While resolution of some of the technical uncertainties may involve some minor schedule delays, there is no indication at this time that they will cause major disruptions or structural changes in the overall program or schedule.

In considering the current schedule in the light of potentially adverse conditions and events, a number of things which could delay or even stop the repository program were identified. Many of these events and conditions are judged to be unlikely to occur, while others may well become significant schedule factors. There is, of course, no way to assert with

Table 4-2. ASSUMPTIONS UNDERLYING THE ANTICIPATED HLW SCHEDULE

- THE MAJOR MILESTONES WILL BE MET ON SCHEDULE
- NO MAJOR LEGAL OR ENVIRONMENTAL OBSTACLES WILL ARISE
- THE SITE CHARACTERIZATION WILL NOT REVEAL A "FATAL FLAW" IN THE CURRENT SITE
- NO MAJOR POLITICAL OR INSTITUTIONAL CHANGES WILL OCCUR WHICH AFFECT THE SCHEDULE OR THE REPOSITORY DESIGN
- THE BASIC "SCIENTIFIC UNDERSTANDING" UNDERLYING THE RESEARCH AND SITE CHARACTERIZATION IS NOT FLAWED
- THE LSS CAN BE DESIGNED AND IMPLEMENTED ON SCHEDULE
- CONGRESS WILL ALLOCATE SUFFICIENT FUNDS
- NO VIABLE OR ACCEPTABLE ALTERNATIVES TO GEOLOGIC STORAGE OF HIGH-LEVEL WASTE WILL EMERGE OR BE CONSIDERED

absolute certainty which of these events and conditions will occur and precisely how they will affect the repository schedule. If any of these events or conditions should occur, then the repository schedule would be delayed. But it is important to note that none of these events and conditions would alter the logical sequence of licensing events. Adverse conditions might stop the repository, force consideration of alternative sites, or require additional work to be done, but the general requirements of the schedule in terms of the logical relationships and the succession of major milestones would not change.

Therefore, these potential schedule impacts would be expected to change the timing of user information needs, but not the overall range of information needs. If the repository schedule were delayed, then the users would need certain information for a longer period of time and other information needs might be shifted to a later time period. If additional work were required, then the immediate focus of user information needs might change during the period when that work was being performed. But the general information requirements of the users, such as the need for information to support technical review of site characterization work products, would not change qualitatively. For this reason, the initial approach to determining the feasibility of

Table 4-3. POSTULATED EVENTS AND CONDITIONS WHICH COULD ADVERSELY AFFECT THE SCHEDULE

STATE OF NEVADA EMPLOYS OTHER LEGAL MEANS FOR DELAYING ACCESS TO THE SITE -

The State of Nevada attempted to block the repository program by refusing to issue permits to the DOE which would allow surface based testing to begin. The federal courts have ruled that the State of Nevada must issue the permits, and there is a presumption that most or all of the legal obstacles to scientific investigations at the site have now been removed. If, however, the State of Nevada is able to raise additional legal obstacles, the schedule will be delayed again.

ENVIRONMENTAL GROUPS ARE ABLE TO LIMIT ACCESS TO THE SITE -

Environmental groups such as those expressing concerns regarding the desert tortoise as an endangered species are attempting to block or delay the repository program. If they are successful, the schedule will be delayed.

POTENTIALLY ADVERSE CONDITIONS ARE FOUND AT THE SITE -

There are a number of adverse conditions which if present, singly or in combination may render the site unsuitable for the repository.

- VOLCANISM - The Szymanski paper raised the possibility of recent volcanism near the site and postulated significant changes in ground water levels as the result of tectonic activity. The DOE is due to publish a definitive paper on volcanism at Yucca Mountain in 1992.

- SIGNIFICANT SEISMIC ACTIVITY - There are numerous faults in the area of Yucca Mountain. Depending upon the age, structure, and other characteristics of these faults, an unacceptable level of seismic activity may be indicated.

- CONDITIONS CAUSING CHANGES IN THE WATER TABLE - A variety of factors may affect the ground water level, and the water table north of the repository site is presently above the repository horizon.

Table 4-3. POSTULATED EVENTS AND CONDITIONS WHICH COULD ADVERSELY AFFECT THE SCHEDULE (Continued)

- RAPID GROUND WATER TRAVEL TIME - The expected rate of ground water flow through the welded tuff at the repository site is expected to be very low based upon the assumption of matrix flow patterns.

- SIGNIFICANT NATURAL RESOURCES - One of the requirements of the site is that it be free from human intrusion.

- EXTREME EROSION - If evidence of extreme erosion were found during site characterization, potential impacts on performance would have to be carefully considered. Given the geology and the present climatic conditions, this scenario does not appear to be likely. But if analyses of global warming were to suggest future changes in the climatic conditions at the repository site, then concerns about extreme erosion could be raised.

- CLIMATIC CHANGES CAUSING CHANGE IN THE FLUX OF GROUND WATER THROUGH THE REPOSITORY SITE - If significant climatic changes were to occur, then both the level of ground water and its flux through the repository area could be significantly altered.

- DIASTROPHIC EVENTS SUCH AS FAULTING, FOLDING, MOUNTAIN BUILDING - The repository site has experienced significant mountain building activity in the geologic past. The potential occurrence and magnitude of diastrophic events needs to be assessed due to potential impacts on performance.

- SIGNIFICANT UNEXPECTED STRUCTURAL FEATURES, DISCONTINUITIES OR INHOMOGENEITIES REVEALED BY SITE CHARACTERIZATION - If significant unexpected structural features, discontinuities or inhomogeneities are found during site characterization they will have to be systematically analyzed and studied to determine if they represent preferential paths for ground water transport of HLW.

Table 4-3. POSTULATED EVENTS AND CONDITIONS WHICH COULD ADVERSELY AFFECT THE SCHEDULE (Continued)

UTILITIES TAKE LEGAL ACTION TO FORCE DOE TO TAKE POSSESSION OF HIGH LEVEL WASTE PRIOR TO THE CONSTRUCTION OF THE REPOSITORY -

At the present time, the DOE is required to begin taking possession of the high level waste from the utilities by 1998. Clearly the repository will not be ready at that time and it is expected that the DOE will not begin to take possession of the waste by that deadline. The utilities are paying for the repository and they are also bearing the expense of holding the waste at the reactor sites. If the utilities enter into litigation to force DOE to take possession of the waste in 1998, then the repository program may be delayed.

TRANSPORTATION ISSUES CAN NOT BE RESOLVED -

Most of the reactors in the United States are east of the Mississippi River, and the process of physically moving the waste from the reactors to Yucca Mountain will involve cooperation of 40 of the 48 contiguous states. If the transportation issues are not resolved, then the parties to the proceeding could be widened considerably and the licensing process could be delayed.

EPA STANDARDS ARE NOT DEVELOPED ON TIME -

The EPA is in the process of revising 40 CFR Part 191 to address the high level waste repository. If this revision is not completed on time, then the Environmental Impact Statement (EIS) may be delayed and this may cause a delay in the overall repository program.

NRC DOES NOT REVISE 10 CFR PART 60 IN A TIMELY MANNER TO MEET THE EPA STANDARDS -

When the EPA finishes revising 40 CFR Part 191, then the NRC must revise 10 CFR Part 60 to conform to the new EPA regulations. If this revision is not completed on time, then overall repository program may be delayed.

LOW-LEVEL MIXED RADIOACTIVE AND OTHER TOXIC WASTES ARE STORED AT THE REPOSITORY -

If mixed waste is stored at Yucca Mountain, the regulatory environment could change, involving RCRA laws and the EPA and this could cause delays in the repository schedule.

Table 4-3. POSTULATED EVENTS AND CONDITIONS WHICH COULD ADVERSELY AFFECT THE SCHEDULE (Continued)

DOE DETERMINES THAT THE SITE IS NOT ACCEPTABLE -

The DOE is scheduled to finish site characterization and make a final determination on the suitability of the Yucca Mountain site in 2001. If DOE finds that the site is not suitable, then the repository licensing program must start again with a new site.

CONGRESSIONAL ACTION TO DECOUPLE THE MRS FROM THE REPOSITORY HAS AN ADVERSE EFFECT ON THE REPOSITORY SCHEDULE -

Congress is presently considering legislation to decouple the MRS from the repository schedule. If this decoupling has a significant impact on the legal strategies of the affected states or the funding of the repository, then significant schedule delays could result.

UTILITY ACTIVITIES FOR ON-SITE STORAGE RESULT IN MULTIPLE INCOMPATIBLE WASTE PACKAGE DESIGNS AND/OR REGULATORY DELAYS -

Several of the utility companies are considering additional on-site storage of HLW waste. If these plans are developed and implemented, then significant delays could be encountered from a regulatory perspective due to the additional complexities of regulating such on-site storage. Additionally, if such on-site storage activities were not properly coordinated, it is conceivable that incompatible waste package designs could be implemented by different utility companies, further complicating the ultimate repository design and implementation.

DOE SUBMITS A LICENSE APPLICATION WHICH THE NRC CANNOT ACCEPT AND DOCKET -

The DOE is scheduled to submit the License application for review by the NRC in 2001. The NRC is expected to spend the next 18 months reviewing the license application to see if it is acceptable. If the license application is not acceptable, significant delays in the licensing schedule will result.

THE PRESIDENT FAILS TO RECOMMEND THE SITE -

The DOE must recommend the site to the President and then the President must recommend the site to Congress. These events are presently scheduled for 2001. If, however, the President does not recommend the site to Congress or delays such recommendation, then the entire repository project will be halted or delayed.

Table 4-3. POSTULATED EVENTS AND CONDITIONS WHICH COULD ADVERSELY AFFECT THE SCHEDULE (Continued)

THE STATE OF NEVADA DOES NOT CONCUR WITH THE SITE SELECTION AND CONGRESS DOES NOT OVERRULE THE STATE OF NEVADA'S OBJECTIONS -

The DOE must notify the affected state and indian tribes of the site selection. Then the state may concur in the selection or it may object. If the state objects to the site selection, the repository will be stopped unless the objections of the state are overruled by Congress.

THE "GREATER THAN CLASS C WASTE" ISSUE CAUSES THE RCRA LAWS TO BE APPLIED TO THE REPOSITORY -

There is a question about what materials will ultimately be placed in the repository. Currently, the repository is being planned and designed for high-level wastes. If, however, greater than class "C" waste is put into the repository the design of the repository may have to be altered and the RCRA laws may have to be applied to the repository. This could cause significant delays in the repository schedule.

ADEQUATE FUNDING IS NOT AVAILABLE -

Licensing and building the HLW repository will require very high levels of funding. There already have been some significant problems with funding and if these problems continue or increase the repository program will be delayed.

REPROCESSING OF SPENT FUEL BECOMES A MAJOR ISSUE OR ALTERNATIVE APPROACH -

While no plans are presently being made for reprocessing in the United States, any introduction of reprocessing would result in both technical and regulatory impacts on the repository program with consequent delays in the schedule.

DECISION ON THE MONITORED RETRIEVABLE STORAGE FACILITY ADVERSELY AFFECT THE REPOSITORY LICENSING PROCESS -

At the present time active consideration is being given to monitored retrievable storage (MRS) facility for high-level waste. Depending upon the final plans and implementation of any MRS the repository schedule could be significantly impacted.

Table 4-3. POSTULATED EVENTS AND CONDITIONS WHICH COULD ADVERSELY AFFECT THE SCHEDULE (Continued)

SIGNIFICANT CHANGES IN THE FUNDAMENTAL SCIENTIFIC PRINCIPLES OR UNDERSTANDING AFFECTING THE SITE CHARACTERIZATION CAUSE SOME RESEARCH OR DECISIONS TO BE INVALIDATED -

The understanding of geologic processes and events has undergone significant refinement during the last ten years with increased emphasis on mathematical modeling and computation. If significant changes were to occur in the understanding of geologic processes and events or other scientific understanding which underlies the site characterization, some research or decisions could be invalidated. This situation could cause significant delay in the schedule or even the abandoning of the site.

THE SITE CHARACTERIZATION INVESTIGATIONS COMPROMISE THE INTEGRITY OF THE SITE ITSELF -

In the process of site characterization a number of bore holes, shafts and trenches will be opened to permit the systematic investigation of the geology of the site. If these shafts and trenches and bore holes create preferential paths for groundwater flow the acceptability of the site could be compromised by these investigations and characterization activities.

THE AVAILABILITY OF THE LSS ITSELF DURING THE PRE-LICENSE APPLICATION PHASE OF THE SCHEDULE CAUSES NEW ISSUES TO BE RAISED WHICH DELAY THE COMPLETION OF THE SITE CHARACTERIZATION OR OTHER ASPECTS OF THE REPOSITORY SCHEDULE -

The availability of the LSS during the latter part of the pre-license application phase of the repository schedule will provide a significant investigative tool for a wide variety of investigators. This tool will permit the technical staffs of the NRC, DOE and other participants to perform more thorough and systematic analyses and reviews of current and past work. It is conceivable that increased scrutiny of DOE work products which results from the mere availability of the LSS will permit investigators to identify and call attention to adverse information, inadequate research, or other conditions which will require additional work to be performed. In this way, the availability of the LSS could indirectly cause delays in the repository schedule.

Table 4-4. TECHNICAL UNCERTAINTIES IDENTIFIED THROUGH SRA

TECHNICAL ISSUES IN GEOLOGIC SETTING CHARACTERIZATION AND PERFORMANCE	Identification and assessment of "scenarios" and their impact on repository performance
	Determination of ground-water travel time in unsaturated zone (must be at least 1000 years)
	Characterization of the groundwater regime and prediction of flow in the unsaturated zone - both liquid and vapor phase
	Characterization and prediction of tectonism and volcanism of the site
	Characterization and prediction of geochemical conditions and processes, including sorption
	Evaluation of mineral resources potential (human intrusion)
	Evaluation and impacts of long-term climatic changes
TECHNICAL ISSUES IN REPOSITORY DESIGN AND PERFORMANCE	Protection against radiation exposures and release of radioactive materials
	Provision for retrievability of wastes - up to 50 years
	Design to withstand effects of natural and man-made seismic events: • Pre-closure • Post-closure
	Limit excavation-induced damage to rock-prevent preferential pathways
	Consideration of the effects of long-term heating and irradiation on rock properties

Table 4-4. TECHNICAL UNCERTAINTIES IDENTIFIED THROUGH SRA

TECHNICAL ISSUES IN ENGINEERED BARRIERS DESIGN AND PERFORMANCE	Waste containers to provide "substantially complete containment" for 300 to 1000 years - projection of short-term data to long time periods
	Waste container, waste form, and any overpacks to control releases to 1/100,000 of the inventory per year - techniques for modeling
	General, local, and biologically induced corrosion processes
	Metastability of metal and nonmetallic phases in the metal container, spent fuel and its cladding, and glass high-level waste forms
	Characterization of the waste package environment

priority loading of the LSS was based upon the current DOE project schedule, and provisions will be made in any priority document loading model to accommodate anticipated and actual schedule changes.

4.4 CHARACTERIZATION OF INFORMATION NEEDS BY SCHEDULE PHASE

The insights gained regarding the anticipated uses of the LSS, the anticipated classes of users, and the anticipated schedule have been combined to prepare a preliminary characterization of the anticipated information requirements of the users by schedule phase. In connection with the preparation of the Task 1 presentation and demonstration, a number of potential user scenarios have been considered and discussed with Center staff. These scenarios were used to characterize information requirements for public access users and intervenors as well as those information requirements anticipated for management, technical and legal staff users of all participants. Additional work will be performed prior to the final recommendation on priority loading to extend and refine these scenarios and to further analyze and characterize the information needs of the user classes by schedule phase[4].

4.4.1 Pre-license Application Phase

During the pre-license application phase of the schedule, the anticipated user information needs can be characterized as outlined below.

TECHNICAL STAFF - The information needs of the technical staffs of all LSS participants are expected to be related closely to the activities in the HLW schedule which are currently being undertaken or which will be undertaken in the near future. Typically, these information needs should follow a pattern for those actually performing the work which increases gradually for approximately 9 to 12 months before the activity is started, peaks shortly before the activity is completed and then drops off rather sharply as the issues raised during the activity are resolved. As the work is completed and the associated documentary materials are entered in the LSS, new information requirements will be generated for those wishing to review the work. Comments and questions arising from review of each work product will, of course, generate additional information requirements over a period of time as the originators of the work product respond to those comments and questions. This pattern of use by the technical staff is estimated to represent a majority of the queries during this phase of the schedule.

MANAGEMENT - The information needs of management users of all LSS participants are expected to be focused on anticipated issues and topics to be investigated. The management users are expected to use the LSS to (a) review the state of knowledge prior to undertaking tasks, (b) track the developing answers as issues are addressed and resolved, (c) focus technical programs, and (d) calibrate the efforts of their staffs to activities of other participants. These needs are expected to be general in nature and are likely to be focused on requirements documents, plans, correspondence and reports.

LEGAL STAFF - The use of the LSS by the legal staffs of all participants is expected to be rather limited during the early parts of the pre-license application phase. This early LSS utilization by legal staff users is likely to be focused on (a) general familiarization, (b) monitoring of developing issues, (c) helping to direct research and other activities into needed areas. As such, it is expected to be rather wide ranging and not so closely coupled to the schedule as LSS utilization by technical staff. Controversial events or reports (e.g. the Szymanski report)[7], of course, would be expected to generate a rather strong response from legal staff users and would be expected to generate direct and collateral information needs.

PUBLIC-ACCESS USERS - The information needs of public-access users and prospective intervenors during the pre-license application phase is expected to be guided by their desire to identify specific concerns and contentions which they may raise or want to address in the hearing. Thus, the information needs are expected to be rather topical and focused. A public-access user or intervenor would be expected to be developing a very extensive list of potential contentions while monitoring developments in depth for a more limited list of critical issues. In general these users are anticipated to search the LSS by topics, while also monitoring correspondence and newly published reports for new developments and potential new issues and

contentions. Public access users and prospective intervenors could, of course, have many of the information requirements identified for technical, management and legal staff users.

4.4.2 License Application Review Phase

During the license application review phase of the schedule, the anticipated information needs can be characterized as follows.

TECHNICAL STAFF - The information needs of technical staffs for all participants are expected to be related closely to the activities of the License Application review process. Thus, they are expected to be highly focused and topical in nature. Typically, these information needs should follow a pattern which increases rapidly for a period of 3 to 6 weeks before the specific portion of the License Application is reviewed, peaks shortly before the review of the topic is completed, drops off rather sharply followed by occasional peaks of activity as required to respond to subsequent questions or comments. This usage by the technical staff is expected to represent the majority of the queries during this phase of the schedule.

MANAGEMENT - The information needs of managers for any of the participants during License Application review are expected to closely follow the topical nature of the needs of the technical staffs. The management queries are expected to lead the technical staff queries because management will be trying to scope the level of effort required to review and respond to specific issues raised by the license application review process.

LEGAL STAFF - The use of the LSS by legal staffs during this phase is expected to be rather heavily focused on two areas: discovery and topical review of the License Application.

PUBLIC-ACCESS USERS - The information needs of the public-access users and prospective intervenors are expected to increase rapidly and become tightly focused on specific issues because it is during this phase that the contentions to be raised in the hearing will be clearly identified and developed.

4.4.3 Hearing Phase

During the hearing phase of the schedule, the anticipated information needs can be characterized as follows.

TECHNICAL STAFF - The information needs of technical staffs for all participants are expected to be related closely to the issues and contentions being addressed in the hearing. Therefore, these needs should be tightly focused on specific topics and should be very intense for relatively short periods of time. This pattern of needs is expected to arise from

technical staff usage of the LSS in support of legal staff and in preparation of testimony. It is anticipated that technical staff usage of the LSS during the hearing phase of the schedule should represent less than half of the queries.

MANAGEMENT - Management use of the LSS is anticipated to be quite light and sporadic during this phase of the schedule.

LEGAL STAFF - The use of the LSS by legal staffs is expected to be quite heavy during the hearing phase. They will utilize the LSS in three major ways:

- Review of official hearing records;
- Preparation of witnesses or preparation of questions for witnesses of other parties;
- Submission and review of evidence.

PUBLIC-ACCESS USERS - The information needs of public-access users and intervenors during the hearing phase is expected to be quite heavy and focused topically. In general, they will be trying to identify and elucidate weaknesses in the positions of other participants and will also be trying to support and strengthen their positions with regard to specific contentions.

4.4.4 Characterization of User Information Needs Which Would not Easily be Satisfied from Information Sources Other Than the LSS

In view of the anticipated need of LSS users to gain access to information which they do not already possess, it was expected that interviews with potential users would identify such needs and place high priority upon access to such information. This expectation was confirmed in discussions with potential LSS users among the Center staff who frequently mentioned certain types of information which are needed but are not readily available. Peer-review comments, laboratory notebooks and raw data are examples of such information which these users feel should be given a relatively high priority for loading into the LSS.

When a report is prepared, it normally goes through a peer-review process in which written comments, criticisms and observations are prepared. These peer-review documents are normally maintained by the originating organization but they are not referenced or distributed. Therefore, it is very difficult to find out about them and obtain copies. In many cases, however, the peer-review comments are of particular interest to members of a technical staff investigating a topic or reviewing the work products of others. These peer-review documents would be included in the LSS and could, therefore, be discovered and accessed directly by the technical staffs of the LSS participants.

There are many instances when all of the documentary material pertaining to a particular investigation is collected into a package. Normally, only the final work product of the investigation is published as a report, map, design or other type of document. The supporting data, including such information as laboratory notebooks, strip charts, data sheets, references to machine-readable media such as magnetic tapes, etc., is stored in package form and may only be accessible through that package.

At the present time, in the absence of the LSS, an investigator wishing to use such information would have to (a) be aware of the existence of the package, (b) gain access to the package (c) examine the package to find the desired information and (d) make arrangements to obtain a copy of the desired information for review and use. The difficulty of discovering the existence of such supporting data and then gaining access to it can introduce substantial delays for the investigator or even render the data inaccessible for all practical purposes. These difficulties associated with finding and accessing information within packages under present conditions are expected to be overcome when the LSS is implemented. Because packages are to be included in the LSS, the staffs of the participants could easily discover and access this type of information directly through the LSS.

5 DOCUMENT CATEGORIES

The consensus among potential users of the LSS at the Center is that (a) the information most needed by users will be the information which they cannot readily obtain from other sources and (b) that topical information searches will predominate at least in the early part of the pre-license application phase of the schedule. Therefore, if priority loading is to be implemented for the LSS, the information which is not readily available from other sources should be given priority and that information should be loaded topically in anticipation of topically oriented information requirements.

Questions naturally arise as to whether it is feasible to identify such information and whether it is feasible to load documentary materials topically. In the initial phases of LSS use, it is anticipated that there will be considerable interest in materials such as peer reviews and raw data which provide support and further insight into the findings, methods and conclusions in published technical reports. These documentary materials are currently being accumulated in packages by the DOE and presumably will also be accumulated in similar packages by other participants. Thus, it appears that much of the anticipated demand for these materials could be satisfied by placing an early emphasis on loading packages of documentary materials.

The other significant prioritization factor identified by users was related to the subject matter of the documentary materials. However, if documentary materials are to be loaded topically it must be possible to identify those materials and separate them topically. Clearly, the header descriptor fields which are to be filled out in accordance with the Topical Guidelines[8] will be helpful in this regard. Additionally, because much prior and ongoing work has been concentrated in certain organizations and national laboratories along topical lines, the document source organization could be helpful in identifying and segregating materials topically in anticipation of priority loading.

While it appears to be feasible to identify documentary materials in these general ways for priority loading, further consideration must be given to the issue of how to categorize and organize the materials to be entered into the system. Documentary materials may be categorized in a number of ways which may be significant for priority loading, some of which are delineated below.

5.1 TOPICAL

The topical categories are anticipated to be the most important categories to the users of the LSS. The initial users of the LSS are expected to have well defined information needs which are directly related to the activities and programs with which they are involved. For these users, topical queries will predominate and therefore topical priority loading categories will be very important. However, the appropriate topical categories depend to a large extent upon the individual user and the stage in the schedule. For example, the main thrust of the repository program through 1994 or 1995 is expected to be in the area of site characterization. Therefore, the predominant information categories during this period would be those associated with site

characterization issues, and more particularly with critical issues which could cause rejection of the site, such as:

- Tectonism and seismic risk;
- Volcanism;
- Ground water travel time;
- Natural resources;
- Radionuclide transport.

Later in the pre-license application phase of the schedule, as the issues associated with site selection are being addressed and resolved, the questions associated with the Engineered Barrier System (EBS) and repository design will become more prominent. Therefore, the predominant information categories during this period would be those associated with the EBS and repository:

- Waste package design;
- Waste package materials selection;
- Corrosion and materials degradation;
- Thermal loading;
- Repository design;
- Mining issues.

As the submission of the License Application approaches, issues associated with performance assessment are expected to become more prominent. The overall performance objective of the repository is to contain the waste and isolate it from the accessible environment for a period sufficient for the natural radioactive decay to reduce potential releases to a level which is consistent with public radiation health and safety standards. Therefore, any condition, such as failure of the engineered barrier system, rapid ground water travel times, extreme elevation of the water table, etc., which would permit excessive transport of radionuclides to the accessible environment could result in a failure to meet the overall performance objective. Thus, many of the concerns associated with performance assessment are related to conditions and mechanisms which would permit transport of radionuclides to the accessible environment, and topical categories concerned with performance assessment and with transport of radionuclides are expected to become particularly important during the final stages of the pre-license application phase.

5.2 DATE

In general, it is expected that the most recent information will be the most important during the early periods of LSS use. As the system matures, however, the older information may become inherently important in that it may reveal inconsistencies and shifts in positions taken by the parties with regard to specific issues.

An exception to this generalization may be found, however, in the area of geological data, the significance of which is not usually affected by time period during which it was collected. Therefore, older geological data would normally be considered to have equal value with more recently collected geological data.

5.3 DOCUMENT TYPE

The document type is particularly significant when collecting and organizing data to be entered into the LSS because the document type is often related to the point of origin of the documentary materials. For example, "correspondence" and "packages" are useful categories because they identify points of origin for a large volume of material. In the case of packages the document type also identifies a collection of information including raw data and peer-reviews which would not normally be accessible from other sources. However, user interest in document type categories is expected to be secondary to concern for topical and date categories.

5.4 DOCUMENT SOURCE

From the perspective of the user, the document source is not expected to be particularly significant other than as a way of narrowing a bibliographic header search for documentary materials. Therefore, based upon the user's perspective alone, it would initially appear that document source should not play a major role in establishing document loading priorities.

However, from the perspective of priority loading, this initial assumption may not, in fact, be appropriate due to the way that work has been performed to date. During the initial site characterization work, a great deal of geological information was generated by the U.S. Geological Survey, and much of this information is contained in data record packages. Thus, if an approach were adopted to begin loading the LSS by capturing all of the pertinent USGS packages, a great deal of pertinent geophysical information would be entered within a time period which would be appropriate to the site characterization work being performed at that phase of the schedule. Similarly, there is a concentration of geochemical and mineralogical information associated with the Los Alamos work products. A concentration of waste package and waste package performance assessment information is associated with work performed by the Lawrence Livermore National Laboratory and a concentration of repository design and repository performance assessment information is associated with work performed by the Sandia National Laboratories. Thus, because of the concentration of work associated with certain topical categories in specific organizations, it may be productive to place some emphasis on a combination of topical guidelines and document source when assigning priorities to this type of information.

6 SUMMARY

Development of an appropriate priority loading approach is feasible. It is also essential to ultimate user acceptance of the LSS. Regardless of the approach that is taken to loading the LSS, there will be a loading priority: either a default loading priority defined by the physical organization and sequence of the submitted documents, or a conscious loading priority based upon anticipated user information needs. If the DOE implements its current plan of loading data into the Infostreams system and then submitting electronic copies of the documentary materials to the LSS, then the loading priority of the LSS may very well be driven by the loading priorities applied to Infostreams. If an approach to priority loading of the backlog of documentary material is not carefully chosen, the most important documents may not be available to users at a time when they could be used to address specific information needs.

Potential LSS users within the Center, representing the anticipated concerns and interests of management, technical and legal staff, have expressed the desire to have the LSS available for use at the earliest possible time. The information most desired is that information which is not already available to them. Such information tends to take the form of unpublished documentary materials. Thus, priority loading of the LSS will be best accomplished if it is guided by the objective of first providing information which is not readily available by other means or from other sources. Of course, if adequate capture station performance can be achieved, the information already available to the user in the form of published reports should also be loaded to provide complete document access.

It is the conclusion of this preliminary report that (a) priority loading is a real and significant concern of potential LSS users, (b) an approach to priority loading of the LSS can be developed which will provide the information most needed by potential users in a timely and effective manner, and (c) the early implementation of the LSS coupled with the development of an effective approach to priority loading is essential to its acceptance and utilization by the full population of potential users. Additional work will be performed prior to the final recommendation on priority loading to validate and refine the analyses and characterizations of potential LSS users and their requirements contained in this report[4]. It is fully expected that the recommendation for the development of an approach to priority loading will be confirmed and strengthened by such subsequent work.

7 REFERENCES

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