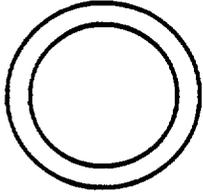


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Office of Civilian Radioactive Waste Management

Office of Resource Management



***Licensing Support System
Preliminary Data Scope Analysis***

March 1988

***U.S. Department of Energy
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PREFACE

This is the second in a series of four reports on the Licensing Support System (LSS) prepared by the DOE Office of Civilian Radioactive Waste Management (OCRWM). The LSS is an information management system intended to support the needs of all the parties involved in repository licensing, including the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC). The reports in this series are:

- o Preliminary Needs Analysis
- o Preliminary Data Scope Analysis
- o Conceptual Design Analysis
- o Benefit-Cost Analysis.

The Preliminary Data Scope Analysis, presented in this report, and the Preliminary Needs Analysis, issued in February 1988, constitute the system requirements basis for developing a conceptual LSS design, which will be presented in the third report. The Benefit-Cost Analysis will present an evaluation of alternatives within this conceptual design. These four reports, and subsequent refinements, are intended to provide the basis for determining the LSS design specifications.

1.0 INTRODUCTION

1.1 Purpose and Scope

The purpose of this analysis is to determine the content and scope of the Licensing Support System (LSS) data base. Both user needs and currently available data bases that, at least in part, address those needs have been analyzed. This analysis, together with the Preliminary Needs Analysis (DOE, 1988d) is a first effort under the LSS Design and Implementation Contract toward developing a sound requirements foundation for subsequent design work. These reports are preliminary. Further refinements must be made before requirements can be specified in sufficient detail to provide a basis for suitably specific system specifications.

There have been a number of previous examinations of the LSS data scope requirements. These are summarized in Section 2. In Section 3.1 a description and schedule of the DOE Office of Civilian Radioactive Waste Management (OCRWM) high level waste repository program is given with an emphasis on the impact of information requirements on LSS. A summary of forthcoming site characterization and licensing documents is also provided. This is followed, in Section 3.2, by profiles of current data bases containing information relevant to LSS, including OCRWM and NRC collections of documents. The required contents of the LSS is then addressed in Section 3.3 from the perspective of potential user needs. This section uses the findings of the Preliminary Needs Analysis as a basis for translating the needs into specific information requirements. The information to be included in the LSS Regulations Access Subsystem is then examined in detail. An estimation of the size of the data base required by LSS users in August 1990 (when LSS is partially loaded and available) is presented in Section 4. Projections from that date are made for the next twenty years. The report concludes with a brief summary of major findings.

This document provides a baseline for what is known at this time. Additional analyses, currently being conducted, will provide more precise information on the content and scope of the LSS data base.

1.2 Background

The evolution of requirements for LSS is discussed in detail in the Preliminary Needs Analysis (DOE, 1988d). That analysis concluded that LSS must:

- (1) Serve as the sole basis for expedited document discovery
- (2) Provide access to licensing information so that all parties' legal counsel and their experts can address the grounds for repository licensing decisions and determine the soundness of technical work
- (3) Provide an automated library of reports and other bibliographic

materials of use to OCRWM and NRC technical staff in conducting their work on licensing document development and review

- (4) Serve as a mechanism for tracking OCRWM compliance with repository licensing regulations.

An overview of the structural components of LSS is given in Table 1. As conceived in the RFP (DOE,1987a), the LSS computer system would include four application software subsystems: a Regulations Access subsystem, a Records Access Subsystem, an Issue Tracking Subsystem and a Commitment Tracking Subsystem. Table 1 provides a brief description of the subsystems and indicates the general size of each of the subsystem data bases.

The analysis of LSS requirements presented in the Preliminary Needs Analysis does not explicitly focus on the scope of information to be included in the LSS data base, nor on the amount of information that data base represents. The following section has been included to summarize previous treatment of these data scope issues.

2.0 PREVIOUS EXAMINATIONS OF THE INFORMATION TO BE INCLUDED IN A LICENSING SUPPORT SYSTEM

This section summarizes information about the content and size of a licensing support system as discussed in previous analyses for the DOE, the NRC, and in other documents relevant to the high-level radioactive waste program. These documents are valuable in that they present information on subject content, types of documents or records, page counts, numbers of records, or similar data that can be used in determining the data requirements for the LSS.

2.1 Nuclear Waste Policy Act (NWSA) of 1982

The NWSA does not specifically mention an information system to support the licensing process, and therefore it does not specify the size or content of such a system. However, it is clear that all documents explicitly required by the Act should be included in such a system, and will be needed by LSS users. These include specific documents (such as the Environmental Assessment, the Site Characterization Plan, and the Environmental Impact Statement) and general documents (such as reports, petitions, hearings, transcriptions, correspondence, and studies from DOE, NRC, the states involved, the President, Congress, and other peripheral agencies). A precise list of the documents required by the Act cannot be made, since some documents are produced annually, some reference supporting documents are not explicitly mentioned in the Act, and yet other documents require the reporting of data collection or testing or interim reporting before a final document is produced. The Act is, however, a good source for identifying the major documents and categorizing document types that will be generated.

Table 1. SALIENT CHARACTERISTICS OF THE LICENSING SUPPORT SYSTEM

SUBSYSTEM	DESCRIPTION	SIZE OF DATABASE/USERS
Regulations Access Subsystem	A text storage subsystem, on-line containing the full text of documents that impose legal requirements on the construction or operation of the geologic repository.	300 documents, 100,000 pages. Used by design and licensing engineers.
Records Access Subsystem	Full text on-line with index to archive files. Contains text of documents subject to discovery during licensing hearings and appeals.	Millions of documents, tens of millions of pages. Used by attorneys and licensing staff.
Issue Tracking and Commitments Tracking Subsystems	Issues are efforts that clarify what a part of a regulation requires or how compliance will be achieved. Commitments are agreements between organizations to perform an activity, adhere to a standard, etc. Details re source, organizations, regulations, milestones with linkages to regulations, documents, etc.	Up to 4,000 issues and 4,000 commitments. Used by DOE, NRC technical staff.

2.2 Mission Plan for the Civilian Radioactive Waste Management Program

Part II of the Mission Plan presents the information needs of the Program as required by the NWSA. It begins with a discussion of the four major issues, the Plan and then details the information necessary to resolve not only the key issues, but also the subordinate issues that make up the issues hierarchy. The issues hierarchy consists of three levels of detail: key issues, which are broad questions derived from the siting guidelines and have as their concern the suitability of the site in terms of protecting the public and the environment; issues, which are questions whose answers will provide the information to resolve the key issue; and information needs, which are specific information needed to answer the questions posed in the issues. Some of these information needs can be provided by existing documents; other information will be obtained through data collection and analysis. As an example, Key Issue 3 concerns protecting the quality of the environment throughout the entire disposal process (from repository siting through decommissioning and transportation operations), without causing unacceptable risks to public health or safety. An attendant issue asks if the site can be located to protect the environment and if significant adverse environmental impacts can be mitigated by reasonable measures. Information needs to determine the environmental conditions at the site include such concerns as existing air-quality levels and trends, existing surface- and ground-water trends, soil characteristics, land use patterns and trends, and noise levels.

In addition, potential financial, political, legal, and institutional problems are recognized and plans for resolving these problems are discussed. An example of such a problem is litigation by states, tribes, or other parties that would prevent the DOE from meeting the NWSA schedule. In addition to consultation and cooperation agreements with these parties, the DOE plans to provide them with access to program information and also plans to document all key decisions and program actions to the level of detail needed to survive a legal challenge.

The resolution of these issues and problems will produce documents and non-document items, expanding the document base established by the NWSA. The Mission Plan also provides a rich source of information on the subject material needed in the preparation of repository licensing documents, during licensing and in the review of documents supporting the repository license application, and therefore on the subject material to be included in the LSS.

2.3 Licensing Information System Requirements Study

In 1985, Roy F. Weston, Inc. produced a report (Weston, 1985) on the requirements of a system to meet the information needs of those parties involved in the repository program. This report examines not only the question of what information is to be included in such an information system, but also what information is to be excluded. The information system requirements include all OCRWM-related regulations and regulatory guidance; the licensing schedule network; all issue-related plans, activities, and resolutions; all commitments-related activities and results; key document

preparations and modifications; and all OCRWM-produced or received information pertaining to regulatory compliance. Therefore, the study indicates, the system must contain not only information on completed activities, but also planned and continuing activities. The type of documents to be excluded are personnel records, drafts documents, duplicate copies, etc. Key documents for inclusion are defined as "any program document specifically required by NWPA, Federal, State, or local regulations that is either prepared by the DOE or by a regulatory agency". Information in the system would be maintained through the decommissioning of the repository.

2.4 Discovery and Rulemaking Perspective on the Use of an Information Storage and Retrieval System in the Licensing Proceedings for the High-Level Waste Repository

The relevance of the information entered into a licensing support data base and the completeness or reliability of the entire data base, i.e. is all the relevant material included are discussed in a report for NRC by John Jordan & Associates (Jordan, 1986). The criteria for relevance are well defined in law and for LSS purposes include: (1) pertinence to the contentions defined by the licensing board and (2) pertinence of the subject matter of those contentions. Further constraints are placed on information to be included by privilege, confidentiality and Freedom of Information Act (FOIA) exemptions. Other considerations that might further define the content of the data base will come from the NRC Negotiated Rulemaking Advisory Committee and from identification by DOE of issues or problems that could arise during the repository licensing process.

2.5 Requirements Definition for a Licensing Information Management System for Nuclear Waste

A report for the NRC by The Aerospace Corporation (Aerospace, 1986) also discusses the content of a licensing information system. The proposed criterion for inclusion of information in the system is "any record likely to be requested that pertains to high-level waste in compliance with 10CFR2 (Rules of Practice for Domestic Licensing Proceedings)." This report includes estimates of the amount of information that would be contained in such a data base. A volume of 300,000 documents is assumed to be in the system by 1999. According to this report, documents not subject to discovery are to be excluded, e.g., handwritten drafts and drafts of published final material.

However, the report notes, materials other than legally-required documents are not necessarily excluded from the data base. Indeed, it is recognized that the system should include other material, but decisions need to be made as to what this material would be. If other materials are included, however, material that meets legal requirements should be distinguished in some manner from that which does not.

Other recommendations from this report that would influence the size of the data base include the storage of an embedded thesaurus, thorough indexing of each document, references to preceding and subsequent documents,

document reviews, and FOIA requests for documents.

2.6 Quality Assurance Plan for High-Level Radioactive Waste Repositories

According to this document (DOE, 1986d) the LSS is to be used "as the repository for and custodian of all OCRWM Office of Geologic Repositories (OGR) Quality records". The OGR will not establish a separate quality records system but will rely on the LSS. Therefore, the LSS must meet the quality assurance requirements established by information from the ANSI/ASME NQA-1. This document defines a QA record as "a completed document that furnishes evidence of the quality of items and/or activities affecting quality". To meet these and other similar requirements, OGR has set the following criteria for records that are to be retained in the LSS data base for the life of the repository:

- o records which "may be used in repository licensing",
- o records which demonstrate the "capability for safe operation",
- o records which would be of value in "maintaining, reworking, repairing replacing or modifying an item",
- o records which would have value in "determining the cause of an accident or malfunction of an item",
- o records which provide "required baseline data for in-service inspections".

To reduce the volume of retained records, records required to show compliance with a requirement that does not meet one or more of the above criteria will be considered as nonpermanent records and may be removed after the retention period set for that record has elapsed. Prior to removing the record from the system a review would be conducted to ensure that the record is no longer required. An index to all records is to be maintained, the plan indicates, and the index will track revisions of documents in the system. Records are either documents or items, e.g., physical samples, magnetic material. Revisions will be filed as separate documents.

2.7 NNWSI Project Information Management System Concepts Evaluation Report

The content and size of a licensing support data base is also discussed in this report (SAIC, 1986a). Regulatory documents considered to be necessary for inclusion are NRC requirements, DOE siting guidelines and Environmental Protection Agency (EPA) guidelines. The report notes that in order to show compliance with these requirements, compliance issues need to be identified, analyzed, tracked, and closed. Each step from identification to closure of an issue should be included in the data base. Given that issues are not all initially defined and that documents already exist that may support future issues, the approach taken is to consider all relevant project material potentially discoverable. This information is generated by three groups: (1) those originating project-related documentation within the organization of the project participant, (2) those within a non-participant organization who are transmitting project-related information to a project participant, and (3) those within a non-project group originating or receiving project-related documentation within the organization of the project participant. The latter group of documents are the most difficult

to identify and obtain since the involvement of these people in the project is peripheral. This includes documents concerning corporate quality assurance, purchasing, etc.

The report concludes that over 6 million documents are expected to meet the above requirement by the year 2000. Based upon an assumption of four pages per document up to 1991 and four pages per document for off-site contractors and two pages per document for on-site contractors from 1991-2000, the total pages required to be contained in the LSS by the year 2000 would be approximately 18 million according to this evaluation.

2.8 Supporting Data and Calculations for the NNWSI Project Information System Concepts Evaluation Report

This report (SAIC, 1986b) provides supporting data for the document discussed in Section 2.7 above. It, like the document it supports, is concerned only with the Nevada Nuclear Waste Storage Investigations (NNWSI) Project. The document and pages estimates it provides are based on a survey that asked project participants and NNWSI contractors for estimates of the amount of Project information to be generated in the 10-year period from 1980 to 1990. Responses from each participant or contractor show document estimates by project activity, document type, document count, pages per document, and total pages.

Representative disciplines and activities covered by this report include geology, hydrology, waste package environment, testing, drilling, project control, and quality assurance. Representative document types include field notebooks, geological maps, aerial photos, core logs, technical reports, computer models, personnel qualifications, drawings, specifications, budgets, and schedules. Document and page count projections for 1990 for all types of documents originated by the nine project participants at this site were 1,039,236 and 3,944,157, respectively.

2.9 LSS Functional Requirements and Design Concepts Report

This study by Arthur Young International (Young, 1987) not only details material for inclusion and exclusion, but also discusses further constraints on submitted material. Their approach is that the primary purpose of the LSS is to support information needs during the licensing of the high-level radioactive waste repository. According to this report, support of other phases of the repository program would initially not be included in this system, although the system could and should be expanded to include these at a later date. Records to be included are those received by DOE or its supporting organizations from an outside group, agency, or individual. A record originating within DOE or its contractors is to be included at the stage when it is ready for formal distribution either as a finished product or as a draft for review, it is cited in support of another submitted record. Materials not to be included in the system, the report notes, are non-record material as specified in DOE Order 1324.2; financial records unrelated to the health, safety or environmental impacts of the repository; personnel records not required by a QA program; attorney work packages; attorney-client privileged records; unrelated internal organizational

memoranda; items such as electronic mail, telephone messages, etc. (if these items contain information of value, they are to be reformatted as memoranda and submitted as such); and drafts of internal correspondence or drafts and marked-up copies of documents not distributed outside the originating office. Types of material include all revisions of related documents, correspondence, inquiries from interested parties, related computer software, photographs, maps, drawings, QA records, regulations, standards, procurement documents, schedule and budget reports. The LSS must also record and track issues and commitments.

In addition to the type of material to be included or excluded, other constraints are placed on information in the system according to this report. These constraints include verification that the information has been authorized and certified for entry, assurance that the records are accurately captured and displayed by the system, verification that the material is not a duplicate of an existing record, and assurance that no changes are made to the record per se after it is stored in the data base. Changes or modifications may be made to identifying elements attached to each record. These elements include keywords, header information, abstracts, etc. Such elements are an additional source of material to be added to the system.

2.10 Basic Ideas Underlying Design and Development of an Information System to Support Proceedings before the NRC on a High-Level Waste Repository

This document by John S. Jordan & Associates (Jordan, 1988) distinguishes between data entered into the existing DOE Automated Records System (ARS) and the future LSS. Distinctions between the two systems include the following:

ARS	LSS
Documents originated or received by OCRWM and its contractors	Documents originated or received by any party
Any subject	All materials related to repository licensing
Transmittal letters, acknowledgments	Only documents relevant to licensing
No handwritten notes, preliminary drafts, buck sheets, etc.	Any type of document that is relevant and goes through document control
Support repository until final closing	Support only the licensing process

ARS obviously has much candidate information for the LSS, but each document must satisfy LSS requirements before it can be included in the LSS.

Issues to be considered that will affect the content of the LSS include

defining "relevant" documents; identifying sources of such documents; how to treat privileged documents; and how to identify, acquire, and store the documents (estimated as being a minimum of 3 million after elimination of the Texas and Washington sites).

3.0 CHARACTERISTICS OF THE LSS DATA BASE

This section examines a number of key elements that will determine the content of LSS. Most important of these is the OCRWM program and milestone schedule. Documents generated by and associated with the program are an obvious must for LSS. The OCRWM and NRC data bases now in existence are a reflection of current information needs and, thus, must be considered as a major source of LSS materials. This section also describes in detail the regulations data base seen as the core of the LSS Regulations Access Subsystem.

3.1 The OCRWM Program

The Preliminary Needs Analysis shows that the vast majority of requirements on the LSS arise from or are related to the major milestone processes. This section summarizes the major program elements of the OCRWM program, including the issue resolution process, and identifies and characterizes the key program documents that will be generated over time. It should be recognized that both DOE and NRC are still in the preliminary stages of defining the flow of documents and their official classifications as well as program milestones. The documents discussed here are based on preliminary planning by DOE and NRC. While the basic document flow is not likely to change appreciably, the official classifications of documents may change.

3.1.1 Overall Program Schedule

Figure 1, adapted from the Preliminary Needs Analysis, shows a preliminary timeline depicting the major program activities, as defined at this time, and estimated schedules for the OCRWM program that directly affect the LSS. The timeline encompasses the repository program and the transportation and monitored retrievable storage programs. However, most of the discussion will center on the repository program because the bulk of documents to be stored in the LSS will result from repository activities. It is important to note that the schedule is tentative and that the program is still evolving.

Using this timeline, which also identifies the major licensing-related documents, the Preliminary Needs Analysis has estimated the relative usage of the LSS over time. The peaks correspond primarily to the stages when a license application, or amendment to the license application, is being developed by DOE and reviewed in a formal licensing proceeding by NRC, the potential host State and other parties. These peaks occur from 1994 to 1997 and again from 1999 to 2004.

3.1.2 Overview of the Major Program Phases Impacting LSS

The activities depicted on the timeline can be grouped into four major phases from now until the early 2000s. They are: (1) site characterization, (2) licensing, (3) construction, and (4) operation. This report will focus primarily on the first two phases, site characterization and licensing, since most of the licensing-related documents will be generated and accessed during these two phases.

3.1.2.1 The Site Characterization Phase

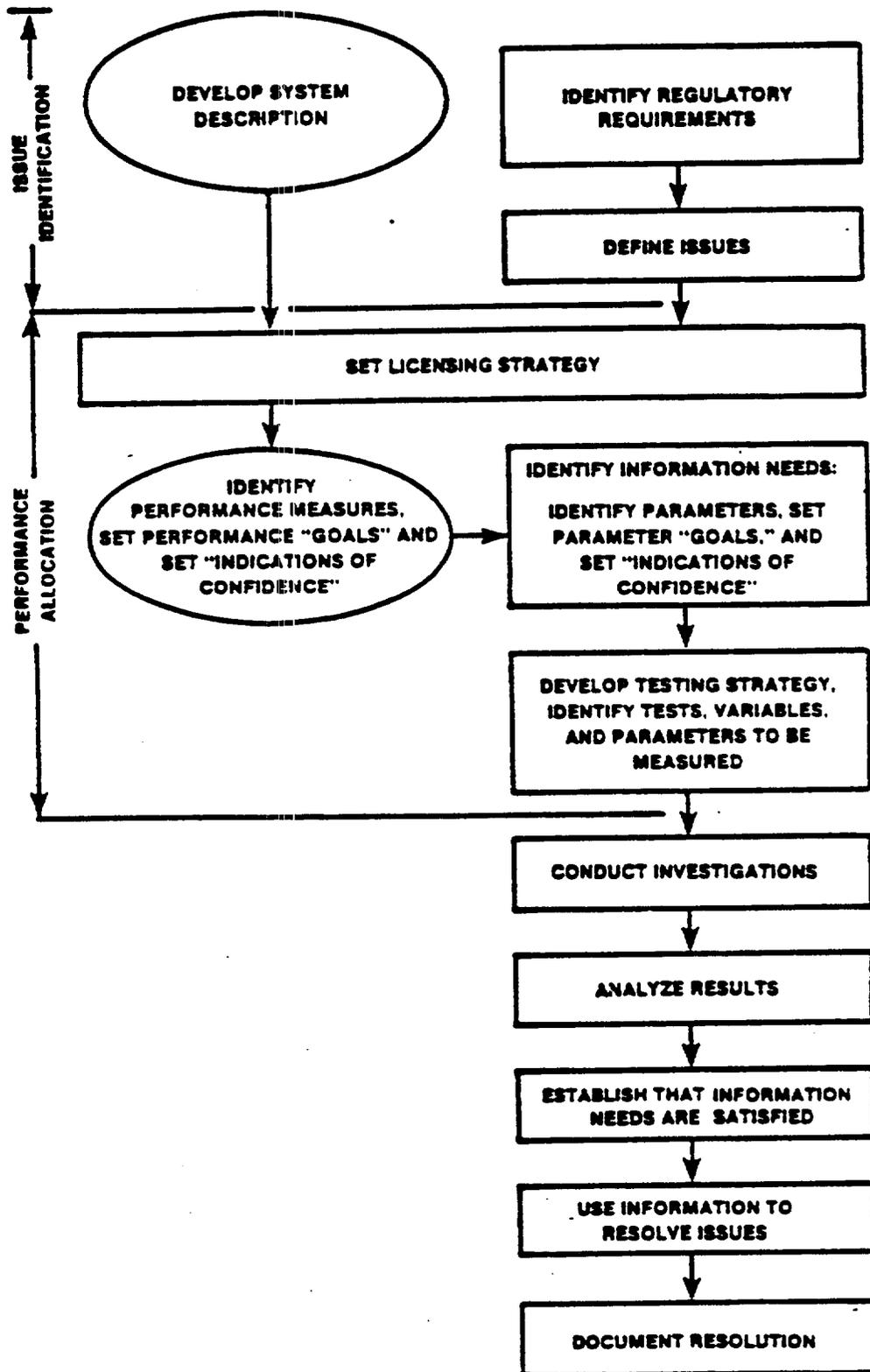
The first major phase, site characterization, will continue until 1994. Site characterization is a program of studies directed at collecting the information necessary to: (1) demonstrate the suitability of a site for development as a repository, (2) design the repository and waste package, and (3) demonstrate compliance with all regulatory requirements pertaining to public health and safety. The scope and content of the site characterization program must produce the data and information necessary to satisfy the requirements under 10 CFR 960 (General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories; Final Siting Guidelines). This regulation and its references to other regulations, contain all the technical criteria for which compliance must be demonstrated. (DOE, 1988a) Based on these requirements, a common set of issues has been developed and are contained in the DOE "Issues Hierarchy for a Mined Geologic Disposal System" (DOE, 1987b). To satisfy the regulatory requirements, DOE must resolve all issues defined in the hierarchy, which will be accomplished primarily during the site characterization phase. Figure 2 contains DOE's 12-step issue resolution strategy (DOE, 1987b).

The issues hierarchy consists of three levels of detail: key issues, issues, and information needs. Key issues are broad-level requirements of overall site suitability which relate to general regulatory objectives. Issues are narrower questions, subordinate to a key issue, that address more specific regulatory requirements pertaining to the site, features of the design, and performance of the system. (Resolution of all issues that support a key issue results in resolution of that key issue.) Information needs represent the information required to resolve the issues and thus provide the basis for the studies, tests and analyses that will take place during the site characterization phase. (DOE, 1988a)

Issuance by DOE of the Site Characterization Plan (SCP) is the first major milestone of the site characterization phase. The basic purpose of the SCP is threefold:

- (1) To describe the site, the preliminary designs of the repository and waste package, and the waste-emplacement environment in sufficient detail so that the basis for the site characterization program can be understood;
- (2) To identify the issues to be resolved during the site characterization, to identify the information needed to resolve the issues, and to present the strategy for resolving the issues; and

Figure 2.
THE DOE RESOLUTION STRATEGY



- (3) To describe general plans for the work needed to resolve outstanding issues. (DOE, 1988c)

A consultative draft SCP (CDSCP) was issued to the NRC and State of Nevada for review and comment in January 1988. Following review of NRC and State comments, DOE expects to issue the final SCP in late 1988, which will be followed by more detailed Study Plans for NRC comment. NRC will issue its Site Characterization Analysis in mid-1989. In 1989, DOE expects to start exploratory shaft construction.

For the next six or seven years, DOE will conduct an extensive program of site characterization, which will consist of surface-based field studies and other tests. During this time period, DOE will be collecting the data necessary to satisfy the information needs for each issue identified in the issues hierarchy and in the SCP and will generate a multitude of reports to document the data obtained and to demonstrate how the data supports the various issues. In addition, a series of workshops, meetings, data reviews and other interactions will take place between DOE, NRC and the State in an attempt to reach early resolution on as many licensing issues as possible before the actual licensing hearing. The reports produced during this phase will also contribute to the development of the repository and waste package designs, the environmental impact statement, the recommendation report to the President, and the license application.

3.1.2.2 The Licensing Phase

In accordance with the Nuclear Waste Policy Act, as amended, NRC must complete its licensing review and hearings within three years of receipt and acceptance of DOE's license application. (A one-year extension is possible with Congressional approval.) DOE expects to submit the license application containing its application for a construction authorization to NRC in early 1995. NRC has no precedent for completion of a major licensing proceeding in three years (Jordan, 1986). Experience with highly contested reactor proceedings indicate that five to seven years is not an uncommon expectation (Olmstead, 1987). For reactor cases, the license application typically comprises 10 or more large volumes of material consisting of both safety and environmental factors (NRC, 1987). The repository application will likely be much greater in length than that required in a commercial nuclear reactor case.

The license application for the repository will consist primarily of the Preliminary Safety Analysis Report and the Final Environmental Impact Statement, both of which will contain the repository and waste package designs, and other related information. These major documents will contain DOE's data, analyses and proposed demonstrations of regulatory compliance based on information derived from the site characterization activities.

After formal docketing of the license application with the NRC, an Atomic Safety Licensing Board (ASLB) will convene and conduct a prehearing conference with the involved parties, including any interveners. The issues and contentions to be pursued in the licensing proceedings are defined during this prehearing conference by the ASLB. After this point, several activities affecting data scope and content will proceed in parallel.

First, the parties to the licensing proceeding begin a formal discovery process (see Section 3.3.1.6). This involves fact finding to obtain information from DOE, NRC, and others in order to develop challenges to the adequacy of the technical data and analyses presented. While informal discovery (e.g., consultative exchanges of information) will have taken place during the several years prior to filing of the license application, formal discovery is generally directed to the contentions accepted by the ASLB. For a proceeding of this nature (first of its kind and multiple well-funded parties) the traditional discovery process would involve hundreds to thousands of requests for information, the handling of thousands of documents, and the filing of multiple interrogatories, depositions, affidavits and testimony. Significant time and resources would be spent in requesting, searching, retrieving, developing, copying and mailing these massive quantities of documents. NRC staff recently estimated that, under existing rules, a document production request in a large case can require 12 to 18 months of manual effort. Large file rooms have to be established by each party and time is needed to manually sort and select records at the site of production. With multiple well-funded parties this means extensive travel, scheduling, review and motion practice (Olmstead, 1987). For reactor cases, the formal discovery phase has typically taken 12 to 24 months (Jordan, 1986). However, as characterized by the Chairman of NRC's ASLB, the repository case may well be the largest administrative proceeding ever conducted. He estimates that the number of fully-funded parties to the licensing hearing will be 10 to 30 times greater than that in reactor licensing cases and that the number of documents subject to the discovery phase will be about 30 to 40 times larger (Cotter, 1986).

With only three years under law to complete the proceeding, it is obvious that steps must be taken to reduce the time required for formal discovery. To cope with this difficult administrative problem and thus avoid substantial delays in the proceeding, NRC proposed the development of a data base management system (the LSS) that would be on-line and available to all parties to the proceeding for discovery. Document discovery, both informal and formal, would take place within the system, which could save significant time and professional resources. If the data base were available well in advance of the start of the proceeding, the formal document discovery procedures could be reduced to a few months (Olmstead, 1987). An NRC negotiated rulemaking, involving all potential parties to the repository proceeding is underway and will set the structural and operational parameters of the LSS.

Second, the NRC staff will conduct its own safety and environmental reviews of the license application. Prior to this time and throughout the proceeding, the NRC and DOE staffs, as well as interested parties, will continually interact, exchanging questions and responses to facilitate a timely review (primarily questions and responses relating to understanding of the data and analyses presented).

For the safety review, the NRC staff will examine DOE's Preliminary Safety Analysis Report (PSAR) to determine whether the repository site and design are safe and consistent with applicable rules and regulations; whether valid methods of evaluation were employed and accurately carried out; and whether DOE conducted its analysis and evaluation in sufficient depth and breadth to support staff approval with respect to safety. When

the staff is satisfied that its own acceptance criteria have been met by the PSAR, the staff will prepare a Safety Evaluation Report (SER) which summarizes the results of its review regarding the anticipated effects of the proposed repository on public health and safety. Following publication of the SER, the NRC's Advisory Committee on Reactor Safeguards (or, in the repository case, an equivalent advisory committee established for waste management) will prepare its own independent report and recommendations to the NRC Chairman, and the staff will issue a supplement to the SER incorporating any changes or actions adopted as a result of the ACRS recommendations. As a result of NRC's questions throughout the review and its SER and any supplements thereto, DOE will issue supplements amending its PSAR. When the NRC staff and the advisory committee have completed their reviews, a public hearing on the safety aspects of the decision will be held near the proposed repository site (NRC, 1987). The hearing stage is a significant contributor to the time and data base requirements involved in a licensing proceeding. This stage can go on from several years to many years depending on the complexity of the case and the number and difficulty of the contentions. As the hearing stage progresses, both DOE's Safety Analysis Report and NRC's Safety Evaluation Report will be finalized. After the hearing record is closed, each of the parties will submit to the ASLB proposed findings of fact. The ASLB will consider each of the findings and will file a decision on the case.

NRC's environmental review of DOE's Final Environmental Impact Statement (FEIS) will proceed in parallel with the safety review and will focus on environmental and site suitability aspects of the proposed facility. The NWPA, as amended, requires that NRC adopt, to the extent practicable, DOE's environmental impact statement. Unlike the typical reactor licensing case, DOE will have issued a Draft Environmental Impact Statement one and a half years before license application is submitted to NRC. This allows more time for review and comment by Federal, state and local agencies, other interested parties and members of the public, as well as for the conduct of public hearings. Following NRC's review of the FEIS, the ASLB will conduct a hearing on the environmental impact and site suitability aspects, following similar steps as outlined above.

If the staff reviews and ASLB hearings have resulted in favorable findings, an authorization to construct the repository could be granted. The current DOE estimate for this milestone is early 1998. Once an NRC authorization to construct the repository is granted, DOE may begin repository construction.

Before DOE can accept spent fuel for disposal in the repository, it must submit an updated license application to the Commission. Since the repository will operate in two phases (Phase I for disposal of limited quantities of spent fuel and Phase II for full operation), DOE will have to submit an updated license application twice. The same process described above will take place; however, the timespans involved are expected to be shorter. The first amended application could be submitted in the year 2000, with receipt of a license to receive and possess limited quantities of radioactive material in 2003. The second amended application could be submitted in 2003, with receipt of a license to receive and possess additional quantities of radioactive material in 2006. (DOE, 1987c). However, these dates are not yet firmly decided.

All these schedules are dependent on the outcome of challenges, motions and information submitted during the NRC licensing proceedings.

3.1.3 Summary of Documents to be Generated In Support of the High-Level Waste Repository Licensing Proceeding

A significant portion of documents in support of the high-level waste licensing proceeding will be generated during the site characterization phase. While many of the major types of documents can be identified at this time, DOE and NRC are still in the planning stages with respect to the timing, nature and flow of documents during this phase. Figure 3 illustrates one of the preliminary concepts being considered within DOE for the flow of documents during site characterization. Based on the issues identified in the DOE issues hierarchy, the SCP identifies the information needed to resolve each of the issues. After more detailed study plans and technical procedures have been developed by DOE and approved by NRC, detailed site characterization activities (e.g., site investigations, advanced design activities, and performance assessment) will be undertaken and will continue for the next four years to support development of the license application.

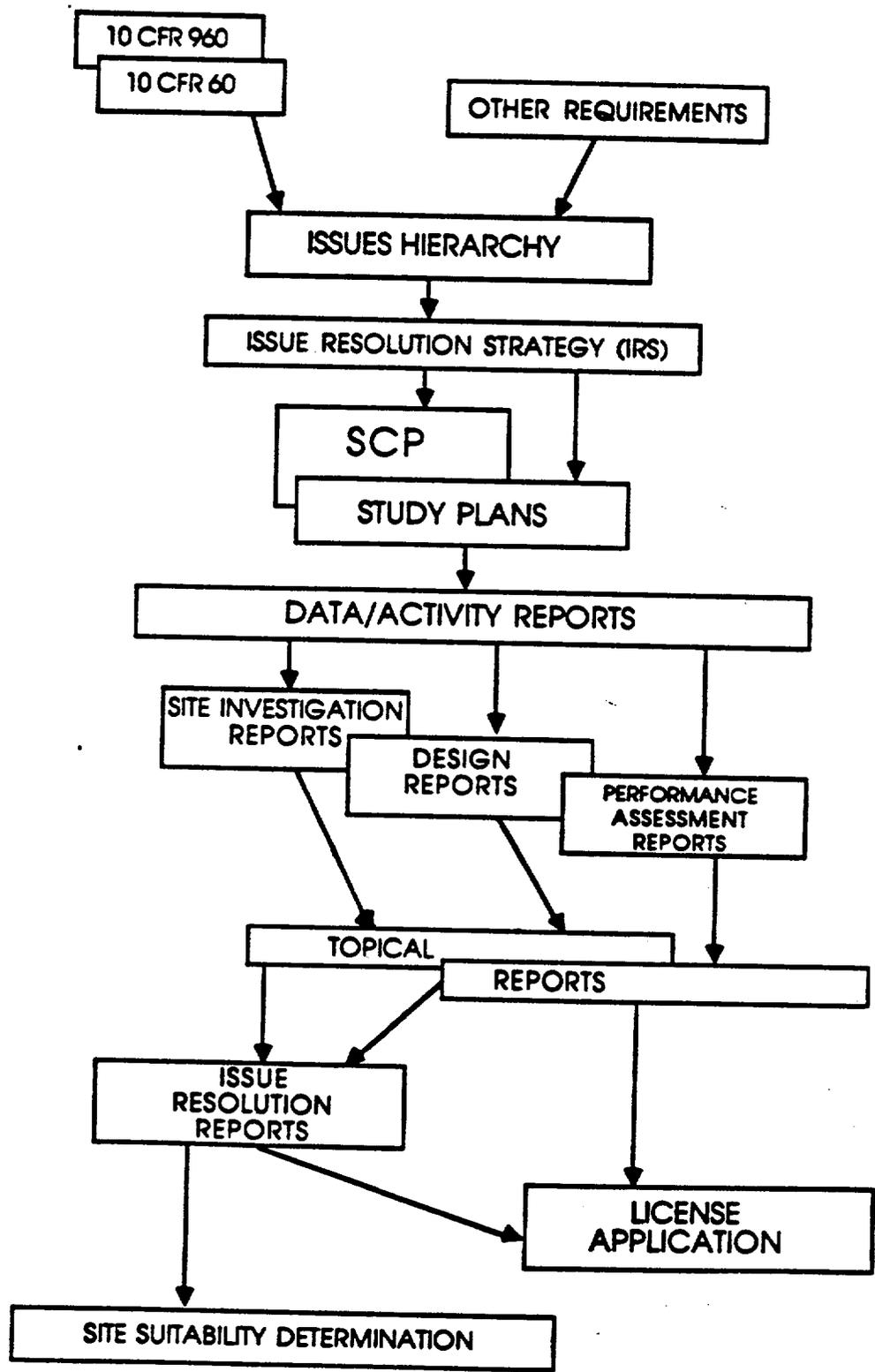
Raw data will be collected and screened for each technical activity identified in the SCP and the data will be summarized and analyzed in data reports (also referred to as activity reports or data/activity reports). Chapter 8 of the CDSCP identifies each of the technical activities and milestones. It is likely that some type of data report will be generated at each milestone or activity point. This can result in hundreds to thousands of data reports of varying length and with varying amounts of figures, maps, calculations and drawings.

To integrate the results of the data reports under each area of investigation in the SCP, DOE will then prepare higher levels of reports, which summarize the data and present conclusions relative to the information needs identified in the SCP. This next level of reports will consist of three types:

- (1) site investigation reports,
- (2) design reports,
- (3) performance assessment reports.

The next reporting level will be topical reports, which will integrate and analyze the data and conclusions presented in the site investigation, design, and performance assessment reports for individual regulatory topics; summarize the data and conclusions relative to each topic; and state the DOE licensing position for each topic. These reports are analogous to "position papers" and will serve as a vehicle through which DOE establishes and communicates its developing technical information base for demonstrating compliance with regulatory requirements. These reports will also serve as the basis for interactions between DOE and NRC staff, allowing early NRC comment on the developing positions. Finally they will provide information to interested parties and will contribute to the development of the next level of report (DOE, 1988a).

**Figure 3.
A PRELIMINARY CONCEPT OF DOCUMENT FLOW
DURING SITE CHARACTERIZATION**



Issue resolution reports will utilize the licensing positions presented in approved topical reports and the data/information from their supporting technical reports to demonstrate the resolution of the "issues" and "key issues" of the DOE issues hierarchy.

In sum, the reports identified above provide "building blocks" for the issue resolution process. An individual issue resolution report could potentially contain input from a number of topical reports, and any one topical report could be applicable in several different Issue Resolution Reports. The same applies to the lower-level documents. The issue resolution reports will be used in confirming site suitability and will provide supporting documentation to the license application. Again, the program is evolving and plans are not yet firm.

The reports described above are the primary issue resolution documents, which will support the license application, including the PSAR and FEIS. However, the universe of documents to be generated during the site characterization phase is even larger. The reports generated by DOE will spawn other documents generated by NRC, the potential host State, other interested parties, and perhaps, again, DOE. In addition, the other involved parties will be generating their own independent reports, which may follow a similar "building block" approach. Also to be accounted for are the documented results of the numerous technical and management meetings, workshops and other interactions that will take place during this period. Table 2 provides a more detailed listing of the specific types of documents or records that will be generated during the site characterization phase, and Figure 4 provides an estimated timeline for document generation during site characterization and up to submittal of a license application.

The volume of documents generated is expected to be the heaviest from 1990 to 1995, when DOE is generating site characterization data and incorporating the interpreted data and analyses into the license application (including the DEIS, FEIS and PSAR). If there is not a significant number of legal challenges following submission of the license application, the rate of new document generation would be expected to decrease. However, it is probable that legal challenges will intensify during the three-year licensing period (e.g., 1995 to 1998). The challenges themselves could lead to the need to generate more data and documents. As a prudent measure, one should assume that the generation of new documents will either remain at the same level as during the site characterization phase or increase.

The scope of such documents will include the legal documents normally involved in a licensing proceeding (e.g., contentions, interrogatories, depositions, testimony, affidavits, motions, findings of fact, decisions), the technical documents involved in the NRC review of the license application (e.g., many rounds of questions and responses, amendments to the Environmental Impact Statement, the Safety Analysis Report, and the Safety Evaluation Report), and the difficult-to-predict technical data and reports that will have to be generated as a result of challenges to the DOE proposal.

Neither DOE nor NRC have reached a stage where it can identify the precise timing of the generation of these licensing documents or their volume.

**TABLE 2 - PRELIMINARY LIST OF THE MAJOR TYPES OF DOCUMENTS
GENERATED BY THE PROGRAM**

(Repository/MRS/Transportation)

MAJOR PROGRAM DOCUMENTS

Site Survey & Area Recommendation Reports
Environmental Assessments (Draft/Final) and comments
Site Characterization Plan (Draft/Final) and comments
Site Characterization Semi-Annual Reports
Repository, MRS and Waste Package Designs
Spent Fuel Shipment Cask Design
Safety Analysis Report Packages (Shipment Casks)
Environmental Impact Assessments (Draft/Final) and comments
Recommendation Report to President
Notices of Disapproval by State
License Application

- Safety Analysis Report and updates (DOE)
- Safety Evaluation Reports and updates (NRC)

Records of Proceedings (contentions, interrogatories, testimony, evidence, proposed findings of fact, ASLB decision, etc.)
NRC Construction Authorization and Cask Certifications
NRC Authorization to Receive and Possess Radioactive Material

SUPPORTING PROGRAM DOCUMENTS

DOE Study Plans and Technical Procedures
DOE Institutional Plans and Procedures
DOE Data/Activity Reports
DOE Site Investigation Reports
DOE Design Reports
DOE Performance Assessment Reports
DOE Regulatory Topical Reports
DOE Issue Resolution Reports
NRC Comments on above
State reports and comments
Public comments
NRC reports (results of contractor analyses, etc.)
Public hearing records
Contractual Statements of Work
Transportation Routes and Route Survey

REGULATIONS, GUIDANCE AND POLICY

Petitions for Rulemaking

Rulemakings

- Advanced Notices of Proposed Rulemaking
- Public Comments on Advanced Notices
- Proposed Rulemaking
- Public Comments on Proposed Rule
- Final Rule and Agency Analyses of Comments

**TABLE 2 - PRELIMINARY LIST OF THE MAJOR TYPES OF DOCUMENTS TO BE
GENERATED BY THE PROGRAM**

**(Repository/MRS/Transportation)
(continued)**

NRC Technical Positions
NRC Regulatory Guides
Standard Review Plans
Requests for legal interpretations
Responses to legal interpretations
Congressional testimony (DOE, NRC, State, intervenors)
Responses to Congressional questions (DOE, NRC, State, intervenors)
Testimony before independent review boards/advisory committees
Responses to questions from independent review boards/advisory committees
Reports and recommendations by independent review boards/advisory committees

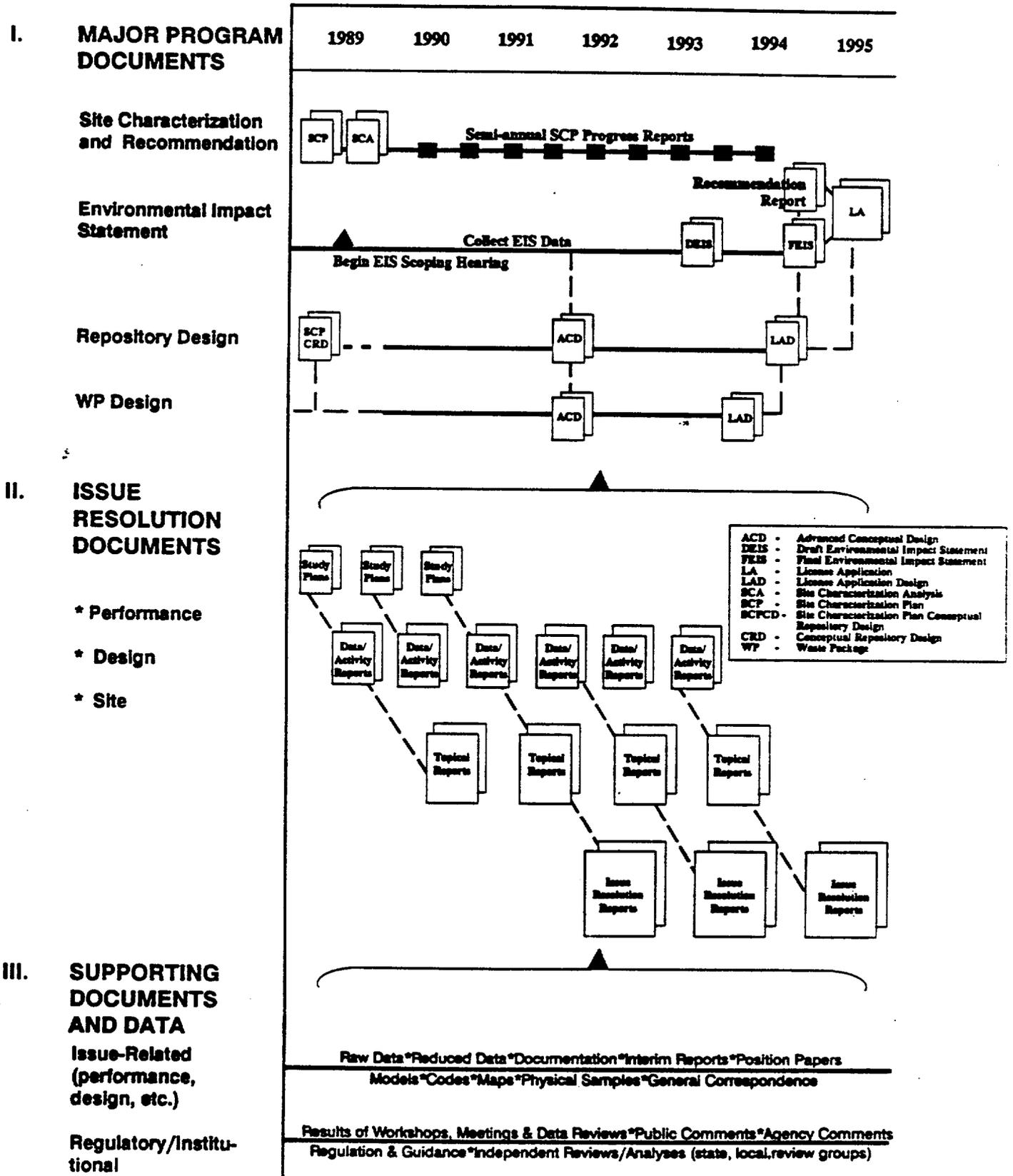
OFFICIAL COMMUNICATIONS BETWEEN AGENCIES

Summaries of NRC/DOE Management Meetings and resulting correspondence
Summaries of NRC/DOE/State Technical Meetings and resulting correspondence
Summaries of NRC/DOE/State Technical Consultations and resulting
correspondence
DOE/NRC/State Technical Briefings and resulting correspondence
NRC/State Data Examinations (at site) and resulting correspondence
Summaries of Site Visits and resulting correspondence
QA documentation (including plans/procedures, audit reports, comments by
observers, responses to audit reports, etc.)

INFORMAL COMMUNICATIONS BETWEEN AGENCIES

One-on-one correspondence between agency staffs (DOE, NRC, State, etc.)
Summaries of internal NRC meetings
Summaries of internal DOE meetings
Summaries of internal State meetings
Reports by NRC's On-Site Licensing Representative

**Figure 4.
SUMMARY OF PROPOSED DOCUMENT GENERATION
DURING SITE CHARACTERIZATION**



3.2 Current Data Bases of Importance to LSS

There currently exists three large collections of data that meet in part the information needs of some potential LSS users and therefore should be included in the LSS data base. Data held by OCRWM headquarters is indispensable to potential LSS users because it includes documentation of OCRWM policy decisions. The OCRWM collection in Las Vegas is essential to potential LSS users because of the Nevada-specific focus of its technical document collection. The substantial collection of nuclear waste management documents at NRC is also important to potential LSS users. The richness of this collection provides a valuable supplement to the OCRWM document collections. The following sections briefly describe these holdings and indicate the contribution they would ultimately make to the LSS collection.

3.2.1 Profile of the OCRWM Headquarters Data Base

In February 1987 work began on processing OCRWM headquarters documents and records. A bibliographic data base, called the Automated Records System (ARS) was established, containing description of documents contained on microfilm. ARS is used to support litigation and provide on-going headquarters records management support.

Table 3 summarizes the types of documents described in the ARS. Table 4 shows several statistics about the document types. Approximately 657,000 pages are contained in the document collection for which bibliographic descriptions are available in ARS. There currently exists a backlog of about 162,000 documents in addition to these documents. Using 5.8 pages per document as an average (derived from a sample of the data base) an estimate of 945,000 pages of backlog can be estimated. OCRWM staff is currently in the process of screening criteria for document entry into the LSS. An initial scan of the data base has identified some extraneous materials including various communications with the public, annual reports, cost reports, administrative reports, (and internal reviews that are not pertinent to the LSS. Also, among the documents that are pertinent to LSS there is substantial duplication. In many instances there are more than a dozen copies of the same document stored in different OCRWM staff offices. The portion of the data base that is relevant and not duplicative is important in that it provides documentation of OCRWM policies and decisions. As Table 4 reveals, more than 60% of the collection is in the form of letters, memos, telefaxes, and other correspondences.

3.2.2 Profile of the NNWSI Data Base

The Las Vegas collection is clearly much more scientific and technical in nature than the OCRWM headquarters collection. Many of these reports are contained in the backlog of 845,000 documents. These reports are thought to be longer than the 5.8 pages per document average at OCRWM headquarters. Estimates of their size range between 8 and 10 pages per document. These estimates produce a backlog at Las Vegas of 6.8 to 8.5 million pages. A much larger portion of the documents in this collection is considered to be potentially useful to LSS users than in the OCRWM Headquarters ARS. With duplicates eliminated, 65% to 70% of the documents in this collection appear

TABLE 3. TYPES OF DOCUMENTS CONTAINED IN THE OCRWM HEADQUARTERS

ARS DATA BASE

<u>ARS Document Type</u>	<u>Description</u>
Correspondence	Includes both incoming and outgoing communications such as letters, memos, and telefaxes.
Reports	Summaries of administrative and technical subject. Can include results of technical investigations, status reports, speeches, hearings.
Publications	Commercially published non-graphic material such as books, journals, Articles, Federal Register and newspaper.
Governing Documents	Includes directives, procedures, orders, resolutions, regulations, instructions, plans, policies, and guidelines. (Not reports discussing directives, plans, etc.)
Graphics	Generally consists of non-textual materials such as maps, charts, drawings, photographs.
Procurement	Documents related to the acquisition, inspection, maintenance, and funding of program activities. This includes RFP's, proposals, contracts, bidder lists, supplier/vendor lists.
Raw Data	Unanalyzed data/information primarily of a technical nature which may appear on logs or stripcharts.
Legal	Includes legal documents produced in the litigation process, patents, and agreements.

**TABLE 4. CONTENTS OF THE OCRWM HEADQUARTERS AUTOMATED RECORD SYSTEM
DATA BASE, MARCH 10, 1988**

<u>ARS Document Type</u>	<u>Number of Documents</u>	<u>% of Total</u>	<u>Average Page Length</u>	<u>Pages</u>
Correspondence	69,971	62	4.8	337,300
Reports	29,386	26	5.4	157,500
Publications	6,480	6	4.6	29,500
Governing Documents	3,022	3	13.9	42,000
Graphics	2,815	2	7.6	21,300
Procurement	808	1	8.1	65,100
Raw Data	420	0	2.9	1,200
Legal	246	0	13.6	3,400
TOTAL	113,088	100%	5.8	657,300

to be appropriate for inclusion in the LSS data base. OCRWM will shortly begin a detailed investigation of this data base to verify Las Vegas estimates.

3.2.3 Profile of the Nuclear Regulatory Commission Data Base

The Transitional Licensing Support System at the Nuclear Regulatory Commission contains both the bibliographic records and the full-text of correspondence documents. The documents were primarily prepared by NRC's Division of Waste Management and their contractors. To date, 3,000 of these documents are included in the system. An additional 47,000 documents are in the backlog. The documents average 7 pages per document, thirty documents per day are being acquired for entry in the system.

3.3 Contents of the LSS Data Base

In this section the characteristics and scope of information required by potential users of LSS are described. Much of this description is derived from the recent Preliminary Needs Analysis that was based on interviews conducted in early 1988. This description is followed by an examination of some key features of the LSS data base.

3.3.1 Information Needs of Potential Users

Four LSS end-user groups are described in the Preliminary Needs Analysis (DOE, 1988d). Each of these groups comprise usage patterns reflecting similar traits. These end-usage categories are:

- o Technical and Engineering Usage
- o Regulatory and Licensing Usage
- o Management and Administrative Usage
- o Public Information and General Public Usage.

In addition to the four end-user groups, two other groups were identified:

- o Intermediary Usage
- o Data Base Management and Quality Assurance Usage.

The characteristics of and data requirements for these end-user groups are provided below.

3.3.1.1 Technical and Engineering Usage

This is the largest usage group constituting 45% of total usage according to the Preliminary Needs Analysis. Scientists and engineers are characteristic of this usage type. Many of these users will require information during the preparation and review of technical reports used in support of the licensing process. Others, more removed from the formal process, will wish to access the LSS with no less professional interest. Members of this usage group will be primarily from the technical staff of

federal agencies, national laboratories, state and local agencies, environmental and public interest groups, and the contractors supporting these sub-groups. Their questions will deal mostly with primary data, published analyses of technical issues, computer program documentation, quality assurance procedures and testing procedures. The documents sought by these scientists and engineers will be DOE, NRC and national laboratory technical reports, articles in scientific and engineering journals, progress and summary reports of contracts for government agencies.

The analytical, experimental, and scientific orientation of this group will typically be concentrated on specific topics and issues. They will use bibliographic citations as a means for conducting comprehensive searches of their topical data bases. They will be concerned with the supporting evidence for claims made in their literature. The chain of citations which they need to examine will vary, but will certainly emanate from or lead to the key documents to be generated by the OCRWM program (described in Section 3.1 above). The documents referenced in the key documents should themselves be included in the LSS data base, because of the substantial likelihood that they will be consulted by these users. Without their inclusion in LSS, research time will be increased. Also, acquisition of many of the relevant technical reports is so difficult that some may not be obtained by researchers. Failure to include the key LSS documents in the data base may retard the licensing process and decrease the quality of scientific and engineering support and review of the license and construction authorization applications.

The argument for inclusion of second generation citations in the LSS data base (documents that are referenced in the documents referenced in the key licensing documents) has some merit but is less persuasive. The contention that technical and engineering documents pertinent to OCRWM issues should be included along with the supporting background documents from the literature of the relevant disciplines (e.g., geology, geoenvironment, hydrology, geochemistry) is more easily defended.

This analysis of what should be included in the LSS is built upon the earlier needs analysis. These conclusions should not be interpreted as limiting inclusion of technical and engineering documents to less than the needs of all potential users. These conclusions are an effort to translate the global expressions of need into an operational set of data scope requirements.

3.3.1.2 Regulatory and Licensing Usage

Usage in this category, about 25% of all usage according to the Preliminary Needs Analysis, is expected to be primarily by regulatory and licensing specialists (including legal staff) requiring access to both technical and regulatory information. These users are procedure- and strategy-oriented, with a broad qualitative bent. Their concerns are with defensibility of positions, completeness of documentation, and direction of overall policies and strategies.

Before submittal of the license application, this group has to perform three major regulatory functions. First, regulatory support staff will

perform an on-going oversight role to ensure that technical work will result in a complete and defensible license application. Second, the regulatory support staff will direct and participate in topical report development, seeking early resolution of issues. Third, programmatic decisions must be reviewed by legislative/policy analysts to determine if actions contemplated are within the letter and intent of applicable federal, state, and local laws and regulations.

After submittal of the license application, the licensing support staff will be responsible for developing positions on hearing issues, identifying witnesses, preparing testimony, responding to motions, etc.

Some of the documents sought by users in this usage group include technical and non-technical reports, correspondence, meeting minutes, regulations, regulatory guidance, planning documents, and commitments. Of the LSS subsystems, the Regulations Access Subsystem would be the most often used by the regulatory and licensing usage group. However, heavy usage of the Records Access Subsystem and Issues and Commitment Tracking subsystems will also be made.

3.3.1.3 Management and Administrative Usage

Usage in this category (about 5% of all usage according to the Preliminary Needs Analysis) is expected to be primarily by managers and administrators who are concerned with projects and contracts they are conducting or monitoring. This group will be mainly task, project and program managers and administrators as well as line managers from government agencies, national laboratories, and private contractors. Some of the documents sought by these users include planning documents, cost and schedule performance charts, statements of work, quality assurance audit reports, correspondence, action and commitment tracking documents and memoranda of understanding.

A data base useful to users of this type currently exists in the Automated Record Systems in Washington and Las Vegas. The information system for LSS must provide broader and larger user community access and retrieval features and will achieve this, in part, through the development of the Issues and Commitments Tracking Subsystem. Nevertheless, the scope of the data base required to satisfy this usage group is of the kind already available. That data base will expand as licensing activities progress but its general characteristics are likely to be similar to the current ARS data base.

3.3.1.4 Public Information and General Public Usage

Usage in this category (about 5% of all usage, according to the Preliminary Needs Analysis) is expected to be primarily in support of information needs of the general public, either in response to direct inquiry or through information dissemination by public information specialists. These users' questions will deal mostly with general and descriptive information about nuclear waste management and OCRWM activities, and summary information on technical and environmental issues. Some of the

documents sought in this usage category are records of public hearings, issue papers, summary technical documents, fact sheets, documents open for public comment, periodical articles and press releases.

Usage by this category can be expected to expand as the licensing process proceeds. Controversy on the repository is likely to develop and generate a substantial data base that needs to be incorporated in the LSS. Newspaper and magazine articles, books, press releases, fact sheets, issue papers will all proliferate in response to heightened public interest. Provision should be made in the LSS data base to include these documents and to assure complete representation of the various points of view that will emerge.

3.3.1.5 Other Usage Groups

During the development of the LSS Preliminary Needs Analysis, it became apparent that, in addition to the four potential LSS end-user groups discussed above, there were two other groups of potential LSS users:

- (1) An Intermediary Usage Group
- (2) A Data Base Management and Quality Assurance Usage Group.

These two groups jointly constitute the remaining 20% of LSS usage according to the Preliminary Needs Analysis.

3.3.1.5.1 Usage by Intermediaries

Usage in this category is expected to be primarily in support of information needs of the end-usage categories, generally in response to inquiries by those who do not have direct access to LSS or those who do not want to access the system themselves. This intermediary group will be mainly librarians and information specialists and may also include administrative assistants, researchers and paralegal staff who have a working knowledge of information retrieval or have become thoroughly experienced in searching the LSS.

The documents sought in this usage category will be all of the documents in the system needed by users in each of the four end-usage categories. While no additional documents will be required by these intermediaries, their greater sophistication in information system usage can be expected to impact on the supporting data systems. These users are more likely to exploit the full capabilities of structured indexed searching and to press the limits of full-text searching.

3.3.1.5.2 Data Base Management and Quality Assurance Usage

Usage in this category is expected to be primarily one of controlling and facilitating the flow and quality of data and documents into and out of the LSS. This group will be mainly QA/QC staff, data base maintenance staff and use trainers.

While this group will not require documents in addition to those needed by the end-users, members of this group will need to be supported by a software and QA data base essential for the operation and maintenance of the system.

3.3.1.6 Discovery, Relevance and Privilege

The issues of discovery, relevance, and privilege are important to this preliminary data scope analysis because their interpretation and application to the licensing process are likely to have a significant impact on the types and scope of data to be included in the LSS. Material subject to discovery during repository licensing should be able to be identified through the LSS. Such material must be relevant to the licensing process and must not be subject to any privilege that would limit access.

3.3.1.7 Summary of the Data Needs of Potential Users

In the discussion of each usage group, a general data needs statement has been provided along with examples of specific kinds of documents needed. The number of these users and their needs are likely to expand over time, especially as the licensing process proceeds and public attention becomes focused on repository issues. As scientists and engineers accelerate their research efforts they will probably discover new data needs. Regulatory and licensing activities will also expand and with these an extended array of data needs. And as noted above, increased public focus on the repository will stimulate public information and general public usage.

Under these conditions, it is essential that LSS contain all the data needs of all anticipated users. To plan for less than this is to risk an incomplete data base and extend the licensing period beyond the target of less than three years.

Criteria for the inclusion of information within the LSS must be developed so that an unambiguous decision can be made as to whether a specific document is to be added to the LSS data base. Where the document provides substantial information clearly relevant to the repository licensing or development process the decision to include it is obvious. But if the document provides background information that might be tangentially useful to LSS users, its inclusion is in doubt. It is premature in this preliminary analysis to propose operational rules for document inclusion in the LSS data base. Decisions yet to be made by the NRAC will shape these operational rules. Also, additional analyses of the ARS document collections have begun and these are likely to provide much relevant information. Several items contained in the appendices to this report will be useful to these analytic efforts.

Appendix A includes a page count of the various sections of the Consultation Draft of the Site Characterization Plan (DOE, 1988d). This list may be used as a preliminary indicator of the relative contribution of scientific disciplines to site characterization activities and also as a checklist of some major topics that should be represented in the data base. Appendices B, C, and D provide specific lists of types of documents to be

included or excluded from the data base. These lists were prepared by the State of Nevada (Appendix B), the Environmental Defense Fund (Appendix C), and the Department of Energy (Appendix D).

3.3.2 The LSS Regulations Data Base

The Statement of Work for the Licensing Support System (DOE, 1987a) describes the LSS Regulations Access Subsystem as containing the "text of documents that impose legal requirements on the construction or operation of the geologic repository". This definition does not restrict the scope of regulations to the NRC licensing process, and therefore extends to state and environmental regulations that apply to repository siting, construction and operation. In order to estimate the size of the regulatory data base, several documents, which have been prepared for the purpose of defining the regulatory environment of the Yucca Mountain site, were collected and reviewed. These documents include:

1. NNWSI Project Regulatory Document Manual (DOE, 1986a)
2. Consultation Draft Site Characterization Plan (DOE, 1988b)
3. Environmental Assessment Yucca Mountain Site (DOE, 1986b)
4. Generic Requirements for Mined Geologic Disposal System (Weston, 1986)
5. Draft Environmental Regulatory Compliance Plan for Site Characterization of the Yucca Mountain Site (DOE, 1988a).

In addition to these sources, discussions with NRC and SAIC staff members familiar with the regulatory environment yielded additional insight into the extent of the applicable regulations and statutes.

The result of this effort is shown in Table 5, a composite listing of potentially applicable regulations. The major sources of regulations include:

1. The Code of Federal Regulations (CFR)
2. The United States Code (USC)
3. Nevada Administrative Code
4. Nevada Revised Statutes
5. Executive Orders.

In addition, certain documents that provide guidance are included such as NRC generic technical positions and DOE orders. The total number of pages included in the regulations listed in Table 6 is 8,311. One should be cautioned in extrapolating the page count to a character count as the number of characters per page varies widely depending on the format. NRC technical positions, for example, average about 2500 characters per page while regulations appearing in the small print, three-column format of the Federal Register average close to 7500 characters per page.

In estimating the size of the regulations data base, it is necessary to define a model for the incorporation of the regulations into the LSS. The model used in this analysis is based on the premise that the initial LSS data base will include all of the pertinent regulations as published in the most recent issue of the appropriate document (Code of Federal Regulations,

TABLE 5. REGULATIONS RELEVANT TO YUCCA MOUNTAIN SITE REPOSITORY PROGRAM

Notes:

1) "Where cited" references:

- N - NNWSI Project Regulatory Document Manual
- S - Draft Consultation Site Characterization Plan
- E - Environmental Assessment
- R - Generic Requirements for a Mined Geologic Disposal System
- C - Draft Environmental Regulatory Compliance Plan for Site Characterization of Yucca Mtn Site (NNWSI)
- O - Other sources (Informal discussion and interviews)

2) The letter "e" following a page count indicates an estimate.

CITATION -----	TITLE -----	WHERE CITED						PAGES -----
		N	S	E	R	C	O	
7 CFR - AGRICULTURE								
7CFR658	Farmland Protection Policy Act						X	6
10 CFR - ENERGY								
10CFR2	Rules of Practice for Domestic Licensing Proceedings						X	118
10CFR20	Standards for Protection Against Radiation	X	X	X	X		X	26
10CFR21	Reporting of Defects for Noncompliance	X						3
10CFR50App A	General Design Criteria for Nuclear Power Plants					X		9
10CFR50App B	Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants	X	X			X		4
10CFR50App I	Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material ...				X			4
10CFR51	Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions	X					X	19
10CFR60	Disposal of High-Level Radioactive Waste in Geologic Repositories	X	X	X	X		X	31
10CFR71	Packaging and Transportation of Radioactive Material	X		X			X	30
10CFR72	Licensing Requirements for the Storage of Spent Fuel in an ISFSI			X			X	24
10CFR73	Physical Protection of Plants and Materials				X	X	X	58
10CFR100	Reactor Site Criteria			X				4
10CFR100AppA	Seismic and Geologic Siting Criteria for Nuclear Power Plants			X				8

TABLE 5. REGULATIONS RELEVANT TO YUCCA MOUNTAIN SITE REPOSITORY PROGRAM.
(continued)

CITATION	TITLE	WHERE CITED N S E R C O	PAGES
-----	-----	-----	-----
10CFR960	General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories; Final Siting Guidelines	X X X X X	56
10CFR961	Standard Contract for Disposal of Spent Nuclear Fuel and/or High Level Waste	X X	18
10CFR1021	Compliance with the National Environmental Policy Act	X	1
10CFR1022	Compliance with Federal Floodplain/Wetlands Environmental Review Requirements	X	4
			----- 415
25 CFR - INDIANS			
25CFR261	Preservation of Antiquities	X	2
29 CFR - LABOR			
29CFR1910	Occupational Safety and Health Standards	X	918
29CFR1926	Safety and Health Regulations for Construction	X X	292
			----- 1210
30 CFR - MINERAL RESOURCES			
30CFR Chap I Parts 5-100	Mine Safety and Health Administration, Department of Labor	X X X	668
33 CFR - NAVIGATION & NAVIGABLE WATERS			
33CFR209	Administrative Procedure	X	52
33CFR320	General Regulatory Policies	X	13
33CFR323	Permits for Discharges of Dredged and Fill Material into Waters of the U.S.	X X	6
33CFR324	Permits for Ocean Dumping of Dredged Material	X	2
33CFR325	Processing of Dept of the Army Permits	X	18
33CFR326	Enforcement	X	4
33CFR327	Public Hearings	X	3
33CFR328	Definition of Waters of the United States	X	2
33CFR329	Definition of Navigable Waters of the U.S.	X	5
33CFR330	Nationwide Permits	X	10
			----- 114

TABLE 5. REGULATIONS RELEVANT TO YUCCA MOUNTAIN SITE REPOSITORY PROGRAM
(continued)

CITATION *****	TITLE *****	WHERE CITED					PAGES *****
		N	S	E	R	C	
36 CFR - PARKS, FORESTS, AND PUBLIC PROPERTY							
36CFR60	National Register of Historic Places					X	16
36CFR61	Procedures for Approved State/Local Government Historic Preservation Programs					X	15
36CFR63	Determination of Eligibility for Inclusion in National Register of Historic Places					X	3
36CFR65	National Historic Landmarks Program					X	11
36CFR67	Historic Preservation Certification...					X	16
36CFR68	Sec of Interior's Standards for Historic Preservation Projects					X	3
36CFR296	Protection of Archaeological Resources: Uniform Regulations					X	12
36CFR800	Protection of Historic & Cultural Properties					X	17
							90
40 CFR - PROTECTION OF ENVIRONMENT							
40CFR50	National Primary and Secondary Ambient Air Quality Standards		X	X	X		51
40CFR51	Reqmts for Preparation, Adoption, & Submittal of Implementation Plans					X	92
40CFR52	Approval and Promulgation of Implementation Plans - Subparts A,DD					X	72
40CFR53	Ambient Air Monitoring Ref. & Equiv. Methods					X	47
40CFR58	Ambient Air Quality Surveillance		X	X		X	17
40CFR60	Standards for Performance for new Stationary Sources					X X	645
40CFR61	National Emission Standards for Hazardous Air Pollutants		X	X	X		71
40CFR81	Designation of Areas for Air Quality Planning Purposes					X	8
40CFR110	Discharge of Oil					X	4
40CFR112	Oil Pollution Prevention					X	12
40CFR116	Designation of Hazardous Substances					X	10
40CFR117	Determination of Reportable Quantities for Hazardous Substances					X	9
40CFR121	State Certification of Activities Requiring Federal License or Permit					X	5
40CFR122	EPA Administered Permit Programs: National Pollutant Discharge Elimination System		X	X			52
40CFR123	State Program Requirements					X	20
40CFR124	Procedures for Decisionmaking					X	54
40CFR125	Criteria and Standards for National Pollutant Discharge Elimination System		X	X			37

TABLE 5. REGULATIONS RELEVANT TO YUCCA MOUNTAIN SITE REPOSITORY PROGRAM
(continued)

CITATION	TITLE	WHERE CITED						PAGES
		N	S	E	R	C	O	
40CFR129	Toxic Pollutant Effluent Standards						X	12
40CFR131	Water Quality Standards						X	6
40CFR133	Secondary Treatment Regulation						X	4
40CFR136	Guidelines Establishing Test Procedures for the Analysis of Pollutants						X	273
40CFR141	National Interim Primary Drinking Water Regs.	X	X	X	X			27
40CFR142	National Primary Drinking Water Regulations						X	19
40CFR143	National Secondary Drinking Water Regulations					X	X	3
40CFR144	Underground Injection Control Program						X	54
40CFR145	State UIC Program Requirements						X	11
40CFR146	Underground Injection Control Program: Criteria and Standards						X	20
40CFR147	State Underground Injection Control Programs						X	71
40CFR149	Sole Source Aquifers						X	5
40CFR162	Regulations for the Enforcement of the Federal Insecticide, Fungicide and Rodenticide Act						X	68
40CFR190	Environmental Radiation Protection Standards for Nuclear Power Operations					X		2
40CFR191	Environmental Standards for the Management & Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes	X	X	X	X		X	9
40CFR192	Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings						X	7
40CFR201	Noise Emission Standards for Transportation Equipment						X	13
40CFR204	Noise Emission Standards for Construction Equip						X	17
40CFR220-30	Subchapter H - Ocean Dumping						X	74
40CFR240-47	Subchapter I - Solid Wastes						X	45
40CFR260-64	Subchapter I - Solid Wastes						X	234
40CFR266	Standards for Management of Specific Hazardous Wastes & Specific Types of Hazardous Waste Management Facilities						X	8
40CFR270	EPA Administered Permit Program: Hazardous Waste Permit Program						X	42
40CFR271	Requirements for Authorization of State Hazardous Waste Programs						X	34
40CFR280	Underground Storage Tanks						X	7
40CFR300	National Oil and Hazardous Substances Pollution Contingency Plan						X	96
40CFR302	Designation, Reportable Quantities, and Notification						X	80
40CFR355	Emergency Planning and Notification						X	24
40CFR401	General Provisions						X	5
40CFR403	General Pretreatment Regulations for Existing and New Sources of Pollution						X	36
40CFR1500-08	Subchapter V - Council on Environmental Quality	X	X	X				29

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TABLE 5. REGULATIONS RELEVANT TO YUCCA MOUNTAIN SITE REPOSITORY PROGRAM
(continued)

CITATION -----	TITLE -----	WHERE CITED N S E R C O -----	PAGES -----
43 CFR - PUBLIC LANDS: INTERIOR			
43CFR3	Preservation of American Antiquities	X	2
43CFR7	Protection of Archaeological Resources	X	15
43CFR3600	Mineral Materials Disposal; General	X	8

			25
49 CFR - TRANSPORTATION			
49CFR101	Office of Transportation Security - Cargo Security Advisory Standards	X X	19
49CFR106-07	Subchap B - Hazardous Materials Transportation and Pipeline Safety	X X	27
49CFR171-78	Subchap C - Hazardous Materials Regulations	X X X X	1189

			1235
50 CFR - WILDLIFE AND FISHERIES			
50CFR17	Endangered and Threatened Wildlife and Plants	X	139
50CFR402	Interagency Cooperation - Endangered Species Act of 1973	X	12
50CFR424	Listing Endangered and Threatened Species and Designating Critical Habitat	X	8
50CFR450-53	Subchap C Endangered Species Exemption Process	X	9

			168
PUBLIC LAWS			
Nuclear Energy:			
42USC2011-2284	The Atomic Energy Act of 1954 as Amended	X X X	137
42USC5801 et seq	Energy Reorganization Act of 1974	X X X	21
	Department of Energy Organization Act	X X	49
42USC10101 et seq	Nuclear Waste Policy Act of 1982	X X X	63
	Nuclear Waste Policy Amendments Act of 1987	X X	29
Environment:			
15USC2601-2654	Toxic Substance Control Act	X	20 e
16USC470 et seq	National Historic Preservation Act	X X	27
16USC1531-1542	Endangered Species Act	X X	33
30USC601-604	Materials Act	X	2
33USC1311-1376	Federal Water Pollution Control Act	X X X	57
42USC300f-300j-1	Safe Drinking Water Act	X X X	29
49USC1801-1812	Hazardous Material Transportation Act	X X X	5
42USC1996	American Indian Religious Freedom Act	X	2 e
42USC4321-4347	National Environmental Policy Act	X X X X	20

TABLE 5. REGULATIONS RELEVANT TO YUCCA MOUNTAIN SITE REPOSITORY PROGRAM
(continued)

CITATION *****	TITLE *****	WHERE CITED					PAGES *****	
		N	S	E	R	C O		
42USC4901-4915	Noise Control Act, Quiet Communities Act			X	X		10	
42USC6901-6979	Hazardous and Solid Waste Amendment Act, Resource Conservation & Recovery Act			X	X	X	42	
42USC7401-7428	Clean Air Act		X	X		X	57	
42USC9601-9657	Comprehensive Environmental Response Compensation and Liability Act					X	X	32
7USC4201-4209	Land: Farmland Protection Policy Act		X		X		2	
43USC1701-1771	Federal Land Policy and Management Act		X		X		33	
30USC801-878	Safety: Federal Mine Safety and Health Act					X	46	

							713	
STATE REGULATIONS								
NevAdminCode	Air Quality: Sections 445.430-445.995				X		50 e	
NevAdminCode	Water Pollution/Underground Injection Control: Sections 445.2-445.96				X		50 e	
NevAdminCode	Sections 445.140-445.182				X		20 e	
NevAdminCode	Sections 445.224-445.420				X		50 e	
NevRevStatutes	Sections 445.131-445.354				X		54	
NevRevStatutes	Appropriate Public Waters: Section 533.325				X		1	
NevRevStatutes	Wildlife: Sections 501.105-501.110				X		1	
NevAdminCode	Sections 503.010-503.080				X		5 e	
NevRevStatutes	Vegetation: Sections 504.520, 527.050, 527.100, 527.105 527.260, 527.270, 527.500				X		5	

							236	
EXECUTIVE ORDERS								
12088	Federal Compliance with Pollution Control Stds				X		3	
11988	Protection of Floodplains				X		3 e	
11990	Protection of Wetlands				X		3 e	

							9	
Total Regs							7423	

TABLE 5. REGULATIONS RELEVANT TO YUCCA MOUNTAIN SITE REPOSITORY PROGRAM
(continued)

CITATION *****	TITLE *****	WHERE CITED N S E R C O *****	PAGES *****
GUIDANCE DOCUMENTS DOE ORDERS			
5440.1C	Implementation of NEPA	X	9
5480.1A	Environmental Protection, Safety and Health Protection Programs for DOE Operations	X	50 e
5480.4	Environmental Protection, Safety and Health Protection Standards	X	25 e
5482.1A	Environmental Protection, Safety and Health Protection Appraisal Program	X	11
5484.1	Environmental Protection, Safety and Health Protection Information Requirements Reporting	X	40 e
5484.2	Unusual Occurrence Reporting System	X	20 e
6430.1	General Design Criteria	X	250 e
			----- 405
NRC DOCUMENTS			
REGUIDE 4.17	Standard Format and Content of Site Characterization Plans for HLW Geologic Repositories	X	48
NUREG-0856	NRC Final Generic Technical Positions: Documentation of Computer Codes	X	12
	Radionuclide Solubility in Groundwater	X	17
	In Situ Testing during Site Characterization	X	18
	Design Information Needs in the Site Characterization Plan	X	13
	Waste Package Reliability Analysis	X	26
	Determination of Radionuclide Sorption	X	19
	Borehole and Shaft Sealing	X	20
	Revised Modeling Strategy Document for HLW Performance Assessment	X	65
	Qualification of Existing Data	X	4
	Peer Review	X	5
	Draft Generic Technical Positions (in Total)	X	236
			----- 483
	Grand Total		8311

U.S. Code, etc.). The LSS will not separately contain background information leading up to those regulations. For example, changes in the CFR are published in the Federal Register along with discussions covering comments, background, comment resolution, and other information pertaining to the understanding of the interpretation of the regulations appearing in the CFR. Similarly, changes in the U.S. Code are based on Public Laws which are passed by Congress. The Public Law itself will not appear in the LSS, unless it has not yet been incorporated into the Code. Following the initial LSS regulations data base loading, the LSS will incorporate all Federal Register notices pertaining to the listed regulations or deemed relevant, all Public Laws affecting the U.S. Code citations in the data base or deemed relevant, and the Regulations Access system data base will be revised to incorporate all later versions of the documents as they are published.

4.0 ESTIMATING THE SIZE OF THE LSS DATA BASE, 1990-2009

In this section, estimates are made of the amount and nature of the information needed by LSS users in August 1990 when LSS is partially loaded and available. A host of assumptions have been made in developing these estimates. Some have already been stated or are implicit in the preceding discussion. Additional assumptions will be made as the estimates are developed. It is necessary to prepare these estimates in order to design the LSS. However, many of the assumptions made here may be modified by decisions of the NRC Negotiated Rulemaking Advisory Committee or by actions of DOE or NRC.

4.1 Size of the LSS Data Base, August 1990

The data base of the information system being developed by NNWSI is considered in this Preliminary Data Scope Analysis as the core of scientific and technical material required to be contained in the LSS. This is justified because of the completeness of this collection. The estimates of its required size and content (SAIC, 1986b) are used here as the first step in estimating the size of the LSS data base in 1990.

The NNWSI project in 1986 consisted of the following participants:

U.S. Geological Survey
Lawrence Livermore National Laboratory
Los Alamos National Laboratory
Sandia National Laboratories
Science Applications International Corporation
Holmes and Narver
Fenix and Scisson
Reynolds Electrical and Engineering Company
Westinghouse/Waste Technology Services Division.

These project participants and NTS contractors were surveyed to estimate all information relating to the NNWSI project generated by or submitted to these organizations. The survey asked for estimates of the amount of project information that was and would be produced in the period 1980 to 1990. The

report (SAIC, 1986b) shows for each participant or contractor the project activity, the document type, and either document count or page count or both. In some cases only the number of pages or documents were provided and the missing quantity was estimated. SAIC staff noted wide differences in the average page per document figures computed from the submitted survey data. Submissions ranged from two pages per document to eight pages per document. Staff increased the estimate to compensate for what they believed was under-reporting in the page count. After discussions with the Las Vegas staff, it was decided to leave the original estimates as reported, but to use in all future estimates for NNWSI documents the more realistic range of 8 to 10 pages per document. Table 6 summarizes the results of the survey in its original form and shows that the data base would consist of about 4 million pages.

These 4 million pages constitute the first step in developing the estimate of the data base needed by LSS users in August 1990. Because the survey included documents to be prepared through Dec. 1989, an adjustment is required to cover the period January to August 1990. At an annual document production rate of 400,000 per year, production over the seven-month period would be about 233,000 (Item 2, Table 7).

In order to add the relevant ARS documents to the estimate without double-counting, the number of NNWSI participants' documents currently in ARS was counted (15,362) and the proportion on non-participant documents was calculated (0.60). As noted earlier, (Section 3.2.2) 65% to 70% of the non-participant documents in Nevada ARS were judged relevant and non-duplicative. When these proportions are combined with the 8 pages per document average (low estimate) and the 10 pages per document average (high estimate) a low estimate of 121,000 and a high estimate of 163,000 of documents referenced in the March 1988 ARS and relevant to LSS is generated (Item 3, Table 7).

New ARS/LAS Vegas documents processed in the 29 months from March 1988 to August 1990 are estimated by using the current ARS monthly production rate of 1,650 documents per month in combination with the factors described in the previous paragraph. Low and high estimates are generated and recorded as Item 4, Table 7.

The current backlog for Las Vegas ARS is 845,000 documents. The number of these documents included in low and high estimates of backlog documents needed by LSS users is described in Item 5, Table 7.

There are 113,088 documents currently indexed in ARS at OCRWM headquarters in Washington, D.C. Only four percent of these documents duplicate the NNWSI project survey documents described in Items 1 and 2 in Table 7. These must be omitted from the count of LSS documents to avoid double counting. Internal duplication of documents at OCRWM headquarters must also be considered as well as duplication with ARS/Las Vegas. Also, as noted in Section 3.2.1 there are many communications, administrative reports and other documents that are not relevant to LSS. Taking these exclusions into consideration, ARS staff at OCRWM estimate that 20% of the collection is relevant to LSS. This percentage is used in preparing the ARS/Washington estimates shown in Items 6, 7, and 8 in Table 7.

**TABLE 6. ESTIMATES OF THE NUMBER OF DOCUMENTS AND PAGES APPROPRIATE
FOR INCLUSION IN THE NNWSI PROJECT DATA BASE
FOR THE PERIOD 1980 TO 1990**

<u>ORGANIZATION</u>	<u>DOCUMENT COUNT</u>	<u>PAGE COUNT</u>
U.S. Geological Survey	96,860	739,400
Lawrence Livermore National Laboratory	83,355	666,840
Los Alamos National Laboratory	83,780	670,200
Sandia National Laboratories	25,163	201,310
Science Applications International Corp.	27,708	221,667
Holmes & Narver	184,000	368,000
Fenix & Scisson	315,000	630,000
Reynolds Electrical & Engineering	135,870	271,740
Westinghouse/Waste Technology Services Division	87,500	175,000
TOTALS	1,039,236	3,944,157

TABLE 7. SUMMARY OF COMPUTATIONS MADE IN ESTIMATING THE SIZE OF THE
LSS DATA BASE IN AUGUST 1990

<u>Item</u>	<u>Low Estimate</u>	<u>High Estimate</u>
<p>1. <u>NNWSI Project Documents</u> Data are from 1986 survey of nine organizations that are participants or contractors with NNWSI Project. Pages estimated as produced by them 1980-1990. All documents assumed to be related to only Nevada site.</p>	4,000,000	4,000,000
<p>2. <u>NNWSI Project Documents for Jan - Aug 1990</u> An estimated 4,000,000 pages for 10 years averages 400,000 pages per year. Estimate for the seven months is 7/12 of 400,000. Assumes production at the mean annual rate over the seven months.</p>	233,000	233,000
<p>3. <u>ARS/Las Vegas Documents</u> There are 38,868 documents currently described in ARS/Las Vegas. A sampling of ARS showed that 60% were not included in estimates above; and staff estimate that 65% (low estimate) to 70% (high estimate) are relevant to LSS. Estimate of pages per document range from 8 (low estimate) to 10 (high estimate).</p>	121,000	163,000
<p>4. <u>ARS/Las Vegas Documents, March 1988 - Aug 1990</u> New documents added for the 29 month period at 1,650 documents per month with 60% not duplicated above; and with 65% (low estimate) to 70% (high estimate) relevant. At 8 pages (low estimate) and 10 pages (high estimate) per document.</p>	149,000	201,000
<p>5. <u>ARS/Las Vegas Backlog</u> There are 845,000 documents in the backlog. Assuming the backlog is similar to documents in ARS, then about 60% of them are not counted in above and 65% (low estimate) to 70% (high estimate) of these are relevant.</p>		

TABLE 7. SUMMARY OF COMPUTATIONS MADE IN ESTIMATING THE SIZE OF THE
LSS DATA BASE IN AUGUST 1990
(continued)

<u>Item</u>	<u>Low Estimate</u>	<u>High Estimate</u>
Estimate of pages per document are 8 (low estimate) or 10 (high estimate).	2,636,000	3,549,000
6. <u>ARS/Washington Documents</u> There are 113,088 documents currently indexed in ARS. It is observed that 96% do not duplicate above and 20% of these are judged relevant. A sample of ARS set average pages per document at 5.8.	126,000	126,000
7. <u>ARS/Washington Documents March 1988 - Aug 1990</u> New documents are added at 50 per day. For the 29 month period at 20 workdays per month, with 96% not duplicating above; with 20% judged relevant and 5.8 pages per document.	323,000	323,000
8. <u>ARS/Washington Backlog</u> There are 162,000 documents in the backlog. 96% are not duplicative of above and 20% are judged relevant. 5.8 pages per document.	180,000	180,000
9. <u>NRC's Division of Waste Management Documents</u> The number of documents currently in collection is 50,000. 90% of these were determined as relevant. 7 pages per document.	315,000	315,000
10. <u>NRC's Division of Waste Management Documents March 1988 - Aug 1990</u> Thirty new documents are being added daily. Assume 20 work days per month for 29 months, 90% relevant, 7 pages per document.	110,000	110,000

TABLE 7. SUMMARY OF COMPUTATIONS MADE IN ESTIMATING THE SIZE OF THE
LSS DATA BASE IN AUGUST 1990
(continued)

<u>Item</u>	<u>Low Estimate</u>	<u>High Estimate</u>
11. <u>Regulations Data Base</u> Current count of pages is 8,311 (see Section 3.3.2). With revisions and new legislation 9,450 are estimated for August 1990. Only some 10% are duplicated in above estimates.	9,000	9,000
12. <u>Issues and Commitments Tracking Data Base</u> Estimate of the data base ranges from 4,000 to 5,000 pages.	4,000	5,000
13. <u>Adjustment for Under-Representation of Relevant Topics</u> Radioactive waste transportation, MRS and socioeconomic effects are insufficiently represented in (1) through (12). An adjustment of 10% of the total through (12) provides a low estimate. An adjustment of 20% provides a high estimate.	821,000	2,304,000
TOTALS	9,027,000	11,057,000

The number of relevant documents prepared by NRC's Division of Waste Management and its contractors currently total 50,000. These documents average 7 pages per document. Ninety percent of these documents are considered relevant to LSS. These assumptions add 315,000 pages to the sizing estimate of LSS. Again, current production is used to estimate new document production for March 1988 to August 1990 (Items 9, 10, Table 7).

The Regulations data base described in Table 5 is 8,311. Allowing for some growth, 9,450 pages are estimated for August 1990. Only some 10% of these pages are duplicated in above estimates (Item 11).

The size of the required issue tracking and commitments tracking data base as of August 1990 has been estimated by DOE staff to be 4,000 to 5,000 pages (Item 12).

The interim total of pages of documents needed in the LSS data base in August 1990 is based on projections of Nevada specific data combined with (non-redundant) estimates from existing relevant document collections. Detailed analysis on subject content of LSS data base needed by the specific independent end-usage groups have been performed for this Preliminary Data Scope Analysis, by the State of Nevada (Appendix B) and by the Environmental Coalition (Appendix C). The last two were prepared for the March 1988 meeting of the NRC Negotiated Rulemaking Advisory Group. A comparison of the subject contents represented in the interim total with the independently derived subject lists shows that several areas are under-represented in the former. Notable deficiencies in the collective data base are in the areas of radioactive waste transportation, monitored retrievable storage (MRS), and socioeconomic effects. It is also clear that the international literature in general is substantially under-represented as are technical journal articles. These current shortcomings will likely be exacerbated as activity on site characterization, MRS and the transportation of waste picks up pace. Release of the final site characterization plan for Yucca Mountain, scheduled for September 1988, is likely to trigger such activity. Consequently, the documents required to meet these needs should be reflected in the August 1990 LSS data base. Program staff estimate that a 10% to 20% increase in the interim total of documents represents what is needed to fill in current gaps in the coverage of these documents in the estimate and to provide for the rapid growth in document generation in the MRS and transportation areas that will occur between now and August 1990 (Item 13, Table 7).

With the addition of these documents the required size of the LSS data base on August 1990 is estimated to range between 9.8 million and 11.1 million pages. These low and high estimates are based on many assumptions summarized in Table 7. The estimates, while preliminary, give an order of magnitude estimate for design purposes. They will be revised as the results of analyses currently being conducted become available.

4.2 Size of the LSS Data Base, 1990 - 2009

It is anticipated that the per year generation of documents relevant to LSS, will increase and decrease relative to the time-line for key OCRWM activities as shown in Figure 1. Document production will increase in the

periods just before the release of important formal deliverables affecting LSS (e.g. the licensing application for the repository, the final environmental impact statements for the repository, and MRS) and will taper off afterwards (i.e. during repository construction).

Table 8 shows low and high projections from year-end 1990 through the following 20-year period. The key assumptions made in preparing this projection are as follows:

- (1) Beginning in August 1990 the additional materials appropriate for inclusion in the LSS data base reflects a 10% to 20% increase in annual additions to the data base beyond current levels in order to account for documents in subject areas where coverage in the estimates is inadequate.
- (2) The rate of production of documents to be included in the LSS annually varies in accordance with the program activity estimates made in the Preliminary Needs Analysis (notably the relative LSS usage time-line shown in Figure 3c, SAIC, 1988).

The projections show about 21.4 million to 28.0 million pages required by LSS at the end of the century and 31 million to 41 million pages required by the end of the year 2009. The projections are plotted on cumulative distribution curves shown as part of Figure 1.

5.0 CONCLUSIONS

The Conceptual Design Analysis, which is the next in this series of reports, will propose an LSS concept (and variants thereof) consistent with the requirements developed in the Preliminary Needs Analysis and the present Preliminary Data Scope Analysis. The system performance and data base size and content requirements will drive the ultimate LSS design. Several previous studies have attempted to quantify the number of documents (and pages) that constitute the information base available to LSS users. With the passage of time, this task has become easier. A better basis upon which estimates of the quantity and characteristics of the material needed in the LSS now exists, through experience gained in implementing systems such as the NRC Transitional Licensing Support System and the DOE Automated Records Systems, which support users with needs similar to those expected for potential LSS users. Further, the recent legislative action that focuses on a single potential repository site in Nevada simplifies the estimation process and reduces the associated uncertainties.

Generally, the LSS must be able to support all the information needs of all the parties involved in repository licensing (and their staffs and organizations). Specifically focusing on information needs to support licensing, the LSS should provide access to all the key program documents and major milestone documents in the licensing process, along with all of the documents cited in them. Additional supporting material in a variety of relevant technical disciplines should be included to provide an appropriate technical and regulatory context for this core. The liberal interpretation of what should be subject to discovery during the licensing process, which is the conservative interpretation from the perspective of schedule,

TABLE 8. PROJECTION OF THE SIZE OF THE LSS DATA BASE, 1990 - 2009

<u>Year</u>	<u>LOW ESTIMATE</u>		<u>HIGH ESTIMATE</u>	
	<u>Pages Added During Year</u>	<u>Cumulative Pages At Year-End</u>	<u>Pages Added During Year</u>	<u>Cumulative Pages At Year-End</u>
1990	830,000	9,304,000	1,100,000	11,885,000
1991	1,087,000	10,391,000	1,441,000	13,326,000
1992	1,428,000	11,819,000	1,892,000	15,218,000
1993	830,000	12,649,000	1,100,000	16,318,000
1994	2,009,000	14,658,000	2,662,000	18,980,000
1995	1,858,000	16,516,000	2,463,000	21,443,000
1996	1,635,000	18,151,000	2,167,000	23,610,000
1997	1,386,000	19,537,000	1,837,000	25,447,000
1998	623,000	20,160,000	825,000	26,272,000
1999	1,286,000	21,446,000	1,704,000	27,976,000
2000	1,170,000	22,616,000	1,550,000	29,526,000
2001	1,877,000	24,493,000	2,487,000	32,013,000
2002	1,236,000	25,729,000	1,638,000	33,651,000
2003	1,261,000	26,990,000	1,671,000	35,322,000
2004	1,327,000	28,317,000	1,759,000	37,081,000
2005	1,120,000	29,437,000	1,484,000	38,565,000
2006	415,000	29,852,000	550,000	39,115,000
2007	365,000	30,217,000	484,000	39,599,000
2008	365,000	30,582,000	484,000	40,083,000
2009	365,000	30,947,000	484,000	40,567,000

suggests that the criteria for document inclusion should be very broad to insure completeness of the LSS data base. This perspective provides an outer-bound estimate of what could be required.

The major document collections and information systems that have already been developed to support the high level waste (HLW) repository technical and regulatory community provide not only a starting point for estimating the characteristics of the LSS data base, but also contain a significant portion of the documents that currently exist and that will be needed in the LSS collection. Because of the varied needs which these systems were designed to meet, it is clear that not all the information in these systems is relevant for inclusion in the LSS and that the LSS must contain significant material beyond what is in them. A comparison of the subject content of these collections with the requirements expressed for the LSS data base reveals that the collections would not meet the LSS user requirements in a number of areas including primarily transportation, monitored retrievable storage, and socioeconomic effects. This suggests that a concerted effort to strengthen these areas will be required in the process of collecting the backlog material to be included in LSS. The technical material in the current collections also appears to under represent the relevant international literature and articles in peer review technical journals which will be needed by LSS users. Further, it is clear that the requirements of data base completeness for discovery, quality assurance, sophisticated information management system users and the technical breadth of HLW disposal literature lead to the conclusion that an active effort must be made to identify and include information appropriate for storage in the LSS, rather than simply including existing collections. This effort is particularly critical for identifying material that is not yet extensively available, such as quality assurance records and legal material generated during the licensing process.

Based on the concepts and assumptions in this analysis, the estimate of total pages of material that would be needed by potential LSS users (and therefore appropriate for inclusion in the LSS data base) in August 1990 ranges from 9.8 million to 11.1 million pages. Based on further analysis and assumptions, the estimate of material needed increases to between 31 million and 41 million pages over the first 20 years of LSS operation. These estimates are preliminary. While additional analyses of the content and scope of the LSS data base are currently being conducted, and this process will be refined, it is expected to continue for the life of the LSS. As program task schedules and issues become better defined, so will estimates of the scope and quantity of relevant information. However, it may be that the major finding of this study is that the uncertainty of these estimates will continue for some time and that consequently, this uncertainty should be incorporated in the design of the LSS.

REFERENCES

- Aerospace, 1986; Requirements Definition for a Licensing Information Management System for Nuclear Waste, Draft Revision 2, The Aerospace Corporation, prepared for NRC, March 1986.
- Cotter, B.P., Jr., 1986; Alternative Approaches to Licensing a Geologic Repository, Memorandum to William J. Olmstead, 7 October 1986.
- DOE, 1985; Mission Plan for the Civilian Radioactive Waste Management Program, DOE/RW-0005, DOE Office of Civilian Radioactive Waste Management, June 1985.
- DOE, 1986a; NNWSI Project Regulatory Document Manual, NNWSI/88-11, DOE Nevada Operations Office, August 1986 (rev. 6, 1 February 1988).
- DOE, 1986b; Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area, Nevada DOE/RW-0073, DOE Office of Civilian Radioactive Waste Management, May 1986.
- DOE, 1986c; Issues Hierarchy for a Mined Geologic Disposal System, DOE/RW-0101, DOE OCRWM Office of Geologic Repositories, September 1986.
- DOE, 1986d; Quality Assurance Plan for High-Level Radioactive Waste Repositories, DOE/RW-0095, DOE OCRWM Office of Geologic Repositories, August 1986.
- DOE, 1987a; Request for Proposal: Design and Implementation of a Licensing Support System, DOE Office of Civilian Radioactive Waste Management, 11 February 1987.
- DOE, 1987b; Issues Hierarchy for a Mined Geologic Disposal System (OGR/B-10), DOE/RW-0101, Revision 1, OCRWM, Office of Geologic Repositories, August 1987.
- DOE, 1987c; OCRWM Mission Plan Amendment, DOE/RW-0128, OCRWM, June 1987.
- DOE, 1988a; Draft Environmental Regulatory Compliance Plan for Site Characterization of the Yucca Mountain Site, DOE/RW-0177, DOE Nevada Operations Office, January 1988.
- DOE, 1988b; Consultation Draft Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0160, DOE Office of Civilian Radioactive Waste Management, January 1988.
- DOE, 1988c; Consultation Draft Site Characterization Plan Overview, Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE Office of Civilian Radioactive Waste Management, January 1988.
- DOE, 1988d; Licensing Support System Preliminary Needs Analysis, DOE/LSS-001, OCRWM, Office of Resource Management, February 1988.

REFERENCES
(continued)

Jordan, 1986; Discovery and Rulemaking Perspectives on the Use of an Information Storage and Retrieval System in the Licensing Proceedings for the High-Level Waste Repository, John S. Jordan & Associates, prepared for NRC, 14 February 1986.

Jordan, 1988; Basic Ideas Underlying Design and Development of an Information System to Support Proceedings before the Nuclear Regulatory Commission on a High-Level Waste Repository, Part 1: General System Concept, John S. Jordan & Associates, prepared for DOE OCRWM, 29 January 1988.

NRC, 1987; 1986 Annual Report, NUREG-1145, Nuclear Regulatory Commission, 15 June 1987.

Olmstead, W.J., 1987; Alternative Dispute Resolution - The NRC's High-Level Waste Negotiated Rulemaking, presented at the ALI-ABA Course of Study, Atomic Energy Licensing and Regulation, Washington, DC, September 14-15, 1987.

SAIC, 1986a; NNWSI Project Information Management System Concepts Evaluation Report, Draft Report, DOE/NV/10270-8, Science Applications International Corp., May 1986.

SAIC, 1986b; Supporting Data and Calculations for the NNWSI Project Information Management Systems Concepts Evaluation Report, DOE/NV/10270-11, Science Applications International Corp. for DOE Nevada Operations Office, December 1986.

Weston, 1985; Licensing Information System Requirements Study: Draft Report of Findings, Roy F. Weston, Inc., prepared for OCRWM Office of Geologic Repositories, 2 October 1985.

Weston, 1986; Generic Requirements for Mined Geologic Disposal System, DOE/RW-0090, Roy F. Weston, Inc., June 1986 (rev. 3, 4 March 1987).

Young, 1987; LSS Functional Requirements and Design Concepts Report, Arthur Young International, prepared for OCRWM, 31 March 1987.

APPENDIX A

**DETAILS OF SIZING COUNTS FOR THE SITE
CHARACTERIZATION PLAN**

Table A. Details of Sizing Counts for the Site Characterization Plan

Section/Topic	Pages	Figures	References	Codes and Regulations
Volume 1				
Organization, Table of Contents, Preface	158	0	0	
Introduction	15	0		
Introduction, References	2		6	3
Part A. Mined Geologic Disposal System	15	0		
Part A. References	3	0	11	1
Chapter 1. Geology	347	96		
Chapter 1. References	72	0	621	3
Chapter 2. Geoengineering	119	26		
Chapter 2. References	19	0	156	1
Volume 2				
Organization, Table of Contents	23	0	0	0
Chapter 3. Hydrology	241	49		
Chapter 3. References	25	0	218	1
Chapter 4. Geochemistry	153	29		
Chapter 4. References	19	0	153	0
Chapter 5. Climatology and Meteorology	107	24		
Chapter 5. References	21	0	183	2
Volume 3				
Organization, Table of Contents	26	0		
Chapter 6. Conceptual Design of a Repository	349	94		
Chapter 6. References	23	0	190	8
Chapter 7. Waste Package	241	45		
Chapter 7. References	32		255	6

Table A. Details of Sizing Counts for the Site Characterization Plan (Continued)

Section/Topic	Pages	Figures	References	Codes and Regulations
Volume 4				
Organization, Table of Contents	106	0		
Chapter 8. Introduction (8.0)	11	1		
Chapter 8. Rationale (8.1)	12	1		
Chapter 8. Issues (8.2)	233	15		
Chapter 8. Planned Tests, Analyses, and Studies (8.3)	4	0		
Site Program (8.4)	2	0		
Site Overview (8.3.1.1)	2	0		
Geohydrology (8.3.1.2)	350	38		
Geochemistry (8.3.1.3)	134	16		
Volume 5				
Organization	3	0		
Rock Characteristics	101	17		
Climate (8.3.1.5)	109	8		
Erosion (8.3.1.6)	32	6		
Rock Dissolution (8.3.1.7)	3	0		
Postclosure Tectonics (8.3.1.8)	126	13		
Human Interference (8.3.1.9)	49	7		
Population Density and Distribution (8.3.1.10)	2	0		
Land Ownership and Mineral Rights (8.3.1.11)	4	0		
Meteorology (8.3.1.12)	32	4		
Offsite Installation (8.3.1.13)	18	2		
Surface Characteristics (8.3.1.14)	68	9		
Thermal and Mechanical Properties (8.3.1.15)	85	5		

Table A. Details of Sizing Counts for the Site Characterization Plan (Continued)

Section/Topic	Pages	Figures	References	Codes and Regulations
Preclosure Hydrology (8.3.1.16)	27	6		
Preclosure Tectonics (8.3.1.17)	193	16		
Volume 6				
Organization	3	0		
Chapter 8. Repository Program (8.3.2)	2			
Repository Overview (8.3.2.1)	30	2		
Configuration of Underground Facilities Postclosure (8.3.2.2)	93	10		
Repository Design Criteria for Radiological Safety (8.3.2.3)	48	4		
Nonradiological Health and Safety (8.3.2.4)	33	3		
Preclosure Design and Technical Feasibility (8.3.2.5)	116	13		
Seal Program (8.3.3)	2	0		
Seal Overview (8.3.3.1)	7	1		
Seal Characteristics (8.3.3.2)	52	7		
Waste Package Program (8.3.4)	5	1		
Waste Package Overview (8.3.4.1)	8	1		
Waste Package Characteristics, Postclosure (8.3.4.2)	62	6		
Waste Package Production Technologies (8.3.4.4)	7	2		
Performance Assessment Report (8.3.5)	2	0		
Strategy for Preclosure Performance Assessment (8.3.5.1)	21	3		
Waste Retrievability (8.3.5.2)	64	10		

Table A. Details of Sizing Counts for the Site Characterization Plan (Continued)

Section/Topic	Pages	Figures	References	Codes and Regulations
Public Radiological Exposures, Normal Conditions (8.3.5.3)	28	4		
Worker Radiological Safety, Normal Conditions (8.3.5.4)	31	4		
Accidental Radiological Releases (8.3.5.5)	34	6		
Higher Level Findings, Preclosure Radiological Safety (8.3.5.6)	14	1		
Higher Level Findings - Ease and Cost of Construction (8.3.5.7)	17	1		
Strategy for Postclosure Performance Assessment (8.3.5.8)	10	2		
Containment by Waste Package (8.3.5.9)	98	3		
Volume 7				
Organization	2	0		
Engineered Barrier System Release Rates (8.3.5.10)	80	7		
Seal Performance (8.3.5.11)	6	2		
Ground Water Travel Time (8.3.5.12)	70	12		
Total System Performance (8.3.5.13)	106	10		
Individual Protection (8.3.5.14)	15	2		
Ground-Water Protection (8.3.5.15)	13	2		
Performance Confirmation (8.3.5.16)	2	0		
NRC Siting Criteria (8.3.5.17)	99	2		
Higher Level Findings, Postclosure System and Technical Guidelines (8.3.5.18)	29	2		

Table A. Details of Sizing Counts for the Site Characterization Plan (Continued)

Section/Topic	Pages	Figures	References	Codes and Regulations
Completed Analytical Techniques (8.3.5.19)	11	0		
Analytical Techniques Requiring Development (8.3.5.20)	10	0		
Planned Site Preparation Activities (8.4)	76	30		
Milestones, Decision Points and Schedule (8.5)	93	36		
Quality Assurance Program (8.6)	47	3		
Decontamination and Decommissioning (8.7)	5	0		
Chapter 8. References	56	0	499	13
Glossary and Acronyms	120	0		
TOTALS	5355	724	2292	38

APPENDIX B
SUBJECT MATTER CATEGORIES OF DOCUMENTS
FOR INCLUSION OR EXCLUSION IN LSS

The following listing, revised March 25, 1988, describes the categories of documents which the State of Nevada wants to be included in the LSS in searchable full text.

A. The following is a list of subject matter categories of documents, whether "prospective" or "backlog", which should be included in the LSS in searchable full text. The term "document" as used herein, means any written, printed, recorded or graphic matter, however, produced or reproduced, prepared during, or referring or relating to the time period involved in the subject proceeding or concerning or related in whole or in part to any issue or subject matter raised or referred to in the subject proceeding. If a document has been prepared in several copies or additional copies have been made and the copies are not identical, whether by reason of subsequent modification of a copy or by the addition of notations or other modifications, the non-identical copy is a separate document. "Document" as used herein specifically includes writings, statements, depositions, diaries, datebooks, calendars, notes, memoranda, correspondence, files, transcripts of meetings and electronic recordings maintained by any person or group of persons as part of his or their personal or official files, whether at home or at work. "Document" as used herein, includes documents as described above, notwithstanding any claim of privilege with respect to disclosure of such document.

1. Any document pertaining to the location of valuable natural resources, hydrology, geophysics, seismic activity, atomic energy defense activities, proximity to water supplies, proximity to populations, the effect upon the rights of users of water, proximity to components of the National Park System, the National Wildlife Refuge System, the National Wildlife and Scenic River System, the National Wilderness Preservation System, or National Forest Lands, proximity to sites where high-level radioactive waste and spent nuclear fuel is generated or temporarily stored, spent fuel and nuclear waste transportation, safety factors involved in moving spent fuel or high-level nuclear waste to a repository, the cost and impact of transporting spent fuel and nuclear waste to a repository site, the advantages of regional distribution in siting of repositories, and various geologic media in which sites for repositories may be located/

2. Any document related to repository siting, construction, or operation, or the transportation of spent nuclear fuel and high-level nuclear waste, not categorized as an "excluded document", produced by or in the possession of the Los Alamos National Laboratory, the Lawrence Livermore National Laboratory, Sandia National Laboratory, Lawrence Berkeley Laboratory, Oak Ridge National Laboratory, the United States Geologic Survey or any other contractor of the Office of Civilian Radioactive Waste Management in general.

3. All documents related to the physical attributes of the Basin and Range Province of the continental United States.

4. Any document listing and/or considering any site or location other than Yucca Mountain as a possible location for a high-level nuclear waste repository, or any alternative technology to deep geologic disposal.

5. Any document analyzing the effect of the development of a repository at Yucca Mountain on the rights of users of water in the Armagosa ground-water basin in Nevada.

6. Any document analyzing the health and safety implications to the people and environment of the transportation of spent fuel between locations where spent fuel is generated and Yucca Mountain, Nevada, or any other site nominated for repository characterization on May 28, 1986, including, but not limited to:

- a. Any analysis of possible human error in the manufacture of spent fuel casks;
- b. Any analysis of the actual population density along all of any specific projected routes of travel;
- c. Any analysis of releases from any actual radioactive material transportation incidents;
- d. Any analysis of the emergency response time in any actual radioactive materials transportation incident;
- e. Any actual accident data on any specific projected routes of travel.
- f. Any calculations or projections of the probability of accidents on any specific projected routes of travel;
- g. Any data on the physical properties or containment capabilities of spent fuel casks which have been used or which are projected to be used at any hypothetical or actual projected repository.
- h. Any analysis of modeling of the containment capabilities of spent fuel casks under a stress scenario;
- i. Any analysis or comparison of spent fuel casks projected to be used against the spent fuel cask certification standards of the Nuclear Regulatory Commission;
- j. Any analysis of the containment capabilities of spent fuel casks containing spent fuel which has been burned up over a extended period.

7. Any document analyzing or comparing Yucca Mountain, Nevada with any other site in the same "geohydrologic setting".

8. Any document relating to any past, present or potential future interference or incompatibility between a Yucca Mountain, Nevada, high-level nuclear waste repository and atomic energy defense activities at the Nevada Test Site.

9. Any document related to the land status, use or ownership or Yucca Mountain, Nevada.

10. Any document considering or analyzing the attributes or detriments or any engineered barrier upon the radioisotope isolation capability of Yucca Mountain, Nevada, or any other site considered.

11. Any document evaluating the effect of extended fuel burn-up on Yucca Mountain, Nevada's adequacy as a repository site for disposal of spent fuel or upon the design of any such theoretical repository.

12. Any document analyzing or investigating the potential for discharge of radioisotopes into the Death Valley National Monument.

13. Any document analyzing the recharge of the underlying saturated zone or the hydroconductivity of the unsaturated zone at Yucca Mountain.

14. Any document containing any data or analysis of volcanic action in the volcanic system of which Yucca Mountain is a part.

15. Any document containing any data or analysis of events of tectonic faulting at Yucca Mountain, either at or beneath the surface of the ground, in tuffaceous rock generally, or in the volcanic system of which Yucca Mountain is a part.

16. Any document containing instructions or other limitations on the scope of work to be performed by Department of Energy personnel or contractors' personnel.

17. Any document pertaining to prevention or control of human intrusion at the Yucca Mountain site.

B. The following is a list of documents which may be excluded from the licensing support system notwithstanding their dates of production.

1. Identical copies of documents which are otherwise includable within the searchable full text system.

2. Letters of transmittal used to accompany the transmission of programmatic documents within the Department of Energy. A programmatic document is one related to administration or execution of the Department of Energy's nuclear waste program which contains no reference to any original data, scientific inquiry, site or facility engineering or other data analyses.

3. Documents submitted for reimbursement of personal expenses of travel of Department of Energy personnel or contractor personnel other than for travel to Yucca Mountain.

4. Any documents pertaining exclusively to the management or administration of the U.S. Department of Energy, or the Office of Civilian Radioactive Waste Management. An administrative document is one pertaining to financial management, procurement, personnel, office space, contracting, etc., which does not contain, or refer to, original data, scientific inquiry, transportation data or analysis, engineering data, design or analysis, site analysis or comparison, radioactive or other releases to the environment, cask design or analysis, waste acceptance rate, or the operation of a geologic repository or monitored retrievable storage facility.

APPENDIX C
LICENSING SUPPORT SYSTEM TOPICS
FOR INCLUSION

The following is the Environmental Defense Fund's list of topics for automatic inclusion into the LSS. The transmittal letter with the list is dated March 9, 1988. On March 22, 1988 the listing was revised. The revisions have been incorporated in the following pages.

LICENSING SUPPORT SYSTEM TOPICS FOR INCLUSION

I. The Site

A. LOCATION, GENERAL APPEARANCE AND TERRAIN, AND PRESENT USE

B. GEOLOGIC CONDITIONS

1. Stratigraphy and volcanic history of the Yucca Mountain area
 - a. Caldera evolution and genesis of ash flows
 - b. Timber Mountain Tuff
 - c. Paintbrush Tuff
 - d. Tuffaceous beds of Calico Hills
 - e. Crater Flat Tuff
 - f. Older tuffs
2. Structure
3. Seismicity
4. Energy and mineral resources
 - a. Energy resources
 - b. Metals
 - c. Nonmetals

C. HYDROLOGIC CONDITIONS

1. Surface water
2. Ground water
 - a. Ground water movement
 - b. Ground water quality
3. Present and projected water use in the area

D. ENVIRONMENTAL SETTING

1. Land use
 - a. Federal use
 - b. Agricultural
 - i. Grazing land
 - ii. Cropland
 - c. Mining
 - d. Recreation
 - e. Private and commercial development
2. Terrestrial and aquatic ecosystems
 - a. Terrestrial vegetation
 - i. Larrea-Ambrosia
 - ii. Larrea-Ephedra or Larrea-Lycium
 - iii. Colegyne
 - iv. Mixed transition
 - v. Grassland-burn site
 - b. Terrestrial Wildlife
 - i. Mammals
 - ii. Birds
 - iii. Reptiles
 - c. Special-interest species
 - d. Aquatic ecosystems
3. Air quality and weather conditions: Air quality
4. Noise
5. Aesthetic resources

- 6. Archaeological, cultural, and historical resources
- 7. Radiological background
 - a. Monitoring program
 - b. Dose assessment

E. TRANSPORTATION

- 1. Highway infrastructure and current use
- 2. Railroad infrastructure and current use

F. SOCIOECONOMIC CONDITIONS

- 1. Economic conditions
 - a. Nye County
 - b. Clark County
 - c. Methodology
- 2. Population density and distribution
 - a. Populations of the State of Nevada
 - b. Population of Nye County
 - c. Population of Clark County
- 3. Community services
 - a. Housing
 - b. Education
 - c. Water supply
 - d. Waste-water treatment
 - e. Solid waste
 - f. Energy utilities
 - g. Public safety services
 - h. Medical and social services
 - i. Library facilities
 - j. Parks and recreation
- 4. Social conditions
 - a. Existing social organization and social structure
 - i. Rural social organization and structure
 - ii. Social organization and structure in urban Clark County
 - b. Culture and lifestyle
 - i. Rural culture
 - ii. Urban culture
 - c. Community attributes
 - d. Attitudes and perceptions toward the repository
- 5. Fiscal and governmental structure

II. EXPECTED EFFECTS OF SITE CHARACTERIZATION ACTIVITIES

A. SITE CHARACTERIZATION ACTIVITIES

- 1. Field studies
 - a. Exploratory drilling
 - b. Geophysical surveys
 - c. Geologic mapping
 - d. Standard operating practices for reclamation of areas disturbed by field studies
- 2. Exploratory shaft facility
 - a. Surface facilities
 - b. Exploratory shaft and underground workings
 - c. Secondary egress shaft

- d. Exploratory shaft testing program
- e. Final disposition
- f. Standard operating practices that would minimize potential environmental damage
- 3. Other Studies
 - a. Geodetic surveys
 - b. Horizontal core drilling
 - c. Studies of past hydrologic conditions
 - d. Studies of tectonics, seismicity, and volcanism
 - e. Studies of seismicity induced by weapons testing
 - f. Field experiments in G-Tunnel facilities
 - g. Laboratory studies

B. EXPECTED EFFECTS OF SITE CHARACTERIZATION

- 1. Expected effects on the environment
 - a. Geology, hydrology, land use and surface soils
 - i. Geology
 - ii. Hydrology
 - iii. Land use
 - iv. Surface soils
 - b. Ecosystems
 - c. Air quality
 - d. Noise
 - e. Aesthetics
 - f. Archaeological, cultural, and historical resources
- 2. Socioeconomic and transportation conditions
 - a. Economic conditions
 - i. Employment
 - ii. Materials
 - b. Population density and distribution
 - c. Community services
 - d. Social conditions
 - e. Fiscal and governmental structure
 - f. Transportation
- 3. Worker safety
- 4. Irreversible and irretrievable commitment of resources

C. ALTERNATIVE SITE CHARACTERIZATION ACTIVITIES

III. REGIONAL AND LOCAL EFFECTS OF LOCATING A REPOSITORY AT THE SITE

A. THE REPOSITORY

- 1. Construction
 - a. The surface facilities
 - b. Access to the subsurface
 - c. The subsurface facilities
 - d. Other construction
 - i. Access route
 - ii. Railroad
 - iii. Mined rock handling and storage facilities
 - iv. Shafts and other facilities
- 2. Operations
 - a. Emplacement phase
 - i. Waste receipt

- ii. Waste emplacement
 - b. Caretaker phase
 - 3. Retrievability
 - 4. Decommissioning and closure
 - 5. Schedule and labor force
 - 6. Material and resource requirements
- B. EXPECTED EFFECTS ON THE PHYSICAL ENVIRONMENT
- 1. Geologic impacts
 - 2. Hydrologic impacts
 - 3. Land use
 - 4. Ecosystems
 - 5. Air quality
 - a. Ambient air-quality regulations
 - b. Construction
 - c. Operations
 - d. Decommissioning and closure
 - 6. Noise
 - a. Construction
 - b. Operations
 - c. Decommissioning and closure
 - 7. Aesthetic resources
 - 8. Archaeological, cultural, and historical resources
 - 9. Radiological effects
 - a. Construction
 - b. Operation
 - i. Worker exposure during normal operation
 - ii. Public exposure during normal operation
 - iii. Accidental exposure during operation
- C. EXPECTED EFFECTS OF TRANSPORTATION ACTIVITIES
- 1. Transportation of people and materials
 - a. Highway impacts
 - i. Construction
 - ii. Operations
 - iii. Decommissioning
 - b. Railroad impacts
 - 2. Transportation of nuclear wastes
 - a. Shipment and routing nuclear waste shipments
 - i. National shipment and routing
 - ii. Regional shipment and routing
 - b. Radiological impacts
 - i. National impacts
 - ii. Regional impacts
 - iii. Maximally exposed individual impacts
 - c. Nonradiological impacts
 - i. National impacts
 - ii. Regional impacts
 - d. Risk Summary
 - i. National risk summary
 - ii. Regional risk summary
 - e. Costs of nuclear waste transportation
 - f. Emergency response

D. EXPECTED EFFECTS ON SOCIOECONOMIC CONDITIONS

1. Economic conditions
 - a. Labor
 - b. Materials and resources
 - c. Cost
 - d. Income
 - e. Land use
 - f. Tourism
2. Population density and distribution
3. Community services
 - a. Housing
 - b. Education
 - c. Water supply
 - d. Waste-water treatment
 - e. Public safety services
 - f. Medical services
 - g. Transportation
4. Social conditions
 - a. Social structure and social organization
 - i. Standard effects on social structure and social organization
 - ii. Special effects on social structure and social organization
 - b. Culture and lifestyle
 - c. Attitudes and perceptions
5. Fiscal conditions and government structure

IV. SUITABILITY OF THE YUCCA MOUNTAIN SITE FOR DEVELOPMENT AS A REPOSITORY

A. SUITABILITY OF THE YUCCA MOUNTAIN SITE FOR DEVELOPMENT AS A REPOSITORY: EVALUATION AGAINST THE GUIDELINES

1. Technical guidelines
 - a. Postclosure site ownership and control
 - i. Data relevant to the evaluation
 - ii. Favorable condition
 - iii. Potentially adverse condition
 - iv. Evaluation and conclusion for the qualifying condition on the postclosure site ownership and control guidelines
 - b. Population density and distribution
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the population density and distribution guideline
 - c. Preclosure site ownership and control
 - i. Data relevant to the evaluation
 - ii. Favorable condition
 - iii. Potentially adverse condition
 - iv. Evaluation and conclusion for the qualifying condition on the preclosure site ownership and control guideline
 - d. Meteorology
 - i. Data relevant to the evaluation
 - ii. Favorable condition

- iii. Potentially adverse condition
 - iv. Evaluation and conclusion for the qualifying condition on the meteorology guideline
 - e. Offsite installations and operations
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the offsite installations operations guideline
 - f. Environmental quality
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying conditions
 - v. Evaluation and conclusion for the qualifying condition on the environmental quality guidelines
 - g. Socioeconomic impacts
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the socioeconomic guideline
 - h. Transportation
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the transportation guideline
- 2. Preclosure System
 - a. Preclosure system: radiological safety
 - i. Data relevant to the evaluation
 - ii. Evaluation of the Yucca Mountain site
 - iii. Conclusion for the qualifying condition on the preclosure system guideline radiological safety
 - b. Preclosure system: environment, socioeconomics, and transportation
- 3. Postclosure technical
 - a. Geohydrology
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the postclosure geohydrology guideline
 - b. Geochemistry
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Evaluation and conclusion for the qualifying condition on the postclosure geochemistry guideline
 - v. Plans for site characterization

- c. Rock characteristics
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Evaluation and conclusion for the qualifying condition on the postclosure rock characteristics guideline
- d. Climate changes
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Evaluation and conclusion for the climate changes qualifying condition
- e. Erosion
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Qualifying condition
- f. Dissolution
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the postclosure and dissolution guideline
- g. Tectonics
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the postclosure tectonics guideline
- h. Human interference: natural resources and site ownership and control
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the postclosure human interference and natural resources technical guideline
- 4. Postclosure system
 - a. Evaluation of the Yucca Mountain site
 - i. Quantitative analyses
 - ii. Qualitative analysis
 - b. Summary and conclusion for the qualifying condition on the postclosure system guideline
- 5. Preclosure technical
 - a. Surface characteristics
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Evaluation and conclusion for the qualifying condition on the preclosure surface characteristics guideline

- b. Rock characteristics
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the preclosure rock characteristics guideline
- c. Hydrology
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the preclosure hydrology guideline
- d. Tectonics
 - i. Data relevant to the evaluation
 - ii. Favorable conditions
 - iii. Potentially adverse conditions
 - iv. Disqualifying condition
 - v. Evaluation and conclusion for the qualifying condition on the preclosure tectonics guideline
- 6. Ease and cost of siting, construction, operation, and closure
 - a. Data relevant to the evaluation
 - b. Evaluation
 - c. Conclusions for the qualifying condition on the ease and cost of siting, construction, operation, and closure guideline
- 7. Conclusion regarding suitability of the Yucca Mountain Site for a repository

B. PERFORMANCE ANALYSES

- 1. Preclosure radiological safety assessments
 - a. Preclosure radiation protection standards
 - b. Methods for preclosure radiological assessment
 - i. Radiological assessment of construction activities
 - ii. Radiological assessment of normal operations
 - iii. Radiological assessment of accidental releases
- 2. Preliminary analysis of postclosure performance
 - a. Subsystem descriptions
 - i. Engineered barrier subsystem
 - ii. The natural barrier subsystem
 - b. Preliminary performance analyses of the major components of the system
 - i. The waste package lifetime
 - ii. Release rate from the engineered barrier subsystem
 - c. Preliminary system performance description and analysis
 - d. Comparisons with regulatory performance objectives
 - e. Preliminary evaluation of disruptive events: disruptive natural processes
 - f. Conclusions

V. TRANSPORTATION

A. REGULATIONS RELATED TO SAFEGUARDS

1. Safeguards
 2. Conclusion
- B. PACKAGINGS
1. Packaging design, testing, and analysis
 2. Types of packaging
 - a. Spent fuel
 - b. Casks for defense high-level waste and West Valley high-level waste
 - c. Casks for use from an MRS to the repository
 3. Possible future developments
 - a. Mode-specific regulations
 - b. Overweight truck casks
 - c. Rod consolidation
 - d. Advanced handling concepts
 - e. Combination storage/shipping casks
- C. POTENTIAL HAZARDS OF TRANSPORTATION
1. Potential consequences to an individual exposed to a maximum extent
 - a. Normal transport
 - b. Accidents
 2. Potential consequences to a large population from very severe transportation accidents
 3. Risk Assessment
 - a. Outline of method for estimating population risks
 - b. computational models and methods for population risks
 - c. Changes to the analytical models and methods for population risks
 - d. Transportation scenarios evaluated for risk analysis
 - e. Assumption about wastes
 - f. Operational considerations for use in risk analysis
 - g. Values for factors needed to calculate population risks
 - h. Results of population risk analyses
 - i. Uncertainties
 4. Risks associated with defective cask construction, lack of quality assurance, inadequate maintenance and human error
- D. COST ANALYSIS
1. Outline method
 2. Assumptions
 3. Models
 4. Cost estimates
 5. Limitations of results
- E. BARGE TRANSPORT TO REPOSITORIES
- F. EFFECT OF A MONITORED RETRIEVABLE STORAGE FACILITY ON TRANSPORTATION ESTIMATES
- G. EFFECT OF AT-REACTOR ROD CONSOLIDATION ON TRANSPORTATION ESTIMATES
- H. CRITERIA FOR APPLYING TRANSPORTATION GUIDELINE

- I. DOE RESPONSIBILITIES FOR TRANSPORTATION SAFETY
 - 1. Prenotification
 - 2. Emergency response
 - 3. Insurance coverage for transportation accidents

- J. MODEL MIX
 - 1. Train shipments
 - a. Ordinary
 - b. Dedicated train
 - 2. Truck shipments
 - a. legal weight
 - b. overweight

- K. INFRASTRUCTURE AND CURRENT USE
 - 1. Rail
 - 2. Highway

APPENDIX D
U.S. DEPARTMENT OF ENERGY'S LISTING OF
MATERIAL TO BE INCLUDED OR EXCLUDED
FROM THE LSS

The following listings, prepared by DOE staff, are as revised on March 25, 1988.

LICENSING SUPPORT SYSTEM
ENHANCED FULL TEXT
INCLUDABLE LIST FOR ALL PARTIES
PROPOSED BY THE DEPARTMENT OF ENERGY

Relevant records of all parties (except those where an appropriate privilege applies) related to the HLW licensing decision to be placed in the LSS in enhanced full text.

- Technical reports and analyses including those developed by contractors
- QA/QC records including qualification and training records
- External correspondence
- Internal memoranda
- Meeting minutes, including DOE/NRC meetings, Commission meetings
- Drafts (i.e., those submitted for decision beyond the first level of management or similar criterion)
- Congressional Q's & A's
- "Regulatory" documents related to HLW site selection and licensing, such as:
 - Draft and final environmental assessments
 - Site Characterization Plans
 - Site Characterization progress reports
 - Issue resolution reports
 - Rulemakings
 - Public and agency comments on documents
 - Response to public comments
 - Environmental Impact Statement, Comment Response Document, and related references
 - License Application (LA), LA data base, and related references
 - Topical reports, data, and data analysis
 - Recommendation Report to President
 - Notice of Disapproval, if submitted

LICENSING SUPPORT SYSTEM
EXCLUDABLE LIST FOR ALL PARTIES
PROPOSED BY THE DEPARTMENT OF ENERGY

MATERIAL NOT TO BE INCLUDED IN THE LICENSING SUPPORT SYSTEM

Public Domain Material

- Official notice material, such as encyclopedias, dictionaries, and text books
- Bulk/public correspondence
- General press clippings, periodicals, press releases, and circulation/direct distribution mail
- Procurement material, such as purchase orders, contract records, and RFP's other than scope of work (some material may also be privileged)
- Staff speeches & publications
- Report references

Personal Records

- Personal mail and other personal material

MATERIAL INCLUDED IN THE LSS BUT NOT IN ENHANCED FULL TEXT

Unsuitable Form

- Raw data
- Computer runs
- Computer programs & codes
- Field notes
- Maps & photographs
- Core samples

Privileged Material

- Information protected by FOIA and Privacy Act
- Classified material including Safeguards and Security Information
- Personnel records, travel requests and vouchers

APPENDIX E
ABBREVIATIONS USED

ABBREVIATIONS USED

ACD	Advanced Conceptual Design
ACRS	NRC Advisory Committee on Reactor Safeguards
ANSI	American National Standards Institute
ARS	DOE Automated Records System
ASLB	NRC Atomic Safety and Licensing Board
ASME	American Society of Mechanical Engineers
CDSCP	Consultant Draft SCP
CFR	Code of Federal Regulations
CRD	Conceptual Repository Design
DEIS	Draft Environmental Impact Statement
DOE	Department of Energy
EPA	Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FOIA	Freedom of Information Act
HLW	High Level Waste
LA	License Application
LAD	License Application Design
LSS	Licensing Support System
MRS	Monitored Retrievable Storage
NNWSI	Nevada Nuclear Waste Storage Investigations
NRAC	Negotiated Rulemaking Advisory Committee, officially known as the HLW Licensing Support System Advisory Committee
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NWPA	Nuclear Waste Policy Act of 1982
OCRWM	DOE Office of Civilian Radioactive Waste Management

ABBREVIATIONS USED
(continued)

OGR	OCRWM Office of Geologic Repositories
OMB	Office of Management and Budget
PSAR	Preliminary Safety Analysis Report
QA	Quality Assurance
QC	Quality Control
RFP	Request For Proposal
SAIC	Science Applications International Corporation
SCA	Site Characterization Analysis
SCP	Site Characterization Plan
SCPCD	Site Characterization Plan Conceptual Repository Design
SER	Safety Evaluation Report
UIC	Underground Injection Control
USC	The United States Code
WP	Waste Package