

Licensing Support Network (LSN)

Project Definition and Analysis Document (PDAD)

Final (Revision 3)
March 22, 2001

Contract Number GS-35F-4507G

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Ltr	Description	Date	Approval
REV 0 Draft A	Initial Submittal of Licensing Support Network (LSN) Project Definition and Analysis Document (PDAD)	10 January 2001	
REV 0 Draft B	Initial Submittal of Licensing Support Network (LSN) Project Definition and Analysis Document (PDAD)	29 January 2001	
REV 1	Revisions based on NRC Comments	2 March 2001	
Final Revision 2	Revisions based on LSN Design Review	19 March 2001	L. Bradley
Final Revision 3	Revisions based on NRC review.	March 22, 2001	L. Bradley

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1 INTRODUCTION

1.1 Background

The Nuclear Waste Policy Act of 1982 (NWPA) requires the Nuclear Regulatory Commission (NRC) to issue a final decision approving or disapproving issuance of the construction authorization for a mined geologic repository to store high-level radioactive waste at Yucca Mountain, Nevada, within three years of the U.S. Department of Energy's (DOE) license application.

The Licensing Support Network (LSN) is a critical tool to ensure that document access, and the associated hearing agenda can be handled in an expeditious manner. As outlined in 10 C.F.R. Part 2, Subpart J, the LSN will provide shared document discovery and facilitate electronic motions practice for the hearings on DOE's license application for the repository.

The NRC has contracted with GRC International (GRCI), an AT&T Company, to provide web-based system design, development, operations, and maintenance of the LSN. The target date for operational implementation of the LSN is September 2001 in order to support the anticipated 2002 submission of the repository license application to the NRC by DOE.

1.2 Objectives

The objectives of implementing the LSN are to:

- Reduce the time needed for the licensing hearing; and
- Support NRC in meeting the Congressionally mandated three-year licensing process time-frame.

The planned system will support time savings by:

- Replacing classic "discovery" exchanges among parties by making relevant documents of all parties publicly accessible before docketing;
- Establishing an electronic and publicly accessible docket; and
- Making motions practice a fully electronic process.

1.3 Scope

The LSN is responsible for addressing various requirements associated with NRC's mission to complete the adjudicatory process for the license application in a three-year time-frame. Four identified components comprising the system's functionality are:

- Establishing an effective Internet-based method of accessing (search and retrieve) the records collections of the parties and potential parties to the high-level waste repository licensing proceeding;

- Providing an audit and compliance subsystem, including the automated tools, policies, and procedures needed to monitor participant compliance with the availability and document integrity submission requirements found in 10 C.F.R. Part 2, Subpart J;
- Providing a web-accessible official docket file for the proceedings; and
- Providing electronic information exchange to support motions practice.

The NRC Agencywide Documents Access Management System (ADAMS) external collections, containing public accessible docket files, will meet the docket requirements. Similarly, the NRC Electronic Information Exchange (EIE) infrastructure will meet the Subpart J motions practice requirements.

1.4 Assumptions

The assumptions are:

- All development work will be performed at the GRCI/AT&T facility at 1900 Gallows Road, Vienna, Virginia.
- AT&T will host the LSN Web Portal at Ashburn, Virginia.
- All meetings will be held at the NRC or GRCI/AT&T facilities.
- A revised rule will go into affect in April/May 2001. The new rule will have little effect on the design; and, if changes to the rule affect the design, we will analyze its effect and provide an assessment.
- System development, when design approval is granted, is constrained by the necessity of meeting the deadline for the LSN to be fully functional on 10 September 2001.
- Initial document deliverables are first drafts and, therefore, may be incomplete.
- The LSN will initially be available on the World Wide Web in April. At that time, the system will demonstrate limited functionality. Participants will be able to review the site using the URL **LSNNET.gov**. The Government and the development team will evaluate participant comments and determine which to incorporate into the website.
- GRCI/AT&T will provide on-line help and training materials necessary to assist users of the LSN. The Government will distribute any hard copies of the materials to users and participants. The training tutorials will have two audiences: first time user and more experienced user. The tutorials will be delivered to the Government by computer disk (CD).

1.5 Applicable Documents

- Nuclear Waste Policy Act, 1982.
- Project Charter for Licensing Support Network (LSN), dated January 5, 2001.
- System Development and Life-Cycle Management (SDLCM) Methodology, Procedures, Standards, and Forms, Version 1.2, dated December 1999.
- System Development and Life-Cycle Management (SDLCM) Methodology, Handbook, Version 2.2, dated December 1999.
- Project Action Plan (PAP), dated January 29, 2001.
- Business Case Analysis for the Licensing Support Network (LSN), prepared by the Atomic Safety and Licensing Board Panel, dated April 6, 2000.

- 10 C.F.R. Part 2, Subpart J, Procedures Applicable to Proceedings for the Issuance of Licenses for the Receipt of High-Level Radioactive Waste at a Geologic Repository, dated December 30, 1998.
- Statement of Work, U.S. Nuclear Regulatory commission, Contract Number GS-35F-4507G dated December 12, 2000.
- GRCI International (GRCI) Nuclear Regulatory Commission (NRC) Licensing Support Network (LSN), Volume 1 - Technical Documentation, dated August 25, 2000.
- GRCI Quality Management Systems Practices Guide, Version 1.0, dated October 1999 (Note: This document is GRCI Proprietary).
- GRCI PINNACLE Guide to Engineering Best Practices, Version 2.0 (Note: This document is GRCI Proprietary).

1.6 Overview

This document is organized according to the NRC System Development Life-Cycle Management (SDLCM) Methodology. As requirements are added, changed, or deleted, this document will be updated. Specific sections include:

- Section 1 provides the user with an introduction to the document.
- Section 2 identifies the approach.
- Section 3 lists the system requirements.
- Section 4 lists the data requirements.
- Section 5 documents the assessment of the current system.
- Section 6 provides an Analysis of Alternatives.
- Section 7 documents the System Operations Concept.
- Section 8 contains the List of Acronyms.
- Section 9 contains the References used within the document.

2 APPROACH

2.1 Overall Approach

The project team is made up of AT&T/GRCI and sub-contractor personnel. The team will build the LSN from standard hardware, operating system, Commercial Off-the-Shelf (COTS) products, reusable components, and minimal custom software. Components will be integrated using lightweight scripting and hypertext. World Wide Web pages will deliver content to participants, the public, and LSN administrators.

2.2 Schedule

The LSN schedule is an accelerated schedule to allow the NRC sufficient time to accomplish a rigorous system shakedown and acceptance test, ensuring that system operations are error free when the site is opened to the participants and the public. The suite of COTS products to be used will provide most of the functional capability required for LSN. This eliminates the need to develop a significant amount of custom code and greatly reduces the cost and risk entailed in such development. The schedule will be refined and adjusted as needed to optimize tasking and delivery of work products.

2.3 Exceptions

The AT&T/GRCI Team takes no exceptions to the Statement of Work, required deliverables, or the Milestone Schedules.

2.4 Contractor Team

The contractor project team consists of a project manager, technical leads, and staff from AT&T/GRCI and each of the teammate companies. Five task leads report to the project manager: the system architect, the quality assurance lead, the software development and integration lead, the system test lead, and the hosting services and support lead.

- The systems architect is responsible for requirements analysis, logical and physical system design, and selection of COTS hardware and software products within the LSN architecture.
- The quality assurance lead ensures that the work on the LSN project is performed to exacting standards for quality.
- The software development and integration lead, who is also designated as the Task 1 and the Task 2 lead, is responsible for the overall implementation of LSN. This individual works closely with the system architect to ensure that AT&T/GRCI personnel have an in-depth understanding of the system requirements, ensures that the selected COTS products are properly integrated, and leads the team that performs the detailed design, code, and unit testing of newly developed hardware and software.
- The system test lead is responsible for ensuring that LSN requirements are testable, for performing the test planning, and for system-level testing prior to turnover to the NRC for final acceptance testing. The system test group will support NRC throughout the period of acceptance testing to fix any problems detected.

- The lead for hosting services and support is also the Task 3 lead. This individual is responsible for planning and providing the hosting services for the LSN World Wide Web site. This individual also is responsible for ensuring that the system is supported at the hosting site at a level that will ensure availability of the system during the core hours of 6:00 a.m. to midnight, eastern standard time, Monday through Friday. This role includes sustaining the World Wide Web application and its database, as well as problem diagnosis and resolution.

2.5 Project Quality Assurance

Quality Assurance (QA) is a planned and systematic set of activities with the purpose of providing management with an independent view that the approved processes are being used and that high quality products are being produced.

Quality Assurance involves:

- Reviewing and auditing the activities and products to verify that they comply with published SDLCM Methodology procedures and standards; and
- Providing managers with the results of these reviews and audits.

These review and audit activities occur throughout the life of the project and provide management with the visibility needed to control the adherence to established plans, procedures, and standards.

The LSN project will follow approved Quality Assurance (QA) guidelines for all activities. The QA Manager works as a key member of the team and attends all meeting and reviews. The QA Manager reports directly to the Project Manager and senior GRCI management.

3 SYSTEM REQUIREMENTS SPECIFICATION (SRS)

The following tables contain the functional, operational, performance, programmatic and other special requirements for the LSN system. The table columns used to document each requirement contain a requirement number and a detailed description of the requirement. The requirements identified in Sections 3.1.1 through 3.1.7 are arranged by function.

Note: Benchmarking was not performed against LSN requirements for electronic document exchange because of NRC's intention to rely on the EIE infrastructure. Similarly, benchmarking was not performed against the requirements for making an electronic docket available because of NRC's intention to rely on the ADAMS infrastructure. Therefore, while these two elements are a critical part of the LSN, they are outside of the scope of this project.

3.1 Functional Requirements

The functional requirements for the LSN components may be summarized as follows:

- Establish an effective Internet-based method of accessing (search and retrieve) the records collections of the parties and potential parties to the high-level waste repository licensing proceedings.
- Provide an audit and compliance subsystem, including the automated tools and policies and procedures needed to monitor participant compliance with the availability and document integrity submission requirements found in 10 C.F.R. Part 2, Subpart J.
- Provide a World Wide Web-accessible official docket file for the proceedings.
- Provide electronic information exchange to support motions practice.

System definition:

LSN DR A-1 (formerly LSN 1.01) - The term Licensing Support Network (LSN) is defined in 10 C.F.R. Part 2, Subpart J (LSN Rule), as the combined system that makes documentary material available electronically to parties, potential parties, and interested governmental participants to the proceeding for a license to receive and possess high-level radioactive waste at a geologic repository operations area pursuant to 10 C.F.R. Part 60, as part of the electronic docket or electronic access to documentary material, beginning in the pre-license application phase. The LSN includes hardware, software, communications, data management processes, documentation, security, and backup and recovery services. Accessibility to the documentary material is by methods including searching, retrieving, and delivery of the bibliographic headers, text, and images as detailed in 10 C.F.R. Part 2, Subpart J (LSN rule) to parties, potential parties, and images of that material as detailed in the LSN Rule.

The specific method of providing access to documentary material is not mandated by the LSN Rule in order to accommodate ongoing and future technology advances [63 Fed. Reg. 71735, SUPPLEMENTARY INFORMATION]. For the purposes of developing these requirements, the technology to be adopted for development and implementation of the LSN is based on the facility popularly known as the "World Wide Web" (www or web) on the Internet. More specifically, this can be defined as dissemination of information with HTTP (HyperText Transfer Protocol) servers to HTTP clients.

3.1.1 Functional Area 1: General Characteristics of Central LSN Site System

LSN Req. No.	Description
LSN DR B-1 (new)	The LSN shall be configured with hardware sufficient to store and serve all information (e.g., sufficient disk space, RAM (Random Access Memory), processing power, network interfaces, etc.) at estimated usage levels, and to be easily upgradeable, should estimates fail to adequately characterize usage. Concurrent usage is estimated at 150 users during peak periods.
LSN DR B-1.1 (new)	The system shall be capable of limiting access to only priority users in the event that spikes in usage occur.
LSN DR B-2 (formerly LSN 1.02)	LSN components shall be integrated using modular design techniques and well-documented interfaces that allow individual components of the system to be replaced without significantly impacting other components.
LSN DR B-3 (new)	The system shall be configured with software, licensed at sufficient levels, to store and serve all documentary and associated materials (e.g., networking-capable operating system), web server software, HTML authoring and site maintenance software, database server, etc.) at anticipated usage levels.
LSN DR B-4 (new)	The system shall be designed to maintain the security of the collection and the system itself including the ability to deny unauthorized access or update privileges, detect and defeat compromise attempts, and defend against denial of service attempts.
LSN DR B-5 (new)	The system shall be designed to maintain the integrity of the collection and provide for timely recovery in the event of a hardware or software failure with complete restoration of the central LSN site within three working days, or earlier if so specified within the parameters of the NRC's disaster recovery plan.
LSN DR B-6 (formerly LSN 1.03)	The LSN shall adhere to established Federal Government, international, and/or industry hardware and software standards appropriate to meet the intent of the Rule.
LSN DR B-6.1 (formerly LSN 2.03.01)	The standard for network access shall be HTTP/1.1 [http://www.faqs.org/rfcs/rfc2068.html] over TCP (Transmission Control Protocol, [http://www.faqs.org/rfcs/rfc793.html]) over IP (Internet Protocol, [http://www.faqs.org/rfcs/rfc791.html]).
LSN DR B-6.2 (formerly LSN 2.03.02)	The standard for associating server names with IP addresses shall be the DNS (Domain Name System), [http://www.faqs.org/rfcs/rfc1034.html] and [http://www.faqs.org/rfcs/rfc1035.html].
LSN DR B-6.3 (formerly LSN 2.03.03)	The standard for web page construction shall be HTML version 4.01 [http://www.w3.org/TR/REC-html40/].
LSN DR B-6.4 (formerly LSN 2.03.04)	The standard for electronic mail (e-mail) exchange between e-mail servers shall be SMTP (Simple Mail Transport Protocol, [http://www.faqs.org/rfcs/rfc821.html]).
LSN DR B-6.5 (formerly LSN 2.03.05)	The standard for the format of an electronic mail message shall be per [http://www.faqs.org/rfcs/rfc822.html] optionally extended by MIME (Multimedia Internet Mail Extensions) per [http://www.faqs.org/rfcs/rfc2045.html] to accommodate multimedia e-mail.

LSN Req. No.	Description
LSN DR B-7 (formerly LSN 1.04)	The LSN shall provide for electronic exchange of information. This function shall allow users to identify and receive electronic documents (e.g., motions, filings, orders, decisions, etc.).
LSN DR B-7.1 (formerly LSN 1.05)	The LSN shall utilize an electronic information exchange function that provides for an electronic acknowledgment that a motions practice document has been transmitted to a requester. The acknowledgment shall include, as a minimum, the name and electronic address of the recipient and the date the document was delivered.
LSN DR B-8 (formerly LSN 1.06)	The LSN shall be capable of electronically storing and retrieving bibliographic headers in the system.
LSN DR B-8.1 (formerly LSN 2.06.01)	Bibliographic headers will contain all fields as described in Table A.
LSN DR B-8.2 (formerly LSN 2.06.02)	Bibliographic headers will be stored in a manner that they can be retrieved through reference to any field as designated in Table A.
LSN DR B-8.3 (formerly LSN 2.06.03)	Bibliographic headers will be stored in a manner that the contents of their fields can be searched for specific data.
LSN DR B-9 (formerly LSN 1.07)	The LSN shall be capable of storing electronic indexes for use in searching and retrieving document texts made available by the participants.
LSN DR B-10 (formerly LSN 1.08)	The LSN shall allow identification of text through queries of the occurrence of text content through all document texts. Specific query options include the ability to search for the occurrence of a phrase in the full text of documents, perform proximity searching (i.e., search for phrases near each other or near the beginning or end of the document), perform wild card searching, perform root searching, perform frequency searching, and to arbitrarily combine any search strategy through the use of Boolean operators.
LSN DR B-11 (formerly LSN 1.09)	The LSN shall be capable of storing electronic indexes for use in searching and retrieving digital images of each page of graphic-oriented documentary material made available by the participants.
LSN DR B-12 (formerly LSN 1.10)	The system shall allow users to easily view (by clicking) and print (by selecting “file/print” from the menu) documents of the following acceptable formats: ASCII, native word processing (Word and WordPerfect versions as requested by participants), PDF Normal, or HTML.
LSN DR B-13 (formerly LSN 1.11)	The LSN shall provide tools to assist users in identifying documentary material consistent with the technology.
LSN DR B-13.1 (new)	Documentation shall be prepared and published on the central LSN site describing how to use the features of the website, specifically the search and retrieval functions.

LSN Req. No.	Description
LSN DR B-13.2 (new)	The system must provide finding aids to users to include online help on use of the site, usage guidelines, and contact information for further assistance.
LSN DR B-13.3 (new)	The LSN shall be capable of displaying bibliographic header information from the hit list resulting from a search.
LSN DR B-13.4 (new)	The system shall default searches based on relevancy ranking. The system shall state that relevancy ranking is machine-generated.
LSN DR B-14 (formerly LSN 1.12)	The LSN shall provide a user interface compatible with current browser technologies including access using both graphical and text-only browsers to documentary collections.
LSN DR B-14.1 (formerly LSN 2.13.02)	The system must be designed to be accessible to Internet users with arbitrary browsers (i.e., not Netscape or Internet Explorer). The system shall deliver a consistent organization and style (including but not limited to colors, fonts, spacing) throughout the central LSN site independent of the browser used to access the LSN.
LSN DR B-15 (formerly LSN 1.13)	The LSN shall support non-interactive access to the central LSN by web "crawlers."
LSN DR B-15.1 (formerly LSN 2.13.01)	Web pages must be authored in compliance with the Web Content Accessibility Guidelines for access by individuals with disabilities [http://www.w3.org/TR/WAI-WEBCONTENT/] .
LSN DR B-16 (formerly LSN 1.14)	The LSN shall be designed to allow the LSN Administrator to coordinate the availability and the integrity of the information available via the LSN.
LSN DR B-16.1 (formerly LSN 1.15)	The system shall provide the LSN Administrator with access to participant collections necessary and sufficient to allow the LSN Administrator to independently verify the integrity of data available via the LSN.
LSN DR B-16.2 (formerly LSN 2.15.01)	The system shall have the capability of non-interactively "crawling" participant LSN websites, and fetching a subset or the entire website for analysis.
LSN DR B-16.3 (new)	The system shall be able to access an electronic log of all retrievals of documentary material from each participant's LSN website. This log will contain the IP address or DNS host name of the recipient's computer and the date and time of delivery. The log shall be in either the web standard "Common Log Format" or "Combined Log Format."
LSN DR B-16.4 (formerly LSN 2.14.01)	A monitoring/audit station shall be established to allow the LSNA to obtain, store, and report information on the availability and integrity of LSN information on the availability and integrity of LSN information.
LSN DR B-16.5 (formerly LSN 2.14.04)	The monitoring/audit station shall have the capability of tracking changes on participant LSN websites, monitoring participant LSN website responsiveness and other performance characteristics, and reporting this information to the LSNA.
LSN DR B-16.6 (new)	The LSN shall provide a means for the LSNA to post announcements and notices on the central LSN site.

LSN Req. No.	Description
LSN DR B-16.7 (new)	The LSN shall not use “persistent cookies” (i.e., ongoing capture of data that tracks a user’s pattern of use and preferences) without the approval of the Chairman of the NRC.

3.1.2 Functional Area 2: LSN Administrator (LSNA) Related Requirements

LSN Req. No.	Description
LSN DR C-1 (formerly LSN 2.14.01)	The LSNA shall obtain, store, and report information on the availability and integrity of LSN information.
LSN DR C-1.1 (new)	The LSNA shall identify any problems experienced by participants regarding LSN availability, including the availability of individual participant's data, and provide a recommendation to resolve any such problems to the participant(s) and the Pre-License Application Presiding Officer relative to the resolution of any disputes regarding LSN availability, including disputes on the availability of an individual participant's data.
LSN DR C-1.2 (new)	The LSNA shall post announcements on the central LSN site about the overall LSN program, items of interest (hour of availability, scheduled outages, etc.), and procedures for a user to acquire authenticated image copies from a participant.
LSN DR C-1.3 (new)	The LSNA shall identify any problems regarding the integrity of documentary material certified in accordance with the LSN Rule by the participants to be in the LSN, and provide a recommendation to resolve any such problems to the participant(s) and the Pre-License Application Presiding Officer relative to the resolution of any disputes regarding the integrity of documentary material.
LSN DR C-1.4 (new)	The LSNA shall post notices that contain listings of changes, if any, to each participant's collection, identified by LSN accession number, with a description of what the change was and why it was necessary.
LSN DR C-2 (new)	The LSNA shall review all participant LSN website designs to ensure that they meet the design standards.
LSN DR C-2.1 (new)	The LSNA shall have the authority to allow variances from the design standards to accommodate changes in technology or problems identified during initial operability testing of the individual participant LSN websites or the central LSN site.
LSN DR C-2.2 (new)	The LSNA may develop and issue guidance for LSN participants on how best to incorporate the LSN standards in their system.

3.1.3 Functional Area 3: General Capabilities of Participant LSN Site Systems

LSN Req. No.	Description
LSN DR D-1 (formerly LSN 1.20)	Each LSN participant must obtain the computer system necessary to comply with the requirements for document production and service.
LSN DR D-1.1 (formerly LSN 2.20.01)	The participant's system must provide the function of HTTP service. HTTP service may be provided by a dedicated computer, a virtual server (dedicated computer hosting multiple web sites), or be provided by a commercial web hosting service (that can comply with requirements).
LSN DR D-1.2 (formerly LSN 2.20.02)	The participant's system must be configured with hardware sufficient to store and serve all documentary and associated materials (e.g., sufficient disk storage, RAM (Random Access Memory), processing power, network interface, etc.) at estimated usage levels and to be easily upgradeable should estimates fail to adequately characterize usage.
LSN DR D-1.3 (formerly LSN 2.20.03)	The participant's system must be configured with software, licensed at sufficient levels, to store and serve all documentary and associated materials (e.g., networking-capable operating system, web server software, HTML authoring and site maintenance software, database server, etc.) at anticipated usage levels
LSN DR D-1.4 (formerly LSN 2.20.04)	The participant's system must be designed to maintain the integrity of the participant's discovery collection documentary material and provide for timely recovery in the event of hardware or software failure with complete restoration of the participant LSN website within three working days, or earlier if so specified within the parameters of the participant's disaster recovery plan.
LSN DR D-1.5 (formerly LSN 2.14.02)	The participant's system shall allow monitoring of various parameters by a monitoring station established by the LSNA to track changes on the participant LSN website, website responsiveness, and other performance characteristics. Specific access shall include SNMP monitoring of network utilization and ICMP access for determination of certain performance characteristics as well as access to the normal web distribution facility.
LSN DR D-1.6 (formerly LSN 2.14.03)	The participant's system shall allow LSNA access to their logs of electronic transactions in raw and summary formats to enable tracking of site usage.
LSN DR D-1.7 (formerly LSN 2.20.05)	The participant's system must be designed to maintain the security of the participant's discovery collection documentary material and the system itself including the ability to deny unauthorized access or update privileges, detect and defeat compromise attempts, and defend against denial of service attempts
LSN DR D-1.8 (formerly LSN 2.20.06)	The participant's system must be connected to the Internet with the capability of being accessed by any Internet user. The participant's system will allow Internet users the ability to retrieve documentary material from the participant's LSN website without utilizing a proxy from the LSN server. This connection shall be sufficient to provide reasonable responsiveness during periods of normal usage.

LSN Req. No.	Description
LSN DR D-1.9 (formerly LSN 2.20.07)	Participants shall make textual (or, where non-text, image) versions of their discovery collection documents available on an Internet accessible server which is able to be canvassed by web indexing software (i.e., a “robot,” “spider,” “crawler”) and the participant’s system must make both data files and log files accessible to this software.
LSN DR D-1.10 (formerly LSN 2.20.08)	Non-LSN-related information may be maintained on the same participant website as LSN-related material, but must be kept logically separate. All LSN materials on a participant’s site must be maintained together within a single hypertext sub-tree. The entire LSN-related sub-tree must be able to be navigated under a single URL (Uniform Resource Locator) reference. If a participant LSN website contains site navigation links on its LSN-related pages (e.g., a “home” button, or the result of a search), these links must point exclusively within the LSN-related sub-tree and not to another part of the World Wide Web site or off site.
LSN DR D-2 (formerly LSN 1.29)	Each LSN participant must design and implement their web facility to ensure acceptable access and responsiveness consistent with performance specifications.
LSN DR D-2.1 (formerly LSN 2.29.01)	Sites must be provisioned to be able to satisfy not less than 500 web page requests per minute.
LSN DR D-2.2 (formerly LSN 2.29.02)	Sites must be provisioned to be able to deliver a web page or image page on average in not more than five seconds to a web browser located on the same LAN segment.
LSN DR D-2.3 (formerly LSN 2.29.03)	Communications between the server and the Internet must be provisioned to be able to deliver interactive response.
LSN DR D-3 (new)	To facilitate data exchange, the participant’s system shall adhere to established hardware and software standards appropriate to meet the intent of the LSN Rule.
LSN DR D-3.1 (new)	The standard for network access shall be HTTP/1.1 [http://www.faqs.org/rfcs/rfc2068.html] over TCP (Transmission Control Protocol, [http://www.faqs.org/rfcs/rfc793.html]) over IP (Internet Protocol, [http://www.faqs.org/rfcs/rfc791.html]).
LSN DR B-3.2 (new)	The standard for associating server names with IP addresses shall be the DNS (Domain Name System), [http://www.faqs.org/rfcs/rfc1034.html] and [http://www.faqs.org/rfcs/rfc1035.html].
LSN DR B-3.3 (new)	The standard for web page construction shall be HTML version 4.01 [http://www.w3.org/TR/REC-html40/].
LSN DR B-3.4 (new)	The standard for electronic mail (e-mail) exchange between e-mail servers shall be SMTP (Simple Mail Transport Protocol, [http://www.faqs.org/rfcs/rfc821.html]).
LSN DR B-3.5 (new)	The standard for the format of an electronic mail message shall be per [http://www.faqs.org/rfcs/rfc822.html] optionally extended by MIME (Multimedia Internet Mail Extensions) per [http://www.faqs.org/rfcs/rfc2045.html] to accommodate multimedia e-mail.

LSN Req. No.	Description
LSN DR D-4 (formerly LSN 1.17)	Each LSN participant must establish its own procedures to make its own documentary material available.
LSN DR D-4.1 (formerly LSN 2.17.01)	Procedures shall cover all aspects of the production and web publication process including (as applicable on a per-document basis) authorship, content guidelines, stylistic guidelines, distribution guidelines, maintenance and revision guidelines, format conversion, quality assurance, uploading to the web server, accessing documentary material, and removal from the web server.
LSN DR D-5 (formerly LSN 1.18)	Each LSN participant must train its own staff on how to make its documentary material available
LSN DR D-5.1 (formerly LSN 2.18.01)	Staff shall be trained in document production, conversion, and web publication in compliance with acceptable procedures.
LSN DR D-5.2 (formerly LSN 2.18.02)	Staff shall be trained in operation and maintenance of the web server system.
LSN DR D-5.3 (formerly LSN 2.18.03)	Staff shall be trained in operation and maintenance of the participant LSN website.
LSN DR D-5.4 (formerly LSN 2.18.04)	Staff shall be trained in performing the user assistance or help desk function, if applicable.
LSN DR D-6 (formerly LSN 1.22)	DOE must provide electronic access to the central LSN site at DOE Headquarters and at all DOE Local Public Document Rooms (LPDRs) in the vicinity of the proposed site for a geologic repository, including Las Vegas, Reno, Carson City, Nye County and Lincoln County.
LSN DR D-6.1 (new)	Access must be provided no later than eight months in advance of submitting its license application to receive and possess high-level radioactive waste at a geologic repository operations area.
LSN DR D-6.2 (formerly LSN 2.22.01)	Access to the central LSN site is to be provided to the public on computers equipped with a web browser.
LSN DR D-6.3 (formerly LSN 2.22.02)	Access to the central LSN site is to be provided to visually impaired and otherwise disabled individuals as needed through appropriate hardware and software or by provision of user assistance.
LSN DR D-7 (new)	The NRC must provide electronic access to the central LSN site at the NRC Public Document Room no later than eight months in advance of DOE's submitting its license application to receive and possess high-level radioactive waste at a geologic repository operations area.
LSN DR D-7.1 (new)	Access to the central LSN site is to be provided to the public on computers equipped with a web browser.

LSN Req. No.	Description
LSN DR D-7.2 (new)	Access to the central LSN site is to be provided to visually impaired and otherwise disabled individuals as needed through appropriate hardware and software or by provision of user assistance.
LSN DR D-8 (new)	Participants should provide items of interest about their LSN website (hours of availability, scheduled outages, etc.) to the LSNA to post on the central LSN site. These items may also be posted on the participant's LSN website.

3.1.4 Functional Area 4: Document Production and Service

LSN Req. No.	Description
LSN DR E-1 (formerly LSN 1.16)	Each LSN participant must designate an official who is responsible for the administration of making its documentary material available.
LSN DR E-1.1 (formerly LSN 2.16.01)	Each designated official must provide contact information to the LSNA including a telephone number, e-mail address, and postal address.
LSN DR E-1.2 (formerly LSN 1.19)	Each LSN participant must have the designated official certify to the Pre-License Application Presiding Officer, in accordance with §2.1009, that procedures have been implemented and that documentary material has been made electronically available, or as otherwise indicated in the LSN Rule.
LSN DR E-2 (formerly LSN 1.23)	Each LSN participant must prepare and publish its documentary collections in a manner that allows access by Internet users who have access to the LSN search and retrieval capabilities.
LSN DR E-2.1 (formerly 2.23.01)	All participating entities must provision their web server with enough storage to accommodate all headers plus text and/or images of their entire collection of relevant documents as specified in the LSN Rule.
LSN DR E-2.2 (formerly LSN 2.23.02)	All participating entities shall ensure access to their documentary collection through electronic means. Participant capabilities should be such that any Internet user using a web browser and the LSN search and retrieval capabilities will be able to locate, identify, and retrieve documents of interest in relevant formats (header, text, and/or image).
LSN DR E-2.3 (formerly LSN 2.23.03)	Each participant must provide documents in a format that allows their presentation through a web server, including a header plus text and/or image portion.
LSN DR E-2.4 (formerly LSN 2.23.04)	All participating entities must provide the LSN with access to its full text or image files as required by the LSN Rule.
LSN DR E-2.5 (formerly LSN 2.23.05)	Documents presented on a participant web server must be an accurate representation of the source document.
LSN DR E-2.6 (formerly LSN 2.23.06)	All participating entities must store each TIFF document image in a page per file format.
LSN DR E-2.7 (formerly LSN 2.23.07)	All participating entities must provide the capability to retrieve and deliver documents identified through searching or browsing performed at the LSN portal site.
LSN DR E-3 (formerly LSN 1.24)	LSN participant must ensure that each document on their system has a unique ID (Participant Accession Number).

LSN Req. No.	Description
LSN DR E-3.1 (formerly LSN 2.24.01)	Each representation of a document (text and/or image) must be index-accessible through its Participant Accession Number. Participants shall programmatically link the bibliographic header record with the text and/or image file it represents to provide for file delivery and display from participant machines using the central LSN site. The bibliographic header must contain fielded data identifying its associated object (text and/or image).
LSN DR E-3.2 (formerly LSN 2.24.02)	It must be possible to retrieve a document by providing its Participant Accession Number.
LSN DR E-3.3 (formerly LSN 2.24.03)	It must be possible to retrieve an individual document which is part of a compound document (package) by providing each individual Participant Accession Number.
LSN DR E-4 (formerly LSN 1.25)	Each LSN participant must follow data format standards to facilitate electronic exchange and transfer.
LSN DR E-4.1 (formerly LSN 2.25.02)	Textual material shall be formatted to comply with the ISO/IEC 8859-1 character set and be in one of the following acceptable formats: ASCII, native word processing (Word and WordPerfect versions as requested by participants), PDF Normal, or HTML. As a goal, textual documents should be accurately represented with an overall error rate of no more than 0.5% based on character accuracy and a per page error rate of no more than 1.5%. Documents converted through means other than OCR should have an error rate of less than 0.05%.
LSN DR E-4.2 (formerly LSN 2.25.03)	Image file format shall be TIFF CCITT G4 for bi-tonal images or PNG (Portable Network Graphics) per [http://www.w3.org/TR/REC-png-multi.html] format for grey scale or color images, or PDF (Portable Document Format). TIFF, PDF, or PNG images will be stored at 300 dpi (dots per inch) or greater, grey scale images at 150 dpi or greater with eight bits of tonal depth, and color images at 150 dpi with 24 bits of color depth. Images shall be stored as single image-per-page to facilitate retrieval of no more than a single page. Alternatively, images may be stored in a page-per-document format if software is incorporated in the web server that allows single-page representation and delivery.
LSN DR E-5 (formerly LSN 1.26)	Each LSN participant must provide a bibliographic header with each document and with other material submitted (e.g., videotape or photograph). This includes submissions for which no text or image is available (e.g., rock sample) and for privileged, confidential, safeguards and other types of limited access documentary material as specifically identified.
LSN DR E-5.1 (formerly LSN 2.25.01)	Bibliographic header data shall be available in an HTTP accessible, ODBC (Open Database Connectivity) and SQL (Structured Query Language)-compliant (ANSI IX3.135-1992/ISO 9075-1992) database management system (DBMS). Alternatively, the structured data containing the bibliographic header may be made available in a standard database readable (e.g., XML Extensible Markup Language http://www.w3.org/xml/), comma delimited, or comma separated value (.csv) file.

LSN Req. No.	Description
LSN DR E-5.2 (new)	Bibliographic headers shall contain all fields as described in Table A, as applicable to participants (i.e., all fields except the LSN Accession Number which is generated by the LSN).
LSN DR E-5.3 (formerly LSN 2.26.01)	Headers for limited access documentary material will be as those for full access documentary material.
LSN DR E-5.4 (formerly LSN 2.26.02)	Headers for limited access documentary material shall be logically organized on the participant LSN website in a list, index, or table of contents separate from documentary material that is publically accessible, with user instructions for reviewing the limited access material.
LSN DR E-6 (new)	Participants may correct or revise documentary already made available on their LSN websites.
LSN DR E-6.1 (new)	Changes to documentary material previously provided are permitted if (1) a corrected or updated version is noted as superseding a previously provided version; and (2) the previous version is not removed.
LSN DR E-6.2 (new)	The participant must notify the LSNA of the change, identified by LSN Accession Number, with a description of what the change was and why it was necessary, so it can be posted on the central LSN site. Notification may also be posted on the participant's LSN website.
LSN DR E-7 (formerly LSN 1.27)	NRC, DOE, and each other potential party, interested governmental participant or party shall provide a statement that indicates where an authenticated image copy of the document can be obtained for those where an image is not required to be made available online.
LSN DR E-7.1 (formerly LSN 2.27.01)	Documents for which the electronic image is not available on the participant LSN website may be made available by means of authenticated image copy distribution. The website shall contain the document's header record and its text representation.
LSN DR E-7.2 (formerly LSN 2.27.03 and LSN 2.27.04)	Requests and delivery for an authenticated image copy will be via procedures and processes established and operated by the participants.
LSN DR E-7.3 (formerly LSN 2.27.02)	Each participant's procedures and processes for a user to acquire images shall be submitted to the LSNA for posting on the LSN home page.
LSN DR E-8 (formerly LSN 1.21)	All documentary material not provided to other participants in electronic form (i.e., not included in the LSN) must be identified in an electronic notice. Any item requested from that list must be provided to the requestor within five business days.
LSN DR E-8.1 (formerly LSN 2.21.01)	Notice of availability may be achieved by publication on the relevant participant LSN website.

3.1.5 Functional Area 5: Timeliness

LSN Req. No.	Description
LSN DR F-1 (formerly LSN 1.28)	DOE must make its documentary material available no later than eight months before submitting its license application. The NRC must make their documentary material available 30 days after the DOE initial certification of compliance in accordance with §2.1009. All other participants must make their documentary material available 90 days after the DOE initial certification of compliance.
LSN DR F-1.1 (formerly LSN 2.28.01)	The computer system providing document production and service must be designed, specified, acquired, integrated and installed sufficiently in advance of the specified date to meet the availability criteria. Customary funding and procurement lead times must be considered when scheduling these actions.
LSN DR F-1.2 (formerly LSN 2.28.02)	Document conversion and participant LSN website page authoring and document collection population must be begun sufficiently in advance of the specified date to meet the availability criteria. Collection size and resource availability must be considered when scheduling these actions.
LSN DR F-1.3 (formerly LSN 2.28.03)	Each participating entity must ensure their site availability and integrate it into the overall LSN sufficiently in advance of the specified date to meet the availability criteria. The availability of other participant staff must be considered when scheduling these actions.
LSN DR F-1.4 (formerly LSN 2.28.04)	Each participating entity must complete site and LSN integration testing acceptable to the LSNA sufficiently in advance of the specified date to meet the availability criteria.
LSN DR F-1.5 (formerly LSN 1.19)	The responsible official shall make the initial certification to the Pre-License Application Presiding Officer in accordance with §2.1009.
LSN DR F-1.6 (formerly LSN 1.19)	The responsible official for the DOE shall also update this certification at the time of submission of the license application.
LSN DR F-1.7 (new)	Documentary material created after the initial certification of compliance must be made available reasonably contemporaneous with its creation, so participants may have timely access to this material in order to prepare for the licensing proceedings.

3.1.6 Functional Area 6: Docket Related Requirements

LSN Req. No.	Description
LSN DR G-1 (formerly LSN 1.30)	The NRC must provide an electronic docket that receives, stores, distributes, and maintains docket material no later than at the time of the docketing of the DOE license application to receive and possess high-level radioactive waste at a geologic repository operations area pursuant to 10 C.F.R. Part 60.
LSN DR G-1.1 (formerly LSN 1.33)	The NRC, in its management of the electronic docket, must provide the computer system necessary to comply with service requirements.
LSN DR G-1.2 (formerly LSN 1.35)	The NRC must provide an electronic docket that contains a list of all exhibits, showing where in the transcript each was marked for identification and where it was received into evidence or rejected.
LSN DR G-1.3 (formerly LSN 1.40)	The NRC must identify a means by which the unavailability of the electronic docket for more than four hours in any day is communicated to the Presiding Officer so that the day is not counted in the computation of time.
LSN DR G-2 (formerly LSN 1.49)	DOE must submit the license application to the docket in electronic form using the same header, text, and image standards and formats as for evidentiary collection materials
LSN DR G-3 (formerly LSN 1.31)	The NRC must provide a Protective Order File.
LSN DR G-4 (formerly LSN 1.32)	The NRC must deliver all pleadings, orders, and decisions per §2.1013(c) (e.g., electronically, using secured process).
LSN DR G-5 (formerly LSN 1.34)	The NRC must maintain the docket.
LSN DR G-5.1 (formerly LSN 1.36)	The NRC must enter hearing transcripts into the docket on a daily basis in order to provide next-day availability at the hearing.
LSN DR G-6 (formerly LSN 1.37)	The NRC must establish a mechanism whereby all filings are able to be submitted/received electronically and to require a password security code for transmission of these documents.
LSN DR G-7 (formerly LSN 1.38)	The NRC, in its management of the electronic docket, must provide a mechanism by which all Presiding Officer and Commission issuances and orders are transmitted electronically.
LSN DR G-8 (formerly LSN 1.39)	The NRC must provide a mechanism by which the Presiding Officer and all counsel of all parties have access to the electronic docket (including Protective Order File) during the hearing.
LSN DR G-9 (formerly LSN 1.41)	The NRC must provide a mechanism to receive electronically transmitted depositions(including questions, cross-questions, and answers) and enter them into the docket file

LSN Req. No.	Description
LSN DR G-10 (formerly LSN 1.42)	The NRC, in its management of the electronic docket, must identify a means by which only a part or parts of a deposition may be offered into evidence.
LSN DR G-10.1 (new)	The NRC must be able to deliver from the docket a single image from a multi-page document.
LSN DR G-11 (formerly LSN 1.43)	Each LSN participant must demonstrate substantial and timely compliance with §2.1003 in order to be granted party status.
LSN DR G-12 (formerly LSN 1.44)	Absent good cause, each LSN participant must ensure that any exhibit is available before the commencement of that portion of the hearing where it will be offered.
LSN DR G-13 (formerly LSN 1.45)	For parties and interested governmental participants, service is completed when the sender receives electronic acknowledgment ("delivery receipt") that the electronic submission has been placed in the recipient's electronic mailbox.
LSN DR G-13.1 (formerly LSN 2.45.01)	All participating entities shall ensure that they can receive and reply to Internet-standard electronic mail by arbitrary Internet users using Internet standard e-mail MUAs (Mail User Agents) and MTAs (Mail Transfer Agents).
LSN DR G-13.2 (formerly LSN 2.45.02)	All participating entities shall maintain an electronic log of all deliveries of LSN documents to their EIE or Internet mail server. This log will contain the IP address or DNS host name of the recipient's computer and the date and time of delivery. The log shall be in either the web standard "Common Log Format" or "Combined Log Format."
LSN DR G-13.3 (formerly LSN 2.45.03)	All participating entities shall maintain an electronic log of all motions practice-related electronic mail transactions. This log will contain the IP address or DNS host name of the recipient's computer, the sender and recipient's user names, and the date and time of exchange.
LSN DR G-13.4 (formerly LSN 2.45.04)	All participating entities shall maintain a log of all non-electronic LSN-related deliveries. This log will contain recipient identification, date of delivery, and method of delivery.
LSN DR G-13.5 (formerly LSN 1.46)	Each LSN participant may utilize an electronic acknowledgment ("delivery receipt") as proof of service.
LSN DR G-14 (formerly LSN 1.47)	Deponents must submit an electronic index of all documentary material in his/her possession relevant to the subject matter of the deposition to all parties and interested government participants, identifying which were already made available electronically, ten days before the scheduled date of the deposition.
LSN DR G-14.1 (formerly LSN 1.48)	Deponents must bring to the deposition a paper copy of all documents that are included in the electronic index that the deposing party or interested governmental participant requests that have not already been provided electronically.
LSN DR G-14.2 (new)	Parties may request that any or all documents on the index that have not already been provided electronically be made electronically available by the deponent.

3.1.7 Functional Area 7: Electronic Information Exchange (EIE) Related Requirements

LSN Req. No.	Description
LSN DR H-1 (formerly LSN 1.50)	During the pre-license application phase, each LSN participant must use the procedures specified in §2.1013(c) for service of all pleadings, answers, orders, and decisions.
LSN DR H-2 (formerly LSN 1.51)	During the licensing proceeding, each LSN participant must use the procedures specified in §2.1013(c) for service of all pleadings, answers, orders, and decisions.
LSN DR H-3 (formerly LSN 1.52)	Absent good cause, parties and interested government participants must submit all filings electronically using a secure transaction process for transmission of documents to the electronic docket.
LSN DR H-4 (formerly LSN 1.53)	Parties and interested government participants must transmit depositions to NRC's Secretary (SECY) in electronic form for entry into the docket.

4 DATA REQUIREMENTS

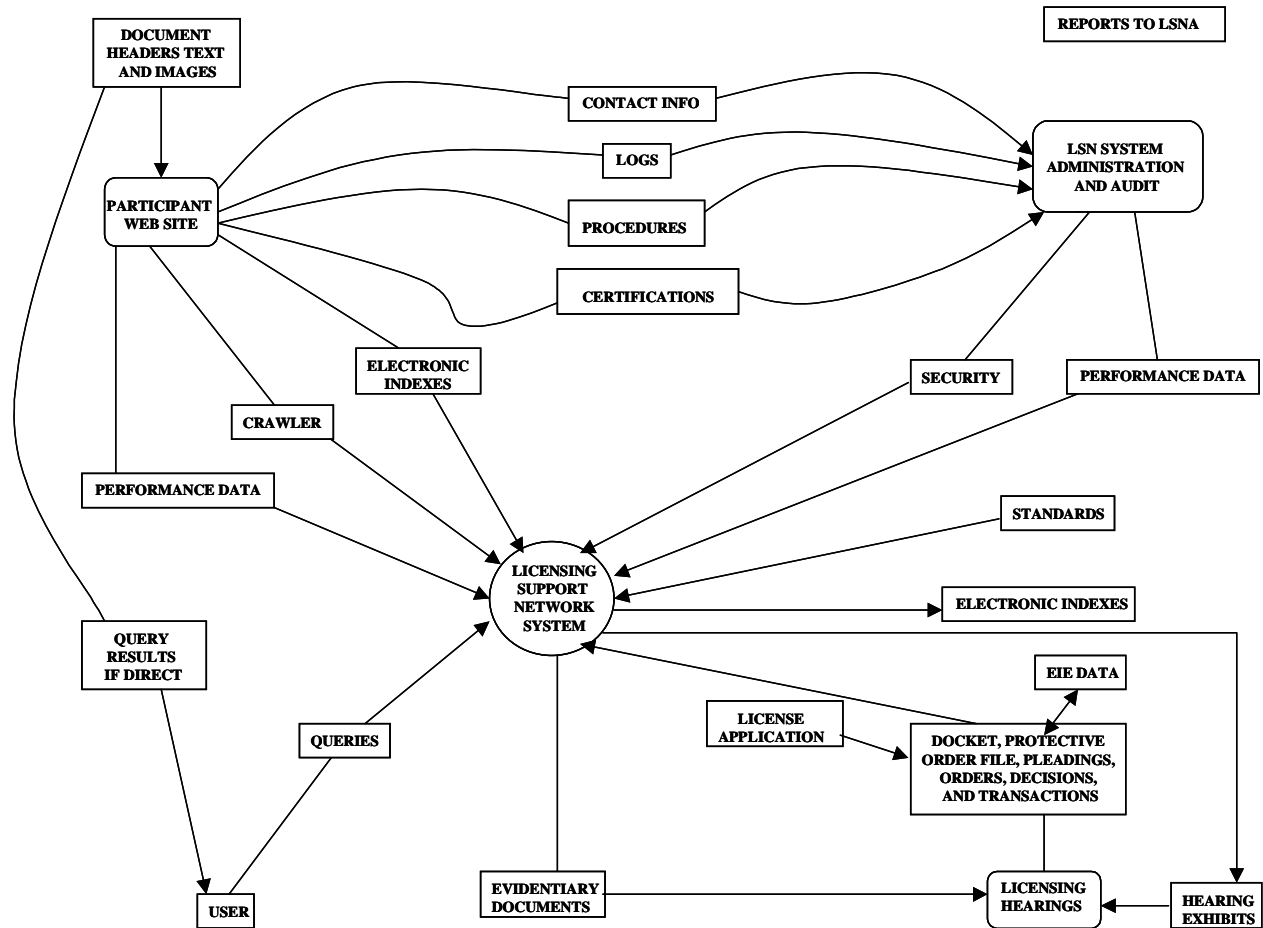
4.1 Entity List and Definitions

Entity	Entity Definition
Participant Bibliographic Headers	Structured data about each document available in an SQL-compliant database management system, or a standard database readable file.
Participant Document Text	Electronic indexed entry of a document that allows the identification of specific words or groups of words within a text file. Must be formatted to comply with the ISO/IEC 8859-1 character set and be in ASCII text, native word processing, PDF or HTML.
Participant Document Images	Image files formatted as TIFF for bi-tonal images, as PNG per format for grey-scale or color images, or as PDF for compound documents.
Standards	Minimum design standards for data structure, data transfer and protocols. The standards for participant World Wide Web sites ensure efficient and effective identification of documents, ensure document and data integrity, and provide tools for discovery.
NRC Electronic Information Exchange Data	Data used to respond to legal submissions conducted between the parties and the presiding official. NRC's EIE will be used for motions practice, electronically transmitted depositions, and the presiding officer's issuances and orders. This existing NRC capability, which is based on PureEdge (formerly UWI) forms and Verisign digital signaturing software. Filings can be submitted/received electronically and the system incorporates password security code techniques as part of the digital signature certificate issuance procedure, including digital signaturing technologies for transmission of documents.
LSN Electronic Indexes	A "catalog" created by the crawler software from reading the participant World Wide Web pages. The crawler program visits participant World Wide Web sites and reads their documents and header files to create entries for the search engine index.
User Search and Retrieval Tools	Users shall be expected to use current browser technologies including access using both graphical and text-only browsers to documentary collections. Tools provided on the LSN World Wide Web site shall enable users to query for the occurrence of text content through all document texts. Specific query options include the ability to search for the occurrence of a phrase in the full text of documents, perform proximity searching (i.e., search for words near each other), perform wild card searching, perform root searching, perform frequency searching, and to arbitrarily combine any search strategy through the use of Boolean operators.

Entity	Entity Definition
Participant World Wide Web Page	A file server to deliver text documents responsive to queries found through a search at the LSN World Wide Web site.
Participant Site Logs	Participants' document usage information from their World Wide Web sites.
Participant Contact Information	Designated official who will be responsible for administration of its responsibility to provide electronic files of documentary materials.
Participant Procedures	Procedures to implement LSN requirements.
Participant Certifications	Certifications by designated officials that the requirements of 10 C.F.R., Part 2, Subpart J have been implemented and that the documentary material has been identified and made electronically available. This certification shall be updated every twelve months. DOE shall also update this certification at the time of submission of the license application.
Non-electronic Documents	Documentary material that is not suitable for image or searchable full text.
LSN Portal Site	The LSN home page/ World Wide Web site that will ensure that the totality of the individual participant World Wide Web sites operate efficiently and effectively. The site is based on portal software technology including hardware and software permitting standardized search and retrieval across all collections using a common user search interface.
NRC Docket	The NRC's electronic information system that receives, distributes, stores, and maintains NRC pre-license application docket materials during the pre-license application phase. NRC's ADAMS external collections, containing publicly accessible docket files will meet the docket requirements. The electronic docket contains a list of all exhibits, showing where in the transcript each was marked for identification and where it was received into evidence or rejected.
Protective Order File	Specialized or limited access document collection established by the NRC.
NRC Orders and Decisions	A judge's formal reply to participant pleadings and motions.
NRC Hearing Transcripts	Transcripts of the proceedings.
Participant Hearing Exhibits	The evidentiary collection of document exhibits submitted during the licensing process.

Entity	Entity Definition
Participant Pleadings and Motions	Requests of the presiding officers and judges.
Participant Document Delivery Logs	Electronic log of all deliveries of LSN documents to the EIE or Internet mail server. This log will contain the IP address or DNS host name of the recipient's computer and the date and time of delivery. The log shall be in either the World Wide Web standard "Common Log Format" or "Combined Log Format."
Participant Motions Logs	Electronic log of all motions practice-related electronic mail transactions. This log will contain the IP address or DNS host name of the recipient's computer, the sender and recipient's user names, and the date and time of exchange.
Participant Document Paper Copies	Hard copy authenticated images of documents.
DOE License Application	Department of Energy request to obtain a license from the Nuclear Regulatory Commission (NRC) to build and operate a geologic repository for highly radioactive materials.
LSN System Performance Data	Data requirements for meeting the audit and compliance capability are met using the files and additional metadata characterizations extracted from files on the participant's servers and from usage log files of the participant servers themselves. Component subsystems such as the participants' servers and the LSN server site must be made available to the LSN audit system for collection of server activity associated with posting, modification, and deletion activities as well as server performance data in responding to requests for files.
Retrieved Results	Results of user queries in the form of headers and/or images and/or text.
LSN User Queries	Requests to the LSN for documents.

4.2 Context Diagram



5. ASSESSMENT OF CURRENT SYSTEM

The Licensing Support Network is a new system and does not replace or supersede an existing current system.

No existing system accomplishes what the LSN is intended to do, although existing NRC capabilities can help fulfill two identified capabilities—electronic document submission and establishment of an electronically accessible docket.

6. ANALYSIS OF ALTERNATIVES

6.1 Alternatives Considered

Five World Wide Web-based alternatives were considered for the LSN. These are described below:

1. **Linked URLs:** Each participant would create its own World Wide Web site and provide its own search engine. The NRC would maintain an LSN World Wide Web site with links to participant sites. Licensing participants directly access those sites as would any other general user of the Internet. Search and retrieval processes are conducted using the tools provided at each individual site.
2. **Central Search Interface and Central Site:** A central portal would perform searches by interfacing with the various search engines on the individual participant World Wide Web sites.
3. **Central Search Interface and Distributed Sites:** A central portal would provide a centralized search engine and “crawl” the participant World Wide Web sites. The search engine would create a central index of all participant documents on the individual World Wide Web sites. Participant file servers would deliver the documents.
4. **Portal on a Single Computer:** A central portal would provide the search engine and interface. All participant computers would be co-located on a single computer and each participant World Wide Web site would feed the portal.
5. **Portal with Central Storage Site:** A central portal would provide the search engine and interface. The portal would also provide central storage of all documents, fed by participants and operated by the LSN. Copies of documents remain on the participant file servers, which provides redundancy and quicker response.

The LSN Technical Working Group (TWG) and the LSN Advisory Review Panel (LSNARP) examined the five alternatives and provided feedback to the NRC. As a result of input, alternatives two and four were ruled out. Alternatives one, three, and five were studied in more depth, as shown in the following sections.

6.2 Advantages and Disadvantages of Feasible Alternatives

Certain benefits exist for all three alternatives because of the inherent functionality of World Wide Web-based systems. In addition, since all three alternatives involve independent operation of various sub-components, some operability should be able to be maintained in the case of system and network outages. The system can be more easily reconfigured under the three alternatives or extended without disruption to the system as a whole. The distributed architecture

permits additional participants to plug into the LSN or a participant component to change with relative ease and little or no disruption of service.

Certain risks accrue to the three design alternatives, including:

- Licensing under 10 C.F.R. Part 2, Subpart G procedures is no longer a viable alternative.
- DOE and NRC collections are the first to be integrated and are tied to the date of the DOE site recommendation to the President of the United States. This is approximately nine to twelve months before the License Application is submitted to NRC. Availability of other parties' document collections is tied to the completion of Congressional review of the site recommendation. These staggered connectivity dates provide some ability to prioritize integration work.
- DOE connectivity and certification of its compliance are pre-requisites for the docketing of the License Application, so its delay could impact the acceptance of any license application and opening of an associated docket.
- Non-availability of NRC's collection would be an embarrassment although the LSN schedule is established in an NRC rule that can be changed by the agency.
- Other parties' admission into the proceeding is contingent on their collections being connected to the system.
- In all cases, if the parties have their collections available on schedule, even if the LSN home page is not ready, the parties could be determined to be in substantial compliance with the rule with no impact on docketing the License Application.

6.2.1 Benefits and Risks of Alternative 1

Alternative 1 Qualitative Benefits		
1 = High Level of Benefit	2 = Medium Level of Benefit	3 = Low Level of Benefit
Item	Rating	Comment
Ability for LSNA to Exercise High Level of Control	3	This alternative involves a distributed architecture with participants' sites under local control. Therefore, it will be difficult for the LSNA to maintain systematic controls.
Ability for LSNA to Ensure Overall Configuration Performance	3	The LSNA will be unable to respond quickly to performance problems.
Reduced Participant Burden to Exercise Controls	3	Participants must implement within highly structured guidelines and procedures and be heavily audited.

Alternative 1 Qualitative Benefits		
1 = High Level of Benefit	2 = Medium Level of Benefit	3 = Low Level of Benefit
Reduced Participant Burden to Ensure Performance	3	Participants shoulder the burden for maintaining their operation at a high level of availability and performance.
Reduced Participant Need to Provide Computer/Expertise	3	Participants must have a high level of computer operations expertise.
Increased User Flexibility to Tailor Desktop/Interface	3	This alternative is inflexible and users will have no ability to tailor their desktop interface.
Increased Ease of Use	3	The system will be difficult to use because each collection/server will have a different interface.
Ability to Ensure Unique and Uniform Document Numbering	3	There is no built-in uniform numbering system. This process must be delegated to the participants to implement, introducing the possibility for error.
Item	Rating	Comment
Improved Consistency of Search Results	3	Since there will be no standardization of participant search and retrieval tools, search results may be inconsistent.
Ability to Ensure Required System Availability	2	Even if one participant's site goes down, other sites are available for searching. If it is DOE's site that goes down, however, it takes 85% of the discovery documents off-line.
Ability to Provide Required Response Time and Performance	3	The response time performance is variable from system to system. The overall system performance is variable.
Ability to Provide Priority Access	3	This alternative does not allow for priority access. Licensing users will be competing against all users on the Internet for access to servers where the file collections are housed.
Average Benefit Rating	2.9	

Alternative 1 Qualitative Risks		
1 = High Level of Risk	2 = Medium Level of Risk	3 = Low Level of Risk
Item	Rating	Comment
Volatility of Requirements (Ability to Accommodate Change)	1	Since changes in requirements (e.g., adding a new data element) must be accommodated separately by each participant, there is a high risk in this area.

Alternative 1 Qualitative Risks		
1 = High Level of Risk	2 = Medium Level of Risk	3 = Low Level of Risk
Scope of Project (Ability to Accommodate Change)	1	Changes in scope will be difficult to accommodate because the system is architecturally constrained and under-engineered to support quick remediation. In addition, changes in scope that cause deficiencies in participant system performance will take a long time to resolve since LSNA has very limited access to the resources to take remedial actions during licensing.
Technical Risk (Implementation Complexity) - LSNA	3	The risk associated with technical complexity of implementation to the LSNA is low.
Technical Risk (Implementation Complexity) - Participants	3	The risk associated with technical complexity of implementation to the participants is low.
Management Consensus	2	In this alternative, certification of data integrity requires heavy auditing and highly structured guidelines and procedures.
Resource Commitment	3	The Commission has endorsed the allocation of additional resources as necessary to carry out the LSN program successfully.

Alternative 1 Qualitative Risks		
1 = High Level of Risk	2 = Medium Level of Risk	3 = Low Level of Risk
Potential Resistance (By Users)	1	LSNARP TWG did not recommend this alternative because it has the following limitations that significantly increase the risk of potential resistance from users: too complex; the user interface is not consistent; too difficult to navigate; not possible to aggregate information across collections; not versatile; does not guarantee powerful search and retrieval; inflexible because users have no ability to tailor desktop interface; and lacks standardization of participant search and retrieval tools requiring users to learn multiple systems. Also, participants must visit the multiple sites iteratively to execute the same searches resulting in its use being redundant, repetitive, and inefficient to users. This alternative also potentially excludes some participants from effective participation and “tilts the playing field” toward those with substantial financial resources.
Sponsor Organization’s IT Project Management Experience	3	There is low risk in this area because the sponsor organization has key staff members who have experience in managing large IT projects.
Schedule Risk-LSNA	3	Because there is no extensive integration, there is low schedule risk of having the LSN homepage, ADAMS docket and EIE unavailable for licensing.
Schedule Risk-Participants	2	Overall, there is only a moderate risk that participants will not be operational in time to support licensing; risk accrues mostly to DOE.
LSNA Custodianship of Participant Documents	3	Parties control their own documents.
Average Risk Rating	2.3	

Alternative 1 is characterized as being of low benefit in delivering efficient and effective access to users and is comparable in risk to Alternatives three and five. Identified benefits are its ability to ensure required system availability when the system initially goes operational and to ensure availability to users on an ongoing basis thereafter.

Initial Availability: Because there is no extensive integration, there is a moderate benefit to having the LSN home page, ADAMS docket, and EIE available for licensing under this approach. To the participants, there is a moderate benefit because parties with smaller collections can meet availability requirements relatively quickly; however, some of this benefit

may not accrue because of the size of the DOE collection and questions about the speed at which its collections can be populated.

Operational Availability: Benefit accrues insofar as large text and image files reside on participant maintained storage devices, which provides a “multi-pathway” capability. This spreads out bandwidth impacts to some degree, especially to the small and mid-size participants. Additionally, if one participant is “down,” the rest are still available although less benefit accrues than would be expected because if the party that is not available is DOE, 85% of the evidentiary collection becomes inaccessible.

The LSNARP TWG *did not recommend* this alternative because it was deemed too complex for users and its user interface was not consistent, making the overall environment too difficult to navigate. Because of the distributed nature of the collections, it is not possible to aggregate information across collections. Additionally, the TWG found that this approach was not versatile, did not guarantee powerful search and retrieval tools would be provided, and potentially excludes some participants from effective participation by “tilting the playing field” toward those with substantial financial resources.

This alternative demonstrates a high degree of risk in the areas of efficiency and effectiveness of the automation environment, lack of controls, variability in performance, and cost to the participants.

Efficiency and Effectiveness: Participants must visit the multiple sites iteratively to execute the same searches, making work redundant and repetitive; this approach is not efficient to users. There may be little standardization of participant search and retrieval tools, requiring users to learn multiple systems.

Lack of Controls: There is no built-in uniform numbering system. This function must be delegated to the participants to implement, introducing the possibility for error. The approach provides no priority access and leaves licensing proceeding users to compete against all the users on the Internet for access to the servers where the file collections are housed. Deficiencies in participant system performance may take a long time to resolve since LSNA has no access to the resources to take remedial actions during licensing.

Performance Variability: Response time performance is variable from system to system. Overall system performance is variable. Participants shoulder greater burden for maintaining system operation at a high level of availability and performance. Even for those participants with the best intentions, the system is architecturally constrained and under-engineered to support quick remediation.

Participant Commitment: Participants incur greater operational cost and require a higher level

of computer operations expertise.

While this alternative represents the lowest initial cost to NRC, recurring annual costs and the audit costs could rapidly escalate because certification of data integrity requires heavy auditing and highly structured guidelines and procedures.

6.2.2 Benefits and Risks of Alternative 3

Alternative 3 Qualitative Benefits		
1 = High Level of Benefit	2 = Medium Level of Benefit	3 = Low Level of Benefit
Item	Rating	Comment
Ability for LSNA to Exercise High Level of Control	2	Audit capabilities are good but participant servers' log capabilities are variable.
Ability for LSNA to Ensure Overall Configuration Performance	2	Control provided for search and retrieval but not file delivery and bandwidth.
Reduced Participant Burden to Exercise Controls	2	This alternative requires some participant coordination and integration (e.g., when the site gets crawled) but flexibility exists.
Reduced Participant Burden to Ensure Performance	2	Participants still are responsible for ensuring file delivery and bandwidth, but the portal provides some availability features.
Reduced Participant Need to Provide Computer/Expertise	2	This alternative reduces, but does not eliminate the need for participants to perform system administration and data management functions.
Increased User Flexibility to Tailor Desktop/Interface	1	This alternative is very flexible for users and allows them to customize their desktop and interface.
Increased Ease of Use	1	The single, uniform query interface provided in this alternative prevents users from having to learn multiple software environments.
Ability to Ensure Unique and Uniform Document Numbering	1	In this alternative, the portal software automatically assigns unique, uniform numbering.
Improved Consistency of Search Results	1	This alternative provides search results consistency and normalization.
Ability to Ensure Required System Availability	2	Search and retrieval is redundant at both portal and participant sites, but file delivery is contingent on the participant server availability.

Alternative 3 Qualitative Benefits		
1 = High Level of Benefit	2 = Medium Level of Benefit	3 = Low Level of Benefit
Ability to Provide Required Response Time and Performance	2	Fetching text and image files is constrained in this alternative and relies on the ability of participants to deliver files from their servers.
Ability to Provide Priority Access	1	This alternative includes the capability to provide priority access to participants.
Average Benefit Rating	1.4	

Alternative 3 Qualitative Risks		
1 = High Level of Risk	2 = Medium Level of Risk	3 = Low Level of Risk
Item	Rating	Comment
Volatility of Requirements (Ability to Accommodate Change)	2	In this alternative, potential requirements changes will be accomplished at the LSN Index and Centralized Portal site rather than at multiple participant sites. Therefore, there is only a moderate risk in this area.
Scope of Project (Ability to Accommodate Change)	2	This alternative provides the LSNA with tools to support analysis of search and access transactions, design of interface, and system security. This allows the LSNA to monitor and tune system performance. This will facilitate the accommodation of changes in scope and make risks in this area moderate.
Technical Risk (Implementation Complexity) - LSNA	2	Slight increment in difficulty over alternative 1 is associated with development of a unified search and retrieval interface.
Technical Risk (Implementation Complexity) - Participants	2	Since the LSNA will be responsible for the bulk of the implementation activity, there are only moderate risks to the participants.
Management Consensus	2	There is moderate risk in this area, because several LSNARP members, including the DOE representative, did not vote for this alternative.
Resource Commitment	2	The Commission has endorsed the allocation of additional resources as necessary to carry out the LSN program successfully.
Potential Resistance (By Users)	3	Since this alternative will require that users learn a single set of seemingly efficient and effective tools rather than multiple and potentially ineffective tools, there should be decreased resistance to the system.
Procurement/Vendor Risk	2	There is moderate risk in this area because contracts must be awarded for system development and consulting services as well as for hardware and software. However, these procurements can be accomplished through GSA's Advantage!™ Multiple Award Schedule (MAS) or other blanket contract vehicles available through the NRC division of contracts.

Alternative 3 Qualitative Risks		
1 = High Level of Risk	2 = Medium Level of Risk	3 = Low Level of Risk
Sponsor Organization's IT Project Management Experience	3	There is low risk in this area because the sponsor organization has key staff members who have experience in managing large IT projects such as ADAMS.
Schedule Risk-LSNA	2	In this alternative, there is a moderate schedule risk to LSNA to have operational to support licensing due to unknown amount of integration work that will be required to implement "crawling" of participant sites.
Schedule Risk-Participants	2	In this alternative, there is a high schedule risk of participants not being operational to support licensing due to integration between portal and participant sites.
LSNA Custodianship of Participant Documents	3	Parties control their own documents.
Average Risk Rating	2.2	

Alternative 3 is characterized as adding significant qualitative value over Alternative 1, but somewhat less beneficial than Alternative 5. Qualitative value is evidenced in the number of tools that it provides to help the LSNA and the participants tune overall system performance. This alternative also evidences strong value to prospective users by reason of the standardization and controls provided. Finally, it delivers high benefit through an ability to help meet unforeseen developments in the hearing process.

Performance: This approach provides a high level of benefit in the area of system availability because the portal and participant sites are independently available and provide search and retrieval redundancy if the portal or participant site becomes unavailable. Additionally, having large text and image files reside on participant maintained storage devices provides a multi-pathway capability and spreads out bandwidth impact. Portal software provides LSNA with controls for search tools and access, design of interface, and system security. This allows the LSNA to monitor and tune system search and retrieval performance whenever general users are accessing collections through the portal site. It provides the capability to prioritize access to participants.

Standardization: This alternative utilizes software that automatically assigns unique, uniform numbering. It delivers a single, uniform query interface that spares users from having to learn multiple software environments. It provides search results consistency and normalization.

Adaptability: The software environment is very flexible, allowing users to customize the desktop and interface to meet information needs while matching skill levels. In a larger sense, because it is built on a DBMS environment, it provides a richer and more powerful system engineering capability to enhance or expand the system should that be required by developments occurring during the licensing proceeding.

Of the alternatives (Alternative 3 and 5 only) that meet the needs of a complex discovery system and were recommended by TWG, this represents the lowest cost for NRC. This is, in part, because the portal software does double duty in managing the data used in the auditing process.

System Availability: This alternative represents a somewhat higher scheduling risk for participants being operational to support licensing due to integration between portal and participant sites. It also represents a moderate schedule risk to LSNA to have operational to support licensing due to unknown amount of integration work that will be required to implement crawling of participant sites.

6.2.3 Benefits and Risks of Alternative 5

Alternative 5 Qualitative Benefits		
1 = High Level of Benefit	2 = Medium Level of Benefit	3 = Low Level of Benefit
Item	Rating	Comment
Ability for LSNA to Exercise High Level of Control	1	Provides all the data and tools needed for LSNA to perform audit and compliance function. The software does double duty.
Ability for LSNA to Ensure Overall Configuration Performance	1	Provides LSNA with controls for search tools and access, design of interface, and system security. This allows the LSNA to monitor and tune system performance.
Reduced Participant Burden to Exercise Controls	1	Participants have no responsibility for exercising controls except for change notification within a five-day window.
Reduced Participant Burden to Ensure Performance	1	Participants have no responsibility for ensuring performance except during initial “crawling” or loading.
Reduced Participant Need to Provide Computer/Expertise	1	Participants could put files on externally accessible server until successfully crawled and then remove them and place the next batch out using automation with little human intervention.

Alternative 5 Qualitative Benefits		
1 = High Level of Benefit	2 = Medium Level of Benefit	3 = Low Level of Benefit
Increased User Flexibility to Tailor Desktop/Interface	1	This alternative is very flexible for users and allows them to customize their desktop and interface.
Increased Ease of Use	1	The single, uniform query interface provided in this alternative prevents users from having to learn multiple software environments.
Ability to Ensure Unique and Uniform Document Numbering	1	In this alternative, the portal software automatically assigns unique, uniform numbering.
Improved Consistency of Search Results	1	This alternative provides search results consistency and normalization.
Ability to Ensure Required System Availability	2	Operational milestone is very difficult to accomplish because of customized nature of mass storage. Once operational, central dispatch for maintenance makes for quicker, coordinated response, but relies more heavily on LSN server/storage to ensure ongoing availability.
Ability to Provide Required Response Time and Performance	1	This alternative has the most predictable response characteristics because it provides central control on both file servers and Internet bandwidth for text and image delivery.
Ability to Provide Priority Access	1	This alternative provides the capability to provide priority access to participants.
Average Benefit Rating	1.0	

Alternative 5 Qualitative Risks		
1 = High Level of Risk	2 = Medium Level of Risk	3 = Low Level of Risk
Item	Rating	Comment
Volatility of Requirements (Ability to Accommodate Change)	2	In this alternative, potential requirement changes will be accomplished at the LSN Index and Centralized Portal site rather than at multiple participant sites. Therefore, there is only a moderate risk in this area.

Alternative 5 Qualitative Risks		
1 = High Level of Risk	2 = Medium Level of Risk	3 = Low Level of Risk
Scope of Project (Ability to Accommodate Change)	2	This alternative provides the LSNA with tools to support analysis of search and access transactions, design of interface, and system security. This allows the LSNA to monitor and tune system performance. This will facilitate the accommodation of changes in scope and make risks in this area moderate.
Technical Risk (Implementation Complexity) - LSNA	2	Increase technical complexity introduced by integration of mass storage device and providing backup while maintaining availability.
Technical Risk (Implementation Complexity) - Participants	3	Since the LSNA will be responsible for virtually all of the implementation activity including establishment of a centralized storage facility, there are low risks to the participants.
Management Consensus	2	There is moderate risk in this area, because some of the LSNARP members voted for this alternative.
Resource Commitment	1	The Commission has endorsed the allocation of additional resources as necessary to carry out the LSN program successfully. However, in this alternative, a very significant amount of additional funding is needed to supplement the allocation to the ASLBP 2001 budget.
Potential Resistance (By Users)	2	Since this alternative will require that users learn to use a single set of seemingly efficient and effective tools rather than multiple and potentially ineffective tools, there should be decreased resistance to the system.
Procurement/Vendor Risk	1	There is high risk in this area because Storage System procurement is not an "off-the-shelf" item and timely delivery after ordering cannot be assured.
Sponsor Organization's IT Project Management Experience	3	There is low risk in this area because the sponsor organization has key staff members who have experience in managing large IT projects such as ADAMS.

Alternative 5 Qualitative Risks		
1 = High Level of Risk	2 = Medium Level of Risk	3 = Low Level of Risk
Schedule Risk-LSNA	1	In this alternative, there is a high schedule risk to LSNA to have operational to support licensing due to unknown amount of integration work that will be required to implement “crawling” of participant sites and the fact that implementing large cache storage could be delayed because equipment is non-standard.
Schedule Risk-Participants	2	In this alternative, there is a moderate schedule risk of participants not being operational to support licensing due to integration between portal and participant sites and transmission security issues. However, participants could meet Subpart J requirements with a less sophisticated system for search and retrieval and smaller, simpler storage solutions.
LSNA Custodianship of Participant Documents	1	Participant documents’ availability and eventual disposition become responsibility of NRC.
Average Risk Rating	1.8	

Alternative 5 is characterized as adding significant qualitative value over Alternative 1 and being of the highest benefit of the three alternatives studied. Like Alternative 3, Alternative 5 evidences qualitative value in the amount of tools that are provided to help the LSNA and the participants tune overall system performance. It also evidences strong value to prospective users as a result of the standardization and controls it provides. Like Alternative 3, it also delivers high benefit by reason of its ability to help meet unforeseen developments in the hearing process. This approach provides some potential benefit to the participants by decreasing the level of ongoing professional support.

Performance: This approach provides a very high level of benefit in the area of system availability. It provides this benefit, and the most predictable response characteristics, because it caches complete copies of all documents and provides central control on file servers and Internet bandwidth for text and image delivery. Aggregate performance will likely improve and will certainly be more predictable in contrast to the performance of distributed systems that are generally more variable. Developing the system in a central computer means only one telecommunications feed will need the higher bandwidth, minimizing the set of connections needed, localizing the area, and requiring dedicated lines. If bandwidth is inadequate, the LSNA can promptly respond to acquire the needed bandwidth. Performance enhancement is easier to accomplish through a central approach, if the portal server is modular and multi-processor based. From a system administration point of view, it is the easiest environment in which to remediate

availability problems experienced by users because remediation is effected by a single source, the LSNA.

As with Alternative 3, portal software provides LSNA with controls for search tools and access, design of interface, and system security. This allows the LSNA to monitor and tune system search and retrieval performance whenever general users are accessing collections through the portal site. It provides capability to provide priority access to participants.

Standardization: This alternative utilizes software that automatically assigns unique, uniform numbering. It delivers a single, uniform query interface that spares users of having to learn multiple software environments. It provides search result consistency and normalization.

Adaptability: The software environment is flexible and allows users to customize the desktop and interface to meet their information needs while matching their skill levels. In a larger sense, because it is built on a DBMS environment, it provides a richer and more powerful system engineering capability to enhance or expand the system should that be required by developments occurring during the licensing proceeding.

Participant Commitment: Technical expertise required by participants is lessened, but greatly increased at the LSN central computer site. Participants will not have to be Webmasters or acquire Webmaster services as in the other two alternatives. World Wide Web site maintenance capability will have to be in-house or acquired. Enhanced central storage imposes the lowest cost burden to the participants in terms of system administration and data management, and might lessen the participants' requirement to implement rigorous backup and disaster-recovery procedures since the central storage facility would be an implicit backup. This does not relieve participants from the responsibility to provide and preserve the "true copy" of a document.

Alternative 5 is characterized as presenting the greatest risk of not meeting the implementation schedule and, at the same time, represents the lowest risk solution that ensures overall system performance to the user and avoids un-resolvable availability issues. Additional risk is associated with the role that NRC assumes in being responsible for the availability of the participants' discovery documents during the course of the proceeding. Alternative 5 represents the greatest potential for a technical implementation that would not be ready by July 2001, because it introduces a large, customized memory array that may involve lengthy purchase, delivery, and integration time lines.

Implementation Schedule: Because the storage system is not an "off-the-shelf" procurement item and timely delivery after ordering cannot be assured, this alternative incurs a moderate-to-high schedule risk to LSNA that the system will not be operational in time for licensing. There is an additional moderate-to-high technical implementation complexity risk for the LSNA.

Overall System Performance: The system cannot be easily reconfigured or extended without disruption to the system as a whole. The level of maintenance and management of the LSN computer system and the expertise required to accomplish it will increase in direct proportion to its size.

System Availability: As is the case for any single large system, the large burden for ensuring implementation that is placed on a small staff can result in implementation delays.

Custody: The LSNA becomes custodian of applicant and intervener discovery materials during the proceedings. This occurs because the chain of custody goes through the portal site and the LSNA in any option where the portal caches everything and that is the file being relied on as part of the licensing process.

Of the two alternatives (Alternatives 3 and 5) that meet the needs of a complex discovery system and were recommended by TWG, Alternative 5 represents the highest cost for the NRC.

6.3 Selection of the Most Advantageous Alternative

The most advantageous alternative, and that selected by the LSNA, with concurrence of ASLBP management, is Alternative 3.

While Alternative 3 is neither the least risky nor the most beneficial, it represents the least cost to NRC and the parties individually and in totality, and represents high value to the licensing proceeding users. It is the lowest cost of the two alternatives endorsed by the LSNARP TWB, is based on a proven technical solution that has been successfully implemented, facilitates the NRC's ability to comply with the schedule for decision on the repository construction authorization, provides an electronic environment that facilitates a thorough technical review of relevant documentary material, and ensures equitable access to the information for the parties to the hearing.

7 SYSTEM OPERATIONS CONCEPT (SOC)

The LSN will be assembled from standard, off-the-shelf, hardware, operating systems, COTS products, reusable components, and minimal custom software. The components will be integrated with lightweight scripting and hypertext. LSN World Wide Web pages will deliver content to participants, the public, and the LSN Administrator. Additional pages will provide administrative functions, such as controlling an access list of priority participants.

The three major functions provided by LSN are described below.

Search and Retrieval: Provides capability for searching and retrieving documents using several methods.

The intelligent search capability will significantly assist the licensing process by freeing participants to analyze content, rather than browsing through large volumes of documents. Autonomy performs searches based on the content and context of the searcher's requirements. Searches based on context rather than key words or phrases return to the searcher only those documents that respond to the searcher's specific requirements instead of all documents that contain a specific key word or words that may be in a document but are not in the context of the searcher's subject at all. This characteristic will reduce the workload on users of the system and at the same time provide more reliable and relevant information to the users.

Priority users will enter LSN through the home page and authenticate via a logon page.

Auditing: Ensures document integrity and reports various performance metrics of the LSN system including participant machines.

The WebTrends and WhatsUp Gold products will provide network performance monitoring. The Autonomy logs provide statistics on document add/change/delete transactions as it "crawls" each site at the byte level. Specifically, the product will detect any changes in a document that has been placed in a participant's document library. Automated extracts imported from participant's World Wide Web logs provide document usage information.

Indexing: Crawls participant sites and catalogs documents.

As a result of crawling participant sites, the Autonomy product will provide the indexed document content and header data. The text of both the document and the header are made available to users in performing searches. After locating a desired document, the user can then use Autonomy to hypertext link to the document text file and/or image files for retrieval purposes.

7.1 System Description

This section describes the system providing its capabilities and other characteristics.

7.1.1 Top-Level View

The figure below shows the major functions in the center with external systems and users arrayed around the outside.

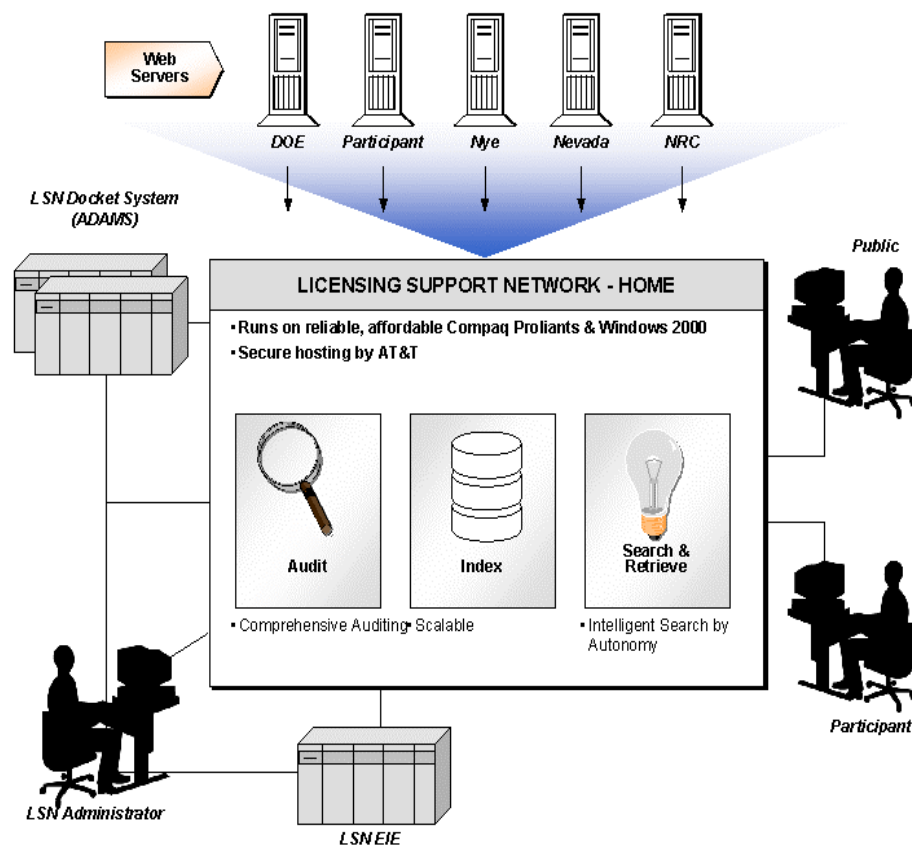


Figure 7.1.1-1. Top-Level View.

7.1.2 Functional and Operational Capabilities

Capability	User* Need Supported	Operator** Need Supported
Establish the LSN homepage.	√	
Connect the LSN homepage with the DOE document collection.	√	
Connect the LSN homepage with the NRC document collection.	√	
Confirm ability to link the LSN homepage with NRC's external ADAMS hearing docket.		√
Confirm ability to transfer electronic documents to each potential party.		√
Establish the LSN audit capability.		√
Connect the LSN homepage with the remaining parties.	√	
Activate linkage between LSN homepage and NRC's external ADAMS docket for the high-level waste repository licensing proceeding.	√	
Provide routine reports generated from the LSN audit capability.		√
Maintain Web site availability to exceed 99% of scheduled uptime.	√	
Monitor the integrity of participant collections and provide routine reports generated from the LSN audit capability.		√
Add not more than 11 calendar days to the three year licensing process due to system non-availability.	√	
Crawl participant sites, fetching participant data (documents, statistics, etc.) and store this data.	√	
Store both data to be processed and the results of that processing.	√	

Capability	User* Need Supported	Operator** Need Supported
Process the data retrieved, store the results of the processing, and generate the required reports.	√	
Process report outputs into formats appropriate for the delivery mechanisms described above, and assist a user in specification of on-demand reports.	√	
Include sub-elements include a firewall or firewall software, secure remote administration software, and intrusion detection software.		√
Monitor hardware and software and reports outages or sub-optimal operation.		√
Gather low-level statistics on network operation for trend and throughput analysis.		√
Provide appropriate environmental and power conditioning and implement disaster recovery mechanisms, i.e., a backup/restore capability.		√

* User = End user who performs search and retrieval only.

** Operator = A system operator who administers the system from either a technical or a functional point of view. An operator may run reports, monitor the use and performance of the system, perform maintenance of hardware and software, perform system backups.

7.1.3 System Characteristics

The LSN will have the following overall characteristics:

- It will be available 8 months prior to the License Application.
- It will be used for the entire three-year licensing period.
- It will contain or provide access to bibliographic header information, full text, and electronic images of relevant documentary materials that originated in electronic or paper form.
- It will provide a unique identifier, an electronically assigned accession number, to each document.
- It will contain only header information of materials that are not imaged or not available in electronic form.
- It will be an Internet-based system providing shared access to participants and the public alike, but will permit priority access to defined users at critical points in time.

- It will enable access to the LSN by casual Internet users through supported web browsers.
- It will link with the NRC's ADAMS docket system.
- It will assure the integrity of the documents as submitted to the system.

The LSN will have the following search and retrieval characteristics:

- It will include all hardware, software, and related processes to provide the full, required functionality of the LSN.
- It will allow users to search headers and text using a single interface.
- It will allow users to view the document text and images, although they reside on the participants' servers.
- It will allow searching structured and unstructured data through any combination of Boolean, root, wild card, frequency, and proximity searches.
- It will include a method of allowing the NRC to establish specialized collections of documents, as needed.

The LSN will have the following audit characteristics:

- It will provide all hardware, software, and related processes for the full-required functionality of an audit and compliance system that allows the LSN Administrator (LSNA) to monitor the performance and the activity of the participants' systems.
- It will enable the LSNA to ensure that the integrity of the documents is not violated once the documents are submitted to the system.
- It will monitor the addition, deletion, and modification of files stored on participant servers.

The LSN will have the following performance characteristics:

- It will provide a website that is continuously available, but designed for maximum performance during peak hours of 6:00 a.m. to 12:00 midnight, eastern standard time, Monday through Friday.
- It will be secure from hacking and from denial of service attacks.
- It will be hosted at a location external to the NRC and the hosting facility will have full-service capabilities for managing the LSN.

7.1.4 Reference Architecture

The below figure illustrates the architecture of the new components of the LSN. Existing components are the NRC's web-accessible official docket file for the proceeding and the NRC's Electronic Information Exchange (EIE) infrastructure. Any needed changes to these existing components are to be determined by the NRC. Changes to the NRC infrastructure are expected to be minimal.

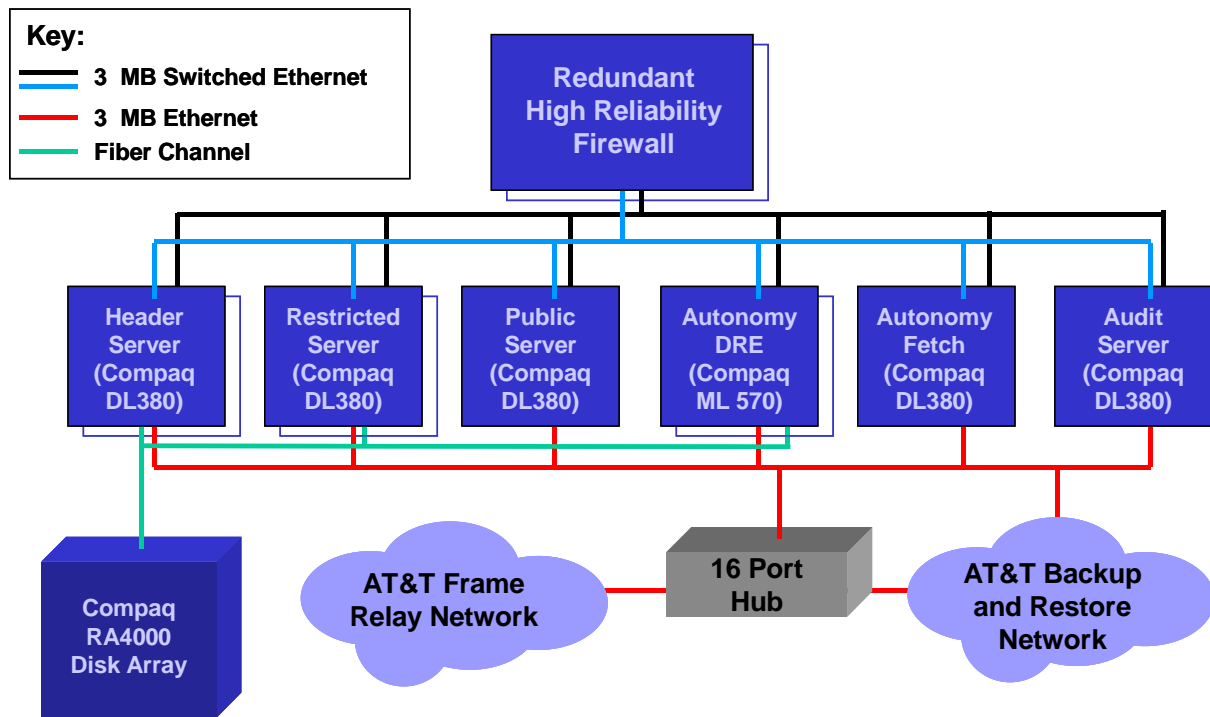


Figure 7.1.4-1. LSN Hardware.

7.1.5 System Interfaces

There are four components comprising the LSN's functionality.

An Internet-based method of accessing (search and retrieval) the records collections of the participants to the high-level waste repository licensing proceeding. Interfaces with the Internet and websites of the participants.

The Audit and compliance subsystem, including the automated tools and policies and procedures needed to monitor participant compliance with the availability and document integrity submission requirements found in 10 C.F.R. Part 2, Subpart J.

The Web-accessible official docket file for the proceeding. Interfaces to link to existing NRC ADAMS external collections, containing publicly accessible docket files will meet the docket requirements.

Electronic information exchange to support motions practice. NRC's Electronic Information Exchange (EIE) infrastructure will meet the Subpart J motions practice requirements. EIE

submissions are incorporated into and interface with the document indexing operations of the Secretary of the NRC (SECY).

7.2 System Environment

The Microsoft Windows 2000 operating system is installed on all LSN servers. The LSN servers are all Compaq Proliants. The break down of the Servers is shown on Figure 7.1.4-1, LSN Hardware.

7.2.1 Organizational Environment

The Atomic Safety and Licensing Board Panel (ASLBP) is the business sponsor of the LSN. The LSN will be designed, built, tested, monitored, and maintained by a combination of NRC and contractor staff as detailed in Section 7.3.5.

7.2.2 Operational Environment

The LSN is an Internet web portal that includes audit capabilities for the LSN Administrator. It will be deployed on the World Wide Web and is publicly accessible worldwide to any user with a current Web Browser. A current version Web Browser is defined as Internet Explorer version 4.0 or Netscape version 4.0 or later. Best performance is obtained using a more recent version such as Internet Explorer version 5.0 or Netscape version 4.7.

The AT&T Internet Data Center in Ashburn, Virginia, will provide the LSN hardware hosting. AT&T staffs the Network Operations Center (NOC) for the Internet Data Center and the Global IP Backbone with technicians that monitor the IP networks and Internet Data Center internal networks for overall network and bandwidth optimization, as well as bandwidth utilization 24 hours a day, 7 days a week. Technical support for AT&T Hosting is also available at all times through a toll-free hot-line (1-800-876-2373) and electronic mail access (noc@attens.com) for reporting World Wide Web server or network connectivity problems. This number can be used by anyone, but is only for problems/concerns pertaining to the Hosting site in Ashburn, Virginia, not for general networking issues.

7.2.3 User Environment

As the LSN is based on providing World Wide Web access to the combined participant collections, the system will be available to anyone who has access to the Internet using a current web browser. A current version Web Browser is defined as Internet Explorer version 4.0 or Netscape version 4.0 or later. Best performance is obtained using a more recent version like Internet Explorer version 5.0 or Netscape version 4.7. Representatives of the parties to the proceeding (key participants), of which there are approximately 500, are given priority access to

the LSN over other users. This is especially true during the discovery and motions practice phases. Priority users will enter LSN through a separate path and authenticate via a login page.

The LSN is accessible to visually impaired and otherwise disabled individuals. The User Interface to the system will be Section 508 compliant.

7.2.4 Development Environment

The development environment, located at GRCI, will involve creating a central web portal with a centralized search engine that will “crawl” the participant websites. The search engine will create an index of all participant documents and headers on the individual participant websites. Each document has a header associated with it. The headers point users to where a document is physically located on a Participant’s site and the participants site serves up the document.

The AT&T/GRCI team is following a package approach and a spiral methodology to developing the LSN. This approach will be based on integrating COTS products along with some development code to tie the system together. The glue that will tie things together is Visual Basic (VB Script). The code will be embedded on active server pages (asp). The scripting tool is Microsoft’s Visual InterDev tool. As software is developed, it will be reviewed with the NRC to demonstrate the status and progress leading up to production Release 1.0 on 10 September 2001. Project status and progress is reviewed during weekly and monthly meetings.

During design, several small prototypes may be developed to test and confirm parts of the design. For example, an early issue was whether Autonomy could handle structured data. The team configured Autonomy to index structured data, demonstrated it, and this is now used by Autonomy in their demonstrations.

A limited capability LSN site will be available in April 2001 and successively thereafter additional functionality will be added to it. Over the summer, several of the participant sites will be indexed and the quantity of documents will increase. As both sites and documents are added to the LSN system we will begin to exercise the other functions like auditing. As documents are added to the system developers and the Government will also begin to exercise the system. Additionally, the Government will invite selected Participants to use the system and capture their comments.

7.2.5 Project Management

The AT&T/GRCI team will conduct a monthly Program Management Review (PMR) held at GRCI as an internal project status review by GRCI Senior Management. The Project Manager is responsible for scheduling the PMR, or it can be event triggered based on senior management discretion. The following items are the minimum that will constitute an acceptable review:

- Status and discussion of open action items from prior review.
- Updated project schedule to indicate status of each work product, activity, and any modifications or re-planning made in accordance with the change management policy.
- Updated project estimates that include changes due to re-planning or change management activities.
- Monthly and cumulative cost budget versus the actual expenditures.
- Personnel planned versus actual personnel.
- Critical project needs, such as training, requirements, hardware, software, and facilities.
- Initial and updated size estimates (expressed for each work product or work product type)
- Updated risks, risk mitigation plans, and risk mitigation status with projected closure dates.
- Work Products List (PDAP, TIP, Weekly Reports, Test Plans, etc).
- QA, CM, Specific Problem Reports (SPR) and Change Request Logs.
- Project Profile Changes, such as methodology change.
- Metrics to include deviations from the baselined development schedule and activities, QA inspection defect measures, QA review action item measures, requirements tracking measures, risk status, and life-cycle effectiveness measures (e.g., testing effectiveness).

The Quality Assurance Lead (or designee) is responsible for documenting any action items identified during the review meeting. All action items will be tracked through completion and closure. If necessary, mitigating actions will be taken on any outstanding or potential program risks.

Weekly status meetings are conducted with the NRC Technical Project Manager. At these meetings management and technical issues are discussed along with a review of program staff activities for the week. The GRCI/AT&T Program Manager provides weekly and monthly status reports to the NRC Technical Program Manager.

7.3 System Operations

This section describes the operation of the system, including requirements, interfaces, and personnel requirements.

7.3.1 Operational Description

The three major functions provided by LSN are (1) auditing to ensure document integrity and report various performance metrics, (2) indexing participant sites, and (3) searching participant documents and returning search results to the requester. The site also presents a home page, along with other general World Wide Web content and provides additional administrative functions, such as controlling an access list of the priority participants.

The system will be accessible 24 hours a day, seven days a week but availability will be

optimized during the time period from 6:00 a.m. to 12:00 midnight, eastern standard time, Monday through Friday. Any down-time for maintenance, backups, upgrades, etc. will be scheduled outside of these core usage hours. The system will be hosted at the AT&T Data Center in Ashburn, VA. The Data Center will redundant support systems and is staffed on a full time basis to ensure continuous system availability. The system will be accessed from standard Web browsers as defined previously.

7.3.2 Significant Operational Requirements

See section 3.1.1, General Characteristics of Central LSN Site System.

7.3.3 Operational Interfaces

The primary system users are the staff of the NRC and the participant parties to the licensing process. They will access the system using standard Web browsers. Users will need to possess basic skills in the use of their browsers.

The AT&T hosting site has a staff trained in the monitoring and operation of the hardware installed at the hosting site. AT&T certifies the operators of the hardware and operating system software at the hosting site.

Software maintenance personnel will maintain the customized software developed to integrate the COTS software tools into the system. They will also be able to analyze and configure the Autonomy search engine. It is necessary to periodically check to verify the relevancy of the search results being returned. Periodic monitoring ensures that over time system performance does not degrade. Periodically solving potential problems reduces the likelihood of an emergency. While this can be done by a variety of means, generally this is done by analyzing Autonomy log file and sampling. For example, if Nye County added a document yesterday to their site, an engineer could conduct a search for a selected document knowing that it should be returned. If that document was not found, the engineer would after examining the file make an adjustment to the configuration file for the Nye County spider so that the file was returned. Even if everything is very stable and no new document has been added in awhile it is beneficial to periodically sample. These software personnel are described in the appendices to the contract and consist primarily of software engineers and database administrators.

The staff will also be able to access the computing hardware remotely using the frame relay capability of the AT&T hosting configuration. This is a secure point-to point connection.

Additionally, there are interfaces (crawling and linking to document files) that occur with external organizations and sources. The primary external interfaces are noted below. It is understood there may be other additions or modifications to the list. In addition to the following

primary external interfaces, the portal site will link to the NRC's EIE (for electronic motions) and ADAMS (for electronic docket) systems.

The current participant systems include:

- Department of Energy (DOE)
- Nuclear Regulatory Commission (NRC)
- State of Nevada
- Nye County, NV
- Clark County, NV
- Lincoln County, NV
- Eureka County, NV
- Churchill County, NV
- White Pine County, NV
- Esmeralda County, NV
- Lander County, NV
- Mineral County, NV
- Inyo County, CA
- Nuclear Energy Institute (NEI)
- National Congress of American Indians (NCAI)

7.3.4 Operational Scenarios

There are two major operational scenarios. The first scenario relates to user interaction with the system and the second relates to the LSN Administrator's management of the LSN Web Portal.

Users fall into two classes; the general public and the key participants in the LSN licensing activity. Both types of users will have complete access to only those documents that are not identified as proprietary or privileged by the participant who placed the document into the LSN. Regardless, all have headers.

User Interaction:

- A **category search** presents the user with a variety of categories of information from which to choose. A corollary example on the World Wide Web is using a search engine such as Yahoo. A user opening Yahoo may enter search terms in a search field, or the user may click on a topic that is pre-determined by Yahoo, such as *Arts and Entertainment*, *News*, *Computers*, *Buying*, etc. A user selects a topic and finds the relevant information in that category. While all users would be able to use this function, it is aimed toward the casual infrequent user. This capability will not be implemented due to the complexity in establishing categories in a highly diverse user group. However, this feature may be considered in future

implementations.

- The **site search** focuses on the repository and source for information. It allows a user to explore all documents that have been placed on the LSN by a specific participant. For example, a user would be able to see all documents placed on the site by Nye County.
- The **structured field** search enables the user to put search criteria in fields that mirror the header fields and narrow down a search to a specific document, or at least very few documents that meet the search criteria. This type of search is only possible when the user has some information about the document, such as the author name, title or date.
- The **full text** search capabilities allow the user to search for unstructured terms and the system will search for those terms using the logic presented in the search (e.g., Boolean operators), to locate the applicable documents.

Users may also use Autonomy to create **search agents** that monitor for a particular type(s) of document or a document that is similar to something a user has indicated an interest in. This is a capability given only to participants. Participants use the LSN on a regular basis, they are familiar with the system and search agents give them the capability to tailor their searches. This tailoring is important to the user because it allows them full control and provides the ability to train their agent. The information and interaction between the user and Autonomy provides more accurate search results. While all users have all search capabilities, only participants have the ability to create their own agents.

The LSN Administrator and LSN Staff interact with component subsystems such as the participants' servers and the LSN server site for collection of server activity associated with posting, modification, and deletion of text and image file activities, as well as server performance data, in responding to requests for files. The LSNA and LSN staff can also monitor the participants' document server performance for providing requested object files (e.g., document files) to system users upon request.

7.3.5 Personnel Requirements

7.3.5.1 Contractor Staff

Contractor support will be utilized for technical design and engineering. Additionally, contractor support will be used for ongoing maintenance and operations of the software, hardware configuration and associated infrastructure.

The contractor staff consists of a project manager, technical leads, and staff members from AT&T/GRCI and each of the teammate companies. Five task leads report to the project

manager—system architect, quality assurance, software development (including database) and integration, system test, and hosting services and support:

- The Task Leader is responsible for planning, directing, monitoring, and evaluating the activities of the staff described below. The task leader will report to the Project Manager and will provide the normal day-to-day operations of the staff throughout the phases of the design, development, and operation of the system.
- The Systems Architect is responsible for requirements analysis, logical and physical system design, and selection of COTS hardware and software products within the LSN architecture.
- The Quality Assurance Lead ensures that the work on the LSN project is performed to exacting standards for quality.
- The Software Development and Integration Lead is responsible for the overall implementation of the LSN. He works closely with the system architect to ensure an in-depth understanding of the system requirements, the selected COTS products are properly integrated, and to lead the team as it performs the detailed design, code, and unit testing of newly developed software. Coordinates with the Senior Database Analyst to ensure SQL2000 is properly configured with its associated tables, columns, and data.
- The System Test Lead is responsible for ensuring that LSN requirements are testable, for performing the test planning, and for system-level testing prior to turnover to the NRC for final acceptance testing. The system test group will support NRC throughout the period of acceptance testing to fix problems detected.
- The Lead for Hosting Services is responsible for planning and providing the hosting services for the LSN World Wide Web site and for providing support to maintain availability for search and retrieval from 6:00 a.m. to 12:00 midnight, Monday through Friday. He is also responsible for sustaining the World Wide Web application and its database as well as problem diagnosis and resolution. He has less than full-time technical support in the areas of software and database to handle problems that may arise.

GRCI/AT&T CONTRACTOR CORE TEAM Name and Functional Title	% Time Dedicated to LSN	
	Task 1	Tasks 2 and 3

Bradley, Larry – Project Manager	20%	85%
Lons, Woody – System Architect (Senior Analyst)	100%	25%
Kline, Jeanne – Quality Assurance Lead (Senior Analyst)	10%	40%
Weaver, Derek – Software Development and Integration Lead (Task 1 and 2 Lead)	100%	100%
Haigis, Kurt – Hosting Services and Support Lead (Task 3 Lead)	20%	40%
Kracke, John – System Test Lead (System Analyst)	20%	50%
Runge, Linda – Senior Software Engineer	20%	100%
Gazzale, Jim – Senior Database Analyst	50%	75%
Hobson, Charles – World Wide Web/Internet Expert	40%	75%
Maddock, Tom – Functional Expert (Senior Analyst)	80%	50%
Tayfun, Angela – Functional Expert (Senior Analyst)	100%	40%

7.3.5.2 NRC Personnel

The NRC staff consists of four Government employees assigned to manage the LSN. They are anticipated to be dedicated to the LSN for the duration of the effort through at least the completion of the construction authorization process sometime in FY 2006.

- The LSN Administrator serves as the LSN business project manager responsible for (1) coordinating and implementing LSN development by identifying and assisting in the resolution of technical and policy issues relating to the system, including analysis and evaluation of hardware and software system designs; and (2) overseeing LSN operations.
- The Senior Computer Systems Analyst serves as the lead system engineer and administrator. This individual will have privileges and accesses to the system. There is a frame relay back-end from the NRC to the hosting site in Ashburn, Virginia.
- The Senior Program Analyst will be dedicated to the development of information management policies and procedures, the overall audit program design and management, and internal training.
- Computer Systems Analyst/Programmer to act as a database specialist for the portal and audit systems and to maintain and operate the compliance audit system. This individual will have privileges and accesses to the system as determined by the NRC.

8 ACRONYMS

The following acronyms are used in this document.

Acronym	Definition
ADAMS	Agency wide Documents Access Management System
ASLBP	Atomic Safety and Licensing Board Panel
ASP	Active Server Pages
AT&T	American Telephone and Telegraph
CD	Computer Disk
C.F.R.	Code of Federal Regulations
COTS	Commercial Off the Shelf
CR	Change Request
DBMS	Database Management System
DNS	Domain Name System
DOE	Department of Energy
EIE	Electronic Information Interchange
FIP	Federal Information Processing
GRCI	GRC International
HTML	Hyper Text Markup Language
HTTP	HyperText Transfer Protocol
IP	Internet Protocol
LSN	Licensing Support Network
LSNA	Licensing Support Network Administrator
LSNARP	Licensing Support Network Advisory Review Panel
LSNTWG	Licensing Support Network Technical Working Group
MTA	Mail Transfer Agents
MUA	Mail User Agents
NOC	Network Operations Center
NRC	Nuclear Regulatory Commission

Acronym	Definition
NWPA	Nuclear Waste Policy Act
ODBC	Open Database Connectivity
PAP	Project Action Plan
PDAD	Project Definition and Analysis Document
PDF	Portable Document Format
PMR	Program Management Review
QA	Quality Assurance
QMS	Quality Management System
RAM	Random Access Memory
SDLCM	System Development Life-Cycle Management Methodology
SECY	Secretary of the NRC
SMTP	Simple Mail Transport Protocol
SOC	System Operations Concept
SPR	System Problem Report
SQL	Structured Query Language
SRS	System Requirements Specification
TIP	Tactical Integration Plan
TWG	Technical Working Group (of the LSN ARP)
URL	Uniform Resource Locator
VB	Visual Basic
WWW	World Wide Web or the Web
XML	Extensible Markup Language

9 REFERENCES

9.1 Statutes and Regulations

10 C.F.R. Part 2, Subpart J, Procedures Applicable to Proceedings for the Issuance of Licenses for the Receipt of High-Level Radioactive Waste at a Geologic Repository.

Workforce Investment Act of 1998, Rehabilitation Act Amendments of 1998, Section 508, Implementation.

Computer Security Act of 1987.

9.2 Technical Documents/Plans/Standards

System Development and Life-Cycle Management Methodology (SDLCM), Procedures Standards and Forms, Version 1.2, dated December 1999.

System Development and Life-Cycle Management Methodology (SDLCM), Handbook, Version 2.2, dated December 1999.

Business Case Analysis for the Licensing Support Network (LSN), Prepared by the Atomic Safety and Licensing Board Panel, April 6, 2000.

9.3 Standards

The standard for network access shall be HTTP/1.1 [<http://www.faqs.org/rfcs/rfc2068.html>] over TCP (Transmission Control Protocol, [<http://www.faqs.org/rfcs/rfc793.html>]) over IP (Internet Protocol, [<http://www.faqs.org/rfcs/rfc791.html>]).

The standard for associating server names with IP addresses shall be the DNS (Domain Name System), [<http://www.faqs.org/rfcs/rfc1034.html>] and [<http://www.faqs.org/rfcs/rfc1035.html>].

The standard for World Wide Web page construction shall be HTML version 4.0 [<http://www.w3.org/TR/REC-html40/>].

The standard for electronic mail (e-mail) exchange between e-mail servers shall be SMTP (Simple Mail Transport Protocol, [<http://www.faqs.org/rfcs/rfc821.html>]).

The standard for the format of an electronic mail message shall be per [<http://www.faqs.org/rfcs/rfc822.html>] optionally extended by MIME (Multimedia Internet Mail Extensions) per [<http://www.faqs.org/rfcs/rfc2045.html>] to accommodate multimedia e-mail.

The standard for Latin character sets shall be ISO/IEC 8859-1.