

2 COST / BENEFIT / RISK ANALYSIS

This section identifies the costs, benefits, and identifiable risks associated with the project as a whole and with each of the alternatives.

2.1 Summary

The elements of benefit and risk were identified by the LSNARP TWG in its deliberations and were allocated either to the NRC, as the sponsor of the system, or to the participants in the licensing proceeding, as follows:

To NRC:

- Schedule Risk to LSNA Having the LSN Operational to Support Licensing
- Implementation Complexity Risk to LSNA
- Ability for LSNA to Exercise High Level of Control
- Ability for LSNA to Ensure Overall Configuration Performance
- Overall Cost for NRC to Develop

To Participants:

- Participant Burden to Exercise Controls
- Participant Burden to Ensure Performance
- Schedule Risk to Participants' Having Systems Operational to Support Licensing
- Implementation Complexity Risk to Participants
- Cost Burden to Participants

To NRC and Participants:

- Availability to Users
- Response Time Performance
- User Flexibility to Tailor Desktop/Interface
- Ease of Use

Risk elements are the most salient findings of our analysis and include schedule, efficiency and effectiveness, cost to the participants, LSN audit tools, and the ability to quickly scale the system in response to presiding officer decisions regarding system operation.

Schedule -- LSN implementation cannot ensure that the agency will meet the three-year license proceeding schedule, but without the system it is generally considered that this objective cannot be met. Moreover, there is little room in the schedule between projected implementation and actual use of the system to meet hearing process milestones. In this regard, the negative legal and political ramifications associated with the system not being available as scheduled are significant. For example, total unavailability of the system may force the entire discovery process to be conducted in a paper-based mode.

Conversely, a system which requires little customization, is designed as a web-based tool rather than a “webified” corporate computer resource, and has all the tools associated with identifying and “crawling” existing legacy systems decreases the risks associated with being able to deploy the system on a timely basis.

Efficiency & Effectiveness -- The technology used for the system must ensure that it provides the tools necessary for participants’ litigation and technical staff to perform a thorough technical review of the license application. Deficiencies in the information management process could become the target of time-consuming disputes that place the three-year schedule objective at risk.

The organization, terminology and acronyms, numbering, and reference structures of a participant’s collection are all unknowns to an outside individual who wishes to access that collection. Given the potential size of the DOE collection of relevant materials, inadequate access tools will rapidly emerge as a significant system constraint that should be identified and avoided. A system that:

- provides powerful search and retrieval tools for both structured (database) and unstructured (text) data,
- normalizes the data so that it is consistent,
- features adequately scaled hardware and software, and
- includes comprehensive security, backup and recovery capabilities

decreases risks associated with the system not being useful during the pre-hearing and hearing phases of the process.

Cost to Participants -- To a large extent, the decision about design alternative implementation will govern the threshold resources for participation by potential participants who petition to intervene. The Internet affords an opportunity for setting relatively low thresholds for making documents available. However, time-consuming, difficult-to-use participant systems, or participant sites with deficient search and retrieval tools, place poorly funded parties at a distinct disadvantage. Well-funded and staffed organizations will simply apply greater resources to obtain superior information assets in order to compensate for poorly designed sites.

Audit Tools -- The system implemented must provide the LSNA with the tools necessary to identify and coordinate resolution of problems with data and document integrity.

Scalability -- The overall design approach implemented must be adaptable to fluctuations in the volume of data and number of users attempting to access the system. Wide variations in the DOE document holdings have been reported and the number of users attempting to access the system during the licensing proceeding could be extremely large given the high visibility and public interest in the Yucca Mountain repository program.

2.2 Objectives

This business case analysis suggests the best solution for:

- meeting the project requirements and objectives of facilitating the NRC's ability to comply with the three-year schedule for decision on the high-level waste repository construction authorization,
- providing an electronic environment that facilitates a thorough technical review of relevant documentary material by participants,
- ensuring equitable access to the information for the parties to the hearing, and
- ensuring that document integrity is maintained during the duration of the licensing proceeding.¹⁰

The LSNA's extensive contractor-supported research into emerging web technologies, in conjunction with the intensive system analysis and evaluation of technical staff representing the parties and potential parties, assures that all reasonable system architectures have been considered, resulting in a sound business and technical solution.

Each alternative was studied in terms of project cost, benefit, and risk.

2.3 Background

ASLBP and the LSNA utilized the resources of the LSNARP TWG and of support contractor, Labat-Anderson, Inc., in developing alternative strategies and characterizing the costs, benefits, and risks associated with those alternatives.

The three alternatives were evaluated with project costs that include necessary hardware and software acquisition, integration, and implementation. Costs were measured in constant dollars. Additionally, this evaluation includes consideration of the costs that might be incurred by NMSS and OCIO in their capacities as licensing proceeding participant and custodian of the ADAMS document and records environment, respectively. Additionally, the cost analysis identifies the expenses that might be incurred by the non-NRC stakeholders as an element of overall cost of the system.

¹⁰ Under current practice, discovery document production materials (as opposed to interrogatories or other discovery materials) need not be supplied to the agency. Assuming Option 5 is not adopted, it would seem that once all court actions relative to both the repository construction authorization (CP) and operating license (OL) are over and the possibility of a remand to the agency no longer exists, the LSN could be "disbanded."

Note that 10 CFR, Part 2, Subpart J speaks in terms of the license "to receive and possess," which under existing Part 60 and proposed Part 63 arguably includes the additional proceeding on the subsequent updating of the CP application to incorporate the information necessary to get OL authorization "to receive and possess." The existing DOE/NRC schedule for action on the HLWR OL extends past the time frame for LSN operations regarding the CP process. Indeed, the three-year hearing completion mandate in NWPA section 114(d) applies only to the CP process.

Costs, benefits, and risks are ranked (based on the likelihood that an individual risk or benefit will occur) to allow for overall comparison. Summaries of the project costs are included in Section 2.6.1 and details are included in Appendix B (Cost Estimates). Project benefits include both quantitative and non-quantitative benefits. The summary of the project benefits is included in Section 2.6.2 and details are included in Appendix C (Benefits). The risks associated with being able to successfully meet the project requirements were examined for each alternative. The summary of the project risks are included in Section 2.6.3 and details are included in Appendix D (Risks).

Section 2.4 presents the assumptions underlying the analysis of the project alternatives for LSN. Section 2.5 briefly reviews the project alternatives. Section 2.6 presents a comparison summary of the project costs, benefits, and risks for each of the alternatives. Section 2.7 presents a comparison of the project requirements for each of the alternatives. Section 2.8 discusses the return on investment for the proposed alternatives. Section 2.9 presents a sensitivity analysis for the proposed alternatives. Finally, Section 2.10 proposes a recommendation for the LSN system.

2.4 Assumptions

The following assumptions apply to this document:

- The LSN must be implemented by July 2001.
- If DOE announces a delay in submitting its license application to NRC, this will not affect the need to implement the LSN by July 2001 because availability of the system is keyed to the date of the DOE site recommendation rather than submission of its license application.
- An automated system is necessary to meet the scheduled three-year licensing process.
- The system will be web-based.
- The system will use a browser-based user interface.
- Parties and potential parties noted in Section 1.5 could increase or decrease in number.
- The life-cycle analysis is a six-year fiscal period from mid FY 2000 through the end of FY 2005.
- Data volumes are a significant factors in determining whether a proposed hardware and software architecture will be “efficient and effective.”
- As a result of conflicting DOE representations over the past year, there could be significant variations in the number of documents DOE will make available. The high-end count reflected in this document represents a conservative approach to both system design and project costing.

- Participants are responsible for publication of their documentary collections under all alternative designs, and includes the responsibility to create and operate a web site.
- All evaluated alternatives rely on NRC's EIE capability to submit digitally signed materials to the docket. Digital signature certificates will be provided by NRC at no charge to the participants and a sufficient quantity of licensed certificates will be available to support the licensing activity.
- All evaluated alternatives rely on using NRC's ADAMS external server to make available to the public and to the parties a folder containing the official docket for the licensing proceeding.
- OCIO will successfully address issues associated with public access to the external collections of ADAMS.
- NRC compliance as a participant is outside the scope of ASLBP's responsibility for LSN design and implementation.
- Participants will adhere to the use of mutually-acceptable standards for text and image file formats, relational databases, communications protocols, and bibliographic header structures.

2.5 Description of Alternatives

Two alternatives - - Alternatives 2 and 4 - - characterized by the LSNARP TWG are not included in this analysis because there was no participant support for Alternative 2 and the participants were affirmatively and unanimously against Alternative 4.

Alternative 1

Alternative 1 is characterized by an LSN homepage that points end-users to the web accessible documentary collections of each of the participants. The LSN homepage adds no value to the inherent information management capabilities found at any of the participant sites.

File formats are specified to facilitate moving files across the Internet and provide rudimentary viewing capabilities inherent in the most commonly used browser software.

The LSN Site -- Acts as a pointer to other home pages. In this alternative, it provides no search and retrieval or file delivery processes to any user. The LSN web page will provide information gleaned by the LSNA audit process regarding documents that participants may have updated at their sites. The LSN web page additionally will provide pertinent information about the performance of the participants' external servers, such as the number of search and retrieval sessions, the number of text or image files sent in response to queries, and the response time experienced at each server. The LSN web page will be used to post announcements about the overall LSN program or items of interest (hours of availability, scheduled outages, etc.) for the participant sites.

The Docket -- The docket for the HLW licensing proceeding is housed on NRC's ADAMS external collection server. The LSN web page carries a direct link to the ADAMS docket collection and access is via the ADAMS web interface available at that time.

Electronic Submission & Motions Practice -- Accomplished by use of NRC's Electronic Information Exchange infrastructure capability.

Participant Textual Documents -- A participant web site provides the sole search and retrieval tools to access its text documents. Participants may use any software of their choosing to provide text search and retrieval, and those packages may represent a wide range of capabilities from minimal to fully featured.

Participant Image Materials -- When documents are non-textual, image files are to be made available. When searchable full text is available and no image is required to be online, Subpart J requires that users be provided with information that indicates where an image version of the document may be acquired.

Participant Structured Header Data -- Subpart J could be interpreted by participants to require only the availability of bibliographic header information but that it does not specify that this must be maintained under DBMS control at the participant site. These bibliographic header records (or meta-tagged text) would be available for downloading should another party wish to build a DBMS to provide standard search, retrieval, sorting, and reporting capabilities in support of their activities. Therefore, the minimum capability assured for a user is that structured data is searchable via the participant-provided full text searching capability, leaving it to the users to build their own bibliographic header search and retrieval capability via downloaded data. If participants elect to provide bibliographic headers under control of a DBMS, participants could provide this capability with a wide range of software products that could be different at each participant site.

Additionally, providing a unique LSN accession number will be the responsibility of the parties. This could be accomplished by utilizing LSNA assigned blocks of unique accession numbers that the participants would assign to their document collections.

Auxiliary functions -- Sorting, printing, finding terms within text, etc., are all the responsibility of the user who retrieves raw text or image files, and are entirely dependant on the tools available to the user.

LSNA Audit Capability -- Because of the distributed nature of this architecture, and because the participant sites are entirely under the control of the participants or their service provider, the LSNA audit capability would be a fully featured hardware and software environment capable of "crawling" participant sites, characterizing (to the byte level) all structured and unstructured data located at that site, establishing a snapshot at defined points-in-time as baselines, and then routinely "recrawling" those sites and comparing new findings against the previous baseline. Crawled data is organized and identified in underlying database environments for structured data and indexes to unstructured data located at a "crawled" location. Data in the underlying databases is

subjected to software evaluation and the findings are submitted to additional software to analyze the findings, compile the data, and generate meaningful reports at both macro- and micro-levels.

Costs of an audit capability independent of the tools used for a portal were examined by ASLBP's support contractor, giving careful consideration to the audit system functional requirements. Significantly, it found that the process of "crawling" sites, organizing data from those crawled sites, and baselining this audit and compliance information is essentially the same functionality that the portal search and retrieval software provides in Alternatives 3 and 5 to support centralized search and retrieval through a single portal interface. Fully featured software tools and packages that supported document collection characterizations have all evolved into portal "back ends" and are not generally available as standalone (or, if they are, with no price break for reduced functionality). For the purpose of Alternative 1, the portal front-end search and retrieval capabilities are just an unused feature provided with our required audit package.

Alternative 3

Alternative 3 is characterized by an LSN homepage developed using portal software technology. Web portals represent a fully featured hardware and software environment capable of "crawling" participant sites, characterizing (to the byte level) all structured and unstructured data located at that site, establishing a snapshot at defined points-in-time as baselines, and then routinely "recrawling" those sites and comparing new findings against the previous baseline. Portal software adds significant value to the inherent information management capabilities found at any of the participant sites.

File formats are specified to facilitate moving files across the Internet and provide rudimentary viewing capabilities inherent in the most commonly used browser software.

The LSN Site -- Under a portal architecture, the LSN would organize and identify the contents of participant collections in its own underlying database environment for structured data and would index unstructured data located at a "crawled" location. The portal software utilizes these underlying databases to respond to search queries with lists of candidate documents that are responsive to a user's request. When the user seeks to retrieve the file, the portal software directs the request back to the original source (participant) collection server that directly delivers the file back to the user. Portal software provides a single user search interface rather than requiring users to learn the search and retrieval commands from each different site. Portal software contains underlying data dictionaries that "interpret" how data was stored in the participant servers and presents it to the user as "normalized." Portal software also assigns a unique identifying number to each file located at a crawled site.

The LSN web page would also provide information gleaned by the LSNA regarding documents the participants may have updated at their sites. The LSN web page would additionally provide information about the performance of the participants' external servers such as the number of search and retrieval sessions, the number of text or image files sent in response to queries, and the response time experienced at each server. The LSN web page may be used to post announcements about the overall LSN

program or items of interest (hours of availability, scheduled outages, etc.) for the participant sites.

The Docket -- The docket for the HLW licensing proceeding is housed on NRC's ADAMS external collection server. The LSN web page carries a direct link to the ADAMS docket collection and access is via the ADAMS web interface available at that time.

Electronic Submission & Motions Practice -- Accomplished by use of NRC's Electronic Information Exchange infrastructure capability.

Participant Textual Documents -- Each participant web site acts as a file server to deliver to Internet users the text documents responsive to a query found through a search at the LSN website.

Participant Image Materials -- When documents are non-textual, image files are to be made available. When searchable full text is available and no image is required to be online, Subpart J requires that users be provided with information that indicates where an image version of the document may be acquired.

Participant Structured Header Data -- The LSN portal architecture utilizes its own index to deliver structured search and retrieval of header information it finds at a participant site. This eliminates any concern about bibliographic header information being made available without a search and retrieval mechanism.

Auxiliary functions -- Sorting structured data files and finding terms within text are provided by the portal. Print capabilities are contingent on the user's desktop capabilities.

LSNA Audit Capability -- The LSNA would utilize all of the information collected by the portal "crawlers" and stored in the portal's databases as the underlying data against which audit analyses would be performed. Data in the portal's underlying databases is subjected to software evaluation and the findings are submitted to additional software to analyze the findings, compile the data, and generate meaningful reports at both macro- and micro-levels.

Alternative 5

Alternative 5 is identical to Alternative 3, with two enhancements. First, when the portal software "crawls" participant sites it also copies each file that it locates onto a very large storage unit on the portal site. Second, a cache is placed in the system architecture at a high-speed location, right at the entrance to "big bandwidth."

The LSN Site -- Identical to Alternative 3 except that (1) when the user seeks to retrieve the file, the portal software delivers the document to a user from the copy maintained on the LSN's very large storage unit; and (2) the cache is provided with high-capacity bandwidth under the control of the LSNA. Participant servers' versions of the document serve as backup copies should the LSN site become inoperative.

The Docket -- Identical to Alternative 3.

Electronic Submission & Motions Practice -- Identical to Alternative 3.

Participant Textual Documents -- Participant web sites act as backup storage devices should the LSN site become inoperative.

Participant Image Materials -- Identical to Alternative 3.

Participant Structured Header Data -- Identical to Alternative 3.

Auxiliary functions -- Identical to Alternative 3.

LSNA Audit Capability -- Identical to Alternative 3.

2.6 Summary of Costs, Benefits, and Risks of Alternatives

The analyses generated by the TWG have been given considerable weight in arriving at the costs, benefits, and risks associated with each of the alternatives. Additional analysis has been performed that reflect input from the most affected organizations within NRC. For example, procurement and acquisition risks represent the LSNA's evaluation of schedule impacts on timely and successful placement of a procurement vehicle within the NRC business context and vendor responsiveness. Input from NRC's Office of the General Counsel and from ASLBP management on whether technical solutions are defensible as efficient and effective is factored into evaluation of risk associated with user acceptance.

In summary, the sponsoring office and the LSNA characterize Alternative 1 as being:

- of low benefit in delivering efficient or effective access to users,
- comparable in risk to Alternatives 3 and 5,
- approximately ■■■■ less costly than Alternative 3 and ■■■■ less costly than Alternative 5 are to NRC,
- but with the highest cost burden shifted to the participants.

Alternative 3 is characterized as:

- adding significant qualitative value over Alternative 1,
- being somewhat less beneficial than Alternative 5,
- incurring somewhat lower degree of risk than alternative 5, and
- being the least expensive solution recommended by the LSNARP TWG at almost ■■■■■■■■ less cost to NRC than Alternative 5.

Alternative 5 is characterized as:

- adding significant qualitative value over Alternative 1,
- the highest benefit,
- the lowest availability and performance risk, but
- the greatest risk of not meeting the implementation schedule, and

- the highest cost of all solutions examined, with NRC bearing a significant share of that cost burden.

There are two remarks to be made regarding the risks associated with Alternative 1. The first is that this alternative was not recommended by the technical representatives of the members of the LSNARP and is included in the analysis primarily because some of the voting LSNARP members demonstrated support for it.

The second consideration is that from the perspective of ASLBP management, this alternative creates a significant risk that system implementation and operation issues may result in disputes whose resolution could impact negatively on the agency's ability to meet its three-year schedule for making a decision on repository construction authorization.

2.6.1 Comparison of the Estimated Costs

Comprehensive cost comparison tables for the total system life cycle cost (TSLCC) of each alternative are presented in APPENDIX B. None of the analyses include the participant cost of document conversion, which is a widely variable cost based on volume, current state of automation, etc.

There are two identifiable discriminators between the alternatives evaluated. The first discriminator is in hardware costs. In the current computer marketplace, analysis shows that the aggregate cost of either Alternatives 1 or 3 would be lower than Alternative 5 due to the availability of commodity computers at extremely low prices. The larger, data center machines required by Alternative 5 generally cost significantly more than the equivalent computing power in commodity machines.

The second dynamic is the cost that would be incurred by the participants -- between ■■■■ and ■■■■ million higher for Alternative 1. There is a very large number of underlying cost drivers associated with this alternative and, because of the large number of participants, there is a much higher multiplier being applied (i.e., "times 15 participants"). To cite just a few, Alternative 1 relies on the participants to meet availability expectations by more extensive backup and recovery -- without affecting search availability -- whereas in Alternatives 3 and 5, the portal site search capability provides search and retrieval redundancy. Alternative 1 relies on the participants to meet performance and response time parameters in both search and retrieval and file delivery, whereas in Alternatives 3 and 5, the participant machines are relied on only for file delivery. For Alternative 1, this means the participants must provide larger and faster servers to handle multiple tasking and the participants are relied upon to provide larger bandwidth access in order to support the web traffic associated with both search and retrieval and file delivery. In DOE's case, their Chief Information Officer has translated this into an increased cost of ■■■■■■.

Additionally, once implemented, NRC and participant recurring costs stabilize because the systems have been sized to maximum capacity. The least participant impact is on NRC because ADAMS meets all three alternatives and represents already expended "sunk-costs."

Finally, even though Alternative 1 represents an initial, minimal NRC expense for the development of the homepage linking to other participant sites, it still requires a significant system development effort in order to establish an audit and compliance capability.

Alternative 1	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	TSLCC
Project Non-Recurring	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Project Recurring	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Participant Recurring & Non-Recurring	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Total	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■

In Alternative 3, the dynamic is that the cost for the audit and compliance system is, for the most part, absorbed by the core capabilities of the search and retrieval portal software. Therefore, search and retrieval introduces relatively modest additions to project related non-recurring costs.

Alternative 3	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	TSLCC
Project Non-Recurring	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Project Recurring	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Participant Recurring & Non-Recurring	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Total	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■

Quantitatively, the largest discrimination is evidenced in the impact of implementing Alternative 5. This alternative has the ability to somewhat reduce costs to the participants because they only make files available without providing search and retrieval, and those files do not need to be maintained at the participant sites after they have been copied into the LSN mass storage and gone through a backup cycle.

Conversely, Alternative 5 increases both one-time and recurring costs to the NRC because of the added cost of storage hardware and associated hardware maintenance. In Alternative 5, the recurring costs escalate primarily because of the hardware and software maintenance fees associated with the addition of more than ■ ■ ■ ■ ■ million in initial hardware. In contrast, there is an associated decrease in the projected cost to participants relative to Alternative 3.

Alternative 5	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	TSLCC
Project Non-Recurring	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Project Recurring	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■

Participant Recurring & Non-Recurring	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■
Total	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■	■■■■■

The following table characterizes the impact of the design alternatives on the participants:

Quantitative - Cost Burden on Participants			
	Alternative 1	Alternative 3	Alternative 5
Investment-Web Server	■■■■■	■■■■■	■■■■■
Annual Maintenance and Operations	■■■■■	■■■■■	■■■■■
Annual Communications	■■■■■	■■■■■	■■■■■
Life Cycle Total	■■■■■	■■■■■	■■■■■

Not included in this table is the operational cost to SECY for intake (cataloging) processing costs of the documents that will be added to the docket file. It is estimated that approximately 17,200 documents per year over the three year time frame will be processed at an annual cost of ■■■■■ per year. Thus, including SECY's annual operating expenses related to the docket intake process adds ■■■■■ million to the participant cost burden numbers in the table above.

2.6.2 Comparison of the Benefits

The following tables compare the benefits associated with each alternative. Qualitative evaluations for each of the three alternatives are presented below. A detailed discussion of the benefits of the Alternatives is presented in APPENDIX C.

Non-Quantitative Benefit			
Rating: 1 - High level of benefit 2 - Medium level of benefit 3 - Low to no level of benefit	Alternative 1	Alternative 3	Alternative 5
Ability for LSNA to Exercise High Level of Control	3	2	1
Ability for LSNA to Ensure Overall Configuration Performance	3	2	1
Reduced Participant Burden to Exercise Controls	3	2	1
Reduced Participant Burden to Ensure Performance	3	2	1
Reduced Participant Need to Provide Computer/Expertise	3	2	1

Non-Quantitative Benefit			
Increased User Flexibility to Tailor Desktop/Interface	3	1	1
Increased Ease of Use	3	1	1
Ability to Ensure Unique and Uniform Document Numbering	3	1	1
Improved Consistency of Search Results	3	1	1
Ability to Ensure Required System Availability	2	2	2
Ability to Provide Required Response Time and Performance	3	2	1
Ability to Provide Priority Access	3	1	1
Average Benefit Rating	2.9	1.4	1.0

2.6.3 Comparison of Risks Associated with Alternatives

The following table compares the benefits associated with each alternative. Detailed discussion of the risks is presented in APPENDIX D.

Non-Quantitative Risk			
	Alternative 1	Alternative 3	Alternative 5
Rating: 1 - High level of risk 2 - Medium level of risk 3 - Low to no level of risk			
Volatility of Requirements (Ability to Accommodate Change)	1	2	2
Scope of Project (Ability to Accommodate Change)	1	2	2
Technical Risk (Implementation Complexity)-LSNA	3	2	2
Technical Risk (Implementation Complexity)-Participants	3	2	3
Management Consensus	2	2	2
Resource Commitment	3	2	1
Potential Resistance (By Users)	1	3	2
Procurement/Vendor Risk	2	2	1
Sponsor Organization's IT Project Management Experience	3	3	3
Schedule Risk-LSNA	3	2	1
Schedule Risk-Participants	2	2	2
LSNA Custodianship of Participant Documents	3	3	1
Average Risk Rating	2.3	2.2	1.8

2.7 Requirements Comparison of Alternatives

All three Alternatives are capable of meeting core functional requirements to provide access to documents. The TWG believed that neither Alternative 1 nor Alternative 2 provided the functionality to allow either to be effectively used as a legal discovery tool. That analysis was performed against a 1995 version of the LSS functional requirements. The high level LSN functional requirements have been restated to reflect a web-based solution and Alternatives 1 and 2 can be made to meet the functional requirements, with some adaptations and manual effort on the part of the participants. Effectiveness as a discovery tool is still a concern to NRC legal staff.

Therefore, no exceptions are taken to any of the alternatives being able to meet all the functional requirements noted in APPENDIX A. The degree to which the alternatives are successful in doing this, and adding value to that process, is outlined in the above discussions of benefit and risk. As noted above, Alternative 1 introduces human intervention into the process of assigning an enterprise-wide, unique LSN control number, but the functional requirement can still be met.

2.8 Return on Investment

There are two perspectives on the prospects for return on investment associated with this project.

In the first perspective, in response to a congressional mandate that has been reflected in the agency's own regulatory requirements, the system is intended to help address hearing process time constraints by speeding the discovery process. It accomplishes this in the context of an agency licensing activity that is highly political, has high visibility, and involves issues of national significance. Accordingly, NRC must demonstrate its ability, resolve, and competence in conducting the Yucca Mountain licensing proceeding. Placing a monetary value on NRC credibility, as "the return," nonetheless may not be a meaningful exercise.

From the second perspective, there are identifiable monetary savings to ratepayers who contribute to the Nuclear Waste Fund that can be impacted by an expeditious licensing hearing. In this context, the LSN Return on Investment (ROI) analysis is based on a precedent used in the original LSS authorization: cost avoidance to the utilities.

1. The original LSS cost benefit analysis performed by DOE was presented to OMB's Office of Information Resources Management (as a Presidential Priority System) in late 1989 and early 1990 and was justified by comparing the cost of the system versus the costs incurred by having to add at-plant storage which might be incurred as a result of delays in opening the repository. Mr. Jack Arthur of OMB found this approach persuasive and DOE was allowed to go forward with its LSS design work.
2. In congressional testimony in early 1999, industry officials indicated that the costs of adding storage capacity in lieu of the Yucca Mountain repository being ready to receive waste shipments was \$4.3 billion over an eight-year period -

roughly \$537 million per year (constant dollars) in additional costs to the ratepayers. The same costs could be attributed to not having the LSN implemented on time, or its ability to accomplish its mission of ensuring the hearing process is completed in the mandated three years.

Therefore, the Alternative 3 life cycle cost of a ■■■■ million investment against a risk of incurring an annual \$537 million levy against ratepayers means that if the LSN accomplishes its mission, it saves ■■■■ million the first year it reduces at-plant storage, for an ROI of ■■■■ (i.e., ■■■■ X the agency and participant investment).

The Commission's most contentious reactor proceeding took almost eight years. If the HLW repository proceeding is commensurate, then there is a 5-year period of storage cost avoidance rather than one year of saving annual storage costs incurred by the utilities amounting to \$2.678 billion. This represents an ROI of ■■■■ (e.g., ■■■■ X the agency and participant investment).

Alternative 1, with a TSLCC of ■■■■ saves ■■■■ for one year (■■■■) with comparable magnitude increases for a five year analysis.

Alternative 5, with a TSLCC of ■■■■ saves ■■■■ million for one year (■■■■) with comparable magnitude increases for a five year analysis.

2.9 Sensitivity Analysis

Sensitivity analyses were performed to examine the costs associated with establishing the LSN search and retrieval and audit servers (for Alternatives 3 and 5 only) at locations off the NRC Headquarters campus location. These analyses focus on two potential resources.

The first is the use of an ISP (Internet service provider), which is a company that provides individuals and other companies with access to the Internet and other related services such as Web site building and hosting. An ISP has the equipment and the telecommunication line access required to have points-of-presence on the Internet for the geographic area served. The larger ISPs have their own high-speed leased lines so that they are less dependent on the telecommunication providers and can provide better service to their customers. Among the largest national and regional ISPs are AT&T WorldNet, IBM Global Network, MCI, Netcom, UUNet, and PSINet. They also include thousands of local providers. In addition, Internet users can also get access through online service providers (OSPs) such as America Online and Compuserve.

The larger ISPs interconnect with each other through MAEs (MAE is not an acronym, it is the name for 'ISP switching centers run by MCI WorldCom') or similar centers. The arrangements they make to exchange traffic are known as peering agreements. An ISP is also sometimes referred to as an IAP (Internet access provider). ISP is also sometimes used as an abbreviation for independent service provider to distinguish a service provider that is independent and separate from a telephone company.

The second potential resource is the University of Nevada Las Vegas (UNLV). Congress, in the FY 1989 appropriations bill for DOE, included language that designated UNLV as the site of the

LSS.¹¹ ASLBP is pursuing the idea of locating the system offsite at UNLV, with an underlying assumption that a contractual or grant arrangement could be satisfactorily negotiated under the umbrella of the design and implementation contract. The practicability of this approach is also contingent on determining that an educational institution can propose availability, backup, and recovery plans that meet A-130 criteria. It is anticipated that the cost effectiveness of this approach would be demonstrated in the competitiveness of contractor teams' bids.

The results of the sensitivity analyses indicate that establishing the LSN in an operational setting external to the NRC White Flint campus is more cost beneficial than operating it here by ■■■■ over the life cycle for Alternative 3. Complete sensitivity analyses for Alternatives 1, 3, and 5 are included in APPENDIX B.

2.10 Recommendations

The LSNA, with concurrence of ASLBP management, recommends against pursuing Alternative 1 because:

- It was not recommended by the LSNARP TWG.
- Alternative 1 falls short in providing assurances that access is efficient and effective to the users.
- Alternative 1 requires human intervention in the process of assigning enterprise-unique LSN accession numbers.
- Alternative 1 relies on the participant sites to provide some level of priority access to the collections during the hearing process.
- It requires development of an audit and compliance capability that is essentially the same product suite and the same level of development effort required in Alternatives 3 and 5, yet provides no added value to a user's ability to search and retrieve documents in an efficient and effective way.

The LSNA, with concurrence of ASLBP management, recommends against Alternative 5 because, while it offers more assuredness of performance and document delivery, it:

- Has initial costs to NRC almost double those of Alternative 3, which fulfills the same number of functional requirements as Alternative 5.

¹¹ Language in the Conference Report on H.R. 4567 for FY 1989 DOE appropriations bill provided " . . .that the University of Nevada/Las Vegas be designated as the site of the computer facility that would incorporate both the LSS and independent records management system of other potential participants." 134 Cong. Rec. H4617.

This language, arguably, as part of an appropriations bill gives only a "snapshot" in time; there has been no subsequent affirmation of this view nor a statement of the current congressional view. Moreover, the appropriations bill directed DOE to place the LSS at UNLV, but NRC has always been designated as having responsibility for locating the site for and operating the system. At this juncture, it seems apparent that no site has been identified until such time as NRC specifically makes a statement on the location for the system.

- It places the LSNA in a position of being accountable for the availability, accuracy, integrity, and custodial chain of participants' discovery materials.

The LSNA, with concurrence of ASLBP management, recommends Alternative 3 with a configuration established at an external location because it:

- Is the lowest cost of the two Alternatives endorsed by the LSNARP TWG.
- 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.
- Ensures equitable access to the information for the parties to the hearing.
- Ensures that document integrity has been maintained for the duration of the licensing proceeding.
- Most consistently provides the information tools needed to organize and access large participant collections.
- Features adequately scaled and adaptable hardware and software.
- Includes comprehensive security, backup, and recovery capabilities.

Recommended Alternative

The LSNA, with the concurrence of ASLBP management, recommends implementation of Alternative 3, anticipating installation at a location off the NRC headquarters campus.