

**From:** Dan Graser  
**To:** ARP\_Materials  
**Date:** Wed, Feb 16, 2000 12:42 PM  
**Subject:** Alternative #3

*Enclosure 10*

A title page and the body of the management plan for alternative 3.

Again, these will be included in the handouts next week at the meeting.

**Mail Envelope Properties (38AAE1A0.4A1 : 1 : 18974)**

**Subject:** Alternative #3  
**Creation Date:** Wed, Feb 16, 2000 12:42 PM  
**From:** Dan Graser

**Created By:** DJG2.TWF2\_PO.TWFN\_DO

Recipients	Action	Date & Time
internet <u>"Bob.Wells@rw.doe.gov"</u> BC (Bob Wells) <u>"Clark.Ray@EPA.GOV"</u> (Ray Clark)	Transferred	02/16 12:43 PM
acj.carson-city.nv.us abby (Abby Johnson)	Transferred	02/16 12:43 PM
anv.net JudyTF (Judy Treichel)	Transferred	02/16 12:43 PM
aol.com MalMurphy (Malachy Murphy) nvtapper (Les Bradshaw) Tiffanih (Nick Stellavato) tuftam (Tammy Manzini)	Transferred	02/16 12:43 PM
att.net hoyle1132 (John Hoyle)	Transferred	02/16 12:43 PM
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co.clark.nv.us dax (Dennis Bechtel) evt (Englebrecht vonTiesenhausen)	Transferred	02/16 12:43 PM
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SLW1 CC	Opened	02/16 2:08 PM
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labat.com	internet
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sierra.net	internet
telis.org	internet
chris	

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elaine

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Friday, January 21, 2000 2:04 PM

REVPLAN3.doc

62750

Friday, January 14, 2000 9:23 AM

titlepg3.wpd

2662

Thursday, January 13, 2000 1:42 PM

titlepg3.doc

1518

Friday, January 14, 2000 9:25 AM

MESSAGE

697

Wednesday, February 16, 2000 12:42 PM

**Options****Auto Delete:**

No

**Expiration Date:**

None

**Notify Recipients:**

No

**Priority:**

Standard

**Reply Requested:**

No

**Return Notification:**

None

**Concealed Subject:**

No

**Security:**

Standard

**To Be Delivered:**

Immediate

**Status Tracking:**

Delivered &amp; Opened

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**LSN DESIGN MANAGEMENT PLAN  
FOR ALTERNATIVE THREE**

December 28, 1999

Prepared for the Nuclear Regulatory Commission by:

**LABAT ANDERSON INCORPORATED**  
8000 Westpark Drive  
Suite 400  
McLean, Virginia 22102

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# LSN Design Management Plan for Alternative Three

## 1.0 Introduction

This document presents a description of Alternative Three for the potential design of the Licensing Support Network (LSN) home site and participant sites. It is based on work done by the LSN Advisory Review Panel (LSNARP) Technical Working Group (TWG) during the months of October through December 1999. A total of five potential LSN designs were evaluated. Of these, two (Alternatives One and Two) were discarded. The other two designs, Alternative Four, the "LSN campus," and Alternative Five, the "consolidated storage" approach, are discussed in separate documents.

The three final design alternatives share many characteristics but differ in important ways, most significantly in the areas of the ability of the LSN Administrator (LSNA) to exert management control over the overall LSN, the burden placed on participants to fund, create, and manage their sites, and the overall cost to the NRC for the "home site." How Alternative Three impacts these factors is discussed below.

The LSN can be regarded as consisting of three functional components. Specifically, these are:

- A component that aids the LSNA in auditing participant compliance with the LSN Rule.
- A component that presents LSN information to participants, other interested parties, and the general public.
- A component that stores LSN documentary information for the use of components one and two.

The alternative designs validated by the TWG differ primarily in the details of the third component; specifically, in how and where LSN materials are stored. The design of the first and second components will not be materially affected by the alternative selected for the third component, although there are differences in the details of implementation and operation.

The following sections will describe Alternative Three, the "distributed storage" alternative, the details of its components, how they "fit" together, the hardware and software used in the design, and an approximation of the component life-cycle costs.

## **2.0 Description of Alternative Three**

Alternative Three has been named the "distributed alternative" by the members of the TWG. This terminology focuses on a key characteristic of the design - that each participant, assemble, prepare, and publish their own collections of documents on a WWW server that they control at a site of their choosing. This approach is essentially identical to the design as originally conceived in the early conceptual development of the LSN. It is an analogue of many other WWW systems extant on the Internet, such as Yahoo or Lycos, and contains many of the same components as these analogous (but much larger) systems.

### **2.1 Compliance Component**

This component is a "front-end" component (one with which end-users interact) with a small set of users who require specific information at specific times. It is intended to address the in-house needs of the LSNA.

#### **2.1.1 Intended functionality**

The purpose of this component is two-fold. First, this component ensures that the LSN is functioning as intended and assures this functioning to the intended user base. Second, it provides the necessary reports on LSN functionality that enable the LSNA to ascertain participant compliance with the LSN Rule and that aid in determining whether remedial action is required.

The primary method of following the operation and evolution of the LSN is through a reporting mechanism. Reports will be generated automatically by the system on a periodic basis, when exceptional conditions arise, and on-demand.

##### **2.1.1.1 Periodic reports**

The full array of required reports is yet to be determined. However, the following types of reports have been identified at this time:

- A listing of changes in participant document collections, i.e. additions, deletions, and modifications.
- A report on the "health" of the LSN, component and sub-component uptime and performance data (e.g. web server hits, average response times, number of users, etc.)

### **2.1.1.2 Exception reports**

Exception reports will be generated when anomalous conditions are noted. Candidates for this type of report include:

- When auditing software detects a possible compliance problem with a participant collection.
- When a component of the LSN itself is determined to be malfunctioning, e.g. due to a computer or network error.
- When a security exception is noted.

### **2.1.1.3 On-demand reports**

It is anticipated that reports may need to be generated from time-to-time to respond to an exception or to "drill down" to garner additional information on a perceived compliance problem. A facility will be provided to perform this process. It is anticipated that HTML forms will be designed to allow individuals to design and generate most reports on demand. However, it is likely that some reports may need to be developed by systems personnel from time-to-time.

## **2.1.2 Intended user base**

The intended user base for the compliance component is the LSNA, his designees and the ASLBP (Atomic Safety and Licensing Board Panel).

## **2.1.3 Access to functionality/information delivery**

### **2.1.3.1 Web browser**

Certain functions of the system are best accessed through a WWW browser (e.g. Netscape, Internet Explorer, etc.) through the standard HTTP/HTML mechanism bolstered by CGI programs that interact with the data stores. Most commercial and open source network management software currently employ a web-based interface. Specifically, those aspects of the monitoring function that change rapidly can best be monitored through a browser. Examples of these are troubleshooting on-going problems and ascertaining the status of a particular sub-component at a particular time. Historical trends will be maintained both in HTML tables and graphically.

A web browser is also anticipated as the normal interface to generate reports on demand, with an HTML forms interface providing the report and data selection, as well as the formatting function.

### **2.1.3.2 Hard-copy delivery**

It is anticipated that certain reports, especially periodic reports "for the record," will be automatically printed and physically delivered to their intended recipient(s).

### **2.1.3.3 E-mail delivery**

E-mail is an alternative method of delivery most appropriate for exception reports, but is useful for all report types.

### **2.1.3.4 Interactive login**

Interactive access to the system will be required to produce on-demand reports that have not been anticipated in the design of the web-based, on-demand facility described above.

### **2.1.3.5 File system access**

File system access is required for ready availability of system logs and other source data for off-line processing and archival.

### **2.1.3.6 Pager notification**

Certain types of exception reports, e.g. notifications of system unavailability, mandate a more aggressive notification. In these instances, the system administrator will be paged automatically with a description of the exception in order to expedite repair.

## **2.1.4 Component elements and their functionality**

### **2.1.4.1 Data retrieval element**

This element will consist of one or more programs which will routinely "rove" participant sites, fetching participant data (documents, statistics, and other) and storing this data pending processing. The exact nature of the data retrieval element will depend on the details of the alternative selected for the storage component, but it is analogous to a "web spider." A web spider, when presented with a starting URL, will traverse all hyperlinks within the body of documents "under" the URL. Through this methodology, it is possible to retrieve and replicate the entire static structure of a web site for further processing.

#### **2.1.4.2 Data storage**

This element is responsible for storing both data to be processed and the results of that processing. Both file system storage and database storage will be accommodated. The database will be a network-capable SQL relational database that will provide structured data to both front ends, i.e. the compliance and presentation components.

#### **2.1.4.3 Data processing**

This element will process the data retrieved, store the results of the processing, and generate the required reports.

#### **2.1.4.4 Data presentation and reporting tool**

This element consists of several programs that process report outputs into formats appropriate for the delivery mechanisms described above, and assist a user in specification of on-demand reports.

#### **2.1.4.5 System assuredness with further sub-elements**

This element provides a level of assuredness that the systems the LSN is housed on are functioning as required. There are several main sub-elements:

- **Security mechanisms.** Security sub-elements include a firewall or firewall software, secure remote administration software, and intrusion detection software.
- **Network monitoring and management.** This sub-element monitors hardware and software and reports outages or sub-optimal operation. It also gathers low-level statistics on network operation for trend and throughput analysis.
- **Physical plant and reliability mechanisms.** This sub-element provides appropriate environmental and power conditioning and implements disaster recovery mechanisms, e.g. a backup/restore capability.

### **2.1.5 Hardware and software required**

No attempt is made to specify make and model of hardware and software at this time. Where appropriate, examples of products will be provided, but these are not intended to represent a comprehensive list of alternatives or preferred selections. Since there is a competitive market for these products, they will be used to develop ballpark pricing estimates, but this should not be construed as an attempt to preselect a vendor or product.

### **2.1.5.1 Computer system hardware**

A single computer system of the workstation class is adequate for this functionality. The security sub-element mandates that the system be separate from and more restricted than the computer system (described below) that provides general access. The system should be equipped with the standard components, a graphical display, and a device appropriate for backup. Examples of this type of system include an i386-architecture workstation (e.g. Pentium III "PC") running open-source Unix (e.g. FreeBSD or Linux), or Microsoft NT, a Sun workstation running Solaris, or a Compaq/DEC Alpha running VMS. The primary selection criteria for the specific hardware and operating system should be based on security objectives, with specific functionality a secondary (but important) consideration.

### **2.1.5.2 Computer system software**

The following software components will be required: a web server (e.g. Apache, Netscape Enterprise, MS IIS), a database with accompanying report generation software (e.g. PostgreSQL, Oracle, MS SQL Server), firewall software (e.g. IPFW, ipfilter, Firewall-1), network monitoring and management software (e.g. Big Brother, SunNet Manager, HP OpenView), and a web spider (e.g. MoMspider, BRS/Search, Fulcrum Search Server). Note that the web server, database, and web spider are also part of the presentation component described in Section 2.2, below). The same software can be used for both purposes. In addition, it is anticipated that this component will require some custom software, scripts and CGI's rather than full-blown applications.

## **2.2 Presentation Component**

This component is a "front-end" with a large set of users who require access to a wide range of information at arbitrary times. It is intended to fulfill the requirement to provide information to interested parties through WWW technology.

### **2.2.1 Intended functionality**

It will be a WWW presentation interface with additional sub-components that consist of:

- Introductory and overview documentation.
- Training / tutorial materials on how to use the site to obtain LSN-related information, and the other aspects of the site, and how to submit to the docket.
- Portal software that allows user customization of user interfaces and user document search and access strategies.

- A search facility that allows LSN-wide searching of participant materials, including individual user custom searching strategies.
- Publication of statistical information on LSN participant sites, including site content and performance.
- Aggregation and publication of overall LSN access and usage statistics, e.g., number of hits.
- A web-based interactive forum in which interested parties can discuss or exchange information regarding LSN matters.
- Help-desk assistance (with escalation) for participants and public users.
- A LISTSERV (e-mail list manager) to allow participants to easily send electronic mail to all interested parties. A number of mailing lists will be created as needed for discussion of specific subjects, including a list with the e-mail addresses of all participants for notification purposes. The LISTSERV software will allow each participant to manage their own subscriptions to interest lists and archive messages to the lists. The LSN is not intended to provide a public LISTSERV function.

### **2.2.2 Intended user base**

The intended user base includes all participants and potential participants, the LSNA and his designees, the press, and the general public.

### **2.2.3 Access to functionality/information delivery**

#### **2.2.3.1 Web browser**

Web browsers will be the predominant access method to this component. It is anticipated that this will be the sole access method for the majority of users. Browsers will be used to gain access to general information, participant documentary collections, and to discussion forums.

#### **2.2.3.2 E-mail**

E-mail will be used for notification to participants by the LSNA or designee, and interaction with the LISTSERV described above.

## **2.2.4 Hardware and software required**

No attempt is made to specify make and model of hardware and software at this time. Where appropriate, examples of products will be provided but these are not intended to represent a comprehensive list of alternatives or preferred selections. Since there is a competitive market for these products, they will be used to develop ballpark pricing estimates but this should not be construed as an attempt to preselect a vendor or product.

### **2.2.4.1 Computer system hardware**

A single computer system of the server class will be required for this functionality. Examples are as in Section 2.1.5.1, but this component will require more processing power and capacity, i.e. a faster CPU or multi-CPU machine, more RAM, bigger disk storage, etc. The primary selection criteria for the hardware is that it should be supported by the portal software selected (the most critical software component).

### **2.2.4.2 Computer system software**

The following software components will be required: a web server (e.g. Apache, Netscape Enterprise, MS IIS), a database with accompanying report generation software (e.g. PostgreSQL, Oracle, MS SQL Server), firewall software (e.g. IPFW, ipfilter, Firewall-1), a web forum (e.g. UltimateBulletinBoard, WWWboard), and a LISTSERV (e.g. MailMan, majordomo, LISTPROC), and portal software (e.g. Plumtree, Excalibur, Knowledge Center). Note that the web server, database, and web spider are also part of the compliance component described in Section 2.1. The same software can be used for both purposes.

## **2.2.5 Participant activities and responsibilities**

None except as end-users. This component is the responsibility of the LSNA.

## **2.3 Storage Component**

The storage component represents the "back-end" functionality serving the needs of the front-end components rather than the end-users directly. The data it contains consists of the documents required to be published by participants in accordance with the LSN Rule, and accompanying required information.

### **2.3.1 Participant systems**

Each participant will assemble, prepare, and publish their own collections of documents on a WWW server. The compliance component and the presentation component will access these collections as WWW clients and perform the necessary operations routinely through participant sites.



### **2.3.2 Intended functionality**

This component is the "back-end" that will provide data to the front-end components described above in Sections 2.1 and 2.2. Participants will make their documentary collections available on a web server located at a site of their choosing and attached to the Internet. Participants are free to establish their own web server, collaborate on a community web server, procure commercial web service, or employ any other provisioning method they choose.

### **2.3.3 Intended user base**

The intended user base is primarily the LSN front-end software described above. It is anticipated that participants may choose to make their document collections (and ancillary information) generally accessible on the Internet, (i.e., other than through the LSN portal site). However, any documents intended to be filed in the licensing process will have to be obtained or cross-referenced through the LSN portal site to ensure the uniqueness, consistency, and traceability of document identification (accession) numbers..

### **2.3.4 Access to functionality/information delivery**

#### **2.3.4.1 Web access**

This will be the primary method by which participant materials are accessed. Access will be interactive (e.g. when a home site front-end user requests a particular document, the home site front end will fetch it from the participant's repository). Access will also be by batch (e.g. the portal will fetch all materials on the web site, index them, and retain only the references to the documents for subsequent presentation in response to end-user queries).

#### **2.3.4.2 SNMP access**

For obtaining network usage statistics and performing monitoring activities, the compliance component will also require SNMP (Simple Network Management Protocol) access to participant web servers and network interface equipment.

### **2.3.5 Participant activities and responsibilities**

Participants are required to make available all documents subject to discovery in standard, LSNA-approved formats on a web site. This consists of the following activities.

#### **2.3.5.1 Document identification and assembly**

This is simply identifying and assembling the documents. This function will provide a reasonably accurate estimate of the storage space and preparation effort required.

### **2.3.5.2 Document preparation**

Documents are to be converted to a format that includes an image representation (TIFF/CCITT or TIFF/JPEG), a searchable text file, and a bibliographic header containing metadata about the document. In many cases, this will require scanning and OCR conversion of a paper document. However, if a document exists in electronic format, it may be preferred to perform a more accurate conversion with appropriate software.

The LSNA may allow participants to provide their documentary collections in alternative page-representation formats such as PDF and proprietary word processor formats like Microsoft Word. This will depend on whether the data retrieval software selected for the front-end components is capable of indexing, searching, and otherwise processing these formats. The requirement to provide a bibliographic header for each document will remain regardless of the documents' formats. The bibliographic header is subject to the same retrieval requirements as the source document, e.g. provided as a searchable text file by the web server, as HTTP headers, or from within a database.

Document preparation is potentially the most labor-intensive and costly aspect of building the LSN, due to the large number of documents included. Therefore, the burden on a participant is more closely correlated to the number of documents they must prepare than any other factor.

### **2.3.5.3 Document publication**

Under this alternative, participants will place their documents on the web server of their choice through whatever file transfer mechanism is supported by the web server. This web server must be connected full-time to the Internet through a communications circuit of adequate speed (to be determined by the LSNA) and have a unique IP address and domain name. The domain name and root URL for the documentary collection, and a list of documents, must be provided to the LSNA.

For consistency in retrieval by the front-end components described above in Sections 2.1 and 2.2, participants may be required to follow a standard format in layout of the web pages that provide access to the documents themselves and accompanying bibliographic header information. Note that many web servers provide a standard way to publish meta information on web-served documents (e.g. by including this information in a file of the same name as the source document in a meta sub-directory). Use of this function may be required by the data retrieval elements of the front-end components.

### **2.3.5.4 Coordination/Integration**

Access from the portal/presentation site to the participant sites must be performed by software with fixed expectations of participant site structure and content. This will require that participants coordinate their site design and operations with the LSNA, which is expected to be a

significant on-going operational requirement.

### **2.3.6 Hardware and software required**

It is difficult to determine the exact hardware and software components due to the possibility of collaboration and the differences in the size of the documentary collections of the participants. Foreseeable alternatives for setting up a web server include a dedicated resource at the participant's site, sharing a server with other participants or non-LSN-related web sites, "co-location" of a participant-owned machine at an IPP (Internet Presence Provider) or outsourcing the entire site to an IPP. Each of these alternatives have a wide range of cost, convenience, assuredness, and administrative issues associated with them.

If a participant adopts a strategy of implementing a dedicated web server, the size of this machine will, again, depend on the size of the document collection the participant is required to make available.

Participants with an extremely small document collection will probably choose to lease web space on an IPP machine or "piggy-back" on another participant's site rather than implement their own web server. The cost of this facility depends on the amount of data published, the bandwidth the site requires, and other metrics. Typical costs for web sites that are appropriate for small participants range from free (of incremental cost over maintaining a basic Internet-access capability) to several hundreds of dollars per month.

For those who choose to implement their own dedicated resource, a fairly modest machine may be fully satisfactory. An example of this would be an i386 architecture "PC" (e.g. 166MHz Pentium, 128MB RAM, 4GB disk) running an open-source Unix-like operating system (FreeBSD or Linux) and the open-source Apache web server. The total cost (hardware and software) of such a machine at current (4<sup>th</sup> quarter 1999) market prices is under \$1,000, and it would accommodate as many as 10,000 documents (at an estimated 250KB per document). Note that operational costs may not be so trivial, especially the disaster recovery aspects (regular backups with off-site storage), and data communications costs. However, resources for these requirements may already exist, and participants who choose to share a web server may be able to equitably spread these costs among themselves.

Participants with larger document collections will, naturally, require a more powerful computer system, and operational costs will scale as well. Due to the considerable resources of these participants and the likelihood of their already possessing significant computer system infrastructure, no attempt has been made to develop a cost for these facilities.

### **3.0 Implications of this Design Alternative**

Selection of this alternative for the final design of the LSN will have implications in several key areas. These represent tradeoffs of functionality and/or cost factors compared to the other remaining alternative designs. Appendix 1, *General Attributes of Alternatives*, presents a tabular comparison of each Alternative considered by the TWG, highlighting these tradeoffs. Note that Alternatives One and Two were considered not viable technical solutions by the TWG, and were discarded.

#### **3.1 Administrator management control**

Compared to Alternatives Four and Five, this design allows the LSNA less control over the ultimate presentation of LSN materials. Because the participants are in control of the design and management of their individuals web sites, and because those sites are not topologically close together, the LSNA can only influence the content and management of those sites indirectly through the establishment of requirements.

#### **3.2 Participant responsibilities**

Participants are responsible for publication of their documentary collections under all alternative designs, including creating and operating a web site. Participants will have more freedom to select the technologies for site implementation but will have a greater burden for maintaining its operation at a high level of availability and performance. This will increase the participant's operational cost and require a higher level of computer operations expertise compared to Alternatives Four and Five.

#### **3.3 Cost**

The aggregate cost (to both the LSNA and the participants) of this design is lower than Alternatives Four and Five. It has the additional characteristic that each participant's implementation costs are a function of the size of their documentary collections. Because participants are free to select technologies of their choice with their own cost factors included in the selection process, this will probably result in cost savings to them. Due to the increased demand on the participant sites for operational readiness and performance, it is likely that some of the life-cycle cost components will be higher, specifically, maintenance and communications. However, it is estimated that the overall cost to the participants (excluding their individual document preparation costs) will vary by about ten percent (10%) among the three alternatives.

The cost to the NRC to build and maintain the compliance and presentation component is lower than under Alternative Four and significantly lower than under Alternative Five. Appendix 2, *LSN Costs for Alternative Three*, outlines a rough estimate of the cost to the NRC, based on currently available information.

### 3.4 Implementation Schedule

The preliminary LSN implementation schedule represented by the Gantt chart (Appendix 3) does not appear to be materially affected by the Alternative selected. This is somewhat due to the lack of detail in the schedule appropriate to this stage of the planning process. It will be useful to expand the level of detail in the areas of procurement, design, and implementation of each component for planning purposes but it doesn't appear to be a useful way to differentiate among alternatives.

Lack of schedule differentiation between alternatives arises from the fact that the differences between alternatives are only in one of the three major components, i.e. the storage component, and that implementation of this component will take comparatively little time. The more time-intensive aspects of overall LSN implementation, specifically document conversion and site integration, are, essentially, identical across alternatives. The other activities common to all three alternatives, specifically, the development and implementation of the compliance and presentation components, have potentially more impact on the schedule and staffing than the development and implementation of the storage component.

One area of potentially significant impact on how selection of a particular alternative will affect the schedule is in the procurement of the storage server for Alternative Five. This is the one component among all the alternatives that cannot be considered an "off-the-shelf" item and timely delivery after ordering cannot be assumed. Generally, systems of this nature are built to customer specification and delivery schedules can vary significantly depending on what item is ordered and when the item is ordered. Delays of three to six months are not uncommon. Efforts should be made to eliminate procurement delays associated with this item from the critical path of the project plan, if at all possible.

**From:** Dan Graser  
**To:** ARP\_Materials  
**Date:** Wed, Feb 16, 2000 12:45 PM  
**Subject:** Alternative #4

This is the management plan and title page for alternative #4.

It will be included in hardcopy in the handouts at next week's meeting.

**Mail Envelope Properties** (38AAE24D.4A1 : 1 : 18974)

**Subject:** Alternative #4  
**Creation Date:** Wed, Feb 16, 2000 12:45 PM  
**From:** Dan Graser

**Created By:** DJG2.TWF2\_PO.TWFN\_DO

Recipients	Action	Date & Time
internet "Bob.Wells@rw.doe.gov" BC (Bob Wells) "Clark.Ray@EPA.GOV" (Ray Clark)	Transferred	02/16 12:46 PM
acj.carson-city.nv.us abby (Abby Johnson)	Transferred	02/16 12:46 PM
anv.net JudyTF (Judy Treichel)	Transferred	02/16 12:46 PM
aol.com MalMurphy (Malachy Murphy) nvtapper (Les Bradshaw) Tiffanhi (Nick Stellavato) tuftam (Tammy Manzini)	Transferred	02/16 12:46 PM
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caliente.igate.com jcciac (Eve Culverwell)	Transferred	02/16 12:46 PM
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john_gandi (John Gandi)		
lew_robertson (Lew Robertson)		
sam_hobbs (Sam Hobbs)		
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JXH5 (John Hoyle)	Opened	02/17 10:03 AM
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TJB1 CC (Thomas Barchi)		
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twf4_po.TWFN_DO	Delivered	02/16 12:46 PM
CBR	Opened	02/16 7:02 PM
CJG1 CC	Opened	02/17 8:35 AM
SLW1 CC	Opened	02/16 2:08 PM
<b>Post Office</b>	<b>Delivered</b>	<b>Route</b>
internet		
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anv.net		internet
aol.com		internet
att.net		internet
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co.clark.nv.us		internet
cs.unlv.edu		internet
eurekanv.org		internet
gfoster.com		internet
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labat.com	internet
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sierra.net	internet
telis.org	internet
chris	

internet:terraspectra.com

elaine

internet:terraspectra.com

threeputt.hawthorne.nv.us

internet

winston.com

internet

ymp.gov

internet

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twf3\_po.TWFN\_DO

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twf4\_po.TWFN\_DO

02/16 12:46 PM

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REVPLAN4.doc	75965	Friday, January 14, 2000 9:24 AM
Titlepg4.wpd	1870	Friday, January 21, 2000 2:05 PM
TITLEPG4.doc	1517	Friday, January 14, 2000 9:26 AM
MESSAGE	692	Wednesday, February 16, 2000 12:45 PM

**Options**

Auto Delete:	No
Expiration Date:	None
Notify Recipients:	No
Priority:	Standard
Reply Requested:	No
Return Notification:	None

Concealed Subject:	No
Security:	Standard

To Be Delivered:	Immediate
Status Tracking:	Delivered & Opened

# **LSN DESIGN MANAGEMENT PLAN FOR ALTERNATIVE FOUR**

December 28, 1999

Prepared for the Nuclear Regulatory Commission by:

**LABAT ANDERSON INCORPORATED**  
8000 Westpark Drive  
Suite 400  
McLean, Virginia 22102

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# LSN Design Management Plan for Alternative Four

## 1.0 Introduction

This document presents a description of Alternative Four for the potential design of the Licensing Support Network (LSN) home site and participant sites. It is based on work done by the LSN Advisory Review Panel (LSNARP) Technical Working Group (TWG) during the months of October through December 1999. A total of five potential LSN designs were evaluated. Of these, two (Alternatives One and Two) were discarded. The other two designs, Alternative Three, the "distributed storage," and Alternative Five, the "consolidated storage" approaches are discussed in separate documents.

The three final design alternatives share many characteristics but differ in important ways, most significantly in the areas of the ability of the LSN Administrator (LSNA) to exert management control over the overall LSN, the burden placed on participants to fund, create, and manage their sites, and the overall cost to the NRC for the "home site." How alternative Four impacts these factors is discussed below.

The LSN can be regarded as consisting of three functional components. Specifically, these are:

- A component that aids the LSNA in auditing participant compliance with the LSN Rule.
- A component that presents LSN information to participants, other interested parties, and the general public.
- A component that stores LSN documentary information for the use of components one and two.

The alternative designs validated by the TWG differ primarily in the details of the third component; specifically, in how and where LSN materials are stored. The design of the first and second components will not be materially affected by the alternative selected for the third component, although there are differences in the details of implementation and operation. The following sections will describe the fourth design, the "LSN campus" alternative, the details of its components, how they "fit" together, the hardware and software used in the design, and an approximation of the component life-cycle costs.

## **2.0 Description of Alternative Four**

Alternative Four has been named the "LSN campus" by the members of the TWG. This terminology focuses on a key characteristic of the design - that each participant, assemble, prepare, and publish their own collections of documents on a WWW server that is located at an NRC-managed campus, local area network (LAN). This approach combines the distributed server/storage systems discussed in Alternative Three with the approach of not allowing development options to be unduly restricted due to communications limitations. No location for the campus has as yet been determined. The locations that have been discussed within the TWG are at NRC Headquarters in Washington, DC and at the University of Nevada - Las Vegas (UNLV) or another site in Las Vegas.

### **2.1 Compliance Component**

This component is a "front-end" component (one with which end-users interact) with a small set of users who require specific information at specific times. It is intended to address the in-house needs of the LSNA.

#### **2.1.1 Intended functionality**

The purpose of this component is two-fold. First, this component ensures that the LSN is functioning as intended and assures this functioning to the intended user base. Second, it provides the necessary reports on LSN functionality that enable the LSNA to ascertain participant compliance with the LSN Rule and that aid in determining whether remedial action is required. The primary method of following the operation and evolution of the LSN is through a reporting mechanism. Reports will be generated automatically by the system on a periodic basis, when exceptional conditions arise, and on-demand.

##### **2.1.1.1 Periodic reports**

The full array of required reports is yet to be determined. However, the following types of reports have been identified at this time:

- A listing of changes in participant document collections, i.e. additions, deletions, and modifications.
- A report on the "health" of the LSN, component and sub-component uptime and performance data (e.g. web server hits, average response times, number of users, etc.)

### **2.1.1.2 Exception reports**

Exception reports will be generated when anomalous conditions are noted. Candidates for this type of report include:

- When auditing software detects a possible compliance problem with a participant collection.
- When a component of the LSN itself is determined to be malfunctioning, e.g. due to a computer or network error.
- When a security exception is noted.

### **2.1.1.3 On-demand reports**

It is anticipated that reports may need to be generated from time-to-time to respond to an exception or to "drill down" to garner additional information on a perceived compliance problem. A facility will be provided to perform this process. It is anticipated that HTML forms will be designed to allow individuals to design and generate most reports on demand. However, it is likely that some reports may need to be developed by systems personnel from time-to-time.

## **2.1.2 Intended user base**

The intended user base for the compliance component is the LSNA, his designees and the ASLBP (Atomic Safety and Licensing Board Panel).

## **2.1.3 Access to functionality/information delivery**

### **2.1.3.1 Web browser**

Certain functions of the system are best accessed through a WWW browser (e.g. Netscape, Internet Explorer, etc.) through the standard HTTP/HTML mechanism bolstered by CGI programs that interact with the data stores. Most commercial and open source network management software currently employ a web-based interface. Specifically, those aspects of the monitoring function that change rapidly can best be monitored through a browser. Examples of these are troubleshooting on-going problems and ascertaining the status of a particular sub-component at a particular time. Historical trends will be maintained both in HTML tables and graphically.

A web browser is also anticipated as the normal interface to generate reports on demand, with an HTML forms interface providing the report and data selection, as well as the formatting function.



### **2.1.3.2 Hard-copy delivery**

It is anticipated that certain reports, especially periodic reports "for the record," will be automatically printed and physically delivered to their intended recipient(s).

### **2.1.3.3 E-mail delivery**

E-mail is an alternative method of delivery most appropriate for exception reports, but is useful for all report types.

### **2.1.3.4 Interactive login**

Interactive access to the system will be required to produce on-demand reports that have not been anticipated in the design of the web-based, on-demand facility described above.

### **2.1.3.5 File system access**

File system access is required for ready availability of system logs and other source data for off-line processing and archival.

### **2.1.3.6 Pager notification**

Certain types of exception reports, e.g. notifications of system unavailability, mandate a more aggressive notification. In these instances, the system administrator will be paged automatically with a description of the exception in order to expedite repair.

## **2.1.4 Component elements and their functionality**

### **2.1.4.1 Data retrieval element**

This element will consist of one or more programs which will routinely "rove" participant sites, fetching participant data (documents, statistics, and other) and storing this data pending processing. The exact nature of the data retrieval element will depend on the details of the alternative selected for the storage component, but it is analogous to a "web spider." A web spider, when presented with a starting URL, will traverse all hyperlinks within the body of documents "under" the URL. Through this methodology, it is possible to retrieve and replicate the entire static structure of a web site for further processing.

### **2.1.4.2 Data storage**

This element is responsible for storing both data to be processed and the results of that processing. Both file system storage and database storage will be accommodated. The database will be a network-capable SQL relational database that will provide structured data to both front ends, i.e. the compliance and presentation components.

#### **2.1.4.3 Data processing**

This element will process the data retrieved, store the results of the processing, and generate the required reports.

#### **2.1.4.4 Data presentation and reporting tool**

This element consists of several programs that process report outputs into formats appropriate for the delivery mechanisms described above, and assist a user in specification of on-demand reports.

#### **2.1.4.5 System assuredness with further sub-elements**

This element provides a level of assuredness that the systems the LSN is housed on are functioning as required. There are several main sub-elements:

- **Security mechanisms.** Security sub-elements include a firewall or firewall software, secure remote administration software, and intrusion detection software.
- **Network monitoring and management.** This sub-element monitors hardware and software and reports outages or sub-optimal operation. It also gathers low-level statistics on network operation for trend and throughput analysis.
- **Physical plant and reliability mechanisms.** This sub-element provides appropriate environmental and power conditioning and implements disaster recovery mechanisms, e.g. a backup/restore capability.

#### **2.1.5 Hardware and software required**

No attempt is made to specify make and model of hardware and software at this time. Where appropriate, examples of products will be provided, but these are not intended to represent a comprehensive list of alternatives or preferred selections. Since there is a competitive market for these products, they will be used to develop ballpark pricing estimates, but this should not be construed as an attempt to preselect a vendor or product.

##### **2.1.5.1 Computer system hardware**

A single computer system of the workstation class is adequate for this functionality. The security sub-element mandates that the system be separate from and more restricted than the computer system (described below) that provides general access. The system should be equipped with the standard components, a graphical display, and a device appropriate for backup. Examples of this

type of system include an i386-architecture workstation (e.g. Pentium III "PC") running open-source Unix (e.g. FreeBSD or Linux), or Microsoft NT, a Sun workstation running Solaris, or a Compaq/DEC Alpha running VMS. The primary selection criteria for the specific hardware and operating system should be based on security objectives, with specific functionality a secondary (but important) consideration.

#### **2.1.5.2 Computer system software**

The following software components will be required: a web server (e.g. Apache, Netscape Enterprise, MS IIS), a database with accompanying report generation software (e.g. PostgreSQL, Oracle, MS SQL Server), firewall software (e.g. IPFW, ipfilter, Firewall-1), network monitoring and management software (e.g. Big Brother, SunNet Manager, HP OpenView), and a web spider (e.g. MoMspider, BRS/Search, Fulcrum Search Server). Note that the web server, database, and web spider are also part of the presentation component described in Section 2.2, below. The same software can be used for both purposes. In addition, it is anticipated that this component will require some custom software, scripts and CGI's rather than full-blown applications.

### **2.2 Presentation Component**

This component is a "front-end" with a large set of users who require access to a wide range of information at arbitrary times. It is intended to fulfill the requirement to provide information to interested parties through WWW technology.

#### **2.2.1 Intended functionality**

It will be a WWW presentation interface with additional sub-components that consist of:

- Introductory and overview documentation.
- Training / tutorial materials on how to use the site to obtain LSN-related information, and the other aspects of the site, and how to submit to the docket.
- Portal software that allows user customization of user interfaces and user document search and access strategies.
- A search facility that allows LSN-wide searching of participant materials, including individual user custom searching strategies.
- Publication of statistical information on LSN participant sites, including site content and performance.

- Aggregation and publication of overall LSN access and usage statistics, e.g., number of hits.
- A web-based interactive forum in which interested parties can discuss or exchange information regarding LSN matters.
- Help-desk assistance (with escalation) for participants and public users.
- A LISTSERV (e-mail list manager) to allow participants to easily send electronic mail to all interested parties. A number of mailing lists will be created as needed for discussion of specific subjects, including a list with the e-mail addresses of all participants for notification purposes. The LISTSERV software will allow each participant to manage their own subscriptions to interest lists and archive messages to the lists. The LSN is not intended to provide a public LISTSERV function.

### **2.2.2 Intended user base**

The intended user base includes all participants and potential participants, the LSNA and his designees, the press, and the general public.

### **2.2.3 Access to functionality/information delivery**

#### **2.2.3.1 Web browser**

Web browsers will be the predominant access method to this component. It is anticipated that this will be the sole access method for the majority of users. Browsers will be used to gain access to general information, participant documentary collections, and to discussion forums.

#### **2.2.3.2 E-mail**

E-mail will be used for notification to participants by the LSNA or designee, and interaction with the LISTSERV described above.

### **2.2.4 Hardware and software required**

No attempt is made to specify make and model of hardware and software at this time. Where appropriate, examples of products will be provided but these are not intended to represent a comprehensive list of alternatives or preferred selections. Since there is a competitive market for these products, they will be used to develop ballpark pricing estimates but this should not be construed as an attempt to preselect a vendor or product.

#### **2.2.4.1 Computer system hardware**

A single computer system of the server class will be required for this functionality. Examples are as in Section 2.1.5.1, but this component will require more processing power and capacity, i.e. a faster CPU or multi-CPU machine, more RAM, bigger disk storage, etc. The primary selection criteria for the hardware is that it should be supported by the portal software selected (the most critical software component).

#### **2.2.4.2 Computer system software**

The following software components will be required: a web server (e.g. Apache, Netscape Enterprise, MS IIS), a database with accompanying report generation software (e.g. PostgreSQL, Oracle, MS SQL Server), firewall software (e.g. IPFW, ipfilter, Firewall-1), a web forum (e.g. UltimateBulletinBoard, WWWboard), and a LISTSERV (e.g. MailMan, majordomo, LISTPROC), and portal software (e.g. Plumtree, Excalibur, Knowledge Center). Note that the web server, database, and web spider are also part of the compliance component described in Section 2.1. The same software can be used for both purposes.

#### **2.2.5 Participant activities and responsibilities**

Primarily as end-users. This component is the responsibility of the LSNA. However, since participant computers will be located within the same security zone as the other components (and other participant sites), participants will be required to follow comparable security guidelines on their servers as on the presentation site.

### **2.3 Storage Component**

The storage component represents the "back-end" functionality serving the needs of the front-end components rather than the end-users directly. The data it contains consists of the documents required to be published by participants in accordance with the LSN Rule and accompanying required information.

#### **2.3.1 Participant systems**

Each participant will assemble, prepare, and publish their own collections of documents on a WWW server located at an NRC-managed campus. The compliance component and the presentation component will access these collections as WWW clients and perform the necessary operations routinely through participant servers.

#### **2.3.2 Intended functionality**

This component is the "back-end" that will provide data to the front-end components described above. Participants will make their documentary collections available on a web server owned

and managed by them, located in close network proximity to the compliance and presentation components, most likely on a single LAN site established by the LSNA. Participants are free to establish their own web server, collaborate on a community web server, procure commercial web service, or employ any other provisioning method they choose as long as it can accommodate the campus concept and remain in compliance with necessary security and administrative requirement. Note that this will probably not allow certain extremely low-cost provisioning options, e.g. commercial “shared server” web service.

### **2.3.3 Intended user base**

The intended user base is solely the LSN front-end software described above. Participants will not be able to make their document collections (and ancillary information) generally accessible on the Internet directly from their web servers, (i.e., other than through the LSN portal site).

### **2.3.4 Access to functionality/information delivery**

#### **2.3.4.1 Web access**

This may not be the primary method by which participant materials are accessed (see below). If supported, access will be interactive (e.g. when a home site front-end user requests a particular document, the home site front end will fetch it from the participant's repository). Access will also be by batch (e.g. the portal will fetch all materials on the participant sites, index them, and retain only the references to the documents for subsequent presentation in response to end-user queries).

#### **2.3.4.2 Network file system access**

For the purposes of efficient access to participant collections, it is anticipated that participants will share their collections through a network file system facility in addition to, or instead of an HTTP server. Note that this cannot be allowed in the distributed alternative for security and performance reasons.

#### **2.3.4.3 SNMP access**

For obtaining network usage statistics and performing monitoring activities, the compliance component will also require SNMP (Simple Network Management Protocol) access to participant web servers and network interface equipment.

#### **2.3.4.4 Administrative access**

To ensure that participant sites are complying with required security practices, and for backup administration (since the participants' servers are located at a site other than their offices), participants may be required to provided the LSNA with administrative access to their systems.

### **2.3.5 Participant activities and responsibilities**

Participants are required to make available all documents subject to discovery in standard, LSNA-approved formats on a web site. This consists of the following activities.

#### **2.3.5.1 Document identification and assembly**

This is simply identifying and assembling the documents. This function will provide a reasonably accurate estimate of the storage space and preparation effort required.

#### **2.3.5.2 Document preparation**

Documents are to be converted to a format that includes an image representation (TIFF/CCITT or TIFF/JPEG), a searchable text file, and a bibliographic header containing metadata about the document. In many cases, this will require scanning and OCR conversion of a paper document. However, if a document exists in electronic format, it may be preferred to perform a more accurate conversion with appropriate software.

The LSNA may allow participants to provide their documentary collections in alternative page-representation formats such as PDF and proprietary word processor formats like Microsoft Word. This will depend on whether the data retrieval software selected for the front-end components is capable of indexing, searching, and otherwise processing these formats. The requirement to provide a bibliographic header for each document will remain regardless of the documents' formats. The bibliographic header is subject to the same retrieval requirements as the source document, e.g. provided as a searchable text file by the web server, as HTTP headers, or from within a database.

Document preparation is potentially the most labor-intensive and costly aspect of building the LSN due to the large number of documents included. Therefore, the burden on a participant is more closely correlated to the number of documents they must prepare than any other factor.

#### **2.3.5.3 Document publication**

Under this alternative, participants will place their documents on their web server located within the LSN campus through an LSNA-approved file transfer mechanism. It is anticipated that this file transfer mechanism will be designed to ensure data integrity, privacy, and non-repudiation during the transfer process.

For consistency in retrieval by the front-end components described above in Sections 2.1 and 2.2, participants may be required to follow a standard format in layout of the web pages, or file system structure that provide access to the documents themselves and accompanying bibliographic header information. Note that many web servers provide a standard way to publish meta information on web-served documents (e.g. by including this information in a file of the

same name as the source document in a meta sub-directory). Use of this function may be required by the data retrieval elements of the front-end components.

#### **2.3.5.4 Coordination/Integration**

Access from the portal/presentation site to the participant sites must be performed by software with fixed expectations of participant site structure and content. This will require that participants coordinate their site design and operations with the LSNA, which is expected to be a significant on-going operational requirement. Note that because participants may have to administer their web servers in a location distant from their offices, this may require remote administration capability or on-site staffing at the campus location.

#### **2.3.6 Hardware and software required**

It is difficult to determine the exact hardware and software components due to the possibility of collaboration and the differences in the size of the documentary collections of the participants. Even though the design of this alternative mandates an LSN campus, options still exist for server setup. Foreseeable alternatives for setting up a web server include a dedicated resource at the LSN campus, or sharing a server with other participants. If a participant adopts a strategy of implementing a dedicated web server or collaborating with other participants, the size of the required computer will depend on the aggregate size of the document collection the server is intended to manage.

For those who choose to implement their own dedicated resource, a fairly modest machine may be fully satisfactory. An example of this would be an i386 architecture "PC" (e.g. 166MHz Pentium, 128MB RAM, 4GB disk) running an open-source Unix-like operating system (FreeBSD or Linux) and the open-source Apache web server. The total cost (hardware and software) of such a machine at current (4<sup>th</sup> quarter 1999) market prices is under \$1,000, and it would accommodate as many as 10,000 documents (at an estimated 250KB per document). Many operational costs, including maintenance of site environmental controls and aspects of disaster recovery, can logically be expected to be shared among all participant members in the LSN campus.

Larger document collections will, naturally, require more powerful computer systems, and operational costs will scale as well. Due to the considerable resources of large participants and the likelihood of their already possessing significant computer system infrastructure, no attempt has been made to develop a cost for these facilities.



### **3.0 Implications of this Design Alternative**

Selection of this alternative for the final design of the LSN will have implications in several key areas. These represent tradeoffs of functionality and/or cost factors compared to the other remaining alternative designs. Appendix 1, *General Attributes of Alternatives*, presents a tabular comparison of each Alternative considered by the TWG, highlighting these tradeoffs. Note that Alternatives One and Two were considered not viable technical solutions by the TWG, and were discarded.

#### **3.1 Administrator management control**

Compared to Alternative Three, this design allows the LSNA more control over the ultimate presentation of LSN materials. Because the participants' web servers are located within a facility that is under the administrative control of the LSNA, the LSNA can directly control the content and management of those sites. The degree of control afforded by this Alternative and that of Alternative Five are comparable.

#### **3.2 Participant responsibilities**

Participants are responsible for publication of their documentary collections under all alternative designs, including creating and operating a web site. Compared to Alternatives Three and Five, participants will be less free to select the technologies for site implementation, but will have a lessened burden for maintaining its operation at a high level of availability and performance. This will decrease the participant's operational cost and require a higher level of computer operations expertise compared to Alternative Three and, to a lesser extent, Alternative Five.

#### **3.3 Cost Factors**

The aggregate cost (to both the LSNA and the participants) of this design is higher than Alternative Three and lower than Alternative Five. Participants have less freedom to select technologies that are applicable to site development, primarily low-cost, easy-entry technologies. The entry cost for LSN participation is likely to be higher and less equitably distributed, i.e. use of the shared campus facility will impose a certain fixed cost on a participant irrespective of their collection size. Due to the decreased demand on individual participant sites for operational readiness and performance (because these are provided under the umbrella of the campus), it is likely that some of the life-cycle cost components will be lower, specifically, maintenance and, especially, network communications. However, it is estimated that the overall cost to the participants (excluding their individual document preparation costs) will only vary by about ten percent (10%) among the three alternatives.

The estimated cost to the NRC to build and maintain the compliance and presentation component is significantly lower than Alternative Five and slightly higher than Alternative Three due to the need to maintain a shared infrastructure. Appendix 2, *LSN Costs for Alternative Four*, outlines a

rough estimate of the cost to the NRC, based on currently available information. Note that it is not clear how a campus LSN will be funded. Aggregating the servers for the collections may make appropriate allocation of costs difficult. The usual issues in any compensation situation arise, e.g., what happens when a participant disputes what it owes or when a participant loses standing but still owes a contribution? The risk of unanticipated expenditures is shifted from one participant for their own requirements to all participants and the LSN campus host.

### **3.4 Implementation Schedule**

The preliminary LSN implementation schedule represented by the Gantt chart (Appendix 3) does not appear to be materially affected by the Alternative selected. This is somewhat due to the lack of detail in the schedule appropriate to this stage of the planning process. It will be useful to expand the level of detail in the areas of procurement, design, and implementation of each component for planning purposes but it doesn't appear to be a useful way to differentiate among alternatives.

Lack of schedule differentiation between alternatives arises from the fact that the differences between alternatives are only in one of the three major components, i.e. the storage component, and that implementation of this component will take comparatively little time. The more time-intensive aspects of overall LSN implementation, specifically document conversion and site integration, are, essentially, identical across alternatives. The other activities common to all three alternatives, specifically, the development and implementation of the compliance and presentation components, have potentially more impact on the schedule and staffing than the development and implementation of the storage component.

One area of potentially significant impact on how selection of a particular alternative will affect the schedule is in the procurement of the storage server for Alternative Five. This is the one component among all the alternatives that cannot be considered an "off-the-shelf" item and timely delivery after ordering cannot be assumed. Generally, systems of this nature are built to customer specification and delivery schedules can vary significantly depending on what item is ordered and when the item is ordered. Delays of three to six months are not uncommon. Efforts should be made to eliminate procurement delays associated with this item from the critical path of the project plan, if at all possible.

**From:** Dan Graser  
**To:** ARP\_Materials  
**Date:** Wed, Feb 16, 2000 12:47 PM  
**Subject:** Alternative #5

A management plan and cover page for the description of alternative #5.

A hardcopy handout will be provided at next week's meeting.

**Mail Envelope Properties** (38AAE2C4.4A1 : 1 : 18974)

**Subject:** Alternative #5  
**Creation Date:** Wed, Feb 16, 2000 12:47 PM  
**From:** Dan Graser

**Created By:** DJG2.TWF2\_PO.TWFN\_DO

Recipients	Action	Date & Time
internet " <a href="mailto:Bob.Wells@rw.doe.gov">Bob.Wells@rw.doe.gov</a> " BC (Bob Wells) " <a href="mailto:Clark.Ray@EPA.GOV">Clark.Ray@EPA.GOV</a> " (Ray Clark)	Transferred	02/16 12:48 PM
acj.carson-city.nv.us abby (Abby Johnson)	Transferred	02/16 12:48 PM
anv.net JudyTF (Judy Treichel)	Transferred	02/16 12:48 PM
aol.com MalMurphy (Malachy Murphy) nvtapper (Les Bradshaw) Tiffanah (Nick Stellavato) tuftam (Tammy Manzini)	Transferred	02/16 12:48 PM
att.net hoyle1132 (John Hoyle)	Transferred	02/16 12:48 PM
caliente.igate.com jcciac (Eve Culverwell)	Transferred	02/16 12:48 PM
co.clark.nv.us dax (Dennis Bechtel) evt (Englebrecht vonTiesenhausen)	Transferred	02/16 12:48 PM
cs.unlv.edu taghva (Kazem Taghva)	Transferred	02/16 12:48 PM
eurekanv.org lfiorenzi (Leonard Fiorenzi)	Transferred	02/16 12:48 PM
gfoster.com gfoster (Glen Foster)	Transferred	02/16 12:48 PM
govmail.state.nv.us	Transferred	02/16 12:48 PM

madams (Marta Adams) ssteve (Steve Frishman)		
idsely.com wpnucwst (Debra Kolkman)	Transferred	02/16 12:48 PM
isri.unlv.edu tom (Tom Nartker)	Transferred	02/16 12:48 PM
labat.com joseph_speicher (Joseph Speicher) tony_neville (Tony Neville)	Transferred	02/16 12:48 PM
NCAI.org Robert_Holden (Robert Holden)	Transferred	02/16 12:48 PM
nei.org rxm (Rod McCullum) spk (Steven Kraft)	Transferred	02/16 12:48 PM
Notes.YMP.gov Claudia_Newbury (Claudia Newberry) Jill_Schrecongost (Jill Schrecongost)	Transferred	02/16 12:48 PM
phonewave.net cccomp (Alan Kall)	Transferred	02/16 12:48 PM
sierra.net escorop (Tony Cain)	Transferred	02/16 12:48 PM
telis.org inyoplanning (Andrew Remus)	Transferred	02/16 12:48 PM
chris berlien (Chris Berlien)	Transferred	02/16 12:48 PM
elaine ezra (Elaine Ezra)	Transferred	02/16 12:48 PM
threeputt.hawthorne.nv.us wallace (Jackie Wallace)	Transferred	02/16 12:48 PM
winston.com strubac (Sheldon Trubatch)	Transferred	02/16 12:48 PM

ymp.gov	Transferred	02/16 12:48 PM
david_hunt (David Hunt)		
harry_leake (Harry Leake)		
john_gandi (John Gandi)		
lew_robertson (Lew Robertson)		
sam_hobbs (Sam Hobbs)		
owf5_po.OWFN_DO	Delivered	02/16 12:48 PM
ELJ CC (Emile Julian)	Opened	02/16 2:18 PM
FXC (Francis Cameron)	Opened	02/16 1:21 PM
twf1_po.TWFN_DO	Delivered	02/16 12:48 PM
gpb (Paul Bollwerk)	Opened	02/16 2:17 PM
jgw (Jack Whetstine)	Opened	02/17 11:02 AM
JXH5 (John Hoyle)	Opened	02/17 10:02 AM
twf2_po.TWFN_DO	Delivered	02/16 12:48 PM
CLH1 CC (Chris Hoxie)	Opened	02/22 3:11 PM
hjs (Harvey Spiro)		
JLC5 CC (Jesse Cloud)	Opened	02/16 1:02 PM
RSI CC (R. Irish III)	Opened	02/16 3:49 PM
SEZ CC (Steven Zane)	Opened	02/17 4:33 PM
TJB1 CC (Thomas Barchi)		
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MRS3 CC (Matthew Schmit)	Opened	02/16 1:45 PM
twf4_po.TWFN_DO	Delivered	02/16 12:48 PM
CBR	Opened	02/16 7:02 PM
CJG1 CC	Opened	02/17 9:16 AM
SLW1 CC	Opened	02/16 2:08 PM
<b>Post Office</b>	<b>Delivered</b>	<b>Route</b>
internet		
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anv.net		internet
aol.com		internet
att.net		internet
caliente.igate.com		internet
co.clark.nv.us		internet
cs.unlv.edu		internet
eurekanv.org		internet
gfoster.com		internet
govmail.state.nv.us		internet
idsely.com		internet

isri.unlv.edu	internet
labat.com	internet
NCAI.org	internet
nei.org	internet
Notes.YMP.gov	internet
phonewave.net	internet
sierra.net	internet
telis.org	internet
chris	

internet:terraspectra.com

elaine

internet:terraspectra.com

threeputt.hawthorne.nv.us

internet

winston.com

internet

ymp.gov

internet

owf5\_po.OWFN\_DO

02/16 12:48 PM

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twf2\_po.TWFN\_DO

02/16 12:48 PM

twf3\_po.TWFN\_DO

02/16 12:48 PM

twf4\_po.TWFN\_DO

02/16 12:48 PM

**Files****Size****Date & Time**

Revplan5.wpd

67619

Thursday, January 13, 2000 1:41 PM

REVPLAN5.doc

75818

Friday, January 14, 2000 9:24 AM

Titlepg5.wpd

1763

Friday, January 14, 2000 9:26 AM

TITLEPG5.doc

1517

Friday, January 14, 2000 9:26 AM

MESSAGE

689

Wednesday, February 16, 2000 12:47 PM

**Options****Auto Delete:**

No

**Expiration Date:**

None

**Notify Recipients:**

No

**Priority:**

Standard

**Reply Requested:**

No

**Return Notification:**

None

**Concealed Subject:**

No

**Security:**

Standard

**To Be Delivered:**

Immediate

**Status Tracking:**

Delivered &amp; Opened

# **LSN DESIGN MANAGEMENT PLAN FOR ALTERNATIVE FIVE**

December 28, 1999

Prepared for the Nuclear Regulatory Commission by:

**LABAT ANDERSON INCORPORATED**  
8000 Westpark Drive  
Suite 400  
McLean, Virginia 22102



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# LSN Design Management Plan for Alternative Five

## 1.0 Introduction

This document presents a description of Alternative Five for the potential design of the Licensing Support Network (LSN) home site and participant sites. It is based on work done by the LSN Advisory Review Panel (LSNARP) Technical Working Group (TWG) during the months of October through December 1999. A total of five potential LSN designs were evaluated. Of these, two (Alternatives One and Two) were discarded. The other two designs, Alternative Three, the "distributed storage," and Alternative Four, the "LSN campus" approaches are discussed in separate documents.

The three final design alternatives share many characteristics but differ in important ways, most significantly in the areas of the ability of the LSN Administrator (LSNA) to exert management control over the overall LSN, the burden placed on participants to fund, create, and manage their sites, and the overall cost to the NRC for the "home site." How Alternative Five impacts these factors is discussed below.

The LSN can be regarded as consisting of three functional components. Specifically, these are:

- A component that aids the LSNA in auditing participant compliance with the LSN Rule.
- A component that presents LSN information to participants, other interested parties, and the general public.
- A component that stores LSN documentary information for the use of components one and two.

The alternative designs validated by the TWG differ primarily in the details of the third component; specifically, in how and where LSN materials are stored. The design of the first and second component will not be materially affected by the alternative selected for the third component, although there are differences in the details of implementation and operation.

The following sections will describe the Alternative Five, the "consolidated storage" alternative, the details of its components, how they "fit" together, the hardware and software used in the design, and an approximation of the component life-cycle costs.

## **2.0 Description of Alternative Five**

Alternative Five has been named the "consolidated storage" alternative by the members of the TWG. This terminology focuses on a key characteristic of the design - that each participant, assemble, prepare, and publish their own collections of documents on a WWW server that they control and place at a site of their choosing, and that their information is replicated at a single central storage facility maintained by the LSNA. This approach is essentially identical to the design originally conceived in the early conceptual development of the LSN, with additional storage capability included, effectively used as a 100% cache of participant documentary materials. This functionality allows improved performance, reliability, ease of implementation, and lessens the operational burden on participants.

### **2.1 Compliance Component**

This component is a "front-end" component (one with which end-users interact) with a small set of users who require specific information at specific times. It is intended to address the in-house needs of the LSNA.

#### **2.1.1 Intended functionality**

The purpose of this component is two-fold. First, this component ensures that the LSN is functioning as intended and assures this functioning to the intended user base. Second, it provides the necessary reports on LSN functionality that enable the LSNA to ascertain participant compliance with the LSN Rule and that aid in determining whether remedial action is required.

The primary method of following the operation and evolution of the LSN is through a reporting mechanism. Reports will be generated automatically by the system on a periodic basis, when exceptional conditions arise, and on-demand.

##### **2.1.1.1 Periodic reports**

The full array of required reports is yet to be determined. However, the following types of reports have been identified at this time:

- A listing of changes in participant document collections, i.e. additions, deletions, and modifications.
- A report on the "health" of the LSN, component and sub-component uptime and performance data (e.g. web server hits, average response times, number of users, etc.)

### **2.1.1.2 Exception reports**

Exception reports will be generated when anomalous conditions are noted. Candidates for this type of report include:

- When auditing software detects a possible compliance problem with a participant collection.
- When a component of the LSN itself is determined to be malfunctioning, e.g. due to a computer or network error.
- When a security exception is noted.

### **2.1.1.3 On-demand reports**

It is anticipated that reports may need to be generated from time-to-time to respond to an exception or to "drill down" to garner additional information on a perceived compliance problem. A facility will be provided to expedite this process. It is anticipated that HTML forms will be designed to allow individuals to design and generate most reports on demand. However, it is likely that some reports may need to be developed by systems personnel from time-to-time.

## **2.1.2 Intended user base**

The intended user base for the compliance component is the LSNA, his designees and the ASLBP (Atomic Safety and Licensing Board Panel).

## **2.1.3 Access to functionality/information delivery**

### **2.1.3.1 Web browser**

Certain functions of the system are best accessed through a WWW browser (e.g. Netscape, Internet Explorer, etc.) through the standard HTTP/HTML mechanism bolstered by CGI programs that interact with the data stores. Most commercial and open source network management software currently employ a web-based interface. Specifically, those aspects of the monitoring function that change rapidly can best be monitored through a browser. Examples of these are troubleshooting on-going problems and ascertaining the status of a particular sub-component at a particular time. Historical trends will be maintained both in HTML tables and graphically.

A web browser is also anticipated as the normal interface to generate reports on demand, with an HTML forms interface providing the report and data selection, as well as the formatting function.

### **2.1.3.2 Hard-copy delivery**

It is anticipated that certain reports, especially periodic reports "for the record," will be automatically printed and physically delivered to their intended recipient(s).

### **2.1.3.3 E-mail delivery**

E-mail is an alternative method of delivery most appropriate for exception reports, but is useful for all report types.

### **2.1.3.4 Interactive login**

Interactive access to the system will be required to produce on-demand reports that have not been anticipated in the design of the web-based, on-demand facility described above.

### **2.1.3.5 File system access**

File system access is required for ready availability of system logs and other source data for off-line processing and archival.

### **2.1.3.6 Pager notification**

Certain types of exception reports, e.g. notifications of system unavailability, mandate a more aggressive notification. In these instances, the system administrator will be paged automatically with a description of the exception in order to expedite repair.

## **2.1.4 Component elements and their functionality**

### **2.1.4.1 Data retrieval element**

This element will consist of one or more programs which will routinely "rove" participant sites, fetching participant data (documents, statistics, and other) and storing this data pending processing. The exact nature of the data retrieval element will depend on the details of the alternative selected for the storage component, but it is analogous to a "web spider." A web spider, when presented with a starting URL, will traverse all hyperlinks within the body of documents "under" the URL. Through this methodology, it is possible to retrieve and replicate the entire static structure of a web site for further processing.

### **2.1.4.2 Data storage**

This element is responsible for storing both data to be processed and the results of that processing. Both file system storage and database storage will be accommodated. The database will be a network-capable SQL relational database that will provide structured data to both front ends, i.e. the

compliance and presentation components.

#### **2.1.4.3 Data processing**

This element will process the data retrieved, store the results of the processing, and generate the required reports.

#### **2.1.4.4 Data presentation and reporting tool**

This element consists of several programs that process report outputs into formats appropriate for the delivery mechanisms described above, and assist a user in specification of on-demand reports.

#### **2.1.4.5 System assuredness with further sub-elements**

This element provides a level of assuredness that the systems the LSN is housed on are functioning as required. There are several main sub-elements:

- **Security mechanisms.** Security sub-elements include a firewall or firewall software, secure remote administration software, and intrusion detection software.
- **Network monitoring and management.** This sub-element monitors hardware and software and reports outages or sub-optimal operation. It also gathers low-level statistics on network operation for trend and throughput analysis.
- **Physical plant and reliability mechanisms.** This sub-element provides appropriate environmental and power conditioning and implements disaster recovery mechanisms, e.g. a backup/restore capability.

#### **2.1.5 Hardware and software required**

No attempt is made to specify make and model of hardware and software at this time. Where appropriate, examples of products will be provided, but these are not intended to represent a comprehensive list of alternatives or preferred selections. Since there is a competitive market for these products, they will be used to develop ballpark pricing estimates, but this should not be construed as an attempt to preselect a vendor or product.

### **2.1.5.1 Computer system hardware**

A single computer system of the workstation class is adequate for this functionality. The security sub-element mandates that the system be separate from and more restricted than the computer system (described below) that provides general access. The system should be equipped with the standard components, a graphical display, and a device appropriate for backup. Examples of this type of system include an i386-architecture workstation (e.g. Pentium III "PC") running open-source Unix (e.g. FreeBSD or Linux), or Microsoft NT, a Sun workstation running Solaris, or a Compaq/DEC Alpha running VMS. The primary selection criteria for the specific hardware and operating system should be based on security objectives, with specific functionality a secondary (but important) consideration.

### **2.1.5.2 Computer system software**

The following software components will be required: a web server (e.g. Apache, Netscape Enterprise, MS IIS), a database with accompanying report generation software (e.g. PostgreSQL, Oracle, MS SQL Server), firewall software (e.g. IPFW, ipfilter, Firewall-1), network monitoring and management software (e.g. Big Brother, SunNet Manager, HP OpenView), and a web spider (e.g. MoMspider, BRS/Search, Fulcrum Search Server). Note that the web server, database, and web spider are also part of the presentation component (described in Section 2.2, below). The same software can be used for both purposes. In addition, it is anticipated that this component will require some custom software, scripts and CGI's rather than full-blown applications.

## **2.2 Presentation Component**

This component is a "front-end" with a large set of users who require access to a wide range of information at arbitrary times. It is intended to fulfill the requirement to provide information to interested parties through WWW technology.

### **2.2.1 Intended functionality**

It will be a WWW presentation interface with additional sub-components that consist of:

- Introductory and overview documentation.
- Training / tutorial materials on how to use the site to obtain LSN-related information, and the other aspects of the site, and how to submit to the docket.
- Portal software that allows user customization of user interfaces and user document search and access strategies.



- A search facility that allows LSN-wide searching of participant materials, including individual user custom searching strategies.
- Publication of statistical information on LSN participant sites, including site content and performance.
- Aggregation and publication of overall LSN access and usage statistics, e.g., number of hits.
- A web-based interactive forum in which interested parties can discuss or exchange information regarding LSN matters.
- Help-desk assistance (with escalation) for participants and public users.
- A LISTSERV (e-mail list manager) to allow participants to easily send electronic mail to all interested parties. A number of mailing lists will be created as needed for discussion of specific subjects, including a list with the e-mail addresses of all participants for notification purposes. The LISTSERV software will allow each participant to manage their own subscriptions to interest lists and archive messages to the lists. The LSN is not intended to provide a public LISTSERV function.

### **2.2.2 Intended user base**

The intended user base includes all participants and potential participants, the LSNA and his designees, the press, and the general public.

### **2.2.3 Access to functionality/information delivery**

#### **2.2.3.1 Web browser**

Web browsers will be the predominant access method to this component. It is anticipated that this will be the sole access method for the majority of users. Browsers will be used to gain access to general information, participant documentary collections, and to discussion forums.

#### **2.2.3.2 E-mail**

E-mail will be used for notification to participants by the LSNA or designee, and interaction with the LISTSERV described above.

## **2.2.4 Hardware and software required**

No attempt is made to specify make and model of hardware and software at this time. Where appropriate, examples of products will be provided but these are not intended to represent a comprehensive list of alternatives or preferred selections. Since there is a competitive market for these products, they will be used to develop ballpark pricing estimates, but this should not be construed as an attempt to preselect a vendor or product.

### **2.2.4.1 Computer system hardware**

A single computer system of the server class will be required for this functionality. Examples are as in Section 2.1.5.1, but this component will require more processing power and capacity, i.e. a faster CPU or multi-CPU machine, more RAM, bigger disk storage, etc. The primary selection criteria for the hardware is that it should be supported by the portal software selected (the most critical software component).

### **2.2.4.2 Computer system software**

The following software components will be required: a web server (e.g. Apache, Netscape Enterprise, MS IIS), a database with accompanying report generation software (e.g. PostgreSQL, Oracle, MS SQL Server), firewall software (e.g. IPFW, ipfilter, Firewall-1), a web forum (e.g. UltimateBulletinBoard, WWWboard), and a LISTSERV (e.g. MailMan, majordomo, LISTPROC), and portal software (e.g. Plumtree, Excalibur, Knowledge Center). Note that the web server, database, and web spider are also part of the compliance component described in Section 2.1. The same software can be used for both purposes.

## **2.2.5 Participant activities and responsibilities**

None except as end-users. This component is the responsibility of the LSNA.

## **2.3 Storage Component**

The storage component represents the "back-end" functionality serving the needs of the front-end components rather than the end-users directly. The data it contains consists of documents required to be published by participants in accordance with the LSN Rule, and accompanying required information.

### **2.3.1 Participant systems**

Each participant will assemble, prepare, and publish their own collections of documents on a WWW server. The compliance component and the presentation component will access these collections as WWW clients and perform the necessary operations routinely through participant sites.

### **2.3.2 Consolidated storage server**

A server intended to aggregate all LSN data will be implemented in close network proximity to the compliance and presentation components. It will act as a 100% cache for participant sites, loading itself from their sites and then supplying the front-end components with data. This will allow a less rigorous design in participant sites, because they will not be required to provide high levels of performance and operational characteristics. The consolidated server can access participant sites at a slow rate of speed and at convenient times (for the participants), and then provide this data at high rates of speed and at all times to the presentation and compliance components.

### **2.3.3 Intended functionality**

Participants will make their documentary collections available on a web server located at the site of their choosing and attached to the Internet. Participants are free to establish their own web server, collaborate on a community web server, procure commercial web service, or employ any other provisioning method they choose. The storage server will load itself from the participant web sites and subsequently be accessed by the compliance and presentation components.

### **2.3.4 Intended user base**

The intended user base of participant sites is primarily the LSN consolidated storage server described above. The user base of the storage server are the compliance and presentation front-ends components.

It is anticipated that participants may choose to make their document collections (and ancillary information) generally accessible on the Internet, (i.e., other than through the LSN portal site). However, any documents intended to be filed in the licensing process will have to be obtained or cross-referenced through the LSN portal site to ensure the uniqueness, consistency, and traceability of document identification (accession) numbers.

### **2.3.5 Access to functionality/information delivery**

#### **2.3.5.1 Web access**

This will be the primary method by which participant materials are accessed. Access will be by batch (e.g. the storage server will fetch all materials from the web site, the portal will index them, and retain references to their location on the storage server for subsequent presentation in response to end-user queries).

#### **2.3.5.2 File system access**

It is expected that the presentation component will access the consolidated storage component directly through a file system rather than through a web server for greater efficiency in data transfer.

### **2.3.5.3 SNMP access**

For obtaining network usage statistics and performing monitoring activities, the compliance component will also require SNMP (Simple Network Management Protocol) access to participant web servers and network interface equipment.

### **2.3.5.4 Interactive login**

The consolidated storage server will support interactive login for administration.

## **2.3.6 Participant activities and responsibilities**

Participants are required to make available all documents subject to discovery in standard, LSNA-approved formats on a web site. This consists of the following activities.

### **2.3.6.1 Document identification and assembly**

This is simply identifying and assembling the documents. This function will provide a reasonably accurate estimate of the storage space and preparation effort required.

### **2.3.6.2 Document preparation**

Documents are to be converted to a format that includes an image representation (TIFF/CCITT or TIFF/JPEG), a searchable text file, and a bibliographic header containing metadata about the document. In many cases, this will require scanning and OCR conversion of a paper document. However, if a document exists in electronic format, it may be preferred to perform a more accurate conversion with appropriate software.

The LSNA may allow participants to provide their documentary collections in alternative page-representation formats such as PDF and proprietary word processor formats like Microsoft Word. This will depend on whether the data retrieval software selected for the front-end components is capable of indexing, searching, and otherwise processing these formats. The requirement to provide a bibliographic header for each document will remain regardless of the documents' formats. The bibliographic header is subject to the same retrieval requirements as the source document, e.g. provided as a searchable text file by the web server, as HTTP headers, or from within a database. Document preparation is potentially the most labor-intensive and costly aspect of building the LSN, due to the large number of documents included. Therefore, the burden on a participant is more closely correlated to the number of documents they must prepare than any other factor.

### **2.3.6.3 Document publication**

Under this alternative, participants will place their documents on the web server of their choice through whatever file transfer mechanism is supported by the web server. This web server must be connected full-time to the Internet through a communications circuit of adequate speed (to be determined by the LSNA) and have a unique IP address and domain name. The domain name and root URL for the documentary collection, and a list of documents, must be provided to the LSNA. For consistency in retrieval by the storage server described above, participants may be required to follow a standard format in layout of the web pages that provide access to the documents themselves and accompanying bibliographic header information. Note that many web servers provide a standard way to publish meta information on web-served documents (e.g. by including this information in a file of the same name as the source document in a meta sub-directory). Use of this function may be required by the data retrieval elements of the front-end components.

### **2.3.6.4 Coordination/Integration**

Access from the storage server site to the participant sites will be performed by software with fixed expectations of participant site structure and content. This will require that participants coordinate their site design and operations with the LSNA, which is expected to be a significant on-going operational requirement.

### **2.3.7 Hardware and software required**

It is difficult to determine the exact hardware and software components due to the possibility of collaboration and the differences in the size of the documentary collections of the participants. Foreseeable alternatives for setting up a web server include a dedicated resource at the participant's site, sharing a server with other participants or non-LSN-related web sites, "co-location" of a participant-owned machine at an IPP (Internet Presence Provider) or outsourcing the entire site to an IPP. Each of these alternatives have a wide range of cost, convenience, assuredness, and administrative issues associated with them.

If a participant adopts a strategy of provisioning a dedicated web server, the size of this machine will, again, depend on the size of the document collection the participant is required to make available. Participants with an extremely small document collection will probably choose to lease web space on an IPP machine or "piggy-back" on another participant's site rather than implement their own web server. The cost of this facility depends on the amount of data published, the bandwidth the site requires, and other metrics. Typical costs for web sites that are appropriate for small participants range from free (of incremental cost over maintaining a basic Internet-access capability) to several hundreds of dollars per month.

For those who choose to implement their own dedicated resource, a fairly modest machine may be fully satisfactory. An example of this would be an i386 architecture "PC" (e.g. 166MHz Pentium, 128MB RAM, 4GB disk) running an open-source Unix-like operating system (FreeBSD or Linux)

and the open-source Apache web server. The total cost (hardware and software) of such a machine at current (4<sup>th</sup> quarter 1999) market prices is under \$1,000, and it would accommodate as many as 10,000 documents (at an estimated 250KB per document). Note that operational requirements, especially the disaster recovery aspects (regular backups with off-site storage), and data communications costs are far less critical under this alternative due to the intercession of the storage server.

Participants with larger document collections will, naturally, require a more powerful computer system, and operational costs will scale as well. Due to the considerable resources of these participants and the likelihood of their already possessing significant computer system infrastructure, no attempt has been made to develop a cost for these facilities.

The storage server will be a high-capacity, high-performance computer capable of housing a fairly large amount of data (approximately double the size of the entire documentary collections of all the participants), estimated to be in the four terabyte range. An example of a system in this class is a Sun Microsystems model 10000 in an appropriate configuration. The software to provide the file sharing capability is generally included with the base system and the software mentioned in the description of the portal system above will be used to populate the storage server so there is no additional software component.

### **3.0 Implications of this Design Alternative**

Selection of this alternative for the final design of the LSN will have implications in several key areas. These represent tradeoffs of functionality and/or cost factors compared to the other remaining alternative designs. Appendix 1, *General Attributes of Alternatives*, presents a tabular comparison of each Alternative considered by the TWG, highlighting these tradeoffs. Note that Alternatives One and Two were considered not viable technical solutions by the TWG, and were discarded.

#### **3.1 Administrator management control**

Compared to Alternative Three, this design allows the LSNA more control over the ultimate presentation of LSN materials. Compared to Alternative Four, this design allows the LSNA slightly less control. Because the participants are in control of the design and management of their individual web sites, and because those sites are not topologically close together, the LSNA can only influence the content and management of those sites indirectly through established requirements. However, the LSNA controls a resource, the storage server, that will preclude untoward events at participant sites from affecting the ability of the LSN to provide information to end-users.

#### **3.2 Participant responsibilities**

Participants are responsible for publication of their documentary collections under all alternative designs, including creating and operating a web site. Participants will have more freedom to select the technologies for site implementation and will have a decreased burden for maintaining its

operation at a high level of availability and performance. This will decrease the participant's operational cost and lower the requirement to acquire and maintain high levels of computer expertise compared to Alternatives Three and Four.

### 3.3 Cost

The aggregate cost (to both the LSNA and the participants) of this design is significantly higher than Alternatives Three and Four. This design has the characteristic that each participant's implementation costs are a function of the size of their documentary collections. Because participants are free to select technologies of their choice with their own cost factors included in the selection process, this will probably result in cost savings on their behalf. Due to the decreased demand on the participant sites for operational readiness and performance, it is likely that the overall life-cycle cost components will be lower, specifically in site maintenance and communications costs. However, it is estimated that the overall cost to the participants (excluding their individual document preparation costs) will only vary by about ten percent (10%) among the three alternatives.

The cost to the NRC to build and maintain its portion of the LSN is estimated to be significantly higher than under Alternatives Three and Four due to the need to acquire and maintain the storage server. Such systems are well within the capabilities of modern computing systems but the raw storage needed, and the processing power to manage that much data can be costly. Appendix 2, *LSN Costs for Alternative Five*, outlines a rough estimate of the cost to the NRC, based on currently available information.

### 3.4 Implementation Schedule

The preliminary LSN implementation schedule represented by the Gantt chart (Appendix 3) does not appear to be materially affected by the Alternative selected. This is somewhat due to the lack of detail in the schedule appropriate to this stage of the planning process. It will be useful to expand the level of detail in the areas of procurement, design, and implementation of each component for planning purposes but it doesn't appear to be a useful way to differentiate among alternatives.

Lack of schedule differentiation between alternatives arises from the fact that the differences between alternatives are only in one of the three major components, i.e. the storage component, and that implementation of this component will take comparatively little time. The more time-intensive aspects of overall LSN implementation, specifically document conversion and site integration, are, essentially, identical across alternatives. The other activities common to all three alternatives, specifically, the development and implementation of the compliance and presentation components, have potentially more impact on the schedule and staffing than the development and implementation of the storage component.

One area of potentially significant impact on how selection of a particular alternative will affect the schedule is in the procurement of the storage server for Alternative Five. This is the one component among all the alternatives that cannot be considered an "off-the-shelf" item and timely delivery after

ordering cannot be assumed. Generally, systems of this nature are built to customer specification and delivery schedules can vary significantly depending on what item is ordered and when the item is ordered. Delays of three to six months are not uncommon. Efforts should be made to eliminate procurement delays associated with this item from the critical path of the project plan, if at all possible.



**From:** Dan Graser  
**To:** ARP\_Materials  
**Date:** Wed, Feb 16, 2000 12:28 PM  
**Subject:** Cost Characterizations

The attached files are underlying cost characterizations developed by Labat-Anderson (NRC contractor) for alternatives 3, 4, and 5. These represent background information, only. They do not represent an accurate estimate of the costs at this time. I am including this information because it was used to help develop more inclusive cost descriptions that are included in the Technical Working Group reports.

After the ARP meeting, the estimates will be reworked before they can be included in a presentation to NRC's Information Technology Business Council to get agency approval to go forward.

A separate sheet for each Alternative design, and, a sheet with assumptions and notes that apply to all three alternatives.

**Mail Envelope Properties (38AADE21.4A1 : 1 : 18974)**

**Subject:** Cost Characterizations  
**Creation Date:** Wed, Feb 16, 2000 12:28 PM  
**From:** Dan Graser

**Created By:** DJG2.TWF2\_PO.TWFN\_DO

Recipients	Action	Date & Time
internet <u>"Bob.Wells@rw.doe.gov"</u> BC (Bob Wells) <u>"Clark.Ray@EPA.GOV"</u> (Ray Clark)	Transferred	02/16 12:33 PM
acj.carson-city.nv.us abby (Abby Johnson)	Transferred	02/16 12:33 PM
anv.net JudyTF (Judy Treichel)	Transferred	02/16 12:33 PM
aol.com MalMurphy (Malachy Murphy) nvtapper (Les Bradshaw) Tiffanih (Nick Stellavato) tuftam (Tammy Manzini)	Transferred	02/16 12:33 PM
att.net hoyle1132 (John Hoyle)	Transferred	02/16 12:33 PM
caliente.igate.com jcciac (Eve Culverwell)	Transferred	02/16 12:33 PM
co.clark.nv.us dax (Dennis Bechtel) evt (Englebrecht vonTiesenhausen)	Transferred	02/16 12:33 PM
cs.unlv.edu taghva (Kazem Taghva)	Transferred	02/16 12:33 PM
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madams (Marta Adams) ssteve (Steve Frishman)		
idsely.com wpnucwst (Debra Kolkman)	Transferred	02/16 12:33 PM
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elaine ezra (Elaine Ezra)	Transferred	02/16 12:33 PM
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lew_robertson (Lew Robertson)		
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FXC (Francis Cameron)	Opened	02/16 1:18 PM
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gpb (Paul Bollwerk)	Opened	02/16 2:17 PM
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JXH5 (John Hoyle)	Opened	02/17 10:05 AM
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CLH1 CC (Chris Hoxie)	Opened	02/22 3:10 PM
hjs (Harvey Spiro)		
JLC5 CC (Jesse Cloud)	Opened	02/16 1:02 PM
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CBR	Opened	02/16 12:36 PM
CJG1 CC	Opened	02/17 9:14 AM
SLW1 CC	Opened	02/16 2:08 PM
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anv.net		internet
aol.com		internet
att.net		internet
caliente.igate.com		internet
co.clark.nv.us		internet
cs.unlv.edu		internet
eurekanv.org		internet
gfoster.com		internet
govmail.state.nv.us		internet
idsely.com		internet

isri.unlv.edu	internet
labat.com	internet
NCAI.org	internet
nei.org	internet
Notes.YMP.gov	internet
phonewave.net	internet
sierra.net	internet
telis.org	internet
chris	

internet:terraspectra.com

elaine

internet:terraspectra.com

threeputt.hawthorne.nv.us	internet
winston.com	internet
ymp.gov	internet
owf5_po.OWFN_DO	02/16 12:28 PM
twf1_po.TWFN_DO	02/16 12:28 PM
twf2_po.TWFN_DO	02/16 12:28 PM
twf3_po.TWFN_DO	02/16 12:28 PM
twf4_po.TWFN_DO	02/16 12:28 PM

Files	Size	Date & Time
ALT3COST_word.doc	22718	Wednesday, February 16, 2000 12:16 PM
Alt3cost.wpd	20136	Friday, February 11, 2000 11:20 AM
ALT4COST_word.doc	22736	Wednesday, February 16, 2000 12:17 PM
Alt4cost.wpd	18865	Friday, February 11, 2000 11:20 AM
ALT5COST_word.doc	22837	Wednesday, February 16, 2000 12:17 PM
Alt5cost.wpd	18830	Friday, February 11, 2000 11:21 AM
COSTASUM_word.doc	23525	Wednesday, February 16, 2000 12:19 PM
Costasum.wpd	14234	Friday, February 11, 2000 11:19 AM
MESSAGE	1341	Wednesday, February 16, 2000 12:28 PM

**Options**

<b>Auto Delete:</b>	No
<b>Expiration Date:</b>	None
<b>Notify Recipients:</b>	No
<b>Priority:</b>	Standard
<b>Reply Requested:</b>	No
<b>Return Notification:</b>	None

<b>Concealed Subject:</b>	No
<b>Security:</b>	Standard

<b>To Be Delivered:</b>	Immediate
<b>Status Tracking:</b>	Delivered & Opened

**LSNA COSTS FOR ALTERNATIVE #3**

Item Number	DESCRIPTION (Comments and Details for Alternative #3)	Gross Estimated Cost*
<b>Non Recurring Costs...</b>		
01	<b>PORTAL SERVER</b> Dell PowerEdge 8450, Dual-CPU Pentium III, 600 MHz, 512MB Ram, 36GB SCSI3 Disk (4x9GB), CD-ROM Drive – Includes 3 years of maintenance	\$32,000.00
02	<b>AUDIT SERVER</b> Dell PowerEdge 6350, Single-CPU Pentium III, 600 MHz, 512 Ram, 18GB SCSI3 Disk (2x9 GB), re-writeable SCSI CD-ROM	\$15,000.00
03	<b>PORTAL MEMORY/STORAGE</b> 2 Dell PowerEdge 8450, 4CPU, 2MB cache, 4GB RAM@56,645 each 4 Dell PowerVault 650F RAID storage with 10x18GB drives @ \$41,368 each	\$278,762.00
04	<b>BACKUP/RECOVERY HARDWARE</b> 2 Multi-cartridge tape drives capable of backing up 70GB to a tape x 7 tapes, wide SCSI, e.g., Quantum DLT7000QDX (attached to the audit server) @ \$9,000 each	\$18,000.00
05	<b>COM DEVICES TO CONNECT BOTH TO NETWORK</b> 12 port 100baseT switch (\$1500), Cisco 2501 router (\$2,000) Note: All computer systems have incorporated 100baseT NICs	\$3,500.00
06	<b>AUXILIARY DEVICES</b> (Scanners, printers, CD writer, etc.)	\$5,000.00

\*Not a quotation – for general reference only. Travel costs NOT included.

07	<b>WORKSTATION/CONSOLE FOR PORTAL ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
08	<b>WORKSTATION/CONSOLE FOR AUDIT SYSTEM ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III, 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
09	<b>OPERATING SYSTEMS SOFTWARE AND OTHER SERVICES</b> Win2000 (portal and portal administrator workstation), FreeBSD 3.4 (audit server), RedHat Linux 6.2 (audit administrator workstation), Solaris 7.0 (Storage server)	N/A – Included in the hardware price
<b>Per each device as needed...</b>		
10	<b>UNDERLYING DATABASE SOFTWARE</b> 1 x Oracle (for Sun 10000), 150 concurrent user licence – \$1500/user	\$225,000.00
11	<b>PORTAL APPLICATION PACKAGES:</b> Plumtree (for portal software) – Unlimited user licences	\$100,000.00
12	<b>TOOLKITS FOR WEB PAGE MODIFICATION</b> (if over and above gadgets) \$500 per computer at which a developer would sit. Five (5) kits = \$2,500	\$2,500.00
13	<b>AUDIT SYSTEM MONITORING TOOLS</b> Various open source software packages	N/A Included in the price of the portal software
14	<b>SOFTWARE PACKAGES FOR ANALYSIS</b> Data mining – Cognos (1 free year maintenance)	\$2,600.00
15	<b>SOFTWARE PACKAGES FOR REPORTING</b> An Oracle report writer – SQL*Plus (one copy for admin)	\$500.00
16	<b>DESIGN AND DEVELOPMENT</b> 2 x FTE programmers for a year (Oracle)	<i>See Labor Costs</i>
17	<b>INSTALLATION AND IMPLEMENTATION</b> (for portal server and workstations only)	\$2,500.00

\*Not a quotation – for general reference only. Travel costs NOT included.

18	<b>INTEGRATION COORDINATION WITH PARTICIPANTS</b> 1 x FTE Systems analyst	<i>See Labor Costs</i>
19	<b>TRAINING MATERIALS DEVELOPMENT</b> On-line, CBT training for portal use--specifically for the searching of documents. Price should include developing the dictionary/thesaurus requirements. Assume 2 personnel (one senior and another mid-level) for 8-10 weeks of effort.	\$30,000 to 50,000
20	<b>TRAINING FOR NRC's DBA's</b> Training would be from portal supplier for the Administrator and the Auditor Costs for training two people for one week	\$6000.00
<b>Recurring cost...</b>		
21	<b>APPLICATIONS MAINTENANCE</b> for custom coding. Assume 20% of the cost of developing custom code.	\$18,900.00
22	<b>SOFTWARE MAINTENANCE AGREEMENTS</b> (for Plumtree software 22.5K for 18 months, and \$900 year for Cognos after the first year of purchase)	\$23,400.00
23	<b>HARDWARE MAINTENANCE AGREEMENTS</b> Approximate estimate based on 20% of purchase price. Total cost for 18 month period.	\$60,000.00
24	<b>FACILITY AND ODC's</b> 2 racks, \$1000/month for a total of 18 months (no facility management labor included)	\$18,000.00
25	<b>DISPOSABLES</b> CD-ROMs, tapes, etc. for backup and storage  400 DLT4 tapes @ \$70	\$28,000.00
26	<b>UTILITY AND GENERAL-PURPOSE OFFICE SOFTWARE</b> Word processing, spreadsheet, e-mail, anti-virus, etc. \$1,500 for each staffer X 5 staffers = \$7,500	\$7,500.00
27	<b>ADDITIONAL TRAINING</b> Procedures, user guides, SDL	<i>See Labor Costs</i>

\*Not a quotation – for general reference only. Travel costs NOT included.



<p style="text-align: right;">SUB-TOTAL GROSS ESTIMATED COSTS WITHOUT LABOR*</p>	<p style="text-align: center;">\$887,162.00 to \$907,162.00</p>
<p style="text-align: right;">GRAND TOTAL GROSS ESTIMATED COSTS WITH LABOR (see below for labor breakdown costs)*</p>	<p style="text-align: center;">\$2,268,898.00 to \$2,288,898.00</p>

Labor Costs	
Phase/Description	Gross Estimated Cost*
Phase I – Design, implementation, integration, and training materials	\$1,059,216.00
Phase II – Implementation for 6 months to January 1, 2001	\$322,520.00
TOTAL	\$1,381,736.00

\*Not a quotation – for general reference only. Travel costs NOT included.

**LSNA COSTS FOR ALTERNATIVE #3**

Item Number	DESCRIPTION (Comments and Details for Alternative #3)	Gross Estimated Cost*
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03	<b>PORTAL MEMORY/STORAGE</b> 2 Dell PowerEdge 8450, 4CPU, 2MB cache, 4GB RAM@56,645 each 4 Dell PowerVault 650F RAID storage with 10x18GB drives @ \$41,368 each	\$278,762.00
04	<b>BACKUP/RECOVERY HARDWARE</b> 2 Multi-cartridge tape drives capable of backing up 70GB to a tape x 7 tapes, wide SCSI, e.g., Quantum DLT7000QDX (attached to the audit server) @ \$9,000 each	\$18,000.00
05	<b>COM DEVICES TO CONNECT BOTH TO NETWORK</b> 12 port 100baseT switch (\$1500), Cisco 2501 router (\$2,000) Note: All computer systems have incorporated 100baseT NICs	\$3,500.00
06	<b>AUXILIARY DEVICES</b> (Scanners, printers, CD writer, etc.)	\$5,000.00

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\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #3)	Gross Estimated Cost*
07	<b>WORKSTATION/CONSOLE FOR PORTAL ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
08	<b>WORKSTATION/CONSOLE FOR AUDIT SYSTEM ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III, 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
09	<b>OPERATING SYSTEMS SOFTWARE AND OTHER SERVICES</b> Win2000 (portal and portal administrator workstation), FreeBSD 3.4 (audit server), RedHat Linux 6.2 (audit administrator workstation), Solaris 7.0 (Storage server)	N/A – Included in the hardware price
<b>Per each device as needed...</b>		
10	<b>UNDERLYING DATABASE SOFTWARE</b> 1 x Oracle (for Sun 10000), 150 concurrent user licence – \$1500/user	\$225,000.00
11	<b>PORTAL APPLICATION PACKAGES:</b> Plumtree (for portal software) – Unlimited user licences	\$100,000.00
12	<b>TOOLKITS FOR WEB PAGE MODIFICATION</b> (if over and above gadgets) \$500 per computer at which a developer would sit. Five (5) kits = \$2,500	\$2,500.00
13	<b>AUDIT SYSTEM MONITORING TOOLS</b> Various open source software packages	N/A Included in the price of the portal software

\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #3)	Gross Estimated Cost*
14	<b>SOFTWARE PACKAGES FOR ANALYSIS</b> Data mining – Cognos (1 free year maintenance)	\$2,600.00
15	<b>SOFTWARE PACKAGES FOR REPORTING</b> An Oracle report writer – SQL*Plus (one copy for admin)	\$500.00
16	<b>DESIGN AND DEVELOPMENT</b> 2 x FTE programmers for a year (Oracle)	See Labor Costs
17	<b>INSTALLATION AND IMPLEMENTATION</b> (for portal server and workstations only)	\$2,500.00
18	<b>INTEGRATION COORDINATION WITH PARTICIPANTS</b> 1 x FTE Systems analyst	See Labor Costs
19	<b>TRAINING MATERIALS DEVELOPMENT</b> On-line, CBT training for portal use--specifically for the searching of documents. Price should include developing the dictionary/thesaurus requirements. Assume 2 personnel (one senior and another mid-level) for 8-10 weeks of effort.	\$30,000 to 50,000
20	<b>TRAINING FOR NRC's DBA's</b> Training would be from portal supplier for the Administrator and the Auditor Costs for training two people for one week	\$6000.00
<b>Recurring cost...</b>		
21	<b>APPLICATIONS MAINTENANCE</b> for custom coding. Assume 20% of the cost of developing custom code.	\$18,900.00

\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #3)	Gross Estimated Cost*
22	<b>SOFTWARE MAINTENANCE AGREEMENTS</b> (for Plumtree software 22.5K for 18 months, and \$900 year for Cognos after the first year of purchase)	\$23,400.00
23	<b>HARDWARE MAINTENANCE AGREEMENTS</b> Approximate estimate based on 20% of purchase price. Total cost for 18 month period.	\$60,000.00
24	<b>FACILITY AND ODC's</b> 2 racks, \$1000/month for a total of 18 months (no facility management labor included)	\$18,000.00
25	<b>DISPOSABLES</b> CD-ROMs, tapes, etc. for backup and storage  400 DLT4 tapes @ \$70	\$28,000.00
26	<b>UTILITY AND GENERAL-PURPOSE OFFICE SOFTWARE</b> Word processing, spreadsheet, e-mail, anti-virus, etc. \$1,500 for each staffer X 5 staffers = \$7,500	\$7,500.00
27	<b>ADDITIONAL TRAINING</b> Procedures, user guides, SDL	<i>See Labor Costs</i>
SUB-TOTAL GROSS ESTIMATED COSTS WITHOUT LABOR*		\$887,162.00 to \$907,162.00

\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #3)	Gross Estimated Cost*
<b>GRAND TOTAL GROSS ESTIMATED COSTS WITH LABOR (see below for labor breakdown costs)*</b>		<b>\$2,268,898.00 to \$2,288,898.00</b>

<b>Labor Costs</b>	
Phase/Description	Gross Estimated Cost*
Phase I – Design, implementation, integration, and training materials	\$1,059,216.00
Phase II – Implementation for 6 months to January 1, 2001	\$322,520.00
<b>TOTAL</b>	<b>\$1,381,736.00</b>

\*Not a quotation – for general reference only. Travel costs NOT included.

**LSNA COSTS FOR ALTERNATIVE #4**

Item Number	DESCRIPTION (Comments and Details for Alternative #4)	Gross Estimated Cost*
<b>Non Recurring Costs...</b>		
01	<b>PORTAL SERVER</b> Dell PowerEdge 8450, Dual-CPU Pentium III, 600 MHz, 512MB Ram, 36GB SCSI3 Disk (4x9GB), CD-ROM Drive – Includes 3 years of maintenance	\$32,000.00
02	<b>AUDIT SERVER</b> Dell PowerEdge 6350, Single-CPU Pentium III, 600 MHz, 512 Ram, 18GB SCSI3 Disk (2x9 GB), re-writeable SCSI CD-ROM	\$15,000.00
03	<b>PORTAL MEMORY/STORAGE</b> 2 Dell PowerEdge 8450, 4CPU, 2MB cache, 4GB RAM@56,645 each 8 Dell PowerVault 650F RAID storage with 10x18GB drives @ \$41,368 each	\$444,234.00
04	<b>BACKUP/RECOVERY HARDWARE</b> 2 Multi-cartridge tape drives capable of backing up 70GB to a tape x 7 tapes, wide SCSI, e.g., Quantum DLT7000QDX (attached to the audit server) @ \$9,000 each	\$18,000.00
05	<b>COM DEVICES TO CONNECT BOTH TO NETWORK</b> 12 port 100baseT switch (\$1500), Cisco 2501 router (\$2,000) Note: All computer systems have incorporated 100baseT NICs	\$3,500.00
06	<b>AUXILIARY DEVICES</b> (Scanners, printers, CD writer, etc.)	\$5,000.00

\*Not a quotation – for general reference only. Travel costs NOT included.

07	<b>WORKSTATION/CONSOLE FOR PORTAL ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
08	<b>WORKSTATION/CONSOLE FOR AUDIT SYSTEM ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III, 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
09	<b>OPERATING SYSTEMS SOFTWARE AND OTHER SERVICES</b> Win2000 (portal and portal administrator workstation), FreeBSD 3.4 (audit server), RedHat Linux 6.2 (audit administrator workstation), Solaris 7.0 (Storage server)	N/A – Included in the hardware price
<b>Per each device as needed...</b>		
10	<b>UNDERLYING DATABASE SOFTWARE</b> 1 x Oracle (for Sun 10000), 150 concurrent user licence – \$1500/user	\$225,000.00
11	<b>PORTAL APPLICATION PACKAGES:</b> Plumtree (for portal software) – Unlimited user licences	\$100,000.00
12	<b>TOOLKITS FOR WEB PAGE MODIFICATION</b> (if over and above gadgets) \$500 per computer at which a developer would sit. Five (5) kits = \$2,500	\$2,500.00
13	<b>AUDIT SYSTEM MONITORING TOOLS</b> Various open source software packages	N/A Included in the price of the portal software
14	<b>SOFTWARE PACKAGES FOR ANALYSIS</b> Data mining – Cognos (1 free year maintenance)	\$2,600.00
15	<b>SOFTWARE PACKAGES FOR REPORTING</b> An Oracle report writer – SQL*Plus (one copy for admin)	\$500.00
16	<b>DESIGN AND DEVELOPMENT</b> 2 x FTE programmers for a year (Oracle)	<i>See Labor Costs</i>
17	<b>INSTALLATION AND IMPLEMENTATION</b> (for portal server and workstations only)	\$2,500.00

\*Not a quotation – for general reference only. Travel costs NOT included.



18	<b>INTEGRATION COORDINATION WITH PARTICIPANTS</b> 1 x FTE Systems analyst	<i>See Labor Costs</i>
19	<b>TRAINING MATERIALS DEVELOPMENT</b> On-line, CBT training for portal use--specifically for the searching of documents. Price should include developing the dictionary/thesaurus requirements. Assume 2 personnel (one senior and another mid-level) for 8-10 weeks of effort.	\$30,000 to 50,000
20	<b>TRAINING FOR NRC's DBA's</b> Training would be from portal supplier for the Administrator and the Auditor Costs for training two people for one week	\$6000.00
<b>Recurring cost...</b>		
21	<b>APPLICATIONS MAINTENANCE</b> for custom coding. Assume 20% of the cost of developing custom code.	\$18,900.00
22	<b>SOFTWARE MAINTENANCE AGREEMENTS</b> (for Plumtree software 22.5K for 18 months, and \$900 year for Cognos after the first year of purchase)	\$23,400.00
23	<b>HARDWARE MAINTENANCE AGREEMENTS</b> Approximate estimate based on 20% of purchase price. Total cost for 18 month period.	\$90,000.00
24	<b>FACILITY AND ODC's</b> 2 racks, \$1000/month for a total of 18 months (no facility management labor included)	\$18,000.00
25	<b>DISPOSABLES</b> CD-ROMs, tapes, etc. for backup and storage  400 DLT4 tapes @ \$70	\$28,000.00
26	<b>UTILITY AND GENERAL-PURPOSE OFFICE SOFTWARE</b> Word processing, spreadsheet, e-mail, anti-virus, etc. \$1,500 for each staffer X 5 staffers = \$7,500	\$7,500.00
27	<b>ADDITIONAL TRAINING</b> Procedures, user guides, SDL	<i>See Labor Costs</i>

\*Not a quotation – for general reference only. Travel costs NOT included.

<p style="text-align: right;">SUB-TOTAL GROSS ESTIMATED COSTS WITHOUT LABOR*</p>	<p style="text-align: right;">\$1,082,634.00 to \$1,102,634.00</p>
<p style="text-align: right;">GRAND TOTAL GROSS ESTIMATED COSTS WITH LABOR (see below for labor breakdown costs)*</p>	<p style="text-align: right;">\$2,464,370.00 to \$2,484,370.00</p>

Labor Costs	
Phase/Description	Gross Estimated Cost*
Phase I – Design, implementation, integration, and training materials	\$1,059,216.00
Phase II – Implementation for 6 months to January 1, 2001	\$322,520.00
TOTAL	\$1,381,736.00

\*Not a quotation – for general reference only. Travel costs NOT included.

## LSNA COSTS FOR ALTERNATIVE #4

Item Number	DESCRIPTION (Comments and Details for Alternative #4)	Gross Estimated Cost*
<b>Non Recurring Costs...</b>		
01	<b>PORTAL SERVER</b> Dell PowerEdge 8450, Dual-CPU Pentium III, 600 MHz, 512MB Ram, 36GB SCSI3 Disk (4x9GB), CD-ROM Drive – Includes 3 years of maintenance	\$32,000.00
02	<b>AUDIT SERVER</b> Dell PowerEdge 6350, Single-CPU Pentium III, 600 MHz, 512 Ram, 18GB SCSI3 Disk (2x9 GB), re-writeable SCSI CD-ROM	\$15,000.00
03	<b>PORTAL MEMORY/STORAGE</b> 2 Dell PowerEdge 8450, 4CPU, 2MB cache, 4GB RAM@56,645 each 8 Dell PowerVault 650F RAID storage with 10x18GB drives @ \$41,368 each	\$444,234.00
04	<b>BACKUP/RECOVERY HARDWARE</b> 2 Multi-cartridge tape drives capable of backing up 70GB to a tape x 7 tapes, wide SCSI, e.g., Quantum DLT7000QDX (attached to the audit server) @ \$9,000 each	\$18,000.00
05	<b>COM DEVICES TO CONNECT BOTH TO NETWORK</b> 12 port 100baseT switch (\$1500), Cisco 2501 router (\$2,000) Note: All computer systems have incorporated 100baseT NICs	\$3,500.00
06	<b>AUXILIARY DEVICES</b> (Scanners, printers, CD writer, etc.)	\$5,000.00

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\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #4)	Gross Estimated Cost*
07	<b>WORKSTATION/CONSOLE FOR PORTAL ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
08	<b>WORKSTATION/CONSOLE FOR AUDIT SYSTEM ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III, 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
09	<b>OPERATING SYSTEMS SOFTWARE AND OTHER SERVICES</b> Win2000 (portal and portal administrator workstation), FreeBSD 3.4 (audit server), RedHat Linux 6.2 (audit administrator workstation), Solaris 7.0 (Storage server)	N/A – Included in the hardware price
<b>Per each device as needed...</b>		
10	<b>UNDERLYING DATABASE SOFTWARE</b> 1 x Oracle (for Sun 10000), 150 concurrent user licence – \$1500/user	\$225,000.00
11	<b>PORTAL APPLICATION PACKAGES:</b> Plumtree (for portal software) – Unlimited user licences	\$100,000.00
12	<b>TOOLKITS FOR WEB PAGE MODIFICATION</b> (if over and above gadgets) \$500 per computer at which a developer would sit. Five (5) kits = \$2,500	\$2,500.00
13	<b>AUDIT SYSTEM MONITORING TOOLS</b> Various open source software packages	N/A Included in the price of the portal software

\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #4)	Gross Estimated Cost*
14	<b>SOFTWARE PACKAGES FOR ANALYSIS</b> Data mining – Cognos (1 free year maintenance)	\$2,600.00
15	<b>SOFTWARE PACKAGES FOR REPORTING</b> An Oracle report writer – SQL*Plus (one copy for admin)	\$500.00
16	<b>DESIGN AND DEVELOPMENT</b> 2 x FTE programmers for a year (Oracle)	<i>See Labor Costs</i>
17	<b>INSTALLATION AND IMPLEMENTATION</b> (for portal server and workstations only)	\$2,500.00
18	<b>INTEGRATION COORDINATION WITH PARTICIPANTS</b> 1 x FTE Systems analyst	<i>See Labor Costs</i>
19	<b>TRAINING MATERIALS DEVELOPMENT</b> On-line, CBT training for portal use--specifically for the searching of documents. Price should include developing the dictionary/thesaurus requirements. Assume 2 personnel (one senior and another mid-level) for 8-10 weeks of effort.	\$30,000 to 50,000
20	<b>TRAINING FOR NRC's DBA's</b> Training would be from portal supplier for the Administrator and the Auditor Costs for training two people for one week	\$6000.00
<b>Recurring cost...</b>		
21	<b>APPLICATIONS MAINTENANCE</b> for custom coding. Assume 20% of the cost of developing custom code.	\$18,900.00

\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #4)	Gross Estimated Cost*
22	<b>SOFTWARE MAINTENANCE AGREEMENTS</b> (for Plumtree software 22.5K for 18 months, and \$900 year for Cognos after the first year of purchase)	\$23,400.00
23	<b>HARDWARE MAINTENANCE AGREEMENTS</b> Approximate estimate based on 20% of purchase price. Total cost for 18 month period.	\$90,000.00
24	<b>FACILITY AND ODC's</b> 2 racks, \$1000/month for a total of 18 months (no facility management labor included)	\$18,000.00
25	<b>DISPOSABLES</b> CD-ROMs, tapes, etc. for backup and storage  400 DLT4 tapes @ \$70	\$28,000.00
26	<b>UTILITY AND GENERAL-PURPOSE OFFICE SOFTWARE</b> Word processing, spreadsheet, e-mail, anti-virus, etc. \$1,500 for each staffer X 5 staffers = \$7,500	\$7,500.00
27	<b>ADDITIONAL TRAINING</b> Procedures, user guides, SDL	<i>See Labor Costs</i>
SUB-TOTAL GROSS ESTIMATED COSTS WITHOUT LABOR*		\$1,082,634.00 to \$1,102,634.00

\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #4)	Gross Estimated Cost*
GRAND TOTAL GROSS ESTIMATED COSTS WITH LABOR (see below for labor breakdown costs)*		\$2,464,370.00 to \$2,484,370.00

Labor Costs	
Phase/Description	Gross Estimated Cost*
Phase I – Design, implementation, integration, and training materials	\$1,059,216.00
Phase II – Implementation for 6 months to January 1, 2001	\$322,520.00
TOTAL	\$1,381,736.00

\*Not a quotation – for general reference only. Travel costs NOT included.

**LSNA COSTS FOR ALTERNATIVE #5**

Item Number	DESCRIPTION (Comments and Details for Alternative #5)	Gross Estimated Cost*
<b>Non Recurring Costs...</b>		
01	<b>PORTAL SERVER</b> Dell PowerEdge 8450, Dual-CPU Pentium III, 600 MHz, 512MB Ram, 36GB SCSI3 Disk (4x9GB), CD-ROM Drive – Includes 3 years of maintenance	\$32,000.00
02	<b>AUDIT SERVER</b> Dell PowerEdge 6350, Single-CPU Pentium III, 600 MHz, 512 Ram, 18GB SCSI3 Disk (2x9 GB), re-writeable SCSI CD-ROM	\$15,000.00
03	<b>PORTAL MEMORY/STORAGE</b> Sun Enterprise 10000, 8 processor @ 400MHz, 4GB Ram, 4TB SCSI3 disk (Includes installation and 1 year of on-site support). Service includes project planning and management, hardware installation, system software installation and configuration, unbundled software installation, system administration tutorial, and base system.	\$1,765,176.00
04	<b>BACKUP/RECOVERY HARDWARE</b> 2 Multi-cartridge tape drives capable of backing up 70GB to a tape x 7 tapes, wide SCSI, e.g., Quantum DLT7000QDX (attached to the audit server) @ \$9,000 each	\$18,000.00
05	<b>COM DEVICES TO CONNECT BOTH TO NETWORK</b> 12 port 100baseT switch (\$1500), Cisco 2501 router (\$2,000) Note: All computer systems have incorporated 100baseT NICs	\$3,500.00
06	<b>AUXILIARY DEVICES</b> (Scanners, printers, CD writer, etc.)	\$5,000.00

\*Not a quotation – for general reference only. Travel costs NOT included.



07	<b>WORKSTATION/CONSOLE FOR PORTAL ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
08	<b>WORKSTATION/CONSOLE FOR AUDIT SYSTEM ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III, 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
09	<b>OPERATING SYSTEMS SOFTWARE AND OTHER SERVICES</b> Win2000 (portal and portal administrator workstation), FreeBSD 3.4 (audit server), RedHat Linux 6.2 (audit administrator workstation), Solaris 7.0 (Storage server)	N/A – Included in the hardware price
<b>Per each device as needed...</b>		
10	<b>UNDERLYING DATABASE SOFTWARE</b> 1 x Oracle (for Sun 10000), 150 concurrent user licence – \$1500/user	\$225,000.00
11	<b>PORTAL APPLICATION PACKAGES:</b> Plumtree (for portal software) – Unlimited user licences	\$100,000.00
12	<b>TOOLKITS FOR WEB PAGE MODIFICATION</b> (if over and above gadgets) \$500 per computer at which a developer would sit. Five (5) kits = \$2,500	\$2,500.00
13	<b>AUDIT SYSTEM MONITORING TOOLS</b> Various open source software packages	N/A Included in the price of the portal software
14	<b>SOFTWARE PACKAGES FOR ANALYSIS</b> Data mining – Cognos (1 free year maintenance)	\$2,600.00
15	<b>SOFTWARE PACKAGES FOR REPORTING</b> An Oracle report writer – SQL*Plus (one copy for admin)	\$500.00
16	<b>DESIGN AND DEVELOPMENT</b> 2 x FTE programmers for a year (Oracle)	<i>See Labor Costs</i>
17	<b>INSTALLATION AND IMPLEMENTATION</b> (for portal server and workstations only)	\$2,500.00

\*Not a quotation – for general reference only. Travel costs NOT included.

18	<b>INTEGRATION COORDINATION WITH PARTICIPANTS</b> 1 x FTE Systems analyst	<i>See Labor Costs</i>
19	<b>TRAINING MATERIALS DEVELOPMENT</b> On-line, CBT training for portal use--specifically for the searching of documents. Price should include developing the dictionary/thesaurus requirements. Assume 2 personnel (one senior and another mid-level) for 8-10 weeks of effort.	\$30,000 to 50,000
20	<b>TRAINING FOR NRC's DBA's</b> Training would be from portal supplier for the Administrator and the Auditor Costs for training two people for one week	\$6000.00
<b>Recurring cost...</b>		
21	<b>APPLICATIONS MAINTENANCE</b> for custom coding. Assume 20% of the cost of developing custom code.	\$18,900.00
22	<b>SOFTWARE MAINTENANCE AGREEMENTS</b> (for Plumtree software 22.5K for 18 months, and \$900 year for Cognos after the first year of purchase)	\$23,400.00
23	<b>HARDWARE MAINTENANCE AGREEMENTS</b> For 18 months at \$21,000 per month	\$378,000.00
24	<b>FACILITY AND ODC's</b> 2 racks, \$1000/month for a total of 18 months (no facility management labor included)	\$18,000.00
25	<b>DISPOSABLES</b> CD-ROMs, tapes, etc. for backup and storage  800 DLT4 tapes @ \$70	\$56,000.00
26	<b>UTILITY AND GENERAL-PURPOSE OFFICE SOFTWARE</b> Word processing, spreadsheet, e-mail, anti-virus, etc. \$1,500 for each staffer X 5 staffers = \$7,500	\$7,500.00
27	<b>ADDITIONAL TRAINING</b> Procedures, user guides, SDL	<i>See Labor Costs</i>

\*Not a quotation – for general reference only. Travel costs NOT included.

<p style="text-align: right;">SUB-TOTAL GROSS ESTIMATED COSTS WITHOUT LABOR*</p>	<p style="text-align: right;">\$2,719,576.00 to \$2,739,576.00</p>
<p style="text-align: right;">GRAND TOTAL GROSS ESTIMATED COSTS WITH LABOR (see below for labor breakdown costs)*</p>	<p style="text-align: right;">\$4,101,312.00 to \$4,121,312.00</p>

Labor Costs	
Phase/Description	Gross Estimated Cost*
Phase I – Design, implementation, integration, and training materials	\$1,059,216.00
Phase II – Implementation for 6 months to January 1, 2001	\$322,520.00
TOTAL	\$1,381,736.00

\*Not a quotation – for general reference only. Travel costs NOT included.

## LSNA COSTS FOR ALTERNATIVE #5

Item Number	DESCRIPTION (Comments and Details for Alternative #5)	Gross Estimated Cost*
<b>Non Recurring Costs...</b>		
01	<b>PORTAL SERVER</b> Dell PowerEdge 8450, Dual-CPU Pentium III, 600 MHz, 512MB Ram, 36GB SCSI3 Disk (4x9GB), CD-ROM Drive – Includes 3 years of maintenance	\$32,000.00
02	<b>AUDIT SERVER</b> Dell PowerEdge 6350, Single-CPU Pentium III, 600 MHz, 512 Ram, 18GB SCSI3 Disk (2x9 GB), re-writeable SCSI CD-ROM	\$15,000.00
03	<b>PORTAL MEMORY/STORAGE</b> Sun Enterprise 10000, 8 processor @ 400MHz, 4GB Ram, 4TB SCSI3 disk (Includes installation and 1 year of on-site support). Service includes project planning and management, hardware installation, system software installation and configuration, unbundled software installation, system administration tutorial, and base system.	\$1,765,176.00
04	<b>BACKUP/RECOVERY HARDWARE</b> 2 Multi-cartridge tape drives capable of backing up 70GB to a tape x 7 tapes, wide SCSI, e.g., Quantum DLT7000QDX (attached to the audit server) @ \$9,000 each	\$18,000.00
05	<b>COM DEVICES TO CONNECT BOTH TO NETWORK</b> 12 port 100baseT switch (\$1500), Cisco 2501 router (\$2,000) Note: All computer systems have incorporated 100baseT NICs	\$3,500.00

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\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #5)	Gross Estimated Cost*
06	<b>AUXILIARY DEVICES</b> (Scanners, printers, CD writer, etc.)	\$5,000.00
07	<b>WORKSTATION/CONSOLE FOR PORTAL ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
08	<b>WORKSTATION/CONSOLE FOR AUDIT SYSTEM ADMINISTRATOR</b> Dell Precision 420, Intel Pentium III, 600MHz, 9GB disk, 256 RAM – Includes maintenance agreement for onsite service	\$5,000.00
09	<b>OPERATING SYSTEMS SOFTWARE AND OTHER SERVICES</b> Win2000 (portal and portal administrator workstation), FreeBSD 3.4 (audit server), RedHat Linux 6.2 (audit administrator workstation), Solaris 7.0 (Storage server)	N/A – Included in the hardware price
<b>Per each device as needed...</b>		
10	<b>UNDERLYING DATABASE SOFTWARE</b> 1 x Oracle (for Sun 10000), 150 concurrent user licence – \$1500/user	\$225,000.00
11	<b>PORTAL APPLICATION PACKAGES:</b> Plumtree (for portal software) – Unlimited user licences	\$100,000.00
12	<b>TOOLKITS FOR WEB PAGE MODIFICATION</b> (if over and above gadgets) \$500 per computer at which a developer would sit. Five (5) kits = \$2,500	\$2,500.00

\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #5)	Gross Estimated Cost*
13	<b>AUDIT SYSTEM MONITORING TOOLS</b> Various open source software packages	N/A Included in the price of the portal software
14	<b>SOFTWARE PACKAGES FOR ANALYSIS</b> Data mining – Cognos (1 free year maintenance)	\$2,600.00
15	<b>SOFTWARE PACKAGES FOR REPORTING</b> An Oracle report writer – SQL*Plus (one copy for admin)	\$500.00
16	<b>DESIGN AND DEVELOPMENT</b> 2 x FTE programmers for a year (Oracle)	<i>See Labor Costs</i>
17	<b>INSTALLATION AND IMPLEMENTATION</b> (for portal server and workstations only)	\$2,500.00
18	<b>INTEGRATION COORDINATION WITH PARTICIPANTS</b> 1 x FTE Systems analyst	<i>See Labor Costs</i>
19	<b>TRAINING MATERIALS DEVELOPMENT</b> On-line, CBT training for portal use--specifically for the searching of documents. Price should include developing the dictionary/thesaurus requirements. Assume 2 personnel (one senior and another mid-level) for 8-10 weeks of effort.	\$30,000 to 50,000
20	<b>TRAINING FOR NRC's DBA's</b> Training would be from portal supplier for the Administrator and the Auditor Costs for training two people for one week	\$6000.00
<b>Recurring cost...</b>		

\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #5)	Gross Estimated Cost*
21	<b>APPLICATIONS MAINTENANCE</b> for custom coding. Assume 20% of the cost of developing custom code.	\$18,900.00
22	<b>SOFTWARE MAINTENANCE AGREEMENTS</b> (for Plumtree software 22.5K for 18 months, and \$900 year for Cognos after the first year of purchase)	\$23,400.00
23	<b>HARDWARE MAINTENANCE AGREEMENTS</b> For 18 months at \$21,000 per month	\$378,000.00
24	<b>FACILITY AND ODC's</b> 2 racks, \$1000/month for a total of 18 months (no facility management labor included)	\$18,000.00
25	<b>DISPOSABLES</b> CD-ROMs, tapes, etc. for backup and storage  800 DLT4 tapes @ \$70	\$56,000.00
26	<b>UTILITY AND GENERAL-PURPOSE OFFICE SOFTWARE</b> Word processing, spreadsheet, e-mail, anti-virus, etc. \$1,500 for each staffer X 5 staffers = \$7,500	\$7,500.00
27	<b>ADDITIONAL TRAINING</b> Procedures, user guides, SDL	<i>See Labor Costs</i>

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\*Not a quotation – for general reference only. Travel costs NOT included.

Item Number	DESCRIPTION (Comments and Details for Alternative #5)	Gross Estimated Cost*
	SUB-TOTAL GROSS ESTIMATED COSTS WITHOUT LABOR*	\$2,719,576.00 to \$2,739,576.00
	GRAND TOTAL GROSS ESTIMATED COSTS WITH LABOR (see below for labor breakdown costs)*	\$4,101,312.00 to \$4,121,312.00

Labor Costs	
Phase/Description	Gross Estimated Cost*
Phase I – Design, implementation, integration, and training materials	\$1,059,216.00
Phase II – Implementation for 6 months to January 1, 2001	\$322,520.00
TOTAL	\$1,381,736.00

\*Not a quotation – for general reference only. Travel costs NOT included.



## Explanation of Costing Tables for LSN Alternatives 3, 4, and 5

January 6, 2000

### Overall Assumptions:

- 1) Compliance and presentation components do not differ across alternatives.
- 1) Pricing presented to TWG at December 6, 1999 meeting (TWG document) is in the ballpark for the components listed. Note that the system described in the TWG document was intended to represent Alternative 5.
- 1) Level-of-effort for design and implementation will be approximately the same across alternatives using the same assumptions previously stated in developing TWG document.

### Common (and unchanged) Items:

Items common to Alternatives 3, 4, and 5, and unchanged from TWG document (item numbers as in that document):

1, 2, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 26.

### Changed items:

#### Alternative 3 (distributed storage):

- 3) Significant reduction in required capability from TWG document, respecify as 2 Dell PowerEdge 8450, 4CPU, 2MB cache, 4GB RAM @ \$56,645 ea., plus 4 Dell PowerVault 650F RAID storage with 10x18GB drives @ \$41,368 ea., total = \$278,762.
- 1) Specify two units rather than one, 2@\$9,000 = \$18,000.
- 12) Toolkits for web page modification - the TWG document lists this at \$500, but it should be \$500 per computer at which a developer will sit, i.e. 5@\$500, total = \$2,500.
- 23) Scaled appropriately to decreased hardware costs, total = \$40,000.
- 25) No change from TWG document.

*Additional line item: Utility and general-purpose office software for each staffer (word processor, spreadsheet, e-mail, anti-virus, etc.), 5@\$1,500 = \$7,500.*

Alternative 4 (LSN campus):

- 3) Significant reduction in required capability from TWG document, respecify as 2 Dell PowerEdge 8450, 4CPU, 2MB cache, 4GB RAM @ \$56,645 ea., plus 8 Dell PowerVault 650F RAID storage with 10x18GB drives @ \$41,368 ea., total = \$444,234.
- 3) Specify two units rather than one, 2@\$9,000 = \$18,000.
- 12) Toolkits for web page modification - the TWG document lists this at \$500, but it should be \$500 per computer at which a developer will sit, i.e. 5@\$500, total = \$2,500.
- 23) Scaled appropriately to decreased hardware costs, total = \$60,000.
- 25) No change from TWG document (assuming participants are responsible for own backup).

*Additional line item: Utility and general-purpose office software for each staffer (word processor, spreadsheet, e-mail, anti-virus, etc.), 5@\$1,500 = \$7,500.*

Alternative 5 (consolidated storage):

- 3) Same unit (Sun 10000) plus additional 2TB disk storage, add \$431,000 for total = \$1,765,176.
- 3) Specify two units rather than one, 2@\$9,000 = \$18,000.
- 12) Toolkits for web page modification - the TWG document lists this at \$500, but it should be \$500 per computer at which a developer will sit, i.e. 5@\$500, total = \$2,500.
- 23) Scaled appropriately to increased hardware costs, total = \$378,000.
- 25) Doubled from TWG document, 2@\$28,000 for total = \$56,000.

*Additional line item: Utility and general-purpose office software for each staffer (word processor, spreadsheet, e-mail, anti-virus, etc.), 5@\$1,500 = \$7,500.*

# Explanation of Costing Tables for LSN Alternatives 3, 4, and 5

January 6, 2000

## Overall Assumptions:

- 1) Compliance and presentation components do not differ across alternatives.
- 2) Pricing presented to TWG at December 6, 1999 meeting (TWG document) is in the ballpark for the components listed. Note that the system described in the TWG document was intended to represent Alternative 5.
- 3) Level-of-effort for design and implementation will be approximately the same across alternatives using the same assumptions previously stated in developing TWG document.

## Common (and unchanged) Items:

Items common to Alternatives 3, 4, and 5, and unchanged from TWG document (item numbers as in that document):

1, 2, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 26.

## Changed items:

### Alternative 3 (distributed storage):

- 3) Significant reduction in required capability from TWG document, respecify as 2 Dell PowerEdge 8450, 4CPU, 2MB cache, 4GB RAM @ \$56,645 ea., plus 4 Dell PowerVault 650F RAID storage with 10x18GB drives @ \$41,368 ea., total = \$278,762.
- 4) Specify two units rather than one, 2@\$9,000 = \$18,000.
- 12) Toolkits for web page modification - the TWG document lists this at \$500, but it should be \$500 per computer at which a developer will sit, i.e. 5@\$500, total = \$2,500.
- 23) Scaled appropriately to decreased hardware costs, total = \$40,000.
- 25) No change from TWG document.

*Additional line item: Utility and general-purpose office software for each staffer (word*

*processor, spreadsheet, e-mail, anti-virus, etc.), 5@\$1,500 = \$7,500.*

Alternative 4 (LSN campus):

- 3) Significant reduction in required capability from TWG document, respecify as 2 Dell PowerEdge 8450, 4CPU, 2MB cache, 4GB RAM @ \$56,645 ea., plus 8 Dell PowerVault 650F RAID storage with 10x18GB drives @ \$41,368 ea., total = \$444,234.
- 4) Specify two units rather than one, 2@\$9,000 = \$18,000.
- 12) Toolkits for web page modification - the TWG document lists this at \$500, but it should be \$500 per computer at which a developer will sit, i.e. 5@\$500, total = \$2,500.
- 23) Scaled appropriately to decreased hardware costs, total = \$60,000.
- 25) No change from TWG document (assuming participants are responsible for own backup).

*Additional line item: Utility and general-purpose office software for each staffer (word processor, spreadsheet, e-mail, anti-virus, etc.), 5@\$1,500 = \$7,500.*

Alternative 5 (consolidated storage):

- 3) Same unit (Sun 10000) plus additional 2TB disk storage, add \$431,000 for total = \$1,765,176.
- 4) Specify two units rather than one, 2@\$9,000 = \$18,000.
- 12) Toolkits for web page modification - the TWG document lists this at \$500, but it should be \$500 per computer at which a developer will sit, i.e. 5@\$500, total = \$2,500.
- 23) Scaled appropriately to increased hardware costs, total = \$378,000.
- 25) Doubled from TWG document, 2@\$28,000 for total = \$56,000.

*Additional line item: Utility and general-purpose office software for each staffer (word processor, spreadsheet, e-mail, anti-virus, etc.), 5@\$1,500 = \$7,500.*

**From:** Dan Graser  
**To:** ARP\_Materials  
**Date:** Wed, Feb 16, 2000 12:36 PM  
**Subject:** A helpful table

It presents, for all five alternatives (two discarded at October TWG meeting plus three still viable), key elements that the TWG examined.

I do not know how this table will convert into MS Word: a hash-grid over the two discarded alternatives appears to me to have been translated into shades of grey.

This will be included in the handout package at the ARP meeting so if it doesn't display properly, you will be getting a hardcopy next week anyhow.

**Mail Envelope Properties** (38AAE034.4A1 : 1 : 18974)

**Subject:** A helpful table  
**Creation Date:** Wed, Feb 16, 2000 12:36 PM  
**From:** Dan Graser

**Created By:** DJG2.TWF2\_PO.TWFN\_DO

Recipients	Action	Date & Time
internet "Bob.Wells@rw.doe.gov" BC (Bob Wells) "Clark.Ray@EPA.GOV" (Ray Clark)	Transferred	02/16 12:37 PM
acj.carson-city.nv.us abby (Abby Johnson)	Transferred	02/16 12:37 PM
anv.net JudyTF (Judy Treichel)	Transferred	02/16 12:37 PM
aol.com MalMurphy (Malachy Murphy) nvtapper (Les Bradshaw) Tiffanah (Nick Stellavato) tuftam (Tammy Manzini)	Transferred	02/16 12:37 PM
att.net hoyle1132 (John Hoyle)	Transferred	02/16 12:37 PM
caliente.igate.com jcciac (Eve Culverwell)	Transferred	02/16 12:37 PM
co.clark.nv.us dax (Dennis Bechtel) evt (Englebrecht vonTiesenhausen)	Transferred	02/16 12:37 PM
cs.unlv.edu taghva (Kazem Taghva)	Transferred	02/16 12:37 PM
eurekanv.org Ifiorenzi (Leonard Fiorenzi)	Transferred	02/16 12:37 PM
gfoster.com gfoster (Glen Foster)	Transferred	02/16 12:37 PM
govmail.state.nv.us	Transferred	02/16 12:37 PM

madams (Marta Adams)  
ssteve (Steve Frishman)

idsely.com wpnucwst (Debra Kolkman)	Transferred	02/16 12:37 PM
isri.unlv.edu tom (Tom Nartker)	Transferred	02/16 12:37 PM
labat.com joseph_speicher (Joseph Speicher) tony_neville (Tony Neville)	Transferred	02/16 12:37 PM
NCAI.org Robert_Holden (Robert Holden)	Transferred	02/16 12:37 PM
nei.org rxm (Rod McCullum) spk (Steven Kraft)	Transferred	02/16 12:37 PM
Notes.YMP.gov Claudia_Newbury (Claudia Newberry) Jill_Schrecongost (Jill Schrecongost)	Transferred	02/16 12:37 PM
phonewave.net cccomp (Alan Kall)	Transferred	02/16 12:37 PM
sierra.net escorop (Tony Cain)	Transferred	02/16 12:37 PM
telis.org inyoplanning (Andrew Remus)	Transferred	02/16 12:37 PM
chris berlien (Chris Berlien)	Transferred	02/16 12:37 PM
elaine ezra (Elaine Ezra)	Transferred	02/16 12:37 PM
threeputt.hawthorne.nv.us wallace (Jackie Wallace)	Transferred	02/16 12:37 PM
winston.com strubac (Sheldon Trubatch)	Transferred	02/16 12:37 PM

ymp.gov	Transferred	02/16 12:37 PM
david_hunt (David Hunt)		
harry_leake (Harry Leake)		
john_gandi (John Gandi)		
lew_robertson (Lew Robertson)		
sam_hobbs (Sam Hobbs)		
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ELJ CC (Emile Julian)	Opened	02/16 2:16 PM
FXC (Francis Cameron)	Opened	02/16 1:20 PM
twf1_po.TWFN_DO	Delivered	02/16 12:37 PM
gpb (Paul Bollwerk)	Opened	02/16 2:17 PM
jgw (Jack Whetstine)	Opened	02/17 11:02 AM
JXH5 (John Hoyle)	Opened	02/17 10:03 AM
twf2_po.TWFN_DO	Delivered	02/16 12:37 PM
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hjs (Harvey Spiro)		
JLC5 CC (Jesse Cloud)	Opened	02/16 12:45 PM
RSI CC (R. Irish III)	Opened	02/16 12:41 PM
SEZ CC (Steven Zane)	Opened	02/17 4:30 PM
TJB1 CC (Thomas Barchi)		
twf3_po.TWFN_DO	Delivered	02/16 12:37 PM
MRS3 CC (Matthew Schmit)	Opened	02/16 1:09 PM
twf4_po.TWFN_DO	Delivered	02/16 12:37 PM
CBR	Opened	02/16 7:02 PM
CJG1 CC	Opened	02/17 9:15 AM
SLW1 CC	Opened	02/16 2:08 PM
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anv.net		internet
aol.com		internet
att.net		internet
caliente.igate.com		internet
co.clark.nv.us		internet
cs.unlv.edu		internet
eurekanv.org		internet
gfoster.com		internet
govmail.state.nv.us		internet
idsely.com		internet



isri.unlv.edu	internet
labat.com	internet
NCAI.org	internet
nei.org	internet
Notes.YMP.gov	internet
phonewave.net	internet
sierra.net	internet
telis.org	internet
chris	

internet:terraspectra.com

elaine

internet:terraspectra.com

threeputt.hawthorne.nv.us	internet
winston.com	internet
ymp.gov	internet
owf5_po.OWFN_DO	02/16 12:37 PM
twf1_po.TWFN_DO	02/16 12:37 PM
twf2_po.TWFN_DO	02/16 12:37 PM
twf3_po.TWFN_DO	02/16 12:37 PM
twf4_po.TWFN_DO	02/16 12:37 PM

Files	Size	Date & Time
Alttable.wpd	25836	Thursday, January 13, 2000 1:42 PM
ALTTABLE_word.doc	23113	Wednesday, February 16, 2000 12:30 PM
MESSAGE	1186	Wednesday, February 16, 2000 12:36 PM

**Options**

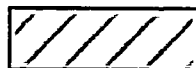
<b>Auto Delete:</b>	No
<b>Expiration Date:</b>	None
<b>Notify Recipients:</b>	No
<b>Priority:</b>	Standard
<b>Reply Requested:</b>	No
<b>Return Notification:</b>	None

<b>Concealed Subject:</b>	No
<b>Security:</b>	Standard

<b>To Be Delivered:</b>	Immediate
<b>Status Tracking:</b>	Delivered & Opened

## GENERAL ATTRIBUTES OF ALTERNATIVES

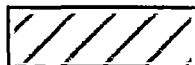
Alternative	I Simplified Strategy	II Moderate Strategy	III Comprehensive Distributed Portal with Participant Maintained Remote Storage	IV Comprehensive Campus Portal with Participant Maintained Proximate Storage	V Comprehensive Distributed Portal with Enhanced Central Storage
<div> <div>Description</div> <div>Criteria</div> </div>	Homepage with Pointers to Other Homepages  Each Participant Maintains Fully Capable Storage, Search, Retrieval Capability.	Centralized Search Interface.  Each Participant Maintains Fully Capable Storage, Search, Retrieval Capability.	Remote Portal Software Indexes.  Participants Maintain Single Set of Files.	Proximate Portal Software Indexes and Data Stores.  Participants Maintain Single Set of Files.	Remote Portal Software Indexes.  Portal Downloads and Caches a Copy of Participants' Files and Uses Cached Items Exclusively.
Ability for LSNA to Exercise High Level of Control	No Systematic Controls Each site Varies	Rudimentary Controls on Interface and Search "Passing"	Search, Interface, Security & Access, and Monitoring & Tuning Tools Provided	Search, Interface, Security & Access  Enhanced Monitoring & Tuning Capability	Search and Interface  Enhanced Security & Access  Enhanced Monitoring & Tuning Capability
Ability for LSNA to Ensure Overall Configuration Performance	Performance is Highly Variable  LSNA Unable to Respond Quickly to Performance Problems	Performance is Highly Variable  Normalized Search "Passing" Still Does Not Guarantee Performance	Performance of Interface Dialogs are Less Variable  Fetching Text & Image Files are Constrained	Assured Interface Performance  Assured File Delivery Performance	Assured Interface Performance  Assured File Delivery Performance
Schedule Risk to LSNA Having Operational to Support Licensing	Low Risk	Moderately Low Risk	Moderate Risk	Moderate Risk	Moderate Risk
Implementation Complexity Risk to LSNA	Low Risk	Moderately Low Risk	High Risk	Moderately High Risk	Moderate Risk



= Alternative no longer being considered

## GENERAL ATTRIBUTES OF ALTERNATIVES

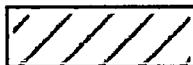
Alternative	I Simplified Strategy	II Moderate Strategy	III Comprehensive Distributed Portal with Participant Maintained Remote Storage	IV Comprehensive Campus Portal with Participant Maintained Proximate Storage	V Comprehensive Distributed Portal with Enhanced Central Storage
Overall Cost for NRC to Develop	Very Inexpensive	Inexpensive	Expensive	Highest Expense	Very Expensive
Participant Burden to Exercise Controls	Participant Implements within Highly Structured Guidelines and Procedures and Is Heavily Audited	Participant Implements within Highly Structured Guidelines (esp. Tech Guidelines for Query Processing) and Procedures (esp. For Change Notification) and Is Heavily Audited	More Coordination and Integration Required (ex. When Site Gets Crawled) but More Flexibility Is Allowable	Campus Administration Imposes More Restrictions in Format Standards, Population of Collections, Security Access than a Distributed Portal	No Responsibility for Controls Except Change Notification within 5 Day Window
Participant Burden to Ensure Performance	Totally Responsible for Availability, Performance and Bandwidth	Totally Responsible for Availability and Performance Relieved of Search Interface	Highly Responsible.  Portal Provides Some Availability Features.  Participant Ensures File Delivery and Bandwidth	Highly Responsible.  Portal Provides Some Availability Features.  Participant Ensures File Delivery Relieved of Bandwidth	No Responsibility Except for During Initial "Crawling" or Loading
Schedule Risk of Participants' Having Operational to Support Licensing	Moderate	High	Higher	Highest	Moderate to High (Affected by Transmission Security)
Implementation Complexity Risk to Participants	Low	Moderately Low	Moderate	Moderate to High	Low



= Alternative no longer being considered

## GENERAL ATTRIBUTES OF ALTERNATIVES

Alternative	I Simplified Strategy	II Moderate Strategy	III Comprehensive Distributed Portal with Participant Maintained Remote Storage	IV Comprehensive Campus Portal with Participant Maintained Proximate Storage	V Comprehensive Distributed Portal with Enhanced Central Storage
<b>Cost Burden to Participants</b>	Minimal A portion of a body or outsourced	Variable Requires Comprehensive System Administration, Depending on Participant System. A portion of a body or outsourced	Variable Requires Comprehensive System Administration, Depending on Participant System; More Difficult to Outsource, More Data Management. A portion of a body or outsourced	Variable Requires Comprehensive System Administration, Depending on Participant System; More Difficult to Outsource, More Data Management. Requires Some Personnel Resource at the Campus Location. A portion of a body or outsourced	Minimal A portion of a body or outsourced
<b>User Flexibility to Tailor Desktop/Interface</b>	Relatively Inflexible	Relatively Inflexible	Very Flexible	Very Flexible	Very Flexible
<b>Ease of Use</b>	Hard Variable Interfaces, per Each Collection/Server	Relatively Easy Query Screen Is Consistent	Easy	Easy	Easy
<b>Availability to Users</b>	Acceptable One or Two Participants Down Leaves the Rest Still Available	Acceptable One or Two Participants Down Leaves the Rest Still Available	Most Available	High Availability	High Availability
<b>Response Time Performance</b>	Variable Depends on Participant Resources	Variable Depends on Participant Resources	Somewhat Variable Image & Text Delivery Depends on Participant Resources	Very Timely	Very Timely



= Alternative no longer being considered



= Alternative no longer being considered

**From:** Dan Graser  
**To:** Abby Johnson, Alan Kall, Andrew Remus, Bob Wells, C.W. (Bill) Reamer, Chris Berlien, Claudia Newberry, David Hunt, Debra Kolkman(...)  
**Date:** Wed, Feb 16, 2000 11:10 AM  
**Subject:** LSN Advisory Review Panel Agenda

One is a MS Word Version, the other is WordPerfect.

Multiple products will be forwarded today and tomorrow via e-mail to give you some advance time to read through the materials.

**CC:** Chad Glenn, Chris Hoxie, Emile Julian, Irish III, R., James Thomas, Jesse Cloud, Matthew Schmit, Sandra Wastler, Steven Zane(...)

**Mail Envelope Properties** (38AAE2C4.4A1 : 1 : 18974)

**Subject:** Alternative #5  
**Creation Date:** Wed, Feb 16, 2000 12:47 PM  
**From:** Dan Graser

**Created By:** DJG2.TWF2\_PO.TWFN\_DO

Recipients	Action	Date & Time
internet "Bob.Wells@rw.doe.gov" BC (Bob Wells) "Clark.Ray@EPA.GOV" (Ray Clark)	Transferred	02/16 12:48 PM
acj.carson-city.nv.us abby (Abby Johnson)	Transferred	02/16 12:48 PM
anv.net JudyTF (Judy Treichel)	Transferred	02/16 12:48 PM
aol.com MalMurphy (Malachy Murphy) nvtapper (Les Bradshaw) Tiffanih (Nick Stellavato) tuftam (Tammy Manzini)	Transferred	02/16 12:48 PM
att.net hoyle1132 (John Hoyle)	Transferred	02/16 12:48 PM
caliente.igate.com jcciac (Eve Culverwell)	Transferred	02/16 12:48 PM
co.clark.nv.us dax (Dennis Bechtel) evt (Englebrecht vonTiesenhausen)	Transferred	02/16 12:48 PM
cs.unlv.edu taghva (Kazem Taghva)	Transferred	02/16 12:48 PM
eurekanv.org lfioenzi (Leonard Fiorenzi)	Transferred	02/16 12:48 PM
gfoster.com gfoster (Glen Foster)	Transferred	02/16 12:48 PM
govmail.state.nv.us	Transferred	02/16 12:48 PM

madams (Marta Adams) ssteve (Steve Frishman)		
idsely.com wpnucwst (Debra Kolkman)	Transferred	02/16 12:48 PM
isri.unlv.edu tom (Tom Nartker)	Transferred	02/16 12:48 PM
labat.com joseph_speicher (Joseph Speicher) tony_neville (Tony Neville)	Transferred	02/16 12:48 PM
NCAI.org Robert_Holden (Robert Holden)	Transferred	02/16 12:48 PM
nei.org rxm (Rod McCullum) spk (Steven Kraft)	Transferred	02/16 12:48 PM
Notes.YMP.gov Claudia_Newbury (Claudia Newberry) Jill_Schrecongost (Jill Schrecongost)	Transferred	02/16 12:48 PM
phonewave.net cccomp (Alan Kall)	Transferred	02/16 12:48 PM
sierra.net escorop (Tony Cain)	Transferred	02/16 12:48 PM
telis.org inyoplanning (Andrew Remus)	Transferred	02/16 12:48 PM
chris berlien (Chris Berlien)	Transferred	02/16 12:48 PM
elaine ezra (Elaine Ezra)	Transferred	02/16 12:48 PM
threeputt.hawthorne.nv.us wallace (Jackie Wallace)	Transferred	02/16 12:48 PM
winston.com strubac (Sheldon Trubatch)	Transferred	02/16 12:48 PM



ymp.gov	Transferred	02/16 12:48 PM
david_hunt (David Hunt)		
harry_leake (Harry Leake)		
john_gandi (John Gandi)		
lew_robertson (Lew Robertson)		
sam_hobbs (Sam Hobbs)		
owf5_po.OWFN_DO	Delivered	02/16 12:48 PM
ELJ CC (Emile Julian)	Opened	02/16 2:18 PM
FXC (Francis Cameron)	Opened	02/16 1:21 PM
twf1_po.TWFN_DO	Delivered	02/16 12:48 PM
gpb (Paul Bollwerk)	Opened	02/16 2:17 PM
jgw (Jack Whetstine)	Opened	02/17 11:02 AM
JXH5 (John Hoyle)	Opened	02/17 10:02 AM
twf2_po.TWFN_DO	Delivered	02/16 12:48 PM
CLH1 CC (Chris Hoxie)	Opened	02/22 3:11 PM
hjs (Harvey Spiro)		
JLC5 CC (Jesse Cloud)	Opened	02/16 1:02 PM
RSI CC (R. Irish III)	Opened	02/16 3:49 PM
SEZ CC (Steven Zane)	Opened	02/17 4:33 PM
TJB1 CC (Thomas Barchi)		
twf3_po.TWFN_DO	Delivered	02/16 12:48 PM
MRS3 CC (Matthew Schmit)	Opened	02/16 1:45 PM
twf4_po.TWFN_DO	Delivered	02/16 12:48 PM
CBR	Opened	02/16 7:02 PM
CJG1 CC	Opened	02/17 9:16 AM
SLW1 CC	Opened	02/16 2:08 PM
Post Office	Delivered	Route
internet		
acj.carson-city.nv.us		internet
anv.net		internet
aol.com		internet
att.net		internet
caliente.igate.com		internet
co.clark.nv.us		internet
cs.unlv.edu		internet
eurekanv.org		internet
gfoster.com		internet
govmail.state.nv.us		internet
idsely.com		internet

isri.unlv.edu	internet
labat.com	internet
NCAI.org	internet
nei.org	internet
Notes.YMP.gov	internet
phonewave.net	internet
sierra.net	internet
telis.org	internet
chris	

internet:terraspectra.com

elaine

internet:terraspectra.com

threeputt.hawthorne.nv.us	internet
winston.com	internet
ymp.gov	internet
owf5_po.OWFN_DO	02/16 12:48 PM
twf1_po.TWFN_DO	02/16 12:48 PM
twf2_po.TWFN_DO	02/16 12:48 PM
twf3_po.TWFN_DO	02/16 12:48 PM
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Files	Size	Date & Time
Revplan5.wpd	67619	Thursday, January 13, 2000 1:41 PM
REVPLAN5.doc	75818	Friday, January 14, 2000 9:24 AM
Titlepg5.wpd	1763	Friday, January 14, 2000 9:26 AM
TITLEPG5.doc	1517	Friday, January 14, 2000 9:26 AM
MESSAGE	689	Wednesday, February 16, 2000 12:47 PM

**Options**

Auto Delete:	No
Expiration Date:	None
Notify Recipients:	No
Priority:	Standard
Reply Requested:	No
Return Notification:	None

Concealed Subject:	No
Security:	Standard

To Be Delivered:	Immediate
Status Tracking:	Delivered & Opened

**Licensing Support Network Advisory Review Panel  
Public Meeting  
February 23, 2000  
Las Vegas, Nevada**

8:30 - 8:45 am	Opening Remarks	John Hoyle
8:45 - 9:00 am	DOE Report on Continuation of Funding For AULGs Through Licensing Process	Claudia Newbury
	Questions/Answers & Discussion	
9:00 - 9:25 am	§2.1004 Clarification on Making Available an Index of Documents Not Placed on Participant External Collection	Chip Cameron
	Questions/Answers & Discussion	
9:25 - 10:00 am	Summary of October & December TWG Meetings	Dan Graser
10:00 - 10:15	Break	
10:15 - 10:30	Overview of Alternatives	Dan Graser
10:30 - 12:00	Alternatives 3, 4 & 5 - Description, Implication And Decision Factors	Glen Foster
12:00 - 1:00	Lunch	
1:00 - 1:45	Questions/ Answers & Discussion on Alternatives 3, 4, & 5	Glen Foster
1:45 - 2:15	General Expenditures Assessment	Dan Graser
2:15 - 2:30	Break	
2:30 - 2:45	Summary & Next Steps Include Plan to Get Closure on Functional Rqmts.	Dan Graser
2:45 - 3:00	Alternatives 1 & 2: Non-Recommendation	Glen Foster
3:00 - 4:30	Panel Discussion and Action on Recommendations	John Hoyle
4:30 - 5:00	Planning, Other Business	John Hoyle

**From:** Dan Graser  
**To:** ARP\_Materials  
**Date:** Wed, Feb 16, 2000 12:10 PM  
**Subject:** Technical Working Group meeting minutes from October

Most of you should have received this already, but just in case its been misplaced...

Word and WordPerfect versions

**From:** Dan Graser  
**To:** ARP\_Materials  
**Date:** Wed, Feb 16, 2000 12:14 PM  
**Subject:** December TWG meeting background info

Most of you should also already have received this.

MS Word and WordPerfect versions