UPDATE OF U.S. NUCLEAR REGULATORY COMMISSION AND CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES FUNCTIONAL NEEDS ANALYSIS FOR TECHNICAL COMPUTING AND INFORMATION MANAGEMENT

Prepared for

Nuclear Regulatory Commission
Contract NRC-02-97-009

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March 1998

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Attachment 2

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1 INTRODUCTION

1.1 BACKGROUND

The Division of Waste Management (DWM) in the Office of Nuclear Material Safety and Safeguards (NMSS) directs the U.S. Nuclear Regulatory Commission (NRC) program for the regulation of Low-Level Waste (LLW), Decommissioning, Uranium Recovery (UR), and the U.S. Department of Energy (DOE) High-Level Waste (HLW) repository program. The DWM develops, implements, and evaluates safety and environmental policies and long-range goals for these activities. The Center for Nuclear Waste Regulatory Analyses (CNWRA) is the NRC federally funded research and development center that provides DWM and other NRC organizations technical assistance and research support. This assessment of functional needs relating to technical computing and information management is focused on the HLW repository program. In order to exercise its license review capabilities, evaluate site characterization and risk assessment reports, and develop and evaluate compliance with regulatory requirements and guidance, NMSS should continue to streamline and upgrade its technical capabilities in three core areas. These areas focus on (i) high-performance technical computing, (ii) document and records management systems, and (iii) office automation. Moreover, these three capability areas should be fully integrated so the flow of program information (i.e., data, documents, and analyses) can be shared and efficiently disseminated in electronic form between the NRC and CNWRA. Although the functional needs of other programs are noted in this analysis, the focus is on the HLW program.

High-performance technical computing requires the employment of high-end scientific computing equipment. DWM maintains an Advanced Computer System (ACS) composed of UNIX-based Sun Microsystems (SUN) as well as Silicon Graphics (SGI) servers and workstations, along with personal computer (PC) clients. Similar capabilities are available at the CNWRA to support technical assistance conducted on behalf of the NRC. The DWM operates this equipment to conduct a range of critical activities including to (i) probe, via a variety of performance assessment (PA) codes, the DOE safety case for the proposed repository; (ii) visualize and interpret, using geographic information system (GIS) software, site characterization data; and (iii) process and analyze, with statistical/graphical software, field data. In addition, the ACS and associated computer codes can be used to evaluate mill tailings stability, impact of *in-situ* uranium mining, effectiveness of decommissioning measures and potential criticality at waste disposal sites. These servers, workstations, and clients can be accessed through a local area network (LAN) or as stand-alone workstations/computers.

Document management is an essential tool for DWM staff review of the DOE repository program, since a vast number of documents (i.e., reports containing site characterization data, repository design studies, and PA studies) are being produced by DOE and its contractors. The NRC and the CNWRA have used, to the extent practicable, existing document management systems, such as Nuclear DOCument System (NUDOCS) and Consolidated DOCument System (CDOCS) to manage search and retrieval of technical documents. Along with the management of documents, the management of official records and control of work flow (i.e., NRC document preparation, review, approval, and distribution) are important to retaining an effective DWM information technology infrastructure.

Office automation proficiency necessitates selecting and deploying word processing, spreadsheet, and database application software, along with software related to e-mail and project management, that is compatible with various LAN environments. In addition, these application software packages should permit the exchange of data and graphics among the DOE, NRC, and CNWRA. Retention of an effective

DWM information technology infrastructure will require availability of sufficient resources to maintain and update NRC LAN capabilities along with associated hardware and software.

A large set of computer codes, developed by the NRC and/or CNWRA and acquired from other organizations, are currently used by the DWM staff for evaluating the performance of the proposed HLW repository. The recently developed Total-system Performance Assessment (TPA) code will be the primary analytical tool used in evaluating compliance with the NRC regulation. However, several other sophisticated computer codes have been designed for auxiliary analyses of engineered and natural barriers. Both the TPA and the auxiliary analyses codes will play a vital role in assessing the implementability of the Environmental Protection Agency (EPA) standard and in developing an appropriate site-specific NRC regulation for HLW disposal.

The NRC will advance its information technology infrastructure and computing resources by implementing, in the near future, its Agency Documents Access and Management System (ADAMS) to replace NUDOCS, CDOCS, and the NRC Public Document Room Bibliographic Retrieval System (BRS). Moreover, NMSS intends to upgrade its PC clients with Intel-based computers using Microsoft Windows NT as their operating system. Concurrent with this expected change in the NRC information technology infrastructure, the CNWRA, too, will similarly migrate its PCs to Intel-based machines operating under Microsoft Windows NT. As these changes are implemented, the NRC and CNWRA are carefully assessing their common information technology and scientific computing needs to ensure the highest level of compatibility.

1.2 PURPOSE

The fundamental purpose of this report is to provide a working document that can be used as part of the NRC planning process. A review and evaluation of the functional needs has been accomplished concerning those information technology and computer resources (i.e., hardware and software) that the DWM and CNWRA will use to satisfactorily execute both prelicensing and licensing activities, particularly those related to the HLW program. An important part of this needs analysis is the identification of

- Near- and far-term needs for documents and records management, commercial-of-the-self (COTS) software for statistical computations and graphical display
- Issues related to ensuring full access to the NRC centralized electronic document system (i.e., ADAMS) via connection and networking of servers
- COTS software required to support the performance assessment activities

This document updates the initial functional needs analysis (Johnson, et al., 1992) that was prepared prior to the establishment of the ACS and development of CDOCS. Although this report primarily focuses on the functional needs for prelicensing and licensing activities for the proposed Yucca Mountain (YM) repository, it also addresses in general terms the needs of the NRC UR, SDMP, Tank Waste Remediation System, West Valley Demonstration Project, and Spent Fuel Projects Office projects.

1.3 ASSUMPTIONS

In examining the specific functional needs of the NRC and CNWRA associated with computer software and hardware capabilities, various programmatic and planning assumptions were made regarding the NRC and DOE HLW repository programs. These assumptions are:

- NRC will implement the ADAMS document and Workflow management system by 1999. By May 1998, DWM will have the client hardware necessary to support implementing ADAMS functions. Once ADAMS is fully operational at NRC, the CNWRA will establish access to ADAMS via a server.

- The existing document management systems (NUDOCS and CDOCS) will be maintained during the transition to ADAMS.

- The Licensing Support System (LSS) will provide a records retrieval capability (text and image) by early 2000.

- NRC will be responsible for loading of the ADAMS and LSS databases.

- The Office of the Chief Information Officer (OCIO) will provide the primary interface regarding (i) support for operation and maintenance of the ACS; and (ii) installation, maintenance, and staff training on use of ADAMS and the LSS for the DWM.

- NRC and CNWRA will have access to the DOE databases and PA computer codes via high-speed communication lines.

- NRC technical staff will use a combination of high-end PC and scientific (e.g., UNIX) workstations for technical computing including data manipulation and graphics.

2 PROGRAM REQUIREMENTS

2.1 PROGRAM ACTIVITY DESCRIPTIONS

Although the presentation of program activities in budgeting documents has varied from year-to-year to reflect changing emphasis and priorities of work, the overall scope and definition of the HLW program activities has not changed materially in recent years. To maintain a consistent planning basis, the descriptions of the program areas found in previous functional needs reports prepared for the DWM (e.g., Chery, 1990, and Johnson et al., 1992) are retained in this document.

2.1.1 License Review Capability

Computer resources are needed for the technical staff of the DWM and CNWRA to develop methods and capabilities to independently evaluate the DOE License Application (LA). Brief descriptions of each of the three major subordinate program areas comprising license review capability follow.

2.1.1.1 Analysis Method Preparation

A fundamental aspect of license review is the development and use of various analytical techniques to probe vulnerabilities in the DOE LA, as well as pre-licensing and supporting documentation. Although the focus of LA review is anticipated to be the determination of compliance with a total system performance requirement [see section 2.1.1.2 Iterative Performance Assessment (IPA)] the Commission must have reasonable assurance in this determination. Consequently, staff must develop and employ a variety of analytical methods that will evaluate the adequacy of DOE site investigations and designs; the contributions of key engineering components to pre- and post-closure performance; and the effects of various features, events, and processes on long-term repository performance. These analysis methods are developed within the appropriate key technical issues (KTI), which define the 10 principal components of the HLW program.

2.1.1.2 Iterative Performance Assessment

A significant aspect of the license review capability and the associated analysis methods involves developing and implementing a methodology to conduct a total-system performance assessment (TSPA). As noted in the preceding section, application of the TSPA methodology is fundamental in determining whether the EPA standard regarding protection of human health and the environment for thousands of years has been met. Because site characterization and design are conducted over a period of years, and understanding regarding total system performance continues to evolve, development and evaluation of the requisite methodology take place over time in a process known as IPA.

2.1.1.3 Review Plans Preparation

The staff is preparing review methods and acceptance criteria to guide its review of DOE prelicensing documents and the LA. Within each KTI, issue resolution status reports (IRSRs) are being developed that include the most current review methods and acceptance criteria. The IRSRs will provide a basis for reviewing the DOE Viability Assessment (VA). It is currently anticipated that, as out-year budgets are restored, a Standard Review Plan (SRP) will be prepared which will incorporate the various review methods and acceptance criteria from the IRSRs. The SRP will integrate the review methods

contained in the IRSRs, which focus on long-term performance, with those dealing with pre-closure radiological health and safety, which have not been developed to date because of resource restrictions.

2.1.2 Site Characterization, Viability Assessment, and EIS Reviews

In recent years, NRC staff have reviewed the DOE Site Characterization Plan (SCP) progress reports on an informal basis; this is anticipated to continue through receipt of the LA. The focus of these reviews has been on (i) new information about the site, design, and performance estimates; (ii) new technical issues and plans to resolve them; (iii) changes to the original plans and schedules; and (iv) DOE progress toward resolving potential licensing issues. Staff has curtailed or strictly limited the review of study plans, site/repository technical reports, and major design reports in light of resource constraints. Concerns are communicated to DOE management through periodic meetings between the senior management of the organizations, technical exchanges, and appendix 7 meetings. This approach has proven to be highly effective. In addition, the technical staff regularly participate in technical interactions with the Advisory Committee on Nuclear Waste (ACNW), Nuclear Waste Technical Review Board (NWTRB), the EPA, the National Academy of Science (NAS), and other organizations involved in HLW management.

Following revision of the overall DOE program and associated direction from Congress, staff has focused its review efforts on the DOE VA, which is scheduled for completion in 1998. This review requires acquisition, reduction, analysis, and presentation of vast quantities of data gathered by various organizations. The spatial and temporal scales of the database and the associated analyses of performance pose particular challenges. Computer databases, visualization software, and analytical techniques are essential to the conduct of these reviews. Reviews are conducted on an ongoing basis as the site characterization program and VA development progress. The purposes of these reviews are to provide regular feedback to the DOE and to permit the NRC and CNWRA staff to gain experience in independently examining, testing, and evaluating DOE products.

The Nuclear Waste Policy Act (NWPA) calls upon the NRC to adopt, to the extent practicable, the DOE environmental impact statement (EIS). NRC review of this document is anticipated to draw upon the results of previous reviews of DOE prelicensing submittals. Furthermore, to the extent that independent analyses may be required to support decision making regarding adoption of the EIS, the TSPA and other analysis methods described in section 2.1.1 will be employed.

2.1.3 NWPA Regulatory Requirements and Guidance

Supporting development of the EPA standard and preparing the NRC implementing regulation are critical aspects of the overall HLW program. Staff interactions on the EPA standard focus on critical evaluations of the underlying principles that EPA intends to incorporate in the standard. These interactions are supported by detailed calculations related to the compliance period, the description and location of the critical group, the role of human intrusion, the effects of disruptive processes, and the like. Similarly, the statement of considerations for the implementing regulation must have a strong technical basis that draws upon the results of independent numerical calculations and technical evaluations.

Beyond the regulations, the development of guidance documents is anticipated to be quite limited. The current schedule for prelicensing activities and LA submittal will probably not permit development of a full range of guidance documents, as is traditionally done. Only the most critical items

will be developed. For example, although the staff completed an LA format and content guide early in the program, it does not appear that time will permit revision of this document to conform to the new regulatory construct. Rather, staff will rely on the basic content of the regulation, the IRSRs, the SRP, and comments on the VA (particularly the LA development plan) to communicate to DOE the requirements for the LA.

2.1.4 Management Support and Other Functions

Certain management functions must be performed to support the ongoing operations of the DWM and CNWRA. Required management support functions include electronic communications; preparation and dissemination of reports, briefing charts, meeting materials, and the like; indexing, storing, and retrieving correspondence and related project documentation; and development of spreadsheets and project schedules for operating plans, five-year plans, and cost reporting. Videoconferencing and associated exchanges of complex technical image files among multiple locations have proven invaluable to the management of the program and conduct of technical interactions with the DOE and other organizations.

As the program progresses, development and implementation of the LSS is anticipated. Based on current plans, hardware and software will have to be in place to permit each of the parties affected by the NWPA to provide input to and retrieve information from the LSS.

2.2 PROGRAM APPLICATION FUNCTIONS

Assuming a three to five year planning horizon, an assessment of functional needs was performed to determine the specific NRC computer application functions that will be needed for supporting the prelicensing and licensing activities. A description of this assessment for each application area is provided in the following sections. The activities and functions delineated in this section are intended to be illustrative, not exhaustive.

2.2.1 High-Performance Technical Computing

The ACS at the NRC is a client-server system consisting of high-performance workstations and computers. The ACS has a spectrum of COTS software packages and appropriate peripheral equipment (e.g., printers, plotters, and scanners). The ACS will be used to (i) access DOE databases and codes; (ii) conduct independent PA for all of the DWM programs, including the HLW repository program; and (iii) evaluate engineering designs for the HLW repository. The ACS should also provide the capability for visualizing geosciences information, manipulating data, constructing geologic framework models, and executing engineering design codes. Access to mainframe and super computers should also be available as needed.

It is expected that staff will extensively use the ACS in reviewing the safety analyses for the proposed HLW repository and other radioactive waste facilities. Extensive interactive modeling and analysis work is being and will be performed by the NRC and CNWRA staffs. During the next three to five years, the following subfunctions are important aspects of high-performance scientific computing for both organizations:

- Assurance of model/code accuracy and reproducibility of results for use in technical reviews and the adjudicatory hearing processes
- Application of engineering and scientific computer codes
- Scientific visualization and multimedia output capability
- Code configuration control
- Maintenance of existing computer systems
- Management of disk space growth
- Network bandwidth in NRC/CNWRA connectivity

2.2.1.1 Engineering and Scientific Codes

For hydrologic and geologic studies, specific computing capabilities are needed to permit detailed analysis and display of spatial/temporal trends of site data. For instance, GIS capabilities are increasingly being used in assessments of the proposed HLW repository. Three-dimensional (3D) image construction with rotation and zoom-in and -out to any scale, displayed on high-resolution color monitors, is needed to develop understanding of complex interrelationships among diverse data, and to handle the large volume of data accurately and in a timely manner.

Visualization software, such as EarthVision, are currently being used at the CNWRA to construct hydrostratigraphic representations and structural feature models. Additionally, visualization models are being used to correlate geophysical survey data (i.e., gravity, magnetic, and seismic) and digital elevation model data collected by the United States Geological Survey (USGS) and others with the geologic structure and stratigraphic models. In addition to visualizing site data, this type of software provides output in the form of two-dimensional (2D) cross-sections at specified locations to support generating 2D and 3D PA model grids. For instance, various COTS software are being used on SUN workstations and high-end PCs to

- Model topographic features of the YM site
- Evaluate runoff/infiltration in relation to subsurface flow at YM
- Assess thermal-hydrologic-chemical effects in the near-field of the repository
- Examine the proposed DOE repository design and total system performance
- Apply statistical techniques as part of system-level sensitivity analyses
- Assess performance of the overall repository system
- Evaluate stability of tailing cells
- Estimate the potential for excursions in *in-situ* leach mining

- Assess long-term doses associated with decommissioning sites
- Evaluate safety of vitrification processes

Such applications span a variety of licensing activities, including the independent TSPA that NRC and CNWRA will conduct for the review of the DOE TSPA-VA and LA.

2.2.1.2 Technical Database Access and Analysis

In the process of preparing for prelicensing and licensing activities, it is necessary for the NRC staff to import large technical databases from DOE, USGS, and others. Capabilities must exist to (i) obtain data, manage and manipulate central data files, and analyze these data; and (ii) copy, archive, and manipulate the processed data and calculational output files.

2.2.1.3 Assessment of Performance and Safety

IPA requires that the staff have the capability to develop and implement complex scientific codes with appropriate pre- and post-processors. The TPA code was specifically developed for use in assessing the isolation performance of the proposed YM site. This computer code, which is used for system-level analyses, is supported by more detailed process-level codes that are used in auxiliary analyses. The TPA code is developed around an executive module that directs the flow of information between different computational modules and controls the sequence of their execution. These computational modules model physical processes such as corrosion of waste packages or transport of radionuclides in the groundwater flow system. The TPA code also drives the sampling of statistically distributed variables and performs probabilistic analyses of the output from the computational modules to get cumulative distribution functions of the radionuclide release and human dose. The current version of this code consists of computational modules pertaining to statistical sampling, waste package failure, source term, heat flow, liquid flow, gas flow, liquid and gas transport, disruptive processes, and dose calculation. Sensitivity and uncertainty analyses are performed by a post-processor on the system code output.

Auxiliary analyses are performed to examine complex processes in sufficient detail and to provide a basis for more simplified relationships that are suitable for use in the TPA code. In general, these codes model physical processes more accurately and, thus, provide a basis to evaluate the capabilities and limitations of the simplified models and codes (e.g., the computational modules of the system code) that are used in TPA to estimate performance. Typical auxiliary analyses include 2D and 3D liquid flow analyses in the saturated and unsaturated zones, analyses of disruptive events and investigation of sensitivity/uncertainty analysis methods. Essential pre- and post-processors include database manipulation codes and graphical output software. The current version of the TPA code is designed to operate on UNIX based Sun workstations. Based on current assumptions, it will need to be converted for use on high-end PCs to assure its utility in the future ACS configuration. Other PA codes such as MEPAS and RESRAD will be used for site decommissioning projects.

2.2.1.4 Rulemaking and Guidance Support

Rapid access and use of reference information as well as other file information relevant to the review and evaluation of DOE documents and other literature is desirable to support the future rulemaking and guidance activities. Scoping calculations as well as detailed analyses are required to

evaluate the proposed EPA standard and to develop the statements of consideration for the NRC implementing regulation.

2.2.2 Document and Records Management

Currently, the CNWRA accomplishes document management primarily by indexing header information within CDOCS for documents to be retrieved by the staff. These documents are stored in physical files based on the codes defined in the CNWRA Correspondence Control Subject Code Manual. Contingent on the disposition of CDOCS at NMSS, the CNWRA may need to implement a records management system to accommodate present and future needs. A determination has been made that, while the document management functions of ADAMS can be accessed by the CNWRA, certain documents (e.g., personnel information and records related to other clients) must be maintained separate from the NRC system. Cosequently, the CNWRA needs to have access to ADAMS, but must also maintain a rudimentary document management system itself.

At NMSS, records are maintained in the NUDOCS and CDOCS databases as well as other locations within its respective divisional offices. Document management at NRC is more thoroughly addressed elsewhere (Bell, 1998). Search and retrieval of electronic documents are accomplished by support or contractor staff. The introduction of ADAMS will provide several "libraries" for indexing header and/or full-text information/data accessible directly by the NMSS technical staff.

2.2.2.1 Full-Text Management

The CDOCS client/server system is available at both the NRC and CNWRA for management of full-text HLW documents and records. The CDOCS database at the CNWRA has over 30,000 document headers loaded, many of which are indexed to physical record copies in the CNWRA Library or file areas. All CNWRA outgoing and incoming correspondence is indexed in CDOCS. Full text of documents and technical reports (approximately 100 in the current database) produced and received by the CNWRA are indexed for retrieval. Scanners are used for input of other requisite information not readily available in electronic format to the NRC and CNWRA.

Implementation of ADAMS by 1999 will provide the necessary hardware and software for full text indexing and retrieval of new documents at NRC. The CNWRA would need to have adequate access to ADAMS to support its technical assistance role in several NRC-funded programs.

2.2.2.2 NUDOCS

Currently, NUDOCS is the primary tool available to the NRC staff for conducting document searches and retrievals. Online access, supported by appropriate network bandwidths, is required for effective retrieval of full-text documents by the DWM and CNWRA. Since NUDOCS will be subsumed into ADAMS, the DWM and CNWRA will benefit from the incorporation of NUDOCS data with other document databases.

2.2.2.3 Licensing Support System

The DWM staff will benefit from the LSS, when it becomes available, for document management and quality control of relevant HLW documents, as required by 10 CFR Part 2, Subpart J.

The LSS will provide the "read-only" access to scientific and technical databases that will be needed in the conduct of prelicensing and licensing technical analyses. The LSS will not be operational until early FY 2000. At that time, HLW program documents in ADAMS will be loaded in the LSS, on a priority basis, and will be made available to the DOE, the public, and other parties involved in the HLW program. To retrieve that portion of HLW documents created primarily by the DOE and not available in ADAMS, on-line access of the LSS should be planned for all the NRC and CNWRA staff.

The anticipated configuration of the LSS has changed significantly over the years and current plans are not yet in place. As originally conceived, it was to be mainframe-based. With the evolution of computer technology and the internet, a distributed system is now envisioned. Regardless of its ultimate configuration, use of the LSS will require external systems, networks and media not presently being used in the program. Security issues will also need to be resolved to meet program requirements. For proper loading, indexing, and retrieval to be provided by the responsible parties, a scope of documents will need to be defined for inclusion in the LSS. The LSS will make available the much needed suite of DOE documents and those of other parties in the program, however additional resources will be required for the implementation and operation of the LSS.

2.2.2.4 Other External Databases

Processing large volumes of external (i.e., non-NRC/CNWRA) technical documents, necessitates document and image scanning capability. This capability provides digitization and information storage from a printed or graphical page for composition of technical reports requiring citation and incorporation of reference material from published papers, letters, other printed material. Access to a number of industry and government databases (i.e., DIALOG and other on-line library document databases) is required by the NRC staff. In addition, it may be necessary to access external databases at the DOE national laboratories, universities, and other sources. Electronic access significantly improves the efficiency and timelinesss of staff responses in all prelicensing and licensing interactions.

2.2.3 Office Automation

Effective office automation capabilities are required to support all program activities. E-mail, word processing, project management and spreadsheets, along with database applications are the primary functions requiring computer support. Maintaining and upgrading office automation software will likely pose a significant challenge to retaining the integration of the NRC/CNWRA network and systems environments.

2.2.3.1 E-Mail

The NRC requires intra- and inter-office e-mail and file transfer capability. The same capability is needed at the CNWRA and the NRC Las Vegas office. The NRC is currently using GroupWise e-mail, while the CNWRA uses Lotus cc:Mail to support communications over the dedicated T1 communication line between the two organizations. In addition to the numerous e-mail messages between the NRC and the CNWRA, significant reports and attachments are transferred electronically between the two organizations. Since many of these files are too large to effectively and reliably transfer in this manner, the capability for electronic file transfer should be enhanced to meet future needs.

2.2.3.2 Word Processing, Project Management, and Spreadsheets

At the present time, the NRC and the CNWRA use WordPerfect 6.1 and 8.0, respectively, for word processing. Both the organizations use Microsoft Project for planning and scheduling tasks and EXCEL for spreadsheet processing. These PC-based software packages are used to support the conduct of work in all NRC-sponsored programs.

2.2.3.3 Regulatory and Management Databases

In the past, the Open Item Tracking System (OITS) was used by the NRC and CNWRA to maintain records regarding resolution status of regulatory, institutional, and technical uncertainties. While still functional, OITS is no longer in active use. All the significant open items have been incorporated into the NRC IRSRs, where their status toward resolution is tracked. The CNWRA Commitment Control Log (CCL) enumerates all major and intermediate milestones and administrative items, along with the progress toward completion and acceptance of each. Completed milestones and those awaiting review by the NRC are also tracked, and the CCL is used to evaluate schedule variances. It is essential that trend analysis and tracking of DOE standard deficiencies reports be implemented. These applications require database support, such as Microsoft ACCESS, for storage and retrieval by NRC and CNWRA staff.

2.3 ANALYSIS OF PROGRAM ACTIVITIES AND APPLICATIONS

The following brief discussion and supporting tables correlate the various program activity areas (section 2.1) with the identified functional needs (section 2.2). Technical and management support activities are grouped into program activity areas. Within each program activity, the requisite computer functions and specific capabilities are associated with the relevant organizations, systems, and databases.

2.3.1 Program Requirements by Application

The HLW program activity requirements described in section 2.1 have been related to the application and computer functions listed in table 2-1. Note that where DOE is indicated in the table, they are a source of data, software, and the like, which are used by the NRC and CNWRA. Since there are program and budget constraints on the design and implementation of appropriate computer system support, an indication of the timing of need for the computer function for each program activity during prelicensing and licensing has been indicated to aid in prioritization.

2.3.2 Schedule of Major HLW Program Milestones

Figure 2-1, Schedule of Major HLW Program Milestones, enumerates the major HLW program milestones. The projected dates for major system implementations indicate that ADAMS will be available to support all major activities beyond VA review, including SRP preparation, and the LSS should be available to support the draft LA, final EIS, and LA reviews. By using the information in table 2-1 and figure 2-1, it is possible to determine the timing of the major functional needs and system requirements during the prelicensing and licensing phases of the HLW program.

Table 2-1. HLW program activity requirements by computer application

Program Activity Area	Application and Computer Function	Organization/System/Data Base Interface	Indication of Need
High-Performance Technical Computing			
All (Except Management Support)	Analyze and display spatial and temporal data	DOE, DWM, and CNWRA using Geographical Information Systems (GIS) and 3D modeling	Prelicensing
Iterative Performance Assessment Site Characterization, VA, and EIS Reviews	Analyze and make assessments for determinations of whether DOE has adequately demonstrated that a repository can be constructed and operated at a given-site, as required by regulation	DOE, DWM, and CNWRA using engineering codes and models	Prelicensing
All (Except Management Support)	"Capture" selected two- and three-dimensional graphics and images (drawings, photographs, video) and incorporate them in written reports or other documents being prepared by the clerical staff	DWM and CNWRA	Prelicensing
Analysis Method Preparation Iterative Performance Assessment	Flow chart computer programs written by staff and incorporate flow charts and program listings in reports	DWM and CNWRA	Licensing
Analysis Method Preparation Iterative Performance Assessment Site Characterization, VA, and EIS Reviews	Copy into files on the staff personal computers (PCs) or into the files on servers used interactively by staff, subsets of numerical physical data from the computer database files	DOE/Geologic and Engineering Materials: Bibliography of Chemical Species (GEMBOCH), Geographic Information System (GIS), Site and Engineering Properties Data Base (SEPDB), HLW data, CNWRA data, United States Geologic Services (USGS) data, United States Department of Agriculture (USDA) data	Prelicensing
Analysis Method Preparation Iterative Performance Assessment	Develop NRC computer codes	DWM, CNWRA, RES, national laboratories	Prelicensing

Table 2-1. HLW program activity requirements by computer application (cont'd)

Program Activity Area	Application and Computer Function	Organization/System/Data Base Interface	Indication of Need
High-Performance Technical Computing (cont'd)			
Iterative Performance Assessment Site Characterization, VA, and EIS Reviews	Make independent performance assessment evaluations	DWM, CNWRA, RES, national laboratories	Prelicensing and Licensing
Analysis Method Preparation Iterative Performance Assessment	Modify computer programs/codes to meet a particular need or to use on a different computer system	DOE, DWM, CNWRA, RES, national laboratories,	Licensing
Analysis Method Preparation Iterative Performance Assessment NWPA Regulatory Requirements and Guidance	Implement the performance assessment methodology	DWM and CNWRA	Prelicensing and Licensing
Iterative Performance Assessment Site Characterization, VA, and EIS Reviews NWPA Regulatory Requirements and Guidance	Check calculations, model predictions, analyses, and data in DOE technical reports and open literature reports	DWM and CNWRA	Prelicensing
Analysis Method Preparation Iterative Performance Assessment Site Characterization, VA, and EIS Reviews	Obtain data, manage and manipulate data files, and analyze these data	DOE/GEMBOCH GIS, SEPDB, CNWRA, USGS, USDA, DWM data	Prelicensing
All (except Management Support)	Manage and manipulate small to large technical databases/files	DOE databases, CNWRA data	Prelicensing and Licensing

Table 2-1. HLW program activity requirements by computer application (cont'd)

Program Activity Area	Application and Computer Function	Organization/System/Data Base Interface	Indication of Need
High-Performance Technical Computing (cont'd)			
All	Control and manage existing in-house files of technical references used by the technical staff and provide the associated document management and quality control requirements	CDOCS, NUDOCS, and ADAMS at the CNWRA and DWM	Prelicensing and Licensing
All	Access information from in-house files for reference and incorporation in analyses and written reports	CDOCS, NUDOCS, and ADAMS at the CNWRA and DWM	Prelicensing and Licensing
All	Access to and use of existing external reference databases	DWM and CNWRA, various sources of information	Licensing
All	Digitize and store information from a printed page for composition of technical reports requiring citation of reference material from printed published papers, letters, etc.	DWM and CNWRA	Prelicensing
All	Use the Licensing Support System (LSS) when it becomes available	Licensing Support System Administrator (LSSA)/LSS	Licensing
Review Plan Preparation	Cite document references and incorporate selected information	IRM/NUDOCS, ADAMS CNWRA/CDOCS	Licensing
All	Quickly access and use (import text material) reference information and other file information relevant to the review and evaluation of DOE study plans and other site characterization documents and literature	IRM/NUDOCS, ADAMS LSSA/LSS, CNWRA/CDOCS, NRC/HLW Document Databases, Open Item Tracking System	Licensing

Table 2-1. HLW program activity requirements by computer application (cont'd)

Program Activity Area	Application and Computer Function	Organization/System/Data Base Interface	Indication of Need
Office Automation			
Management Support	Trend analyses; identify, track, and evaluate trends in the DOE standard deficiencies reports of their quality assurance audits	DWM and CNWRA/ACCESS DOE databases	Prelicensing
Management Support	Maintain a means for tracking open items	CNWRA/ACCESS, DWM/Site Characterization Analysis (SCA)	Prelicensing
Management Support	Prepare project schedules and make various assessments of staff resources and utilization	DWM/C-3, CNWRA/Commitment Control Log (CCL)	Prelicensing
Management Support	NRC intra- and inter-office e-mail	NRC, Other NRC Offices	Prelicensing
Management Support	CNWRA e-mail	CNWRA	Prelicensing & Licensing
Management Support	File transfers and file management	NRC, CNWRA	Prelicensing & Licensing
Management Support	Prepare high quality printed material using word processing	NRC, CNWRA	Prelicensing & Licensing

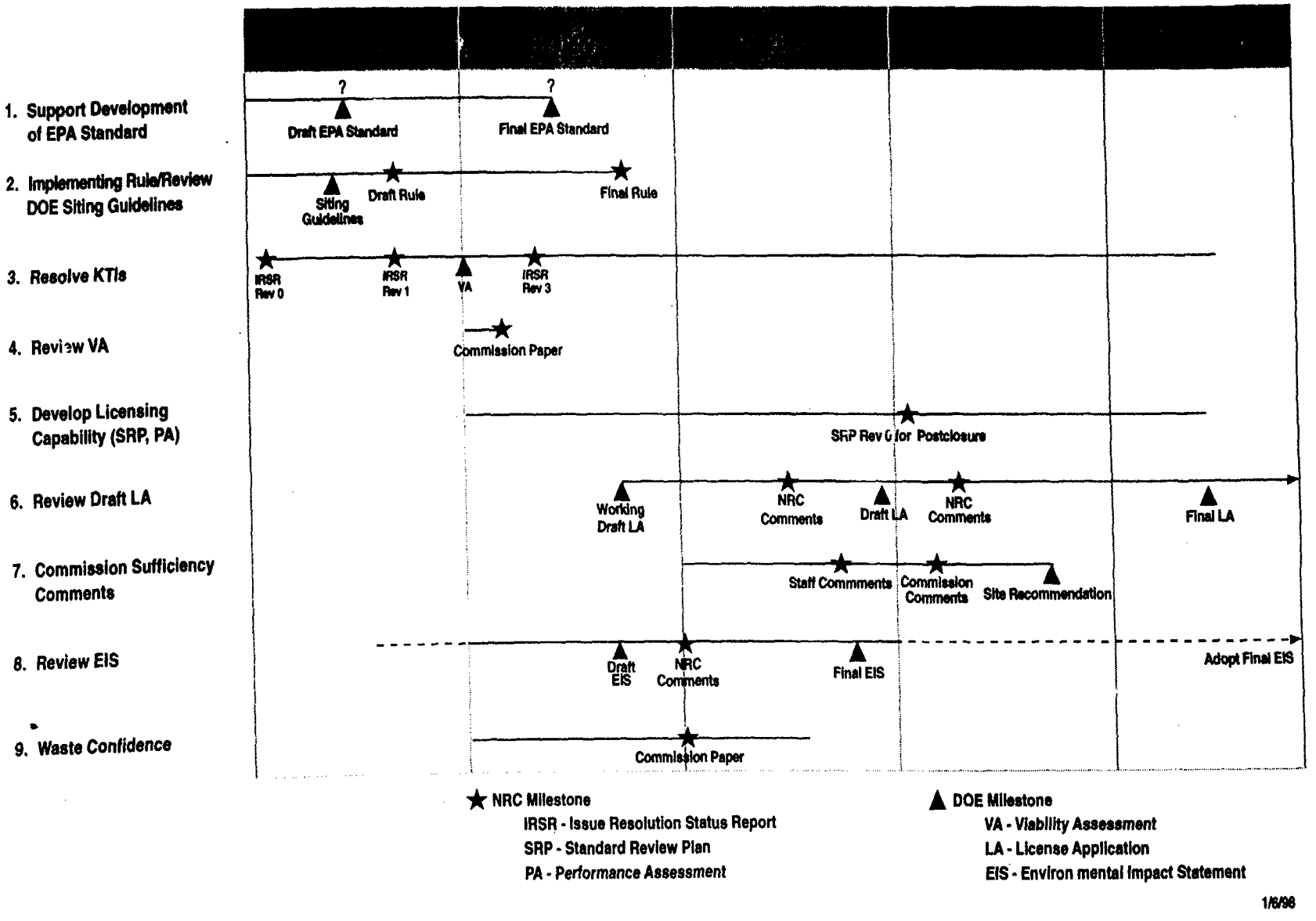

Figure 2-1. Schedule of major high-level waste program milestones

3 POTENTIAL EFFECTS OF NRC INFRASTRUCTURE CHANGES

Over the next three years, the largest potential impact on HLW program activities and computer applications is expected to be associated with changes in the NRC information technology (i.e., computer-related) infrastructure. The primary changes include the planned implementation of (i) centralized document management and (ii) other system and network enhancements.

3.1 AGENCY DOCUMENTS ACCESS AND MANAGEMENT SYSTEM

ADAMS will replace NUDOCS, CDOCS, and the NRC Public Document Room BRS by the end of 1999. ADAMS is an enterprise electronic document management system that supports the generation, capture, distribution, disposition, retrieval, and management of electronic documents and records as illustrated in figure 3-1. ADAMS is a client/server system that operates on local and wide area networks, including the inter- and intra-net. The three basic FileNet software packages—part of ADAMS FileNet Integrated Product Suite Solution—support Workflow, Document Imaging, and Document Management.

ADAMS will affect the indexing and retrieval of bibliographic headers in CDOCS, including of full-text documents currently in the system. All pertinent CDOCS information will have to be transferred or reentered into ADAMS. ADAMS Workflow implementation will require not only the standard interface to generation, retrieval, and management of documents and records, but compatibility with the NRC and CNWRA office automation systems, particularly e-mail, and local and wide area network systems All document scanning for input to ADAMS should to be compatible with and linked to the central repository for capture of documents and inclusion in ADAMS.

3.1.1 Document and Records Management

ADAMS will be a major element of the NRC information technology and management infrastructure. It will provide the capability for cognizant staff to more efficiently collaborate on the development of new or modified text and track progress of documents in preparation, store all new documents electronically in one location, capture documents as they are created, and allow staff searches of the new electronic document collection and the index database of the NUDOCS historical collection at their workstations.

ADAMS will start collecting newly prepared documents from the day it becomes operational. The project will not include conversion of existing documents (i.e., those created prior to ADAMS implementation) into ADAMS. Offices will have to budget for any existing documents that merit conversion, such as those currently in CDOCS.

The conversion of the current CDOCS database into ADAMS appears to be technically feasible. Once the database structures and input/output protocols of the two systems are thoroughly understood, appropriate preprocessing of CDOCS content for transfer into ADAMS will be undertaken in a phased manner, taking into consideration program priorities. For ADAMS to support NRC and CNWRA users, access must be adequate from two standpoints: (i) it must have an easy-to-use interface for the users, and (ii) it must be responsive. The same is true for document generation by the CNWRA and the NRC. In order for access of the central server of ADAMS to be feasible, the necessary bandwidth must be available on the local and wide area networks. Existing use of the dedicated T1 line between the NRC

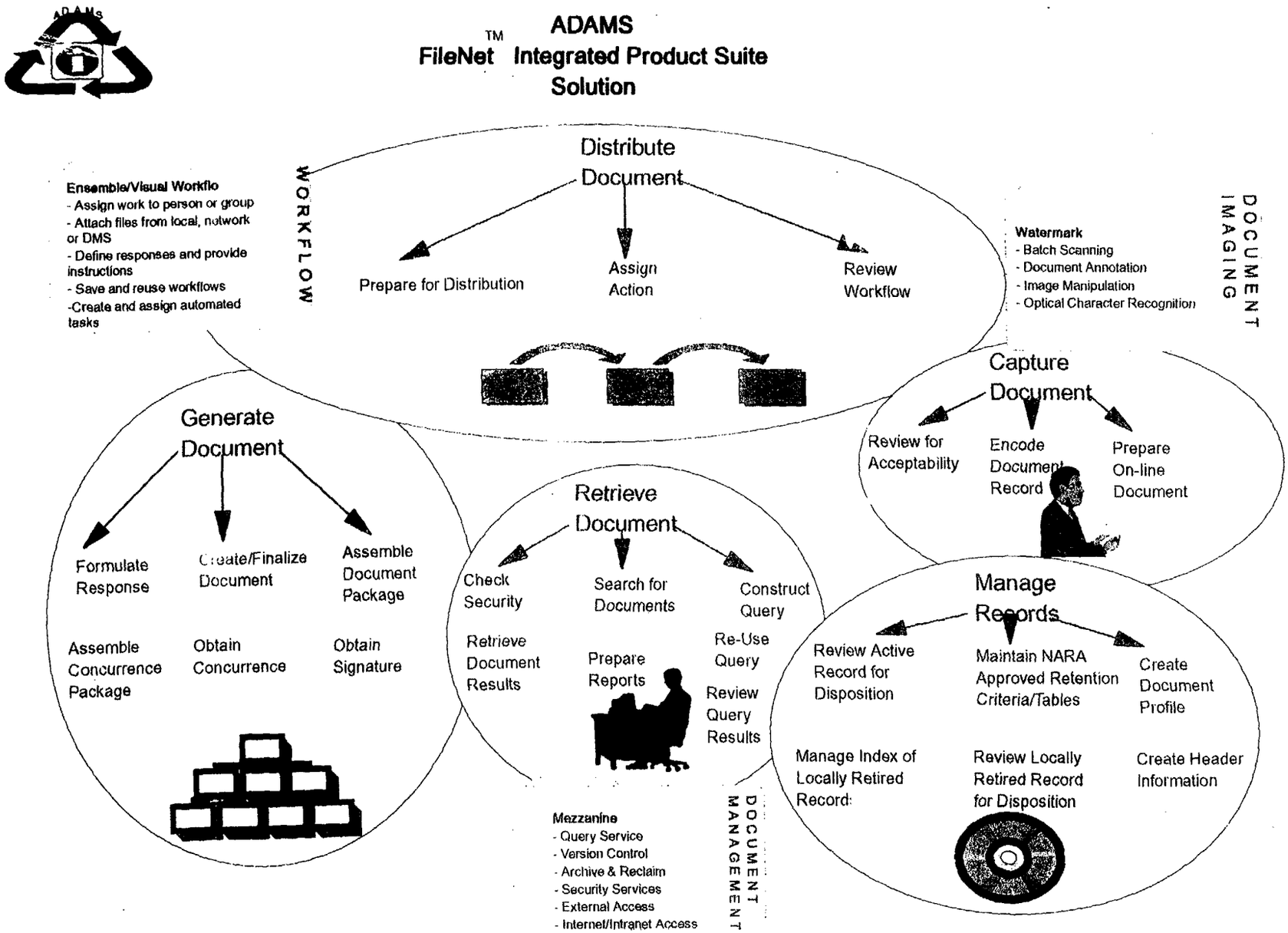

Figure 3-1. NRC document management services

and CNWRA [currently about 6 percent of capacity (Bell, 1998)] indicates that this increase can be accommodated over the next few years.

3.1.2 Workflow

Workflow (i.e., electronic transfer of documents and records among the NRC and CNWRA staff) will automate a wide range of business processes ranging from one-time projects to standard document approvals. Users will be able to graphically describe their business processes using intuitive tools. Work will be routed quickly and easily to participants via the NRC Novell GroupWise and trade e-mail. With intuitive graphical status tracking, users will monitor work as it progresses. Production workflow can integrate document generation, imaging, retrieval, and other document management functions to automate the full range of processes throughout an organization (figure 3-1).

The implementation of Workflow at the NRC and the CNWRA will demand compatibility of the GroupWise and cc:Mail e-mail systems with ADAMS and the LAN at both locations. For complete tracking and statusing of Workflow processes, users must be able to interact over the wide area network between the two organizations; this requires that appropriate interfaces, bandwidth, and security be in place. Although evaluations are ongoing, it appears at this time that adequate functionality can be made available at the CNWRA without installing at replicating site in San Antonio.

3.1.3 Imaging

Imaging capabilities will be available to replace inefficient and costly document handling procedures and for streamlined processing of scanned images, faxes and other electronic documents. Scanning processes will be scaled to meet the needs of a single user, a small group, or larger organizational groups and will leverage the latest technology and Internet capabilities. Imaging for ADAMS will require that appropriate configurations of scanning systems be interfaced to the system servers and networks already mentioned for document and record management as well as workflow processes. The capture, storage, and retrieval of images will significantly increase the needed bandwidth on local and wide area networks for the NRC and the CNWRA (section 3.1.1).

3.2 NETWORK AND SYSTEMS CONFIGURATIONS FOR THE DWM AND CNWRA

3.2.1 Wide Area Network

Because of the need for review and concurrence during document generation, the DWM user interfaces with the Office of General Counsel (OGC), RES, and other organizational units are considered integral to effective internal communications (figure 3-1). The CNWRA, the NRC site office at Las Vegas, the NRC regional offices, and the national laboratories are considered some of the major external (network) organization interfaces.

Technical computing, full-text document management, and e-mail coordination are anticipated to increase significantly within and between the DWM and the CNWRA during the next three years. Consequently, the appropriate bandwidth must be available on the wide area network linking the NRC and the CNWRA (section 3.1.1). Additional security features may be required to ensure the confidentiality and integrity of database file transfers and full-text document management (including those

facilitated through the LSS) over non-dedicated wide area networks. Other access by the NRC and the CNWRA to external databases (i.e., such as the national laboratories and other similar organizations) may also require additional security measures.

The current NRC/CNWRA firewall system will continue to provide information security for the CNWRA in San Antonio and the CNWRA Washington Technical Support Office. As a result of increased need for user access to external networks, enhancements, upgrades, and increased bandwidth are required for the efficient operation of these firewall systems.

3.2.2 Local Area Network

The plans for the NRC LAN during the next three years are to standardize as much as possible on Microsoft Windows NT for personal computers and servers. Most of the personal computers will be converted during the next two years. Larger servers and specialized workstations used to support technical computing and data visualization may still be UNIX based platforms.

Functional Needs Analysis: Document Management

EXECUTIVE SUMMARY:

Conclusions:

- Consolidated Document System (CDOCS) is no longer needed to meet mission-critical activities.
- CDOCS should be shut down at NRC. The shutdown should salvage the CDOCS database, as appropriate, and complete any needed documentation.
- Decisions on how the CDOCS database might best be moved into the Agency Document Access and Management System (ADAMS) should be deferred until after the initial review of file conversion issues is completed in conjunction with OCIO staff.
- There is no compelling need for the Office of Nuclear Material Safety and Safeguards (NMSS) to have an earlier ADAMS installation date than is tentatively scheduled.
- NMSS should seek to have staff conducting high-level waste (HLW) work to be among the first NMSS staff to have ADAMS.
- NMSS should pursue CNWRA connectivity to ADAMS without establishing a replicating site at CNWRA.
- An inventory of HLW-related documents in NUDOCS should be taken to determine the extent that full text documents are available. The results of this survey should be considered in evaluating the transfer of the CDOCS document database.

Background

This functional needs analysis is driven by three considerations. First, NRC requirements under 10 CFR Part 2 for the Licensing Support System (LSS) are under revision. Second, NMSS has identified problems and potential problems with the CDOCS, a document management tool developed to support the LSS. Third, NRC has accelerated the deployment of the ADAMS to address problems with applications susceptible to the "year 2000 problem." These issues will be discussed in greater detail below. The objective of this analysis is to provide a basis for decisions related to CDOCS and ADAMS.

The revision of 10 CFR Part 2, Subpart J has implications for the NRC document management requirements. NRC is required to make certain documentary material available in a centralized repository -- the LSS -- under the current regulatory requirements or to place this documentary material in an electronic information system (EIS) that is accessible to other participants in the expected hearings, as would be required under the amended regulation. The proposed amendment recognizes the changes that have resulted in the nearly 10 years since the initial publication of the Subpart J requirements. The changes provide NRC with additional flexibility and reduce the scope of the documents that must be provided electronically. Subpart J was

intended to provide a central, shared, federally funded database of licensing information beginning in 1995; the amended Subpart J requires that the EIS be in place and the information be available at the time of the site recommendation (currently expected in 2001).

CDOCS was developed by the Center for Nuclear Waste Regulatory Analyses (CNWRA) beginning in the late 1980s with the Technical Document Index (TDI). TDI was incorporated into the Technical Document System (TDOCS), beginning in 1991. Later, the Open Item Tracking System and the Regulatory Program Database were added to TDOCS; this combined application is called CDOCS. Advances in document management software are believed to have introduced cost effective replacements to CDOCS. Also, it is expected that ADAMS will eventually replace CDOCS and the CDOCS database would be incorporated into ADAMS.

In addition to the opportunities that may be available with ADAMS, a number of vulnerabilities have been identified with CDOCS. CDOCS consists of a code written in the C programming language that integrates several commercial off-the-shelf (COTS) software applications. These COTS applications were acquired from different vendors and compatibility between the programs was established within CDOCS. Upgrades in the COTS software could require the C code to be rewritten to reestablish compatibility, before the new version of the COTS software could be used within CDOCS. Use of the TOPIC upgrade would require a complete rewrite of the CDOCS C code. Currently, CDOCS incorporates WordPerfect 5.1, which has been superseded by later versions in the NRC infrastructure, and Verity TOPIC version 4.0.0c, which is no longer supported by its developer. Also, the original developers of CDOCS have left CNWRA, so any future changes to CDOCS would be more difficult to implement. Further, there have been difficulties in getting CDOCS fully operational on personal computers. Finally, problems have been identified for moving CDOCS into a Windows NT operating environment; NMSS will migrate to Windows NT as part of the ADAMS deployment in the near future.

NRC accelerated the deployment of ADAMS in the spring of 1997. This action was driven by the agency's need to address problems with applications susceptible to the "year 2000 problem." This decision to accelerate the ADAMS deployment was made after NMSS had completed its budget planning for FY98-FY01. In December 1997, details about the proposed functionality emerged. The introduction of ADAMS provides NMSS with several opportunities, however, NMSS must determine if its document management needs can be met with ADAMS and within the constraints of the draft implementation schedule.

ADAMS is based on FileNET Panagon, a COTS software suite. Panagon provides integrated document management, records management, workflow, and imaging services. The functionality in this suite extends beyond that currently available in CDOCS. However, a number of design and implementation issues for ADAMS remain unresolved. Therefore, it will be necessary to make assumptions on the capability of ADAMS and its availability to NMSS.

NMSS Functional Needs

Licensing Support System/Electronic Docket

The requirements for NRC to provide electronic access to documentary material under 10 CFR Part 2, Subpart J are pending publication of the final rule. However, changes have been proposed to take advantage of changes in the high-level radioactive waste program and

advances in technology. The proposed amendments to Subpart J are the basis for the following assumptions:

- NRC will be required to provide access to documentary material -- as defined in the November 13, 1997, proposed rule -- at the time of the site recommendation.

- The site recommendation will occur no earlier than September 2001.

- The NRC EIS will need to be operational 15 months prior to the site recommendation or 6 months prior if the earlier information is stored electronically and capable of being ported to the EIS.

- The following formats must be handled by the EIS:

  - full text [searchable] of documentary material[1]
  - graphic-oriented documentary material
  - bibliographic headers for documentary material not suitable for imaging or full text, and
  - bibliographic headers for documentary material where:
    - claim of privilege is asserted
    - it constitutes confidential financial or commercial information, or
    - it constitutes safeguards information.

- The NRC EIS must be able to accommodate electronic information provided by other parties.

- Pending legislation may precipitate a need to have an EIS by August 1999 (see discussion, below).

There is the potential that legislation could change the schedule currently established for the Yucca Mountain site recommendation and license application. Currently, there exists a Senate bill (S. 104) and a House resolution (H.R. 1020) that have been passed by the Senate and the House of Representatives, respectively. These will have to be reconciled through conference before becoming law. Of the two, S. 104 establishes the more aggressive schedule, requiring the Department of Energy to publish a Record of Decision by October 31, 2000, and to submit a license application by October 31, 2001. This schedule would create a need for the EIS to be available as early as August 1999, assuming that the EIS would need to be operational 15 months before the Record of Decision is published. The current schedule calls for ADAMS to be installed throughout NMSS by March 1999. It is assumed that the ADAMS installation will be complete by September 1999. However, the transfer of the Nuclear Documents System (NUDOCS) to ADAMS may not be completed before September 1999. The assumed 15-month operational period can be compressed, if needed. Compressing the operational period is expected to increase the costs associated with preparing the electronic docket. The increase in cost will be determined by the actual schedule and the number and type of documents that

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[1] Embedded text need not be searchable.

must be entered into the EIS. In summary, there is the potential for NMSS requirements to be impacted by the pending legislation.

Contract Management

Discussions were held with staff in Program Management and Policy Development and Analysis (PMDA) that manage the CNWRA contract. These discussions identified the current approach to maintaining working records and records disposition. There has been an effort within PMDA to move towards a "paperless office." Achieving this goal is still highly desirable. However, the contract can be adequately managed if the goal is not met or if an improved electronic filing system is deferred. The following assumptions are derived from the review of current PMDA activities and the identified needs:

- Current PMDA approach to managing documents will be adequate to manage the CNWRA contract over the next 2-4 years.

- Documents currently distributed to central file will be introduced into the Nuclear Documents System (NUDOCS) and available for searches and manual retrieval (microfiche).

- PMDA has a need to establish a historical repository of contract related documents that is searchable and electronic.

    - Repository need not capture all legacy documents.
    - Documents transferred with an established disposition of February 2000 could be added to the electronic repository, if needed.

- PMDA will gradually reduce its dependence on hard copy files.

Document Management at CNWRA

Any analysis of the functional needs for document management must include consideration of the needs of CNWRA. There are two aspects of CNWRA operations that must be considered. First, the document management infrastructure must support internal operations to allow CNWRA to perform its mission and to meet its obligations. Second, CNWRA activities include a close working relationship with NRC staff and the infrastructure must support the coordination necessary to allow CNWRA to support NRC in the fulfillment of the NRC mission.

CNWRA has provided NRC with information regarding its document management needs. The following assumptions are derived from the CNWRA input:

- CNWRA has proprietary and confidential information that:

    - cannot be shared with NRC
    - relates to the CNWRA work for others
    - cannot leave direct CNWRA (or Southwest Research Institute) control, and
    - is restricted from unauthorized users.

- Deltek's Costpoint project accounting software will be used by CNWRA to manage and maintain CNWRA financial data and records.

- Quality assurance requirements necessitate that CNWRA be able to search against the header information.

- CNWRA must retain access to the NUDOCS database.

- CNWRA must retain access to Regulatory Information Distribution System (RIDS) documents and continue to get documents distributed through RIDS.

- CDOCS is used as the CNWRA library catalogue system.

Document Management at NRC/NMSS

The document management needs within the Division of Waste Management (DWM) have been reviewed. These needs can be characterized as current needs and future needs. Future needs arise from the statutory requirement -- established in the Nuclear Waste Policy Act -- for the timely review of a license application for a geologic repository for HLW disposal. The evaluation of these future needs is necessarily speculative. However, the requirements for the electronic docketing will provide an infrastructure that will support some (or all) of the additional staff requirements for document management during licensing. The following assumptions are made about document management needs in NMSS:

- Current NMSS document management practices are adequate (excluding LSS/electronic docketing demands) for current activities.

- Document management needs in DWM are greater than for other divisions within NMSS; the needs for HLW licensing are greater than the other needs within DWM. Unique needs for specific divisions are adequately served using current systems that are actively used by that division.

- The Viability Assessment review can be accomplished using current document management practices.

- DWM technical staff will not require enhanced document availability (i.e., searchable access and retrieval to electronic reports) before the site recommendation.

- The EIS established under 10 CFR Part 2 Subpart J will be available for staff use and will be adequate to meet staff needs for efficient electronic access to information during the license application review.

Description of CDOCS Functionality and Current Use

CDOCS provides full-text search and retrieval capability for documents stored as full text. Searches can also be conducted against header files. CDOCS provides a mechanism for synchronizing document databases at CNWRA and NRC.

CDOCS is used at CNWRA. CNWRA relies upon CDOCS to provide a searchable file of headers as established by quality assurance requirements. CDOCS is also used as a cataloguing system for reference material. However, the full-text search and retrieval capabilities of CDOCS has only limited use at CNWRA; this functionality has been identified as desirable, but not required by CNWRA. CNWRA has indicated that cost effective alternatives to CDOCS may be available, provided that the requirements imposed by synchronization are removed; that is, the quality assurance requirements and the cataloguing requirements can be replaced.

The CDOCS database includes documents related to HLW, uranium recovery (UR), and tank waste remediation systems (TWRS); the database is partitioned so that documents can be withheld from CNWRA (by NRC) or from NRC (by CNWRA). The majority of documents available to NRC in the CDOCS database are pertinent to HLW work. A small number of UR documents have also been added to CDOCS. A very limited number of TWRS documents are resident in the CDOCS database. Documents from the Fuel Cycle Safety and Safeguards, Industrial and Medical Nuclear Safety, PMDA, and Spent Fuel Project Office (SFPO) divisions have not been regularly placed into CDOCS. These divisions have not substantially relied upon CDOCS in the conduct of their work. Therefore, CDOCS is not required for these divisions to continue to satisfy their mission. In contrast, DWM has added documents to the CDOCS database. However, problems associated with the use of CDOCs have been identified. A number of these problems relate to loading documents into the CDOCS database. Document loading problems include: (1) the quantity of documents being loaded into the database has been lower than anticipated, (2) the cost of adding documents to the database has been greater than anticipated; and, (3) contrary to expectations, recent products have not been routinely added to the database. Other problems relate to the use of CDOCS, specifically, that staff use of CDOCS has been very slight and the technical staff has not had the need or the inclination to rely on CDOCS to perform their work. CDOCS has not been found to satisfy any critical need within NMSS that could not be met through other means without hardship. Also, NMSS does not need to maintain continuous access to the CDOCS database and would be able to meet its needs even if the CDOCS database were unavailable for an extended period of time. It is prudent and desirable to minimize any period of unavailability.

CDOCS does provide a repository of electronic documents and technical reports that is accessible to NMSS staff. Hard copies of the reports in general use are maintained by the appropriate staff. It is possible that reports may become less accessible over time. However, the full text reports in CDOCS are expected to remain accessible (in hard copy) over the next two years, which would be sufficient time for the important elements of the CDOCS database to be moved to ADAMS and to become accessible to NMSS staff through ADAMS.

The discussion above does not include the role of CDOCS as it relates to the requirements under 10 CFR Part 2, Subpart J. The LSS was envisioned to become operational in 1995. This

has not occurred. Also, the proposed changes in Subpart J would give NRC additional time to develop an operational system and would increase the flexibility that can be exercised in establishing an EIS. Technology and the functionality of software applications are both expected to continue their advance. COTS software developments have already advanced to provide an adequate approach to meeting the Subpart J requirements. In the absence of HLW legislation, ADAMS is expected to have the necessary functionality and to be operational in sufficient time for NRC to establish an EIS to meet its requirements under Subpart J. ADAMS will establish a docket for the HLW licensing through its electronic hearing functionality. This "HLW library" will be within the NRC firewall. A copy of the library will also be placed outside the firewall, making its contents accessible to the public for search and retrieval. Therefore, the need for CDOCS to support the LSS (or EIS) will be removed by the revision of Subpart J, and there is not a strong need to retain CDOCS to act as a foundation for the EIS.

Ancillary to the discussion of CDOCS functionality is the availability of document capture (scanning). CNWRA and NMSS staff have used the capability to scan documents, which was established as part of the CDOCS infrastructure. In some instances, optical character recognition (OCR) was performed on images to create a working document. This capability does not require the existence of CDOCS and could be retained. Document capture and OCR will be available under ADAMS in some form (see below). OCR has not been identified as a critical need for NMSS or CNWRA.

Conclusions:

- CDOCS is no longer needed to meet mission critical activities.

- Decisions on how the CDOCS database might best be moved into ADAMS should be deferred until after the initial review of file conversion issues is completed in conjunction with OCIO staff.

- CDOCS should be shut down at NRC. The shutdown should salvage the CDOCS database, as appropriate, and complete any needed documentation.

Description of ADAMS Functionality

ADAMS is built around FileNET Panagon (COTS software). Panagon includes document management, records management, workflow, and imaging services.

The document management component will provide the following capabilities: search and retrieval, version control, archive and reclaim, security services and intranet/internet search and retrieval access.

The records management component will: maintain National Archives and Records Administration retention/disposition schedules, review active records for disposition, review locally retired records for disposition, manage an index of locally retired records, and create document profiles.

The workflow component will allow: work to be assigned to a person or a group, documents or images to be attached, instructions and responses to be defined, workflow actions to be tracked. It will also allow workflows to be saved and reused. These capabilities are not currently available. They do not represent critical needs for DWM. However, the review of the license application for Yucca Mountain could be expedited through the functionality provided by the workflow component. Although it is likely that the license review can be accomplished without workflow management, the current statutory requirement for the length of time available for NRC's review makes it extremely important that this functionality is available during the license application review.

The imaging component of ADAMS will provide: batch scanning, document/image annotation, image manipulation, and [on-the-fly] optical character recognition. This functionality is expected to allow, if necessary, PMDA to move documents with a disposition schedule to ADAMS before the documents are destroyed. The two-year disposition schedule for documents establishes February 2000 as the date by which PMDA would need to have the capability to transfer hard copies of records into ADAMS. The ADAMS schedule indicates that the functionality should be available well before the February 2000 deadline.

Conclusions:

- There is no compelling need for NMSS to have an earlier ADAMS installation date than is tentatively scheduled.

- NMSS should seek to have its staff conducting HLW work to be among the first NMSS staff to have ADAMS.

- There are no identified needs requiring NMSS/DWM to maintain a separate system to obtain critical functionality not offered by ADAMS.

CNWRA and ADAMS

It is clear from the identified needs of CNWRA, that some access will be required through ADAMS. The best approach to meet the CNWRA needs has to be ascertained. This is evaluated on the following criteria: What are the CNWRA functional needs particular to ADAMS? What are the costs associated with meeting those costs? Are there legal or other issues that make one approach preferred over another?

ADAMS is still in development and several technical issues remain to be resolved. Therefore, it is necessary to make several assumptions:

- Panagon will allow multiple distinct libraries to be established. Four libraries can be established on a single Windows NT server. Additional servers at NRC headquarters can be established to increase the number of available libraries. Currently, OCIO plans to establish one server.

    - NMSS will be able to acquire the use of one library for LSS-related documents,
    - CNWRA would have access to this library, and

- CNWRA access to the library can be limited through the available security in the Panagon environment, if a full library is not available.

➢ Panagon will allow some outside users (e.g., CNWRA, on-site representatives) to have access to additional functionality, specifically check-in and check-out procedures.

➢ The important documents within the CDOCS database can be incorporated into ADAMS through file conversion or reentry.

➢ A central document processing capability will be established by OCIO.

➢ RIDS will be terminated; the functionality will be retained in the workflow portion of Panagon.

➢ CNWRA could access ADAMS through a dedicated line or through replicating servers located at CNWRA.

- The workflow portion of ADAMS (including RIDS) will not be available to users across a direct line; and
- Documents can be distributed to CNWRA through ADAMS, as is now accomplished through RIDS.

➢ CNWRA will have continued access to documents distributed to CNWRA through RIDS.

➢ Adequate bandwidth can be established to allow CNWRA sufficient access to ADAMS.

➢ A replicating site at CNWRA would require CNWRA to retain the services of a system administrator for ADAMS: this administrator would have duties similar to that of a database administrator.

➢ ADAMS installations will be complete by September 1999.

Two considerations might require a replicating site at CNWRA. One, CNWRA may require access to the workflow portion of ADAMS. Two, the available bandwidth required to provide CNWRA access to ADAMS makes the replicating site more cost competitive. CNWRA has identified that it does not require the workflow portion of ADAMS. However, CNWRA stated that it requires continued access to RIDS. RIDS may only be available through the ADAMS workflow, which may require a replicating site. This will be discussed below. A review of the current load on the dedicated line used for communication between NRC and CNWRA was performed. The use of this dedicated line peaks at about 6% of the current capacity. The assumption that sufficient bandwidth can be retained to allow CNWRA to access ADAMS through a dedicated line appears reasonable. Costs associated with increasing the bandwidth in this dedicated line are expected to be lower than that required to maintain a replicating site at CNWRA for moderate increases. RIDS provides an automated distribution system that routes documents to CNWRA. The documents received at CNWRA are then routed to appropriate CNWRA staff. The routing within CNWRA is determined exclusive of RIDS. CNWRA maintains

hard copies of the documents distributed by RIDS, until microfiche copies are available. Documents routed to CNWRA through the ADAMS workflow will continue to be available to CNWRA through the check-in and check-out procedures that will be accessible to CNWRA.

The workflow portion of ADAMS will recreate the logic underlying RIDS. Documents will be automatically distributed as if they were submitted to RIDS. Therefore, CNWRA will continue to receive copies of appropriate documents. CNWRA does not, however, require the ability to submit documents under RIDS (i.e., the functionality that will be provided through the ADAMS workflow logic). CNWRA does not require the workflow portion of ADAMS and does not require a replicating site.

Although establishing a replicating site is not the preferred option, it was considered. It is not believed to be the most cost effective approach to meet the needs of NRC or CNWRA. The overhead costs will be greater and there are no identified benefits that would outweigh these costs. Also, the replicating site raises potential legal concerns, depending on its implementation. For example, CNWRA has an identified need for managing its work for others and its internal proprietary information; it may not be possible for CNWRA to maintain or store this information on the ADAMS servers. Establishing the replicating site at CNWRA would establish a burden for CNWRA that can be avoided at lower cost to NRC.

Conclusions:

- NMSS should pursue CNWRA connectivity to ADAMS without establishing a replicating site at CNWRA.

- An inventory of HLW-related documents in NUDOCS should be taken to determine the extent that full text documents are available. The results of this survey should be considered in evaluating the transfer of the CDOCS document database.