

DRAFT

Revision 1

Requirements Definition for a Licensing
Information Management System for Nuclear Waste

Subtask 1. Task Order 002 of FIN 4167
Programmatic System Studies and Analyses

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Prepared by

Government Support Division
THE AEROSPACE CORPORATION
Washington, D.C.

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FOREWORD

The Nuclear Regulatory Commission (NRC) Division of Waste Management (DWM) is investigating automated information management systems for document control needs during the preclicensing and licensing of high-level radioactive waste repositories. Records must be retained and readily retrievable to support all aspects of DWM's responsibilities.

DWM's Policy and Program Control Branch (WMPC) is conducting a planning and requirements study to define the needs and to evaluate approaches for applying advanced electronic hardware and software to store and deliver information to a growing body of users. The Aerospace Corporation is assisting DWM in this activity under task order contract to perform the following studies:

- Requirements Analysis and Design of an Issue Management System for Nuclear Waste, Task Order 001;
- Requirements Analysis for a Waste Management Information Management System, Task Order 002; and
- Pilot Project Demonstration Program, Task Order 004 (a series of tests using computers and real records).

This Requirements Definition describes the underlying rationale and system requirements for a licensing information management system (LIMS) for nuclear waste. It is the initial requirements analysis study under Task Order 002. Background is presented on why the LIMS is needed, and the performance and functional requirements are derived. The general characteristics and conceptual architecture of a distributed processing network for managing NRC's information needs are outlined. Performance evaluation and requirements analysis will continue in FY 1986 during the completion phase of the pilot test demonstration program, Task Order 004.

The Requirements Definition report was prepared by Aerospace under the direction of the NRC Program Manager, Mr. Avi Bender, WMPC. The requirements will be updated throughout the development and operations of the LIMS.

EXECUTIVE SUMMARY

This Requirements Definition presents the requirements for a licensing information management system (LIMS) for storing and retrieving records that will meet the Nuclear Regulatory Commission (NRC) needs for licensing and prelicensing nuclear waste repositories. The requirements are based on applicable Federal regulations and reflect the practical needs of users of waste management information for primarily high-level waste (HLW) and also for low-level waste (LLW) and uranium recovery waste. This Requirements Definition is simply a statement of "what" the system must accomplish, with concepts and approaches on "how" the requirements should be satisfied. The level of detail is sufficient to bring the LIMS to the system design stage but not to a detailed implementation stage.

The requirements of the LIMS are driven by regulatory requirements, the needs of the users which can be related to the regulations, and the type and form of the data. Users of the LIMS will be associated with a variety of organizations and will change as the waste program develops. Users identified in the NRC include those associated with the offices of Nuclear Materials Safety and Safeguards (NMSS), Nuclear Regulatory Research (NRR), Office of Executive Legal Director (OELD), Atomic Safety Licensing Board (ASLB), and Advisory Committee on Regulatory Safeguards (ACRS) and Commission staff members. Other federal agencies will also need access to LIMS and will include the Department of Energy (DOE), the Environmental Protection Agency, the U.S. Geological Survey, and the U.S. Bureau of Mines. Users will also consist of members of state governments, Indian tribal organizations, and the general public.

Onsite representatives of Division of Waste Management (DWM) can be expected to use the LIMS for the exchange of data between the field and Headquarters. The NRC legal staff of the OELD is a primary user and should be consulted during the design and implementation phase of the system. The legal activities during hearings, depositions, and discovery must be supported during all licensing processes.

The needs of the diversity of users require an integrated network linking dispersed terminals with the data base of the LIMS and special attention to the differences in the various user's capability to acquire and interpret the data. The LIMS not only will be mandatory for supporting the licensing hearings, but also will be required to support daily nuclear waste information needs of the NRC and other parties during the licensing process.

Requirements for the nuclear waste LIMS are based on the rules for licensing proceedings, NRC user needs, and on an analysis of the projected volume of records to be stored and the prompt response needed during licensing for retrieving these records. The requirements in summary are:

1. Comprehensive Content: Store in retrievable manner any record or partial content of a record likely to be requested that pertains to high-level waste in compliance with 10 CFR §2.740(b) and §60.301(a)(1).*
2. Multi-Media Accommodation: Store, index, and provide access to records on hard copy, microfiche, charts, magnetic tape, disk, and other accessible media.
3. Broad Indexing Capability: Be able to search and select by keywords, or descriptor phrases, that define the subject, author, and title and by significant words in context in abstracts and text. Be able also to search on date, issuing agency, identifying number, and other necessary identifiers.
4. Prompt Response: Verify the existence of a record, determine the location of a record, and display text of records resident in the data base in real time at authorized user terminals. Produce hard copy of any record within five working days.
5. Operational Availability: Make the LIMS available as soon as possible for the prelicensing phase and have it remain operational during licensing and after licensing.
6. Security: Protect against the loss and destruction of records and protect privileged material by controlled access.
7. Related Systems Disclosure: Disseminate general descriptions of information available on all automated information management systems maintained within the community related to high-level waste. Provide instructions for user access to systems and provide a thesaurus of keywords and descriptors to facilitate user queries.
8. Simplicity of Use: Provide access (read and print only) for nontechnical users with no prior online data base interaction experience.

*Code of Federal Regulations, Title 10, Energy, Part 2 and Part 60, of 1985.

9. Long-Term Viability: Incorporate capability to improve service throughout the licensing period.
10. Accessibility: Provide remote terminals so data bases are accessible to personnel of the States, Indian tribal organizations, and the general public.
11. Compatibility: Provide network interfacing compatibility to access other information management systems and data bases.
12. Reliability: Maintain system with minimum downtime. Protect data files during system crashes and provide recovery in less than 24 hours.
13. Affordability: Provide an information management system and networking system that are cost effective.
14. Standardization: Use data transmission, library, and information science standards for data storage and records transfer for data bases as set by the American National Standards Institute.

The information or records contained in the LIMS will reflect the licensing role, activities, and products of DWM as well as the records and documents sent to DWM from the DOE projects, State governments, and other sources relevant to the HLW, LLW, and uranium mining program. The final volume of information to be stored and indexed is unknown. Estimates of the numbers of records to be stored in the future LIMS are derived from:

- Historic growth in DWM's Docket Control Center (DCC) during the last 4 years,
- Schedule for licensing activities,
- Budget forecasts,
- Informed estimates by NRC and DOE specialists, and
- Extrapolation from a reactor licensing case system.

The DCC now maintains about 20,000 individual documents and is receiving about 135 pieces of incoming mail (documents) for processing each day. About 20 pieces each day are filed as permanent records. The number of documents estimated to be accumulated by 1999 is more than 300,000. The volume of storage required can be related to the average number of pages per document and the average number of characters per page. The following averages were used for estimating:

- An average document has 7 pages,
- An average page has 1500 characters, and
- An average document has 10,000 characters.

If the entire holdings estimated for 1999 were stored electronically as full text, memory capacity requirements would be in the range from 2000 to 4500 megabytes of storage, assuming full efficiency.

Two components of information retrieval that are crucial to the utility of the system are search and retrieval. Search indicates whether or not a specific piece of information is in the system, helps identify pertinent information within the system, indicates the form in which the information can be retrieved, and tells its location; retrieval provides information in a form appropriate to the situation, such as online presentation, microfiche, magnetic tape, or hard copy.

To interact directly with an automated system requires the ability of users to search in real time. For the system to be used with confidence, "real time" is interpreted as finding the location of a specific document citation within minutes and other relevant material within a half hour. When a user wishes to identify all relevant information on a given subject, such as for discovery, a search of several hours would probably be acceptable.

A requirement of the LIMS is that it use the resources of other information management systems where the information is technically compatible and physically accessible. This will avoid the duplication of holdings, and these Information Management Systems could serve as valuable backups.

The conceptual architecture defines a distributed processing network that might be used in the implementation of the LIMS and would be capable of meeting the LIMS requirements. The concept is a system overview for NRC to consider in order to accomplish the LIMS goals. A detailed implementation plan will be required.

The currently NRC-wide operational Document Control System is based primarily on nonmechanized, labor-intensive techniques with only minimal use of modern information storage and retrieval technology. However, the numerous information hardware components available within the organization offer a potential for trial demonstration tests. Although most of these components are currently operating on a standalone basis, they offer the potential for hands-on test and evaluation of information system requirements and equipment operation.

Details of a pilot project demonstration test to be performed in FY 1986 may be found in the companion program document titled "Operating Plan for the Information Management and Open Item Tracking Systems

Pilot Project Demonstration Program."* The results of this test activity will be documented in a final report and will be used as a basis for assessment of the proposed systems configuration and operating philosophy. This review will lead to the formulation of a final systems plan and detailed systems architecture specifications for the installed system.

*The Aerospace Corporation, "Operating Plan for the Information Management and Open Item Tracking Systems Pilot Project Demonstration Program," (draft) Task Order 004, FIN A-4167, Report No. WPR-85(5812-04)-2, 1985.

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ACRONYMS

ACRS	Advisory Committee on Reactor Safeguards
ADP	Automatic Data Processing
ANSI	American National Standards Institute
ASLB	Atomic Safety Licensing Board
BASIS	Battelle Software Package for Information Storage
BPMD	Battelle Project Management Division
BRMC	Basalt Records Management Center
BWIP	Basalt Waste Isolation Project
C/ATS	Commitment/Action Item Tracking System
CDC	Controlled Document Center
CDC	Control Data Corporation
CDMS	Contract Data Management System
CFR	Code of Federal Regulations
CRPO	Crystalline Rock Program Office
CTRC	Controlled Technical Reference Center
DCC	Docket Control Center
DCS	Document Control System
DCTRS	Document Comments Tracking and Response System
DDR	Detail Data Reference
DEC	Digital Equipment Corporation
DOE	Department of Energy
DM	Data Management (Battelle software)
DMB	Data Management Branch
DR	Definition of Requirements
DWM	Division of Waste Management
EA	Environmental Assessment
EDRS	Engineering Data Bases Systems
ERS	Engineering Release System
FOIA	Freedom of Information Act
FIPB	Freedom of Information and Privacy Acts Branch
HLW	High-Level Waste
IDMS	Integrated Data Management System
IMS	Information Management System
LIMS	Licensing Information Management System
LLW	Low-Level Waste
LPDR	Local Public Document Room
ML	Mail Log
NMSS	Nuclear Materials Safety and Safeguards
NNWSI	Nevada Nuclear Waste Storage Investigations Office
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NWPA	Nuclear Waste Policy Act
OCR	Optical Character Reader
OCRWM	Office of Civilian Radioactive Waste Management
OELD	Office of Executive Legal Director
OITS	Open Item Tracking System
ONWI	Office of Nuclear Waste Isolation

ACRONYMS (continued)

PC	Personal Computer
PDR	Public Document Room
PMS	Project Management System
PRS	Public Release System
RCS	Reports Clearance System
RES	Nuclear Regulatory Research
RIS	Records and Information System
RM/D	Resource Management/Division of Automated Services
RMS	Records Management System
RTP	Records Turnover Package (data base)
RTS	Reference Tracking System
SAIC	Science Applications International Corporation
SCP	Site Characterization Plan
SIMS	Sample Inventory Management System
SNL	Sandia National Laboratories
SRP	Salt Repository Project
SRPO	Salt Repository Project Office
TDB	Technical Data Base (software)
WMPC	Division of Waste Management, Policy and Program Control Branch
WMEG	Division of Waste Management, Engineering Branch

1.0 INTRODUCTION

This document presents the requirements for an information management system (IMS) for storing and retrieving records that will meet the Nuclear Regulatory Commission (NRC) needs for licensing and preclicensing nuclear waste repositories. The requirements for the licensing information management system (LIMS) are based on applicable Federal regulations and the practical needs of users of waste management information including high-level waste (HLW), low-level waste (LLW), and uranium recovery waste. This Definition of Requirements (DR) is also a statement of "what" the system must accomplish, not "how" the requirements should be satisfied.

1.1 Background

The licensing process for waste disposal facilities is lengthy owing to the many divergent interests affected by licensing and the applicable legislation. Many of the required steps in a licensing procedure involve the distribution of information available to NRC to interested parties either through the Freedom of Information Act (FOIA) regulation (10 CFR, 1985:§9.3) or the discovery process (10 CFR, 1985:§2.740). Delays in obtaining requested information or inaccuracies or incompleteness in the information obtained can be the cause of delays in the entire licensing process. The resulting delays can far exceed the actual time spent in retrieving information. The functions of the NRC staff can proceed more rapidly if easy access to information is provided.

Section 114(d)(2) of 10 CFR 60 (1985) requires NRC to issue a final decision on issuing a construction authorization for a high-level waste repository within 3 years after the date of submission of a Department of Energy (DOE) license application. The 3-year schedule allotted for NRC safety reviews, licensing adjudication, and Commission decision for the repository is significantly shorter than that necessary for reactor licensing reviews and decisions, even with substantial preclicensing consultation. For the first geologic repository, the most recent schedule is only 27 months (DOE, 1985). One of the most significant contributors to the length of review periods is the time associated with sending, receiving, and handling information and data. This is true both for docketed correspondence between receivers and applicants and for discovery by interrogatories during adjudication. Current technology for electronic storage, retrieval, and mail should substantially shorten and, in some cases, could eliminate the time traditionally needed for information handling.

The capability of the NRC Division of Waste Management (DWM) Docket Control Center (DCC), a manual information storage and retrieval

system, will soon be insufficient to meet the increasing demand for high-level waste documentation. Between 1982 and mid-1985, the system logged about 20,000 documents (averaging about 8 pages per document). By 1990, following the DOE characterization of three potential repository sites, it is estimated that in excess of 200,000 documents will be accumulated, necessitating an automated information management system.

This Requirements Definition is sufficient to bring the LIMS to the system design stage but not to a detailed implementation stage. Periodic reviews of this report by the DWM personnel will ensure that the LIMS will meet individual as well as collective requirements to prelicensing and licensing of high-level waste, low-level waste, and the uranium recovery process.

1.2 Definition of "Requirements" and "Information Management System" Terms

The term "requirements," when applied to an information management system, has various levels of interpretations. Requirements must, in general, serve the regulations, but those regulations offer no guidance with respect to practical implementation, comprehensiveness, or difficulties implicit in the hearing processes. At a more detailed level, requirements specify an information system (1) that has practical characteristics for serving particular groups of users, (2) that stores particular records, and (3) that offers particular geographic access. Specifically, requirements can define capacity, performance times, indexing objectives, security restrictions, and administrative procedures. Under some circumstances, requirements also dictate cost, hardware characteristics, software characteristics, hours of operation, physical locations, and characteristics of the extended system including work flow, responsibilities of system users, priorities of access, operating modes, and system sizing. In the most detailed definition, requirements include the full specification of hardware, software, support procedures, man-machine interfaces, communication network, etc.

An information management system is a collection of records (the information) for which a separately maintained set of descriptions or index items (the management) exists. An information management system includes provisions to load records and index items and to sort and search through the index in order to identify which records fulfill some criteria for their selection. Computer record searching is conducted by either inverted index accessing or sequential scanning. As shown in Table 1-1, the oldest, best known information management systems use library stacks for records and card catalogs for the index. Modern library systems still have stacks, but use data base management systems for indexes by title, author, date, and multiple subject headings (keywords). Some modern systems keep the full text of records (like correspondence or legal case reports) complete in

Table 1-1. Information Management Systems

Collection of Records	Separate Index
Library stacks (hard copy)	Bibliography and location maintained in manual card catalog by author, title, general subject.
Library stacks (hard copy)	Bibliography and location are computer accessible by author, title, keywords, dates, etc.
Text storage (electronic)	Text and bibliography through computer accessible index. Access by words and phrases in text using Boolean logic operators for searches.

computer storage and for indexing use an inverted dictionary and a directory to all significant words in all of the records.

1.3 Approach

To define the requirements for the Division of Waste Management's LIMS, a series of interviews were conducted with personnel in Nuclear Materials Safety and Safeguards (NMSS) and other organizations within NRC. A review of the NRC Document Control System (DCS) was conducted, and the responsibilities and procedures of DWM's DCC were studied and analyzed.

The LIMS is intended to respond to serve many user needs:

- Reference source for inquiries related to the Freedom of Information Act,
- Comprehensive reference library for the DWM staff,
- Correspondence file for DWM contractors,
- Correspondence file for inquiries addressed to DWM and their responses,
- Reference source for materials to be used at hearings by legal staff and for general day-to-day staff use,

- Material support for any authorized party searching for information germane to a position while planning a hearing, and
- Widely available index of waste management data for any general user.

Section 2 of this report examines the regulatory and user requirements and summarizes the results of user interviews. The requirements of the LIMS are described in Section 3. The intent of this section is to identify "what" the LIMS must do. Details on "how" these requirements will be met will be developed during subsequent phases of the project.

Section 4 describes a conceptual system architecture for implementation of the LIMS, and Section 5 discusses a planned pilot demonstration project. That project will evaluate available technology for use in the LIMS. It is anticipated that this testing activity may identify additional system requirements, and as a result, this document will be periodically revised to reflect the latest requirements definition.

2.0 REGULATORY AND USER REQUIREMENTS

The requirements of the LIMS are driven by regulatory and user requirements that can be related to the type and form of the data. This section addresses:

- Applicable regulations,
- Media requirements,
- User access and data control,
- Interview findings, and
- Past DWM requirements studies.

2.1 Applicable Regulations

The Code of Federal Regulations (CFR), Title 10, Energy (10 CFR, 1985), Chapter I - Nuclear Regulatory Commission, defines NRC responsibilities for retrieving records for discovery (§2.740 et seq.) and pursuant to the provisions of the Freedom of Information Act regulations (§9.3 et seq.). Sections 2.741, 2.744, 2.790, and 9.8 of the CFR deal with records retrieval and are found in Appendix A.

2.1.1 Requirements for Discovery

The regulations that relate to discovery proceedings associated with license applications for waste disposal are contained in 10 CFR 2 (1985), Rules of Practice for Domestic Licensing Proceedings, Subpart A--Procedure for Issuance, Amendment, Transfer, or Renewal of a License. Section 2.101, Filing of Application, subsections (f) and (g), specifically states that applications for licenses to receive, possess, or dispose of radioactive waste governed under Parts 60 and 61 of 10 CFR will be processed in accordance with §2.101. Further, under §2.101(f)(8), a hearing is required prior to issuing construction authorization. Timely notice of the hearing will be given per §2.104(e). Once a notice of hearing is given, Part 2, Subpart G--Rules of General Applicability, are in effect as stated in §2.700.

According to §2.790, all final NRC documents relevant to nuclear waste disposal generated at any time (not including handwritten notes and drafts) and excepting those exempted from disclosure (same rules as those for FOIAs; see Section 2.1.2) are to be made available at a public document room (PDR) for inspection and copying. Final

documents prepared by and for NRC during a pre-application period related to site characterization, plans, issues, etc., as detailed in §60.11(g) will be placed on deposit in the PDR in accordance with §60.11(h).

According to §2.744, even if a document has not been placed in the PDR, a party to an initial licensing proceeding may request it by individual item or by category. The party shall describe the item or category with reasonable particularity and shall state why that record or document is relevant to the proceeding. Section 2.744 constitutes a severe requirement for any information management system: Any record or document may be requested even if it has not been indexed or retained by NRC in a PDR. It essentially requires an index for all records. The full extent of the requirement hinges on a legal interpretation of "reasonable particularity."

Written response is required within 30 days after the service of the request for production of records and documents. Also, 10 CFR 60 (1985; §117(a)) requires that information be provided to State governments and Indian tribes within 30 days of receipt of the request for information.

According to §2.740b, interrogatories must be considered separately and fully in writing. A copy of the answer and objections shall be served within 14 days after service of an interrogatory (or other period as allowed by the hearing officer). This shorter time places a burden on staff or others in producing records as evidence.

2.1.2 Requirements for FOIA

Procedures for responding to requests made in accordance with the FOIA have been established at NRC and are managed with a dedicated staff. The demands on an information management system to support those requests are implicit in §9.4 and §9.7(b). §9.4 states:

Any identifiable record, whether in the possession of the NRC, its contractors, its subcontractors, or others shall be made available for inspection and copying pursuant to provisions of this part (i.e., subject to stated exemptions) upon request of any member of the public.

"Records" are defined in §9.3a(b) to include all documentary material regardless of creation media and current possession or control of the material as it pertains to NRC and its transaction of public business.

The "stated exemptions" protect interests of national defense, private data from personnel records, negotiating positions, trade secrets, proprietary data, legal processes, conflicts of interest, internal memorandums, predecision information, etc., as defined in §9.5,

Exemptions. Section 9.8(b) defines the requirements of the requestor:*

All requests for copies of records must reasonably describe the record sought in sufficient detail to permit the identification of the requested record.

The NRC has 10 working days to respond to FOIA requests either to produce the record (§9.8), to explain why it is exempt (§9.9(a)), or to reply that the request does not describe the record well enough to produce it (§9.8(b)). Under unusual circumstances related to getting the records from the field, or needing to search voluminous files, or getting the records from other agencies, the time may be extended to 20 working days (§9.13). If that is still not enough time, the Director, Office of Administration, may seek agreement with the requestor for a specific extension of time (§9.9(d)).

2.1.3 Responsible Custodian of Record

It is required that a government agency be responsible to maintain in its files all records germane to its activities.** These files must contain all records that are produced by members of the agency and all records that are produced under contract for the agency and delivered to it under contract. If these records are never formally transmitted to another agency, then the originating agency remains the one responsible custodian for the record and is required to maintain it in its files and to be able to produce a copy of any record if reasonably described.

The NRC is not directly responsible for records mentioned in bibliographic references in documents that have been delivered to it under contract unless the contract requires the delivery of all contractor's backup material. In many contracts, records developed by contractors to government agencies are the property of the government

*Note: From the FOIA regulations, it is indicated that every record received at NRC and retained there, or generated by NRC, must be indexed to permit its location if the record is "reasonably described"--sufficient detail to permit the record's identification. The description for an FOIA search is not permitted to be "by category" as it is for discovery material. Thus, the indexing requirements for an FOIA might be construed as being, by regulation, less stringent than they are for discovery. A management information system that satisfies discovery requirements should also satisfy FOIA requirements.

**Olmstead, William, Nuclear Regulatory Commission, Personal Communication, January 15, 1985.

and implicitly of the agency letting the contract. In this case, if the records are not delivered, they could be claimed by the agency at any time, and may or may not be in the LIMS, depending on whether they are claimed.

There are limitations to this implied responsibility. Thus, the LIMS must provide for timely search and retrieval, but does not always need to provide an immediate response. Federal regulation 10 CFR 2.741 requires a written response within 30 days to a written request for documents pursuant to discovery. NRC is not responsible for providing documents already available to the general public, but must identify their existence and location. Handwritten drafts are not discoverable nor are drafts of published final material. Typed drafts released for review but not published as final are, however, discoverable records.

The decision process of what should be included in the LIMS data base is complex, and criteria for this need to be developed. For example, original oscillographs or raw data could be interpreted as draft material of residual importance or could be considered central to an issue, depending on significance of the data. However, the use of the LIMS is considered to support more than legal processes and, therefore, is expected to contain data that may, or may not, be legally required for discovery or FOIA responses. Therefore, it seems prudent to flag those records contained in the data base that support legal activities.

2.2 Media Requirements

In accordance with the definition of "record" as stated in 10 CFR 60, the LIMS will be required to store and index records on a variety of media and in a variety of formats. Although most records will be hard copy text documents with incidental graphics, other records will include field notes, maps, strip charts, photographs, photographic slides and film, raw tabulated data, computer listings, microfiche, magnetic tape and disks, sound recordings, and geological specimens.

Any text data stored on disks or magnetic tape (whether for full text or partial text search) are machine-readable and can be incorporated in the LIMS directly. However, a large quantity of data (records) requires separate storage and recall techniques. Regardless of storage method or media being stored, a common indexing scheme must provide appropriate reference within the LIMS and cross indexes to other data elements. These requirements are discussed in greater detail in Section 3.4.

2.3 User Access and Data Control

The LIMS will be required to index and store information necessary for many types of users and to provide an expeditious retrieval service for those with the most stringent of requirements.

Users identified within NRC include the technical staff and DWM management staff. Their use will emphasize the tracking of issues related to licensing (see Section 2.5). Other DWM users are those in the Policy and Program Control Branch concerned with congressional queries and liaison with the States, Indian tribal organizations, and the general public. The onsite representatives of DWM can be expected to use the LIMS for the exchange of data between the field and Headquarters. The DCC must be an integral part of the LIMS, and its staff will be directly involved in maintaining and indexing the backlog of nuclear waste records that will become part of the LIMS.

The NRC legal staff of the Executive Legal Directorate is a primary user and should be consulted during the design and implementation phase of the system. Activities in hearings, depositions, and discovery must be supported during all licensing processes. Successful fulfillment of these steps in the process is a major reason for developing an automated LIMS. Other potential NRC users include personnel from the other divisions of the Office of Nuclear Materials Safety and Safeguards, the Office of Nuclear Regulatory Research, the Atomic Safety Licensing Board, and the Commission.

External users will include personnel from other government agencies such as DOE, Environmental Protection Agency, U.S. Geological Survey, U.S. Bureau of Mines, and the Army Corps of Engineers. Representatives of the States, Indian tribal organizations, and the general public can be expected to require access as stipulated in 10 CFR 60 and the FOIA. Under 10 CFR 60 (§117(a)), information must be provided to State governments and Indian tribal organizations within 30 days of receipt of request.

To meet the needs of the diversity of users requires an integrated network linking dispersed terminals with the data base of the LIMS. Within DWM and other offices of NRC, local terminals, or personal computers (PCs) can be used. The interface of the LIMS with the general public can use public document rooms (PDRs) and local public document rooms (LPDRs) already established for this purpose, with access being one of search and read only. While onsite representatives and other government agencies may need to exchange data, the LIMS must be capable of controlling data entry and update at a central point for reasons of security, exemptions, and quality control. In particular, NRC and DOE have agreed that NRC should have no special privilege of access to a DOE data base over that of the involved States and Indian tribal organizations.

2.4 Interview Findings

From December 1984 to February 1985, Aerospace personnel, accompanied by Division of Waste Management, Policy and Program Control Branch (WMPC) staff, conducted 29 interviews with 33 individuals to define user needs. Included were representatives of DWM (all branches), the

Office of Executive Legal Director (ELD), Resource Management/Division of Automated Services (RM/D), Document Control System, the Data Management Branch (DMB) in the Office of Administration, and Freedom of Information and Privacy Acts (FIPB) Branch. Since then, additional selective interviewees have provided clarification of points. Interview responses were categorized to discern trends. Many comments provided useful background information on the structure and functions of NRC, DWM, and the branches. Remaining comments were grouped as areas of consensus, areas of differences, and highlights useful in defining requirements of the LIMS to make it effective.

Potentially crucial to NRC compliance with requirements for FOIA and the discovery process is information that currently is virtually unavailable. Numerous individuals keep technical files, even "private libraries" of information. The interviewees revealed that some information (such as supporting references used during a review) may be discarded after the review. In general, that all pertinent materials must be accessible through the LIMS is well understood. It may be necessary to set procedures for a practice that will ensure such availability.

Responsibility for indexing records was suggested to rest with the individual(s) most closely associated with the material. For example, the initiator of a report should provide indexing information, as should the reviewer of a document. The need for a thesaurus was suggested because not everyone uses identical terms to describe similar subject matter; the system must make it possible to determine and correlate terms.

The types of indexing suggested as desirable are varied. For instance, it would be helpful for documents and correspondence to be indexed to cognizant individuals as well as to subjects, keywords, etc. Correspondence should be traceable through a concurrence chain as should technical positions and changes thereof. Reports, technical positions, and reviews should be indexed to appropriate personnel for the purposes of corporate memory and identification of potential witnesses.

Referencing subsequent and preceding documents would be helpful when a position or opinion changes; it would help researchers find the more current information on which a change in position may have been based. The chronology of such a document chain should be easily discernible.

Document reviews should be indexed to (or attached to) the documents reviewed. That a document has been reviewed should become a permanent part of the document's record. Follow-up notes that are issued (i.e., after a workshop has been held and reported on) should be tied (physically or by index) to the meeting summary.

During the discovery process, it would be helpful to know whether a similar-subject had been queried under FOIA, if so, when and by whom. That a document has been produced in response to an FOIA request should become a part of that document's record.

The necessity of keywords was discussed from the points of view (1) of either keyword or full text search capabilities and (2) of keyword and full text searching. Opinions on full text capabilities differ. Some believe that the full text capability would be ideal for searching; the inherent problem of keywords of the subject not appearing in the text was also noted. For example, if the term "quality assurance" does not appear in a searched document, a full text search on that term would come up empty even though that subject may have been addressed; thus, a combination of keywords and full text search capability was suggested. The question remains of how effective the LIMS would be at identifying essentially all relevant documents with and without the full text search capability. This issue will be tested and evaluated in the pilot demonstration program (see Section 5.0).

Opinions differ about the purpose of the LIMS: whether the information management system should serve only NRC or also the States, Indian tribal organizations, and the general public. It may also be necessary to distinguish between legal and practical requirements. A more general view is to look at the basic requirement on NRC: responsibility for any document either in its possession or used in decision making, regardless of user. In this regard, there is agreement developing between NRC and DOE to use the same vocabulary and have a common index in the LIMS that is accessible by all organizations, that is, NRC, DOE, the States, Indian tribal organizations, and the general public (DOE, 1985).

Although reference to those documents officially transmitted as correspondence to NRC must be in the LIMS, not every document requested must be physically available to outside requesters. Documents produced by other agencies should be provided by those agencies. If any part of a document were pertinent to an opinion or position, and the NRC staff were to be deposed or to testify on the subject, original hard copy would be expected to be produced at a related deposition or hearing. It is unlikely that legal and practical requirements can be differentiated because the legal requirements include being able to substantiate any technical position taken and any change of position or opinion. To the extent that any material has been used to formulate an opinion, that material must be retrievable if requested.

Another area of consideration is retrievability of charts, field logs, seismic tapes, and other materials that are nonstandard in size and unwieldy to handle and to store. Also, there is a need for a place to review such materials. This type of record will most probably reside

at DOE field project offices, although some may be formally transmitted to NRC and may have to be stored and retrievable. Current electronic storage methods may not be amenable to these records.

Several unique comments gathered during the interviews are provided below:

- The IBM 5520 word processor allows "shared document revision," in which several people can work on a document simultaneously. In a LIMS, any record editing should be strictly controlled.
- It is possible that an originating organization of a document requested by NRC may withhold the document as "sensitive."
- DOE and NRC must continue to coordinate their LIMS activity with the intent of developing a LIMS to serve both agencies and others.
- Contractors should submit reports in machine-readable form as well as on hard copy. This should be a requirement in future statements of work.
- PC access to contractor reports and data would be helpful.
- In current practice, telephone calls not documented do not exist, for the record.
- For extensive reading of a document, hard copy is preferable to reading from a screen. On the other hand, a screen is preferable for quick search and review to find information.
- Priorities should be established for turnaround time for different records. This can be performed with more credibility following the pilot demonstration tests.
- Procedures should be established to determine appropriate material for the LIMS, backup policy, indexing, system access, and archiving.
- LLW and uranium mining information requirements are not as great as those for HLW and should not drive the system.
- Access to other data bases, such as ORBIT, DIALOG, and RECON, through the LIMS is desirable.

2.5 Past DWM Requirements Studies

In defining the requirements for a LIMS, the current system was evaluated. A description of the current Docket Control Center was prepared (Brown, 1984a) that included historical background; objectives; users; types of information storage, control, and searching; search time; document classification system; problems; and potential solutions. The DCC now provides the functions that will be assumed by a LIMS. Comments on the DCC obtained during interviews with potential users are addressed in "Recommendations for DCC Improvements". Major areas for interim improvement to the DCC include (Aerospace, 1985b):

- Increase storage and working areas;
- Expand capabilities (e.g., add an online index to locate documents);
- Reorganize the DCC;
- Reduce dependence on critical personnel;
- Establish duplicate records retention; and
- Convert to LIMS in an orderly manner.

Users needs and the services desired from a LIMS were defined by Brown (1984b). These preliminary user requirements include discussion of the primary licensing requirements for an information management system; the types of information desired by users; anticipated volume of information; users and interfaces; reliability and quality control; storage, search, and retrieval requirements; and backup requirements. The preliminary definition of requirements for a LIMS (NRC, 1984) describes all major components of the foregoing reports.

A requirements analysis for an open item tracking system (OITS) was also prepared (Aerospace, 1985a). It recommends that DWM adopt a formalized open item management system supported by an automated open item tracking system. This requirements definition assumes the tracking system will be a component of the larger LIMS. Many of the characteristics are identical. Requirements for an OITS as determined in this study are as follows:

- The definition of each open item, action needed for resolution, milestones of that action, status, priority, and relationship to other open items must be stored for flexible and rapid access by both staff and management.
- The structure of the data base must not limit the number of open items that can be tracked.

- The system must be designed to store and retrieve data based on an index of keywords or phrases, but should also allow for free text search.
- The system must provide rapid access to data that demonstrate and validate the progress achieved in the resolution of each open item. In particular, the tracking system must:
 - Be capable of showing critical paths in the milestones to resolution;
 - Provide references to all necessary information required to support an NRC position on whether "reasonable assurance" for the resolution of each open item has been achieved; and
 - Provide adequate reference to all progress made toward resolving an open item, such as technical reports, meeting minutes, correspondence, etc.
- Input forms must be designed to minimize the staff workload, both for initial entry and for update or maintenance of the data base.
- Rapid recall with the capability to produce DWM standard reports, as well as printing ad hoc responses to queries, must be provided.
- Cross referencing to the current DCC, and other internal NRC data systems such as the DCS must be provided.

Related to DWM's Requirements Study is an ongoing NRC study to upgrade the NRC Document Control System. A draft operating strategy for accomplishing this upgrade has been drafted (NRC, 1985). The plan indicates NRC will provide an electronic information system for users. The upgrade is to overcome the shortcomings of the DCS--that of not having a subject index and not serving as an online text-searchable reference and information source.

3.0 REQUIREMENTS DEFINITION FOR A LICENSING INFORMATION MANAGEMENT SYSTEM

Requirements for the waste management LIMS are based on the provisions in the rules for licensing proceedings (10 CFR 2, 1985) and on NRC user needs obtained through interviews with the staff (Section 2). These requirements are also based on an analysis of the projected volume of records to be stored and the prompt response needed during licensing for retrieving these records. The system requirements support the basic access and response needs of users and are consistent with current information management technology.

3.1 General Requirements

These basic requirements are generic in nature; types of records to be stored, implementation approach, and other constraints on an NRC LIMS are not considered.

1. Comprehensive Content: Store in retrievable manner any record or partial content of a record likely to be requested that pertains to high-level waste in compliance with 10 CFR 2.740(b) and 301(a)(1) (10 CFR 60, 1985).
2. Multi-Media Accommodation: Store, index, and provide access to records on hard copy, microfiche, charts, magnetic tape, disk, and other accessible media.
3. Broad Indexing Capability: Be able to search and select by keywords, or descriptor phrases, that define the subject, author, and title and by significant words in context in abstracts and text. Be able also to search on date, issuing agency, identifying number, and other necessary identifiers.
4. Prompt Response: Verify the existence of a record, determine the location of a record, and display text of records resident in the data base in real time at authorized user terminals. Produce hard copy of any record within five working days.
5. Operational Availability: Make the LIMS available as soon as possible for the prelicensing phase and have it remain operational during licensing and after licensing.
6. Security: Protect against the loss and destruction of records and protect privileged material by controlled access.

7. Related Systems Disclosure: Disseminate general descriptions of information available on all automated information management systems maintained within the DOE community related to high-level waste. Provide instructions for user access to systems and provide a thesaurus of keywords and descriptors to facilitate user queries.
8. Simplicity of Use: Provide access (read and print only) for nontechnical users with no prior online data base interaction experience.
9. Long-Term Viability: Incorporate capability to improve service throughout the licensing period.
10. Accessibility: Provide remote terminals so data bases are accessible to personnel of the States, Indian tribal organizations, and the general public.
11. Compatibility: Provide network interfacing compatibility to access other information management systems and data bases.
12. Reliability: Maintain system with minimum downtime. Protect data files during system crashes and provide recovery in less than 24 hours.
13. Affordability: Provide an information management system and networking system that are cost effective.
14. Standardization: Use data transmission, library, and information science standards for data storage and records transfer for data bases as set by the American National Standards Institute.

Each item on the list, except for the fourth, is qualitative. The fourth item identifies the performance measurement scale that must be used to gauge the system but does not state where on the scale the system is satisfactory. Establishing these threshold values will be the object of the specification phase of the system development.

3.2 Types of Records

The information or records contained in the LIMS will reflect the licensing role, activities, and products of DWM as well as the records and documents sent to DWM from the DOE projects, State governments, and other sources relevant to the HLW, LLW, and uranium mining programs. In this case a record is formally defined in 10 CFR 2.4(q):

"NRC records and documents" means any book, paper, map, photograph, tape, paper tape, sound recording, pamphlet, slide, motion picture, or other documen-

tary material regardless of form or characteristics, made by, in the possession of, or under the control of the NRC pursuant to Federal law or in connection with the transaction of public business as evidence of NRC organization, functions, policies, decisions, procedures, operations, programs or other activities. "NRC records and documents" do not include objects or articles such as structures, furniture, tangible exhibits or models, or vehicles and equipment.

A list of the records that will become information and data elements in the LIMS was generated by WMPC and is presented in Table 3-1 (NRC, 1984). This list is representative of the types of records that will be acquired by the Docket Control Center. Many items in this list could be maintained in the DOE data base (e.g., DOE technical reports).

3.3 Projected Volume of Information To Be Stored and Indexed

The rules for licensing mandate the widest and most open availability of records. Because there is no precedent for the process of licensing geologic repositories for nuclear waste, and because it is impossible to predict which records will never be required in licensing, all records, even those marginally relevant, should be indexed in the LIMS. The final volume of information to be stored and indexed is unknown. Estimates of the numbers of records to be stored in the future LIMS are derived from:

- Historic growth in the DCC during the last 4 years,
- Schedule for licensing activities,
- Budget forecasts,
- Informed estimates by NRC and DOE specialists, and
- Extrapolation from a reactor licensing case system.

Summary estimates of the waste management document acquisitions based on historic data from the Document Control System and extrapolated to 1999 are presented in Table 3-2. The estimate is based on correlating the DCS acquisitions with the DOE waste management budget forecast and extrapolating from the Diablo Canyon Reactor Licensing case. Details of this projection are given in Appendix B.

For the data used in Table 3-2:

- 1981 to 1984 are the DCC actual acquisitions;
- 1985 to 1990 estimates are taken from DCS counts as extrapolated using the DOE budget; and

Table 3-1. Types of NRC Records to Form Licensing Information Management System Information and Data Elements

NRC/DOE workshop documentation	Procedural agreements between NRC/DOE
NRC staff trip reports	Quality assurance (QA/QC record)
NRC contractor trip reports	Regulations
NRC staff reviews of DOE technical reports	Regulatory guides
NRC staff internal memoranda applications	Material referenced in DOE licensing
NRC staff site characterization analyses	Licensing review procedures
NRC staff site technical positions	License applications and environmental reports
NRC staff generic technical positions	
NRC staff reviews of Site Characterization Plan (SCP) updates	NRC reviews of design, operations, closure, and monitoring of LLW Sites
NRC staff comments on DOE Environmental Assessments (EAs)	Topical report reviews
NRC staff technical letters to DOE	Supporting documentation of technical assistance to States
	Technical positions
Contractor reviews of DOE technical reports	Site transfer criteria
Contractor letter reports	Site transfer review criteria
Contractor formal reports (includes Research)	
Comments by ACRS	Amendments to 10 CFR Part 60
Comments by miscellaneous committees (HLW Task Force, etc.)	Informal information
	Notes to the file
Research Symposia	Calculations
	Significant news articles
DOE technical reports	Speeches
DOE Environmental Assessments	Technical papers, seminars
DOE site characterization plans and updates	Other information of interest
Questions and answers by public, Congress, Commission, and others	Primary data sent to NRC as record evidence
Correspondence (outside NRC)	DOE-generated data in logs and data notebooks
Issues and their resolution	Data, facts, and information from existing outside sources
Exemptions to rule	Geophysical logs
Federal Register notices	Data reports
Public comments on specific documents and NRC responses	Description of collection methods
Receivers of information and mailing lists	Borehole completion report
Legal opinions and rulemakings	Data analysis reports, e.g.
Staff reports (on-site representatives)	Hydrology modeling studies
Commission actions and decisions	Data base handbooks
State and Indian meetings	Environmental assessments
Formal minutes of meetings held under NRC/DOE procedural agreements	Site characterization plans
	Safety analysis reports

Table 3-2. Summary of Estimates of Waste Management Document Acquisitions

Year	Low Estimate		Mid Estimate*		High Estimate	
	Acquisitions	Cummulative	Acquisitions	Cummulative	Acquisitions	Cummulative
DCC Actual Acquisitions						
1981	2,000	2,000	2,000	2,000	2,000	2,000
1982	4,000	6,000	4,000	6,000	4,000	6,000
1983	6,000	12,000	6,000	12,000	6,000	12,000
1984	9,000	21,000	9,000	21,000	9,000	21,000
DCS Data**						
1985	15,000	36,000	17,000	38,000	20,000	41,000
1986	19,000	55,000	22,000	60,000	26,000	67,000
1987	21,000	76,000	27,000	87,000	36,000	103,000
1988	26,000	102,000	37,000	124,000	52,000	155,000
1989	18,000	120,000	28,000	152,000	44,000	199,000
1990	22,000	142,000	34,000	186,000	53,000	252,000
Diablo Canyon Data**						
1991	18,000	160,000	27,000	213,000	42,000	294,000
1992	14,000	174,000	21,000	234,000	33,000	327,000
1993	11,000	185,000	17,000	251,000	27,000	354,000
1994	9,000	194,000	14,000	265,000	22,000	276,000
1995	7,000	201,000	11,000	276,000	17,000	393,000
1996	6,000	207,000	9,000	285,000	14,000	407,000
1997	4,000	211,000	7,000	292,000	11,000	418,000
1998	4,000	215,000	6,000	298,000	9,000	427,000
1999	3,000	218,000	5,000	303,000	7,000	434,000

*Geometric midpoint between high and low estimates.

**See Appendix B.

- 1991 to 1999 high and low estimates are derived from the Diablo Canyon data.

The estimates in Table 3-2 use the following rules:

- In the low estimate, the counts are increased by a factor that decreases linearly from 2 in 1985 to 1.2 in 1989. In the high estimate, the factor is kept at 2 throughout.
- The mid estimate is the geometric midpoint between the high and low estimates (the midpoint on a logarithmic scale).

The volume of storage required can be related to the average number of pages per document and the average number of characters per page. The following averages were used for estimating:

- An average document has 7 pages,
- An average page has 1500 characters, and
- An average document has 10,000 characters.

If the entire holdings estimated for 1999 were to be maintained in full text storage, memory capacity requirements are estimated to grow to be in the range from 2000 to 4500 megabytes of storage, assuming full efficiency. If an inverted index on the full text were added, the memory requirements could increase by up to 50 percent or more. More than half of these holdings are expected to be acquired by 1990.

3.4 Indexing Requirements

The types of records and their potential uses will influence how LIMS records will be indexed. Of the many indexing options, only computer-supported indexing systems are considered here. The different computer indexing options are not mutually exclusive; typically, a number of different indexes will be maintained for all records. For example, all records will be indexed by accession number assigned, title, publishing agency, and date.

There are two requirements for indexing, and both require special effort to achieve: a comprehensive subject and sub-subject index for all records and a cross-reference capability that provides (1) reference to related documents that preceded it (such as an earlier draft or a directive that caused the document to be prepared) and (2) reference to related documents that were prepared subsequently (such as later revisions or detailed responses to recorded inquiries).

Both subject and cross-reference indexes require a combination of hardware, software, and thorough procedures. The hardware and

software capabilities affect the procedure requirements. Should both full text and reference searches be used, the indexes would be applicable to:

<u>Full Text Searches</u>		<u>Reference Searches</u>
Inquiries and responses	Environmental analyses	Technical studies
Position papers	Site characterizations	Data
Reviews	License applications	Papers
Issues resolution	Critical reviews	Minutes of meetings-- routine
NRC announcements	Hearings	Unofficial comments
Legal opinions	Selected depositions	News articles
Minutes of meetings-- selected		
Major documents		

For full text searching, criteria and procedures must be established to ensure that proper material be entered into the LIMS system. When a document is assigned to the system, effort would be expended to ensure its completeness and accuracy in that system.

Informal records can be indexed in a standard library system with author, date, title, abstracts, keywords, cross references, data, accession number, originating agency, agency and contractor report numbers, contract number, and history of users. These holdings will require procedures to ensure that keywords are satisfactorily established and to ensure that all documents enter the electronic system (Borko and Benier, 1978).

Subject indexing is by word and phrase. Subject words appear in four places in a record:

- Titles,
- Abstracts,
- Text, and
- Keywords.

Titles are usually searched as a phrase, but may be searched for individual words. Designated keywords are established by the selection of appropriate descriptors and their selection is critical. Words in abstracts and text are treated in concordance. To the extent that they coincidentally indicate the general subject, they are or are not valid for scanning the holdings. Searching for words in abstracts or in text requires an inverted dictionary of the significant words. A list of documents taken from earlier studies was reviewed to determine how words in each might be indexed.

Because keywords vary and there are subtle variations in the meaning of words, terminology is always a problem in information searches. One aid to search efficiency is the incorporation of a well-maintained, automatic thesaurus imbedded in the access operations stream. For example, if a user requests a search on keyword 1, and the thesaurus indicates that keyword 274 is a synonym for keyword 1, then, unless the user intentionally suppresses the feature, lists on both keyword 1 and keyword 274 will be provided.

3.5 Information Capture and Quality Assurance

An important requirement of the LIMS is assurance of information--data reliability. The LIMS must be able to link the originators of information and data, the various activities, and sources of information that are relevant to data creation and understanding. To ensure quality control, the LIMS must be capable of controlling data entry and updating (i.e., through a central point) and limit some users to read-only capability (NRC, 1984). It will be necessary to have procedures and organizations in place in order to fulfill this requirement.

3.6 Information Retention and Security

There are three basic security requirements for any information processing system:

- Prevent unauthorized disclosure of information;
- Protect the resources and information that are used by a program or activity to perform its mission by preventing unauthorized modification, destruction, and events that will affect timely availability of data (e.g., by redundant storage copies); and
- Provide quality control accountability methods (e.g., password account records, log records of changes) to support the investigation effort in the event that the first two requirements are not being met.

In order to accomplish these requirements, the system must include contingency plans for continuing operations in the event of a disaster, backup systems such as duplicate tapes and hard copy (microfiche), and system recovery and reconstruction within a short time period (NRC, 1984).

3.7 Information Retrieval

Two components of information retrieval that are crucial to system usefulness are search and retrieval. Search indicates whether or not a specific piece of information is in the system, helps one to

identify pertinent information within the system, indicates the form in which the information can be retrieved, and tells its location. Retrieval provides information in a form appropriate to the situation, such as online presentation, microfiche, magnetic tape, or hard copy.

To interact directly with an automated system requires the ability of users to search in real time. For the system to be used with confidence by a skilled user, such as a research librarian, "real time" is interpreted as the location of a specific document citation within minutes and other relevant material within a half hour. When a user wishes to identify all relevant information on a given subject, as for discovery, a search of several hours would probably be acceptable.

Retrieval of documents in various forms and at several locations will take differing amounts of time depending on requirements of the user. In general, technical staff looking for specific information will want to see the information as soon as possible. The system should provide retrieval services comparable to those of commercial systems such as DIALOG and ORBIT; those services provide abstracts by overnight mail delivery. Electronic document transfer is preferred where available and cost justifiable; however, any form of information that must be delivered by the mail should be received within 5 days, according to the guideline used in establishing schedules for the various phases of discovery. Under the law, NRC must be capable of identifying the existence, description, nature, and custody of any books, documents, or other matter that may be subject to discovery or FOIA requests (see Section 2.1).

3.8 Interfaces With Other Information Management Systems

A requirement of the LIMS is that it use the resources of other information management systems where the information is technically compatible and physically accessible. This will avoid the duplication of holdings and these information management systems could serve as valuable backups. A preliminary evaluation of existing and planned information management systems related to repository design and development was conducted including the DOE Office of Civilian Radioactive Waste Management (OCRWM) and its related repository project offices (including Basalt Waste Isolation Project Office (BWIP), Salt Repository Project Office (SRP), Nevada Nuclear Waste Storage Investigations Office (NNWSI), and Crystalline Rock Project Office (CRPO)). Details of this analysis are provided in Appendix C.

In addition to the DOE information management systems, other systems such as the system being developed by Oak Ridge National Laboratory for the NRC Geotechnical Branch and the system being developed by EG&G, Idaho, for DOE's LLW program should be considered for integration with the system. An engineering HLW data base is under development for Division of Waste Management Engineering Branch (WMEG) by the

Bureau of Standards and will contain technical reviews of DOE reports (NBS, 1985). Many of these data bases are in the developmental stage and monitoring of them should continue. Specific requirements for accessing other information management systems will be developed at a later date.

4.0 SYSTEM ARCHITECTURE CONCEPT

The system architecture concept, presented in Figure 4-1, defines a distributed processing network that might be used in the implementation of the LIMS and would be capable of meeting the LIMS requirements discussed in Section 3-1.

The concept, as presented, is not meant to imply specific numbers of terminals or the number of public document rooms that will be included in the system. Rather, it is intended to illustrate the network and serve as the system overview that NRC must consider in order to accomplish the LIMS goals. A detailed implementation plan will be required.

Distributed processing techniques imply the use of intelligent or programmable terminals at sites remote from the main computer facility, all of which can communicate with each other; these are privileged terminals. Restricted terminals are those that would be used only for searching information from the main computer. In general, only NRC staff would have access to the privileged terminals, and the public users would have access to the restricted terminals.

4.1 System Details

4.1.1 Central Computer Facility

The central computer facility is the repository for all data files and system software. The computer itself must be capable of handling all the data files of the entire information management system. The LIMS will consist of all the files of a records data base system, the licensing open item tracking management system, the NRC work plan system, and any technical data bases that the NRC staff members require for analysis.

The software requirements must include a data base management system, a project management system (e.g., PERT networking), and general programming compilers (Fortran, PL1, etc.). The computer system would require sufficient hard disk storage for immediate data access and backup storage for less active data (e.g, tape storage or optical disks).

The communication interface between the main computer and the overall system controls all communication to and from the main computer. The interface buffers incoming messages to the computer and distributes the outgoing traffic to the proper remote stations. The software included in the communication interface would enable any terminal to

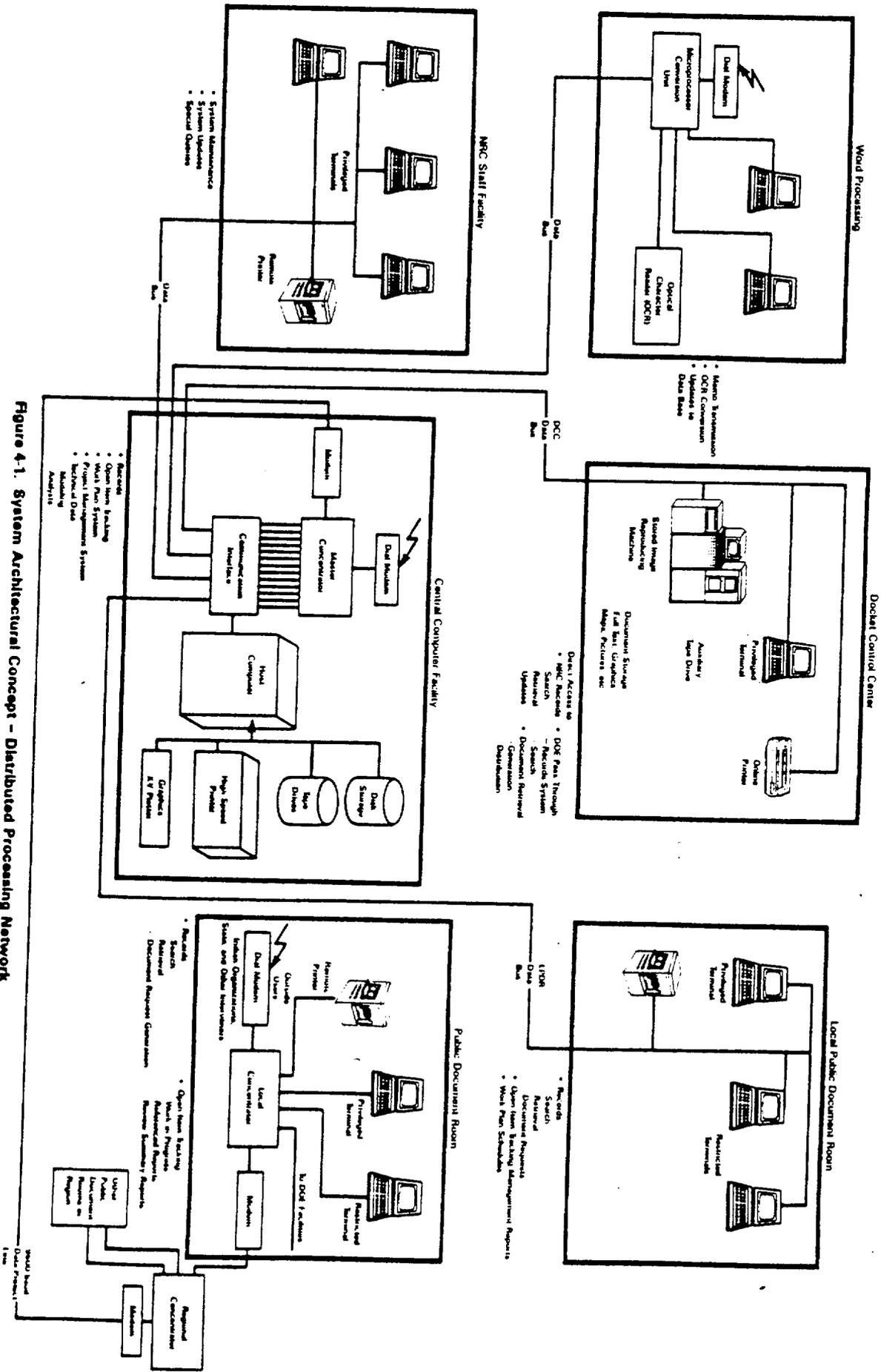


Figure 4-1. System Architectural Concept - Distributed Processing Network

be routed directly to other terminals in the system and also to DOE facilities, thus allowing online capabilities between reading rooms and "pass-through" capabilities to DOE systems.

The master concentrator is a demodulation unit that receives the modulated data stream and separates it into single data paths identified by the source of the path. The dial modems are included for other users, such as State representatives, Indian tribal organizations, and the general public, to access the system using telephone lines.

4.1.2 Docket Control Center

The DCC is directly coupled to the computer facility by a data bus and has online capabilities to all systems through their terminal(s). The DCC personnel can perform all search and retrieval functions of the NRC systems and the DOE systems. The DCC would also have the authority to update the files as they receive and log in new documents. Documents may be read into a stored image reproducing machine. This device is capable of generating a facsimile of a document, including text, photographs, maps, graphics, etc., and storing the page image on magnetic tape. The images can then be recalled for copies. The advantage of this technique is that a master copy of all documents is stored within the device from which copies can be generated. Therefore, the original hard copy inadvertently cannot be removed from the repository by users. The DCC would also have an online printer that would print out all document requests. Each request would identify the documents of interest and generate a mailing label for document distribution.

4.1.3 Word Processing

The existing word processing capability enhanced by a microprocessor unit will be capable of translating the word processor files into files that are compatible with the computer system. A dial modem accepts files from outside users, such as DOE, enabling direct electronic transmitting of reports. An optical character reader (OCR) will be available to scan and digitize typed reports. The microprocessor will accept the output of the OCR and interface with a person to translate the input to a format compatible with the system.

4.1.4 NRC Staff Facility

Privileged terminals will be available to the NRC staff members in order to perform the various requested staff functions. These functions include all system maintenance, new systems development, all system data file update, and special or unique system queries. The responsibility of this function may include the review of all data that are to be used to update the system. That is, the DCC and word processing input to the system may not go directly into the data files, rather the data would be input into buffer files. These files

would then be reviewed by a data base administrator for accuracy, consistency, and content, and the data base administrator would perform the actual file update. The staff terminals would also be capable of interfacing with the computer system to perform technical data analysis functions.

4.1.5 Local and Public Document Rooms

The PDRs are considered satellite installations with the primary function of searching and retrieving information for the public. Privileged terminals would be controlled by the NRC staff members responsible for the location. This terminal will be capable of direct access to the main system. For extensive studies, the NRC staff member could "off-load" a portion of the system and store it in the local concentrator at the PDR facility. Then they would have exclusive interface with the system for detailed examination of a retrieval subset of the data base.

The restricted terminals at reading rooms will have read-only access to selected portions of the system. The primary function will be to access the records system to identify documents and reports of interest and allow the user to browse the records online. Once the documents or portions thereof are identified for hard copy retrieval, a document request form will be invoked. This request form, when filled out, will allow the information to be printed on the local online printer at the PDR for the requestor.

In addition to the terminals available in the local PDR, dial modems can also be connected. These modems process telecommunications from external sources, such as queries from State representatives, Indian representatives, or special interest groups. Reading rooms that are colocated in the vicinity of DOE facilities will have ports in the concentrator that are dedicated to communicate with the DOE facility. By this method, all terminals will be able to access those portions of the data bases made available to them.

4.2 Hardware

At this conceptional level, specific hardware cannot be identified, but classes of hardware can be suggested. The central computer could be of the IBM 4331 class. Other computers which could be considered are DEC VAX, PRIME, Phase Four, and IBM Series 38. The hardware is a function of the amount of data the system is liable to contain, the minimum response time required, available expansion capabilities, etc. All these considerations will need to be adequately addressed in a detailed implementation plan. Based on a similar information management system, a rough estimate of the cost of implementation is in the range of \$1 million for the hardware with a continuing maintenance fee and \$2 million for software development and systems implementation (DeLutis, 1984).

5.0 PILOT PROJECT DEMONSTRATION TEST AND EVALUATION PROGRAM

The currently operational DCS is based primarily on nonmechanized, labor-intensive techniques with only minor use of modern information storage and retrieval technology. However, the numerous information hardware components available within the organization offer a potential for trial demonstration tests. Those hardware components include personal computers, word processors, an optical character reader, high speed printers, and access through an existing contract to an IBM time-shared network computer service with powerful software programs. Although most of these components are currently operating on a standalone basis, they offer the potential for hands-on test and evaluation of information system requirements and equipment operation.

The anticipation of heavy use of the LIMS by all involved segments of NRC and others dictates that the efficiency of search and retrieval philosophies and techniques be validated prior to large-scale implementation of the final system. The ability of this user community to effectively understand and accept the system features should be examined to provide maximum utility of the final system to the users. This evaluation would also include the assessment of system output formats and flexibility for current user demands as well as anticipated user activities. A pilot project demonstration would identify any unrecognized requirements that might become apparent in the user hands-on environment. Similarly, the tests serve to identify and quantify any deficiencies or operational problems in systems components or architecture that might become apparent only in the hands-on environment. Test results will provide the basis for future system design efforts, hardware acquisition activities, and eventual system implementation and expansion of the current DCS into an automated LIMS.

Details of the pilot project demonstration tests to be performed in FY 1986 may be found in the companion program document, "Operating Plan for the Information Management and Open Item Tracking Systems Pilot Project Demonstration Program" (Aerospace, 1985a).

The results of this test activity will be documented in a final report and will be used as a basis for assessment of the proposed systems configuration and operating philosophy. This review will lead to the formulation of a final systems plan and detailed systems architecture specifications for the installed system. It is anticipated that the assembled hardware configuration for operational testing will form part of the interim system.

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10 CFR 2, 1985, "Rules of Practice for Domestic Licensing Proceeding," Code of Federal Regulations, Title 10, Energy, Part 2.

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APPENDIX A. EXCERPTS FROM 10 CFR DEALING WITH
INFORMATION AVAILABILITY

The following sections of the Code of Federal Regulations (CFR) dealing with records retrieval and public availability are presented here for convenience of the reader:

- Requirements for Discovery
Sections 2.741, 2.744, and 2.790
- Requirements for Freedom of Information Act
Section 9.8

For additional information refer to the Code of Federal Regulation, Title 10, Energy (10 CFR) 1985.

§ 2.741

10 CFR Ch. I (1-1-85 Edition)

§ 2.741 Production of documents and things and entry upon land for inspection and other purposes.

[37 FR 15134, July 28, 1972]

(a) *Request for discovery.* Any party may serve on any other party a request to:

(1) Produce and permit the party making the request, or a person acting on his behalf, to inspect and copy any designated documents, or to inspect and copy, test, or sample any tangible things which are within the scope of § 2.740 and which are in the possession, custody, or control of the party upon whom the request is served; or

(2) Permit entry upon designated land or other property in the possession or control of the party upon whom the request is served for the purpose of inspection and measuring, surveying, photographing, testing, or sampling the property or any designated object or operation thereon, within the scope of § 2.740.

(b) *Service.* The request may be served on any party without leave of the Commission or the presiding officer. Except as otherwise provided in § 2.740, the request may be served after the proceeding is set for hearing.

(c) *Contents.* The request shall set forth the items to be inspected either by individual item or by category, and describe each item and category with reasonable particularity. The request shall specify a reasonable time, place, and manner of making the inspection and performing the related acts.

(d) *Response.* The party upon whom the request is served shall serve on the party submitting the request a written response within thirty (30) days after the service of the request. The response shall state, with respect to each item or category, that inspection and related activities will be permitted as requested, unless the request is objected to, in which case the reasons for objection shall be stated. If objection is made to part of an item or category, the part shall be specified.

(e) *NRC records and documents.* The provisions of paragraphs (a) through (d) of this section do not apply to the production for inspection and copying or photographing of NRC records or documents. Production of such records or documents is subject to the provisions of §§ 2.744 and 2.790.

§ 2.744 Production of NRC records and documents.

(a) A request for the production of an NRC record or document not available pursuant to § 2.790 by a party to an initial licensing proceeding may be served on the Executive Director for Operations, without leave of the Commission or the presiding officer. The request shall set forth the records or documents requested, either by individual item or by category, and shall describe each item or category with reasonable particularity and shall state why that record or document is relevant to the proceeding.

(b) If the Executive Director for Operations objects to producing a requested record or document on the ground that (1) it is not relevant or (2) it is exempted from disclosure under § 2.790 and the disclosure is not necessary to a proper decision in the proceeding or the document or the information therein is reasonably obtainable from another source, he shall so advise the requesting party.

(c) If the Executive Director for Operations objects to producing a record or document, the requesting party may apply to the presiding officer, in writing, to compel production of that record or document. The application shall set forth the relevancy of the record or document to the issues in the proceeding. The application shall be processed as a motion in accordance with § 2.730 (a) through (d). The record or document covered by the application shall be produced for the "in camera" inspection of the presiding officer, exclusively, if requested by the presiding officer and only to the extent necessary to determine:

(1) The relevancy of that record or document;

(2) Whether the document is exempt from disclosure under § 2.790;

(3) Whether the disclosure is necessary to a proper decision in the proceeding;

(4) Whether the document or the information therein is reasonably obtainable from another source.

(d) Upon a determination by the presiding officer that the requesting party has demonstrated the relevancy of the record or document and that its production is not exempt from disclo-

sure under § 2.790 or that, if exempt, its disclosure is necessary to a proper decision in the proceeding, and the document or the information therein is not reasonably obtainable from another source, he shall order the Executive Director for Operations, to produce the document.

(e) In the case of requested documents and records (including Safeguards Information referred to in sections 147 and 181 of the Atomic Energy Act, as amended) exempt from disclosure under § 2.790, but whose disclosure is found by the presiding officer to be necessary to a proper decision in the proceeding, any order to the Executive Director for Operations to produce the document or records (or any other order issued ordering production of the document or records) may contain such protective terms and conditions (including affidavits of non-disclosure) as may be necessary and appropriate to limit the disclosure to parties in the proceeding, to interested States and other governmental entities participating pursuant to § 2.715(c), and to their qualified witnesses and counsel. When Safeguards Information protected from disclosure under section 147 of the Atomic Energy Act, as amended, is received and possessed by a party other than the Commission staff, it shall also be protected according to the requirements of § 73.21 of this chapter. The presiding officer may also prescribe such additional procedures as will effectively safeguard and prevent disclosure of Safeguards Information to unauthorized persons with minimum impairment of the procedural rights which would be available if Safeguards Information were not involved. In addition to any other sanction that may be imposed by the presiding officer for violation of an order issued pursuant to this paragraph, violation of an order pertaining to the disclosure of Safeguards Information protected from disclosure under section 147 of the Atomic Energy Act, as amended, may be subject to a civil penalty imposed pursuant to § 2.205. For the purpose of imposing the criminal penalties contained in section 223 of the Atomic Energy Act, as amended, any order issued pursuant to this para-

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graph with respect to Safeguards Information shall be deemed an order issued under section 161b of the Atomic Energy Act.

(f) A ruling by the presiding officer, the Atomic Safety and Licensing Appeal Board, or the Commission for the production of a record or document will specify the time, place, and manner of production.

(g) No request pursuant to this section shall be made or entertained before the matters in controversy have been identified by the Commission or the presiding officer, or after the beginning of the prehearing conference held pursuant to § 2.752 except upon leave of the presiding officer for good cause shown.

(h) The provisions of § 2.740 (c) and (e) shall apply to production of NRC records and documents pursuant to this section.

[37 FR 15135, July 28, 1972, as amended at 40 FR 2973, Jan. 17, 1975; 46 FR 51723, Oct. 22, 1981]

ment Room, except for matters that are:

(1)(i) Specifically authorized under criteria established by an Executive order to be kept secret in the interest of national defense or foreign policy and (ii) are in fact properly classified pursuant to such Executive order;

(2) Related solely to the internal personnel rules and practices of the Commission;

(3) Specifically exempted from disclosure by statute (other than 5 U.S.C.) 552(b), provided that such statute (i) requires that the matters be withheld from the public in such a manner as to leave no discretion on the issue, or (ii) establishes particular criteria for withholding or refers to particular types or matters to be withheld.

(4) Trade secrets and commercial or financial information obtained from a person and privileged or confidential;

(5) Interagency or intraagency memorandums or letters which would not be available by law to a party other than an agency in litigation with the Commission;

(6) Personnel and medical files and similar files, the disclosure of which would constitute a clearly unwarranted invasion of personal privacy;

(7) Investigatory records compiled for law enforcement purposes, but only to the extent that the production of such records would (i) interfere with enforcement proceedings, (ii) deprive a person of a right to a fair trial or an impartial adjudication, (iii) constitute an unwarranted invasion of personal privacy, (iv) disclose the identity of a confidential source and, in the case of a record compiled by a criminal law enforcement authority in the course of a criminal investigation, or by an agency conducting a lawful national security intelligence investigation, confidential information furnished only by the confidential source, (v) disclose investigative techniques and procedures, or (vi) endanger the life or physical safety of law enforcement personnel;

(8) Contained in or related to examination, operating, or condition reports prepared by, on behalf of, or for the use of an agency responsible for the

AVAILABILITY OF OFFICIAL RECORDS

§ 2.790 Public inspections, exemptions, requests for withholding.

(a) Subject to the provisions of paragraphs (b), (d), and (e) of this section, final NRC records and documents,¹ including but not limited to correspondence to and from the NRC regarding the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, or order, or regarding a rule making proceeding subject to this part shall not, in the absence of a compelling reason for nondisclosure after a balancing of the interests of the person or agency urging nondisclosure and the public interest in disclosure, be exempt from disclosure and will be made available for inspection and copying in the NRC Public Docu-

¹Such records and documents do not include handwritten notes and drafts.

regulation or supervision of financial institutions; or

(9) Geological and geophysical information and data, including maps, concerning wells.

(b)(1) A person who proposes that a document or a part be withheld in whole or part from public disclosure on the ground that it contains trade secrets or privileged or confidential commercial or financial information shall submit an application for withholding accompanied by an affidavit which:

(i) Identifies the document or part sought to be withheld and the position of the person making the affidavit, and

(ii) Contains a full statement of the reasons on the basis of which it is claimed that the information should be withheld from public disclosure. Such statement shall address with specificity the considerations listed in paragraph (b)(4) of this section.

In the case of an affidavit submitted by a company, the affidavit shall be executed by an officer or upper-level management official who has been specifically delegated the function of reviewing the information sought to be withheld and authorized to apply for its withholding on behalf of the company. The affidavit shall be executed by the owner of the information, even though the information sought to be withheld is submitted to the Commission by another person. The application and affidavit shall be submitted at the time of filing the information sought to be withheld. The information sought to be withheld shall be incorporated, as far as possible, into a separate paper.

The affiant may designate with appropriate markings information submitted in the affidavit as a trade secret or confidential or privileged commercial or financial information within the meaning of § 9.5(a)(4) of this chapter and such information shall be subject to disclosure only in accordance with the provisions of § 9.12 of this chapter.

(2) A person who submits commercial or financial information believed to be privileged or confidential or a trade secret shall be on notice that it is the policy of the Commission to

achieve an effective balance between legitimate concerns for protection of competitive positions and the right of the public to be fully apprised as to the basis for and effects of licensing or rule making actions, and that it is within the discretion of the Commission to withhold such information from public disclosure.

(3) The Commission shall determine whether information sought to be withheld from public disclosure pursuant to this paragraph: (i) is a trade secret or confidential or privileged commercial or financial information; and (ii) if so, should be withheld from public disclosure.

(4) In making the determination required by paragraph (b)(3)(i) of this section, the Commission will consider:

(i) Whether the information has been held in confidence by its owner;

(ii) Whether the information is of a type customarily held in confidence by its owner and whether there is a rational basis therefor;

(iii) Whether the information was transmitted to and received by the Commission in confidence;

(iv) Whether the information is available in public sources;

(v) Whether public disclosure of the information sought to be withheld is likely to cause substantial harm to the competitive position of the owner of the information, taking into account the value of the information to the owner; the amount of effort or money, if any, expended by the owner in developing the information; and the ease or difficulty with which the information could be properly acquired or duplicated by others.

(5) If the Commission determines, pursuant to paragraph (b)(4) of this section, that the record or document contains trade secrets or privileged or confidential commercial or financial information, the Commission will then determine (i) whether the right of the public to be fully apprised as to the bases for and effects of the proposed action outweighs the demonstrated concern for protection of a competitive position and (ii) whether the information should be withheld from public disclosure pursuant to this paragraph. If the record or document for which withholding is sought is

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deemed by the Commission to be irrelevant or unnecessary to the performance of its functions, it shall be returned to the applicant.

(6) Withholding from public inspection shall not affect the right, if any, of persons properly and directly concerned to inspect the document. The Commission may require information claimed to be a trade secret or privileged or confidential commercial or financial information to be subject to inspection: (i) Under a protective agreement, by contractor personnel or government officials other than NRC officials; (ii) by the presiding officer in a proceeding; and (iii) under protective order, by parties to a proceeding, pending a decision of the Commission on the matter of whether the information should be made publicly available or when a decision has been made that the information should be withheld from public disclosure. In camera sessions of hearings may be held when the information sought to be withheld is produced or offered in evidence. If the Commission subsequently determines that the information should be disclosed, the information and the transcript of such in camera session will be made publicly available.

(c) If a request for withholding pursuant to paragraph (b) of this section is denied, the Commission will notify an applicant for withholding of the denial with a statement of reasons. The notice of denial will specify a time, not less than thirty (30) days after the date of the notice, when the document will be placed in the Public Document Room. If, within the time specified in the notice, the applicant requests withdrawal of the document, the document will not be placed in the Public Document Room and will be returned to the applicant. Provided, That information submitted in a rule making proceeding which subsequently forms the basis for the final rule will not be withheld from public disclosure by the Commission and will not be returned to the applicant after denial of any application for withholding submitted in connection with that information. If a request for withholding pursuant to paragraph (b) of this section is granted, the Commission will notify the applicant of its determi-

nation to withhold the information from public disclosure.

(d) The following information shall be deemed to be commercial or financial information within the meaning of § 9.5(a)(4) of this chapter and shall be subject to disclosure only in accordance with the provisions of § 9.12 of this chapter:

(1) Correspondence and reports to or from the NRC which contain information or records concerning a licensee's or applicant's physical protection or material control and accounting program for special nuclear material not otherwise designated as Safeguards Information or classified as National Security Information or Restricted Data.

(2) Information submitted in confidence to the Commission by a foreign source.

(e) The presiding officer, if any, or the Commission may, with reference to the NRC records and documents made available pursuant to this section, issue orders consistent with the provisions of this section and § 2.740(c).

[41 FR 11810, Mar. 22, 1976, as amended at 42 FR 12877, Mar. 7, 1977; 46 FR 51723, Oct. 22, 1981]

§ 9.8 Requests for records.

(a) Copies of records may be requested in person at the NRC Public Document Room, 1717 H Street, NW., Washington, D.C. Written requests for copies of records shall be addressed to the Director, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. The request should clearly state on the envelope and in the letter that it is a "Freedom of Information Act request." A request that is not so marked will be deemed not to have been received by the NRC until it is actually received by the Director, Office of Administration.

(b) All requests for copies of records must reasonably describe the record sought in sufficient detail to permit the identification of the requested record. Where possible, specific information regarding dates, titles, docket numbers, file designations, and other information which may help identify the records should be supplied by the requester. If a request does not reasonably describe the record sought in sufficient detail to permit its identification, the requester will be so informed by the Director, Office of Administration, or his designee, within 10 working days after receipt of the request and requested to submit additional information regarding the request or to meet with appropriate NRC personnel in order to clarify the request. Requests for Waiver or reduction of fees shall be made in accordance with § 9.14a, waiver or reduction of fees, and shall be processed in accordance with § 9.14b. Processing of requests for a waiver or reduction of fees.

(c) If the record for which a request is made has been reasonably described pursuant to paragraph (b) of this section and is available in the NRC Public Document Room, the requester will be informed within 10 working days after receipt of the request by the Director, Office of Administration, or his designee, of the time and place where the record will be made available, and the estimated cost for furnishing copies of the record. In order

to obtain copies of records in the most expeditious manner, a person may request copies of records in person at the NRC Public Document Room, or may open an account at the Public Document Room with the private firm contractually responsible for reproducing copies of NRC records.

(d) Requested records which have been reasonably described pursuant to paragraph (b) of this section but which are located at places other than the NRC Public Document Room or NRC headquarters may, at the discretion of the NRC, be made available for inspection and copying at such other locations within 10 working days after receipt of the request. For example, contracting officers may authorize an NRC contractor to disclose records in its possession at the contractor's facility or, if the record is in the possession of a subcontractor, at a subcontractor's facility. To the extent applicable, the charges specified in § 9.14 for locating and reproducing copies of records shall be applied to records made available pursuant to this paragraph.

(e) A request for a record which is not available in the NRC Public Document Room shall be promptly forwarded by the Director, Office of Administration, or his designee, to the head of the office primarily concerned with the records requested. The Director, Office of Administration, or his designee will maintain, and the Executive Legal Director or his designee will be furnished, a copy of each request referred to another office, together with the following information: (1) The date the request was received; (2) the office to which it was referred; and (3) the date on which it was referred.

[40 FR 7895, Feb. 24, 1975, as amended at 41 FR 20645, May 20, 1976; 44 FR 16001, Mar. 16, 1979]

APPENDIX B. PROJECTED VOLUME OF INFORMATION FOR A LICENSING INFORMATION MANAGEMENT SYSTEM

The holdings of the Nuclear Regulatory Commission (NRC) Docket Control Center (DCC) grew at a rate of approximately 50 percent per year between 1981 and 1985 (see Table B-1). DCC personnel have increased from one in 1981 to four in 1985, a 40 percent per year increase.

The Document Control System (DCS) acquisitions history began during reactor licensing, and only 1 percent of DCS holdings relate to waste management, i.e., approximately 10,500 documents. Most of those documents were indexed in the last 2 years. The total acquisitions for DCS have remained roughly constant for the last 3 years, even with the increase in waste management acquisitions. The growth rate for waste management acquisitions is estimated to be between 50 percent and 100 percent per year during the last 3 years, depending on the estimate for the base of acquisitions in 1982 (see Table B-2).

A forecast of DCS waste management acquisitions between 1985 and 1989 has been prepared based on the Department of Energy (DOE) budget. The historical estimates were prepared from the budgets expended from 1981 to 1983. It is assumed that there is a lag between budget allocation and document production; that is, 1985 document production is proportional to the size of the 1984 budget and likewise for other years (see Table B-3).

The functional relationship between budgeted dollars and the production of records is critical. If the expenditures are construction-intensive, fewer technical records will be produced. Available data indicate that shaft construction will be about 20 percent of the FY 1986 budget and less of subsequent year's budgets. In the later portion of the site characterization phase, it is uncertain whether the budget will increase or decrease. It is assumed here that the budget will increase to accommodate more detailed studies of the second (and other) possible sites and to verify and corroborate findings. It is assumed that record production will increase to the end of the site characterization period, at which time it will decrease until all reviews are complete. Then record production will be based principally on response to inquiries and discovery proceedings.

The number of DCC acquisitions and DCS acquisitions differ. DCC has acquired approximately twice as many records as the DCS waste management holdings during the same period of time. This difference is due probably to the DCC's holding administration files for NRC contracts and correspondence files not routinely routed to the DCS. The NRC budget is approximately only 1 percent of the DOE budget. It

Table B-1. DCC Acquisitions from 1981 through 1985

End of Year	DCC Staff Level	Estimated Acquisition	Total Holdings
1981	1	2,000	2,000
1982	2	4,000	6,000
1983	3	6,000	12,000
1984	4	9,000	21,000
1985 (estimated)	5	14,000	35,000

Table B-2. DCS Waste Management Acquisitions from 1981 through 1984*

Year Acquired	Per Year Increase	
	At 50%	At 100%
1981	0	0
1982	2,200	1,500
1983	3,300	3,000
1984	5,000	6,000
TOTAL	10,500	10,500

*Reflects DCS report that most waste management documents acquisition began in 1983.

Table B-3. Estimated DCS Acquisitions from 1981 through 1989
as a Function of DOE Budget

Fiscal Year	Budget (\$ million)	Year of Acquisition	Documents Acquired	
			Low Estimate	High Estimate
1981	unknown	1982	2,200	1,500
1982	unknown	1983	3,300	3,000
1983	200	1984	5,000	6,000
1984	319	1985	7,500	10,000
1985	328	1986	10,500	13,000
1986	572	1987	13,500	18,000
1987	836	1988	19,500	26,000
1988	686	1989	16,000	24,000
1989	700	1990	16,000	24,000

is assumed that DOE production of technical records in the site characterization phase will overload the Division of Waste Management (DWM) technical document production.* However, NRC reviews, including contractor submissions, will substantially supplement DOE production. The DCC acquisition rate is estimated to have been consistently 180 percent of the DCS acquisition rate from 1982 to 1985. For future estimates, this ratio is assumed to drop to 110 percent linearly throughout the site characterization phase.

Informed individuals at NRC speculate that the licensing for geologic repositories will be far more difficult than the licensing for even the most contentious reactor case, Diablo Canyon. The Diablo Canyon licensing case generated in correspondence more than 10,000 documents and in hearing files and other reports, almost 9000 documents. The

*In early 1985, one DOE spokesperson stated that DOE has more than 300,000 documents on file. Whether these are all waste management related is not known, but presumed not. If 10 percent were waste management related, that would account for 30,000 records.

speculation is that documents to be generated for repository licensing will be 10 times the number of those for Diablo Canyon. It is indicated that this estimate is for only the discovery and hearing phases of the licensing process. It is not indicated whether inspection reports were taken before or after hearings started. To span possible variations, the speculative factor, 10, is assumed to be between 5 and 12 (see Table B-4).

The prehearing and hearing phases for repository licensing are scheduled to extend over 3 years, whereas the Diablo Canyon case took 16 years. It is not likely that repository hearings and trials will take 5 to 12 times as long, but 3 years might be an optimistically short schedule. Should the hearings stretch out for 10 years, then the extrapolation for document acquisition for the discovery and hearing phase would cover this time period. It is assumed that document production would be weighted toward the beginning of the period, because just a few critical issues will hold up the process toward the end. Table B-5 provides an estimate of the distributed document production during the discovery and hearing phases. The assumption has been made that document production will decrease each year by 20 percent for 10 years.

Table B-4. Number of Acquisitions Based on Extrapolating from Diablo Canyon Licensing Process (Discovery and Hearing Phases)

Unit	Reported Number of Documents	Extrapolation	
		Five Times	Twelve Times
Documents	19,575	98,000	235,000
Pages	156,000	780,000	1,870,000
Shelf Feet	130.5	650	1,550
Library Stacks (6 shelves high)	7	36	87

Table B-5. Estimated Distributed Document Production in
Discovery and Hearing Phases

Year	Acquisition Extrapolation	
	Five Times Diablo Canyon	Twelve Times Diablo Canyon
1990	22,000	53,000
1991	18,000	42,000
1992	14,000	33,000
1993	11,000	27,000
1994	9,000	22,000
1995	7,000	17,000
1996	6,000	14,000
1997	4,000	11,000
1998	4,000	9,000
1999	3,000	7,000
TOTAL	98,000	235,000

APPENDIX C. INTERFACES WITH OTHER INFORMATION MANAGEMENT SYSTEMS

Where accessible, other information management systems (IMSs) should be used by the Nuclear Regulatory Commission (NRC) system, rather than duplicate holdings. A preliminary investigation of existing and planned IMSs related to repository design and development was conducted, and the findings are summarized in this appendix.

C.1 Department of Energy Office of Civilian Radioactive Waste Management

The Department of Energy (DOE) Office of Civilian Radioactive Waste Management (OCRWM) is responsible for the permanent disposal of spent fuel and high-level waste. The OCRWM provides policy guidance, program direction, and technical review capabilities at DOE Headquarters. The DOE Operations Offices and repository project offices have the responsibility for project execution and day-to-day management. Summaries of the Basalt Waste Isolation Project (BWIP), Salt Repository Project (SRP) Office, and Nevada Nuclear Waste Storage Investigations (NNWSI) Office Information Management Systems are provided in Sections C.2 and C.4.

The OCRWM recognizes the need for an information system that would support the activities of OCRWM and other organizations within DOE during the licensing process. DOE Headquarters is currently supported by a manual, decentralized, filing system, and the repository project offices have or are in the process of developing systems for the storage and retrieval of documents. However, to support the technical and managerial information needs of obtaining a license and to provide a permanent record of licensing activities, a flexible licensing information system that has access to regulations and program archives, tracks issues and commitments, and documents key records is required (DOE, 1985). In addition to being of use to DOE, the system would also act as a source of information when responding to outside requests.

The DOE Office of Geological Repositories has the responsibility for the development of this licensing information system for the OCRWM. DOE is

...in the final stages of developing the system specification and hopes to start system design and further implementation soon... (DOE, 1985).

The work is being performed by Roy F. Weston, Inc.

The licensing information system concept that has been developed is shown in Figure C-1. The system will be distributed and will be supported by indexes and archives at DOE Headquarters and the

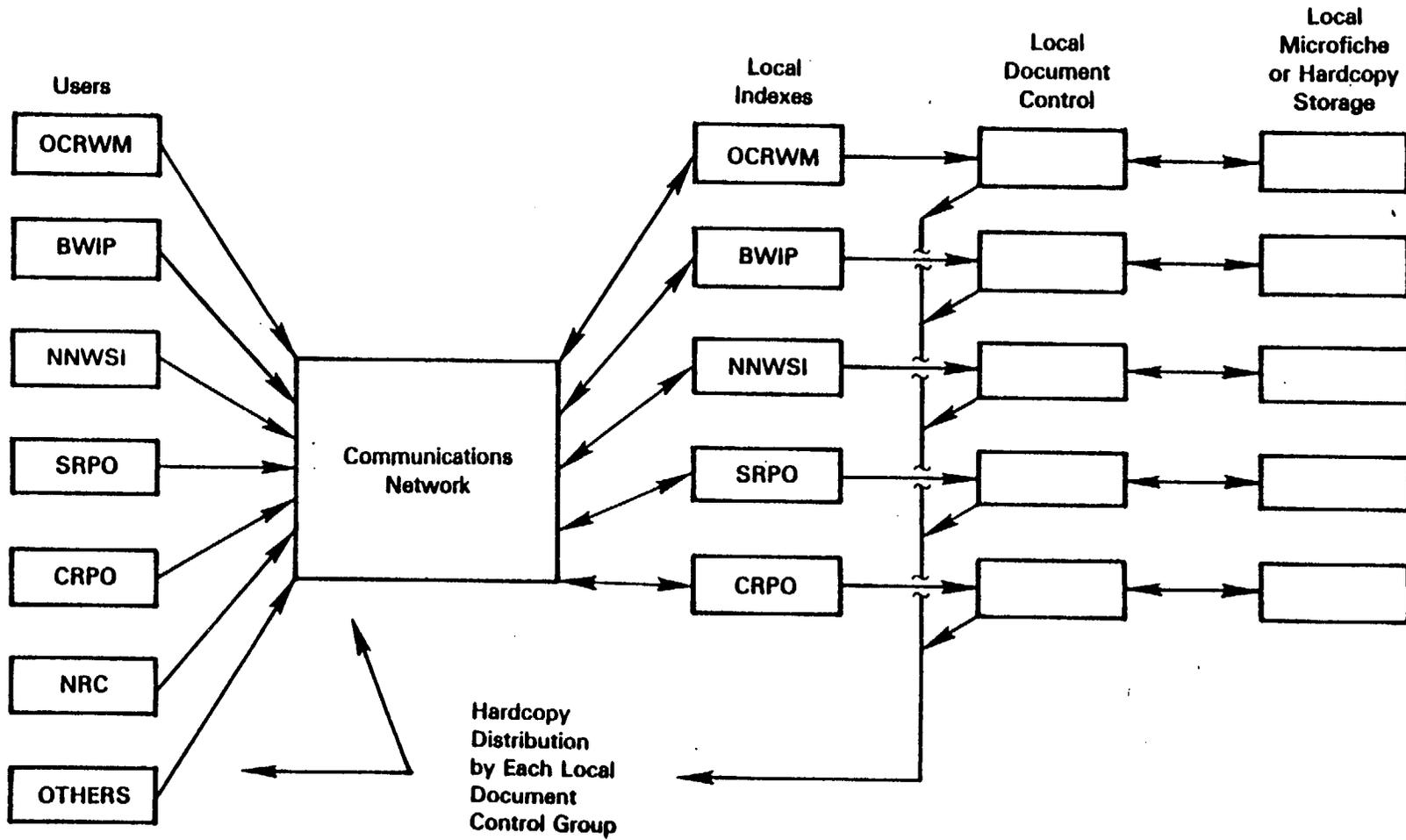


Figure C-1. Conceptual OCRWM Licensing Information System

repository project offices (BWIP, Salt Repository Project Office (SRPO), NNWSI, and the Crystalline Rock Project Office (CRPO)). Users will have remote access via personal computers and telephone line communications. It is anticipated that all information collection, indexing, key wording, abstracting, storage, and retrieval of hard copy would be done at the DOE locations by designated document control staffs. In addition to use by DOE, users at NRC, the States, Indian tribal organizations, and the general public will also have access to the system.

C.2 Basalt Waste Isolation Project

A large number of documents are generated by BWIP as a result of the work done in support of the mission of the OCRWM Program. In addition, BWIP also receives documents from external sources. To govern the administrative processing and control of these documents during the period of site identification, exploration, characterization, and selection (i.e., Advanced Development Phase), BWIP has developed a records management system (RMS). This system, developed in response to the policies and procedures of Rockwell and DOE, has been operational since 1979 and is supported by personnel, procedures, and computer facilities. The Basalt Records Management Center (BRMC) in the BWIP Systems Department is responsible for integration and control during document processing; the organizations within BWIP generate and receive documents and work with the BRMC to implement the RMS.*

The RMS is essentially an archival system that contains all documents issued or received by the project. These documents include, but are not limited to, incoming and outgoing correspondence, meeting minutes, and technical reports. Within the system there are four groups of documents that receive special processing: supporting documents, documents subject to the Rockwell Engineering Release System, documents cleared by the DOE Richland Operations Office, and documents included within the public release system (PRS) (see Table C-2). In general, as documents are generated or received by project personnel and the mailroom, the process is coordinated by the BRMC to ensure that one copy is processed for retention. Following receipt and issuance control procedures, the documents are registered in an index by the BRMC and are microfilmed for permanent retention and reference. Microfilms of documents are filed in the Basalt Reference File and a hard copy may be stored in a records holding area. Where a record is not in a form suitable for microfilming, i.e., core samples, it is retained in its original medium in an approved facility, and the BRMC is responsible for ensuring that a listing is prepared of all such items. Details of this process are provided in the BWIP Records Management Plan (Ferguson, 1984) and its supporting documentation.

*Mary, R.E., Personal Communication, Basalt Waste Isolation Project, July 11, 1985.

Table C-2. Special Subsystems of BWIP Records Management System*

Engineering Release System (ERS)	Ensures that applicable engineering documents (i.e., engineering drawings, engineering orders, specifications, etc.) are properly approved, released, and tracked; overlaps with DOE-cleared and PRS documents.
Supporting Documents	Selected documents that detail basic data for project management, site characterization, or facility design; within scope of ERS; overlap with documents in the PRS.
Public Release System	Provides program participants with documents and data necessary to monitor BWIP activities; produces the Document/Data Accessions List; overlaps with DOE-cleared and ERS documents.
DOE-Cleared Documents	Selected documents that have been cleared by the DOE Richland Operations Office for patentability and sensitivity, etc.; overlaps with ERS and PRS documents.

*Ferguson, J.E., 1984

The registration and indexing of the documents by the BRMC has been automated to permit administrative control and retrieval. The resulting records retention data base is the core of the RMS. Currently BWIP uses the Boeing Computer Service's UNIVAC and System 2000 as the data management software. There are approximately 55,000 records registered in the System with 50 data elements available for use in indexing and retrieval. The most common data fields are:

Record Number	Work Breakdown Structure
Document Type	Originator
Document Number	Recipient
Document Date	Microfilm Location
Document Title	Hard Copy Location
Subject Code	

Using these data, the information may be retrieved by various methods, and ad hoc and batch reports can be generated. The principal users of the system are the BWIP staff. Some of the staff may access the

system directly via terminals; there is no charge to users for this service. However, normally the staff uses the BRMC where they have access to film file and microfiche viewers and support staff. Currently, the RMS does not tie in with any other systems, and there is no direct outside access to the system.

The PRS provides program participants and the public access to BWIP documents and data via the Document/Data Accessions List. The Accessions List, which was initiated in 1983, is limited to documents or data developed by the BWIP and contains approximately 5 percent of the total number of records indexed in the system. This report is generated from the Records Retention data base. The Accessions List is arranged by OCRWM tasks and is sorted by document type. Within each document type, documents are sorted by the document number and date. Recently, BRMC began including abstracts in the Accessions List.

Currently, there is no direct computer access to the PRS. The Accessions List is updated quarterly and supplemented monthly. Each month, the BRMC distributes 54 copies of the Accessions List to program participants. Copies are also available in the DOE Reading Room. Documents may be requested by contacting BWIP BRMC representatives or by completing a document request form. Physical samples, data tapes, etc., that are not microfilmed may be reviewed at the BWIP offices.

The RMS was developed for use in the Advanced Development Phase of the OCRWM Program. Although the Records Management Plan (Ferguson, 1984) assumes minimum expansion of the system until 1986, BWIP recognizes the need for the implementation of a unified Data Management System. A system will be required that can meet the needs of the Engineering Development Phase that includes completion and submission of the license application and design and construction of the repository. Such a system would increase the data base size and probably include many subdata bases. BWIP is planning for this expansion and has considered using an IBM 4341 and System 2000. It is anticipated that a definitive plan will be available.

C.3 Salt Repository Project Office

The Salt Repository Project Office (SPRO) of the OCRWM is responsible for designing and accessing the performance of a geologic repository in salt. The SRPO is currently developing an integrated data management system (IDMS) that can assist in meeting the documentation and information requirements during the licensing process. The system operates under procedures established to ensure conformance with the quality assurance requirements of DOE and the Battelle Project Management Division (BPMO). To aid in data configuration management and control, a Configuration Control Board and Configuration Management Office have been established. The Information Management Systems Department is responsible for the management and control of the software, facilities, and data processing procedures. The work

package managers have the responsibility for selecting the data to be input to the technical data bases and providing input to changes in the system (ONWI, 1985). The BPMD project management system (PMS) contains data that are pertinent to the IDMS. The PMS is used to manage the overall project and is a formal system consisting of policies, procedures, hardware, and software. Data generated by the PMS process, i.e., cost and schedule, are integrated with the IDMS using various control procedures and software.

The IDMS provides for data acquisition, validation, and storage in data bases that are accessible for online queries and generation of standard and ad hoc reports. The types of data in the system include numerical values as well as document references. Some data are available online. However, more detailed data are in the form of magnetic tapes, microform, or hard copy. Manual procedures and computer processes have been developed to control data input and validation. These procedures and details of the IDMS are discussed in the IDMS System Description (ONWI, 1985) and related documentation.

Fourteen subsystems compose the IDMS. Those subsystems are in various stages of development. Some portions of the system have been operational since 1980. The subsystems are defined in Table C-3, and their characteristics are summarized in Table C-4. Currently, the computerized portions of subsystems reside on two host computers, the Control Data Corporation CYBER or the Digital Equipment Corporation VAX, operated by the Battelle Columbus Laboratories Computer Center. The Battelle Software Package for Information Storage and Retrieval (BASIS) and the Battelle Relational Software Package for Database Management (DM) are the major software packages being used. The data bases in the IDMS are supported by the Controlled Technical Reference Center (CTRC) and the Controlled Document Center (CDC); those facilities store the hard copy and microform copies of documents. The CTRC provides access to BPMD reference documents available for loan as well as controlled access documents (i.e., one-of-a-kind references). CDC retains hard copies of 30 controlled documents and in the future may be expanded to store engineering documents.

Users are able to communicate with the host computers through a data switch that can be connected to dial-up telephone lines, TYMNET, or direct-wired data lines. Access, at no cost to the user, is controlled by the use of passwords and user names, and any ASCII terminal may be used. The NRC Repository Projects Branch currently uses five subsystems of the IDMS: records and information system (RIS), Catalog, reference tracking system (RTS), records turnover package (RTP), and the technical data base (TDB). NRC uses IBM PCs to connect to the Battelle computers using TYMNET. NRC has a single password for access to the system. The SRPO IDMS is still under development. Because the subsystems reside on different computers, it is necessary for the user to logoff one computer and then repeat search procedures on the other. The SRPO is in the process

Table C-3. Functions of the Integrated Data Management System (IDMS) Subsystems*

IDMS Subsystem	Function
Salt Repository Project/ Technical Data Base (SRP/TDB)	Provides online access to numerical data; contains geologic data from 200 well completion reports, environmental data, and some engineering data.
Records and Information System (RIS)	Free text system that provides information and backup for many other components of the IDMS. Computerized data base that permits document retrieval by more than 30 data elements (i.e., title, author, date, etc.)
Records Turnover Package (RTP) Data Base	Contains an index to the action documents generated during the life of a contract or subcontract; actual documents are on microfiche.
Commitment/Action Item Tracking (C/ATS)	Contains the records of the system action items and commitments received by Office of Nuclear Waste Isolation (ONWI), from DOE/SRPO that require written responses.
Mail Log (ML)	Internal administrative tool used to manage incoming and outgoing correspondence for ONWI and other BPMD projects.
Detail Data References (DDR)	Will support the management of magnetic tapes or other numerical data not contained in the SRP/TDB; will contain record of analyses performed on the data and rationale used in analysis.
Sample Inventory Management System (SIMS)	Contains the inventory record of system samples (i.e., core, water, soil, etc.) that are analyzed during the course of SRP work; includes accounting of sample source locations, tests conducted, etc.

*ONWI, 1985.

Table C-3 Functions of the Integrated Data Management System (IDMS) Subsystems (continued)

IDMS Subsystem	Function
Engineering Data Base System (EDRS)	Will address the identification and handling of engineering specifications, drawings, and controlled design data; will be supported by a controlled retention facility.
Reference Tracking System (RTS)	List of references to documents that support ONWI technical activities; tracks reports referenced in Environmental Assessments (EAs), Site Characterization Plans (SCPs), etc., as they are processed.
Document Comments Tracking and Response System (DCTRS)	Tracks the evolution of EAs, SCPs, and institutional questions and answers through the comment and approval process.
Contract Data Management System (CDMS)	Identifies and tracks the status of deliverables listed as milestones in the PMS.
Report Clearance System (RCS)	Tracks SRP reports through administrative and patent review and clearance process.
Catalog System (Catalog)	Announces forthcoming technical documents to be distributed to the public when published; inventory of unanalyzed reports identified as milestones in project work packages.
Site Characterization Plan Issues Management System (SCP/IMS)	Will address the SCP data needs through an issues hierarchy and provider hierarchy and will correlate them with the respective SCP sections.

Table C-4. Characteristics of the Integrated Data Management System (IDMS) Subsystems*

Subsystem	Hardware	Software	Status	Number of Records	Retrieves	Overlap	Backup	Output
SRP/TDB	VAX	BASIS	Operational 1983 - present additions being made	400	Specific values, data	None	Microfilm, backup tape, hard copy	Data, reports, handbook, searches
RIS	CDC CYBER	BASIS	Operational 1980 - present	15,000+	Bibliographic references	RTP C/ATS ML RTS	Microfilm/microfiche, hard copy OMWI-200	Bibliographies (OMWI-200), indexes
RIP	CDC CYBER	BASIS	Operational 1982 - present	165,000+	Bibliographic records	RIS	Microfilm/photo-graphic negatives	Bibliographies, indexes, specific package information
C/ATS	CDC CYBER	Query Update	Operational 1981 - present	2,500+	Action items, commitments	RIS (completed items only)	Hard copy	Status reports
ML	CDC CYBER	BASIS	Operational 1984 - present	14,000+	Incoming/outgoing correspondence, project-related mail	RIS	Microfilm	Daily log report
DDR			Under development			None	Magnetic tapes	
SIMS	VAX	DM	Early operational	150	Sample records	No direct	Hard copy, microfilm	Inventories, status of samples and requests
EDRS	-	-	Under development	-	Documents	OMWI configuration control process, other DOE primes, agencies	Microfilm	Copies of drawings, specs, other data
RTS	CDC CYBER	BASIS	Operational 1984 - present	2,300+	Bibliographic record	RIS, CTRC	Hard copy, microfiche	References in EAs, SCPs, etc.
DCTRS	VAX	BASIS	Test stage	Test data	Comments, responses, issues	None	Backup tape	
CDMS	VAX	DATA RETRIEVE	Under development	Test data	Status of deliverables	Catalog, PMS, RIS	Magnetic tape	Deliverables, lists, delinquency reports, status reports
RCS	CDC	Query Update	Operational 1979 - present	1,973	Bibliographic records of reports in clearance	PMS, Catalog CDMS	Hard copy	Lists of approved/unapproved reports, keyword indexes
Catalog	CDC CYBER	BASIS	Operational 1983 - present (may be integrated with CDMS)	317	Records of forthcoming reports	CDMS, PMS, RCS	Hard copy (6 times/y)	Catalog (of forthcoming reports)
SCP/IMS	-	-	Planning stage	-	-	-	-	-

integrating the data on one computer and to develop software that is more user-friendly. Additionally, some of the IDMS subsystems will be streamlined or combined and valid data redundancies eliminated.*

C.4 Nevada Nuclear Waste Storage Investigations

The Nevada Nuclear Waste Storage Investigations portion of the OCRWM is responsible for evaluating the suitability of the Nevada Test Site (NTS) area for a geologic repository, designing the repository, and evaluating its performance. NNWSI is managed by the DOE Nevada Operations Office. There is no prime contractor at NNWSI; current participants include Sandia National Laboratories (SNL), Los Alamos National Laboratory, Lawrence Livermore National Laboratory, the U.S. Geological Survey, Westinghouse Electric Corporation, and Science Applications International Corporation (SAIC). NNWSI does not have an information system that integrates the efforts of these program participants. Some current project information sources are shown in Table C-5.

NNWSI does have some systems (i.e., Action Item Log, Correspondence Log, Site Characterization Plan Reference System) that reside on a VAX-11/750 and are managed using INGRES software.

One component of the NNWSI information resources is the tuff data base located on the SNL CDC CYBER 170/855 (NRC/NNWSI, Information Management System Meeting, August 31, 1984). The data base contains 2.0×10^6 characters and is managed using System 2000 software. The data base is directed toward the needs of performance assessment and contains reference data, interpreted data, reduced data, and supporting information. Data to be input includes geology, geochemistry, in situ stress, thermal properties, and repository and waste package design information. Several backup mechanisms are used to ensure system reliability including use of cartridge tapes, microfiche, and paper copies. Users have "read only" access to the data base. A user friendly interface, the Tuff Data Base Interface is being developed (Langkopf et al., 1985).

Although NNWSI has no integrated records management system, each of the laboratories does have its own separate system.** There is a Central Records Center located at NTS that meets DOE policies and procedures. NNWSI is currently in the process of conducting a study that will result in the design and testing of a prototype system that would meet the project's long-range objectives.** One component of this overall system would probably be a licensing information system.

*Starr, S., Personal Communication, Office of Nuclear Waste Isolation, Battelle Project Management Division, July 15, 1985.

**Dickson, W., Personal Communication, Nevada Operations Office, July 29, 1985.

C.5 References

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Fergenson, J.E. 1984, "Basalt Waste Isolation Project Records Management Plan," SD-BWI-AP-001, Rockwell Hanford Operations, Richland, Washington, 1984.

Langkopf, B.S., B.J. Satter, and E.P. Welch, 1985, "Version I of the Users Manual for the Tuff Data Base," Interface, SAND-84-1643, Sandia National Laboratories.

ONWI, 1985, "SRP Integrated Data Management System Systems Description," Office of Nuclear Waste Isolation, Battelle Project Management Division.