

*REVIEW OF  
U.S. DEPARTMENT OF ENERGY  
ACTIVITIES TO PRESERVE  
RECORDS CREATED BY  
THE YUCCA MOUNTAIN  
REPOSITORY PROJECT*

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August 2013

A Report to Congress  
and the Secretary of Energy



UNITED STATES  
Nuclear Waste Technical Review Board

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# U.S. NUCLEAR WASTE TECHNICAL REVIEW BOARD

REPORT TO CONGRESS AND THE SECRETARY OF ENERGY

REVIEW OF U.S. DEPARTMENT OF ENERGY ACTIVITIES TO  
PRESERVE RECORDS CREATED BY THE  
YUCCA MOUNTAIN REPOSITORY PROJECT



AUGUST 2013

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UNITED STATES  
NUCLEAR WASTE TECHNICAL REVIEW BOARD  
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August 2013

The Honorable John Boehner  
Speaker  
United States House of Representatives  
Washington, DC 20515

The Honorable Patrick J. Leahy  
President Pro Tempore  
United State Senate  
Washington, DC 20510

The Honorable Ernest J. Moniz  
Secretary  
U.S. Department of Energy  
Washington, DC 20585

Dear Speaker Boehner, Senator Leahy, and Secretary Moniz:

Congress created the U.S. Nuclear Waste Technical Review Board in the 1987 amendments to the Nuclear Waste Policy Act (NWPA) (Public Law 100-203) to evaluate the technical and scientific validity of activities undertaken by the Secretary of Energy to implement the NWPA. In accordance with provisions of the Law directing the Board to report its findings, conclusions, and recommendations to Congress and the Secretary of Energy, the Board submits this Report, *Review of U.S. Department of Energy Activities to Preserve Records Created by the Yucca Mountain Repository Project*. The purpose of the Report is to inform Congress and the Secretary about the Board's evaluation of Department of Energy (DOE) activities related to archiving and preserving materials developed by the Yucca Mountain Project (YMP).

For almost 30 years, DOE studied a site at Yucca Mountain in Nevada for its suitability as the location of a deep geologic repository for disposal of spent nuclear fuel (SNF) and high-level radioactive waste (HLW). DOE's site investigations and the development of a Yucca Mountain license application created enormous amounts of technical and scientific information. In 2010, funding for the YMP was eliminated, and DOE notified the Nuclear Regulatory Commission of its intention to withdraw the Yucca Mountain license application, which had been submitted in 2008. Also in 2010, responsibility for archiving and preserving Yucca Mountain scientific and engineering information was transferred to DOE's Office of Legacy Management (LM).

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The Board began evaluating DOE activities related to archiving and preserving Yucca Mountain data and information in 2010, as part of its ongoing technical and scientific review. The following year, in a Report accompanying the Fiscal Year 2012 Energy and Water Development Appropriations bill, the House Appropriations Committee directed the Board to “give support to” DOE as it archived and preserved scientific data, documents, and materials from the YMP.

Based on the results of a limited number of retrieval “spot checks” undertaken by the Board and its ongoing review, the Board finds that:

- Yucca Mountain documents have been preserved and can be accessed and retrieved.
- With significant time and effort, LM personnel can search and retrieve relevant e-mail records.
- LM does not have the capability to load and execute most of the analytical software used on the YMP.
- Some boxes of YMP records being stored by LM contain physical objects, but the inventories of the contents vary in how detailed they are. Consequently, it is unclear what measures might be needed to preserve them or to create searchable databases for the objects.
- LM has used approved National Archive and Records Administration schedules to identify what YMP records should be preserved permanently and what records should be preserved temporarily.
- The general public can access preserved records held by LM, but only through a Freedom of Information Act request.

Based on its findings, the Board makes the following recommendations:

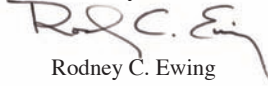
1. *A retrieval exercise, similar to the one conducted in August 2012, should be repeated in three years to assess the level of record preservation and retrieval capability at that time.*
2. *Policy-makers should evaluate how much priority should be given to archiving and preserving YMP documents and physical materials. Without a continuing commitment of resources, it is unclear whether the current level of effort in this area can be sustained over time.*
3. *Additional project documents may still be forwarded to LM to be archived and preserved. Such records should be added to the Yucca Mountain Records Information System if they are determined to contain new technical information.*
4. *DOE should consider providing web access to the foundational documents developed as part of the YMP. These records may be of scientific, technical, and historical value and deserve to be easily accessible by the general public.*
5. *In the cases of boxes of physical objects being stored by LM for which inventories are limited and/or not included in a searchable database, DOE policy-makers should evaluate whether to undertake additional efforts to develop informative inventories that could be placed into searchable databases.*



6. *Although not the responsibility of LM, materials from geologic investigations, such as rock cores and materials from experimental studies, such as metal coupons used in corrosion investigations, may have future value to ongoing DOE projects and may find application in broader scientific and technical studies. This report does not address or evaluate the fate of these materials; however, the Board recommends that an external review be initiated to determine what types of materials exist, where they are located, and what their potential value might be. Such a review should provide recommendations to DOE policy-makers on whether and how materials judged to be valuable should be preserved and made accessible.*

We hope that Congress and the Secretary find the Board's findings and recommendations in the Report useful, and the Board looks forward to continuing its ongoing technical and scientific review of DOE activities related to managing and disposing of SNF and HLW.

Sincerely,

A handwritten signature in dark ink, appearing to read "R.C. Ewing", with a stylized flourish at the end.

Rodney C. Ewing  
Chairman



# EXECUTIVE SUMMARY

The Nuclear Waste Policy Act of 1982 (NWPAct) authorized the U.S. Department of Energy (DOE) to investigate sites for a deep-mined geologic repository to dispose of high-level radioactive waste and spent nuclear fuel. In 1987 Congress amended the NWPAct to direct DOE to characterize only a site at Yucca Mountain, located about 80 miles northwest of Las Vegas, Nevada. The 1987 law also created the U.S. Nuclear Waste Technical Review Board (NWTRB or Board), an independent federal agency charged with “evaluating the technical and scientific validity” of the work undertaken by the Secretary of Energy to implement the NWPAct.

The purpose of this Report to Congress and the Secretary of Energy is to document the Board’s oversight of DOE’s activities to archive and preserve materials developed by the Yucca Mountain Project (YMP).

For nearly 30 years, DOE studied Yucca Mountain as a potential repository site and completed significant engineering design work. In June 2008, DOE submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct a repository and associated surface facilities. Hearings before the NRC Atomic Safety and Licensing Board (ASLB) started in the fall of that year. In February, 2010, funding for the YMP was eliminated in the President’s Budget for Fiscal Year 2011, which also announced that the YMP would be terminated. At the same time, DOE notified the ASLB that it intended to withdraw the Yucca Mountain license application. On July 29, 2010, responsibility for archiving and preserving Yucca Mountain scientific and engineering information was internally transferred from the unit in charge of the YMP, the Office of Civilian Radioactive Waste Management (OCRWM), to the Office of Legacy Management (LM). On September 30, 2010, OCRWM ceased all its activities. A year later, the NRC Commissioners decided to halt the Yucca Mountain licensing proceedings. As of July, 2013, that decision is under review before the U.S. Court of Appeals for the District of Columbia Circuit.

DOE’s investigation of the Yucca Mountain site and its development of a license application generated massive amounts of technical and scientific information as well as extensive analyses of that information. As public records, proper archiving and preservation of that material is required by law. In addition, the possibility remains that either the Appeals Court might order NRC to resume hearings on the license application or a new administration might choose to reactivate the application. Finally, the data gathered, the samples collected, and the analyses undertaken by the YMP could prove to be of scientific value beyond their worth in supporting an application to construct a deep-mined geologic repository at Yucca Mountain. Thus, the responsibilities given to LM are consequential.

As part of the NWTRB’s ongoing technical and scientific review of DOE activities related to implementing the NWPAct, the Board began to monitor events as they unfolded in the spring of 2010, considering, among other things, the question of what would be the fate of the materials developed for the Yucca Mountain license application. DOE recognized the

importance of properly archiving and preserving critical information from the YMP. DOE also appreciated how the decision to cease work on the YMP and the effort to withdraw the license application created an environment where DOE's management of YMP-generated information might be closely scrutinized by other interested and affected parties. For this reason, DOE approached the Board in May, 2010, and proposed that the Board, as a disinterested party, formally oversee LM's efforts to archive and preserve YMP documents and materials. At that time, DOE notified the ASLB that it was in discussions with the NWTRB about how the Board might to carry out that task.

The following year, in a Report accompanying the Fiscal Year 2012 Energy and Water Development Appropriations bill, the House Appropriations Committee directed the Board to "give support to" DOE as it archived and preserved scientific data, documents, and materials from the YMP. Now that LM has mostly completed its acceptance of records from OCRWM, this Report to Congress and the Secretary of Energy responds to the House Appropriations Committee's request and presents findings and recommendations from the Board's evaluation of DOE's archival and preservation efforts.

LM's primary responsibility is to archive and preserve materials created by the YMP during its nearly 30-year lifetime. These materials take the form of electronic databases and retrieval systems, analytical software, and physical objects, such as maps, videotapes, well-logs, and other items, some of which cannot be digitized. The two most important databases and retrieval systems are the Records Information System (RIS) and the E-mail Warehouse. The former holds the central information generated by the YMP; the latter stores the Lotus Notes e-mails sent and received by YMP personnel. Together these databases and systems contain more than 62 million records.

Additional physical items, such as geologic cores, rock samples, and experimental materials, such as metal coupons from corrosion investigations, are not the responsibility of LM but instead are the responsibility of DOE's Office of Nuclear Energy (NE). Preservation of these physical materials falls outside DOE's request to the Board to oversee LM activities. Because such items are an important component of the scientific information produced by the YMP, however, they are discussed in a separate section of this report.

LM also must implement DOE's commitment, made in the President's Budget for Fiscal Year 2011 and later confirmed to the ASLB, to archive and preserve a special collection of records: the Licensing Support Network document collection (LSNdc). The LSNdc contains 3.65 million documents, comprising more than 34 million pages of information. Until early August, 2011, this material could be accessed through a web-based, NRC-operated portal, the Licensing Support Network (LSN), which was developed to facilitate the legal process of discovery during the license application proceeding.

Although there is considerable overlap between the internal YMP records and the LSNdc, one is neither a subset nor a superset of the other. The internal YMP databases hold confidential information, such as attorney-client communications, litigation work products, and "house-keeping" requirements. The LSNdc contains copyrighted documents and other materials that, while relevant to DOE's license application, were not created by the YMP.

As part of its review, the Board designed a spot-checking exercise to determine whether records could be retrieved from storage. It is important to state precisely the limitations of this exercise. Given the vast number of records being archived and preserved, the Board could only ask LM to retrieve a very small fraction of the documents. The Board requested

records spanning a wide range of technical work undertaken over the years by the YMP, but this does not represent a statistically significant sampling of the documents that have been archived and preserved.

As long as the YMP was active and the license application was still being litigated through NRC's adjudicatory hearing process, YMP-generated information and analyses were publicly available either from an easily accessible DOE website or, more comprehensively, through the LSN. Subsequently very few of the key YMP documents can be found on DOE websites. Thus, LM's preservation of YMP records remains DOE's primary mechanism for ensuring that those documents will be available in the future—at least in principle—to government officials, scientists, engineers, historians, and other interested parties.

Based on the results of its review, including the spot-checking retrieval exercise, the Board finds that:

1. *Yucca Mountain documents have been preserved and can be accessed and retrieved.* LM has developed a computer program that integrates the primary electronic database, the RIS, with records of data collected during the course of the YMP. In the Board's view, this new system, the Yucca Mountain Record Information System (YMRIS), has improved significantly the functionality of search and retrieval operations. In particular, the Board has a high degree of confidence that documentary material developed by the YMP and included in the LSNdc can be accessed and retrieved.
2. *With significant time and effort, LM personnel can search and retrieve e-mails from the E-mail Warehouse.* Because of the level of effort involved, the Board staff could not directly test LM's capability to access electronic messages. Board staff members, however, were shown how LM responded to congressional requests for YMP e-mails. A small set of e-mails deemed necessary to support the ASLB hearing on the Yucca Mountain license application was captured in the RIS database and included in the LSNdc. Board staff members were able to readily access a sample of these messages through the YMRIS.
3. *LM does not have the capability to load and execute most analytical software.* This software was used by YMP personnel to analyze data and support modeling activities. LM cannot run most of the analytical software to recreate some of these analyses, although both the inputs and outputs used by the software have been archived and preserved.
4. *Some boxes being stored by LM contain physical objects, such as videotapes, well logs, and maps.* However, LM has only a general understanding of the contents of the boxes. When activity ceased on the YMP, OCRWM personnel began transferring boxes with physical objects to LM for storage. The contents of those boxes were inventoried, and the inventories were provided to LM. The amount of detail in the inventories varies greatly. For this reason, it is unclear what measures might be needed to preserve the physical objects from the YMP for extended periods or to provide searchable databases for these objects.
5. *LM has used schedules approved by the National Archives and Records Administration (NARA) to identify YMP records that should be preserved permanently and YMP records that should be preserved temporarily, that is, for periods ranging from 10 to 100 years.*

Temporary records will be held by LM. Permanent records will be transferred to NARA no sooner than 30 years from the time that the YMP is conclusively shut down either as the result of a non-appealable court decision or by definitive executive or legislative actions. The procedures used by NARA for obtaining access to those records under its control can be cumbersome. Thus, examining even permanent YMP records may be difficult in the future.

6. *The general public can access written records held by LM.* However, to do so individuals or organizations must file a Freedom of Information Act request. Only four such requests from external parties have been received by LM since it took over responsibility for archiving and preserving YMP-generated material.

Based on its findings, the Board recommends the following:

1. A retrieval exercise, similar to the one conducted in August 2012, should be repeated in three years to assess the level of record preservation and retrieval capability at that time.
2. Policy-makers should evaluate how much priority should be given to archiving and preserving YMP documents and physical materials. Without a continuing commitment of resources, it is unclear whether the current level of effort in this area can be sustained over time.
3. Additional project documents may still be forwarded to LM to be archived and preserved. Such records should be added to the YMRIS if they are determined to contain new technical information.
4. DOE should consider providing web access to the foundational documents developed as part of the YMP. These records may be of scientific, technical, and historical value and deserve to be easily accessible by the general public.
5. In the cases of boxes of physical objects being stored by LM for which inventories are limited and/or not included in a searchable database, DOE policy-makers should evaluate whether to undertake additional efforts to develop informative inventories that could be placed into searchable databases.
6. Although not the responsibility of LM, materials from geologic investigations, such as rock cores and materials from experimental studies, such as metal coupons used in corrosion investigations, may have future value to ongoing DOE projects and may even find application in broader scientific and technical studies. This report does not address or evaluate the fate of these materials; however, the Board recommends that an external review be initiated to determine what types of materials exist, where they are located, and what their potential value might be. Such a review should provide recommendations to DOE policy-makers on whether and how materials judged to be valuable should be preserved and made accessible.

# ACRONYMS AND ABBREVIATIONS

AASG	American Association of State Geologists
AMR	Analysis/Modeling Report
ASLB	Atomic Safety and Licensing Board
Board	U.S. Nuclear Waste Technical Review Board
CFR	Code of Federal Regulations
CR	Condition Report
DIRS	Document Input Reference System
DOE	U.S. Department of Energy
EBS	Engineered barrier system
FEP	Features, events, and processes
GROA	Geologic Repository Operations Area
GSA	Geological Society of America
HLW	High-level radioactive waste
LA	Yucca Mountain license application (to construct and operate a repository)
LA-SAR	License Application Safety Analysis Report
LM	U.S. Department of Energy Office of Legacy Management
LMBC	Legacy Management Business Center in Morgantown, West Virginia
LSN	Licensing Support Network
LSNdc	Licensing Support Network document collection
NARA	National Archives and Records Administration
NE	U.S. Department of Energy Office of Nuclear Energy
NRC	U.S. Nuclear Regulatory Commission
NSHE	Nevada System of Higher Education
NWPA	Nuclear Waste Policy Act of 1982
NWTRB	U.S. Nuclear Waste Technical Review Board
OCR	Optical Character Recognition
OCRWM	DOE Office of Civilian Radioactive Waste Management

## ACRONYMS AND ABBREVIATIONS *CONTINUED*

PDF/A	Portable Document Format, version A
PCSA	Pre-closure Safety Analysis
QA	Quality assurance
RIS	Records Information System
RSF	Records Storage Facility
RIMA	Records Inventory Management Application
SAR	Safety Analysis Report
SMF	Sample Management Facility
SNF	spent nuclear fuel
SNL	Sandia National Laboratories
TAD	Transportation/aging/disposal
TDMS	Technical Data Management System
TechLib	Index of hardcopy books and articles held by the YMP Technical Library
TSPA	Total System Performance Assessment
TSPA-LA	Total System Performance Assessment License Application
TSPA-VA	Total System Performance Assessment Viability Assessment
U.S.C.	United States Code
USGS	U.S. Geological Survey
YMP	Yucca Mountain Project
YMRIS	Yucca Mountain Records Information System





# CONTENTS

EXECUTIVE SUMMARY . . . . .	ix
ACRONYMS AND ABBREVIATIONS . . . . .	xiii
PURPOSE. . . . .	1
BACKGROUND . . . . .	1
TYPES OF RECORDS DEVELOPED AS PART OF THE YUCCA MOUNTAIN PROJECT . . . . .	4
DOE ACTIVITIES TO PRESERVE RECORDS FROM THE YUCCA MOUNTAIN PROJECT . . . . .	6
BOARD STAFF MEMBERS VISIT TO THE LEGACY MANAGEMENT BUSINESS CENTER . . . . .	9
Description of Record-Retrieval Exercise . . . . .	9
Results of Record-Retrieval Exercise . . . . .	11
PHYSICAL MATERIALS FROM THE YUCCA MOUNTAIN PROJECT THAT ARE OUTSIDE THE RESPONSIBILITY OF THE OFFICE OF LEGACY MANAGEMENT . . . . .	13
BOARD FINDINGS AND RECOMMENDATIONS . . . . .	14
APPENDICES. . . . .	17
APPENDIX 1	
Office of Legacy Management Chronology of Activities for Preserving Yucca Mountain Project Records . . . . .	18

## APPENDIX 2

Yucca Mountain Project Electronic Databases and Retrieval Systems . . . . .	20
---	----

## APPENDIX 3

Standards and Procedures Used by the Office of Legacy Management to Preserve Yucca Mountain Project Records . . . . .	23
---	----

## APPENDIX 4

Tables of Retrieval Exercise Tasks . . . . .	27
Table 1. Task 1 Records and Tasks . . . . .	28
Table 2. Task 2 Records and Tasks . . . . .	29
Table 3. Task 3 Records and Tasks . . . . .	30
Table 4. Task 4 Records and Tasks . . . . .	32
Table 5. Task 5 Records and Tasks . . . . .	33
Table 6. Task 6 Records and Tasks . . . . .	34
Table 7. Task 7 Records and Tasks . . . . .	36
Table 8. Task 8 Records and Tasks . . . . .	38
Table 9. Task 9 Records and Tasks . . . . .	39
Table 10. Task 10 Records and Tasks . . . . .	42
Table 11. Task 11 Records and Tasks . . . . .	43
Table 12. Task 12 Records and Tasks . . . . .	44
Table 13. Task 13 Records and Tasks . . . . .	48

## APPENDIX 5

Yucca Mountain Project Record Retrieval Demonstration . . . . .	50
---	----

## APPENDIX 6

Retrieval of Physical and E-Mail Warehouse Records . . . .	58
Retrieved Boxes of YMP Physical Materials . . . . .	58
E-Mail Warehouse Retrieval . . . . .	61
<i>Objective</i> . . . . .	62
<i>Criteria</i> . . . . .	62
<i>Software Used</i> . . . . .	62
<i>Search Process</i> . . . . .	62
Result Matrix. . . . .	69



## PURPOSE

The purpose of this Report to Congress and the Secretary of Energy is to document the U.S. Nuclear Waste Technical Review Board's (Board or NWTRB) oversight of the U.S. Department of Energy's (DOE) activities to archive and preserve materials developed by the Yucca Mountain Project (YMP). The report is divided into six major sections: (1) a discussion of the background that triggered those activities; (2) a description of the types of scientific and technical information developed by the YMP; (3) a description of steps being taken by DOE to archive and preserve YMP information; (4) the oversight of those actions by the Board; (5) preservation of physical items outside of LM's control; and (6) Board findings and recommendations related to current and future YMP data archival and preservation activities.

## BACKGROUND

In 1982, the Congress passed the Nuclear Waste Policy Act (NWPAct), which created the Office of Civilian Radioactive Waste Management (OCRWM) within DOE. OCRWM was responsible for locating, constructing, and operating a deep-mined geologic repository for the disposal of high-level radioactive waste (HLW) and spent nuclear fuel (SNF). Pursuant to this legislation, OCRWM studied several potential repository sites across the country in the mid-1980s. In 1987, Congress amended the NWPAct and directed DOE to investigate Yucca Mountain in Nevada as the sole site to be considered for the location of a permanent repository. The 1987 law also created the NWTRB, an independent federal agency charged with "evaluating the technical and scientific validity" of the work undertaken by the Secretary of Energy to implement the NWPAct.

For nearly 30 years, DOE studied Yucca Mountain as a potential repository site and completed significant engineering design work. On June 3, 2008, DOE submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct a repository and associated surface facilities at the site. Hearings before the NRC Atomic Safety and Licensing Board (ASLB) started in the fall. In February, 2010, funding for the YMP was eliminated in the President's Budget for Fiscal Year 2011, which also announced that the YMP would be terminated. At the same time, DOE notified the ASLB that it wished to withdraw the Yucca Mountain license application. On July 29, 2010, responsibility for archiving and preserving Yucca Mountain scientific and engineering information was internally transferred from OCRWM to DOE's Office of Legacy Management (LM).<sup>1</sup> On September 30, 2010, OCRWM ceased all its activities.<sup>2</sup> A year later, the NRC Commissioners decided to halt Yucca Mountain licensing proceedings.<sup>3</sup> As of July, 2013, that decision is under review before the U.S. Court of Appeals for the District of Columbia Circuit.

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<sup>1</sup> Memorandum from David K. Zabransky, Office of Civilian Radioactive Waste Management, to John E. Davenport, Office of the Chief Information Officer, "Transfer of Office of Civilian Radioactive Waste Management (OCRWM) Records Custodianship to the Office of Legacy Management (LM)," July 29, 2010.

<sup>2</sup> See "Memorandum of Understanding: Closure of RW and Maintenance of the Yucca Mountain Site," initiated by Kristina Johnson, Under Secretary of Energy, September 16, 2010. That memorandum distributed OCRWM's responsibilities among five Program Secretarial Offices—Nuclear Energy, Environmental Management, General Counsel, National Nuclear Security Administration, and Legacy Management.

<sup>3</sup> NRC Commissioners, "Memorandum and Order," CLI-11-07, September 9, 2011; ASLB, "Memorandum (Suspending Adjudicatory Proceeding)," ASLPB No. 09-892-HLW-CAB04, September 30, 2012.

DOE's investigation of the Yucca Mountain site and its development of a license application generated massive amounts of technical and scientific information as well as extensive analyses of that information. As federal records, proper archiving and preservation is required by the Federal Records Act.<sup>4</sup> In addition, the possibility remains that either the Court of Appeals might order the NRC to resume licensing hearings or a new administration might choose to reactivate the license application. Finally, the data gathered, the samples collected, and the analyses undertaken by the YMP could prove to have scientific value beyond their role in supporting an application to construct a deep-mined geologic repository at Yucca Mountain. Thus, the responsibilities given to LM with respect to preserving YMP records and information are consequential.

As part of its ongoing technical and scientific review of DOE activities related to implementing the NWP, the Board began to monitor events as they unfolded in the spring of 2010, considering, among other things, the question of the fate of the materials developed by the YMP. DOE recognized the importance of ensuring that critical information from the YMP was properly archived and preserved. DOE also appreciated how the decision to cease work on the YMP and the effort to withdraw the license application created an environment where its management of the YMP-generated information might be closely scrutinized by other interested and affected parties.

For this reason, DOE approached the Board in May, 2010, and proposed that the Board, as a disinterested party, formally oversee LM's efforts to archive and preserve YMP-generated documents and materials. In addition, DOE notified the ASLB that it was in discussions with the Board about how this oversight function might be carried out.

[DOE has] contacted the Nuclear Waste Technical Review Board (NWTRB) about the NWTRB's interest in providing independent oversight of DOE's actions in preserving the scientific information that has been developed by OCRWM. The NWTRB could thus review the planned disposition of the relevant scientific information before its disposition in accordance with [National Archives and Records Administration] NARA approved schedules.<sup>5</sup>

The following year, in its Report on the FY 2012 Energy and Water Development Appropriations bill, the House Appropriations Committee's Subcommittee on Energy and Water Development directed that:

The NWTRB should also provide support to the Department of Energy's ... efforts to archive and preserve all Yucca Mountain-related documents and physical materials of scientific value.<sup>6</sup>

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<sup>4</sup> Records include all books, papers, maps, photographs, machine-readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency of the United States Government under Federal law or in connection with the transaction of public business and preserved or appropriate for preservation by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the Government or because of the informational value of the data in them (44 U.S.C. 3301). Many of the key terms, phrases, and concepts in this statutory definition of records are defined in 36CFR1222.12.

<sup>5</sup> Department of Energy, "U.S. Department of Energy Answers to ASLB Questions from Order Dated April 21, 2010," May 24, 2010, p. 37.

<sup>6</sup> House of Representatives, Committee on Appropriations, "Report on Energy and Water Development Appropriations Bill, 2012," 112-118, 112<sup>th</sup> Congress, 1<sup>st</sup> Session, June 24, 2011, p. 191.

Now that LM has mostly completed its acceptance of records from OCRWM, this Report to Congress and the Secretary of Energy responds to the House Appropriations Committee's request and presents findings and recommendations from the Board's evaluation of DOE efforts to archive and preserve YMP records.

LM's primary responsibility is to archive and preserve materials created by the YMP during its 30-year lifetime. These materials take the form of electronic databases and retrieval systems, analytical software, and physical objects, such as maps, well logs, and videotapes, some of which cannot be digitized.

In addition, LM must implement DOE's commitment, made in the President's Budget for Fiscal Year 2011 and later confirmed to the ASLB, to archive and preserve one specific collection of records: the Licensing Support Network data collection (LSNdc). The LSNdc contains 3.65 million documents, comprising more than 34 million pages of information. Until early August 2011, this material could be accessed through a web-based, NRC-operated portal, the Licensing Support Network (LSN), which was developed to facilitate the legal process of discovery during the license application proceeding.<sup>7</sup>

Although there is considerable overlap between internal YMP records and the LSNdc, one is neither a subset nor a superset of the other. The internal YMP databases hold confidential information, such as safeguards and security reports, proprietary business information, communications protected by attorney-client privilege, deliberative process/pre-decisional memoranda, litigation work products, and "house-keeping" requirements. In contrast, the LSNdc was completely open to the public but contained copyrighted documents and other materials that, while relevant to DOE's license application, were not created by the YMP.<sup>8</sup>

The decision to cease all YMP activities initiated transition efforts within DOE.<sup>9</sup> (These are set forth in Appendix 1.) To begin with, LM prepared a plan that governed the transfer of the internal YMP records. Specifically, the plan identifies

... transition tasks and provides a roadmap for the current and final custodians for the various categories of records information. The plan presents an approach to transition information maintained by OCRWM and will be updated as needed. The planned approach is to produce a seamless transition of current operations by preserving OCRWM institutional knowledge and support systems.<sup>10</sup>

According to the plan, LM undertook to operate, maintain, and archive key OCRWM electronic databases; take custody of the record copy and store other electronic databases; convert remaining physical records into electronic files; and oversee the physical transfer of

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<sup>7</sup> The rules governing participation in the license application proceeding obligated all parties to make electronically available, through the LSN, information relevant to the positions they anticipated taking in the hearing. The requirements for each party's document collection are laid out in 10CFR2.1011.

<sup>8</sup> In the LSNdc, privileged information was displayed only as a bibliographic header.

<sup>9</sup> Some of the events described in this and the following section are based on information supplied to the Board by LM. The Board has not verified the chronology independently. But, based on the Board's oversight activities during the last two and a half years, the listing of events appears to be generally accurate.

<sup>10</sup> Office of Legacy Management, "Office of Civilian Radioactive Waste Management (OCRWM) Records Management Transition Plan," June 2010, p. 5.

records from Las Vegas and other YMP sites to an LM facility in Morgantown, West Virginia. LM also developed arrangements for archiving and preserving the LSNdc.<sup>11</sup>

As long as the YMP was active and the license application was still being litigated through NRC's adjudicatory hearing process, YMP-generated information and analyses were publicly available either from an easily accessible DOE website or, more comprehensively, through the LSN.<sup>12</sup> Subsequently very few of the key YMP documents can be found on DOE websites. Thus, LM's preservation of YMP records remains DOE's primary mechanism for ensuring that these documents will be available in the future—at least in principle—to government officials, scientists, engineers, historians, and other interested parties.

## TYPES OF RECORDS DEVELOPED AS PART OF THE YUCCA MOUNTAIN PROJECT

Over a nearly 30-year period, DOE characterized the Yucca Mountain site to determine whether it was suitable for developing a deep-mined geologic repository for HLW and SNF. DOE also undertook engineering studies to support a proposed design for such a facility and its associated surface structures. These investigations covered a very wide variety of areas, including subsurface geology, earthquake and volcanic risk assessment, water infiltration, localized corrosion, coupled thermo-mechanical model behavior, radionuclide transport in the site's unsaturated and saturated zones, operational parameters, and quantitative risk assessment. Most of this work was conducted under a rigorous quality assurance (QA) program.

At its height, the YMP brought together roughly 400 federal personnel and 2,500 contractor employees. These individuals were located primarily in Nevada and Washington D.C., although many of them worked out of offices and laboratories scattered from New Mexico to Chicago and from California to New York. The types of information developed within such a large organization reflected the diversity of its participants: scientists, engineers, administrators, and auditors.

The overwhelming number of YMP records resides in several dozen internal electronic databases and retrieval systems. (These records are described in greater detail in Appendix 2.) These systems, which could only be accessed by YMP personnel, served a variety of functions including:

- Managing the production, revision, and accessibility of complex technical documents
- Ensuring that YMP personnel used consistent assumptions, data, and methodologies
- Archiving internal communications, especially e-mail traffic
- Tracking the location, acquisition information, and technical details of physical samples, such as corrosion coupons and geologic cores

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<sup>11</sup> Office of Legacy Management, "Office of Civilian Radioactive Waste Management (OCRWM) DOE Licensing Support Network Collection Transition Plan," Version 1.0, June 2010.

<sup>12</sup> On July 26, 2011, the Administrator of the LSN notified the ASLB that, due to a lack of funds, the LSN would be shut down on August 5, 2011. See Memorandum from Daniel J. Glaser to Thomas Moore, Paul Ryerson, and Richard Wardwall, "Shutdown of the Licensing Support Network," July 26, 2011. The ASLB subsequently ordered all parties to the Yucca Mountain license application proceeding to furnish NRC with PDF/A copies of all the documents contained in their respective collections. Those files are accessible, with great difficulty, through NRC's ADAMS electronic database.



- Organizing housekeeping functions, such as the Corrective Action Program and the physical whereabouts of internally produced and copyrighted reference documents.

During the eight-month period from February to September, 2010, when OCRWM was preparing to cease all its activities, officials from that unit identified those electronic databases and retrieval systems for which preservation and continued operation were deemed most critical. These 17 legacy systems were collectively designated “Priority-1.” For the purposes of this report, the two most important systems are the Records Information System (RIS) and the E-mail Warehouse. The former holds the central information generated by the YMP; the latter stores the Lotus Notes e-mails sent and received by YMP personnel. Together they contain more than 62 million records. In addition to the Priority-1 systems, the YMP created a wide variety of other databases and data sets. They include the Information Exchange Drawings (IED), the Reference Information Base (RIB), the index of hard copy books and articles held by the YMP (TechLib) and the Technical Data Management System.

A second category of YMP material is analytical software. These programs, which could only be run by YMP personnel, were used to analyze, synthesize, and abstract data and information gathered in the field or in laboratories.<sup>13</sup> Some of this software was obtained commercially, some consisted of propriety programs previously developed by YMP participants, such as DOE’s national laboratories, and some were created within the YMP as it operated.

A third category of material comprises physical objects produced by the YMP, such as source documents submitted by YMP scientists and engineers, reference materials, computer storage media of various types, and other worker documents. Also included in this category are maps, photographs, well logs, and videotapes of boreholes and fractures. Some of these materials cannot be digitized and thus cannot be stored in electronic databases. Other materials have simply not been scanned.

Additional physical items, such as rock cores and samples, and experimental materials, such as metal coupons from corrosion investigations, are not the responsibility of LM but instead are the responsibility of DOE’s Office of Nuclear Energy (NE). Preservation of these physical materials falls outside DOE’s request that the Board oversee LM activities. However, because such items are an important component of the scientific information produced by the YMP, they are discussed in a separate section of this report.<sup>14</sup>

The table below summarizes the status—both before and after OCRWM ceased its activities—of each of the three categories of internal YMP documents and records. It also provides information on the status of the LSNdc, which is now the responsibility of LM.

<sup>13</sup> Because the software had to be validated and tested rigorously, it was colloquially termed “QA software.”

<sup>14</sup> Cores and rock samples are mainly stored in the Sample Management Facility (SMF) located on the Nevada National Security Site. Corrosion coupons and other experimental samples are stored at Sandia National Laboratories (SNL). Some geologic materials and samples may still be held by contractor and national laboratories that participated in the YMP.

## STATUS OF YUCCA MOUNTAIN RECORDS BEFORE AND AFTER OCRWM CEASED ITS ACTIVITIES

TYPE OF RECORD	BEFORE OCTOBER 1, 2011	AFTER SEPTEMBER 30, 2011
<i>Electronic databases and retrieval systems</i>	Files resided in Las Vegas, NV, and were maintained by OCRWM. Access to some or all of the electronic databases and retrieval systems was limited to YMP personnel.	All Priority-1 electronic databases and retrieval systems were shipped to Morgantown, WV, and are being preserved by LM. Electronic access to some or all of the databases and retrieval systems is limited to LM personnel.
<i>Analytical software</i>	Accessed by YMP personnel in the course of their day-to-day activities. Software typically resided on individual computers and workstations. Because the software had to be validated and tested rigorously, it was colloquially termed "QA software."	Original software media, diskettes and CDs have been sent to Morgantown, WV, where they are stored in fire-resistant file cabinets. The computers and workstations that had run the software have been disposed of.
<i>Physical objects (other than rock cores and experimental samples)</i>	This material was placed in the Records Storage Facility (RSF) in Las Vegas, NV. OCRWM personnel tracked the objects' location.	The material was placed in boxes and shipped to Morgantown, WV, where it is currently being stored. Inventories of the contents of each box vary in their level of detail.
<i>LSNdc</i>	Generally accessible through the LSN until August 5, 2011.	PDF/A files have been provided to the NRC. Interested parties can access these files, with some difficulty, through NRC's ADAMS system or through a Freedom of Information Act request to LM.

## DOE ACTIVITIES TO PRESERVE RECORDS FROM THE YUCCA MOUNTAIN PROJECT

The archiving and preservation of YMP records must comply with the rules and regulations established by the National Archive and Records Administration (NARA). (Appendix 3 lists the applicable rules and regulations.) "Permanent records" will be kept by LM for at least 30 years after a non-appealable court decision or definitive executive or legislative actions about the YMP has been rendered, at which time the records will be transferred to NARA for preservation. "Temporary records" will be held by LM and will be managed according to NARA-approved disposition schedules.

Of the two million records held in the updated RIS (the Yucca Mountain Records Information System [YMRIS]) and the 60 million messages in the E-mail Warehouse, only 220,000 are classified as permanent federal records. All records contained in the myriad other electronic databases and retrieval systems are deemed temporary. The analytical software used by the YMP is considered temporary, although both the inputs and outputs from that software have been classified as permanent. Most physical objects under LM's control are considered temporary records.<sup>15</sup> Finally, LM has recommended to NARA that

<sup>15</sup> A small, but indeterminate, number of photographs, organization charts, and non-scientific records that are boxed and stored in Morgantown, WV, will also be classified as permanent.

the LSNdc be preserved for 100 years, but that the LSNdc Support Materials collection be preserved for only 10 years.<sup>16</sup>

Regardless of their classification, all of the YMP records that have been placed in LM's custody have been handled consistently.<sup>17</sup> In June, 2010, DOE instructed all participant organizations not to destroy or dispose of any documents or copies of documents related to the YMP. DOE also requested that hard copies of all YMP documents be indexed, boxed, and submitted to OCRWM at DOE's Hillshire facility in Las Vegas, Nevada.<sup>18</sup>

Pursuant to DOE instructions, participating contractor and national laboratory organizations and the U.S. Geological Survey (USGS) submitted YMP records to DOE's Hillshire facility outside of Las Vegas where the records were scanned and entered into the RIS. All YMP electronic databases and retrieval systems, except for the RIS and the E-mail Warehouse, were shut down and sent to the Legacy Management Business Center (LMBC) in Morgantown, West Virginia, in July, 2011.<sup>19</sup>

When responsibility for the custody and management of all YMP records was transferred from OCRWM, LM began moving boxed hard copies of documents and boxed physical objects to the LMBC.<sup>20</sup> Consistent with NARA requirements, redundant copies of important YMP electronic databases and retrieval systems, the E-mail Warehouse, requisite computer hardware, and regular backup tapes of LM computer systems also are maintained in the LM Grand Junction Office in Colorado.

Three members of the Board staff visited the Hillshire facility on September 17, 2010, to observe DOE activities related to collecting, classifying, and archiving YMP records and closeout materials. During this visit, LM staff members presented an overview of DOE plans, conducted a tour of the document storage areas, explained what activities were ongoing at the site, and carried out a live session to "test" RIS access to YMP technical documents. LM personnel successfully located and retrieved from the RIS the dozen or so documents that members of the Board staff spontaneously requested at the time of their visit to the Hillshire facility.

LM informed Board staff that numerous hard copies of documents and boxed physical objects already had been shipped in eight semi-trailer trucks to the LMBC. Board personnel were shown several rooms containing boxes of YMP documents that LM personnel identified as closeout materials that had been sent to the Hillshire facility by YMP partici-

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<sup>16</sup> The support materials document the screening process to select records for inclusion in the LSNdc and to identify privileged records that will be labeled with a bibliographic header.

<sup>17</sup> The two transition plans referenced in footnotes 10 and 11 provided the framework for LM's subsequent management of YMP records.

<sup>18</sup> See, for example, Letter from Susan Jones (OCRWM) to Evaristo Bonano (Sandia National Laboratories) dated June 18, 2010, and Letter from Spencer Peterson (OCRWM) to Kenneth Skipper (U.S. Geological Survey) dated June 22, 2010.

<sup>19</sup> The LMBC is a 59,000-square-foot, level-III security, federal facility. It includes a 31,000-square-foot records storage facility (RSF) with the capacity to store up to 154,000 cubic feet of records. The RSF, which stores other federal records in addition to those from YMP, was approved for the storage of federal agency records by NARA in December, 2009. The LMBC facility certification granted by NARA is governed by standards detailed in 36CFR1234 - Facility Standards for Records. These requirements specify the minimum structural, environmental, property, and life-safety standards that a federal RSF must meet when the facility is used for storing federal records.

<sup>20</sup> Although the vast majority of records have been transferred, some material may still be held at the USGS offices in Denver. LM has told the Board that it is working to secure those records.

pants in response to DOE's June, 2010, order. LM maintained that no YMP records or documents received at the Hillshire facility had been discarded.

LM staff had sorted the materials held at the Hillshire facility into three categories:

- Materials that were being scanned and entered into the RIS and the LSNdc. LM staff members estimated there were 200 boxes of materials in this category.
- Derivative discovery documents, which are hard copies of documents with handwritten comments. LM staff members estimated there were 500 boxes of derivative discovery documents.
- Recycle boxes of materials that contain printed reports, written correspondence, and other miscellaneous papers typical of material kept in the offices of YMP personnel. LM staff members estimated there were 190 boxes of recycle materials. Board staff spot-checked a very small number of those boxes, which contained newspaper advertisements, personal notes, and hard-copies of YMP documents. The documents observed by Board staff had been given accession numbers, indicating that this material could be retrieved from the RIS.

When all activity on the YMP ceased at the end of September, 2010, the National Nuclear Security Administration assumed responsibility for managing the physical site at Yucca Mountain, including basic site operations and maintenance. DOE's Office of Environmental Management was given responsibility for site remediation and closure. Following final closure of the physical site, long-term surveillance responsibility will transfer to LM.

During 2011, LM continued to receive YMP records at the Hillshire facility and enter them into the RIS. This activity continued until April 12, 2012, when the RIS was closed to accepting new records. Throughout this period, YMP electronic databases and retrieval systems, analytical software, and physical objects were transferred to the LMBC from the Hillshire facility, contractor and national laboratory participants, the USGS, federal record centers, and commercial storage.

In July, 2011, LM provided the Board with an inventory of YMP records. The inventory, which consists of a large Excel spreadsheet file, includes a list of YMP records contained in the RIS,<sup>21</sup> an account of what is known concerning the YMP physical objects that are stored in boxes,<sup>22</sup> and a list of YMP electronic databases<sup>23</sup> that have been transferred from OCRWM to LM. At a public meeting of the Board held on September 13, 2011, LM officials provided a briefing on LM's mission and preservation activities.<sup>24</sup>

In the meantime, LM upgraded hardware systems at the LMBC to accommodate the electronic databases and retrieval systems inherited from the YMP. YMP files and data on compact discs, along with optical media linked to source documents, were imported as

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<sup>21</sup> File "NWTRB\_RISweb\_Listing.xlsx," dated 7/18/2011 and received on CD August 2, 2011.

<sup>22</sup> File "lmbcympholdings.pdf," titled "LM Business Center Yucca Mountain Project Holdings," 316 pp., dated 7/18/2011 and received on CD August 2, 2011. An updated list of LM physical holdings was provided to the Board on August 15, 2012.

<sup>23</sup> File "YMP Legacy Systems.doc." This single page Word document included a bullet list of 17 electronic database systems. This document was received by e-mail on July 11, 2011.

<sup>24</sup> A record of presentations and discussion can be found on the Board web site (<http://www.nwtrb.gov/>) under the heading, "Meetings."

electronic records. A copy of the LSNdc was created in PDF/A format and provided to the NRC.<sup>25</sup>

Beginning in 2012, LM completed its efforts to integrate the RIS with optical media used to store data and other information, such as QA reports, collected during the characterization of the Yucca Mountain site. In the Board's view, the resulting YMRIS is more efficient at retrieving YMP information than the original RIS.

In sum, by the summer of 2012 at the West Virginia facility, LM had YMRIS up and running, had moved the TechLib and the E-mail Warehouse onto LM platforms, and had placed the 14 other Priority-1 systems on warm standby mode, allowing for rapid access to the information they contain.

## BOARD STAFF MEMBERS VISIT TO THE LEGACY MANAGEMENT BUSINESS CENTER

On August 21 and 22, 2012, three members of the Board staff visited the LMBC. The primary purpose of this visit was to witness and document the retrieval of technical YMP records by LM staff.

It is important to state precisely the limitations of this exercise. Given the vast number of records being preserved by LM, Board staff could only ask LM to retrieve a small fraction of the total. The records requested by Board staff did span a wide range of technical work undertaken over the years by the YMP. But it would be hard to argue that these documents were "representative" or a statistically significant sample size.

YMP records occupy slightly less than 10 percent of the total space at the LMBC (see Figure 1). In addition, YMP analytical software is kept in concrete-lined, fire-resistant file cabinets (see Figure 2). Although the official NARA format for archiving and preserving records is in electronic form, hard copies of some of the records as well as physical objects are stored in well-marked standardized boxes (see Figure 3).

### *Description of Record-Retrieval Exercise*

The record-retrieval exercise conducted in August, 2012, was designed to access YMP records and databases that covered:

1. The entire history of the YMP, ranging from the 1980s to 2010 when the YMP ceased all activity;
2. The breadth of important YMP document types, including documents authored by contractors, national laboratories personnel, and other YMP participants as well as Analysis Model Reports, high-level abstractions, calculations, software documentation, technical quality assurance procedures, data, and e-mails; and
3. A range of complete and incomplete identifying information.

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<sup>25</sup> In October 2012, Board staff communicated with the State of Nevada to learn what the State was doing to make the LSNdc documents accessible and searchable (the State obtained a PDF/A copy of these documents from DOE). The copy contains eight terabytes of data. All the documents are in searchable PDF form, but the size of the LSNdc database makes it impractical to index and difficult to implement search and retrieval functions for any particular YMP records.



In advance of their visit to the LMBC, Board staff members prepared a preliminary list of 131 retrieval tasks. Many tasks involved retrieving multiple records that met the pre-established search criteria. Appendix 4 of this report contains 13 tables that specify, among other things, what records were selected for retrieval and their relationship to other YMP records and to the Yucca Mountain license application. Since the YMRIS is the most complete and comprehensive collection of YMP historical technical data and records, it was searched for all electronic records listed in the tables. Other electronic databases and retrieval systems were searched as appropriate.

Out of the 131 planned retrieval tasks, Board staff members provided LM staff with preliminary information on 90 tasks in advance. Table 3, Table 7, part of Table 12, and a new Table 13 in Appendix 4 were presented to LM for the first time when Board staff members arrived at the LMBC.

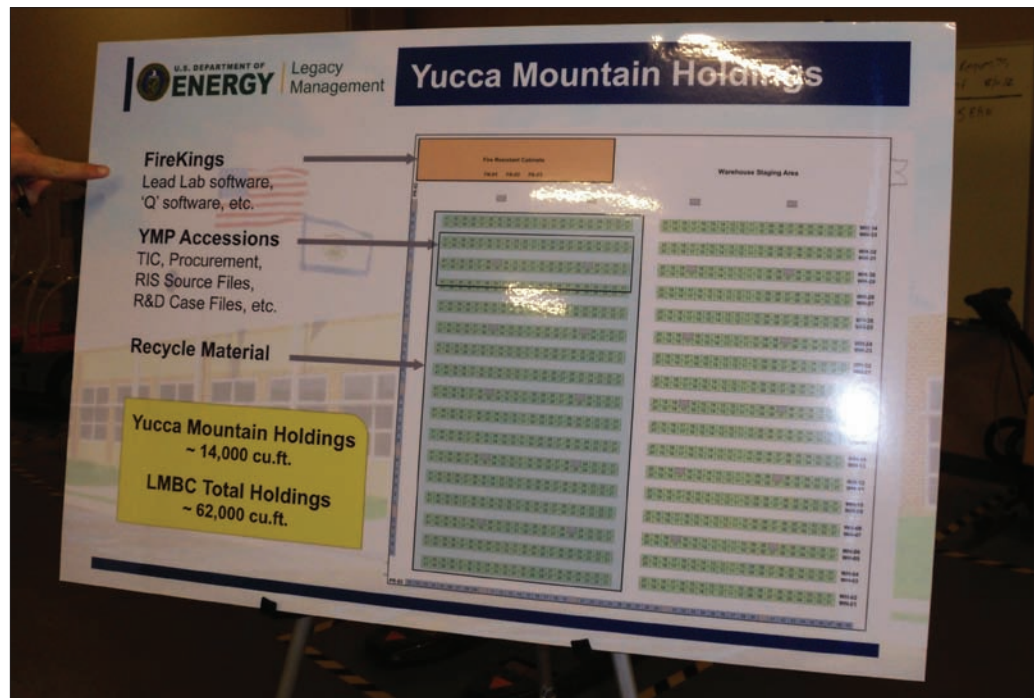


Figure 1. Locational Map of YMP Holdings at the LMBC



Figure 2. File Cabinets Holding Analytical Software



Figure 3. Boxed Physical Objects

### *Results of Record-Retrieval Exercise*

LM personnel were able to retrieve virtually all the records sought as part of the retrieval exercise. Retrieved records were either downloaded as electronic files or the search results were saved to a hard drive. In some cases, LM personnel took photographs of opened boxes of physical retrieval materials.<sup>26</sup> The results of each numbered retrieval task are included in the tables provided in Appendix 4. More information about the search and retrieval process can be found in Appendix 5.

In preparation for the visit by Board staff members, LM staff loaded hard drives with the 90 records that had been identified prior to the exercise. In the presence of Board staff members, LM staff then completed the 41 additional retrieval tasks. Hard copies of the requested records were located in storage boxes and brought to Board staff for verification. The results of these additional searches were also placed on a hard drive and provided to the Board.

During the two-day retrieval exercise, hundreds of YMP documents were successfully retrieved and verified. LM personnel, however, were unable to retrieve 18 requested records that were held in the E-mail Warehouse. To have retrieved these records would have required a major programming effort, which Board staff did not believe was warranted, given that e-mails with technical content were preserved in the RIS.<sup>27</sup> (See Appendix 6 for a detailed discussion of the programming effort.) Board staff members asked LM to carry out 13 new e-mail searches using YMRIS. In the end, out of 126 retrieval tasks attempted, LM successfully completed all but two.

<sup>26</sup> Board staff took additional photographs of materials such as field notebooks and borehole videotapes.

<sup>27</sup> LM had, in fact, undertaken a similar effort to obtain documents requested by Congress. Board staff members were shown the results of those searches.

LM personnel were able to quickly search and retrieve selected records. Moreover, Board staff observed that source data could be easily retrieved electronically by selecting a tab tied to the original report. In conducting this exercise, Board staff members saw first-hand the increased functionality that was gained when LM migrated the RIS to the more sustainable YMRIS platform.

LM is currently unable to activate any of the analytical software used by YMP workers to perform modeling and calculations because the computers and workstations needed to run this software have not been transferred to Morgantown.<sup>28</sup> Conceivably, if the same analytical capabilities are required in the future, new versions of the software might carry out the calculations and modeling exercises using the original input which are being permanently archived and preserved, and comparing the new outputs with the original outputs, which are also being permanently archived and preserved.

Several categories of YMP records could not be identified conclusively from LM's inventories of physical objects placed in boxes. To better understand what those boxes held, Board staff worked with LM personnel to inspect a random selection of boxes. Appendix 6 includes photographs of these boxed materials and summarizes the results of these inspections. To assure appropriate preservation, LM may need to take action to preserve the various types of media observed, including photographs, maps, well logs, and videotapes.

In addition to the items retrieved during the spot-checking exercise, the Board subsequently requested well-log records for one of the boreholes drilled by the YMP in the early 1990s. Within 24 hours, LM staff members located 16 boxes containing Yucca Mountain well logs. For one borehole, LM staff members copied the first page of 3-D velocity logs, caliper logs, electric logs, fluid density logs, density borehole compensated gamma ray logs, neutron logs, section gauge logs, induction logs, and sonic logs. The majority of these logs were in the strip-chart format.

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<sup>28</sup> LM personnel indicated prior to the visit that they could not activate many YMP analytic software packages because these packages require legacy hardware and legacy software to run. The Board believes it may be possible for LM to install and run this YMP software, but doing so could require significant resources. In fact, both of the two failed searches involved activating analytical software.



## PHYSICAL MATERIALS FROM THE YUCCA MOUNTAIN PROJECT THAT ARE OUTSIDE THE RESPONSIBILITY OF THE OFFICE OF LEGACY MANAGEMENT

While site characterization work was underway at Yucca Mountain, rock cores and rock samples were kept in the climate-controlled SMF located on the Nevada National Security Site. Before YMP activity ceased, data from those samples had been collected and stored in various electronic systems. Metal samples (coupons) from corrosion tests were actively maintained at Sandia National Laboratories and Lawrence Livermore National Laboratory, the two laboratories where corrosion tests were conducted.

NE is currently responsible for the geologic core and rock samples, which are being stored inside the SMF; however, since OCWRM ceased its activities, all climate control at that facility has been turned off and no active maintenance of the rock cores and samples is taking place. Sandia National Laboratories is the current custodian of most of the corrosion coupons and other experimental samples; these stored materials, likewise, are not being actively maintained.

Some of the most significant scientific advances made by the YMP were in understanding water movement through a thick unsaturated (vadose) zone in fractured volcanic rock. Much of this increased understanding came from samples, cores, in situ subsurface tests, and electronic well logging (the geophysical equivalent to core sampling) in boreholes drilled directly into fractured volcanic rock. These samples, cores, well logs, and subsurface test results yielded critical data for the development and testing of conceptual and numerical models of coupled thermal hydrologic processes, which in turn provided the basis for the YMP performance assessment. The data form an invaluable archive for researchers investigating the hydrology of arid areas, waste management, and contaminant migration in fractured volcanic rock. For example, these data are highly significant for ongoing DOE efforts to assess potential radionuclide migration from various underground test areas in the nearby Nevada National Security Site.

These samples may also provide critical information on subsurface properties that could be useful for a host of other important geologic studies. A number of professional geoscience organizations, including the Geological Society of America (GSA) and the American Association of State Geologists (AASG), have pointed to the value of such materials in addressing technical and scientific questions of national interest. In particular, the GSA has noted that samples and data sets provide fundamental references for basic and applied research as well as opportunities for reanalyzing data in ways that can generate new knowledge. The AASG has made the point that critical questions of national interest can be informed by geologic data, including issues related to climate change, carbon sequestration, water supply, and the identification and prediction of natural hazards.

An evaluation of the potential value of these materials by organizations other than DOE, such as the USGS, state geological surveys, and academic institutions that maintain archives of geologic materials, could provide the basis for recommendations on the preservation and accessibility of the geologic samples. Depending on the strategy proposed, these organizations could provide useful information on proper preservation procedures as well as realistic cost estimates.

## BOARD FINDINGS AND RECOMMENDATIONS

Based on the results of its review, including the spot-checking retrieval exercise, the Board makes a number of findings:

1. Yucca Mountain documents have been preserved and can be accessed and retrieved. LM has developed a computer program that integrates the primary electronic database, the RIS, with records of data collected during the course of the YMP. In the Board's view, this new system, the Yucca Mountain Record Information System (YMRIS), has improved significantly the functionality of search and retrieval operations. In particular, the Board has a high degree of confidence that documentary material developed by the YMP and included in the LSNdc can be accessed and retrieved.
2. With significant time and effort, LM personnel can search and retrieve e-mails from the E-mail Warehouse. Because of the level of effort involved, the Board could not directly test LM's capability to access electronic messages. Board staff members, however, were shown how LM responded to congressional requests for YMP e-mails. A small set of e-mails deemed necessary to support the ASLB hearing on the Yucca Mountain license application was captured in the RIS database and included in the LSNdc. Board staff members were able to readily access a sample of these messages through the YMRIS.
3. LM does not have the capability to load and execute most analytical software. This software was used by YMP personnel to analyze data and support modeling activities. LM cannot run most of the analytical software to recreate some of these analyses, although both the inputs and outputs used by the software have been archived and preserved.
4. Some boxes being stored by LM contain physical objects, such as videotapes and maps. However, LM has only a general understanding of the contents of the boxes. When activity ceased on the YMP, OCRWM personnel began transferring boxes with physical objects to LM for storage. The contents of those boxes were inventoried, and the inventories were provided to LM. The amount of detail in the inventories varies greatly. For this reason, it is unclear what measures might be needed to preserve the physical objects from the YMP for extended periods or to provide searchable databases for these objects.
5. LM has used schedules approved by the National Archives and Records Administration (NARA) to identify YMP records that should be preserved permanently and YMP records that should be preserved temporarily, that is, for periods ranging from 10 to 100 years. Temporary records will be held by LM. Permanent records will be transferred to NARA no sooner than 30 years from the time that the YMP is conclusively shut down either as the result of a non-appealable court decision or by definitive executive or legislative actions. The procedures used by NARA for obtaining access to those records under its control can be cumbersome. Thus, examining even permanent YMP records may be difficult in the future.
6. The general public can access written records held by LM. However, to do so individuals or organizations must file a Freedom of Information Act request. Only four such requests from external parties have been received by LM since it took over responsibility for archiving and preserving YMP-generated material.

Based on its findings, the Board recommends the following:

1. A retrieval exercise, similar to the one conducted in August, 2012, should be repeated in three years to assess the level of record preservation and retrieval capability at that time.
2. Policy-makers should evaluate how much priority should be given to archiving and preserving YMP documents and physical materials. Without a continuing commitment of resources, it is unclear whether the current level of effort in this area can be sustained over time.
3. Additional project documents may still be forwarded to LM to be archived and preserved. Such records should be added to the YMRIS if they are determined to contain new technical information.
4. DOE should consider providing web access to the foundational documents developed as part of the YMP. These records may be of scientific, technical, and historical value and deserve to be easily accessible by the general public.
5. In the cases of boxes of physical objects being stored by LM for which inventories are limited and/or not included in a searchable database, DOE policy-makers should evaluate whether to undertake additional efforts to develop informative inventories that could be placed into searchable databases.
6. Although not the responsibility of LM, materials from geologic investigations, such as rock cores and materials from experimental studies, such as metal coupons used in corrosion investigations, may have future value to ongoing DOE projects and may even find application in broader scientific and technical studies. This report does not address or evaluate the fate of these materials; however, the Board recommends that an external review be initiated to determine what types of materials exist, where they are located, and what their potential value might be. Such a review should provide recommendations to DOE policy-makers on whether and how materials judged to be valuable should be preserved and made accessible.



# APPENDICES

## APPENDIX 1

The Office of Legacy Management Chronology of Activities  
for Preserving Yucca Mountain Project Records

## APPENDIX 2

Yucca Mountain Project Electronic Databases  
and Retrieval Systems

## APPENDIX 3

Standards and Procedures Used by the Office of Legacy  
Management to Preserve Yucca Mountain Project Records

## APPENDIX 4

Tables of Retrieval Exercise Tasks

## APPENDIX 5

Yucca Mountain Project Record Retrieval Demonstration

## APPENDIX 6

Retrieval of Physical and E-mail Warehouse Records

## APPENDIX 1

### THE OFFICE OF LEGACY MANAGEMENT CHRONOLOGY OF ACTIVITIES FOR PRESERVING YUCCA MOUNTAIN PROJECT RECORDS

This appendix provides a chronology of activities undertaken by LM that are related to the preservation of YMP records. This chronology was provided to the Board by LM and is complete as of September 2012. The Board believes that the account provided here is generally accurate but has not verified these activities independently.

Date	YMP Record Preservation Activity/Accomplishment
March 2010	LM is notified of the planned YMP transition. LM initiates transition-planning efforts. Personnel make initial LM visit to the YM Summerlin campus in Las Vegas, Nevada, to assess scope and logistics for records, IT, and property transfer activities.
April 2010	LM personnel review the RIS and LSNdc functionality during a visit to the Summerlin campus.
May 2010	LM personnel complete a detailed review of property at the Summerlin campus. Personnel identify property for transfer to the LMBC and to the LM Grand Junction, Colorado, office for beneficial reuse. Property also is identified for transfer to the DOE Hillshire facility for ongoing records transfer activities.
June 2010	The YM Records Management Transition Plan and the LSN Collection Transition Plan are approved. YMP records and processing equipment are transferred from the Summerlin campus Building 1 to the Hillshire facility for further processing and to the LMBC for ongoing storage.
July 2010	DOE OCRWM Freedom of Information Act responsibilities are officially transferred to LM. LM transfers electronic media from Building 1 to the LMBC to meet media dual-storage requirements. LM support personnel box the Technical Information Center library materials located in Building 1 of the Summerlin campus. The boxed materials are prepared for shipment to the LMBC for storage. OCRWM relocates YMP operational IT equipment from the Sahara commercial data center to the Hillshire facility ahead of turnover to LM.
September 2010	Board staff visits the Hillshire facility to observe transition operations. The visit includes a facility tour, a demonstration of RIS search and retrieval capabilities, and a review of the derivative discovery and recycle material boxes stored on site. LM assumes ownership of some OCRWM information systems and discontinues external access to the RIS. However, some OCRWM information systems have proprietary software licenses that are retained by DOE-NE. The existing LM cyber security program plan is amended to allow a network "enclave" for YMP systems. The segregation of the LM network and the YMP legacy networks is initiated. LM initiates a validation exercise of the archive tapes received from OCRWM and produces a set of backup tapes in the LM standard format. An interim directive issued by the LM contractor program manager authorizes contractor personnel to follow YMP records processes used by OCRWM.
November 2010	LM arranges for approximately 760 cubic feet of YMP records to be transferred from the Riverside Federal Records Center to the LMBC. An additional 825 cubic feet of records is transferred to the Hillshire facility for processing before being forwarded on to the LMBC. LM establishes a secure terminal service connection to provide authorized personnel from the DOE Office of the General Counsel (OGC) with RIS access in the DOE Forrestal Building in Washington, DC. LM renews and extends YMP IT system support contracts through FY2011. IT personnel also install a storage array network at the LMBC to expand data storage capacity for YMP computer systems.
December 2010	LM purchases additional scanners to augment throughput for RIS backlog data entry at the Hillshire facility. Efforts are initiated at the Hillshire facility to process the backlog of records into the RIS. Personnel followed established YMP processes and ensured that processing quality control measures were followed.
January 2011	LM records personnel coordinate the transfer of four cubic feet of YMP records from the Suitland (Maryland) Federal Records Center to the LMBC. LM decides to develop an enhanced RIS system, YMRIS, as an interim system for maintaining the RIS records until they can be migrated to the LM electronic recordkeeping system (ERKS).
February 2011	Records personnel package YMP recycle material at the Hillshire facility for shipment to the LMBC. LM support contractor adds additional incumbent IT staff members to support YMP transition activities. LM initiates plans to vacate the Hillshire facility by the end of FY2011 as specified in the YMP Records Management Transition Plan. Options are considered for migrating legacy IT systems to LMBC computer systems.

## APPENDIX 1 CONTINUED

Date	YMP Record Preservation Activity/Accomplishment
March 2011	Records personnel complete efforts to process the backlog of YMP records into the RIS. More than 16,000 RIS documents are entered as part of this effort. LM initiates project to relocate YMP legacy infrastructure to the LMBC. LM initiates efforts to apply enhanced optical character recognition (OCR) to all RIS files.
April 2011	IT personnel complete a virus scan of the YMP E-mail Warehouse, identifying thousands of infected files to quarantine.
May 2011	Records personnel initiate transfer of five shipments of YMP records totaling approximately 5,400 cubic feet from the Recall commercial storage facility in Las Vegas to the LMBC. Indexing of USGS YMP records is completed and records are transferred to the LMBC for storage. LM agrees to maintain the YMRIS system in fully operational state with the remaining Priority-1 systems loaded on LM servers on warm standby. These systems are viewed as important to preserving the science of the YMP and supporting litigation. Efforts are initiated to reinstate and extend related software maintenance and support contracts for the systems.
July 2011	Records personnel initiate transfer of more than 750 cubic feet of record material at the Hillshire facility to the LMBC. The effort to apply OCR to all RIS files is completed. The floor plan and HVAC systems of the existing LMBC Consolidated Data Center (which houses computer systems) are upgraded to accommodate YMP IT infrastructure. Records staff completes effort to index more than 750 cubic feet of YMP correspondence files with aids for finding files loaded to the LM ERKS.
August 2011	Formal written notification is provided to the DOE Office of Chief Information Officer (OCIO) to recognize the official transfer of custodianship over YMP records to LM. Personnel complete the transfer of the consolidated YMP IT infrastructure from the Hillshire facility to the LMBC Consolidated Data Center. An additional backup server is installed at the LMBC to support YMP archive tape verification. LM provides the NRC with a PDF/A copy of DOE's LSN collection of documents that were publicly available through the NRC portal.
September 2011	LM provides the Board with an update on past and current transition-related efforts, including the migration of both physical and electronic records. LM contractor personnel in Las Vegas relocate from the Hillshire facility to a smaller office at Town Center Drive. IT personnel ship five racks of IT equipment from the Hillshire facility to the LM Grand Junction office for preservation until revised OGC guidance is received. Personnel also recall all media from the Iron Mountain commercial storage facility to transfer to the LM Grand Junction office and LMBC.
October 2011	LM completes a project to migrate RIS data submittals from optical media (CD-ROMs and DVDs) to online storage. More than 20,000 datasets totaling 6 terabytes are migrated. Records personnel initiate efforts to identify permanent records in the RIS and to identify permanent and non-transitory records in the E-mail Warehouse.
November 2011	Thirty cabinets of Q software and related materials are transferred from the YMP Management and Operating Contractor to the LMBC. IT personnel complete an effort to convert all 1.8 million RIS documents to archival-quality PDF files using OCR.
January 2012	LM approves a plan for a technology refresh of the E-mail Warehouse infrastructure through FY2012.
March 2012	IT personnel complete the migration of the legacy YMP RISweb to the YMRIS system, including the optical media data.
May 2012	IT personnel initiate planning to fully archive the legacy RISweb.
June 2012	LM is notified of an additional volume of YMP records maintained in a Las Vegas commercial storage facility. Efforts are initiated to transfer this material to the LMBC. Records and IT personnel complete successful acceptance testing of the new YMRIS.
July 2012	Records personnel complete efforts to index Q software with aids for finding records uploaded to the LM ERKS. Twenty-four cubic feet of material previously stored at the Yucca Mountain work site are processed. The material is transferred to the LMBC for storage. IT personnel initiate an audit of the YMRIS collection, comparing it with the RIS archive media. LM vacates the Town Center Drive office ahead of lease termination.
September 2012	LM completes the identification of permanent records in YMRIS for transfer to NARA. LM staff identified approximately 209,000 records grouped according to 12 categories with permanent disposition requirements. LM completes the identification of permanent records in the E-mail Warehouse for transfer to NARA. More than 9,000 records with permanent disposition requirements are identified. LM personnel also work to complete the identification of non-transitory records in the E-mail Warehouse.

## APPENDIX 2

### YUCCA MOUNTAIN PROJECT ELECTRONIC DATABASES AND RETRIEVAL SYSTEMS

The YMP generated and managed a diverse set of records. Those that are archived and preserved by LM fall into three categories. (Geologic samples and experimental specimens comprise a fourth category, however these are the responsibility of NE.) The three categories of LM records are as follows:

1. Electronic databases and retrieval systems that were organized, controlled, preserved, and, prior to the cessation of OCRWM's activities, provided access to information by YMP participants;
2. Analytical software (including both software developed in-house and commercial software), manipulated data and performed analysis, and modeling work. Some of the software was formally qualified as part of the YMP quality assurance program.
3. Physical objects, such as maps, photographs, and videos. These objects were retrieved from the Records Processing Center (RPC) and were placed in boxes, inventoried, and shipped to the LMBC.

This Appendix describes the first category of LM records.

As YMP activity began to cease in the spring and summer of 2010, OCRWM personnel identified 17 "Priority-1" databases and systems. LM agreed to keep those databases and systems readily accessible so that DOE personnel could retrieve information for ongoing activities, such as YMP close-outs, litigation support, and reporting. Each of the 17 Priority-1 electronic records is described below.

1. *Records Information System* – an electronic database providing on-line retrieval of YMP technical data and federal inclusionary records created over the history of the OCRWM program.
2. *Email Warehouse* - the electronic repository of all YMP Lotus Notes email messages and their attachments sent by project workers.
3. *Technical Data Management System* – the system of databases containing the technical data generated and used by the YMP, as well as the following database indices:
  - a. *Automated Technical Data Tracking* – a database that indexes key information about YMP data such as the qualification status, supersession information, and links to actual datasets in other Technical Data Management System databases.
  - b. *Yucca Mountain Project Geographic Information* – a database that contains spatial data sets managed as part of a Geographic Information System that tied YMP data to spatial coordinates including environmental, geological, hydrological, meteorological, natural resource, transportation, and other data.
  - c. *Yucca Mountain Project Model Warehouse* - an online archive of software-generated data (input and output files) and supporting information.
  - d. *Site and Engineering Properties* - database that controlled and managed the storage and reporting of scientific and engineering YMP data.



## APPENDIX 2 CONTINUED

- e. Technical Data Parameter Dictionary* - organized listing of technical data parameter names approved for YMP use that defined the parameter category, specific technical parameter name, and provided other descriptive information.
  - f. Reference Information Base* – a dictionary of data parameter terms, such as rock properties, that provided a categorized summary of YMP technical project data. The dictionary could be searched by type or parameter name. The Reference Information Base was intended to be the single-source reference for locating project consensus or “best” data of a particular type.
- 4. *Requirements Traceability Network* – an information system that was used to document the flow of requirements down from high-level documents (e.g., laws, policies, directives) to implementing documents.
- 5. *Technical Library* – a library database of all submitted hard copies of purchased document “references,” including books, journal articles, and any other copyrighted references.
- 6. *Document Input Reference System* – an administrative tool used to verify that document references are available in the RIS, the Technical Library, or the Technical Data Management System. The database contains no documents; each reference entry includes a unique number and contextual citation information, such as a short description and the location of quoted/referenced text in the referenced document.
- 7. *Controlled Document Information System* – a database designed to control the distribution of documents and approved changes to documents. The Controlled Document Information System also retains a master copy of all approved YMP documents in their electronic native form.
- 8. *Corrective Action System* – a database created to track the status and resolution of all issues or conditions identified and reported by YMP personnel including technical error reports, nonconformance conditions, deficiency reports, employee concerns, and root cause corrective action reports.
- 9. *CM Synergy SCM repositories that have been exported to a Windows file share* – the Software Configuration Management system is a control database for YMP software. It is managed by the M&O contractor and lists qualified OCRWM software by name, version, software tracking number, and associated computer hardware and operating system requirements.
- 10. *Curatorial Sample Inventory and Tracking System* – a database that includes descriptions and a custodial record history of all core, rock samples, and other geologic materials kept at the SMF.
- 11. *Curatorial Sample Inventory and Tracking System Web Interface* – an on-line web version for the Curatorial Sample Inventory and Tracking System

## APPENDIX 2 CONTINUED

12. *License Applications Contentions* – a database that contains issues of law or fact that allege the license application or Yucca Mountain Environmental Impact Statement (as adopted by NRC) does not meet statutory or regulatory requirements, and, in the case of the license application, address the point that “nonconformance would be contrary to providing reasonable assurance of adequate protection of the public health and safety.”
13. *License Applications Completions / Request for Additional Information Response System* – a database that includes submissions to NRC regarding a license application to construct and operate a geologic repository at Yucca Mountain as well as specific NRC requests for additional information that were sent to DOE together with DOE’s responses to those requests.
14. *Lessons Learned / Operating Experiences* – a database of lessons learned submitted by YMP employees for the purpose of improving safety and quality, and sharing best practices—both internal best practices and best practices incorporated from external sources, such as DOE’s Lessons Learned Database, the Institute of Nuclear Power Operations, and NRC.
15. *Lotus Notes Applications and Databases* – an independent Management and Operating Contractor database that collects and controls all engineering work products, including information on collaboration, version control, and reviewer comment resolution.
16. *SOFTLIB File Share* – a file share that consists of the Group Drive File Share and the Home Drives File Share, both of which are non-record Windows file systems used by various YMP groups that contain unstructured, unauthenticated data.
17. *Training Server* – a database of YMP employees that lists both training requirements and details about training course completion.

## APPENDIX 3

### STANDARDS AND PROCEDURES USED BY THE OFFICE OF LEGACY MANAGEMENT TO PRESERVE YUCCA MOUNTAIN PROJECT RECORDS

The information in this appendix was provided by LM. The Board has not verified the correctness of this information.

**Standards and Procedures**—Consistent with LM’s responsibility to preserve, protect, and share records and information, the work of the LM records management program is governed by the following NARA requirements, DOE directives, and LM procedures:

- United States Code (U.S.C.) 552, Freedom of Information Act
- 5 U.S.C. 552a, Privacy Act
- 44 U.S.C. Chapter 29-31, Records Management
- 44 U.S.C. Chapters 36, E-Government Act of 2002
- 10 Code of Federal Regulations (CFR) 1004, Freedom of Information, DOE Guidance
- 10 CFR 1008, Records Maintained on Individuals (Privacy Act), DOE Guidance
- 36 CFR Chapter XII – Subchapter B, Records Management
- 41 CFR 201-6, Management and Use of Information and Records
- DOE Order 206.1, Department of Energy Privacy Act Program
- DOE Order 243.1, Records Management Program
- DOE Order 243.2, Vital Records
- DOE Order 471.6, Information Security
- LM Policy 200.1-2, Electronic Mail Records
- LM Policy 243.1, Records Access and Retrieval Policy
- LM Policy 243.2, Capturing Yucca Mountain Project Site Records Information System and Licensing Support Network Relevant Records
- LM Procedure 200.1, Vital Records
- LM Procedure 200.1-1, File Plan
- LM Procedure 200.1-3, Processing Litigation Requests
- LM Procedure 200.1-5, Records Disaster Prevention, Mitigation, and Recovery
- LM Procedure 200.1-6, Comprehensive Environmental Response, Compensation, and Liability Act Administrative Record Processing
- LM Procedure 200.2, Electronic Records
- LM Procedure 200.2-1, Electronic Recordkeeping Systems and Electronic Information Systems
- LM Procedure 200.2-2, Processing Internal Inactive Records for Storage

## APPENDIX 3 CONTINUED

- LM Procedure 200.3, Classified, Sensitive, and Proprietary Document Handling
- LM Procedure 200.4, Records Management
- LM Procedure 200.4-1, Records Management Self Assessment
- LM Procedure 200.4-2, Donation of Temporary Federal Records and Nonrecords
- LM Procedure 243.1, Records Inventory
- LM Procedure 243.2, Preservation of Web Site-Related Records
- LM Procedure 243.3, Digitizing Records
- LM Procedure 243.4, LM Business Center Records Operations
- LM Procedure 243.5, Processing Requests for Yucca Mountain Project Site Information
- LM Procedure 341.1, Energy Employees Occupational Illness Compensation Act Processing
- LM Procedure 513.1, Freedom of Information Act and Privacy Act Records
- LM Procedure 1350.1, Audiovisual Records
- LMS Procedure, LMS/YMP/S08591-0.0, Yucca Mountain Records Management (adopted Yucca Mountain procedures AP-SEC-001, Identification, Protection, Distribution, and Use of Sensitive Unclassified and Classified Information; RM-PRO-6001, Managing Licensing Support Network Relevant Records; Memorandum: Compliance with U.S. Nuclear Regulatory (NRC) Regulatory Issue Summary (RIS) 2000-18, October 23, 2009; RM-PRO-1002, Processing Records; DOE/RW-0333P, Revision 21, Section 17 – Quality Assurance Requirements and Description, and AP-17.1Q, Records Management)

**LMBC Certification**—The LMBC was approved for use as an agency federal records storage facility by NARA in December 2009. New facility certification is governed by compliance with standards in 36 Code of Federal Regulations (CFR) 1234 - Facility Standards for Records (previously known as 36 CFR 1228, Subpart K). The CFR specifies the minimum structural, environmental, property, and life-safety standards that a records storage facility must meet when the facility is used for the storage of federal records.

**Rationale for Scheduling YMP Records**—A records disposition schedule is a document that provides mandatory instructions for what to do with records (and non-record materials) that are no longer needed for current government business; it also provides authority for the final disposition of recurring or nonrecurring records. All DOE records are scheduled for disposition using NARA approved DOE disposition schedules; requirements are codified in 36 CFR Chapter XII – Subchapter B, Part 1225 – Scheduling Records. OCRWM records were scheduled using the existing Yucca Mountain File Plan (a file plan is a comprehensive outline—specific to a project, organization, or function—that defines the project’s or organization’s records series, file organization, records custodians, active file locations, file transfer instructions, file retention and disposition instructions, and other

## APPENDIX 3 CONTINUED

project- or organization-specific instructions intended to provide guidance for effective records management). LM records management personnel cross-walked the Yucca Mountain File Plan to current DOE approved schedules. In instances where there was not an approved existing DOE disposition schedule, LM prepared an SF-115, Request for Records Disposition Authority, and submitted it to NARA for approval (e.g., SF-115s were prepared for the LSN and LSN supporting documents).

**DOE Philosophy of Record Disposition Determination**—The following guidance comes from the DOE Research and Development Records Schedule N1-434-96-9 and N1-434-07-01:

All R&D records must be evaluated and assigned one of the following three levels, unless otherwise indicated in the schedule. Records retired under this schedule will not be accepted by a Federal records center without an appropriate disposition level designation. The three levels and their associated dispositions are:

**Level I:** Projects that received national or international awards of distinction; active participation of nationally or internationally prominent investigators; research, which resulted in a significant improvement in public health, safety, or other vital national interests; scientific endeavors that were the subject of widespread national or international media attention and/or extensive congressional, DOE or other Government agency investigation; show the development of new and nationally or internationally significant techniques which are critical for future scientific endeavors or made a significant impact on the development of national or international scientific, political, economic, or social priorities.

**Level I Disposition Instructions:** Permanent. Cutoff after project/program completion, cancellation or termination or in 5 year blocks. Retire to a Federal Records Center (FRC) within 2 years after termination of project/program. Transfer to the National Archives and Records Administration (NARA) 30 years after termination of project/program. (N1-434-96-9)

**Level II:** Research that leads to the development of a “first-of-its-kind” process or product, improved an existing process, product or application, or has implications for future research.

**Level II Disposition Instructions:** Cutoff files after project/program completion, cancellation or termination, or in 5 year blocks. Retire to the FRC within 2 years after termination of project/program. Destroy 25 years after termination of the project/program. (N1-434-96-9)

**Level III:** Research projects/programs that do not fall into Level I or II.

**Level III Disposition Instructions:** Cutoff files after project/program completion, cancellation or termination, or in 5 year blocks. Retire to the FRC within 2 years after termination of project/program. Destroy 10 years after termination of project/program. (N1-434-96-9)

## APPENDIX 3 CONTINUED

**Description of How the Public Can Request YMP Records**—The public may request access to YMP records through the Freedom of Information Act and Privacy Act.

The Freedom of Information Act, which is found in 5 U.S.C. 552, is a law that gives a person the right to obtain federal agency records unless the records (or parts of the records) are protected from disclosure by any of the nine exemptions contained in the law. A Freedom of Information Act request can be submitted in writing to: FOIA Officer, United States Department of Energy, 1000 Independence Avenue, SW, Washington, DC 20585, Phone (202) 586-5955. A request can also be filed electronically at: <http://energy.gov/doe-headquarters-foia-request-form>.

The Privacy Act (5 U.S.C. 552a) provides safeguards against unwarranted invasions of privacy through the misuse of records by federal agencies by restricting disclosure of personally identifiable records maintained by agencies; granting individuals increased rights of access to records maintained about them; granting individuals the right to seek amendment of records maintained about them upon a showing that the records are not accurate, relevant, timely or complete; and establishing a code of “fair information practices” that requires agencies to comply with statutory norms for record collection, maintenance, use, and dissemination. Information requested from DOE under the Privacy Act must be in writing, and sent to the same address as FOIA requests (above).

## APPENDIX 4

### TABLES OF RETRIEVAL EXERCISE TASKS

This appendix lists all of the retrieval tasks formally provided to LM for purposes of this review. For retrieval tasks that were identified prior to the visit by Board staff, LM staff organized and attempted to perform all the searches ahead of time, except for E-mail Warehouse searches; these records were placed on a hard drive. In a review of these tasks by Board staff, only three tasks (2h, 9g, and 9j) resulted in failure to initially pull up the target records. In the tasks presented upon the Board staff's visit, LM staff only failed once (on task 3l) to retrieve the target record. With help from Board staff, however, the targeted record in each of these cases was eventually found and successfully retrieved. For retrieval tasks in which some document ID information had not been provided to LM staff prior to the visit, LM had no difficulties finding and retrieving requested records from the information provided.

As noted previously, two retrieval attempts related to YMP QA software were unsuccessful. For task 2e, the physical NUFT software was missing (the labeled folder was empty). Task 6m was to retrieve, install, and test the installation of UDEC 3.1 software. The identified UDEC software CDs were successfully retrieved, but the necessary hardware (computer CPU and security dongle) and operating system were not available to install and test the software. LM staff had indicated prior to the Board staff's visit that LM staff could not activate software. Since many YMP software packages require both legacy hardware and software to run, the Board's assumption is that installing and running this software may be possible, but would require significant resources.

During the visit, Board staff requested a walk-through demonstration to document how YMP electronic and physical documents are retrieved. Task 2a ("Multiscale Thermohydrologic Model," ANL-EBS-MD-000049 REV 03 ADD 02, DOC.20080201.0003) was chosen for this purpose.

Due to the time required, it was not practical to conduct e-mail searches of the YMP E-mail Warehouse during the Board staff's visit. Tasks 3m and 3n were not completed: in both cases, the desired e-mail was not found in the RIS. However, it is likely that LM staff could locate the requested e-mails and their attachments could be located in the E-mail Warehouse. The Board staff has verified that the E-mail Warehouse exists; moreover, LM staff has demonstrated a satisfactory ability to search and retrieve e-mail from it.

## TABLES OF RETRIEVAL EXERCISE TASK

**Table 1. Task 1 Records and Tasks**

A key portion of the YMP license application (LA) concerns the results of efforts to model the behavior of the entire repository system after closure using the “total system performance assessment” (TSPA) model. The LA Safety Analysis Report is the first item to be spot-checked and appears on line 1a in the table below. In particular, the TSPA model predicts the expected radionuclide dose to the reasonably maximally exposed individual over a long time scale from packages of nuclear waste stored in the repository (the TSPA report is 1b).

The LA describes the Engineered Barrier System (EBS) as one of three containment barriers important to waste isolation. The waste isolation capability of the EBS depends on EBS components not being breached for thousands of years. Describing those repository features (e.g., geologic rock types, waste package materials), events (e.g., volcanic activity, human intrusion), and processes (e.g., corrosion of metal waste packages, sorption of radionuclides on rock surfaces), that are significant and should be included in the TSPA is the subject of the features, events, and processes (FEPs) report in 1c. For example, the rock emplacement drift (tunnel) is identified as an EBS feature important to waste isolation, as is the drip shield placed to protect the waste packages. An example of a disruptive event considered important is seismic ground (earthquake) motion that damages the rock emplacement drift and results in damage to the metal drip shield. The FEPs report was prepared in accordance with the approved procedure, *Scientific Analyses and Calculations* (1d).

The TSPA systematically analyzes credible future scenarios to predict what can happen, how likely is it to happen, and what the resulting consequences would be. A scenario is a well-defined sequence of events and processes designed to represent one possible future condition of the repository system. The LA explains how TSPA calculations are developed for four important classes of scenarios. For example, one of the scenario classes focuses on seismic events: it is designed to account for all possible futures in which seismic events occur. Physical processes and their consequences are organized into a number of “model abstractions” that are used to develop the inputs that feed the TSPA model. For example, the *Seismic Consequence Abstraction* model (1e) examines the nature and probability of site seismic activity and the possible consequences of seismic activity on repository features. Another example of an abstraction is the *In-Package Chemistry Abstraction*, which focuses on the impact of in-drift water and gas chemistry on waste form and package degradation (1f).

Task ID#	YMP Record I.D. No.	Identifying Information	Record Type	Search Locations
1a	DOE/RW-0573 REV 0	Yucca Mountain Repository License Application: Safety Analysis Report, June 2008	document, analysis report	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
1b	MDL-WIS-PA-000005 REV 00 ADD 01 DOC.20080312.0001	Total System Performance Assessment Model/ Analysis for the License Application (final and complete LA version with all addendums)	document, technical report	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
1c	ANL-WIS-MD-000027 REV 00 DOC.20080307.0003	Features, Events, and Processes for the Total System Performance Assessment: Analyses (final and complete LA version with all addendums)	document, analysis report	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
1d	SCI-PRO-005, Rev. 9, ICN 0 DOC.20080221.0004	Scientific Analyses and Calculations QA procedure for preparing technical documents	document, procedure	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
1e	MDL-WIS-PA-000003 REV 03 DOC.20070928.0011	Seismic Consequence Abstraction (final and complete LA version with all addendums)	document, abstraction	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
1f	ANL-EBS-MD-000037 REV 04	In-Package Chemistry Abstraction (final and complete LA version with all addendums)	document, abstraction	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			



**Table 2. Task 2 Records and Tasks**

The TSPA and model abstractions are built from a number of technical basis documents that address specific processes acting on repository features or scenarios. These documents include science analysis/modeling reports (AMRs) and engineering calculations. Abstractions consist of statistical or mathematical generalizations from more detailed AMR models of physical and chemical processes. One example of an AMR is the Multiscale Thermohydrologic Model (2a), which predicts the temperature, gas-and-liquid fluxes, and relative humidity conditions in the repository drifts and near-field host rock. Modeling reports describe the simulation model of interest with its inputs, outputs, and appropriate use. For example, outputs from the Multiscale Thermohydrologic Model include predictions of waste package, drip shield, and drift wall temperatures over time and rock dryout of the drifts during active ventilation.

Documents, data, and software are maintained in separate, controlled databases, each of which is checked below. Records 2b through 2g are all associated with the Multiscale Thermohydrologic Model AMR in 2a. Record 2b is a previous version, revision 02 of the report (historical). The records package (2c) is the complete submission of the final AMR (2a) to the records center including checker and review copies of the AMR, QA software programs used to run model calculations (2d, 2e), source (input) data fed to the software programs (2f), and output data produced by the software program (2g). This AMR provides direct inputs to the TSPA model and LA. The Software Baseline Report (2h) is a list of all the QA software that is approved (like NUFT, 2d) for use with YMP modeling reports and calculations.

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
2a	ANL-EBS-MD-000049 REV 03 ADD 02 DOC.20080201.0003	Multiscale Thermohydrologic Model (final and complete LA version with all addendums) (July 2005 version)	document, AMR	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS. As a demonstration, the physical report documents were also retrieved.			
2b	ANL-EBS-MD-000049 REV 02 DOC.20041014.0008	Multiscale Thermohydrologic Model	document, AMR	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
2c		Records package associated with 1a	electronic	RIS
	Spot-check results: Record 1a (License Application was not submitted as a records package). Typo, 2a intended. Record package retrieved in person (DBR).			
2d	NUFT v3.0s, STN: 10088-3.0s-02	Nonisothermal Unsaturated-saturated Flow and Transport model (NUFT) (for solving subsurface contaminant-transport problems)	QA software	RIS SCM
	Spot-check results: Documentation on NUFT retrieved from RIS. No SCM system for lead laboratory QA software was transferred to LM.			
2e	NUFT v3.0s, STN: 10088-3.0s-02	NUFT Software CDs	QA software, CDs	Software Library
	Spot-check results: In the SNL QA FireKing cabinets, file folders for NUFT v3.0s were found, but they were empty (CDs not transferred to LM). NUFT v2.0 CDs were found in the FireKing cabinets.			
2f	DTN: LB03023DKMGRID.001	UZ 3-D Site Scale Model Grids, 02/26/2003 (3D mesh element/connection data: Grid_LA_3D. mesh) (3D mesh vertices data: grid2002.grd)	data, source electronic files for NUFT v3.0s	RIS TDMS
	Spot-check results: Documentation on DTN CDs retrieved from RIS. Data retrieved from TDMS.			
2g	DTN: LL030602723122.027	Multiscale Thermohydrologic Model Output to TSPA and WAGDEG for Upper Infiltration Case	data, output electronic file, NUFT v3.0s	RIS TDMS
	Spot-check results: Documentation on DTN files retrieved from RIS. Data retrieved from TDMS.			
2h	LLR.20090309.0161	Software Baseline Report (final LA version with all addendums)	document	RIS CDIS
	Spot-check results: Initially not found, but located with help from Bruce Kirstein (BEK) in RIS and CDIS.			

**Table 3. Task 3 Records and Tasks**

One process that could affect repository performance is the production of heat from the decay of radionuclides contained in waste packages. In the Yucca Mountain LA, the assumption is that some of this heat will be actively removed from the repository using forced ventilation of the emplacement drifts prior to closure. However, air and drift rock within the repository would continue to heat up after the repository is closed and forced ventilation ends. The Ventilation Model and Analysis Report is the AMR that models and calculates the transfer in and around a ventilated emplacement drift. For the period before repository closure, this AMR determines temperature conditions in the drift host rock.

Records 3b and 3c are associated with the Ventilation Model and Analysis Report AMR in 3a. The analytic model used in this AMR is implemented in an Excel spreadsheet (3b). One example of important input data used in this AMR (and all TSPA products) is the Information Exchange Drawing (IED) data produced by YMP engineers (3c). An IED was used to document and control the identification and to exchange information across the organizational boundary between the engineering contractor responsible for YMP pre-closure functions and the scientific groups responsible for post-closure and scientific investigation functions. The AMR in 3a provides inputs to the Multiscale Thermohydrologic Model and Drift Degradation Analysis AMRs.

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
3a	ANL-EBS-MD-000030 REV 04	Ventilation Model and Analysis Report (October 2004) (final and complete LA version with all addendums)	document, AMR	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
3b	DTN: MO0307MWDAC8MV.000	Analytical-LA-Coarse Ventilation Model an implementation of the ventilation conceptual model (find the DTN preserving this model and data)	model and data, Excel spreadsheet	RIS TDMS
	Spot-check results: Documentation on DTN files retrieved from RIS. Data retrieved from TDMS.			
3c	800 IED-WISO-00203-000-00B ENG.20040202.0011	D&E / PA/C IED Typical Waste Package Components Assembly waste package heat decay data for an entire drift (find reference in ANL-EBS-MD-000030 REV 04)	IED document  data, input to 3a model	RIS
	Spot-check results: Retrieved from RIS.			
The above IED of waste package decay heat data is produced by an engineering calculation (3d). This engineering calculation is the source of all assembly decay-heat information used to derive waste-package decay heats. The associated records package (3e) includes information about the three CDs referenced in and submitted with this report (3f). Apparently, these data were not submitted to the TDMS so there is no DTN record for the data, which means the CDs, part of calculation 3d, are the sole source of the data. Record 3g is the engineering calculation that represents different YMP source term data, 3h is the records package submitted with this report, and 3i consists of electronic data submitted on a CD in support of the report in 3g.				
3d	CAL-MGR-MD-000001 REV 00	Waste Packages and Source Terms for the Commercial 1999 Design Basis Waste Streams (source of all the assembly decay-heat information used to derive waste-package decay heats)	document,  calculation	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
3e		Records package associated with CAL-MGR-MD-000001 REV 00	document	RIS
	Spot-check results: Retrieved from RIS.			
3f		The 3 data CDs associated with calculation CAL-MGR-MD-000001 REV 00 (3f)	data on CDs	boxes
	Spot-check results: CDs were migrated to online system – content retrieved.			
3g	000-00C-MGR0-03500-000-00B ENG.20080130.0002	Source Terms for HLW Glass Canisters January 2008	document, engineering design	RIS
	Spot-check results: Retrieved from RIS.			

TABLE 3 CONTINUED

3h		Records package associated with 000-00C-MGR0-03500-000-00B	document	RIS
	Spot-check results: Retrieved from RIS.			
3i		Electronic files on CD, see Attachment A 000-00C-MGR0-03500-000-00B	data	boxes
	Spot-check results: CDs were migrated to online system – content retrieved			
Records 3j through 3n test general search and retrieval functionality of the e-mail database and the RIS.				
3j		Search in Fields: From: or To: "" [not restricted] Dates: "1 Apr 2003" to "31 Dec 2003" Subject keywords: "MSTHM" OR "gas" OR "pressure" OR "MDL-NBS-HS-000007" OR "Mountain-Scale" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 7487 hits found in RIS. E-mail Warehouse impractical to search.			
3k		Search in Fields: From: or To: "Kirstein" Dates: "1 Apr 2003" to "31 Dec 2003" Subject keywords: "MSTHM" OR "gas" OR "pressure" OR "MDL-NBS-HS-000007" OR "Mountain-Scale" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 41 hits found in RIS. E-mail Warehouse impractical to search.			
3l		Search in Fields: From: "Kirstein" To: "Schreiner" Date: "1 May 2003" Subject keywords: "MSTHM" OR "CSO" (retrieve associated e-mail and attachments)	documents and correspondence with attachments	RIS, e-mail database
	Spot-check results: No hits initially in RIS. E-mail Warehouse impractical to search. E-mail located in RIS with help of BEK.			
3m		Search in Fields: From: "Buscheck" To: "Andrews" Date: "13 June 2003" Subject keywords: "gas pressures" (retrieve associated e-mail and attachments)	documents and correspondence with attachments	RIS, e-mail database
	Spot-check results: No hits in RIS. E-mail Warehouse impractical to search. Not found, likely to exist in the E-mail Warehouse.			
3n		Search in Fields: From: "Howard" To: "Williams" Date: "25 June 2003" Subject keywords: "Path Forward on Model Validation" (retrieve associated e-mail and attachments)	documents and correspondence with attachments	RIS, e-mail database
	Spot-check results: No hits in RIS. E-mail Warehouse impractical to search. Not found, likely to exist in the E-mail Warehouse.			

**Table 4. Task 4 Records and Tasks**

A number of calculations, modeling efforts, and reports were produced by the YMP that are now historical information. These are records that once contained key information on the YMP, but the approaches or data used to generate the information were subsequently replaced or superseded. An example of an important historical document is the Total System Performance Assessment – Viability Assessment (TSPA-VA). Volume 3 of the five-volume TSPA-VA report included a description of the TSPA (item 4a in the table below). The technical basis document for the TSPA-VA is item 4b.

An independent review of the TSPA-VA was commissioned by Clark County, Nevada, and was carried out by S. Cohen & Associates; item 4c is their report. The DOE also requested an independent review, which was conducted by a peer review panel of experts who produced a final report. The response of the Management and Operations Contractor to the peer review comments comprises the response report (4d). The Board reviewed DOE technical activities related to developing the TSPA-VA and some of the expert review comments were referenced in the TSPA-VA (4f). Some externally published references are a record in the RIS.

An example of historical data that supported the TSPA-VA is the host rock thermal conductivity data (4f). These data were submitted as a DTN; a question of interest now is whether the DTN can be retrieved in the RIS or TDMS. Related to the 4f data is a YMP memorandum regarding the data (4g). A historical AMR that supported the TSPA-VA was the Mountain-Scale Coupled-Processes (TH/THC/THM) Models report (4h).

<b>Task ID#</b>	<b>Record YMP I.D. No.</b>	<b>Identifying Information</b>	<b>Record Type</b>	<b>Search Locations</b>
4a	DOE/RW-0508	Viability Assessment of a Repository at Yucca Mountain, Volume 3, Total System Performance Assessment, December 1998, DOE	document, analysis report	RIS
	Spot-check results: Retrieved from RIS.			
4b	B00000000-01717-4301-00001 Rev 01	Total System Performance Assessment-Viability Assessment (TSPA-VA) Analyses Technical Basis Document CRWMS M&O Contractor, dated 11/13/1998	document, analysis report	RIS
	Spot-check results: Retrieved from RIS.			
4c		Review of Total System Performance Assessment in the U.S. Department of Energy Viability Assessment for the Yucca Mountain Site Clark County, Nevada, May 28, 1999	document, technical review	RIS
	Spot-check results: Retrieved from RIS.			
4d		Comment Response on the Final Report: Peer Review of the Total System Performance Assessment-Viability Assessment (TSPA-VA), DOE TSPA-VA Peer Review Panel report author: Martha W. Pendleton August 5, 1999	document, response to review	RIS
	Spot-check results: Retrieved from RIS.			
4e	MOL.20030501.0066 or HQO.19970505.0022	Report to the U.S. Congress and The U.S. Secretary of Energy, January to December 1996, 1997 Nuclear Waste Technical Review Board (NWTRB)	external document reference	RIS
	Spot-check results: Retrieved from RIS.			
4f	DTN: SNT-05071897001.002	System Performance Assessment Data: Base Case Thermal Property Data for TSPA-VA	data	RIS TDMS
	Spot-check results: Data and documentation retrieved from RIS. Data retrieved from TDMS.			
4g	MOL.19980518.0229	Nicholas D. Francis (memo) to Distribution, April 16, 1997, "The base-case thermal properties for TSPA-VA modeling," Sandia National Laboratories, 19 pages.	document, e-mail memo	RIS
	Spot-check results: Retrieved from RIS.			
4h	MDL-NBS-HC-000007 REV01C	Mountain-Scale Coupled-Processes (TH/THC/THM) Models November 2003	document, Technical Model Report	RIS or paper copy
	Spot-check results: Retrieved from RIS.			

**Table 5. Task 5 Records and Tasks**

A second example of a TSPA model abstraction is the Abstraction of Drift Seepage, item 5a, which predicts groundwater flow into the emplacement drifts. Part of the basis for this abstraction is the AMR Seepage Model for PA Including Drift Collapse (5b). Both 5a and 5b are referenced in the LA-SAR. The 5b analysis requires input data concerning the amounts of groundwater seepage estimated to arrive at the drift. Groundwater seepage, in turn, is determined using future climate analysis (5c), water infiltration model simulations (5d), and groundwater flow in the unsaturated zone (UZ, 5e).

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
5a	MDL-NBS-HS-000019 REV 01	Abstraction of Drift Seepage	document,	RIS
	DOC.20041103.0003	Nov. 2004 version and complete final LA version	abstraction	CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
5b	MDL-NBS-HS-000002 REV 03	Seepage Model for PA Including Drift Collapse	document, AMR	RIS
	DOC.20040922.0008	(final LA version with all addendums)		CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
5c	ANL-NBS-GS-000008 REV 01	Future Climate Analysis	document	RIS
	DOC.20040908.0005			
	Spot-check results: Retrieved from RIS.			
5d	MDL-NBS-HS-000023 REV 01 ADD 01	Simulation of Net Infiltration for Present-Day and Potential Future Climates	document, AMR	RIS
	DOC.20080201.0002			CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
5e	DOC.20080108.0003	UZ Flow Models and Submodels	document, AMR	RIS
	DOC.20080114.0001	MDL-NBS-HS-000006 REV 03 ADD 01		CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			

**Table 6. Task 6 Records and Tasks**

Scientific models are used to predict when EBS components may be breached. One of the important components is the drip shield that protects waste packages in the drift. An earthquake is a natural event that could significantly affect the drip shield and packages. For example, an earthquake could cause rocks in the roof of the drift emplacement tunnel to dislodge and damage the drip shield. The AMR that addresses this possibility is the Drift Degradation Analysis (6a), which documents efforts to model and analyze the behavior of the rock mass that surrounds the emplacement drifts over time. The AMR includes data on rockfall and change in drift tunnel geometry. The predictions made in AMR 6a are used in documents 5a and 5b.

Records 6b through 6k are all associated with the Drift Degradation Analysis (6a). Records 6b and 6c include two types of input data used in 6a. 6b consists of data from an engineering calculation and 6c contains USGS data. In addition, a condition report (CR) was issued related to a possible problem with the data in 6a; this report was labeled CR 5281. 6d discusses the final resolution of CR 5281 and 6e consists of the CR documentation as entered into the YMP Corrective Actions Program (CAP) system electronic database. Record 6f is a key engineering report, referenced in 6a, that provides data and describes the technical basis for the modeling approach used in the AMR. Record 6g provides an example of data produced from 6a. Record 6h consists of a sample e-mail, with attachment, that provides direct input data to 6a.

Records 6i to 6m relate to a qualified software program, UDEC 3.1, that was used extensively in 6a. Record 6i is the RIS entry for the software qualification package, 6j consists of supporting reports for qualifying the software, and 6k is the software procedure used to QA the drift degradation analysis. Record 6l gives the location of this software in the SCM library. Record 6m describes the task of activating this QA software and verifying that it has been installed correctly (according to relevant report documentation).

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
6a	ANL-EBS-MD-000027 REV 03 DOC.20040915.0010	Drift Degradation Analysis (final and complete LA version with all addendums)	document, AMR	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
6b	DTN: MO0311RCKPRPCS.003	Values of rock mass strength, see Appendix A, calculation file, rock mass strength v2.xls, worksheet "Intact Strength"	data, input	RIS TDMS
	Spot-check results: Documentation on data files retrieved from RIS. Data retrieved from TDMS (has different file name).			
6c	DTN: GS021008314224.002	Lithophysal abundance, data from Tptpl unit in ECRB (ANL-EBS-MD-000027 REV 03, see Appendix O)	USGS data, input	RIS TDMS
	Spot-check results: Data and documentation retrieved from RIS. Data retrieved from TDMS.			
6d	MOL.20050711.0025	Resolution of CR 5281 "CR Record Report for Traceability to Lithostratigraphic Unit for Laboratory Samples"	resolution of Condition Report (CR)	RIS
	Spot-check results: Retrieved from RIS.			
6e	CR 5281	Retrieve CR 5281 "CR Record Report for Traceability to Lithostratigraphic Unit for Laboratory Samples" (from Corrective Action System, CAP)	Condition Report (CR)	CAP
	Spot-check results: Retrieved from CAP system.			
6f	800-K0C-SS00-00200-000-00A ENG.20041111.0001	Lithophysal Rock Mass Mechanical Properties of the Repository Host Horizon November 2004	document, engineering report	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
6g	DTN: MO0407MWDDSLCR.000	Drip Shield Load in Collapsed Lithophysal Rock, 07/21/2004	data, output from AMR	RIS TDMS
	Spot-check results: Documentation on DTN files retrieved from RIS. Data retrieved from TDMS.			

TABLE 6 CONTINUED

6h	MOL.20030314.0188	E-mail from D. Buesch to D. Kicker and D. Rigby, March 10, 2003, with attachment  "Hydrogeologic Properties of Features in Crystallized Topopah Spring Tuff."  (direct input ANL-EBS-MD-000027 REV 03)	correspondence w/enclosure	RIS
	Spot-check results: Retrieved from RIS.			
6i	MOL.20021105.0241	Software Qualification Package for UDEC v3.1 STN: 10173-3.1-00, sub-release 3.10.109 and list of supplements to records package	records package	RIS
	Spot-check results: Retrieved from RIS.			
6j	MOL.20021105.0244  10173-SDR-3.1-00; MOL.20021105.0245  10173-SIR-3.1-00	Software Definition Report (SDR) and Software Implementation Report (SIR) for UDEC V3.1	software reports SDR and SIR	RIS
	Spot-check results: Retrieved from RIS.			
6k		AP-SI.1Q, Rev 3/ICN 4 (used for 6j reports)	software procedure	RIS
	Spot-check results: Retrieved from RIS.			
6l	STN: 10173-3.1-00	UDEC v3.1, sub-release 3.10.109	QA software	SCM
	Spot-check results: Documentation on UDEC retrieved from RIS. No SCM system for M&O QA software was transferred to LM, but LM has created a detailed inventory of M&O QA software and UDEC v3.1 was found in the inventory.			
6m	STN: 10173-3.1-00	Activate and validate installation of UDEC v3.1, sub-release 3.10.109	QA software	Software Library
	Spot-check results: Installation software CDs found in QA software in the FireKing cabinets. LM cannot activate and install the UDEC v 3.1 since the specified hardware platform, the operating system, and the hardware dongle (key) are not available.			

**Table 7. Task 7 Records and Tasks**

At one time during work on the YMP, YMP technical documents referenced a number of different sources of information on underground mechanical and thermal rock parameters. Record 7a consists of a document that was produced, in response to an NRC request, to collect the best rock parameter data in one report. Records 7b through 7l are associated with this report. The LA-SAR, TSPA documents, and YMP AMRs all reference the rock data contained in 7a.

Item 7b is the Document Input Reference System (DIRS) report, which lists all references cited in 7a. The references are identified using a unique document identifier called a DIRS number. The DIRS electronic database tracks all documents referenced in YMP technical documents. The database includes information on quality status and version control, along with a pointer to the location of cited text in the referenced document. Item 7c is the records package submitted with 7a, while item 7d consists of unique data that were submitted on CDs as part of 7c.

Item 7e is the latest version of the engineering report cited in the LA-SAR. An earlier version of this report (item 7a) is cited by some of the AMRs used to support the license application. Records 7f through 7l are associated with 7e. Item 7f consists of data that were summarized in 7e and used by YMP technical documents but not submitted to the TDMS. Item 7g is an IED created from 7e output data. Item 7h is an engineering report that contains direct data inputs to record 7e. Item 7i is the TWP used to develop record 7e. Item 7j is the DIRS report associated with 7e. Item 7k provides an example of software used in 7a and 7e. Item 7l consists of information concerning corrections made to software 7k. Item 7m provides information on the main tunnel as constructed.

Records 7n through 7r test the general search and retrieval functionality of the e-mail database and the RIS.

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
7a	800-K0C-WIS0-00400-000-00A ENG.20040108.0001	Subsurface Geotechnical Parameters Report December 2003 (reference used extensively in LA AMR: ANL-EBS-MD-000027 REV 03)	document, engineering report	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
7b	MOL.20040322.0130	DIRS report of technical product 800-K0C-WIS0-00400-000-00A	document, DIRS report	RIS DIRS
	Spot-check results: Retrieved from RIS. Retrieved from DRIS.			
7c		Records package for 800-K0C-WIS0-00400-000-00A	records package	RIS
	Spot-check results: Retrieved from RIS.			
7d		Data CDs containing the only source of a set of UDEC v3.1 and PFC2D v2.0 verification runs (800-K0C-WIS0-00400-000-00A, Attachment VIII and report records package)	data, validation input and output files for software, CDs	boxes
	Spot-check results: CDs were migrated to online system – content retrieved. Physical disks also retrieved from boxes..			
7e	ANL-SSD-GE-000001 REV 00 ENG.20070115.0006	Subsurface Geotechnical Parameters Report January 2007 (reference used extensively in LA documents)	document, engineering report	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
7f		Find summary files static rock test data (Excel) (not submitted as DTNs, only a part of this version of the Technical Report, ANL-SSD-GE-000001 REV 00, January 2007, see CD listing in Appendix H) (part of record submittal package)	data, Excel Spreadsheets  [latest YMP data for use by all YMP documents and models]	RIS or CDs
	Spot-check results: CDs were migrated to online system – content retrieved.			
7g	800-IED-MGR0-00402-000-00A ENG.20070108.0001	IED Geotechnical and Thermal Parameters II (data source in ANL-SSD-GE-000001 REV 00)	IED document	RIS
	Spot-check results: Retrieved from RIS.			
7h	800-K0C-SS00-00800-000-00A ENG.20051108.0007	Intact Rock Mechanical Properties of Yucca Mountain Stratigraphic Units	document, engineering calculation	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			



TABLE 7 CONTINUED

7i	DOC.20061004.0001	Technical Work Plan for Subsurface Geotechnical Parameters Report (used to develop TWP-SSD-GE-000001 REV 00)	document, TWP	RIS CDIS
	Spot-check results: Retrieved from RIS. Retrieved from CDIS.			
7j		DIRS report of technical product ANL-SSD-GE-000001 REV 00	document, DIRS report	RIS DIRS
	Spot-check results: Retrieved from RIS. Retrieved from DIRS.			
7k	STN: 10828-2.0-01	PFC2D V2.0	QA software	RIS SCM
	Spot-check results: Documentation on PFC2D retrieved from RIS. No SCM system for M&O QA software was transferred to LM, but LM has created a detailed inventory of M&O QA software and PFC2D v2.0 was found in the inventory. Physical hardware dongle (key) also located.			
7l	MOL.20040322.0118	E-mail from John Leem to distribution, engineering LOTUS NOTE database Subject: CR for PFC FISH TANK	correspondence memo	RIS
	Spot-check results: Retrieved from RIS, CR #1137.			
7m	800-KMC-SSD0-00800-000-000 ENG.20050825.0005	ESF As-Built Configuration	document	RIS
	Spot-check results: Retrieved from RIS.			
7n		Search in Fields: From (Author): "Rigby" Dates: "1 Feb 2003" to "30 Sep 2004" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 25 hits found in RIS. E-mail Warehouse impractical to search.			
7o		Search in Fields: To: "Rigby" Dates: "1 Feb 2003" to "30 Sep 2004" (total number and listing of hits)	correspondence	e-mail database
	Spot-check results: Listing of 22 hits found in RIS. E-mail Warehouse impractical to search.			
7p		Search in Fields: From: or To: "Rigby" Dates: "1 Feb 2003" to "30 Sep 2004" Subject keywords (or): "uncertainty" "KTI" "RDTME" "LLR" "data" "CR" "CIRS" "CAR" "subsurface" "database" "problems" "issues" "comments" (retrieve e-mail and documents up to first 10)	documents and correspondence & attachments	RIS, e-mail database
	Spot-check results: Listing of first 10 hits found in RIS using Subject keyword "subsurface." E-mail Warehouse impractical to search.			
7q		Search in Fields: From: or To: "Rigby" Dates: "1 Feb 2003" to "30 Sep 2004" Subject keywords (or): "porosity" "lithophysal" "density" "geophysics" "Tptpl" "Tptpul" "slot" (retrieve e-mail and documents up to first 10)	documents and correspondence & attachments	RIS, e-mail database
	Spot-check results: Listing of first 10 hits from total of 22 hits found in RIS. E-mail Warehouse impractical to search. LSNs also searched and hits found.			
7r		Search in Fields: From (Author): "Buesch" Dates: "1 Jan 2002" to "31 Dec 2008" Subject keywords (or): "notebook" "notebooks" "log" "logs" "borehole" "video" "abundance" "drift" "data" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 155 hits found in RIS. E-mail Warehouse impractical to search.			

**Table 8. Task 8 Records and Tasks**

The Nevada System of Higher Education (NSHE), formerly known as the University and Community College System of Nevada, received dedicated funding from DOE as part of a DOE cooperative agreement to collect scientific field and laboratory data, conduct scientific research, and develop scientific work products in support of the YMP. These work products were submitted to the YM Records Processing Center. Much of this research yielded qualified data and included scanned copies of the supporting field and laboratory notebooks. The technical report in 8a is an example of NSHE's YMP work, 8b consists of one laboratory notebook associated with 8a, and 8c consists of data submitted as part of 8a.

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
8a	MOL.20070705.0171	Influence of Lithophysal Geometry on the Uniaxial Compression of Tuff-Like Rock,  Technical Report TR-07-001, Task ORD-FY04-013  (report produced by UNLV for DOE)	document, NSHE QA report	RIS
		Spot-check results: Retrieved from RIS.		
8b	MOL.20070313.0125	Retrieval of above report  "LOG E: QA PATTERN C CIRCULAR"  (see records package submitted)	document, NSHE laboratory notebook	RIS
		Spot-check results: Retrieved from RIS.		
8c	DTN: MO0311UCC018LM.001	Uniaxial Compression Tests Results  Submittal date: 11/19/2003	NSHE data	RIS TDMS
		Spot-check results: Data and documentation retrieved from RIS. Data retrieved from TDMS.		

**Table 9. Task 9 Records and Tasks**

The documents in this table cover other major types of data and analysis associated with the YMP.

The preclosure safety analysis (PCSA) is a systematic safety examination of the YMP. It evaluates potential natural and operational hazards for the preclosure period—that is, for the 30- to 100-year period of operations before permanent repository closure. The PCSA relates primarily to the Geologic Repository Operations Area (GROA) and is described in Chapter 1 of the LA-SAR. The following records are associated with the PCSA and referenced in the LA-SAR:

Records 9a – 9d represent examples of PCSA site characterization documents needed to design surface waste handling facilities for the repository. They provide data on surface hydrology (9a), seismic features (9b), geotechnical characteristics (9c), and geochemistry (9d).

Record 9e discusses the types of waste forms and packages that would likely be received at the GROA (9e), including transportation, aging, and disposal (TAD) canisters. Record 9f consists of the TAD performance specification, 9g is the TAD design basis report, and 9h is the expected source term study for TAD containers. Record 9i describes the Initial Handling Facility, a major surface facility of the GROA that would be designed to receive naval SNF canisters and DOE HLW canisters

One major purpose of the PCSA is to identify potential hazards and initiating events in the GROA that could potentially cause individuals to be exposed to radiation. Record 9i lays out exposure hazards and event sequences associated with the Initial Handling Facility. Significant event sequences are based, in part, on an evaluation of potential external events such as earthquakes, floods, and aircraft crashes (9j). Record 9k evaluates the integrity of various DOE SNF canisters subject to these event sequences. Other documents estimate probabilistic dose consequences during normal operations; for example, record 9l examines GROA worker doses. Record 9m provides atmospheric dispersion factors for calculating general public offsite exposures in the event of a surface release. Record 9n discusses the preclosure repository nuclear criticality safety program and related evaluations.

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
9a	000-00C-CD04-00100-000-00A ENG.20040504.0005	Hydrologic Engineering Studies for the North Portal Pad and Vicinity	document engineering	RIS
	Spot-check results: Retrieved from RIS.			
9b	MDL-MGR-GS-000003 REV 01 DOC.20041111.0006	Development of Earthquake Ground Motion Input for Preclosure Seismic Design and Postclosure Performance Assessment of a Geologic Repository at Yucca Mountain, NV	document	RIS
	Spot-check results: Retrieved from RIS.			
9c	TDR-MGR-GE-000010 REV 00 DOC.20080206.0001	Technical Report: Geotechnical Data for a Geologic Repository at Yucca Mountain, Nevada	document	RIS
	Spot-check results: Retrieved from RIS.			
9d	ANL-EBS-MD-000074 DOC.20070911.0004	Analysis of Dust Deliquescence for FEP Screening Rev 01 August 2005	documents	RIS
	DOC.20070824.0001	Rev 01, ACN 01 August 2007		
	DOC.20080109.0005	Rev 01, ACN 02 January 2008		
	Spot-check results: DOC.20070911.0004 and DOC.20070824.0001 retrieved from RIS.			
9e	000-PSA-MGR0-01800-000-00A ENG.20071106.0001	Waste Form Throughputs for Preclosure Safety Analysis	document	RIS
	Spot-check results: Retrieved from RIS.			
9f	WMO-TADCS-000001 DOC.20080331.0001	Transportation, Aging and Disposal Canister System Performance Specification	document	RIS
	Spot-check results: Retrieved from RIS.			
9g	000-3DR-MGR0-00300-000-002 ENG.20080229.0007	Basis of Design for the TAD Canister-Based Repository Design Concept	document	RIS
	Spot-check results: Screening for LA document located, not the original report. Report located with help of DBR.			

TABLE 9 CONTINUED

9h	000-30R-GGDE-00100-000-00A ENG.20060831.0007	TAD Source Term and Dose Rate Evaluation	document	RIS
	Spot-check results: Retrieved from RIS.			
9i	51A-PSA-IH00-00100-000-00A ENG.20080207.0005	Initial Handling Facility Event Sequence Development Analysis	document	RIS
	Spot-check results: Retrieved from RIS.			
9j	000-00C-MGR0-00500-000-00C ENG.20080219.0001	External Events Hazards Screening Analysis	document	RIS
	Spot-check results: Draft version of report initially located. Final report located with help of DBR.			
9k	000-PSA-WHS0-00100-000-000 REV 00 ENG.20040719.0001	U.S. Department of Energy Spent Nuclear Fuel Canister Survivability	document	RIS
	Spot-check results: Retrieved from RIS.			
9l	000-PSA-MGR0-01400-000-00C ENG.20080327.0010	GROA Worker Dose Calculation	document	RIS
	Spot-check results: Retrieved from RIS.			
9m	000-00C-MGR0-02800-000-00B ENG.20070813.0003	General Public Atmospheric Dispersion Factors	document	RIS
	Spot-check results: Retrieved from RIS.			
9n	TDR-MGR-NU-000002 REV 01 ENG.20080307.0007	Preclosure Criticality Safety Analysis	document	RIS
	Spot-check results: Retrieved from RIS.			
<p>The YMP design philosophy is to ensure access for the retrieval of waste packages throughout the preclosure period. Record 9o discusses preliminary planning approaches for waste package retrieval. Plans for decontaminating GROA facilities, which incorporated operational and design considerations to facilitate future decontamination, are discussed in record 9p.</p> <p>The natural analogues report (9q) looks at other ash-flow rock units around the world that have similar geologic features to the Topopah Spring tuff found at Yucca Mountain.</p> <p>The DOE planned to construct a new rail line to connect the GROA to commercial rail lines within the state of Nevada. Construction of the rail line is outside the scope of the LA, but record 9r contains planning information for the rail line and 9s is a supporting geotechnical report.</p>				
9o	800-30R-HER0-00100-000-007 ENG.20080109.0010	Concepts for Waste Retrieval and Alternate Storage of Radioactive Waste	document	RIS
	Spot-check results: Retrieved from RIS.			
9p	000-30R-MGR0-03000-000 REV 002 ENG.20080312.0029	Yucca Mountain Repository Concept of Operations	document	RIS
	Spot-check results: Retrieved from RIS.			
9q	TDR-NBS-GS-000027 REV 01 DOC.20040524.0008	Natural Analogue Synthesis Report	document	RIS
	Spot-check results: Retrieved from RIS.			

TABLE 9 CONTINUED

9r	MOL.20080603.0004	Yucca Mountain Project Rail Line, Calente Rail Corridor – Plan of Development March 4, 2008	document	RIS
	Spot-check results: Retrieved from RIS.			
9s	ENG.20070905.0016	Geotechnical Report Volume 1. Caliente Rail Corridor Vendor Document V0-CY05-NHC4-00197-00009-001 July 16, 2007	document	RIS
	Spot-check results: Retrieved from RIS.			
Record 9t explains the decisional basis for changing from a “cold” repository design (Enhanced Design Alternative I or EDA-I) to a “hot” design (EDA-II), which is the design choice described in the DOE-LA.				
Record 9u describes planned site characterization activities (as of 1992) including surface, in situ, and laboratory studies for the YMP.				
Record 9v discusses corrosion mechanisms and potential risks to waste package integrity from barrier failures.				
Task 9w is a search of the RIS for records pertaining to YMP system integration programs.				
9t	B00000000-01717-4600-00123 REV 01 ICN 01 MOL.19990908.0319	License Application Design Selection Report August 1999	document	RIS
	Spot-check results: Retrieved from RIS			
9u	DOE/RW-0313P	Yucca Mountain Site Characterization Project Plan January 1992	document	RIS
	Spot-check results: Retrieved from RIS.			
9v	ANL-EBS-MD-000003 REV 02 DOC.20041004.0001	General Corrosion and Localized Corrosion of Waste Package Outer Barrier, October 2004	document	RIS
	Spot-check results: Retrieved from RIS.			
9w		Search the RIS document titles and subject line for “system integration program” (provide total number of hits and a listing)	document search	RIS
	Spot-check results: Listing of 165 hits found in RIS. All documents retrieved.			

**Table 10. Task 10 Records and Tasks**

A number of quality procedures were developed and used in the course of the YMP to qualify data, develop technical work projects and manage software. Records 10a through 10g represent a selection of important science and engineering procedures used as part of the YMP.

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
10a	DOC.20040805.0003	Scientific Analyses AP-SIII.9Q, Rev. 1, ICN 6 (major revisions from 2002 to 2005)	document, science procedure	RIS CDIS
		Spot-check results: Retrieved from RIS (Rev 0 ICN 0, Rev 1 ICN 0 and ICN 6). Retrieved from CDIS.		
10b	DOC.20040805.0005	Models AP-SIII.10Q, Rev. 2, ICN 6 (major revisions from 2002 to 2005)	document, science procedure	RIS CDIS
		Spot-check results: Retrieved from RIS (Rev 0 ICN 1, Rev 1 ICN 0, Rev 2 ICN 0 and ICN 6). Retrieved from CDIS.		
10c	DOC.20030827.0013	Design Calculations and Analyses AP-3.12Q, Rev 2, ICN 1 (major revisions from 2002 to 2005)	document, engineering procedure	RIS CDIS
		Spot-check results: Retrieved from RIS (Rev 1 ICN 1, Rev 2 ICN 0 and ICN 1). Retrieved from CDIS.		
10d		Scientific Analyses LP-SIII.9Q-BSC (latest version)	document, engineering procedure	RIS CDIS
		Spot-check results: Retrieved from RIS (Rev 1 ICN 1). Retrieved from CDIS.		
10e		Software Management LP-SI.11Q-BSC (latest version)	document, engineering procedure	RIS CDIS
		Spot-check results: Retrieved from RIS (Rev 0 ICN 2). Retrieved from CDIS.		
10f	DOC.20040226.0001	Submittal and Incorporation of Data to the Technical Data Management System AP-SIII.3Q, Rev. 2, ICN 1 (and locate the latest version)	document, science procedure	RIS CDIS
		Spot-check results: Retrieved from RIS (Rev 2 ICN 1 and Rev 4 ICN 3). Retrieved from CDIS.		
10g	DOE/RW-033P	Quality Assurance Requirements and Description (QARD), Revision 17 (and major revisions from 2002 to 2005)	quality procedure	RIS CDIS
		Spot-check results: Retrieved from RIS (Revs 11, 12, 13, 14, 15, 16, and 17). Retrieved from CDIS.		

**Table 11. Task 11 Records and Tasks**

Key guidance documents that were developed for the purpose of understanding and conducting uncertainty analyses on the YMP are represented in records 11a through 11c.

Task ID#	Record YMP I.D. No.	Identifying Information	Record Type	Search Locations
11a	MOL.20020109.0064	Letter from N.H. Williams (BSC) to S.J. Brocoum (DOE), November 19, 2001  "Contract No. DE-AC08-01RW12101 – Uncertainty Analyses and Strategy Letter Report," REV 00,  Activity #SA0114  (YMP Uncertainty Guidance)	document,  letter w/  enclosure	RIS
		Spot-check results: Retrieved from RIS.		
11b	MOL.20020904.0002	Guidelines for Developing and Documenting Alternative Conceptual Models, Model Abstractions, and Parameter Uncertainty in the Total System Performance Assessment for the License Application  TDR-WIS-PA000008 REV 00 ICN 01  (YMP Uncertainty Guidance)	document	RIS  CDIS
		Spot-check results: Retrieved from RIS. Retrieved from CDIS.		
11c		Scientific Processes Guidelines Manual  MIS-WIS-MD-000001 REV 01  (YMP Uncertainty Guidance)	document	RIS  CDIS
		Spot-check results: Retrieved from RIS. Retrieved from CDIS.		

**Table 12. Task 12 Records and Tasks**

E-mail correspondence between YMP personnel included important discussions of technical subjects and work products. The purpose of task 12 is to test the ability to search for YMP e-mails based on a variety of search criteria. Specific search criteria are indicated in the table (Task IDs 12a through 12w). The same criteria (as far as possible) were also used to test the search functionality of records (not limited to e-mail) in the RIS. The majority of YMP e-mail traffic is not captured in the RIS, however a technical work product (captured in the RIS) would typically involve e-mail traffic. The tasks in this table cover searches for available YMP records that meet the search criteria and expand the scope of technical subject matter beyond that covered in other retrieval tables.

<b>Task ID#</b>	<b>Record YMP I.D. No.</b>	<b>Identifying Information</b>	<b>Record Type</b>	<b>Search Locations</b>
12a		Search in Fields: From: "van luik" OR "vanluik" Dates: "1 Jan 1998" to "31 Dec 1998" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12b		Search in Fields: From: "Nancy Williams" To: "William Boyle" Dates: "1 Jan 2003" to "31 Dec 2003" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse. No hits found in LSNdc.			
12c		Search in Fields: From: "Coppersmith" To: "Yunker" Dates: "1 Jan 1999" to "31 Dec 1999" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12d		Search in Fields: From: "Kirsten" To: "Schreiner" Dates: "1 Jan 2003" to "31 Dec 2003" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12e		Search in Fields: From: "Buscheck" To: "Andrews" Dates: "1 Jan 2002" to "31 Dec 2002" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			



TABLE 12 CONTINUED

12f		Search in Fields: From: "Whitcraft" To: "Lucas" Dates: "1 Jan 2005" to "31 Dec 2005" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12g		Search in Fields: From: "Rusinko" To: "Lucas" Dates: "1 Jan 2005" to "31 Dec 2005" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12h		Search in Fields: From: "Buesch" To: "Rigby" Dates: "1 Jan 2002" to "31 Dec 2005" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12i		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 2007" to "31 Dec 2007" Subject keywords: "dust deliquescence" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12j		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 2004" to "31 Dec 2006" Subject keywords: "alloy 22" AND "corrosion" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 4648 hits found in RIS. E-mail Warehouse impractical to search.			
12k		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 1992" to "31 Dec 1997" Subject keyword: "DOE/RW-0313P" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 290 hits found in RIS. E-mail Warehouse impractical to search.			

TABLE 12 CONTINUED

12l		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 1994" to "31 Dec 1995" Subject keywords: "site characterization project plan" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 199 hits found in RIS. E-mail Warehouse impractical to search.			
12m		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 1986" to "31 Dec 1998" Subject keywords: "OCRWM Transportation Program" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 1190 hits found in RIS. E-mail Warehouse impractical to search.			
12n		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 1998" to "31 Dec 2007" Subject keywords: "national transportation" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: Listing of 5272 hits found in RIS. E-mail Warehouse impractical to search.			
12o		Search in Fields: From: "Mark Board" To: "Ming Lin" Dates: "1 Jan 2001" to "31 Dec 2002" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12p		Search in Fields: From: "Rigby" To: "Elayer" OR "Rael" Dates: "1 Jan 2003" to "31 Dec 2005" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12q		Search in Fields: From: "Davidsavor" To: "Grant" Dates: "1 Jan 2003" to "31 Dec 2005" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			

TABLE 12 CONTINUED

12r		Search in Fields: From: "Kirstein" To: "Yunker" Dates: "1 Jan 2003" to "31 Dec 2003" Subject keywords: "" [not restricted] (total number and listing of hits)	correspondence	e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12s		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 1996" to "31 Dec 2007" Subject keywords: "fast flow" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12t		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 2006" to "31 Dec 2009" Subject keywords: "canister-based repository design concept" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12u		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 2006" to "31 Dec 2009" Subject keywords: "volcanic hazard analysis update" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Retrieval task canceled as E-mail Warehouse is impractical to search. Search "hits" are probable in the E-mail Warehouse.			
12v		Search in Fields: From: or To: "" [not restricted] Dates: ("1 Jan 1998" to "31 Dec 1998") OR ("1 Jan 2001" to "31 Dec 2002") Subject keywords: "model uncertainty" (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: RIS search canceled. E-mail Warehouse impractical to search.			
12w		Search in Fields: From: or To: "" [not restricted] Dates: "1 Jan 1984" to "31 Dec 1992" Subject: "Nevada Agency for Nuclear Projects" AND ("finding" OR "comment" OR "review") (total number and listing of hits)	documents and correspondence	RIS, e-mail database
	Spot-check results: RIS search canceled. E-mail Warehouse impractical to search.			

**Table 13. Task 13 Records and Tasks – Added E-mail Searches of RIS**

Because it turned out to be impractical to search the E-mail Warehouse, Board staff decided to add some e-mail searches of the RIS by name (as author and receiver) with no date or subject keywords indicated. Four other specific e-mail searches in the RIS were also added.

<b>Task ID#</b>	<b>Record YMP I.D. No.</b>	<b>Identifying Information</b>	<b>Record Type</b>	<b>Search Locations</b>
13a		Search in Fields: From: or To: "Board"	e-mail	RIS
	Spot-check results: Author: listing of 2 hits found. Receiver: listing of 48 hits found.			
13b		Search in Fields: From: or To: "Boyle"	e-mail	RIS
	Spot-check results: Author: listing of 125 hits found. Receiver: listing of 313 hits found.			
13c		Search in Fields: To: "Brownstein"	e-mail	RIS
	Spot-check results: Receiver: listing of 97 hits found.			
13d		Search in Fields: From: or To: "Duan"	e-mail	RIS
	Spot-check results: Author: listing of 16 hits found. Receiver: listing of 87 hits found.			
13e		Search in Fields: From: or To: "Lechel"	e-mail	RIS
	Spot-check results: Author: listing of 160 hits found. Receiver: listing of 219 hits found.			
13f		Search in Fields: From: or To: "Summerson"	e-mail	RIS
	Spot-check results: Author: listing of 9 hits found. Receiver: listing of 196 hits found.			
13g		Search in Fields: From: or To: "Van Luik"	e-mail	RIS
	Spot-check results: Author: listing of 870 hits found. Receiver: listing of 73 hits found.			
13h		Search in Fields: From: or To: "Voegelé"	e-mail	RIS
	Spot-check results: Author: listing of 37 hits found. Receiver: listing of 140 hits found.			
13i		Search in Fields: From: or To: "Yunker"	e-mail	RIS
	Spot-check results: Author: listing of 25 hits found. Receiver: listing of 111 hits found.			

TABLE 13 CONTINUED

13j	MOL.20050214.0005	From L.E. Kokajko (NRC) to J.D. Ziegler (DOE/ORD) January 11, 2005, "Pre-Licensing Evaluation of Agreements in 'Technical Basis Document Number 4, Mechanical Degradation and Seismic Effects and Three Other Associated Agreements.'"	e-mail	RIS
	Spot-check results: Retrieved from RIS.			
13k	MOL.20050906.0347	From B.E. Rusinko (BSC) to Distribution August 23, 2005, "Contract No. DE-AC28-01RW12101 - Minutes of June 21, 2005 Geotechnical Data Issues and Concerns Meeting."	e-mail	RIS
	Spot-check results: Retrieved from RIS.			
13l	MOL.20051118.0072	From R.E. Fray (BSC) to Distribution, October 6, 2005, "Contract No. DE-AC28-01RW12101 - Minutes of September 15, 2005 Geotechnical Data Issues and Concerns Meeting."	e-mail	RIS
	Spot-check results: Retrieved from RIS.			
13m	CCU.20061102.0006	From M.L. Johnson (BSC) to Distribution, November 2, 2006, "Contract No. DE-AC28-01RW12101 - Minutes of December 8, 2005 Geotechnical Data Issues and Concerns Meeting"	e-mail	RIS
	Spot-check results: Retrieved from RIS.			

## APPENDIX 5

### YUCCA MOUNTAIN PROJECT RECORD RETRIEVAL DEMONSTRATION

Board staff requested that LM staff search and retrieve a typical document. Board staff captured that effort by taking screen shots of each stage of the activity. For this demonstration, the Board selected the electronic and physical record identified in Task 2a (Appendix 4): “Multiscale Thermohydrologic Model,” ANL-EBS-MD-000049 REV 03 ADD 02, DOC.20080201.0003.

To retrieve physical holdings from the YMP records collection, LMBC personnel searched both the YMRIS and the LM Records Inventory Management Application (RIMA).

LMBC personnel first searched for the relevant YMP accession number in the YMRIS database.

YMRIS - Records Search - Advanced - Windows Internet Explorer

https://ymris.lm.doe.gov/Query/QueryForm/Advanced

File Edit View Favorites Tools Help

Submit Search Clear Search Form Search Tips

Search for documents that:

**Title:**  
Title Contains

**Date:** (Use mm/dd/yyyy format ONLY! Enter 'first : last' for Between)  
Document Date On

**Author:**  
Author Name Is

**Receiver:**  
Receiver Name Is

**Document #:**  
Document Number Is

**Accession #:**  
Accession Id Is DOC.20080201.0003

**Identifier:**  
Identifiers Is

**Package:**

**Text:**  
Text Contains

**Type:**

**Author Org:**  
Author Organization Is

**Receiver Org:**  
Receiver Organization Is

**Trace #:**  
Trace Id Is

**LSN Relevancy (N=No, Y=Yes) / Accession #:**  
LSN Accession Id Is

**Comments:**  
Comments Contains

Done Trusted sites | Protected Mode: Off 125%

The accession number search produced a YMRIS result set with an entry for the requested report.

U.S. DEPARTMENT OF ENERGY Legacy Management YMRIS - Yucca Mountain Records Information System

Records Search Boxes Search Welcome GJO\MonahanL

Records Summary Result Set

1 of 1 (Rows 1 - 1 of 1)

Export to Excel Revise Current Search New Search

Accession #	Type(s)	Title
DOC.20080201.0003	REPORT	MULTISCALE THERMOHYDROLOGIC MODEL

Export to Excel Revise Current Search New Search

1 of 1 (Rows 1 - 1 of 1)

Expanded Result Set

Printer Friendly (1-1)

Dept. of Energy Version 1.2 DOE Legacy Management

The YMRIS search result provides detailed information about the document.

U.S. DEPARTMENT OF ENERGY Legacy Management YMRIS - Yucca Mountain Records Information System

Records Search Boxes Search Welcome GJO\MonahanL

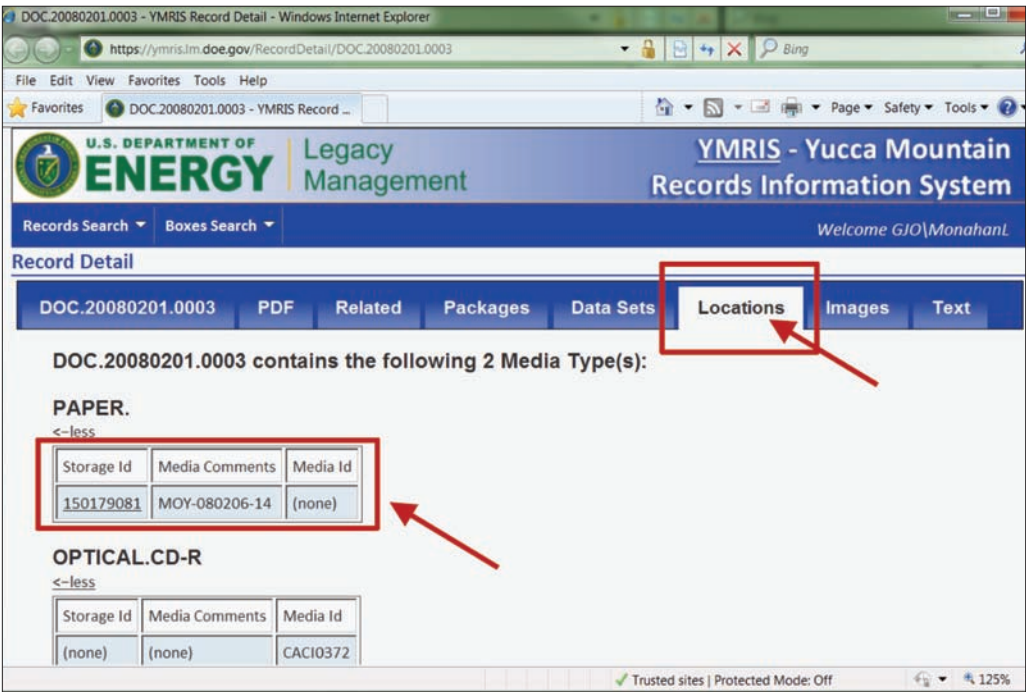
Record Detail

DOC.20080201.0003 PDF Related Packages Data Sets Locations Images Text

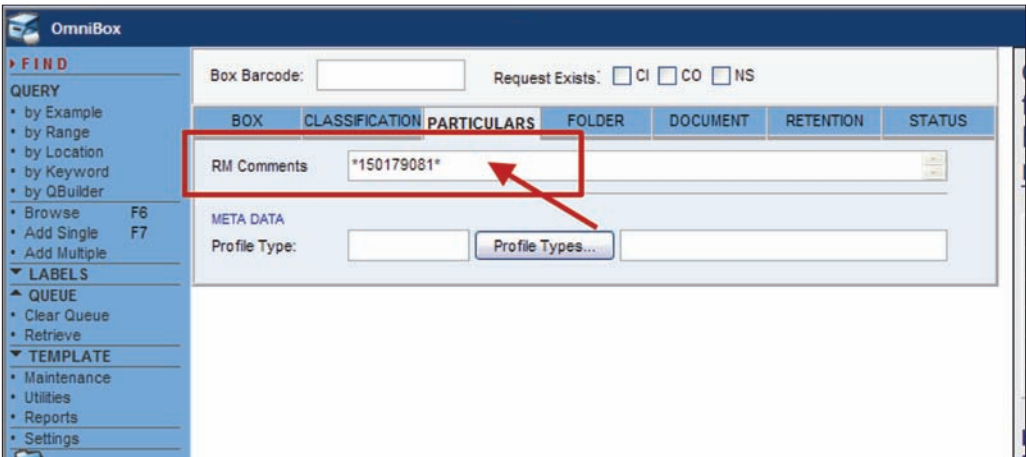
Printer Friendly

Accession #	DOC.20080201.0003
Document #	ANL-EBS-MD-000049
Title	MULTISCALE THERMOHYDROLOGIC MODEL
Date	01/29/2008
Version(s)	03 AD02
Author(s)	BUSCHECK TA - BSC

The YMRIS record detail location tab provides a Storage ID Number (150179081) for the report.



LM personnel then transferred the Storage ID Number to the LM RIMA software to locate the corresponding LM box number for the LMBC records storage area. YMRIS Storage ID Numbers are entered in the LM RIMA RM Comments field.





The LM RIMA query results in a match for an LMBC holding with the barcode LM00105819.

OmniBox  
BROWSE FORM  
Page 1 of 1 Total: 1  
OK Cancel Request Reorder Columns Put On Hold Remove Select All Unselect All Add to Queue Sort Export

Browse and request box records

To request a record via the Browse form  
1. Select one or more records you want to request.

<input type="checkbox"/>	Barcode	Box Number	Total Boxes	Accession Number	NARA Accession	Current Location Code	Title	Schedule Code	Primary Code	Primary Title	Secondary Code	Secondary Title	Office Code	Office Description
<input type="checkbox"/>	LM00105819	85	144	YMP-2011-0108		WH-23-22-13-1	Yucca Mountain Project (YMP), Source documents used to create electronic records in the Records Information System (RIS), September 30, 2010	WH-RRS	ADM 20	Electronic Records	2.A.4	Input/Source Records	DOE-LM	Department of Energy - Legacy Management

Page 1 of 1

The LMBC box profile describes where the physical box containing the requested YMP report is located. The box title; the LM box grouping, the accession number; and the storage box type (a standard NARA storage box in this case) appear under the box tab.

OmniBox  
SAVE F8  
QUERY  
• by Example  
• by Range  
• by Location  
• by Keyword  
• by QBuilder  
• Browse F6  
• Add Single F7  
• Add Multiple  
• View  
• Request  
• Print F5  
• Print Label  
• Print Box  
• TRANSFER  
• Check In F10  
• Check Out F2  
• Relocate  
• BATCH TRANSFER  
• LABELS  
• QUEUE  
• Add  
• Add All

Location: CAMEONP Peter J (PJ) Cameon 8/22/2012 9:32:24 AM SPRADLED  
Box Barcode: LM00105819 Request Exists: ☐ CI ☐ CO ☐ NS  
Items: 1 of 1 (total: 1)

BOX CLASSIFICATION PARTICULARS FOLDER DOCUMENT RETENTION STATUS

BOX  
Title: Yucca Mountain Project (YMP), Source documents used to create electronic records in the Records Information System (RIS), September 30, 2010  
Client Box Number: 85 of 144  
Box Type: STD Box Types... NARA Standard Box  
Accession Number: YMP-2011-0108  
DATES  
Content Dates: (MM/DD/YYYY) to 09/30/2010 (MM/DD/YYYY)  
Organization  
Code: DOE-LM Organization... Department of Energy - Legacy Management

Edit Mode Trusted sites 100%

Selecting the location field gives the LMBC shelf location of the box and indicates any past storage or retrieval activity associated with the box. This information documents the chain of custody for the materials in the box.

OmniBox

SAVE F8

QUERY

- by Example
- by Range
- by Location
- by Keyword
- by QBuilder

Browse F6

Add Single F7

Add Multiple

View

Request

Print F5

Print Label

Print Box

TRANSFER

Check In F10

Check Out F2

Relocate

BATCH TRANSFER

LABELS

QUEUE

Add

Add All

Location: CAMEONP Peter J (PJ) Cameon 8/22/2012 9:32:24 AM SPRADLED

Box Barcode: WH-23-22-13-1 SHELF RC: WH A: 23 C: 22 R: 13 B: 1 7/7/2011 2:20:12 PM STAGE-IN Warehouse Staging In 7/7/2011 11:17:17 AM MARSHB YMP-CALL Yucca Mountain Project Recall 6/27/2011 1:00:00 AM CON FRIDOE

BOX

BOX

Title: Yucca Mountain Project (YMP), Source documents used to create electronic records in the Records Information System (RIS), September 30, 2010

Client Box Number: 85 of 144

Box Type: STD Box Types... NARA Standard Box

Accession Number: YMP-2011-0108

DATES

Content Dates: (MM/DD/YYYY) to 09/30/2010 (MM/DD/YYYY)

Organization

Code: DOE-LM Organization... Department of Energy - Legacy Management

The LM RIMA classification tab provides the records retention code for the box. In this case, the box contains input/source documents for electronic records.

OmniBox

SAVE F8

QUERY

- by Example
- by Range
- by Location
- by Keyword
- by QBuilder

Browse F6

Add Single F7

Add Multiple

View

Request

Print F5

Print Label

Print Box

TRANSFER

Check In F10

Check Out F2

Relocate

BATCH TRANSFER

LABELS

QUEUE

Add

Add All

Location: CAMEONP Peter J (PJ) Cameon 8/22/2012 9:32:24 AM SPRADLED

Box Barcode: LM00105819 Request Exists: ☒ CI ☐ CO ☐ NS

Items: 1 of 1 (total: 1)

BOX CLASSIFICATION PARTICULARS FOLDER DOCUMENT RETENTION STATUS

SCHEDULE

Code: WH-RRS Schedules... Warehouse Records Retention Schedule

PRIMARY

Code: ADM 20 Primaries... Electronic Records

Title: Electronic Records

Scope:

SECONDARY

Code: 2.A.4 Secondaries... Input/Source Records

Title: Input/Source Records

Scope: NLN

Once LM personnel confirm that the OmniRIM search result is identical to the storage box associated with the requested YMP report, LM personnel enter a check-out request for the box.

The screenshot shows the 'OmniBox' application window with a title bar containing 'Home', 'Help', and 'Logout' links. The main window title is 'REQUEST LIST PROCESSING'. Below this is a menu bar with 'Exit', 'Edit', 'Save', 'Delete', and 'History...'. The form contains several input fields and buttons:

- Type:** A dropdown menu set to 'Check out'.
- Requested For:** A text field containing 'CAMEONP', a 'Users...' button, and a text field containing 'Peter J (PJ) Cameon'.
- User Office:** A text field containing 'DOE-LM' and another containing 'Department of Energy - Legacy Management'.
- User Department:** A text field containing 'MGN' and another containing 'LM Sites Program/Project Administration'.
- Requested By:** An empty text field.
- Required Date:** A text field with a calendar icon and the format '(MM/DD/YYYY)'.
- Delivery Priority:** A dropdown menu set to 'Normal'.
- Service Site:** A text field, a 'Service Sites...' button, and another empty text field.
- Instructions:** An empty text field.
- Remarks:** An empty text field.

At the bottom right of the form is a checkbox labeled 'All Records'. Below the form is a table with four columns: 'Requested For', 'Requested By', 'Instructions', and 'Request Date/Time'. The table is currently empty.

The request process generates an LM Box Request Report. This report is used by storage personnel to retrieve the box. A handheld barcode scanner is used to track box request activity. The report's reference barcodes are used to scan the box to the temporary custody of the requestor.

Requested For		Date of Request	Required Date
/Request Type	User Name / Instructions		
CAMEONP	Peter J (PJ) Cameon	August 22, 2012	
Check out	Instructions:		

**Box Barcode:** LM00105819

**Series Descrip:** Yucca Mountain Project (YMP), Source documents use

**Box Type:** STD NARA Standard Box

**Client Box Number:** 85 of 144 **NARA AccessionNo:** **LM Accession No:** YMP-2011-0108


**Organization:** DOE-LM Department of Energy - Legacy Management

**Site:** YMP Yucca Mountain Project, NV

**Location:** WH-23-22-13-1 **Perm Location:** WH-23-22-13-1

---

**Requester Name**



Peter J (PJ) Cameon


**Requester Initials:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Warehouse Rep Initials:** \_\_\_\_\_ **Date:** \_\_\_\_\_

---


**Temporary Locations**

**Box BarCode**




LM00105819

**Stage In BarCode**




STAGE-IN

**Intransit BarCode**



INTRANSIT

**Stage Out BarCode**



STAGE -OUT

---

Page: 1

LMBC personnel then retrieves the box from the location indicated in the LM RIMA system. The box identification number LM00105819 from RIMA matches that of the retrieved box (Figure A-1).

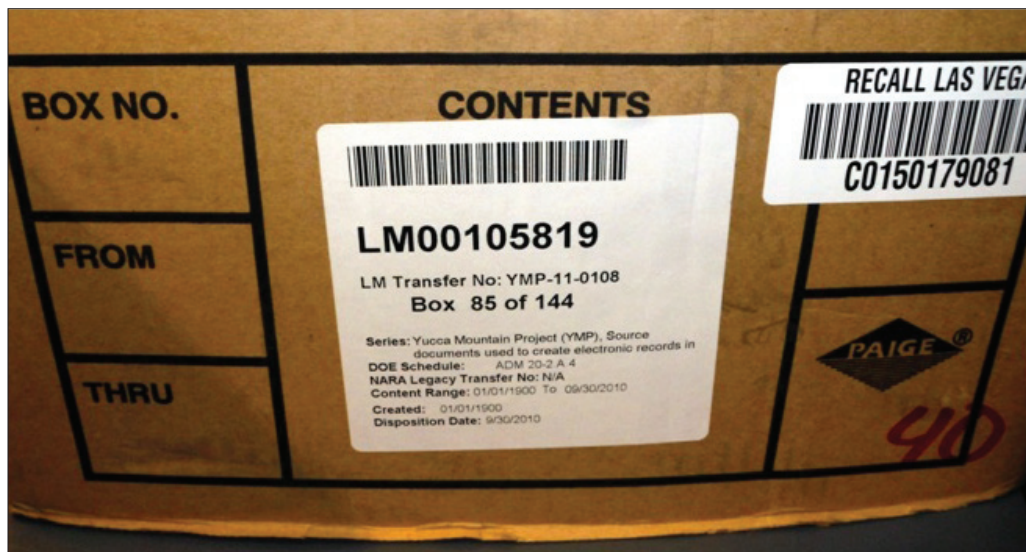


Figure A-1. Retrieved Box of YMP Documents

After opening the box, the desired physical report is located; Board staff confirm the accuracy of the search and retrieval process.



## APPENDIX 6

### RETRIEVAL OF PHYSICAL AND E-MAIL WAREHOUSE RECORDS

#### *Retrieved Boxes of YMP Physical Materials*

Board staff randomly selected three boxes from each of the categories of materials identified in the list below provided by LM. LM staff retrieved those boxes, which were opened and inspected by Board staff.

<u>“Title” Group Name</u>	<u>No. of boxes</u>
1. YMP Technical Information Library	1,444
2. Vault and Photo Materials	1,160
3. R&D Project Case Files – YM	676
4. Scanned Hardcopies	252
5. OCRWM	26
6. Shutdown Non-Record Recycle Documents	1,893
7. YMP, Source Documents	4,905

LM staff took pictures of all retrieved boxes and samples of their contents.

1. YMP Technical Information. LM staff pulled three boxes (Numbers 1, 34, and 69) from this category with barcode accession number YMP-10-0001. The boxes were correctly labeled; they contained material from the Technical Information Center Library. The box barcode labels for all three boxes indicate that this material is classified as permanent, according to DOE Schedule N1-434-YMP-1, with a disposition (preservation) date of 100 years.
2. Vault and Photo Materials. LM staff pulled three boxes from this category with barcode accession numbers YMP-10-0012 (YMP Vault – Microfilm), box 200; YMP-11-0013 (YMP Vault – One of Kind Non-Electronic Media), box 2; and YMP-11-0030 (YMP Mission Photos/Negatives), box 2. The contents of these boxes included material from the “Vault,” which was formerly under the control of the USGS. Two examples of USGS “Vault” material are shown in Figures A-2 and A-3. The box barcode labels for all three boxes indicate that this material is classified according to DOE Schedule R&D – 1 A2 and ADM 21-1 1A with a disposition date of 25 years.
3. R&D Project Case Files. LM staff pulled three boxes from this category with barcode accession numbers YMP-10-0241, box 25; YMP-11-0053, box 25; and YMP-2012-0013 (Borehole Videos), box 2. The contents indicate that this material had been managed by the USGS while the project was active. An example is shown in Figure A-4. These videotapes contain important scientific data that are not digitized and captured in the RIS. The box barcode labels for all three boxes indicate that this material was classified according to DOE Schedule R&D – 1 A2 and ADM 01-43 A1, with a disposition date of 25 years.

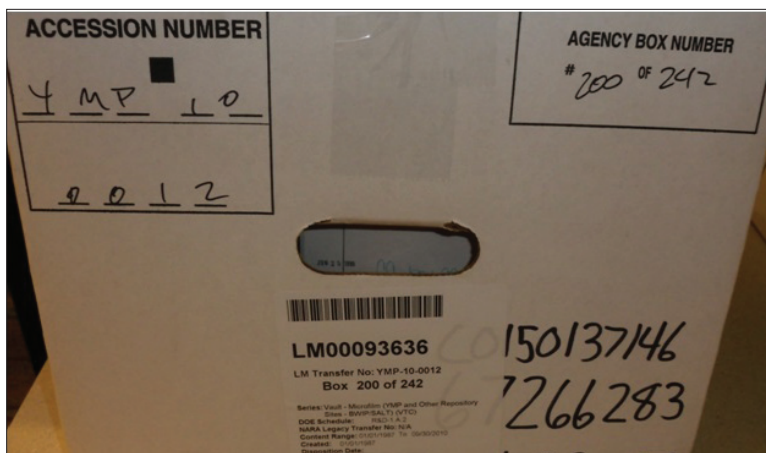


Figure A-2.  
Box YMP-10-0012 Contains  
Microfilm Media

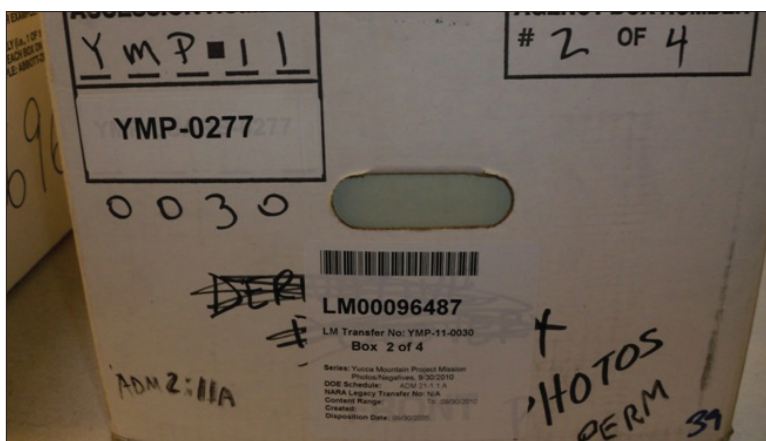


Figure A-3.  
Box YMP-11-0030 Held YM Site  
Photographs and Other Materials



Figure A-4.  
Box YMP-2012-0013  
Showing Analog  
Borehole Videotapes

4. Scanned Hard Copies of Records. LM staff pulled three boxes from this category with barcode accession numbers YMP-10-0006, box 104; YMP-11-0008, box 7; and YMP-11-0044, box 25. Their contents consisted of a variety of YMP records that were processed by the RPC and apparently scanned into the RIS. The box barcode labels for two or three boxes indicate that this material is classified according to ADM 20-2 A4, with a disposition date of zero years (since the primary records are the scanned RIS records and not these paper records).
5. OCRWM. LM staff pulled three boxes at random from this category with barcode accession number YMP-10-0014, boxes 1, 13, and 26. Each box contained a variety



of computer backup media (tapes and CD-ROMs), meaning that none of the boxes contained primary records that would not have been captured in other databases. The barcode labels for all of these boxes indicate that this material is classified according to GRS-24 4 B, with a disposition date listed for zero years.

6. Shutdown Non-Record Recycle Documents. LM staff pulled three boxes at random from this category with barcode accession numbers YMP-11-0045, box 25; YMP-11-0051, box 25; and YMP-11-0052, box 25. The title on each box was “Non-Record Recycle Documents that Fall Under a YM Shutdown/Transition Destruction Freeze.” The contents consisted of a variety of documents apparently from the shelves of former YMP workers – these were determined by OCRWM and LM staff to not be important YMP records. The barcode labels for all these boxes indicate that this material is classified according to NRM-YMP with no disposition dates listed.
7. YMP, Source documents. LM staff pulled three boxes at random from this category with barcode accession numbers YMP-11-0073, box 25; YMP-11-0111, box 25; and YMP-11-0054, box 25. The full title on each box was “YMP Source documents used to create electronic records.” The contents consisted of a variety of YMP paper documents that were submitted and processed by the RPC. The box barcode labels indicate that this material is classified according to ADM 20-2 A 4 with disposition date of zero years.

In addition to the boxes that fell into these seven categories, other boxes held material that had been placed into recycling containers at the Hillshire facility. As noted in the text, Board staff visited the Hillshire facility in September 2010 and were shown those boxes, which on inspection consisted of printed reports, correspondence and other miscellaneous content that came from the offices of YMP workers. During the LMBC visit, Board staff asked LM staff to locate three boxes of these “recycle materials.” LM staff pulled boxes with barcode accession numbers YMP-11-0051, box 101; YMP-11-0052, box 236; and YMP-11-0051, box 73. None of these boxes contained YMP records that would be important to retain; rather, they appeared to contain the same kinds of documents that had previously been seen by Board staff at the Hillshire facility.

### *E-Mail Warehouse Retrieval*

As noted in the text, Board staff originally had included 18 e-mail searches in the spot-checking exercise. LM staff indicated that carrying out these searches would require significant resources. Board staff concluded that pursuing their original plan would be too onerous. That conclusion was based in large part on LM’s experience fulfilling a congressional request to search and retrieve a number of e-mails stored in the E-Mail Warehouse.

The latter effort began on April 14, 2011, and was completed on April 27, 2011. The search and retrieve process is documented below. (Personal information has been either redacted or disguised.)

#### DOCUMENTATION OF PROGRAMMING STEPS REQUIRED TO RESPOND TO A CONGRESSIONAL REQUEST FOR E-MAILS

## **Objective**

The purpose of the exercise was to search and collect all e-mails—sent and received—that were filed in the E-Mail Warehouse by specific YMP personnel during the period from 4/15/2010 through 7/30/2010 using predefined search terms. Once located, the requested messages and attachments would be converted to three separate PDF packages.

## **Criteria**

### **Names:**

John Doe 1

Jane Doe 1

John Doe 2

John Doe 3

John Doe 4

John Doe 5

Jane Doe 2

Jane Doe 3

John Doe 6

### **Search Terms:**

1. ("withdraw" OR "withdrawal") AND ("license" OR "LA" OR "application")
2. ("shutdown" OR "shut down" OR "closeout" OR "close out" OR "terminate")
3. ("zero" AND "budget")

### **Search Time Frame:**

Starting date: April 15, 2010

Ending date: July 30, 2010

## **Software Used**

Software Client: Lotus Notes 8.5.2, Windows XP

Server: Domino 7.0.3, Windows 2003

## **Search Process**

Responding to the congressional search request involved first collecting all sent and received e-mails from all individuals listed above into one result container using scheduled

agent. The “search this view” option from the Lotus Notes client was then used to manually create the full-text index and perform the search based on the terms listed above.

## 1. Determine the User Names/Aliases

To gather all sent and received e-mails, LM staff first assembled all the names and aliases possibly used by the individuals and verified that these names existed in the Domino address books for the search date range. The list included standard Notes account names, mail addresses, short names, and alternate names. The table below contains all the possible names and aliases for the search.

John Doe 1(a)	John Doe 3(b)	John Doe 5(f)	Jane Doe 3(d)
John Doe 1(b)	John Doe 3(c)	John Doe 5(g)	Jane Doe 3(e)
John Doe 1(c)	John Doe 3(d)	Jane Doe 2(a)	Jane Doe 3(f)
John Doe 1(d)	John Doe 6(a)	Jane Doe 2(b)	Jane Doe 3(g)
John Doe 1(e)	John Doe 6(b)	Jane Doe 2(c)	Jane Doe 3(h)
John Doe 4(a)	John Doe 6(c)	Jane Doe 2(d)	Jane Doe 3(i)
John Doe 4(b)	John Doe 6(d)	Jane Doe 1(a)	John Doe 2(a)
John Doe 4(c)	John Doe 6(e)	Jane Doe 1(b)	John Doe 2(b)
John Doe 4(d)	John Doe 5(a)	Jane Doe 1(c)	John Doe 3(c)
John Doe 4(e)	John Doe 5(b)	Jane Doe 1(d)	John Doe 3(d)
John Doe 4(f)	John Doe 5(c)	Jane Doe 3(a)	John Doe 3(e)
John Doe 4(g)	John Doe 5(d)	Jane Doe 3(b)	
John Doe 3(a)	John Doe 5(e)	Jane Doe 3(c)	

## 2. Identify Data Fields

The data structure of the mail templates changed over time. For this reason it was necessary to analyze all versions of the templates used within the search date range to determine the fields that could possibly contain the individual names.

dbowner
emsfiledby
from
from1
sendto1
copyto1
blindcopyto1
principal
smtporiginator
_rpc_allrecipients

### 3. Determine Data Location

Based on the requested date range, the data to be processed would be in ERMS. These databases resided on the RPC Domino server under the “erms\2010\” folder:

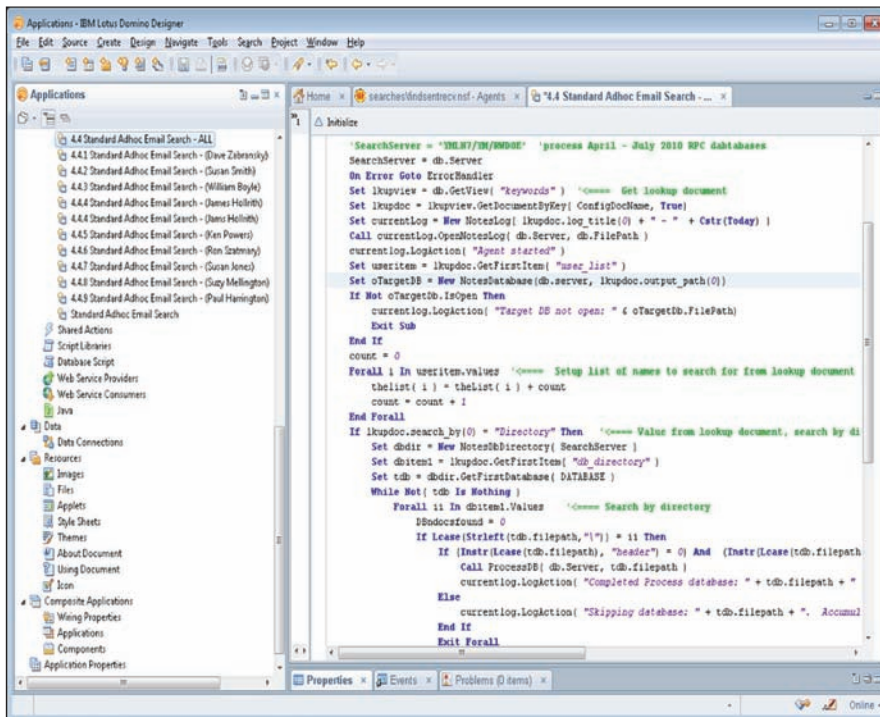
erms\2010\2010_04_rpcprivfed.nsf	erms\2010\2010_06_rpcnonrec.nsf
erms\2010\2010_05_rpcprivfed.nsf	erms\2010\2010_07_rpcnonrec.nsf
erms\2010\2010_06_rpcprivfed.nsf	erms\2010\2010_04_rpccal.nsf
erms\2010\2010_07_rpcprivfed.nsf	erms\2010\2010_05_rpccal.nsf
erms\2010\2010_04_rpcfedrec.nsf	erms\2010\2010_06_rpccal.nsf
erms\2010\2010_05_rpcfedrec.nsf	erms\2010\2010_07_rpccal.nsf
erms\2010\2010_06_rpcfedrec.nsf	erms\2010\rpclsn0410.nsf
erms\2010\2010_07_rpcfedrec.nsf	erms\2010\rpclsn0510.nsf
erms\2010\2010_04_rpcnonrec.nsf	erms\2010\rpclsn0610.nsf
erms\2010\2010_05_rpcnonrec.nsf	erms\2010\rpclsn0710.nsf

### 4. Search and Collect All the Sent and Received E-mails for these Names

A Lotus Notes application along with the configuration form and the LotusScript agent were developed for searching the sent and received messages. The information provided in the configuration form included names, data fields, search date range, server name, data source, user name list, etc. The configuration form served as a data input for the backend agent to process the RPC containers and collect results into one database.

Keyword Document:	
Keyword Name:	<input type="text"/>
Log Entry Title:	<input type="text"/>
Data Source:	<input checked="" type="radio"/> RPC <input type="radio"/> OEW <input type="radio"/> LEGACY
Search Date Range:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Fields to Search:	<input type="text"/>
Starting Output DB Number	<input type="text"/>
OutPut Path:	<input type="text"/>
OutPut Server:	<input type="text"/>
OutPut Template DB:	<input type="text"/>
OutPut Database Title:	<input type="text"/>
OutPut Template Server:	<input type="text"/>
Number of Documents Per OutPut:	<input type="text"/>
Remove ReaderFields:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Set \$KeppPrivate to 1:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Search By:	<input checked="" type="radio"/> Database Path <input type="radio"/> Directory
Databases Paths:	<input type="text"/>
Include or Exclude List of Names:	<input checked="" type="radio"/> Include <input type="radio"/> Exclude
Include User Name List:	<input type="text"/>

Copy of the form for keyword entries that the agent used to process the search.



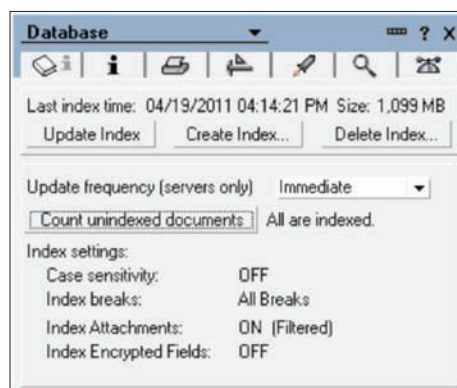
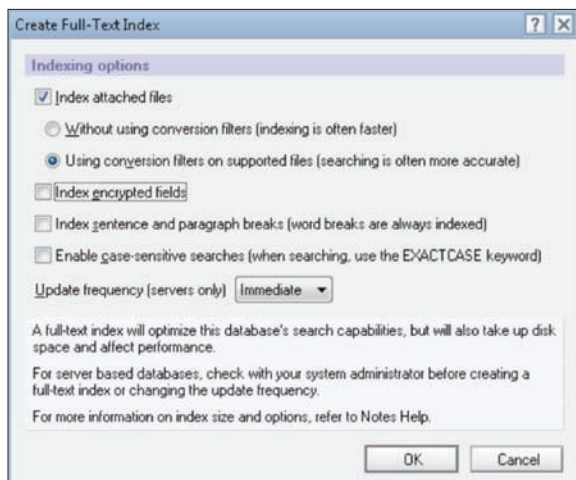
Sample part of the LotusScript schedule agent that ran on the server to search and collect requested e-mails.

## 5. Perform Search by Terms

A search using the terms on the result database was performed manually. The search process was carried out interactively rather than by backend LotusScript. Once full-text indexing was completed for the result database, a simple search could be performed at the folder level by specifying search conditions. The result from each search term was moved into a folder representing the collection of each search term. Each of these collections was then copied into a new database for de-duplication and conversion to PDF format.

### a. Indexing

To prepare the result database for the multiple words search, the database was full-text indexed with the following options selected:

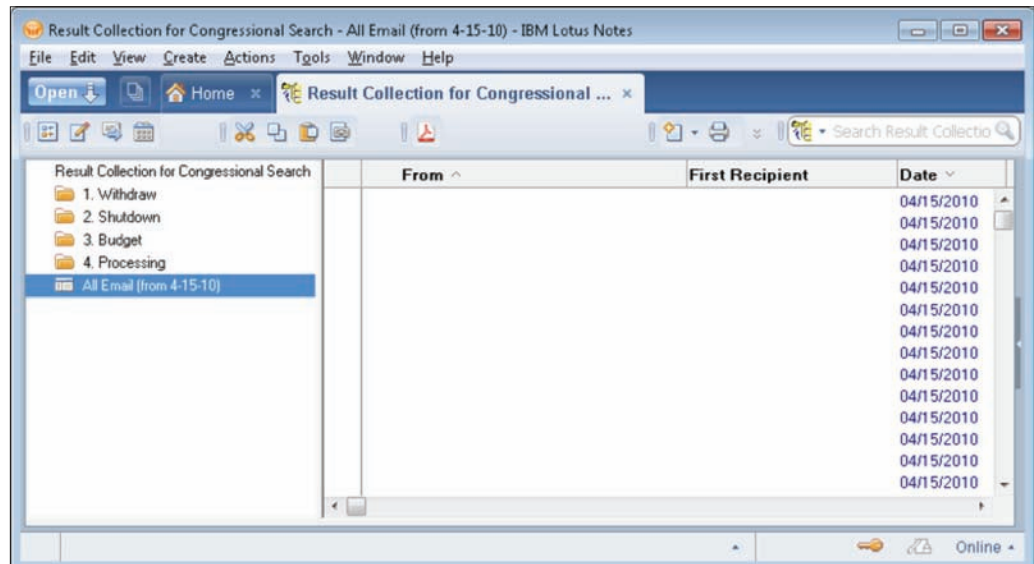


With the full-text index enabled, LM staff was able to use multiple words or phrases and obtain search results more quickly as compared to sequentially searching one document at a time.

Although file attachments appear in the body of e-mail messages, they are actually stored outside the body content. Therefore, indexing attachments is recommended to obtain more accurate search results. File attachments can be indexed using Lotus Notes' capability with the conversion filters option turned on. However, it is important to recognize that Lotus Notes might not be able to index file attachments that are executable, that contain image files, that are password protected, or that contain proprietary security settings.

b. View, folders, and search query setup

A new view called "All E-mail (from 04-15-10)" was used to display all messages from 04/15/2010 to 07/30/2010. Three folders (labeled Withdraw, Shutdown, and Budget) were created to organize the results for each search term. An additional folder called "Processing" was created to search for and move target documents to the result folder.



Options ☐ Use word variants ('cat' will also find 'cats')  
☐ Fuzzy search

Save search... Load search ▼ Max results...

An instance of one of the search query setups.

Add Condition

Condition Multiple words

Search for documents containing... any of the terms below

1. shutdown	5. terminate
2. shut down	6.
3. closeout	7.
4. close out	8.

Notes will find documents which contain the specified terms. For each term, you may enter single words or short phrases.

Add Cancel

The options “Word Variants” or “Fuzzy Search” were not used since LM was seeking e-mails that explicitly contain one of the phrases mentioned above. Search criteria can be set up at one time, saved, and then reused at a later time. This process was repeated for the other two search terms.

#### c. Search and collect process

The steps taken to search within the result database and collect target messages based on the search query setup in the previous step are listed below:

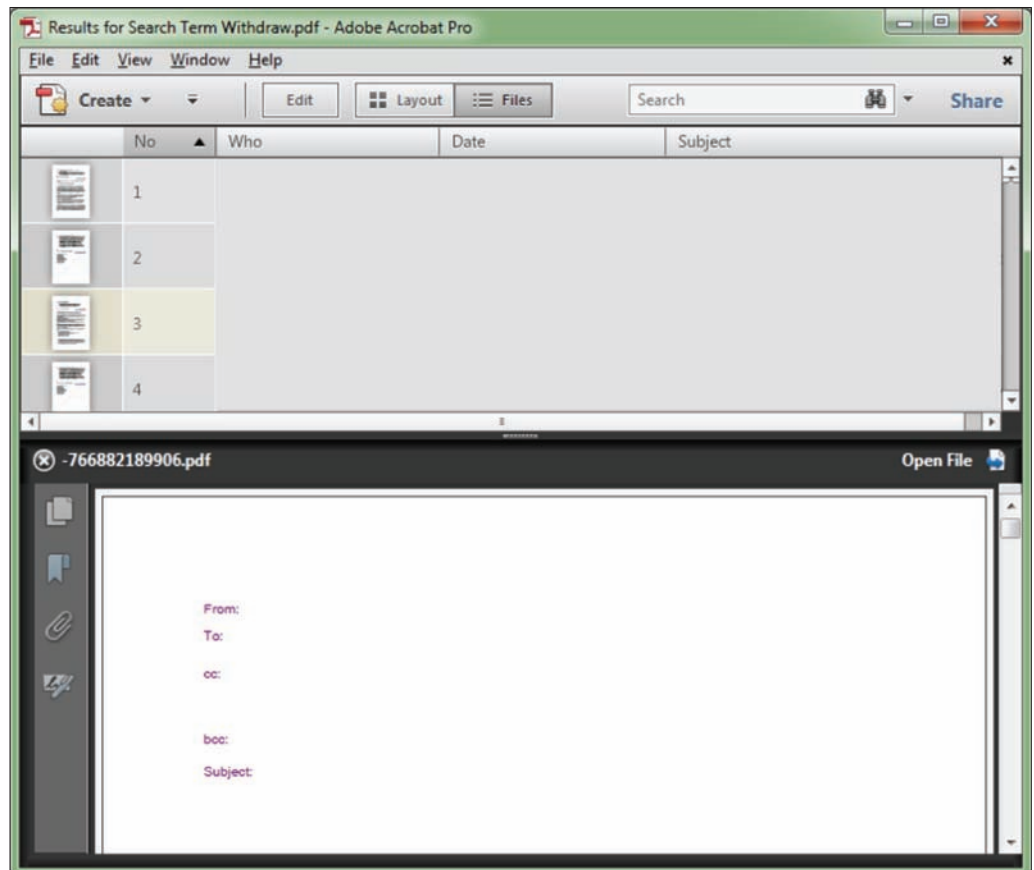
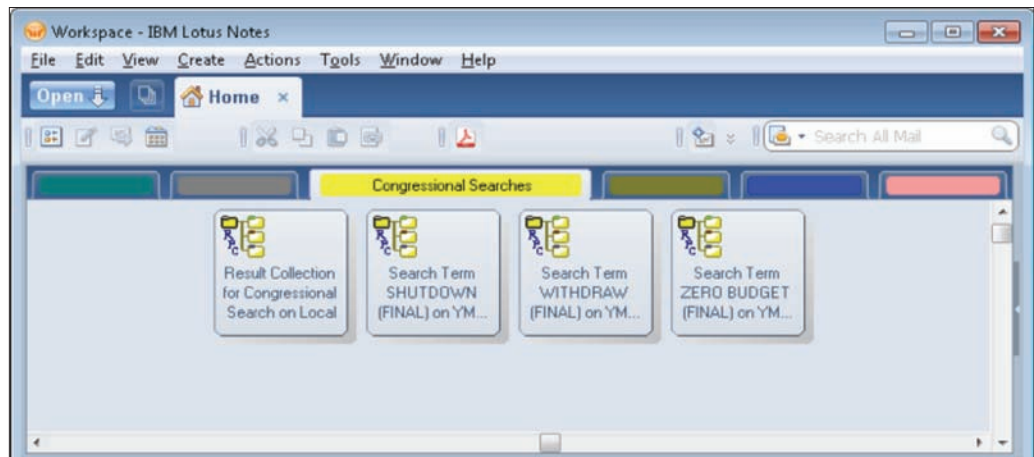
1. Moved all messages from the view “All e-mail (from 04-15-10)” to the “Processing” folder.
2. Within the “Processing” folder, performed each search query using the “Load” search command.
3. Moved the search result into the appropriate folder for each search term.
4. Refined the search by going into each of the result folders, performing the other two search queries and moving them into the appropriate folder. Example: In the Withdraw folder, we searched for the query “budget AND zero” and moved the targeted documents into the Budget folder.
5. Created three new final databases, one for each search term.
6. Results from each folder (Withdraw, Shutdown, and Budget) were copied to the final database.
7. In the final databases, a new folder was created for the de-dup process; categorized by sender, date, and document ID.



8. All messages were moved into the de-dup folder.
9. Messages in the de-dup folder were scanned for duplicates and duplicates were moved out of the folder.
10. Once the de-dup was completed, all the messages remaining in the folder were converted to PDF packages.

#### 6. Search Results

The search results were stored in three separate NSF files based on the search terms. They were then converted to three separate PDF packages. These PDF files were transferred to DOE HQ for review.



An example of a PDF package. The messages and attachments can be viewed and sorted by Who, Data, and Subject columns within the PDF package.



Below is a breakdown of the search results.

***Result Matrix***

Search Terms	Number Messages	Size
1. ("withdraw" OR "withdrawal") AND ("license" or "LA" OR "application")	648	487 MB
2. ("shutdown" OR "shut down" OR "closeout" OR "close out", OR "terminate")	1755	910 MB
3. ("zero" AND "budget")	174	288 MB
<b>Total</b>	<b>2,577</b>	<b>1,685 MB</b>





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