

**Evaluating, Migrating, and Consolidating Databases and Applications for Long-Term Surveillance and Maintenance Activities at the Rocky Flats Site**

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**ABSTRACT**

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is assuming responsibilities for long-term surveillance and maintenance (LTS&M) activities at the Rocky Flats Environmental Technology Site (RFETS) during fiscal year 2006. During the transition, LM is consolidating databases and applications that support these various functions into a few applications which will streamline future management and retrieval of data. This paper discussed the process of evaluating, migrating, and consolidating these databases and applications for LTS&M activities and provides lessons learned that will benefit future transitions.

**INTRODUCTION**

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is assuming responsibilities for long-term surveillance and maintenance (LTS&M) activities at DOE Office of Environmental Management (EM) closure sites upon completion of physical cleanup actions. LM assumed phased responsibility for the Rocky Flats Environmental Technology Site (RFETS) in early in fiscal year 2006. The LTS&M responsibilities include monitoring and maintenance of the accelerated actions to minimize risk to human health and the environment, communicating with stakeholders regarding ongoing and future activities, managing the active and legacy inactive record collections, and responding to claims and requests for information from former workers and other agencies.

The environmental cleanup at RFETS was successfully completed 10 years ahead of the original estimated schedule. Buildings and equipment were decontaminated and demolished and the site was restored to a natural setting similar to the surrounding areas. The site has been set aside as a national wildlife refuge.

The RFETS cleanup activities required the development and maintenance of a multitude of systems to manage business, personnel, engineering and construction, and environmental information. These systems were used for various purposes such as to record and report waste shipments; track employee training, exposure, and medical history; store site features such as geological, hydrologic, and ecologic; prepare engineering designs and perform construction; and store analytical results for both environmental (ground- and surface-water, air, and ecology) and

employee sample tests. Complex systems and interfaces between systems were developed and maintained to support the cleanup activities and record information on the over 40,000 people who had worked at Rocky Flats since the early 1950's. In fact, over 250 contractor and DOE information systems and databases supported the RFETS EM mission.

The LM scope at Rocky Flats is much reduced compared to the EM scope. LM responsibilities are largely specific to maintaining the accelerated actions and legacy records, and administering benefits and pensions. The challenge during transition from EM to LM was to evaluate the 250 EM information systems, identify all of the legacy data that needed to be preserved, and implement state-of-the-art enterprise systems so that the information could be consolidated and retrieved in an efficient and cost effective manner.

### **THE VISION AND THE STRATEGY**

DOE-LM will assume LTS&M activities for all DOE closure sites. Currently, there are over 40 sites in the LM program and another 30 are expected within the next 20 years. LM responsibilities are similar for all closure sites, as are the data required to accomplish the LM mission.

LM adopted a basic strategy for maintaining legacy information from multiple closure sites that included the following principles: acquire only the information needed to accomplish the LM mission; develop enterprise systems for maintenance and retrieval of information from multiple closure sites; develop web-enabled systems that are accessible from any internet-enabled location; and ensure future access to information is provided by using industry-standard software and keeping software licenses current.

LM identified three major functional areas that require enterprise information systems for LTS&M activities. LM required an enterprise system to store and provide search capabilities to support records and former worker claim processing efforts. LM also determined that a system to store historical and record current air, ground water, surface water, and meteorological monitoring results information was required. Historical and current geospatial data are also needed for LTS&M activities.

DOE-LM had previously implemented the Hummingbird RM/DM system to manage records for LTS&M sites. Hummingbird has a high degree of customization and allows the creation of data entry screens with fields tailored to the type of information being stored. The real power of the Hummingbird software, however, is the indexing and search engine used to search and retrieve "electronic records." LM recognized that this technology could be used to store "reports" of critical RFETS legacy information and provide infinite search paths to retrieve record finding aid, building contamination, and employee health and presence-on-site information.

DOE-LM has also implemented a consolidated management system to manage environmental data for all LM sites- the system is called SEEPro. SEEPro stores environmental data using an Oracle based system with a Microsoft Access front end. LM has developed standard reports and graphs in SEEPro to allow users to produce consistent-looking data output for all LM sites. As new reports or capabilities are added to SEEPro (such as meteorologic data reports or well log viewing) all LM sites benefit. Reports that are specific to an LM site can also be added to

SEEPPro, such as the report to show the amount of water that has flowed through the Rocky Flats creeks at their monitoring stations. Having one system to manage environmental data also saves much time in data loading, data maintenance, and maintaining associated data entry applications.

DOE-LM uses the Environmental Systems Research Institute (ESRI) suite of GIS applications; including ArcGIS, ArcSDE and ArcIMS. These applications are used for map preparation, management of geospatial data, and the reporting and analyzing of spatial and environmental data. ArcSDE is a spatial database engine that stores the data features and imagery (historic and present) associated with a closure site. ArcGIS generates the geographic maps for a site with environmental data overlays. ArcIMS is a method for delivering maps and displaying and reporting GIS and environmental data via the Web.

The Geospatial Environmental Mapping System (GEMS) provides dynamic mapping and environmental monitoring data display for sites under stewardship by the DOE-LM LTS&M Program. The information that is made available and the environmental data display tools developed for GEMS are based on input from various stakeholders and can be tailored to meet specific needs of each closure site.

## **MIGRATION PROCESS**

DOE began the process of transitioning RFETS from the EM office for cleanup activities to the LM office for LTS&M activities in fiscal year 2003(?). Initial meetings resulted in the creation of a “scoping check list” that identified transition tasks and established deadlines for their completion. The transition tasks were grouped by function and deadlines were typically event and regulatory driven. One of the biggest challenges encountered during the transition was to develop a strategy for the long term preservation of legacy information needed for on-going LTS&M activities. Initial scoping check list transition activities for information systems failed to identify the process and steps required to successfully identify and migrate the information that is needed to accomplish the LM mission. It wasn't until individual processes were identified and understood that are needed for the long-term mission, that specific applications and databases could be identified for migration or transfer to an LM system.

### **Application Classification**

During the initial transition meetings for RFETS, approximately 250 information systems and database applications were identified. A spreadsheet that listed all of the applications was created. The applications were given an initial classification as “Environmental” for systems supporting environmental monitoring activities or “Business” for systems supporting records management and former worker employee claims processing. Teams consisting of IT and Subject Matter Experts were established based on the two classifications. After a formal presentation of EM systems capabilities to LM personnel additional classifications were made. The first cut of applications consisted of a review of unused, outdated applications that were not currently used. They were quickly assigned the “oh, no-nevermind” category. Continued review became more complicated. –LM devised the “shadowing” concept and sent a representative to work along side the EM personnel that were performing work that would continue under LM,

such as the records management functions and responding to former worker and Freedom of Information Act (FOIA) Claims. The shadower's responsibility was to learn everything about the records management functions as performed by EM and identify the records finding information contained in of the RFETS applications. This process identified the initial cut of systems and data from those systems that would be needed by LM to perform the records management and other "business systems" scope.

**Environmental Monitoring** – Each environmental application was reviewed for its data contained therein and its unique application capabilities (in case LM needed a capability and did not currently have a system to perform it). This data review took in to account what data LM needed to perform its task. So perhaps even a database/application had been very important and large for the EM tasks at hand, LM might not even need the data (because that work was all complete, or out of the LM scope, etc.). It was also important for the team evaluating environmental data to look at data sets that were not in formal applications or databases. There were two or three very important (to ongoing monitoring) data sets that were contained in spreadsheets maintained by the subject matter expert. It was time-consuming, but important, to understand how these spreadsheets were structured, maintained, and used to produce output (and how these datasets were connected to other real applications).

### **Geospatial**

For the migration of the geospatial data, a checklist of data features had been developed to assist DOE-LM personnel. Based on the checklist, a data review was performed to develop an understanding of the RFETS geospatial data structure and content. Also, RFETS GIS personnel had the foresight to anticipate the transfer and worked to identify, consolidate and centralize their geospatial data and users. This foresight assisted DOE-LM in the transfer of the geospatial data by reducing the effort required in identify existing data features and their owners.

### **Application Disposition Process**

When the transition process began, two stakeholders were identified: LM and EM. As the transition progressed, it became evident that things were not so simple. EM, in fact, had multiple stakeholders: DOE-RFPO was responsible for regulatory completion, Kaiser Hill was responsible for contract close out, DOE-EM and former contractors had pending litigation responsibilities that all required RFETS legacy information. The transition process became infinitely more complicated as the multiple stakeholders and transition milestones were quantified. LM had identified precisely the information it would need, but the LM migration strategy would not support the on-going EM closure activities. A formal application disposition process was devised where all stakeholders were identified. An attempt was made to determine whether the information maintained by one stakeholder could be used by all other stakeholders. Unfortunately, in the end, it was decided that multiple copies of systems and data should be maintained in order to assure all stakeholders would have access to the information they required.

## **RESULTS**

The LM migration and consolidation process produced significant results. After reviewing over 250 EM applications, LM consolidated information from 13 business and records management systems into the Hummingbird RM/DM system. Five business and records management applications were inherited and modified to satisfy on-going LM requirements, and four business and records management systems were archived to respond to requests from epidemiological studies.

Additionally, LM consolidated information from 7 EM environmental monitoring databases and datasets into the SEEPro system. Also the geospatial environment (data and mapping projects) was migrated from EM's geographical information system to LM's. There were four environmental databases or systems that will continue to be used by LM in their native EM format and five environmental databases that were archived in case the need for the data arose in the future.

## LESSONS LEARNED

When DOE embarked on the massive task of evaluating, categorizing and transferring legacy data from the EM office to the LM office, no transition processes existed. Many mistakes were made resulting in "two steps forward, one step back." Lessons learned from the process include

**Hire incumbent personnel with "tribal knowledge" to continue to LM mission.** Databases and information systems contain only part of the information LM requires. Information about how the data was acquired and how to evaluate the data are invaluable and are necessary to maintain continuity to LM.

**Important data may not be in a database.** Historical information or data that is needed for the continuing LM scope may have been managed in spreadsheets or on hard-copy forms. When this is determined, a decision must be made whether to load the spreadsheets into the LM systems (loading into a database or simply storing files on LM servers), enter the data from the hard-copy forms into LM databases, or scan the hard-copy forms to be made available to LM as images. Additionally, management of data over time in spreadsheets results in variable data formats and possibly variable content. This non-uniformity causes obstacles to programmatic data conversion and obligates increased manual involvement in the conversion process. Thus, overall conversion time might be greater than expected.

**Identify the LM LTS&M activities and scope early.** Make sure everyone involved in migration activities understands the LM scope so that informed decisions can be made. Just because an information system was essential for performing EM tasks does not mean the system can or should be maintained for performing LM's very specific scope. When EM personnel begin to understand LM scope, they can assist LM to make informed decisions about the information to keep.

**Transition from EM to LM does not occur on a specific date for information systems, it is an on-going process.** One of the most difficult areas addressed was the on-going requirement by EM for systems they relied upon and felt responsible for through the contract closeout process, even though scope may have transferred to LM. Because LM did not take EM systems "as is," a method for obtaining and migrating periodic updates of EM data was developed.

Also, because LM had hired former EM contractor employees, the process of validating and training personnel to use LM systems was a continuing and evolving process.

**Group the transition scope by functional area and establish teams to accomplish the transition.** One of the most time-consuming tasks of the transition was identifying the right personnel to be included in the decision making process. Time will be wasted if the right people are not brought into the process early.

**Identify all of the stakeholders and develop a formal decision making process that all stakeholders buy into.** When the transition process was started, it was assumed that the transition of applications and databases would occur between EM and LM. Late into the transition process, EM and LM recognized that there were additional stakeholders. Other entities such as DOE-Environmental Health (EH) and DOE EM-Office of Chief Council (OCC) had requirements for the preservation of legacy data. A formal process for dispositioning information systems is needed to: identify all of the various DOE stakeholders; identify systems needed by various stakeholders during the transition; identify who would be responsible for maintaining databases and supplying updates to other stakeholders during the transition process; identify who is responsible for supplying information to all stakeholders following transition; ensure that no legacy data is deleted until all stakeholders had given permission.

**LM must assume responsibility.** LM had a vision and developed enterprise systems to accomplish the LM scope. LM also needed to assert their responsibility by developing the network infrastructure and communication tools to implement the solution. Because LM and EM personnel co-habited the EM office space during the transition, LM established a network infrastructure with access to LM tools to use while performing the LM scope.

**Travel, Travel, Travel.** The virtual office concept may work well with personnel in the same organization tasked with similar objectives, but when working with groups of personnel with disparate responsibilities, even though they may be from the "same DOE," trust must be developed and professional relationships built. LM personnel needed to meet one-on-one with EM personnel to understand their processes in order to identify the information LM required. EM personnel needed to see live demonstrations of the LM solution to be persuaded that the LM enterprise solution was valid.

## CONCLUSION

Transitioning closure sites responsibility from the two DOE entities (Environmental Management and Legacy Management) is a complicated process involving many stakeholders that have different and, sometimes, conflicting needs for legacy data. Trust must be built over time. All stakeholders must be identified early and each stakeholder's responsibilities and requirements must be clearly defined. Although the transfer of responsibility for closure sites is between DOE-EM and DOE-LM, many other federal and local government entities have a stake in the preservation of legacy information.