

MINING SURVEILLANCE AND MAINTENANCE DOLLARS

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Abstract

Accelerating site cleanup to reduce facility risks to the workers, the public and the environment during a time of declining federal budgets represents a significant technical and economic challenge to DOE Operations Offices and their respective contractors. A significant portion of a facility's recurring annual expenses are associated with routine, long-term surveillance and maintenance (S&M) activities. However, ongoing S&M activities do nothing to reduce risks and basically spend money that could be reallocated towards facility deactivation.

This paper discusses the background around DOE efforts to reduce surveillance and maintenance costs, one approach used to perform cost reviews, lessons learned from field implementation and what assistance is available to assist DOE sites in performing these evaluations.

Introduction

Surveillance and Maintenance (S&M) of facilities in the Department of Energy complex consumes a significant portion of the overall DOE budget. The management of nuclear materials, facilities and wastes requires an extensive amount of fiscal and personnel resources to maintain adequate worker, public, and environmental safety. The most effective way to reduce these S&M costs is to deactivate surplus facilities by removing all nuclear material, wastes, systems, and components thereby reducing the hazards and risks associated with those facilities. However, the accelerated deactivation of DOE facilities first requires the stabilization and consolidation of nuclear materials, treatment, storage, and disposal of waste, and is further complicated by declining budgets.

The Clinton Administration, Congress, and DOE are committed to balancing the federal budget by the year 2002. In 1997 the House Energy and Water Development Appropriations Bill identified the need to reduce current mortgages for maintaining facilities that will ultimately be closed. The bill also recommended that the Department review the possibility of reducing costs without compromising safety by redefining the minimum safety requirements commensurate with each surplus facility, and by developing a validated, requirements-based estimate of surveillance and maintenance costs.

As a result, reducing S&M and other support costs have become a key component of the DOE Environmental Management (EM) Program and its development of the 2006 Accelerated Cleanup Plan. It has been recognized that prior to facility deactivation, EM can significantly reduce S&M costs by evaluating existing activities and determining the minimum set of

activities required to protect workers, the public, and the environment, while maintaining an adequate safety envelope and compliance status.

There are several methods currently being utilized by DOE to identify resources from existing funding levels. Such methods include activity based costing, project management approaches to “level of effort” type activities, re-engineering, assets for services and the Requirements Based Surveillance and Maintenance Review Process (RBSM).

The by-products from implementing any S&M cost reduction evaluation is the identification of potential reductions in S&M activities to reallocate funding and labor resources to mission direct work which accelerates facility cleanup and ultimate site closure. For one of these processes, RBSM evaluations conducted across the complex identified a potential for approximately 40% in S&M cost savings on the average, a result not unreasonable to expect at other facilities and sites.

Implementation of these processes supports a number of the objectives and strategies addressed in the Environmental Management 2006 Accelerated Cleanup Plan. Specifically, their outcome can directly support site efforts to meet support cost reduction targets established for the sites over the next five years. By effectively reallocating resources, sites can demonstrate additional productivity and efficiency improvements addressed in the 2006 Plan. In addition, the information generated from these reviews has other potential benefits including support to site re-engineering efforts and development of databases for S&M benchmarking efforts that facilitate intra-site and inter-site integration and process improvement. Furthermore, the activity level information is useful in the development and prioritization of facility and site budgets, and the performance of cost reduction reviews to meet contract performance incentives. In addition, the RBSM process itself provides DOE and contractor management with a systematic evaluation process for comparing activities against requirements, and the identification of potential improvements in cost and schedule performance by reducing or eliminated efforts expended on non-value added activities.

The Evaluative Process

Although some S&M cost evaluation methodologies have proven effective in reducing the cost of doing business in the near term within facilities, they do not always provide a systematic approach to evaluating both cost effectiveness and regulatory compliance. In some cases these differing methodologies can be effectively used together. For example, the RBSM Review Process complements the DOE's Work Smart Standards and other traditional methods such as Activity Based Cost Accounting management practices.

Regardless of the evaluation methodology chosen, the process used to conduct S&M reviews should systematically aid managers in understanding what drives the activities being done at their facility and how those drivers impact costs and their ability to get work done. Such methodologies should address the following objectives:

- Provide a systematic review method that can be easily used for a wide range of activities.
- Categorize activities based on cost reduction opportunities through a reduction in the required work.
- Provide the information needed to prioritize and allocate resources to improve the efficiency of S&M activities.
- Identify the bases (drivers) for conducting an activity and evaluate the conformance of the activity to the driver requirements.

A basic comparison of three widely used cost saving methodologies is shown in Table I below.

Table I. Cost Saving Methodologies Currently Utilized by DOE

RBSM	Work Smart Standards	Activity Based Costing
Bottoms up, systematic review of work process	Top down review of work process and safety hazards	Bottoms up, cost accounting review of unit based activity charges
Evaluates conformance of an activity to a requirement driver	Establishes a minimum set of ES&H standards	Establishes activity costs based on direct and indirect charges
Prioritizes and allocates resources to ensure cost-effective compliance to requirements	Determines compliance to Laws, regulations, orders, standards and industry practices	Cost accounting process not related to requirements
Identifies over conservative compliance activities	Aligns site and facility processes and procedures with requirements	Attempts to control and manage activity expenses based on unit costs derived from direct and indirect expenses

The scope of any review process focuses on surveillance and maintenance activities. The following are definitions for surveillance and maintenance activities as defined in the EM budget B&R code structure:

- **Surveillance** - any activity at a site or facility that involves the scheduled periodic inspection of a site area, facility, equipment or structure as required by federal and state environmental, safety, and health laws, regulations, and DOE orders for the purpose of demonstrating compliance, identifying problem areas requiring corrective action, and for determining the facility's present environmental, radiological, and physical condition. More specifically, surveillance includes activities performed to determine the operability

of critical equipment, monitor radiological conditions, check safety-rated items, provide for site or facility security controls, and to assess facility structural integrity.

- **Maintenance** - any activity performed at a site or facility on a day to day basis that is required to sustain property in a condition suitable for the property to be used for its designated purpose and includes preventative, predictive, and corrective (repair) maintenance. (Note: While corrective maintenance activities are defined as S&M, they are not candidates for review under the RBSM Review Process. These activities are performed on an as-needed basis and are driven by the condition of facilities or equipment, not requirements that specify the periodicity of performance.)

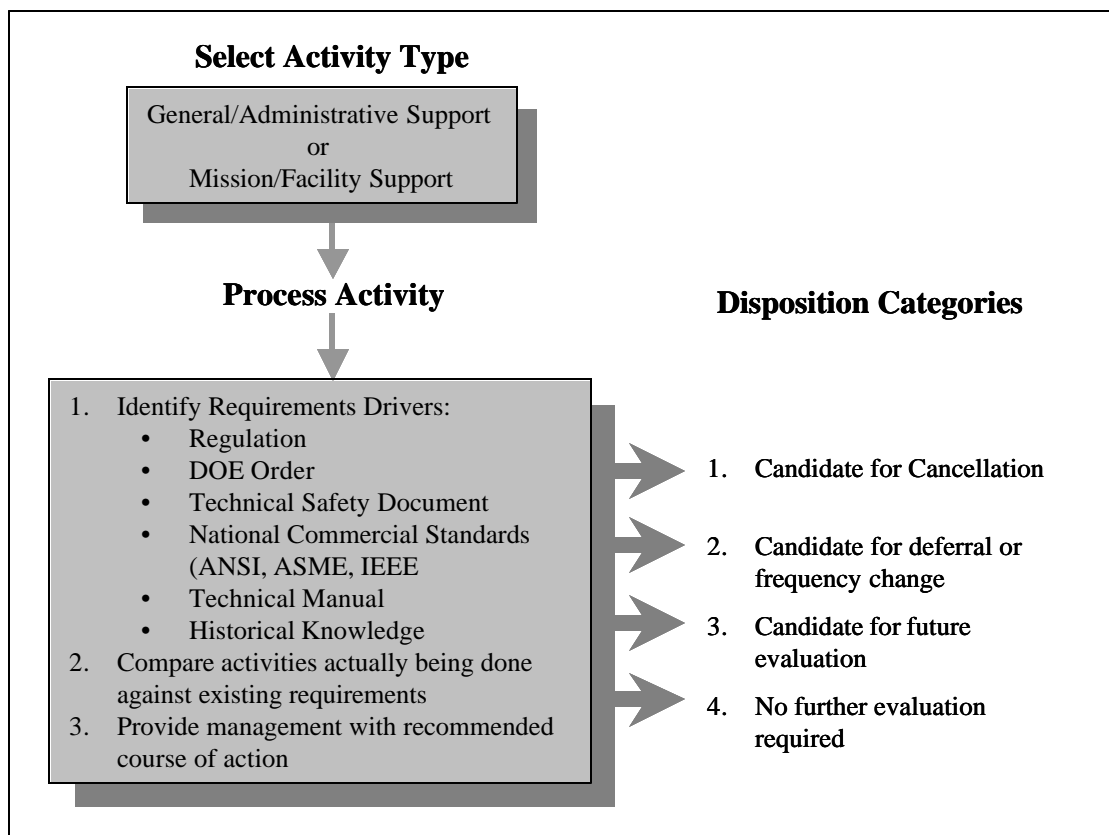


Figure 1. Basic Description of the RBSM Review Process

Taken together, these categories of activities comprise Surveillance and Maintenance (S&M). S&M is defined as an activity or set of activities at a site or facility that result in the effective management of hazards and that are necessary to obtain safe and secure conditions and to comply with applicable requirements.

As one methodology to evaluate support costs, EM developed a Requirements-Based Surveillance and Maintenance (RBSM) review and evaluation process for use by site personnel. The RBSM process, developed with improving cost and schedule performance in mind, is a tool that has been used to systematically perform a bottom up analysis of S&M and other activities. Application of the process includes gathering facility data using a series of questions to evaluate

the conduct of activities and their associated requirements. In instances where drivers for activities are non-existent or not current, or where the activity is being performed at a frequency greater than that required, the process identifies appropriate management actions that can be taken. Conversely, where it is clear that the activity has a legitimate driver and it is being performed at the appropriate frequency, the process provides validation for continued conduct of the activity.

The product from implementing an S&M requirements-based evaluation process is the identification of potential reductions in S&M activities to reallocate funding and labor resources to other mission direct work that accelerates facility cleanup and ultimate site closure. Since its inception in 1997, RBSM has been performed at 10 facilities across the DOE complex in a wide variety of functional areas/activities for an average investment cost in the range of \$50K to \$200K, based on the complexity of the area under review. These reviews have identified a combined total of approximately 160,000 man-hours of re-allocatable labor hours. Of these identified hours, approximately 38,000 (24%) have been implemented within the first year of the report, with the remainder still under management evaluation and consideration.

The balance of this report will discuss the RBSM Review Process, where it has been performed, a synopsis of its results, and how NFDI can help you perform an RBSM review at your facility.

Once an activity has been identified, the evaluator will proceed to determine the ultimate driver for that activity, i.e., the actual reason why it is being done. For the purposes of the RBSM review process, drivers at a site or facility are divided into seven categories:

1. Federal and State Regulations
2. Legal Commitments
3. Department Of Energy Orders
4. Facility Specific Technical Safety Documents
5. National Commercial Standards
6. Technical / Vendor Specifications
7. Best Engineering / Maintenance Practices.

**This hierarchy goes from the most to the least consequences
of non-compliance with the driver.**

For each driver category, the why's and how's of that activity are explored in order to fully understand the need for conducting the activity, how that need is satisfied (methodology), and the frequency for conducting the activity.

The RBSM Review Process also seeks to determine if operations or conditions have changed significantly enough such that the driver is (or may be) no longer applicable to that activity. Further analysis is then used to probe the specifics of each activity to determine such questions as whether regulatory requirements or commitments can be renegotiated, if the activity reflects

changes made to the driver since the inception of the activity, or whether the activity is being conducted more rigorously than is required.

Once the RBSM process reviews an activity, it will be grouped into one of four categories (disposition categories) to indicate a course of action for management to take.

Table II. Distinguishing Characteristics of each Disposition Category

Category Number	Category Name	Category Distinguishing Characteristic
1	Candidate for Cancellation	<ul style="list-style-type: none"> ▪ No driver can be found for activity ▪ Facility conditions have changed making activity unnecessary ▪ Current or future mission of facility makes activity unnecessary ▪ Strong criteria exists to support this recommendation
2	Candidate for Frequency Change	<ul style="list-style-type: none"> ▪ Activity was being performed more frequently than specified by driver ▪ Strong criteria exists to support this recommendation
3	Candidate for Further Evaluation	<ul style="list-style-type: none"> ▪ Limited information on actual activity driver was available ▪ Driver may not be appropriate for activity reviewed ▪ Indeterminate criteria exists to support evaluation ▪ Regulatory relief could or should be sought for activity ▪ Driver interpretation may be incorrect
4	No Further Evaluation Required	<ul style="list-style-type: none"> ▪ Activity scope and frequency was found to be valid

Together with driver(s) for the activity, the general information provided on an activity assists management in identifying S&M activities that may be modified in frequency or scope, or even eliminated, to free up funding for mission-direct work. Additionally, because the process records the time required for performing each activity, it is possible for management to identify costs associated with activities being performed. With this information, management is now able to better determine the precedence for further reviewing the activities or group of activities identified with the RBSM review process.

The outcome derived from this process is the end of the evaluation of an activity. Management must still validate the recommendation from the RBSM process and make a final decision regarding disposition of that activity. The recommendation for disposition provides a starting point for facility management to concur with and implement the results of the RBSM process.

Who has used this process so far?

The RBSM Review Process was first performed on a pilot basis at Building 771 at the Rocky Flats Environmental Technology Site (RFETS). The purpose of this pilot was to test the process methodology and provide important feedback that would be used to enhance future reviews. As a result of this pilot, the RBSM methodology was written into a review guideline and posted for complex-wide use on the EM-20 Web Site.

The following tables provide the names of facilities that have conducted an RBSM review. Also included are the major areas that the review evaluated and a blind summary of RBSM results across the complex.

Table III. Facilities Who Have Completed an RBSM Evaluation

Facility	RBSM Review Areas
RFETS – Building 771	Environmental Compliance Production Operations Radiation Protection Industrial Hygiene Fire System Services Utilities
Hanford – Building 324/327	Maintenance Training Radiation Protection Nuclear Safety Emergency Preparedness Operations
Hanford – Tank Farms	Radiation Protection
Hanford – K Basins	Radiation Protection
Hanford – Treated Effluent Disposal Facility (TEDF)	Engineering Operations
RFETS – Building 707	Maintenance Industrial Hygiene Environmental Protection Waste Management Operations Fire Protection Management Systems Safeguards and Security Nuclear Safety Training Radiation Protection
Hanford – Plutonium Finishing Plant	Maintenance Operations Engineering
Hanford – Tank Farms	Operations Radiation Protection

Table IV. Summary of DOE Facilities who have conducted an RBSM Review

(Note the key below this table for better understanding.)

Facility	Annual Activity Labor-Hrs (pre-RBSM Review)	Annual Labor-Hrs (Post-RBSM Review)	Potential Labor Hrs Saved	Percentage of Total Hours Saved	Percentage of Hrs Saved under Cancellation and Frequency Change Categories
A	34164	14516	19648	58%	45.3%
B	30971	18271	12700	41%	12.5%
C	29291	15691	13601	46%	15.2%
D	19900	14840	5087	26%	12.7%
E	69830	43755	26075	37%	16.1%
F	70440	54528	15912	23%	8.4%
G	30818	18214	12639	41%	12.4%
H	62579	31468	31111	50%	27.6%
I	38053	18236	19817	52%	27.3%
Complex Wide	386046	229519	156590	41%	19.4%

A Key to aide in the understanding of this table:

Column 1 provides a generic identification for that facility.

Column 2 delineates the number of labor-hours spent annually performing the tasks within this disposition category.

Column 3 expresses the number of labor-hours that could be spent performing the tasks within this disposition category after each recommendation for change is implemented.

Column 4 shows the number of labor-hours that could be potentially saved by implementing all of the recommendations within this disposition category.

Column 5 shows the percentage of recommended labor-hours saved per disposition category.

Column 6 highlights the percentage of these potential labor-hours saved that fall under either Category 1 (Cancellation) or Category 2 (Frequency Change). This delineation is important since recommendations made under Category 1 or 2 are considered “low hanging fruit”; in other words, these savings can be readily achieved with little effort from the affected facility (most require no more than a procedural change).

The Results of RBSM

When an RBSM review has been completed, the following results/products are achieved and documented:

1. findings from the conduct of the Requirements Based Surveillance and Maintenance (RBSM) review of your facility are documented,
2. recommendations for capturing the savings are identified and,
3. additional areas where the RBSM process could be used to identify significant savings are also identified.

The information produced as typically been shown as in Table V below.

Table V. Sample of Management Synopsis

Activity Evaluation Result Category	Number of activities evaluated	Current resources utilized in man-hours per year	Recommended resources to be utilized in man-hours per year	Potential resource savings in man-hours per year
Cancellation	48	7,228	59	7,169
Frequency Change	76	16,067	5,942	10,125
Further Evaluation Needed	53	26,773	12,996	13,777
No Further Evaluation	51	12,511	12,471	40
Total	228	62,580	31,469	31,111

In addition, other information such as the following is generated:

- General background information about the RBSM process as it applied to your facility.
- A management summary or “big picture” looks at opportunities and findings. (later sections will provide the specifics on where this is a problem and what is recommended to correct it.)
A few observations repeated throughout many facilities include:
 - **Lack of reliability-based engineering practices create over-conservative surveillance frequencies**

Without a reliability-based preventive maintenance (PM) program in place, engineering and maintenance organizations rarely review equipment or system performance to determine if PM frequencies can be extended. Equipment failure histories are seldom used to set surveillance frequencies. Also, in most cases, PM frequencies were initially

determined based on the vendor's equipment usage factors; but as missions change, equipment is seldom operated at the same rate as designed and specified.

– **Unclear roles and responsibilities impact surveillance costs and oversight**

It is often difficult to determine what group or individual “has responsibility” for a surveillance activity and as such no one maintains control. Tasks go unreviewed for years. In other cases, multiple groups think they have responsibility and often duplicate oversight efforts. This duplication is often seen between the engineering staff and the licensing staff.

– **Lack of facility integration is driving up costs**

The saying “the right hand doesn't know what the left hand is doing” can sum this up. Different organizations are often performing similar tasks without either realizing this redundancy or without evaluating how one group might actually lesson the other's workload by combining or sharing tasks.

– **Lack of worker and management acceptance of redundant computerized surveillance data**

Equipment and/or plant surveillance data is often automatically collected by computerized monitoring systems/components. However, due to a real or perceived problem with relying on computer data, workers or management often manually collect the same data.

– **Over-conservative surveillance frequencies inflate surveillance costs**

Often the justification for doing a required surveillance at twice the true frequency, is that management would rather pay these additional costs than “bear the consequences” of missing a required surveillance. Management should rely on proper conduct of operations to ensure that required work is completed on time.

The RBSM review methodology derives its recommendations through a structured “interviewer – interviewee” process. An *RBSM Evaluation Interview Form* has been developed to guide the interviewer in this process. Each evaluated activity is queried through the use of the interview form and the results of all interviews are entered into a database for analysis.

Normally the manager overseeing the RBSM evaluation will assign technically knowledgeable individuals to review the RBSM recommendations. The details provided in this report will allow this individual to understand the thought process behind the reviewer's disposition.

The results of the analysis are presented in two different formats, differing by the level of detail the reviewer requires. The first report is a spreadsheet identifying such identifying information as: name of activity, recommended disposition, and potential re-allocatable hours. The intent is to easily identify recommendations in a relatively brief format to follow. Details on how the recommended disposition was derived are presented later. The analysis of 100 activities could be efficiently shown on a seven-page spreadsheet.

And for the details, the report would also provide the reviewer with the full results from the interview, including a disposition justification section where the interviewer explains the “rationale” behind the recommended disposition for each activity. It is expected that individuals assigned to evaluate and implement the RBSM recommendations will use this report. An analysis of 100 activities typically requires 200 pages.

Although this report can be customized according to a facility’s needs, a typical report has the format shown in Figure 2 on the next page.

RBSM Lessons Learned

As a result of the RBSM evaluations conducted to date the following lessons learned have been identified:

- 1) Process requires committed management and support from facility personnel.
- 2) Process requires a team of dedicated, well trained evaluators
- 3) Best overall method to ensure the greatest results in the shortest time period requires the use of experienced, dedicated, unbiased team of individuals from outside the facility.
- 4) Implementation planning is critical to the success of the evaluation.
- 5) Process requires that the facility staff undergoing evaluation be well informed and trained.
- 6) Pre-evaluation review and analysis of site and facility data is critical to a timely, successful evaluation.
- 7) Evaluation team needs to be knowledgeable of facility management and DOE/Industry practices.
- 8) A facilitated interview process is more effective than a self-directed questionnaire process.

RBSM Evaluation Report	
Report Number: 2	
Evaluator:	Interviewee:
Evaluator Organization:	Interviewee Organization:
Evaluator Phone:	Interviewee Phone:
Facility Name:	
Activity:	
Function:	Drivers:
Other Functions:	Primary Driver:
Procedure:	Driver Required Frequency:
Directive Document:	Actual Field Performance:
	Hours of Labor per activity:
Required Personnel:	Annual Hours of Labor:
Other Personnel Affected:	Potential Re-allocable Hours:
Required/Actual Variance?	
Facility Mission:	
Brief Explanation of Facility Mission:	Outstanding Issues:
Projected Termination Milestone:	
Disposition Recommendation:	
Disposition Analysis:	
Other Efficiencies:	

Figure 2. Sample RBSM Report Form

- 9) Key to identifying synergistic savings with other support organizations requires the review of the Operations organization first.

10) Administrative activities (e.g. training, emergency management, meetings/shift briefings, etc.) should be evaluated since they consume a significant portion of an organizations time.

Assistance for RBSM through NFDI

Since the RBSM methodology is a NFDI supported tool, the RBSM methodology is posted for complex-wide use on the EM-60 web site.

In addition, assistance is available through the National Facility Deactivation Initiative (NFDI) Program.

NFDI is a partnership between the Department of Energy Field Offices and the Office of Nuclear Material and Facility Stabilization established to reduce risks and costs through accelerated facility deactivation,

NFDI can support your facility by providing an RBSM demonstration and evaluation project.

Specifically, an RBSM demonstration and evaluation project would:

- Evaluate your facility and help you determine what areas would benefit most from this process.
- Train respective facility personnel in the benefits and conduct of the RBSM process. This step has been shown to greatly enhance the review process by improving management acceptance of recommendations and reducing the perceived worker fear associated with any new “work review process”.
- Develop a schedule and cost outline for the full RBSM review process and report generation. This step will define and outline your facility’s commitment to supporting the RBSM process.
- Establish a “one point of contact” within the facility for the performance of the RBSM review process itself. This ensures that your facility representative is fully cognizant of all ongoing and planned RBSM activities before any work begins.

Contacting NFDI for Details

If you want to speak to someone to discuss RBSM in general terms as it relates to NFDI and/or your facility, please contact the following individuals:

National Facility Deactivation Initiative (NFDI)

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Conclusion

The reallocation of resources from surveillance and maintenance activities to such areas as mission support (whether related to production or deactivation/decommissioning activities) is an important element of a facility's overall goals. Budgets are not likely to increase and are most likely to undergo gradual reductions overtime, thus forcing facilities to do more with less. As discussed, there are several proven ways to evaluate support cost reductions. This paper simply focused on one of those methods, RBSM. NFDI is ready to support any methodology chosen by a facility.

The RBSM review process is a proven, systematic, bottoms-up analytical process that results in the identification of the primary driver(s) e.g., statute, DOE Order, company policy, procedure, etc. applied to the performance of a activity/task. This process identifies potential reductions in unnecessary activities thereby allowing management to re-allocate funding and labor resources to unfunded mission related work. Since its inception in 1997 it has been responsible for identifying approximately 160,000 man-hours of re-allocatable resources for other mission related activities. It is a valuable tool in the DOE arsenal for identifying resources to accelerate and support site deactivation and decommissioning activities.