

BENCHMARKING AND PERFORMANCE IMPROVEMENT AT ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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ABSTRACT

The Rocky Flats Environmental Technology Site (RFETS) has initiated a major work process improvement campaign using the tools of formalized benchmarking and streamlining. This paper provides insights into some of the process improvement activities performed at Rocky Flats from November 1995 through December 1996. It reviews the background, motivation, methodology, results, and lessons learned from this ongoing effort. The paper also presents important gains realized through process analysis and improvement including significant cost savings, productivity improvements, and an enhanced understanding of site work processes.

INTRODUCTION

Recently, considerable attention has been paid to the use of benchmarking and streamlining within the U.S. Department of Energy (DOE) and the nation's business community. In order to meet the challenge of reduced budgets and rising performance expectations, the Kaiser-Hill team at the Rocky Flats Environmental Technology Site (RFETS) has employed benchmarking as a means of examining its work processes and ultimately identifying and implementing improvements in the quality, productivity, and timeliness of products and services necessary to complete the site's mission. The results of the process improvement effort described below are being used to establish immediate and long-term performance improvement targets as well as to provide accurate estimates of future spending during site closure.

Benchmarking has been candidly defined as the practice of being humble enough to admit that someone else is better at something and being wise enough to try to learn how to match or surpass them at it. This has been a fundamental principle of the RFETS benchmarking approach, and consequently this effort has included some attributes not found in other approaches pursued across the DOE complex, namely:

- Process owners (the employees that manage and operate site processes) identified key performance measures, selected and met benchmarking partners, and developed recommendations for improving their own work processes. *External consultants did not conduct this study.*
- The process owners focused on the measurement and improvement of work activities, not on establishing a database of cost metrics. *Cost metrics often indicate where*

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ABSTRACT

The Rocky Flats Environmental Technology Site (RFETS) has initiated a major work process improvement campaign using the tools of formalized benchmarking and streamlining. This paper provides insights into some of the process improvement activities performed at Rocky Flats from November 1995 through December 1996. It reviews the background, motivation, methodology, results, and lessons learned from this ongoing effort. The paper also presents important gains realized through process analysis and improvement including significant cost savings, productivity improvements, and an enhanced understanding of site work processes.

improvements should be made, but offer little insight into why performance is lacking and specifically how it should be improved.

MOTIVATION TO BENCHMARK

Three primary drivers led to the initiation of benchmarking and process improvement efforts at the Rocky Flats site:

- *Declining Resources* - Budget reductions continue to plague site planning and hamper traditional strategies for accomplishing the site's mission. Future funding scenarios are expected to further increase the challenge of operating and dismantling the site quickly and safely using available resources. Only through analyzing existing methods of performing work and instituting changes that produce dramatic cost improvements can the challenge of reduced budgets be met.
- *High Support Costs* - DOE statistics have confirmed that the ratio of support costs to costs incurred for direct mission work requires improvement at the Rocky Flats site. Benchmarking directly meets this challenge by examining the causal factors for work inefficiencies and implementing actions for improvement.
- *ASAP Goals* - In order to meet the site's cleanup mission as described in the *Accelerated Site Action Project* (ASAP), accurate estimates of the cost of performing work must be developed (Ref. 1). These estimates must be based on verifiable performance data such as those produced through benchmarking. In addition, the competition for scarce resources within the DOE complex demands that Rocky Flats demonstrate superior cost efficiency throughout its operations in order to justify annual funding requests.

To address these three drivers, the following objectives were identified prior to initiating the Rocky Flats benchmarking effort:

- 1) to measure the efficiency and effectiveness of essential site cleanup and support processes,
- 2) to identify similar processes at other public and commercial facilities perceived as having better performance,
- 3) to perform quantitative and qualitative comparisons of key process performance measures,
- 4) to understand the causes for performance gaps,
- 5) to realize improvements in site performance consistent with the Rocky Flats ASAP,

- 6) to develop Cost Reduction Proposals (CRPs) leading to the reallocation of funds to complete currently unfunded site activities, and
- 7) to incorporate benchmarking and other performance improvement methods into the RFETS work culture.

BENCHMARKING METHODOLOGY

Benchmarking is one of many continuous improvement techniques that can be used to enhance organizational performance. Benchmarking is unique in that it employs comparative analyses with other organizations, called benchmarking partners, to generate creative solutions to process inefficiencies. A wide range of partners may be selected for a benchmarking study. It is not necessary to select partners that have identical organizational missions, only similar processes. One well-known example of utilizing benchmarking partners from different industries is the case of a shotgun shell manufacturer that sought help from a cosmetics company. Because the cosmetics company was doing an outstanding job producing lipstick cases, their manufacturing process was successfully adapted to produce high quality shotgun shell casings.

Experience gained during the past decade in both the public and private sectors has reinforced the practical value of benchmarking in environmental management activities. In January 1996, the DOE Office of Environmental Management published a benchmarking guide for use by federal and contractor personnel performing benchmarking analyses at its field sites. The *Environmental Management Benchmarking Guide* provides a flexible model for improving work processes through a series of discrete analysis activities (Ref. 2). The benchmarking model employed at Rocky Flats, depicted in Figure 1 below, was adapted directly from this guide. In some cases the benchmarking model was applied rather loosely to accommodate specific resource constraints encountered by process owners, while in others it was followed more rigorously to maximize returns on the analysis efforts.

The specific activities pursued during each step in the Rocky Flats benchmarking model are described below. Emphasis was consistently placed on the fact that benchmarking historically has been most effective when performed by the process owners themselves. To this end, the Kaiser-Hill benchmarking team served only to facilitate the process improvement activities, to maintain focus on the benchmarking objectives, and to provide status briefings to the managers and sponsors of the benchmarking initiative.

- *Identify Processes and Activities* - Twelve major process areas were selected for analysis (see Table 1). These processes were chosen to represent a wide cross section of activities which contribute substantially to the overall site mission at Rocky Flats.
- *Establish Teams* - As mentioned previously, process owners played the most important roles in this study. Approximately three to four employees from each process area participated in the benchmarking initiative. Facilitators provided the training and consultation necessary to

allow process team members to accomplish most process improvement activities without direct assistance.

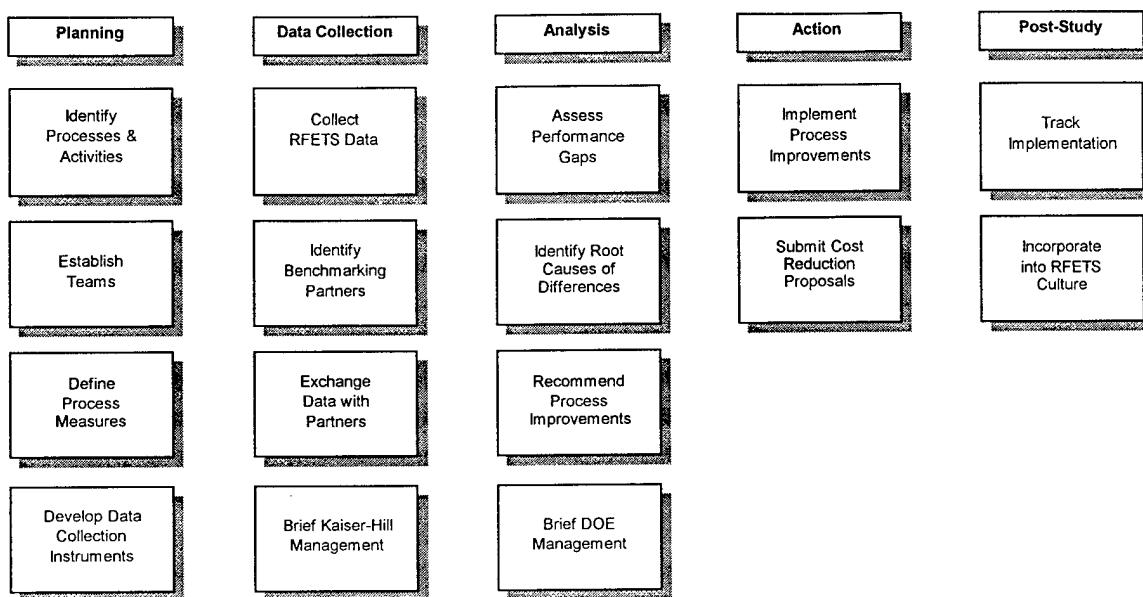


Figure 1. The Rocky Flats Benchmarking Model

- *Define Process Measures* - Process owners developed a list of quantitative performance measures by which to evaluate their work processes. In addition, the process owners characterized the nature of their operations to allow normalization of data received from benchmarking partners.
- *Develop Data Collection Instruments* - Written surveys were developed by the Rocky Flats process teams to guide conversations with their benchmarking partners and to ensure that their results could be presented in a consistent manner.

Table I. Processes Selected for Benchmarking

SITE FUNCTION	PROCESS
Cleanup	Environmental Restoration Cleanup Waste Management
Management	Environmental Restoration Overhead Procedures Training
Safety and Health	Safety Infrastructure Radiation Protection
Compliance	Environmental Compliance (Water/Air)
Safeguards and Security	Site Security
Landlord Services	Central Steam Plant Water/Wastewater Treatment

Maintenance

- *Collect RFETS Data* - One of the primary axioms of benchmarking is to know your own processes before comparing them with others. Rocky Flats process owners spent considerable time examining their own work processes and activities. In some cases, process improvements were identified based upon an internal analysis of RFETS activities.
- *Identify Benchmarking Partners* - Partners were selected based on process similarities and their willingness to share information. These partner organizations were all considered to be better performers than RFETS in their respective process areas.
- *Exchange Data with Partners* - In several cases, Rocky Flats process owners visited partner sites to exchange information and to examine work methods and practices. These off-site visits were particularly insightful in that RFETS personnel were able to witness firsthand the environment in which the partner operated. As a result of resource and time constraints, some process teams exchanged data via phone interviews and facsimile.
- *Assess Performance Gaps* - Process owners compiled and analyzed partner data to discern relevant performance gaps. Data directly reflecting discrepancies in size and/or complexity between RFETS and partner organizations were discarded if normalization was not feasible. Also, the benchmarking teams discounted differences in processes that, if implemented at Rocky Flats, would compromise worker or public safety. While the study focused on gaps where the benchmarking partners exceeded RFETS performance, process teams also noted activities where Rocky Flats exhibited superior performance.
- *Identify Root Causes of Differences* - When relevant performance gaps were identified, the process owners then evaluated the sources of these differences. In general, causes for performance differences were grouped into one of the following categories:
 - 1) configuration of site facilities and equipment,
 - 2) skill mix of site staff,
 - 3) technical bases for site operations,
 - 4) procedures, policies, and standards,
 - 5) non-competitive work environments,
 - 6) union bargaining agreements,
 - 7) training requirements, and
 - 8) stakeholder and public expectations.
- *Recommend Process Improvements* - The process owners provided preliminary recommendations for improving their processes. These recommendations were then reviewed by site management in consultation with the benchmarking facilitators.
- *Implement Process Improvements* - Upon approval from Kaiser-Hill and/or DOE management, recommended improvements were implemented by the participating process

owners and operators.

- *Submit Cost Reduction Proposals* - For process improvements directly resulting in lower site costs, Cost Reduction Proposals were developed per Clause H.6 of the Kaiser-Hill integrated management contract with DOE (Ref. 3). This clause specifies award fees proportional to the achieved cost savings for the Kaiser-Hill contracting team and their employees.

Following completion of these activities, the benchmarking facilitators continued to track the implementation of process improvements to ensure lasting change and to recalibrate process performance for future analyses. Benchmarking activities at Rocky Flats are currently ongoing in an effort to incorporate continuous process improvement into the site organizational culture.

RESULTS

Quantitative results for each of the twelve process analyses were presented in the Phase I Report prepared by the Kaiser-Hill benchmarking project team (Ref. 4). Below is a summary of the root causes for performance gaps identified by the process owners in each area.

Environmental Restoration Cleanup: The primary causes for performance gaps in environmental restoration cleanup were 1) skill mix of site staff, 2) procedures, policies, and standards, and 3) a non-competitive work environment. To improve performance at Rocky Flats, the process team recommended staffing and work assignment changes, adoption of industry standards, and reduction of regulatory requirements.

Waste Management: The primary causes for performance gaps in waste management operations were 1) the configuration of site facilities and equipment, 2) technical bases for site operations, and 3) procedures, policies, and standards. To improve performance at Rocky Flats, the process team recommended streamlined sampling and analysis processes, reductions in staffing levels, and revised permitting and waste consolidation practices.

Environmental Restoration Overhead: The primary causes for performance gaps in environmental restoration overhead costs were 1) the configuration of site facilities and equipment, 2) technical bases for site operations, 3) procedures, policies, and standards, 4) a non-competitive work environment, and 5) training requirements. To improve performance at Rocky Flats, the process team recommended staffing changes, closer monitoring of equipment and travel, and reductions in training requirements.

Procedures: The primary cause for performance gaps in procedures was the unclear technical basis for procedure development and implementation at Rocky Flats. The process team recommended further analysis of this process by Kaiser-Hill management.

Training: The primary causes for performance gaps in training were 1) procedures, policies, and standards, 2) a non-competitive work environment, and 3) training requirements. To

improve performance at Rocky Flats, the process team recommended streamlining and outsourcing site training duties.

Safety Infrastructure: The primary causes for performance gaps in the site safety infrastructure were 1) skill mix of site staff, 2) technical bases for site operations, and 3) the union bargaining agreement. To improve performance at Rocky Flats, the process team recommended site visits to partner organizations to further explore more effective safety processes and programs.

Radiation Protection: The primary causes for performance gaps in radiation protection activities were 1) the configuration of site facilities and equipment, 2) technical bases for site operations, and 3) procedures, policies, and standards. It should be noted that Rocky Flats exhibited significantly superior performance in the frequency of contamination incidents. To further improve performance at Rocky Flats, the process team recommended standardization and streamlining of procedures and requirements, and reduction in step-off pad staffing.

Environmental Compliance: The primary causes for performance gaps in compliance measures were 1) the configuration of site facilities and equipment, 2) skill mix of site staff, 3) technical bases for site operations, 4) procedures, policies, and standards, and 5) stakeholder and public expectations. To improve performance at Rocky Flats, the process team recommended reductions in the number and complexity of source assessments, a request for regulatory relief from the frequency of agency inspections, and streamlined compliance reporting procedures.

Site Security: The primary cause for performance gaps in site security was the configuration and type of site facilities and equipment. To improve performance at Rocky Flats, the process team recommended reduced training requirements and additional management review of security procedures and clearances, maintenance of classified information, and staffing of security posts.

Central Steam Plan: The primary causes for performance gaps in the operation of the site steam plant were 1) the union bargaining agreement and 2) training requirements. A significantly lower fuel cost for RFETS was the basis for superior overall cost performance. To further improve performance at Rocky Flats, the process team recommended modified training requirements and renegotiation of the collective bargaining agreement to allow plant operators to perform routine facility maintenance.

Water/Wastewater Treatment: This analysis demonstrated that the water treatment facility at Rocky Flats operates in a cost effective manner relative to the benchmarking partner. The primary causes for performance gaps in site wastewater treatment activities were 1) skill mix of site staff, 2) technical bases of site operations, and 3) procedures, policies, and standards. To improve performance at the Rocky Flats wastewater treatment facility, the process team recommended a review of current staffing requirements.

Maintenance: This analysis demonstrated that site maintenance is currently performed in a cost effective manner relative to one of the benchmarking partners. The primary causes for the performance gaps found between RFETS and a second partner organization, a commercial nuclear utility, were 1) the configuration of site facilities and equipment, 2) technical bases for

site operations, and 3) procedures, policies, and standards. To further improve performance at Rocky Flats, the process team recommended a site visit to the commercial facility.

Team members from the twelve process areas experienced various degrees of success in terms of implementing process improvements based on their data collection and analysis efforts. Three process teams—training, radiation protection, and procedures—ultimately submitted Cost Reduction Proposals totaling \$1.1 million as a result of the benchmarking initiative. To date, the training CRP (valued at nearly \$350,000) has been approved by DOE. The other two CRPs developed during this benchmarking effort are still awaiting final evaluation. It should be noted that all the process teams achieved positive results through benchmarking, ranging from a more comprehensive understanding of existing work processes to insight gained from partner processes which eventually will lead to long-term productivity improvements at Rocky Flats. As a direct consequence of these gains, Kaiser-Hill has renewed its commitment to pursue benchmarking and other process improvement strategies in 1997 and beyond.

CONCLUSIONS

Several benchmarking teams cited similar causes for their performance deficiencies. Among the most prevalent of these factors were the following:

- *Technical Bases for Site Operations* - It is clear from these findings that many of the functions performed at Rocky Flats were initially developed to support the site in its capacity as a production facility. Some of these functions may no longer be appropriate during site closure and should be reevaluated in light of the identified performance differentials.
- *Procedures, Policies, and Standards* - Several of the benchmarking teams identified site controls as a key factor in the costs of their processes. This suggests that it is within the authority of Kaiser-Hill management to affect significant cost reductions by streamlining process controls and organizational protocols. In addition, more proactive engagement with state and federal regulators, labor unions, and stakeholders could result in less prescriptive process standards and hence less restrictive and more cost effective work environments.
- *Configuration of Site Facilities and Equipment* - This performance inhibiting factor is, for the most part, a fact of life at Rocky Flats. As the site pursues a closure strategy during execution of its Accelerated Site Action Project, however, the potential will exist to minimize further impacts of this performance factor.

LESSONS LEARNED

Several interesting observations were made during the course of this year-long benchmarking initiative. The benchmarking project sponsors initially were uncertain of the level of participation and success this effort would generate at Rocky Flats, but to varying degrees each

process team was able to achieve a positive outcome as a result of its endeavors. Some of the more useful lessons learned from the benchmarking analyses are discussed below.

- *Benchmarking Training* - Based on their experience with other process improvement efforts, the benchmarking project sponsors believe this effort achieved greater success than most because participants received formal benchmarking training upon commencement of the project. Training workshops were provided by professional management consultants utilizing highly interactive discussions and participatory case study exercises to instruct process owners on the fundamentals of benchmarking including brainstorming, flow charting, developing performance measures, collecting process data, measuring quantitative and qualitative performance gaps, and implementing process improvements. The workshops also featured moderated discussions of benchmarking ethics and successful change implementation.
- *Organizational Self Assessment* - Several process teams encountered difficulties clearly defining their existing processes and identifying useful performance metrics. In such cases, team members first had to engage in some level of organizational self assessment. These assessments required process team members to 1) evaluate the resources applied to various work processes in their organization, 2) quantify the time and cost required to complete various activities within a process, and 3) identify candidate processes for the benchmarking project having substantial resource requirements and/or significant impacts on overall site performance. It is suggested that such activity-based diagnostics be applied to all processes being considered for future benchmarking analyses.
- *Performance Metrics and Benchmarking* - In view of the limited time available for process team members to perform benchmarking activities in addition to their routine work duties, benchmarking in the classic sense was not fully achieved for all the selected processes. Instead, a comprehensive set of performance metrics was developed in preparation for further investigation into the drivers of process performance and the sources of performance deficiencies. These investigations are ongoing for several site work processes.

FUTURE EFFORTS AT ROCKY FLATS

The Kaiser-Hill team will continue to employ benchmarking, streamlining, and reengineering techniques in pursuit of further improvements in process efficiency and effectiveness at the Rocky Flats Environmental Technology Site. The ultimate goal of these efforts will be the development of Cost Reduction Proposals leading to the reallocation of funds to complete currently unfunded site activities, thereby hastening site closure.

Currently, process owners have begun analysis of several functions within the Environmental Restoration/Waste Management & Integration organization at Rocky Flats. To date they have initiated efforts to generate CRPs for activities relating to 1) wastewater treatment, 2) building maintenance, and 3) groundwater monitoring . In addition, Kaiser-Hill has proposed a

streamlining analysis of the current site budgeting process in advance of the FY1998 budget call. This analysis would include an objective evaluation of current practices and protocols, incorporation of lessons learned from the FY1996 and FY1997 budget calls, and comparative assessments of other DOE sites and/or private-sector business enterprises, as appropriate. Other site organizations currently being considered as candidates for process improvement include Human Resources and Finance and Administration.

Finally, as a result of this benchmarking effort, Kaiser-Hill management intends to institutionalize the process improvement philosophy within the organizational culture at Rocky Flats. This likely will require annual training seminars utilizing progressive knowledge transfer and organizational learning techniques, modification of annual work package approval requirements to include provisions for process improvement activities aimed at developing CRPs, and the adoption of annual performance reviews for work package managers to evaluate the impacts of process improvements. By incorporating these measures into their integrated management strategy, the Kaiser-Hill team is poised to accomplish their accelerated site closure goals while maintaining the highest standards of productivity, efficiency, and safety.

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