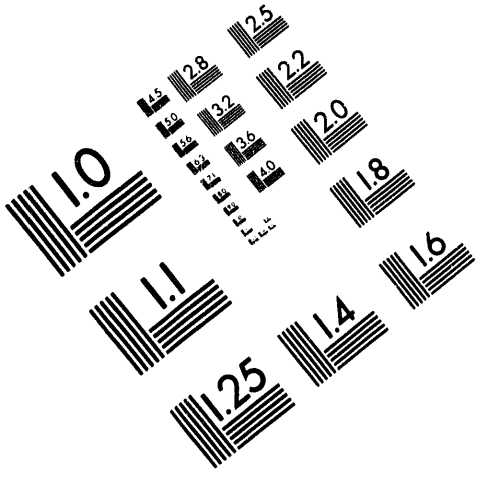

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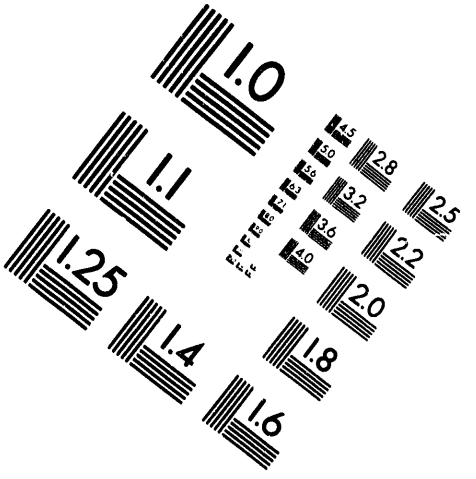

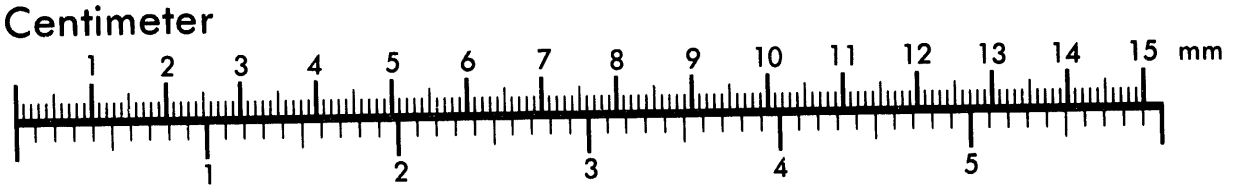

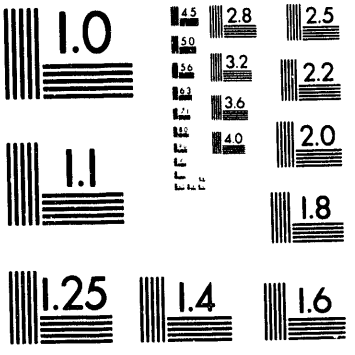

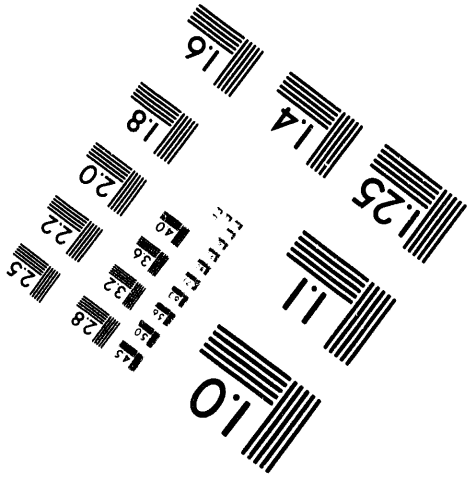

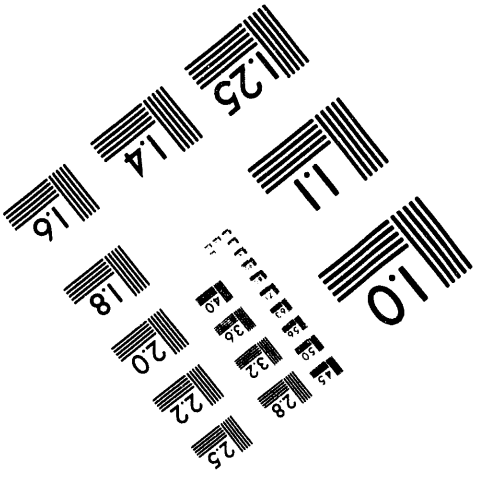

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Poliution Prevention Tools:
Applying Benchmarking to Waste Minimization

by Victoria Levin,
Environmentally Conscious Life Cycle Systems Department,
Sandia National Laboratories

ABSTRACT

Finding innovative ways to reduce waste streams generated at Department of Energy (DOE) sites by 50% by the year 2000 is a challenge for DOE's waste minimization efforts. The Benchmarking for Waste Minimization project examines the usefulness of benchmarking as a waste minimization tool, specifically for infrastructure-related, common waste streams at DOE organizations. A team of process experts and benchmarking consultants from a variety of DOE sites used a 12-step benchmarking process to examine the liquid photographic waste stream and identify best-in-class industry partners for an information exchange. The site visits yielded strategies for source reduction, recycle/recovery of components, regeneration/reuse of solutions, treatment of residuals, as well as best management practices.

Introduction

Finding innovative ways to reduce waste streams generated at Department of Energy (DOE) sites by 50% by the year 2000 is a challenge for DOE's waste minimization efforts. The Benchmarking for Waste Minimization project is being conducted to gain new information on waste minimization techniques and technologies within the DOE by using the quality tool of benchmarking. Benchmarking encourages participants to perform a self-examination, improve internal processes, and then look outside of the organization to find the best practices available in industry or government. Thus, DOE will learn the best methods for waste minimization from "best-in-class" partners.

This labor-intensive team effort drew on the expertise of process experts, benchmarking consultants, and facilitators from DOE organizations across the country. Management and funding support was provided by the DOE Waste Minimization Division (EM-352).

This work was supported by the United States of Energy under Contract DE-AC04-94AL8500.

Background

DOE has four main waste-generating activities: mission-related, waste management, environmental remediation, and infrastructure-related. (See Figure 1.) Infrastructure-related activities (shown in Figure 1) are the DOE's "landlord" activities such as operating the motor pool, the cafeteria, or the offices; operating shops such as photography, plating, or machining; construction projects; and ES&H activities. Infrastructure-related activities were chosen because they have not yet received the same DOE-wide attention that the other three waste-generating activities have received. These activities produce DOE-wide waste streams that are also produced in outside industry. Therefore, they are ideal activities for benchmarking because appropriate industry partners should be easy to identify and locate. Common waste streams originating from infrastructure-related activities, including both hazardous and nonhazardous wastes, will be studied over the course of this project.

Benchmarking Concepts

Benchmarking is a commonly used quality tool that can help an organization achieve significant improvements to its internal processes. Benchmarking is defined as the continuous process of improving products, services, and practices by identifying and understanding customer requirements and process performance; exchanging information with recognized leaders in the field; implementing meaningful improvement; and recalibrating the process by assessing the progress and monitoring the trends and results.

Some key objectives of benchmarking are to assess your existing process, to measure your process objectively, to find others with similar processes that are better, to share information, and to find out what makes their processes better. Benchmarking is more than just comparative analysis or copying strategies. It is a matter of understanding those practices that make organizations the best-in-class and then adapting those practices for use in your own organization.

Steps to Perform Benchmarking

Each organization that uses benchmarking develops its own specific steps to accomplish the same basic goals. The benchmarking methodology used in this project was adapted from a methodology used by Sandia National Laboratories and is based on the following 12 steps:

1. Identify the process to be benchmarked
2. Establish management commitment
3. Identify and establish a benchmarking team
4. Define and understand the process to be benchmarked
5. Identify and define metrics
6. Evaluate current performance
7. Identify potential benchmarking partners
8. Collect process data from potential partners
9. Analyze potential partners' data and choose partners
10. Conduct site visits
11. Communicate results
12. Continue to conduct benchmarking of process.

Project Overview

The first waste stream to be examined using the benchmarking process was liquid photographic waste. It served as a prototype and an example of how benchmarking could be beneficial to the DOE's waste minimization efforts.

During a series of workshops, the team defined a consensus administrative process for liquid photographic waste; created a process flow chart; identified metrics, customers, suppliers, inputs, and outputs; identified criteria to help choose industry partners that were willing to share process information; developed telephone and written questionnaires; learned on-site interviewing techniques; and developed interview questions. The team performed site visits at Eastman Kodak, Co. and Johnson Space Center/National Aeronautical and Space Administration.

Project Results

The report *Using Benchmarking to Minimize Common DOE Waste Streams,* Volume 1, describes the methodology and how it was applied to the liquid photographic waste stream. The report also provides the results of the benchmarking effort. The results fell into two categories: strategies and best management practices (BMPs).

Source reduction strategies include:

- using correct chemicals,
- using squeegees to minimize chemical carry-over between baths,
- determining the most advantageous replenishment rates,

- using floating lids on chemical containers to reduce evaporation, oxidation, and contamination, and
- using plumbingless minilabs.

Recycling and recovery strategies include:

- chemical replacement cartridges,
- electrolytic recovery,
- precipitation,
- reverse osmosis,
- ion exchange, and
- minimizing evaporation.

The third strategy involved:

- regeneration or reuse of bleaches, fixing baths, wash waters, developers and stabilizers, and stop baths.

The BMPs focused on system design, water control, and processing and monitoring considerations, including:

- Sizing equipment and capacities to meet actual needs,
- Working closely with vendors to ensure proper use/application of products,
- Having up-to-date and clearly written procedures available,
- Installing sticky pads at the entrance to lab facilities to reduce dust,
- Trimming the number of processes and equipment in the laboratory,
- Calibrating the flow meters annually,
- Using wash water savers, and
- Controlling inventories of processing chemicals.

The above best management practices (BMPs) in essence fit into the following general BMP categories: good housekeeping, accurate record keeping, good system design, and effective monitoring. BMPs provide a tool for waste minimization of most infrastructure-related waste streams because they encourage the process users to continually ask themselves, "How can we improve the process?" and do not rely only on past methods.

An unanticipated result from this benchmarking pilot project was discovering the value of networking within the DOE complex. All the process experts valued the opportunity

to share ideas and information, hear about the process at each of the sites, and contrast and compare methods. Coping with environmental regulations, discovering new ideas, and meeting peers at similar DOE sites were top benefits cited by the participants.

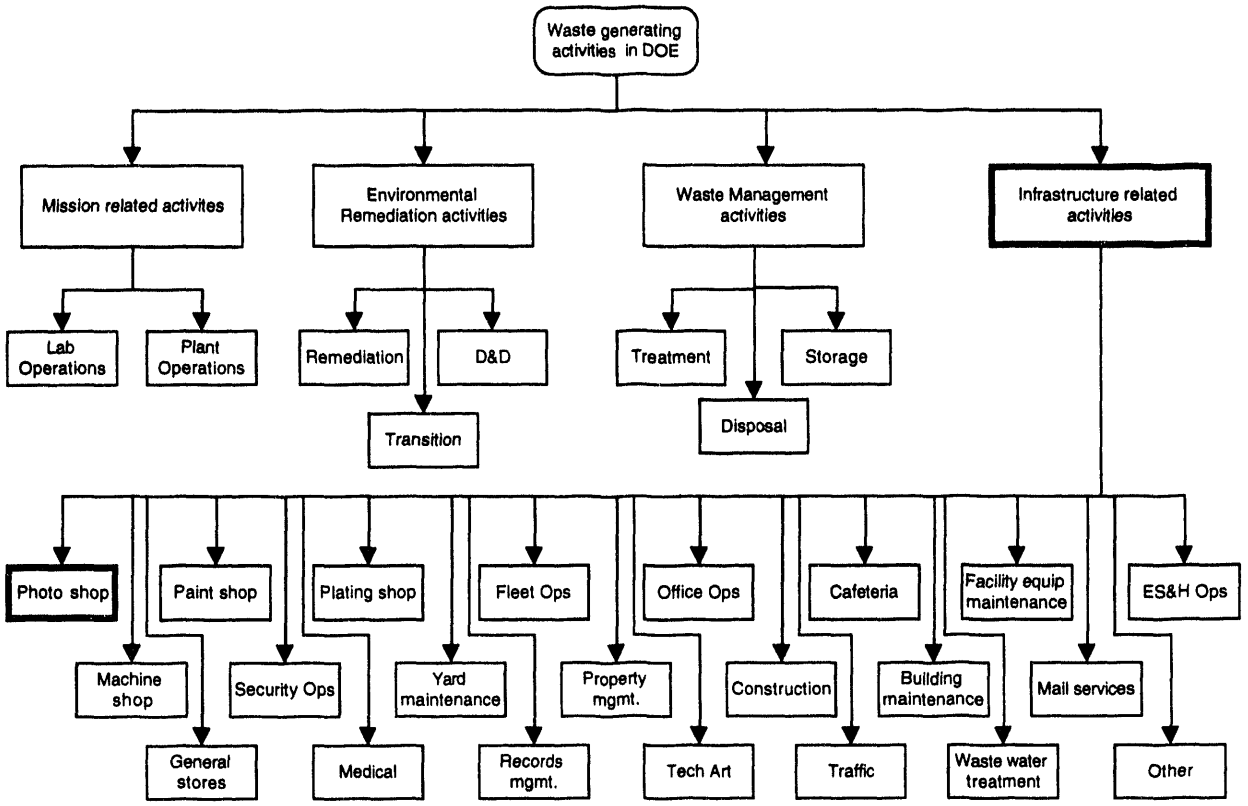
Continuing Efforts

A second team examined waste motor oil. During the search for an industry partner, the team could not find a company that fit the profile of the DOE-related processes that was doing a better job of waste motor oil minimization. The team visited two DOE sites that had strong waste minimization efforts and compiled best management practices. The team findings will be issued in Volume 2 of the benchmarking report series to be issued in the summer of 1994.

The next step in the Benchmarking for Waste Minimization project is to benchmark machine shop waste, plating shop waste, construction debris, and miscellaneous office waste later in fiscal year 1994. Benchmarking of other important infrastructure-related waste streams are planned in subsequent fiscal years.

For more information about the project or the benchmarking report, contact Victoria Levin at (505) 844-8956.

Figure 1. DOE Waste-Generating Activities


Waste generating activities in DOE
Mission related activites
Environmental Remediation activities
Waste Management activities
Infrastructure related activities
Lab Operations
Plant Operations
Remediation
D&D
Transition
Treatment
Storage
Disposal
Photo shop
Paint shop
Plating shop
Fleet Ops
Office Ops
Cafeteria
Facility equip maintenance
ES&H Ops
Machine shop
Security Ops
Yard maintenance
Property mgmt.
Construction
Building maintenance
Mail services
General stores
Medical
Records mgmt.
Tech Art
Traffic
Waste water treatment
Other

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