



# **Benchmarking to Improve Lab Operations**

Taking it to the Next Level

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# Presentation Overview

- Overview of Benchmarking
- Review of a Multi-Agency Utility Lab Benchmarking Study
  - Study Goals
  - Methodology
  - What we learned **FROM** the process
  - What we learned **ABOUT** the process
- Recommendations and Things to Consider

# What is a Benchmark?

A standard against which something can be measured. A survey mark of previously determined position used as a reference point.

– *Dictionary definition in Camp, Benchmarking (1989)*

# **What is Benchmarking?**

**Benchmarking is a systematic process to discover and incorporate best practices into your operations**

**Or...**

**Benchmarking is the practice of being humble enough to admit that someone else is better at something and wise enough to try and learn how to match and even surpass them at it.**

***–American Productivity & Quality Center***

# **Two Kinds of Benchmarking**

- **Process Benchmarking**
  - Methods or practices
  - How work gets done
- **Performance Benchmarking**
  - Metrics
  - Measure of the results achieved by the work practice

# **The Chicken & the Egg**

- **Metrics measure the gap**
- **Best practices identify ways to close the gap**
- **The tendency is to begin with performance benchmarking (metrics)**
- **Robert Camp suggests beginning with process benchmarking (industry best practices)**

# **Benchmarking is...**

- **A journey**
- **An ongoing process of discovery, learning, and change**
- **An objective decision making tool**
- **A winning business strategy**
- **A new way of doing business**

# **Benchmarking is not...**

- **Industrial tourism**
- **A way to identify budget cuts**
- **A cookbook**
- **A fad**
- **A quick fix**



**Lessons Learned  
from a Multi-Agency  
Laboratory  
Benchmarking Study**

# **Participating Agencies**

- **Central Contra Costa Sanitary District**
- **East Bay Municipal Utility District**
- **King County Department of Natural Resources**
- **City of Los Angeles**
- **Massachusetts Water Resources Authority**
- **Orange County Sanitation District**
- **Portland Bureau of Environmental Services**
- **Sacramento Regional County Sanitation District**
- **City of San Jose**

# **Study Goals**


- **Improve functional laboratory operation**
- **Minimize costs and maximize efficiencies**
- **Develop a model to compare costs for individual analyses**
- **Develop a model to compare changes from year to year**

## **Study Goals (cont.)**

- **Identify best practices of the individual labs**
- **Identify laboratory costs associated with the various stages of the wastewater treatment process**

# **Benchmarking Process**

- **Met approximately 4 times a year for 3 years**
- **Meetings lasted 1 to 2 days**
- **Met at least once at each lab and toured the facility**
- **One participant took the lead for managing spreadsheets, another took the lead for writing**
- **Everyone worked on data collection assignments between meetings**



**Methodology and  
Findings:  
Process  
Benchmarking**

# Methodology

- **Process benchmarking survey**
  - ▣ **Workload Management**
  - ▣ **Customer Service**
  - ▣ **Employee Development and Morale**
  - ▣ **Staffing Strategies**
- **Tables comparing staffing, salaries, benefits, workload and lab organization**

# **Workload Management Best Practices**

- **Optimize batch size to best utilize laboratory capacity**
- **Implement a project management approach**
- **Maximize the use of automation**
- **Implement more productive methods that reduce operational costs**

# **Workload Management (cont.)**

- **Miniaturize analyses and implement waste minimization**
- **Contract work that is not cost-effective to do in-house**
- **Hold annual customer meetings to evaluate programs based on data quality objectives (ensure work is value-added)**

# **Customer Service Best Practices**

- **Establish customer advisory committees**
- **Work with customers and regulatory agencies to eliminate redundancies**
- **Invite customers to spend time in the lab**

## **Customer Service (cont.)**

- **Develop invoicing systems (provide cost accountability for clients)**
- **Survey customers and hold focus groups with customers**

# **Employee Development and Morale Best Practices**

- Professional development opportunities
- Continuous improvement training
- Annual staff surveys
- Career ladders and career progression systems

# **Staffing Strategies Best Practices**

- **Cross-trained interdisciplinary teams with flexibility to move staff as workload fluctuates**
- **Focus analytical staff time on lab work**
  - **Use non-technical staff to perform support functions**
  - **Consolidate all non-analytical functions into a support group (QA, project and sample management, etc.)**



**Methodology and  
Findings:  
Performance  
Benchmarking**

# **Methodology**

- **Laboratory cost per mgd of treated wastewater**
- **Budget and cost-per-test data (most difficult part of the process)**
- **Productivity metric (useful for best practice discussion)**

# **Steps to Develop a Cost-per-Test Model**

- **Define what constitutes a test**
- **Develop apples to apples budgets**
- **Decide how to handle overhead costs**
- **Calculate actual cost for each analysis**
- **Calculate 'reconciled' cost for each analysis**

# **What is a Test?**

- **Agreed to define tests by method**
- **Exception was metals and ion chromatography, which were defined by element**

# **Apples to Apples Budgets**

- **What activities should be included in the cost model budget**
  - ▣ **Field sampling costs**
  - ▣ **Equipment depreciation costs**
  - ▣ **Support services (IS, admin, building maintenance, etc.)**

# How to Handle Overhead

- **Indirect**

- ▣ **Management**

- ▣ **LIMS and QA Support**

- **Direct**

- ▣ **Supplies**

- ▣ **Supervision**

- ▣ **Equipment depreciation**

# **Overhead-Burdened Hourly Rates**

- Calculate average overhead-burdened salary rate for each major analytical area
  - ▣ Base salary plus direct and indirect overhead
- Develop linked budget and cost/test spreadsheets

# **Cost-per-Test Calculation**

- **Cost/Test = Hours/Test x Salary/Hour**
- **Salary by analytical area**
- **Ideally, hours/test based on data, estimated if necessary**

# **‘Reconciled’ Cost per Test**

- $\Sigma(\text{cost/test}) \times (\text{annual \# of tests})$   
typically less than 100% annual budget
- Calculated percentage difference between the budget and sum of annual costs per test
- Indicator of time spent on ‘indirect’ activities
- Related to how well sample volume matches available lab capacity

# Productivity Metric

- Developed a 'productivity metric' defined as tests/FTE/month **for each analytical area**
- Useful for best practice discussion - what factors affect cost and productivity?

# **Performance Benchmarking Findings**

- **Cost and time-per-test data valuable to**
  - ▣ **Compare cost-per-test and time-per-test metrics between labs**
  - ▣ **Compare efficiency of different methods for the same parameter**

# **Performance Benchmarking Findings (cont.)**

- **Cost-per-test model does not account for time spent on**
  - ▣ **Special studies**
  - ▣ **Method development**
  - ▣ **Consulting**
  - ▣ **Meeting and training time**

# Performance Benchmarking Findings (cont.)

- **Marginal cost dilemma**
  - ▣ **What is the real cost of adding a few more tests to existing batches?**
  - ▣ **What happens when batch sizes are smaller than average?**

# **Performance Benchmarking Findings (cont.)**

- **More similarity than expected in times-per-test and staff time spent on indirect activities**
- **Significant difference for labs in the same business**
  - ▮ **Only 5 of the 222 methods in the cost model were conducted by all 9 labs**
  - ▮ **140 of the 222 methods in the cost model were conducted by only one lab**



# **Summary of Key Benchmarking Findings**

# **Key Benchmarking Findings**

- **Minimizing cost/test is mostly a function of optimizing batch size and best utilizing laboratory capacity**
- **Automating equipment, streamlining sample processing, and reducing reruns improve efficiency and productivity**

# **Key Benchmarking Findings (cont.)**

- **Tools like customer surveys, staff surveys and job progression help laboratories improve customer service and employee morale**
- **Flexible staffing strategies help laboratories respond to workload fluctuations**

# **Key Benchmarking Findings (cont.)**

- **It is critical for laboratories to work with customers to:**
  - ▣ **Develop cost-effective sampling and analysis plans that address data quality objectives**
  - ▣ **Balance workload to minimize ‘peaks and valleys’**
  - ▣ **Eliminate redundancies among analytical programs**

An hourglass is shown in the background, with the top bulb containing a light blue liquid and the bottom bulb containing a golden-brown liquid. The hourglass is positioned on the right side of the frame, with the top bulb at the top right and the bottom bulb extending towards the bottom right. The background is a soft, out-of-focus gradient of light blue and white.


# **Learnings About the Process**

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- **Accurate cost comparison required much more effort than originally anticipated**
- **Concerns about how results would be used 'back home' significantly impacted the process**
- **A lot of initial time and effort was spent establishing trust among participants**

# **Learnings about the Process (Cont.)**

- **Difficult to ensure all agencies implemented agreements the same**
- **E-tools and results for completing individual assignments between meetings were disappointing**
- **Relationship building and first-hand experience visiting other laboratories were invaluable**



# **Recommendations and Things to Consider**

# **What Would be Different Next Time?**

- Focus on best practices and metrics like tests/FTE instead of cost/test
- Have someone facilitate the process
- Develop a charter with agreements about roles, responsibilities, etc.
- Meet more often and complete the process in less time
- Continue collecting data and meeting to track progress over time

# **Requirements for Successful Benchmarking**

- **Willingness to change**
- **Process in place that supports change**
- **Employee involvement and buy-in**
- **Good communication**
- **Management support**
- **Resource and time commitment**
- **Structured methodology**

# **Before You Begin, Ask Yourself...**

- **What do you expect from the process?**
- **What are the expectations from your management?**
- **How much time and resource will you allocate?**
- **What fears might staff have, and how will you address them?**

# **Suggestions**

- **Develop a statement of work or charter for the group**
- **Agree on roles, responsibilities, and meeting ground rules**
- **Have someone facilitate the process**
- **Educate your management about the process and keep them apprised**
- **Educate and involve your staff, keep them apprised of the process**

## **Suggestions (cont.)**

- **Expand scope beyond technical work**
- **Don't limit your benchmarking to other laboratories**
- **Identify areas to benchmarking by asking what are your obstacles to quality, timeliness, etc.?**
- **Focus on the system and processes**
- **Don't expect it to go quickly or smoothly**

# Remember

“Benchmarking is the practice of being humble enough to admit that someone else is better at something and wise enough to try and learn how to match and even surpass them at it.”

# **Acknowledgements**

- **Jim Cooke, City of Portland**
- **Mike Delaney, Massachusetts Water Resources Authority**
- **Bhupinder Dhaliwal, Central Contra Costa Sanitary District**
- **Bill Ellgas, East Bay Municipal Utility District**
- **Lucy Jao, City of Los Angeles**
- **Sam Mowbray, County Sanitation Districts of Orange County**
- **Hank Stevens, Sacramento County Regional Sanitation District**
- **Dave Tucker, City of San Jose**