CSP

Tools For Optimizing Chemical Management Manual

Strategies for Reducing Chemical Use and Cost

Chemical Strategies Partnership

a project of the Tides Center
founded by The Pew Charitable Trusts
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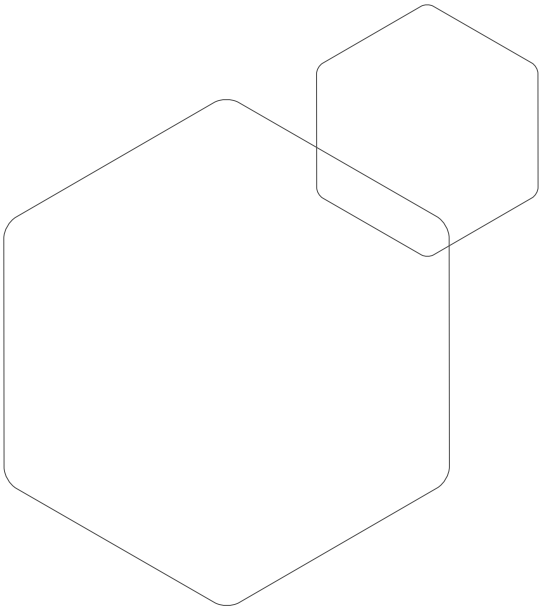

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Preface

This guidebook was written to help you measure the "real" cost of chemicals to your company and then use the information to reduce costs and chemical use. By "real" cost we mean all the costs—usually hidden—tied to chemical use. These costs can include compliance, safety, disposal, storage, training, etc. Ironically, not many companies realize and track the true costs of chemicals.

Several studies have revealed that chemical management costs can range from 1 to 10 times the purchase cost of chemicals. That means for $7 million spent on chemicals, a facility may actually spend between $7 million and $70 million more to manage those chemicals.

In addition, very few firms use supplier know-how to reduce chemical costs and volumes. The suppliers are the experts in handling chemicals, after all, so why not leverage their expertise to create a mutually beneficial relationship? We recommend developing chemical management programs with specialists (suppliers) such that they manage—or help you manage—your chemicals, rather than simply sell them to you. This shifts their own profitability model from "sell more" to "manage better." That translates to decreased chemical use, thus decreasing costs and liabilities for your company. In an era of ever-increasing global competition, every variable counts.

The Chemical Strategies Partnership (CSP), a non-profit organization, has been working with companies to develop and implement such chemical management programs. Not only will these projects achieve cost reductions and more strategic supplier relations, but they will also provide significant environmental benefits by reducing chemical use in manufacturing.

This manual outlines the CSP Program and provides a step-by-step approach to help you develop and implement your own chemical management services (chemical service) program with your provider(s). A chemical service program involves strategic partnering with a chemical service provider who performs some or all of the activities related to managing chemicals in your company. This manual will help your company answer questions like:

1. What do chemical management services include?
2. Should my company consider developing a chemical service program?
3. How can I quantify the benefits of a chemical service program for my company?
4. What baseline information is necessary?
5. How can I develop the environmental and cost justifications for upper management?
6. What services are my providers capable of providing?
7. What steps do I take to successfully implement a chemical service program at my company?

THE CHEMICAL STRATEGIES PARTNERSHIP

CSP is a cooperative effort among The Pew Charitable Trusts (The Trusts), The Heinz Endowments, and partner manufacturing companies. The Trusts established CSP in June 1996, with additional support from the Heinz Endowments. CSP's mission is to help companies reduce chemical use through improved chemical management.

The Chemical Strategies Partnership was motivated by the fact that: 1) few companies realize and track the true costs of chemicals; and 2) few companies utilize their suppliers as a resource to reduce costs and volumes of chemicals used. Based on these two premises, the goals of CSP are to:

- Help companies reduce the use and release of toxic chemicals and measure these reductions (less pollution, improved reputation)
- Evaluate opportunities for companies to restructure their relationships with their chemical suppliers to achieve chemical use reduction and efficiency goals
- Foster a business-driven, corporate commitment to make pollution prevention a strategic business objective (bigger, smarter, more cost-effective vision)

To achieve these goals, CSP developed a program to help companies determine a facility's true chemical cost. With that knowledge, you can identify opportunities for working with chemical providers to achieve chemical use reduction and translate it into financial benefits. Sure, you can talk about "reduced liabilities" and "the environment" (and you should, but as additional information), but people understand the issues better in financial terms. So this program is to help you figure out the hard (quantifiable) costs first and then add the soft (more qualitative) costs.

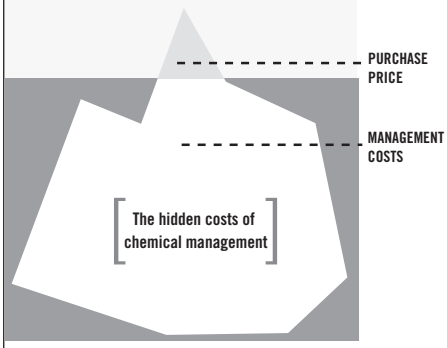
Through this program, you can establish financial incentives to help reduce chemical use, reduce costs, improve quality, and spur innovation. The key is in leveraging the resources and expertise of chemical service providers.

We have helped partner companies establish baseline chemical management costs by conducting materials and cost accounting analyses. With this baseline cost data, companies can assess the costs and benefits of developing a chemical service program with a chemical service provider.

Chemical Strategies Partnership Future Activities

In its next phase, CSP is poised to serve two critical roles: 1) shape the fundamental nature of chemical services to include forward-thinking environmental performance objectives and 2) accelerate proliferation of chemical services among companies to achieve financial and environmental benefits sooner.

The Chemical Cost Iceberg



Adapted from:
Bierma, T.J., and Waterstraat, F.L. Chemical Management: Reducing Waste and Cost Through Innovative Chemical Supply Strategies, John Wiley & Sons, Inc., New York, (forthcoming)

To leverage the intensive work CSP has completed with our partner companies, we have compiled much of our experience and centralized knowledge base on chemical service in this manual. It provides interested companies with tools to implement a cost-effective, environmentally progressive chemical service program.

HOW TO USE THIS MANUAL

The Manual will guide you through all the steps to analyze, develop, and implement a successful chemical service program. These steps include costing your facility's chemical lifecycle, selling upper management on the program, and selecting a service provider.

As you work through the steps to develop a chemical service program, there are several points where a team decision is necessary to determine how to proceed. These "decision-points" are critical steps in the process where the team analyzes and discusses a set of data or information and comes to consensus on how to move forward.

1. Introduction

1. Introduction

A NEW MODEL TO IMPROVE CHEMICAL MANAGEMENT

Every time you reduce chemical use, you reduce cost and exposure to liabilities. Beyond tangible expenditures, there are not-so-quantifiable benefits to well-managed chemical programs: reducing accidents; maintaining a good reputation in the community; staying clear of environmental agencies' spotlights, etc. These are all positive aspects of sound chemical management.

Stakeholders—from employees, to neighbors, to international investors, to the media—are starting to pay attention to the environmental impact of companies. So it's no wonder that there is an emerging trend in materials management that is redefining and improving the way chemicals are purchased, managed, used, and disposed. This new Chemical Management Services (chemical service) model changes the traditional relationship between chemical suppliers and their customers from providing product, to providing service. That's a major shift with major implications and yet, the model is compatible with many emerging business management trends. It highlights strengthening a company's core business, outsourcing support functions, and building strong alliances with suppliers.

Here's how the shift works. In traditional supplier-customer relationships, the chemical supplier's profitability is a function of the volume sold. The more chemicals sold, the higher the revenue for the supplier. Meanwhile, the buyer has an opposite incentive—to reduce costs or the amount of chemicals purchased. In the chemical service model, suppliers become chemical management providers and are paid for successfully delivering and managing chemicals. Thus, the supplier's profitability is based on better performance, not on selling more chemicals.

By aligning the incentives of suppliers and customers, both can achieve bottom line benefits via reduced chemical use, costs, and waste. Fewer chemicals in the overall equation can also result in significant environmental benefits (which takes us back to the less-quantifiable benefits of reduced liabilities).

WHY CHANGE YOUR CHEMICAL MANAGEMENT SYSTEM?

Chemical management begins with procurement and spans through use and disposal of the chemical(s). At each stage, a company incurs quantifiable costs of labor, materials, equipment, liability, hazard training, and compliance efforts. Unfortunately, design, production, and management decisions regarding chemicals are typically made without consideration of all these hidden costs.

In working and talking with several companies, CSP has seen the cost of chemical management range from $1.00 to $10.00 for every dollar of chemical purchased. That means for a facility purchasing $7 million in chemicals, the additional cost of using chemicals could be between $7 million to $70 million. These high costs are due to the concealed expenses behind chemical use, like compliance, safety, disposal, and floor space.

For most manufacturing companies, chemical management is not considered part of the "core" business. Chemicals are a very important part of manufacturing, but managing them is not generally a process that attracts much management attention—until something goes wrong. As a result, chemical management often does not run as efficiently and cost effectively as other manufacturing processes.

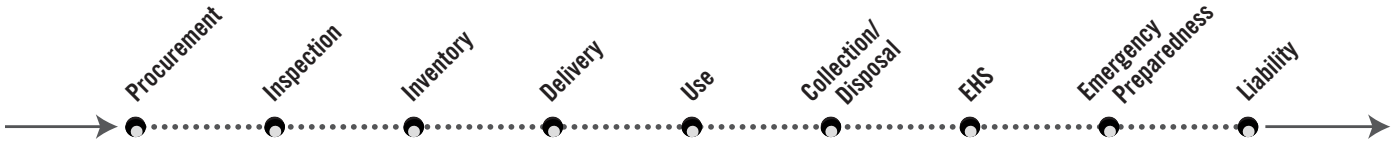
Getting your chemical management system in order has benefits on many levels. Aside from lowering costs, some primary reasons companies launch a strong effort to improve their chemical management include:

- Reducing liability
- Leveraging the knowledge resources of a supplier
- Freeing up floor space for manufacturing
- Reducing chemical use to drop emissions below environmental reporting thresholds
- Reducing the number of accidents on site
- Improving staff productivity by eliminating chemical management tasks from their overall responsibilities
- Increasing employee safety

The Chemical Lifecycle

We use the term "chemical lifecycle" as a framework to characterize the chemical management system and the costs associated with it (see *Figure 1.1*). By pulling the chemical costs out at each step of the lifecycle, you can identify the hidden costs associated with chemical use. The true costs of chemicals can be obscured because they are distributed among many departments within a company. In addition, departments are often required to pay an "overhead" expense which can include chemical costs associated with energy, waste removal, storage, training, etc.

Figure 1.1 ***Chemical Lifecycle***



WHAT ARE CHEMICAL SERVICES?

Chemical services are a range of chemical management activities that are contracted to a chemical service provider, or Tier 1 supplier. A chemical service provider may be a chemical supplier, waste hauler, or environmental engineering firm that offers a range of services to manage your company's chemicals. They may purchase and deliver chemicals, maintain the inventory, and track Material Safety Data Sheets (MSDSs). They also may provide a broader range of services including process efficiency improvement, data collection for environmental monitoring and reporting, and waste collection and disposal. Currently, the term "chemical services" is used inconsistently: it may mean a narrow or broad range of services.

Any chemical service program has two dimensions: the Chemical Lifecycle and the Chemical Range.

- ***Chemical Lifecycle***
  The Chemical Lifecycle refers to the scope of services that a chemical service provider performs. Services may include purchasing chemicals, maintaining inventory, providing "just-in-time" delivery, managing chemicals onsite, maintaining MSDSs, tracking chemical use, and identifying and implementing efficiency improvements.
- ***Chemical Range***
  The chemical range is the sum total of all the chemicals managed by a service provider. For example, some companies contract a service provider to manage only their coolants, whereas other companies will contract for all their chemicals including maintenance chemicals.

Why Does It Work? How Far Can It Go?

As outlined above, the chemical service model delivers results by aligning the incentives of chemical suppliers and their customers. The supplier's profitability is independent of the volume of chemicals sold. In other words, the suppliers no longer get paid based on how well they can sell chemicals, but how well they can manage chemicals. This is accomplished by establishing supplier compensation on performance-based metrics and fees. This makes chemical service a service-based model.

Generally, chemical service providers begin by offering a narrow range of chemical management services. That is, they don't start out in client companies by taking over management of all chemical needs. For example, a chemical service provider might purchase and deliver chemicals, manage MSDSs, pick-up waste, and provide data for some environmental reports. Later, they might expand their work scope to include such services as research for chemical substitutes and process efficiency improvements.

The chemical service model delivers results by aligning the incentives of chemical suppliers and their customers. The supplier's profitability is independent of the volume of chemicals sold. In other words, the suppliers no longer get paid based on how well they can sell chemicals, but how well they can manage chemicals.

In the most advanced stage, the chemical service provider would be compensated per each unit of quality product successfully produced (e.g., a fixed fee per 100 toaster ovens produced or 1000 circuit boards cleaned).

Chemicals become an operational cost to the supplier instead of the manufacturer. As with labor, utilities, and other material inputs, the supplier now has an incentive to use fewer chemicals to yield higher margins. The manufacturer gains a partner in its efforts to manage chemicals more efficiently; the supplier becomes an integral part of the business by providing a differentiated, value-added service.

SUCCESSFUL EXAMPLES

Several companies within the automotive and electronics industries have adopted chemical service relationships with their suppliers.
Some examples include:

- General Motors (GM), together with their chemical suppliers, reduced cost, chemical variety, and associated risks. One GM assembly plant achieved a 43% reduction in the number of chemicals used and total savings of more than $750,000 a year.
- Navistar International and Castrol Industrial developed opportunities for reducing cutting and grinding fluid waste. Given Castrol's expertise with these chemicals, they installed a process to clean and reuse the fluids, reducing new fluid use by 50%. This lowered the cost of fluid waste by 90%.
- The chemical service provider for a semiconductor manufacturing facility helped cut its chemical consumption by 50% over 2 years and instituted changes resulting in savings of approximately $200,000 a year.
- One facility of an aerospace company achieved total savings of $1.1 million in chemical management costs during the first year of their chemical service program.

These companies now enjoy tangible benefits such as reduced costs, improved product quality, and streamlined chemical handling. And, at the risk of sounding redundant, we can't forget to mention the "uncountables" like improved workplace safety, better reputation assurance, etc. Countable or not, they all contribute to a competitive advantage in the marketplace.

However, even with these tremendous incentives, few companies are engaging in such strategic partnerships with their suppliers due to logistical, cultural, and management reluctance. It is an investment of time and resources to initiate a chemical service program, but in the majority of cases, the benefits significantly outweigh the costs. See *Appendix 1* for case studies of four manufacturers' experience in developing and implementing a chemical service program and the benefits gained.

Is your company ready to explore the possible benefits?

D E C I S I O N P O I N T

Should my company move forward and evaluate chemical services as an option?

The decision should be made in consideration of the objectives of the organization, the available resources, and the interest by top management. If you decide to proceed, the next step is to put together a multi-functional team.

Now that you have gathered some facts to back the hunch that your firm is overspending on chemicals, it's time to present them to a multi-functional group. Tell them what you know about the successes of other companies. Tell them about some of the failures in chemical management, too. Then tell them how and why you think this program could help your own firm.

Solicit input. Get other departments involved. Learn about their own concerns. See *Appendix 2* for sample presentation to introduce the chemical service approach.

T A S K S

- Review CSP Manual
- Estimate your company's current chemical purchases
- Talk with colleagues in purchasing, EH&S, and engineering to assess interest
- Gather a multi-functional team to make an initial presentation
- Determine whether to move forward and evaluate implementing a chemical services program at your facility

The Planning Process

2.

There are several critical steps to take as you begin the process of developing a chemical service program. Implementation of a successful chemical service program requires:

- Formation of a multi-functional facility team
- Sustained effort by that team to proceed through the chemical service implementation process described in this manual
- Upper management support and commitment for the team's activities and objectives
- Strong communications effort in introducing chemical services to facility personnel

The value of management commitment to this type of program cannot be overestimated. Without support from upper management, the chances for success greatly decrease. Appropriate management decision-makers need to be informed and committed to the program during its development and throughout its eventual implementation.

Chapter 2

OBJECTIVE:

Establish a multi-functional team and obtain management buy-in to proceed.

ESTABLISH A PROGRAM TEAM

The first step is identifying a team leader charged with guiding the development of the program. The leader must have an intimate knowledge of the facility(ies) and chemical management systems; be influential with upper management and his/her peers; and have strong leadership and communication skills.

The first task of the leader is to bring together a multi-functional facility team (team) with representation from all stages of the chemical lifecycle. The team should broadly represent all necessary interests within the company including representatives from:

- **Facilities**
- **Environmental, Health & Safety**
- **Purchasing**
- **Finance**
- **Engineering**
- **Materials & Waste Management**
- **Accounting**
- **Manufacturing**

Involving this set of key people in the process from the beginning is crucial. You really can't get the most out of a chemical service endeavor if you don't gain participation and subsequent buy-in across the company. Besides, the combined knowledge base of the employees from these functions is invaluable and definitely greater than the sum of the parts. Together, they have the intimate knowledge of the manufacturing operations, as well as have access to information that will be vital to the process. This multi-departmental team will expedite data collection and can assist in analyzing the results from the broadest and most detailed perspectives. Further, buy-in from all these groups is critical to the success of a chemical service effort: their representation on the team will contribute to building necessary understanding and support across departments for implementation.

The leader should seek approval from each team member's manager to ensure sufficient resources and support for team participation. CSP estimates that the team will devote approximately 6 hours a month toward program

design and implementation. However, this does not include research and data collection, which will vary from site to site depending upon current information systems and data management.

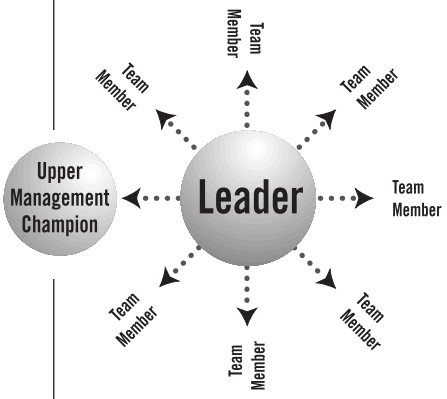
The team should then identify an upper management champion (champion) and establish communications channels with him/her. Implementing a new chemical service program is a major cultural and operational change and you will need strong management support to make it happen. Those with experience implementing chemical service programs agree on one thing across the board: top management must support the program and often, must mandate its implementation. Thus, the champion plays a critical role in overcoming barriers to progress, ensuring sufficient resources are allocated to the project, and influencing key management players at important junctures in the process. The champion should be regularly informed of the team's progress, and should attend quarterly meetings, as minimum participation.

Those with experience implementing chemical service programs agree on one thing across the board: top management must support the program and often, must mandate its implementation.

DEFINE TEAM ROLES AND RESPONSIBILITIES

As a group, the team should define both the team's responsibilities and team members' roles. The team should also outline and agree upon specifics to obtain the necessary resources and time approval from managers. Begin the process by deciding on the following issues:

- Determine how often the team will meet. Establishing a standing meeting (e.g., the first Wednesday of every month at 10:00 AM) helps Team members plan appropriately and keeps the team on track.
- Select a person to communicate with the champion and upper management: appointing a spokesperson (often the team leader) keeps the team's communications with upper management clear and organized.
- Select a scribe to record decisions at each meeting and to document progress and responsibilities.



DEVELOP GOALS AND OBJECTIVES

The first outcome of the team meetings should be a set of goals and objectives for improving chemical management at the facility. The goals make up the big-picture. Objectives are generally smaller in scale and a more tactical matter. For some companies this may be an easy task, and require only one meeting; for others it may mean multiple meetings. However, moving forward without consensus on the goals and objectives may result in future backpedaling, so try to avoid the temptation.

Goals may include the following:

- Reduce cost of products
- Improve production quality and efficiency
- Improve environmental performance and worker health and safety
- Reduce liability

Objectives may include the following (with quantifiable targets where possible):

- Increase throughput and shorten time-to-market
- Leverage the resources of a supplier
- Reduce chemical use to drop emissions below environmental reporting thresholds
- Free up floor space for manufacturing
- Reduce the number of accidents on site
- Improve staff productivity by eliminating chemical management tasks from their overall responsibilities

DECISION POINT

The team should determine if they have enough support to move forward. If you do, you should create a workplan. (See *Appendix 3* and *Appendix 4* for sample workplans.)

DEVELOP A WORKPLAN

Once the goals and objectives have been clearly outlined and agreed upon, the team's next step is to develop a workplan. The workplan should detail the first 3 tasks outlined below:

1. Selecting a facility (if the planning process began at the corporate level)
2. Conducting a cost analysis to determine the total cost of chemical use (obtain baseline costs)
3. Developing a Chemical Management Services program

There is a slight chance that after conducting steps 1-3, you will decide you are already so adept at managing your own chemicals, that no outside resource is necessary. With all due respect, we doubt that will happen. It's not that someone is doing a "poor" job of managing, it's more likely that not enough resources are allocated to properly manage chemicals. Now's the chance…not to make anybody wrong, but to make a lot of people right. As you look three or five or ten years in the future—how will you continue to be competitive? By tapping the resources of your supplier, you are strengthening the capabilities of your own company and improving its competitive position.

TASKS

- Identify a team leader
- Establish a multi-functional team
- Identify an upper management champion
- Establish a forum and process for information exchange both within the team and with upper management
- Document the team's activities
- Develop goals and objectives for the team
- Agree upon roles and responsibilities for individuals and the team as a whole
- Develop a workplan

Methodology & First Steps

3.

DOCUMENTING BASELINE DATA: WHY AND HOW

You can't tell everyone how far you should go if you can't tell them where you are starting. So, before your team can understand how to best pursue the chemical service model, you need to gather data that characterizes your existing chemical management system. Therefore, a key element of the CSP program is developing baseline data for your current chemical use and the costs you incur to manage those chemicals. This important baseline data provides the information to:

- Make the cost and environmental case to upper management about the importance of developing an efficient and effective chemical management program
- Develop a proposal to recruit chemical service providers
- Evaluate progress towards reducing chemical use and costs

An overview of how to gather this data is provided in this chapter. There are three sets of data that comprise the baseline data.

1. Chemical use and purchase cost data.
2. A cost analysis to determine the total cost of chemical use at the facility. This includes many "hidden," but real costs beyond the purchase price (detailed in *Chapter 4*).
3. A process-level analysis to highlight opportunities for process efficiency improvements (detailed in *Appendix 5*). **Collecting this data is optional.** A process-level analysis is a materials and cost accounting of a specific process where all material inputs and outputs are identified. This analysis helps to determine your facility's chemical use efficiency; expose existing data management systems (thereby identifying information gaps); and identify specific areas for improvement. CSP has found that performing this somewhat detailed analysis on one process demonstrates significant room for improved chemical efficiency and thus cost savings. In addition to the above cost analysis, it often provides the convincing data for your team and upper management to consider developing a chemical services program. Your choice to collect this data will depend on data availability, the complexity of your manufacturing operations, time and resource constraints. Please read *Appendix 5* to determine whether you want to collect this data.

3.

Chapter 3

OBJECTIVE:

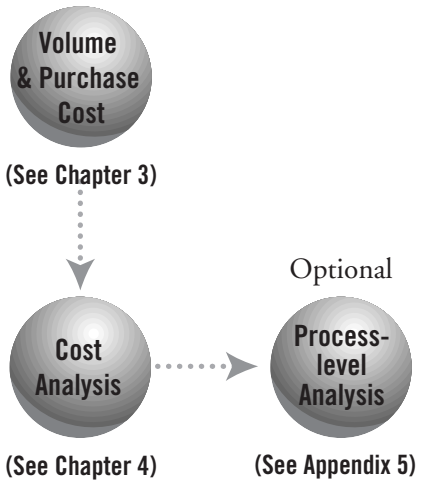
To quantify the current volume and purchase cost of chemicals used.

FIRST STEPS: BASELINE CHEMICAL USE AND PURCHASE COST

Baselining chemical costs begins with documenting chemical use. The goal is to generate a list of chemicals used in the last 12 months and their volumes. You may also want to document where the chemicals are used in the facility. This information helps orient potential service providers, and helps you track progress in chemical use and cost reduction by department.

The difficulty of collecting this data is largely dependent on the information systems already tracking chemical use in your company. Some companies we worked with could retrieve this information easily, yet others had multiple systems for purchasing, inventory tracking, and process data, making it more challenging to determine chemical use.

Next, you need to document chemical purchase cost. This is generally the easiest data to collect. The purchasing department should have this information. We have found it useful to document the cost in two ways:



1. The first way is to total the cost of chemicals, broken down into the major chemical categories (e.g., adhesives, acids, paints, cleaners). Such summation and segmentation provides an overview of the diversity and magnitude of the facility's chemical use (which may serve as potential providers' basis for costing proposals).
2. The second way to document chemical cost is through unit price. The value of this documentation is that it provides a baseline for measuring future price reductions. (You can expect such reductions when you consolidate your chemical purchasing.) It also gives potential providers a sense of what you pay for chemicals relative to market prices.

WHAT COMES NEXT?

Chapter 4 details the tasks required to perform a total cost analysis. After this baselining exercise, the next steps will be to determine what portion of the chemical range and lifecycle should be transferred to a chemical service provider. Chapter 5 helps you make this determination: you will consider issues of management efficiency, management control, logistical constraints, and system design.

Chapter 6 outlines how to develop and issue a Request for Proposals (RFP) to solicit a chemical service provider. Chapter 7 describes the major elements in evaluating the proposals and selecting a service provider.

Document as You Go

It is critical to systematically document your work throughout the process so that the sources, assumptions, and methodologies are transparent and easily understood. The documentation is important for supporting your data to gain approval from upper management, select a service provider, and negotiate compensation and incentive structures with that provider. The documentation is also useful for colleagues in other facilities or business units who want to replicate your successes.

T A S K S

- Collect data on the volume of chemicals used at your facility in the past year
- Collect cost data on chemicals purchased
  - By chemical categories
  - By unit price

4. Baselining Your Chemical Costs

WHY THIS ANALYSIS?

The analysis of your chemical management system is one of the most important parts of the entire process. The analysis tracks chemical use and cost through the entire chemical lifecycle: from purchasing, to distribution, to disposal. This analysis includes such costs as the purchase and storage of chemicals; management of environmental, health, and safety issues associated with chemicals; and management of waste. Through this analysis, you obtain documentation of your existing system and the full cost of managing chemicals.

The first step for the team is to map your current chemical management system. The "map" illustrates how chemicals are purchased, received, moved, used, and disposed of in the facility.

From this work, you will be able to characterize your existing system, and determine the full cost of managing chemicals. This information will then help you develop components for a new system and provide a basis for pricing a service contract.

As we've said, the true cost of chemical use to any company goes beyond the purchasing cost of chemicals. The problem is usually that the related costs are obscured, making them hard to account for in regular accounting methodology. Unfortunately, design, production, and management decisions regarding chemicals are typically made without consideration of these hidden costs. The true cost of chemical use actually can be up to fifteen times what the chemicals themselves cost. This can be quite a shock to even the best of managers.

Once you estimate the total cost of chemicals, you will be able to raise management's awareness of its magnitude. This startling realization often helps stimulate action towards managing down the total cost of chemical management.

This data is the most difficult to collect, but also reveals the most about your true costs of chemical use and management. These numbers—usually surprising—help convince upper management to support a chemical service program. This information is also critical for analyzing the costs and benefits of developing a chemical service program with a chemical service provider.

Throughout this analysis, remember to ask as many "Why?" questions as possible. "Why are we storing these chemicals for so long?" "Why are we using these chemicals and not less toxic ones…is there an alternative?" You see what we mean: in essence, get to the root of the issue. Sometimes companies have found that by getting to the root of the question, they are able to come up with less expensive answers.

A LIFECYCLE FRAMEWORK FOR GATHERING DATA

Chemical management involves many departments throughout the facility and thus, often makes total chemical-related costs difficult to quantify. For example, just purchasing and storing chemicals involves a range of departments including procurement, engineering, materials storage, environmental and safety, finance, and legal. The method we use with our partner companies is a valuable tool for

Chapter 4

OBJECTIVE:

To determine what it costs you to manage chemicals at your facility.

both characterizing the system and identifying the cost elements that underlie it. We start with the lifecycle of the chemicals as they move through the facility as shown in *Figure 4.1* below.

Figure 4.1 ***Chemical Lifecycle***

At each stage, the facility incurs costs of labor, materials, equipment, and the harder-to-quantify costs of space and capital all to support the management of the chemicals.

Using this framework, there are three major steps involved with performing the analysis:

1. Map the flow of chemicals and identify the responsible internal departments at each stage of the lifecycle
2. Assign the costs of chemical use to each lifecycle stage
3. Analyze the nature of the costs and verify them

It is important to engage the whole team in mapping the flow of chemicals, since everyone has a different perspective on chemical management.

MAP THE FLOW OF CHEMICALS

Mapping the movement of chemicals through the facility often illuminates a surprisingly complex chemical path. It also shows just how many people and resources are involved in each stage of the chemical lifecycle. This process is largely a manual, interactive effort that entails following chemicals through the facility to identify which departments are involved at each stage.

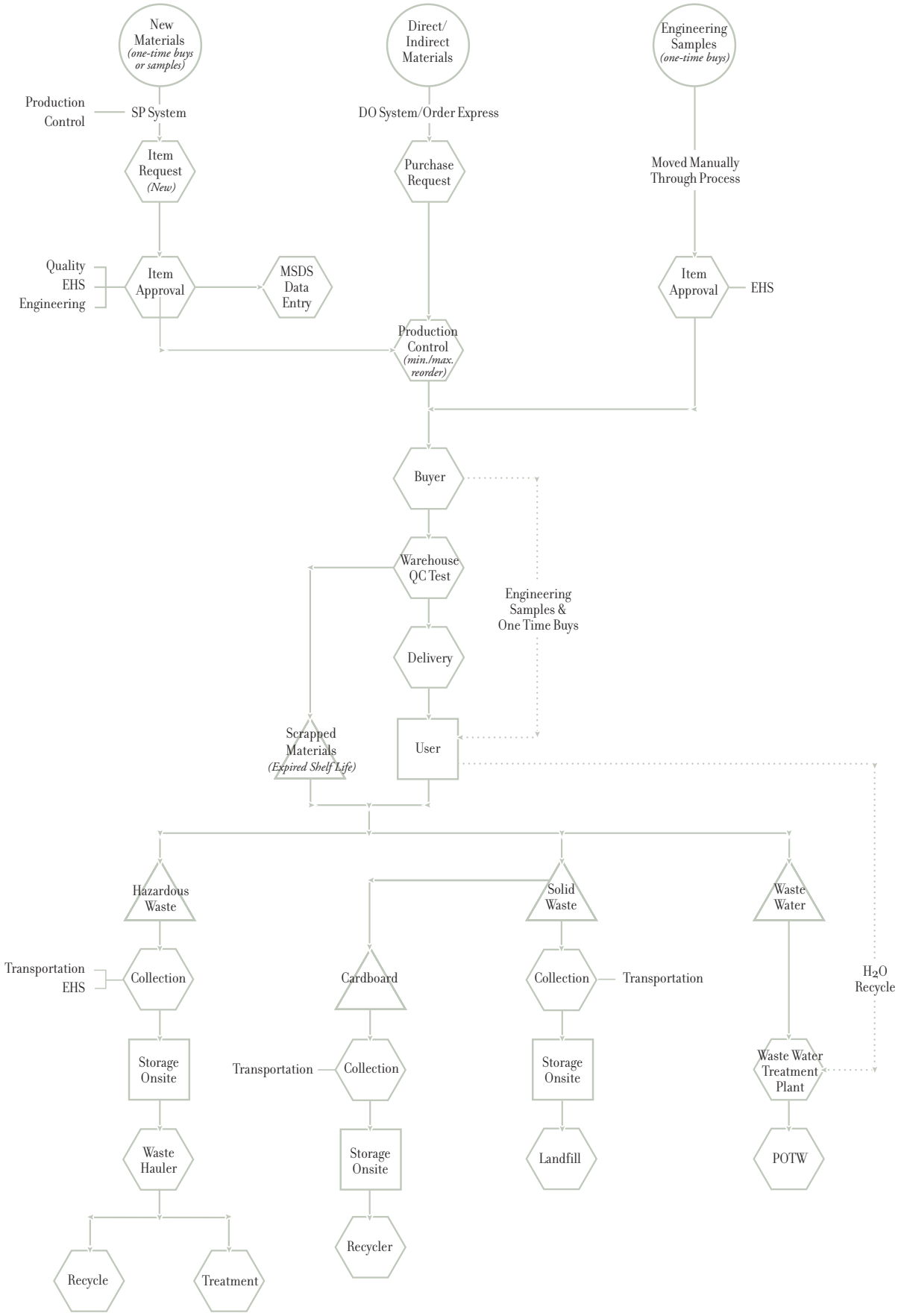
It is important to engage the whole team in this exercise, since everyone has a different perspective on chemical management. Entire team participation is another vital ingredient that cannot be overstated. It is a "must."

When mapping the flow of chemicals through the facility, the team should include the people, equipment, and information systems involved. (See *Figure 4.2*) The complexity, problems, and inefficiencies are quickly identified through this process. Team members are usually very surprised when they see the whole picture at once.

ASSIGN COSTS OF CHEMICAL USE

The next step is to attach costs to each lifecycle stage. This is done by determining the resources specific to chemical management within each organizational function. *Table 4.1* provides an example of the organizational functions and cost elements for each lifecycle stage. To collect this information, team members talk with the responsible people in each department. This

Figure 4.2 ***Chemical Management Flow Chart***



provides estimates of time and other resources devoted to chemical-related tasks.

We have found that the bulk of chemical management costs are labor costs. Therefore, a vital and challenging part of this analysis is developing reliable estimates of time people spend on chemical-related activities. Team members need to be aware that they may cause concerns and anxiety among personnel they interview. As you ask facility staff how they spend their time, they can become defensive about their work and suspicious about their job security. It is important that all team members give a consistent and clear explanation of what the team is doing, its goals, and expected outcomes. This will help relieve potential anxieties.

Once you have time estimates, you will need labor rates to convert time into money. Your finance department can provide you these rates for different labor grades. For the purposes of this exercise, fully burdened labor rates should be used.

Other costs—such as equipment costs, inventory carrying costs, and waste management costs—may be more readily determined via cost reports. Generally, these cost reports also come from the finance department.

As you collect this information, you can compile the cost information in CSP's Chemical Management Cost Analysis tool. (Please see *Appendix 6*). The tool is a simple Excel workbook designed to help users identify and collect data from all the departments where chemical-related activities are likely to occur. Once the data is entered, the tool summarizes the data in a series of charts, graphs and other visuals that quickly help the team identify major areas of cost. *Figure 4.3* is a sample graph from the tool that provides a good format for presenting results to the team and other stakeholders (e.g. top management, department managers, etc.) It is important to clearly define what costs are included in each lifecycle stage. (See *Table 4.1* for a description of the activities and costs included in each lifecycle stage.)

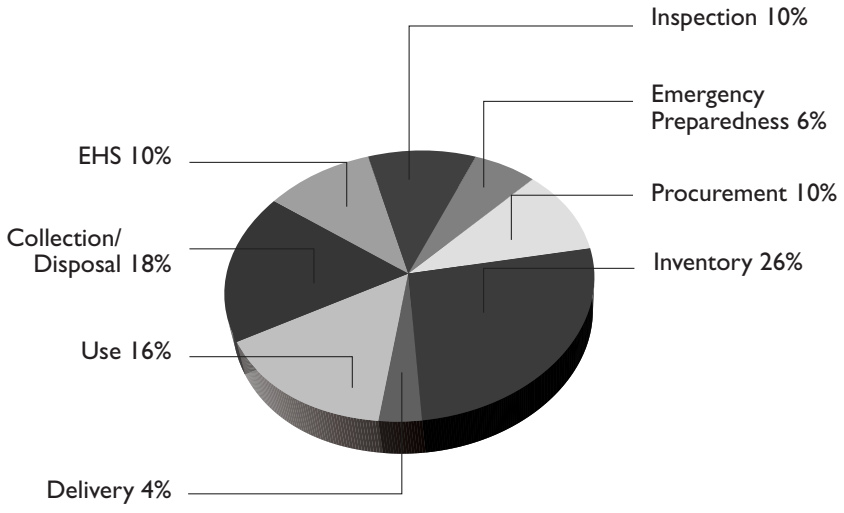


Figure 4.3
Chemical Management Cost Analysis
(Company purchases $8 millionin chemicals/yr)

Table 4.1 Sample Lifecycle Stages & Organizational Functions

Lifecycle Stage	Departments/ Organizational Functions	Associated Cost Elements
Procurement	▸ Materials procurement	▸ Management of suppliers ▸ EHS approval of chemicals ▸ Chemical buyers' labor costs ▸ Delivery of chemicals to the warehouse ▸ Information system
Inspection	▸ Quality control/assurance ▸ Logistics	▸ Quality certification labor and expenses ▸ Lab space
Inventory	▸ Inventory management ▸ Shipping ▸ Receiving	▸ Chemical storage personnel ▸ Facility space ▸ Inventory carrying costs ▸ Shipping/packaging labor and expenses ▸ Receiving labor
Delivery - from warehouse to point of use	▸ Transportation ▸ Garage	▸ Labor, vehicles, lifts, etc., necessary to move chemicals throughout site ▸ Maintenance time and expenses for equipment
Use	▸ Operations ▸ Chemical technical support ▸ Personal protective equipment (PPE) ▸ Facilities ▸ Use reduction activities ▸ Training	▸ Labor to troubleshoot problems, maintain chemical baths, etc. ▸ Gloves, goggles, etc. ▸ Costs associated with containment areas and plant protection systems (alarms, etc.) ▸ Additional capital goods: explosion-proof motors, special ventilation systems, etc. ▸ Hazardous material handling training
Collection/Disposal	▸ Collection and transportation ▸ Storage ▸ Waste management ▸ Treatment systems	▸ Labor and expenses associated with in-plant waste collection ▸ On-site storage and requirements for hazardous and non-hazardous waste ▸ Labor and expenses associated treatment and disposal ▸ Waste management vendor fees
Environment, Health and Safety	▸ Monitoring ▸ Reporting ▸ Operations	▸ Labor to track chemicals and waste ▸ MSDS maintenance and compliance ▸ Labor to monitor usage and compliance ▸ Labor to gather reporting data ▸ Monitoring equipment
Emergency Preparedness	▸ Fire protection ▸ Hazardous materials training ▸ Spill response training	▸ Labor and expenses associated with emergency response units for hazardous spills, fire, and confined space calls ▸ Labor time spent in training sessions relating to chemical management
Liability	▸ Insurance ▸ Medical ▸ Accident recovery/Remediation	▸ Insurance rates for environmental liabilities ▸ Workers' compensation

It is important to clearly define what costs are included in each lifecycle stage.

ANALYZE AND VERIFY COSTS

Once the team has identified the chemical management costs, analyzing them in the context of overall business management costs will help in further understanding their significance. There are several analyses worth doing:

1. What is the ratio of total chemical management costs to total chemical purchases? In other words, for every dollar of chemicals purchased, how many ("x") dollars are spent managing them? This brings to light the hidden costs of managing chemicals.

2. What are the chemical management costs relative to the total amount spent in facility key cost categories? For example:

   - What percent of inventory cost is spent on chemical inventory?
   - What portion of procurement resources is devoted to chemical procurement?

   While these proportions are often small, they may demonstrate a disproportionate share of resources that chemicals demand. You might find that while chemicals represent only 10% of total materials purchased, they consume 30% of procurement resources.

3. Another useful analysis is to delineate the fixed-versus-variable nature of chemical management costs. Costs can vary according to the volume of chemicals purchased; the number of orders placed; and the number of different chemicals used. Some do not vary. For example, if fewer chemicals are purchased, it is likely that variable costs such as procurement, inspection, and inventory costs will be reduced. However, fixed costs such as emergency response, monitoring, and reporting are unlikely to change much.

   This task is especially difficult. Determining the definition of what is a fixed cost and what is a variable cost will vary among team members. In the example above, inspection and inventory costs could be considered fixed costs because as long as you purchase any level of chemicals, you will always need inspection services and a warehouse for inventory. A rough estimate is a good start and may be all you need.

   Understanding the differences in cost drivers can help determine where systematic changes are needed; what savings are possible when chemical use is reduced; and what the cost structure of the chemical service contract may be.

4. Finally, you need to determine which activities could be transferred to a chemical service provider. It is useful to consider which cost savings will result in actual bottom-line savings (hard savings), versus those that will free up resources for other uses (soft savings).

   For example, transferring chemical purchasing to a chemical service provider may result in hard savings in chemicals purchased (i.e., the chemical service provider can leverage their volume to get lower prices on chemicals purchased). In addition, it could produce soft savings by eliminating the 20% time that a purchasing manager spends on trouble-shooting chemical purchase problems. That is considered a "soft savings" because the purchasing manager who remains fully employed on purchasing issues now has more time to work on other more productive tasks. In our experience, this information is invaluable in justifying and supporting a chemical service contract.

Once the nature of the costs has been determined, we recommend the analysis be verified with your finance department. You will build many assumptions into your analysis in the course of gathering and compiling information and they need to be confirmed. Since the team will be relying on this information as it moves forward, it is important to achieve the highest possible level of confidence in the analysis results. So, involve the finance department; ask them questions; and get their buy-in.

Note: *Working with a chemical service provider is not an exercise in shifting costs, but rather* ***eliminating*** *costs. When you develop this new and integrated relationship with a service provider, they are helping you to reduce costs overall. This happens through better efficiency in many aspects of chemical management where the service provider has invested resources to improve efficiency. Whether it is stream-lining inventory management, initiating a chemical tracking system, or identifying cheaper and less toxic chemicals, the service provider is focusing on ways to reduce costs and improve quality as part of their own core competency.*

Accuracy Versus Time and Cost

The time required to perform the analysis in Chapter 4 will depend largely on existing data management systems and the complexity and number of chemicals and chemical users at your facility. While there is certainly value to the information you can gain from this analysis, it does not come without a cost: time.

Therefore, as you begin the cost analysis, keep in mind your purpose and specifically, what you will do with the information once you get it. Ask yourself even more questions. "Why do we need this information?" "What will we do with it?" "What will it tell us?" "What can we leave out?" It is necessary to consider the trade-offs between achieving greater accuracy and incurring more costs to do so. Sure, accuracy is important but "don't let perfect ruin good."

T A S K S

- Map the flow of chemicals through the facility
- Collect cost data for each lifecycle stage using the CSP Cost Analysis tool
- Summarize data
- Analyze data and identify major cost drivers

Developing a Chemical Service Program

5.

BASIC DECISIONS: SCOPE OF THE PROGRAM

Based on your company's objectives and the analysis of your current chemical management system, your next step is to define a strategic chemical service program. Your baseline data from *Chapter 4* provides you with a snapshot of your primary cost drivers. With this information, the team will need to make decisions about the scope of a chemical service program.
Scope considerations include:

What chemicals should be included in the program (the range)?
For example, the range may include all chemicals, including maintenance chemicals or only solvents or coatings.

Which elements of the chemical lifecycle should be included in the program?
That is, which aspects of chemical management are likely to be more effectively run by an outside service provider with the expertise, focus, and incentive to optimize efficiency?

Lifecycle coverage may be limited to contracting a primary provider to purchase chemicals and manage your inventory. Or it might be more comprehensive, involving your provider as an integrated partner in a production process. What you essentially aim for is the biggest "bang for your buck." In each company that will manifest differently. In CSP's experience, the broader the coverage of the chemical service program—incorporating both the lifecycle and range—the greater the opportunity for chemical use and cost reductions.

Often chemical service programs start out with limited service and expand incrementally over time. For example, the initial service contract may only contain services for procurement and inventory management. The contract may then grow to include data management, process efficiency improvements, waste management, etc. In the most advanced program structure, the provider owns all aspects of chemical use and management and is compensated on a unit of output basis.

Many manufacturers choose to start with a program composed of procurement and inventory management because they believe those are the only options for cost savings. The deficiency of such an approach is that you don't experience the chemical management improvements throughout your entire system and the savings are short-term—usually realized in the first two years of the chemical service program. Often there is greater potential for continuous cost savings and environmental and safety benefits with a larger scope of services. A larger scope may include process efficiency improvements, delivery to point of use, chemical handling and safety training, and waste management. CSP strongly encourages you to consider a larger scope of services when you design your chemical service program. The program is more difficult to develop upfront, but the benefits can be greater and there is more opportunity for continuous improvement over time. (See *Table 5.1* for examples.)

Chapter 5

OBJECTIVE:

To design your chemical service program and determine what portion will be managed by a chemical service provider.

IDENTIFY THE PRIMARY COST DRIVERS

Scope-setting begins with data gathered in your cost analysis, and your findings of the primary cost drivers in your chemical management system. For example, a company might perform a chemical management cost analysis and generate the data in *Figure 5.1*. (See *Table 4.1* for a description of activities included in each "Lifecycle Stage".)

Based on the data in *Figure 5.1*, it is likely this company initially will focus on the most costly categories—inventory, use, and collection/disposal—for cost savings and chemical use reduction. The next issue to consider is whether to engage a chemical service provider to help improve efficiency in these categories and others. This is where other logistical, cultural, and managerial issues are balanced with the cost information to develop the chemical service program scope for the service provider. These issues are addressed below.

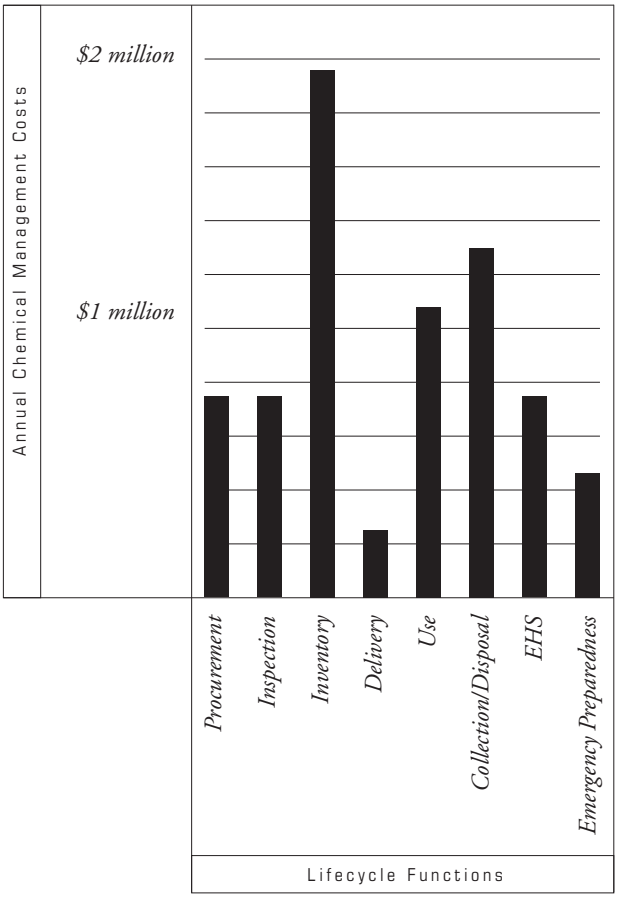


Figure 5.1
Chemical Management Cost Analysis
(Company purchases $8 million in chemicals/yr)

KEY ISSUES TO CONSIDER: LOGISTICAL, CULTURAL, & MANAGERIAL

Let's face it: you will be introducing some very different ideas and processes. They may not be so readily accepted. Maybe even harder for some to accept will be the entirely new service model you'll be proposing. Change can rock the comfort zone of the familiar. That's why we've included this segment. It will help you prepare for some possible nay-saying reactions.

Logistics

Logistical constraints within your company may inhibit certain tasks from being transferable or exclude certain chemicals from the program. For example:

- If a collective bargaining unit represents your operators, there may be restrictions over what tasks can be transferred to a chemical service provider.
- You may have proprietary processes for which a service provider can not have access. However, every manufacturer has "highly proprietary processes," so be careful this is not used as an easy excuse. Even the most secretive semiconductor firms have chemical service programs. Be sure to consider what options might accommodate your company's concerns, such as signing a non-disclosure agreement with your provider.
- If there are fundamental differences in the way your facility specifies, buys, or uses particular classes of chemicals—and if there is a good reason for those differences—you may want to investigate if it makes sense to roll all chemicals into one program.

In the single service provider concept, there are economies of scale and scope achieved through managing a large portion of chemical-related activities. If these economies do not exist because of previous constraints, there may be reason to narrow the program's chemical range or lifecycle elements.

A key question is really: "Which constraints form real barriers and which ones may be overcome?" As long as constraints exist in any form, it is important to consider them upfront.

Table 5.1 Sample Scopes of Chemical Service Programs

Company	Navistar	Ford	Chrysler	GM
Program Name	Chemical Management Services	Total Fluids Management & Total Solvents Management	Pay-as-Painted	Chemical Management Program (CMP)
Supplier	**Castrol**	**PPG/Chemfil**	**PPG**	**BetzDearborn**
Chemical Range	▸ coolants ▸ cleaners ▸ additives	▸ most chemicals *(excluding paint, sealer, lubricant)*	▸ all active chemicals	▸ water treatment ▸ maintenance ▸ purge ▸ commodity
Chemical Lifecycle Services	▸ procurement ▸ inventory mgmt ▸ distribution ▸ container mgmt ▸ qa/qc & testing ▸ maintenance ▸ product/ process engineering ▸ EHS studies ▸ training ▸ process/waste problem solving	▸ procurement ▸ inventory mgmt ▸ distribution ▸ container mgmt ▸ qa/qc & testing ▸ maintenance ▸ product/ process engineering ▸ EHS studies ▸ VOC reduction training ▸ process/waste problem solving	▸ procurement ▸ inventory mgmt ▸ distribution ▸ container mgmt ▸ qa/qc & testing ▸ maintenance ▸ product/process engineering ▸ EHS studies ▸ training ▸ process/waste problem solving	▸ procurement ▸ inventory mgmt ▸ monitor/ coordinate chemical use ▸ improve chemical performance ▸ reporting & communication ▸ product/ process engineering ▸ EHS studies ▸ training ▸ continuous waste minimization

Consider a larger scope of services when you design your chemical service program. The program is more difficult to develop upfront, but the benefits can be greater and there is more opportunity for continuous improvement over time.

Adapted from:
Bierma, T.J., and Waterstraat, F.L. Chemical Management: Reducing Waste and Cost Through Innovative Chemical Supply Strategies, John Wiley & Sons, Inc., New York, (forthcoming)

The "We Can Do It Better Internally" Argument

Don't be surprised if some feathers are ruffled by the concept that an "outsider" might possibly perform better than "one of the gang." There may be some initial resistance to the idea that current operations have room for improvement at all. But it isn't really a matter of doing it better, as much as it is remaining true to the core competencies of a business and maximizing the benefits of expertise.

Your challenge is to try to objectively assess the operations, absent the inevitable in-house bias and NIH (Not Invented Here) fears. There is a perception that you must "relinquish" control to the service provider. The reality is that companies often gain greater control because they are provided better information with which to make better decisions. With the service provider, you will be creating the goals and guiding the process, the service provider is implementing the details.

Thus, the chemical service model is based on the establishment of good faith and trust and will not work well if there is reluctance to fully release the chemical management tasks that become part of the program. This will allow the provider to optimally manage the responsibilities consistent with overall program objectives and not become hamstrung in power struggles, bureaucracy, or territoriality.

Ultimately, the broader the spectrum of your chemical service program, the more synergistic opportunities among lifecycle tasks and chemicals can arise.

Options and Closing Considerations

Ultimately, the broader the spectrum of your chemical service program the more synergistic opportunities among lifecycle tasks and chemicals can arise. Moreover, the greater control, responsibility, and accountability you can transfer to a service provider, the stronger the partnership, the stronger the program, and the stronger the ability to generate a significant impact. Of course, with potential reward comes risk. By putting your proverbial eggs (chemical management tasks) in one basket (a single service provider), you invest a lot of confidence in the arrangement and need to have safeguards in place. Options for companies not willing to take this large step include:

A Phase-in Approach

One way to hedge your risk is to phase in the chemical service program, either in chemical lifecycle, chemical range, or both. There are advantages and disadvantages to a phase-in approach.

The biggest disadvantage to phasing in a chemical service program is that subsequent program enhancements have to be added on the existing program, rather than being designed in from the start. There also may be compatibility issues. For instance, your service provider may be responsible for procurement but not inventory or for coolants but not cleaners. These incompatibilities might complicate interface and other interaction mechanisms and could create systems redundancy.

Keep Services In-house

As another option, once you have performed the baseline lifecycle and range analyses, you may decide that your current programs are adequate. Thus, for operational or logistical reasons, you may choose to manage the new program independent of your provider. To make this decision and move forward, however, you still need to fully assess and evaluate your current program.

OBTAIN TOP MANAGEMENT APPROVAL

The final step is to gain approval from top management on your recommendation for a new chemical service program and authorization to begin recruiting a chemical service provider. If your team champion has been doing his/her job, key upper managers should be familiar with the work of the team and anticipating the results. You must develop a strong presentation of the results from the team's cost analysis that support the recommendation for a new chemical service program. You should make arguments based on expected cost savings, increased availability of floor space, potential for process efficiency gains, environmental benefits, and liability reduction. Engage your team champion to help develop the presentation and do some behind-the-scenes preparation. Have individual meetings with key decision-makers to educate them and get their buy-in early. Remember, you are proposing major cultural and operational changes. You need top management support to drive the process forward towards selecting a service provider and implementing the program. (Please see *Appendix 7* for a sample presentation.)

Be sure to engage your team champion to help develop the presentation to upper management and do some behind-the-scenes preparation. Have individual meetings with key decision-makers to educate them and get their buy-in early.

DEVELOP A COMMUNICATIONS PLAN

When you proceed to develop a chemical services program and begin recruiting a service provider, you will need to inform key chemical users at the facility. The team is already composed of many department managers for areas that will be impacted. However, there may be some managers who were not involved and who need to be informed. It will also be important to inform the key chemical users in the facility as well. Some staff will be impacted by the new chemical service program, so the communications effort should be crafted strategically and clearly to inform staff about the upcoming change. We cannot overestimate the importance of an effective communication plan—as the chemical service provider will work with chemical users throughout your organization their participation is critical to the program's success.

A FINAL NOTE: COMMUNICATIONS AND OBSTACLES TO INTERNAL SELL

"In any moment of decision, the best thing you can do is the right thing; the next best thing is the wrong thing; and the worst thing you can do is nothing."
—*Theodore Roosevelt*

Even with a great communications plan, the people who are comfortable with the chemical sales model might not be so thrilled with the idea of service. They will be tempted toward the last of the options enumerated in Teddy's

quote—do nothing. But switching to a chemical service provider will require change on everyone's part.

In introducing chemical service to companies, there are often internal barriers to considering the changes we talk about in this manual. A communications strategy must take these issues into consideration and be developed with the team's upper management champion. Good presentation and communications materials supported with strong data help battle the resistance to change. As you develop your communications strategy and craft your message, you should consider addressing some of the barriers below.

In introducing chemical service to companies, there are often internal barriers to considering the changes we talk about in this manual. A communications strategy must take these issues into consideration and be developed with the team's upper management champion.

Chemical Management is Not a Priority

The perceived costs of purchasing and managing chemicals often comprise less than one percent of operating costs for a company. Thus, reducing chemical use or chemical management costs is generally not a corporate priority. However, as your analysis has revealed, conventional accounting systems typically do not reveal the actual, and often greater than expected, costs of chemical use.

- Costs of existing chemical management systems are not known because many relevant costs are pooled in overhead accounts and the chemical management activities are decentralized and diffuse.
- The role of chemical management in quality, efficiency, safety, and environmental performance is unrecognized and difficult to attribute.
- The resources and attention needed to implement chemical service compete against larger, short-term cost saving opportunities.

Lack of Basic, Credible Information

Chemical services represents a new supplier relations paradigm for which very little information is publicly available.

- Case studies have emerged only very recently.
- There is no centralized source of information.
- There is no neutral party disseminating information (most information comes from chemical suppliers selling the services).

High Perceived Transaction Costs and Risks

Business decisions are made first and foremost on the basis of perceived costs and risks. Some of the critical areas where there are high perceived costs or risks are:

Switching costs: There are immediate expenses in restructuring supply relationships known as switching costs. These may manifest as the costs of defining the chemical services program; selecting a service provider; adapting information systems; and/or maintaining the program.

Financial risk: This risk is tied to relinquishing chemical management responsibility to a service provider. Some purchasing managers fear higher prices when their supply base is centralized and there is less competition among suppliers (i.e., less control over supplier selection). From a manager's perspective, diminished control means more financial risk.

Operational risk: This type of risk is a major concern to engineers and facility managers who cannot afford a shut down due to problems in chemical quality or delivery. For example, an unplanned shutdown at a GM assembly plant due to a chemical supply shortage cost an estimated $40,000 per hour due to cascading effects at other plants.

ORGANIZATIONAL AND INSTITUTIONAL INERTIA

Chemical services represent a significant change in conventional operations, facing the same resistance as other shifts in management strategy.

- Outsourcing chemical management may threaten workers' security; transitioning to fewer suppliers or a single supplier changes long-standing supplier-customer relations.
- Managers fear operational failure might result from changing existing systems.
- Enhancing supplier relationships requires sharing potentially sensitive information.
- Purchasing mindset and reward systems focus on unit purchase cost, rather than total enterprise or lifecycle chemical cost.
- Many companies already believe they are doing the "best possible job." This attitude leaves little room for improvement.

T A S K S

- Develop the scope of your chemical service program
- Present to and gain buy-in from top management
- Develop a communications plan

D E C I S I O N P O I N T

Should our company go forward with issuing an RFP?

Is there agreement among the team and top management to develop a chemical service program? If so, the next step is to articulate the services that will be required of a chemical service provider in a Request for Proposal (RFP).

The RFP will clearly describe what your chemical requirements are, what services you need to manage them, and what sort of compensation structure you envision. It will request proposals to provide those chemical management services. Moreover, the RFP will be the primary vehicle for eliciting information you will use to evaluate the capabilities of the companies submitting proposals.

Recruiting a Chemical Service Provider

6.

Chapter 6

OBJECTIVE:

To develop a Request for Proposals to recruit a Chemical Service Provider.

The Request for Proposals (RFP) is the primary vehicle for communicating your expectations and evaluating the qualifications of prospective chemical service providers. In this section, we will outline: 1) how to develop an RFP and 2) how to evaluate responses to the RFP.

Once your team has decided to recruit a chemical service provider, the next step is to develop an RFP. The purpose of an RFP is twofold:

1. To provide information to the prospective chemical service supplier, explaining what services you are requesting. These might include the following:
   - Your chemical requirements and the objectives you want to achieve with the selected chemical service supplier
   - The services you want a company to provide (i.e., the scope of work)
   - The metrics for objectives and performance measures of these services
   - The compensation and pricing structure you envision
2. To solicit a description of the chemical service supplier's capabilities and experience so you can assess their capacity to provide the requested services.

DEVELOPING AN RFP

The RFP is developed from your team's original objectives, baseline data, and required scope of services and chemicals. A service provider (bidder) will need sufficient information about your objectives, needs, and specified scope of services to accurately estimate the chemical service costs.

For each service you specify, the bidder will estimate the resources required. Based on this, the bidder will propose a compensation structure. A clear RFP helps ensure the bidders' chemical service proposal cost estimates reflect the required level of service. It also places all bidders on a level playing field by minimizing uncertainty.

In drafting an RFP, there is a delicate balance between providing enough detail to get your point across without being overly prescriptive. If the language is too vague or imprecise, as demonstrated in the first column of *Table 6.1*, it will not be possible for the bidder to make an informed estimate. Too many details, as shown in the second column of *Table 6.1*, can inhibit a potential chemical service provider's innovation, and turn the RFP into an unwieldy document.

If the RFP language is too prescriptive, you might limit the bidder's ability to serve your needs as efficiently as possible. Your primary concern is that your needs are met, not how they are met. And while there may be some internal policies the chemical service supplier will need to follow (e.g., a documented method for screening new chemicals brought onto the site), it is usually better to leave the "how" to the bidder. Remember, one reason to solicit a service provider in the first place is because your core business is not chemical management: you expect the provider can manage your chemicals more efficiently. If you prescribe the means of providing those services, you risk

losing that benefit, as the chemical service provider would be managing chemicals the same way you already do.

Using the "balanced" approach—as shown in the last column of *Table 6.1*—your team will precisely explain your needs, without directing their specific manifestation. For example, in specifying inventory management, the RFP should reflect the desired quality of the material, as well as clarify when the material changes ownership. Allow the chemical service provider to determine how often the inventory is turned; how optimal stocking levels are set; how shelf-life items are handled, etc. As long as you receive chemicals that meet quality specifications in the specified delivery time, don't concern yourself with the minute details of how the chemical service supplier is doing his job.

Table 6.1 Sample RFP Language Specificity

Too Vague	Too Prescriptive	Balanced
Manage inventory.	The Provider will establish a system for the management of inventory where inventory is turned a minimum of 7.5 times per year. Regularly used chemicals should be stocked to provide a one-month usage buffer. For the restocking of these items, the Provider should add three business days to the supplier's stated lead-time. Inventory items with shelf-life requirements will be inspected on a weekly basis . . .	The Provider will own all chemical inventory. It will become the property of Company X upon receipt of the material requested.
Deliver chemicals.	Upon receipt of a chemical order, the Provider will process the request to initiate an inventory pickup from a local warehouse. The requested item should be loaded on the Provider's truck within 24 hours of the inventory pickup. The truck will follow a predetermined route and schedule . . .	Regularly used chemicals (as previously defined) will be delivered to designated delivery points within one business day of the request. Special order items will be delivered within 5 business days.

ELEMENTS OF AN RFP

CSP has found the following broad elements to be essential in clearly and systematically describing your chemical service requirements.

- **Cover Letter**
- **Introduction**
- **Scope of Work**
- **Scope of Chemicals**
- **Performance Metrics**
- **Compensation and Incentives**

The Cover Letter—should describe the general intent of the RFP; specify milestone dates and when a bidder's briefing will take place; and lay out ground rules for the RFP process. The team should designate a point person for all inquiries, and state all contact information in the cover letter. You should be clear that all inquiries must be made in writing to the designated point person. You may also wish to anticipate other likely questions or necessary information providers may need.

The Introduction—describes your company and its chemical management program objectives. You might include objectives and corporate philosophy regarding your interest in chemical use reduction, reducing chemical management costs, on-time delivery of chemicals, and improving safety. You can also add the location of facility(s), and the desired term of service in this section.

The Scope of Work—should outline the elements of the lifecycle established by the team in the previous section. The range of possible services was described in Chapter 4, *Table 4.1* using the chemical lifecycle. Within each stage of the life-cycle, you should define each service, thus creating a common understanding of your request. Some of the services you request may include:

- Inventory
- Quality Control
- Procurement
- Data Management
- Process Efficiency Improvement
- Waste Management

The Range of Chemicals—which was originally determined by your team, should provide an estimate of the average annual volume and/or cost of chemicals purchased. It is beneficial to break down the chemicals by gases, waste, and chemicals. It may be helpful to further breakdown costs by purchases of maintenance, bulk, specialty chemicals, etc. You may also want to list your current suppliers.

The Performance Metrics—will be the means by which you monitor progress towards your objectives. The development of the RFP is the best time to establish these metrics so that both you and your potential chemical service

By outlining your company's objectives, identifying the activities you want to reward (chemical use reduction), and identifying the activities you want to discourage (unnecessary chemical purchases), you and your supplier can work towards the same goal.

providers have a clear understanding of what performance parameters are most important to your operation. Performance measures should:

- Measure progress towards program objectives
- Be quantifiable and relatively simple to track
- Be achievable via positive activities (sometimes performance measures inadvertently create negative incentives)
- Be stated in terms that can be easily understood throughout the corporation

The following table is a list of sample performance measures. The measures you ultimately choose will depend on the most meaningful areas of your particular chemical service program.

Table 6.2 Sample Performance Measures

Area	Performance Measures
Procurement	On-time delivery of product (to the site or point of use, depending on the facility) ▸ Stock inventory delivered within 24 hours of request ▸ Special order items within 5 business days of request
Quality	No defects, no contamination
Chemical use reduction	10% reduction in chemical use per year
Cost reduction	5% reduction in annual costs of chemical management
Reduction in diversity and toxicity of chemical use	Elimination/minimization of one chemical per year from priority chemical use reduction list
Safety	No accidents Provide access to current MSDS information

COMPENSATION AND INCENTIVES FOR ENVIRONMENTAL PERFORMANCE

The compensation and incentives should be designed to motivate your supplier to aggressively achieve your program objectives. Through compensation, you can ensure that your organization's objectives are being met most efficiently by aligning incentives for both your company and your chemical service supplier. By outlining your company's objectives, and identifying the activities you want to reward (chemical use reduction), and the activities you want to discourage (unnecessary chemical purchases), you and your supplier can work towards the same goal.

There are several options for mechanisms to compensate a provider depending on what kind of activity you want to reward (see *Table 6.3*). You can also use the compensation mechanisms in different combinations. The right combination for your program will depend on your expectations of the program's cost-saving potential, your ability to implement any particular element, and how you want to create incentives.

Table 6.3 Compensation Mechanisms

Compensation Mechanism	Description	Issues to Consider
Implementation Fee	Depending on the magnitude of your program, there may be significant costs associated with its implementation. This fee, if included, can be a one-time, up-front fee or can be amortized over the life of the contract.	Providing an implementation fee gives the chemical service provider some initial resources to establish and institutionalize the program. If the fee will go towards building the provider's capacity, you may not want to pay it, because you may feel the provider should finance its own development and you do not want to bear the financial burden for fixed costs that will benefit the provider's other (perhaps future) customers. On the other hand, if the implementation costs are covering the establishment of systems or other program elements that will be of permanent benefit to your company, it may be appropriate for you to pay an implementation fee.
Management Fee	Many service offerings are compensated via a management fee. This fee is typically meant to pay for the cost (or value) of the services provided. There are several types of management fees: ▸ a periodic, fixed fee (e.g., $5,000 per month); ▸ a variable fee (e.g., $50 per labor hour expended); ▸ a proportional fee (e.g., 18% of chemical purchase costs); or ▸ a combination (e.g., $3,000 per month plus $20 per labor hour expended). For variable and proportional fees, sliding scales can be used (e.g., 18% for the first $1,000,000 of chemical purchases, 12% for the next $250,000, 8% for the next $250,000, etc.).	While a management fee seems like a logical means of compensating a service provider, it does have a few disadvantages: ▸ A fixed fee provides a payment that is not linked to a particular level of activity. A potential drawback is that, in its simplest form, the provider is compensated independently of the service it provides; i.e., there is no inherent incentive to perform well, payment is the same no matter what happens. ▸ A variable or proportional fee provides incentive to increase activity (and thus cost). Often, this outcome will create perverse incentives; e.g., the provider will gain as you purchase more chemicals (which is counter to your goals of reducing costs and chemical use). Linking fees to performance can mitigate these concerns (see *Table 6.2*).
Chemical Purchase Cost	If you are paying the provider directly for chemical purchases, there are two general options. The first is a straightforward pass-through where you pay the provider for the actual cost of the chemicals you purchase. The second is paying the provider a predetermined price for each chemical, based either on a bid amount or on a historical amount.	Passing-through chemical purchase costs is simple and provides a means to easily separate the purchases from the rest of the services they are providing. A major disadvantage is that it removes the provider's incentive to seek better prices (and you will have largely relinquished your ability to do so). Another disadvantage is that a pass-through system requires some level of price auditing that, itself, can be costly. As with management fees, linking performance to compensation can mitigate the missing incentive. Paying a predetermined price gives the provider an incentive to seek better prices (a savings that can be shared – see below). This scenario may require a mechanism for indexing the prices to account for program-independent price changes (e.g., inflation). In the purest sense of a service program, the purchase cost of the chemicals is not an issue because you pay for the service of the chemical, which includes the service and cost of chemicals.

Above all, the compensation structure must be established in a way that is beneficial for both parties. Mutual benefit is critical to establishing a strong, long-term relationship. The traditional purchasing mentality of "squeezing" suppliers will not create an environment to achieve the highest cost savings and chemical use reduction.

Based on our experience, we encourage you to solicit compensation options from prospective chemical service providers. This allows for the greatest

The traditional purchasing mentality of "squeezing" suppliers will not create an environment to achieve the highest cost savings and chemical use reduction.

Table 6.3 Compensation Mechanisms, continued

Compensation Mechanism	Description	Issues to Consider
Fixed Total Price	The simplest compensation structure is a fixed total price (e.g., $1,500,000 per year) that pays for both products and services.	This structure provides some of the benefits and suffers some of the flaws of those listed previously. It creates an inherent incentive for the supplier to reduce its own costs, which it can do by reducing the volume of chemicals purchased, the unit price of chemicals purchased, or the cost of the services it provides (ideally by making the chemical management system more efficient). If there are shared or guaranteed savings, both parties can benefit. More so than the other compensation elements, this one will likely require sophisticated normalization to adjust the fixed price for fluctuations outside the scope of the chemical service program. It may be the most difficult option for either party to initially price, but the simplest to implement.
Unit price	This takes the Fixed Total Price a step further. A price per finished product is paid for all chemicals and services. (e.g., $20 for each printed circuit board)	This is an optimal compensation mechanism because it links price to performance and production. When the chemical functions correctly, equipment is running efficiently, and product quality is high, the provider is rewarded. It pays the service provider for value-added services not just chemical performance. It does not have the difficulty of normalization, because as production increases, so does the payment to the provider.
Share Cost Savings	The cost savings you anticipate can be broadly classified as materials savings and management savings. These can be shared with your provider as part or all of the compensation. This feature is usually used in combination with another compensation mechanism.	To calculate materials savings, you need to use the predetermined material costs you established as a baseline. To calculate management savings, you need to establish a system whereby the savings can be realized and documented. Sharing savings provides a financial incentive for both parties to seek and achieve them. There is a lot of flexibility in how strong the relative incentives can be and thus how significant a part of the overall compensation the shared savings can be.

innovation potential and creative ideas from bidders. By strictly specifying how the chemical service provider will be compensated, you may create a constraint that results in a sub-optimal compensation structure. It is useful, however, to outline a few potential mechanisms to give the bidders a sense of what you are seeking.

For example, you may recommend several options for a provider to consider and encourage them to propose one that they think would be optimal. In each case, you are trying to establish incentives for the provider to reduce costs, reduce chemical use, and improve efficiency. You must also consider the risk and reward you are willing to accept when proposing each option. Below is an example of how you may lay out the options.

Above all, the compensation structure must be established in a way that is beneficial for both parties. Mutual benefit is critical to establishing a strong, long-term relationship.

Option #1

No fee is charged to the Company. The Company pays the service provider only what it currently spends on chemical purchases. The Company is guaranteed an annual reduction in this payment for three years. (e.g., The Company currently spends $55 million on chemicals. The Company will pay the service provider $55 million to purchase the chemicals and perform the scope of work outlined in the RFP, adjusted for major changes in production or unit purchase costs. Each year the Company will reduce the payment by 5 or 10%. Thus, the provider's compensation is based on the savings they can achieve.)

Option #2

Management fee and share cost savings. The Company will pay the service provider a management fee and the chemical purchase costs will also be passed through to the Company. The provider guarantees reductions in chemical purchase costs over 3 years. Savings above the guaranteed reduction will be shared. Also, management savings in reductions in chemical use and chemical toxicity will be shared. (Thus, the Company may regain some of the management fees through guaranteed reductions and additional cost savings.)

Option #3

Unit fee per finished product. The Company will pay a set fee for each successfully finished product. The fee will include all chemical and management costs (adjusted for major changes in production). (Thus, if the provider enables the Company to produce more products and/or reduce chemical use and/or reduce chemical management costs per product, the provider will be rewarded.)

Option #4

Please suggest an alternate compensation proposal that addresses the objectives outlined in this RFP and where the risk and reward are shared between the Company and service provider.

DISTRIBUTING THE RFP

With the text of the RFP complete, the task will shift to determining who should receive the RFP. Begin your list by naming current suppliers with whom you have had positive experiences. In addition, there are other chemical service

providers who will not be on your current supplier list, but whom you should consider, especially since some service providers don't make and sell chemicals. (New suppliers are entering the market everyday. For a partial list of suppliers see the CSP website at **www.chemicalstrategies.org**.)
Should you need to narrow your list, some suggested criteria are:

- Experience providing chemical management services
- Financial capability of assuming liability for a minimum level of damages
- Multi-regional presence if you want service at geographically diverse sites

A standard practice is to distribute a letter to inform suppliers that you will be preparing an RFP. You will ask suppliers to respond if they are interested in receiving the RFP. This will help to narrow your list even further.

Note that the concept of "chemical management services" is defined differently by different providers. The scope of services offered under the umbrella of chemical services can range from only strategic purchasing only, to managing the entire lifecycle of the chemical. Since no standard definition of chemical services exists, the burden is on your organization to evaluate each potential service provider's ability to successfully meet your objectives.

MANAGING THE RFP PROCESS

Once you have sent out the RFP, the team must actively manage the process. Outlined below are the major steps in managing the RFP process. (A sample workplan for selecting a service provider can be found in *Appendix 4*.)

Develop a Protocol for Responding to Inquiries

The bidders conference is a forum where potential service providers can ask questions about the proposal preparation. Undoubtedly, however, additional issues will arise. It is necessary, then, to prepare for that eventuality, and establish a system in which all bidders have fair and equal access to whatever information is communicated. A good way to manage this process is to establish a protocol (which you will have outlined in your RFP cover letter) for handling information. It may seem a burden to devote resources to facilitating bidders in their proposal preparation, but it is a worthy investment that will increase the likelihood of complete and comparable proposals. An established protocol helps to avoid individual information exchanges, which can be much more costly in both time and resources.

A suggested protocol is to establish a "point person" for incoming and outgoing information. As inquiries are received (in writing) from bidders, your point person will provide answers, seeking team member input as necessary. There may be cases, when ad hoc team meetings may be necessary to fully respond to an inquiry. Once the answer is complete, both the inquiry and the answer are sent (in writing) to all bidders. A system to confirm that all bidders have received all correspondence during this stage can help alleviate subsequent problems. E-mail confirmation may be the most efficient way to do this.

Managing the RFP Process

- Distribute RFPs
- Develop a protocol for responding to inquiries
- Inform personnel that RFP is issued
- Convene a bidders conference
- Develop criteria to evaluate the proposals
- Receive proposals
- Evaluate responses
- Obtain approval from top management
- Negotiate the contract

INFORM FACILITY PERSONNEL THAT AN RFP HAS BEEN ISSUED

Through your earlier communications, you have already informed those affected by the new program of the team's progress. Once the RFPs are distributed, however, it is public knowledge that your company has intentions of significantly changing your chemical management operations. Therefore, it is important to inform a broader circle of people within your company that they may be receiving inquiries about the RFP. Facility personnel should direct all inquiries to the Team-designated point person.

CONVENE BIDDERS CONFERENCE

One challenge in managing the RFP process is in ensuring that all bidders are provided the same information. The information flow during this stage, therefore, requires meticulous attention and organization to provide a level playing field for suppliers. An effective tool for managing information is by convening a conference for the bidders at your site. Objectives of a bidders conference are to:

- Provide a forum to supplement the information that potential suppliers received in the RFP
- Give chemical service suppliers an opportunity to pose questions, provide feedback, and make comments
- Help ensure that critical pieces of information are received and understood by all parties
- Gain insight into who is interested in responding to the RFP
- Allow you to give potential suppliers a better flavor of the facility's environment in which they would be working

For the sake of consistency, the point person should lead the conference session. However, your entire team should attend the conference to answer questions, since the knowledge of the chemical service program is distributed throughout the team. Also, meeting prospective chemical service suppliers will be useful to the entire team when it is time to evaluate the proposals.

The agenda for the conference should be flexible, but should include:

- **Introduction**
- **Restatement of the chemical service program rationale and goals**
- **Company and facility overview**
- **Facility tour**
- **RFP Discussion and Questions and answers**
  - general
  - scope elements
  - compensation
  - concluding remarks and restatement of schedule

One challenge in managing the RFP process is in ensuring that all bidders are provided the same information. The information flow during this stage, therefore, requires meticulous attention and organization to provide a level playing field for suppliers.

When preparing for the bidders' conference, review the RFP and prepare the team for difficult questions. You can also reuse presentation materials previously developed for internal purposes. The remainder of the preparation is simply reviewing the RFP, and preparing for many difficult questions.

RECEIVE PROPOSALS

As you receive proposals, you should carefully log what you have received and scan the proposals for completeness. For each RFP recipient, you should send a written communication following the proposal submission deadline. The correspondence will convey one of the following sentiments.

> Thank you for your proposal. We will contact you on _____.

> We have received your proposal and found it to be incomplete in the following areas: _____.

> We have not received a proposal from you. Please let us know if you plan to submit one or, if not, why you chose not to submit one. *(You may find this information instructive for the future.)*

Once you have received all the proposals, you are ready to begin the difficult task of evaluating them. The challenges at this stage are to evaluate each proposal on the same basis and to distinguish between substance and undeliverable promises. You will need to evaluate the responses to the questions posed in your RFP. The first is simply to determine if the response is adequate. The second, and more difficult level of evaluation is to determine if the response is credible (i.e., how likely is it that the bidder can support the response in practice).

T A S K S

- Develop a Request for Proposals (RFP)
- Develop a list of suppliers who will receive the RFP
- Inform key facility personnel that an RFP will be released
- Distribute the RFPs with a schedule for decision-making
- Convene a bidder's conference
- Receive proposals and send out confirmation of receipt

7. *Selecting a Chemical Service Provider*

DEVELOP EVALUATION CRITERIA

It is important to create some basis from which you can equitably evaluate each proposal. Depending on the nature of the proposals, this may be simple or elaborate. You should consult your corporate procurement department for the standard procedure they use to evaluate RFPs. You may need to amend their procedure slightly to accommodate the unique nature of chemical service contracts. The criteria for evaluating the proposals will be different, as will the variety of proposed compensation structures. Different providers will propose different payment schemes, and your team will need to analyze the implications of each proposal.

In this section, we will outline some general evaluation criteria and a simplified scoring methodology. Again, the corporate procurement department probably has experience in this and could serve as an excellent facilitator in your process. You should ask them to conduct the financial background check on the companies submitting bids. Financial integrity is a minimum criterion, and will immediately disqualify a supplier who does not meet this minimum qualification.

This chapter presents a simple format focusing on technical and cost evaluation. The result will yield a numerical index for providing a quantitative proposal ranking. Note that it is a good idea for your team to develop the evaluation criteria and weightings while you are waiting for proposals to be submitted.

The proposals submitted by the service providers should mirror the RFP in structure, therefore, the evaluation methodology should, as well. Each piece of information you solicited in the RFP is relevant to your selection. Therefore, each piece should be evaluated and then compiled for overall evaluation of the proposal.

Table 7.1 outlines general evaluation criteria and weightings. Assignment of proposal evaluation weightings should be done together by the team. Since the team represents different program interests, it is important to achieve consensus on the weightings and criteria.

To reach consensus, the team should conduct a process where each member proposes weightings for the major components. For example, the table below breaks up the evaluation into three major components based on the RFP: experience, service reliability, and compensation. The team first weights those areas (see Total Weighting column). The relative weighting should be reflective of the importance of each area in the final decision-making process.

Subsequently, more detailed criteria are filled in for each major component—again, based on the language in the RFP. In the example of "experience," two more areas are included: "experience providing chemical service," and "general management capability." These sub-components are assigned weightings as well.

Chapter 7

OBJECTIVE:

To analyze the costs and benefits of the proposals and select a service provider.

It is important to document the evaluation process in order to:

- **Justify the Team's decision**
- **Support your recommendation to upper management**
- **Answer any challenges internally, and by other suppliers about the award**

Table 7.1 Sample Evaluation Criteria and Weightings

RFP Components	Sub-total Weighting	Total Weighting
1. Experience		10
▸ Experience providing chemical service	5	
▸ General management capability	5	
2. Service reliability		50
Ability to meet scope of services:		
▸ Procurement/delivery	10	
▸ Chemical use reduction/efficiency improvements	10	
▸ Hazardous waste management	10	
▸ On-site personnel commitment	5	
▸ Data systems/data management	15	
3. Compensation proposal		40
▸ Lowest proposed cost	25	
▸ Potential for shared savings	5	
▸ Pricing structure incentivizes chemical use reduction	5	
▸ Linkage to performance measures	5	
Total		**100**

Even more detail can be included by assigning each question in the RFP to one of the sub-components. For example, in the "data systems/data management" line item, there may be three questions from the RFP that correspond to this line item. The fifteen points are distributed among the questions and the suppliers' answers are evaluated by awarding points. To determine the rating scale and weighting for each question, it may be useful to break your team into subgroups, organized by expertise. For instance, one team would develop rating scales and weightings for the hazardous waste section, etc.

NOTE: *The evaluation of the written proposal is but one input into the final decision of what chemical service provider(s) with whom to pursue discussions. The net cost of the proposed services, customer references, experiences during proposal preparation, presentations, and even instinctual feelings all will contribute to the final recommendation.*

EVALUATE THE PROPOSALS

Once weightings are assigned to each component and sub-component, the Team evaluates the proposals. For each line item, a scoring is assigned. For example, under "Experience," the team may feel that the supplier does not have much chemical management experience, but very good general management capability. Therefore, for "Experience providing chemical service," they are given 2 points out of 5, and for "General management capability," they are given 4 points out of 5. Thus, the total weighting for "Experience" is 6 out of 10 points.

Systematically reviewing the proposals may best be done individually by the Team members before reviewing them as a group. If there are many proposals, each member may only review two or three, and the team will rely on the judgement of those few. The team, then should set aside several days to collectively review the proposals. It is very helpful to have a facilitator assist the team in the evaluation process.

ANALYZE THE COST OF THE PROPOSAL

One of the most important aspects of evaluation is analyzing the proposed cost of services offered by each bidder. The challenge in evaluating the proposals is that you will make assumptions related to expected volume, savings, etc., which will affect the bottom-line implication of each option. It is also possible that the bidders made assumptions you will need to understand.

Ultimately, you will estimate the bottom-line impact of each proposal for the duration of the contract. To determine the bottom-line impact, you will use your baseline data as a reference point against all proposed scenarios.

Analyzing the costs and potential benefits of each proposal is a critical step in selecting a service provider. Be sure there are good incentives included to encourage environmental performance and chemical use reduction.

Estimating Savings Potential

This is where you calculate the potential savings for your company over time. You need to read through the compensation proposal from each service provider and write down all the fees proposed and the savings you expect to gain. For each expected savings, you then estimate the cost reductions that you think your company will realize by engaging a service provider. Your assumptions are based on what you know about your own chemical management costs and best guesses on opportunities for savings. In estimating your own savings, you can also estimate the income of the service provider.

The challenge in estimating savings is identifying which savings will be "hard" savings and which ones are "soft" savings. Hard savings are savings that can be quantified in the accounting ledgers of the company (e.g., permanent head count reduction, warehouse space freed up). Soft savings are not generally costs that can be accounted for, but are still quantifiable (e.g., redirected resources such as partial personnel, cost avoidances such as reduced workers compensation claims). You may have identified these potential savings when developing your baseline data.

In the example in *Table 7.2*, we list hard and soft savings. Depending on how your company estimates cost savings, you may choose to include the soft savings in the model or as an additional piece of information.

Modeling the Costs and Benefits

In our experience, we have found it necessary to model the various proposals in a spreadsheet. This exercise enables you to standardize your method of estimating financial impact and test the sensitivity of your assumptions. The sample model in *Table 7.2* illustrates how to go about designing and utilizing a simple model to understand various compensation proposals. There are five major inputs to the model:

- Baseline data (Lines A-C)
- Transition savings expected (Line D)
- Material savings expected (Line E)
- Efficiency improvement savings expected (Line F)
- Redirected resources (Line G)
- Fees: Management fee/Implementation fee/Fixed fee proposed (Line H)

Table 7.2 Evaluating the Costs and Benefits of a Proposal

	Year 1	Year 2	Year 3	Total
Company Y Current Costs				
(Based on baseline data gathered in 1998)				
A. Internal Chemical Management Costs	$ 7,500,000	$ 7,500,000	$ 7,500,000	$ 22,500,000
B. Material Baseline Costs				
B1. Chemicals	$ 18,000,000	$ 18,000,000	$ 18,000,000	$ 54,000,000
B2. Waste Disposal (incl. Transport)	$ 4,500,000	$ 4,500,000	$ 4,500,000	$ 13,500,000
C. Total internal chemical mgmt. costs	**$ 30,000,000**	**$ 30,000,000**	**$ 30,000,000**	**$ 90,000,000**
Estimated Savings Potential				
HARD SAVINGS				
D. Transition Savings				
D1. Company Y Transition Savings	**$ 1,200,000**	**$ 1,500,000**	**$ 1,500,000**	**$ 4,200,000**
	100%	100%	100%	
E. Material Savings				
E1. Leveraged Savings for Chemicals	$ 1,800,000	$ 3,060,000	$ 3,960,000	$ 8,820,000
E2. Waste Savings	$ 225,000	$ 450,000	$ 450,000	$ 1,125,000
Shared Material Savings				
E3. Company Y Chem & Waste Savings	**$ 1,012,500**	**$ 2,457,000**	**$ 3,087,000**	**$ 6,556,500**
	50%	70%	70%	
F. Efficiency Improvement Savings	$ -	$ 900,000	$ 3,000,000	$ 3,900,000
F1. Company Y Savings	**$ -**	**$ 450,000**	**$ 1,500,000**	**$ 1,950,000**
	50%	50%	50%	
SOFT SAVINGS				
G. Redirected Resources				
G1. Company Y Savings	**$ 550,000**	**$ 775,000**	**$ 825,000**	**$ 2,150,000**
H. Management Fee				
H1. Company Y pays to Service Provider	**$ (1,200,000)**	**$ (1,000,000)**	**$ (800,000)**	**$ (3,000,000)**
I. Total Company Y Savings	**$ 1,562,500**	**$ 4,182,000**	**$ 6,112,000**	**$ 11,856,500**

Baseline Data

A. Internal Chemical Management Costs

Enter the chemical management costs you calculated in Chapter 4, making sure not to include the cost of chemicals purchased. Enter the costs for each year of the proposed life of the contract (our example only illustrates three years of a five-year contract.)

B1./B2. Material Baseline Costs

Enter the value of the chemicals purchased and the cost of waste disposal that you are including in the contract.

C. Total Internal Chemical Management Costs

Adding the chemical management costs (Line A) and materials costs (Lines B1 and B2) results in the total costs for your facility or company to purchase and manage chemicals. In our example, we assumed that the baseline costs of $30 million are recurring costs (i.e., in each year, your company expects to incur chemical and waste management costs of $30 million), therefore over three years, the facility will spend a total of $90 million to perform these functions.

In reading the proposal, Company Y expects savings in the four areas listed below.

D. Transition Savings

Many companies experience immediate savings by transferring current in-house functions to a service provider (e.g., procurement, inventory, record keeping, reporting, document production, storage, etc.) These savings can be estimated from your cost analysis of the departments that will be affected. In our example, Company Y expects to realize most of the transition savings in Year 1, with additional savings in Year 2 and no further reductions in Year 3. Line D1 indicates that 100% of the savings from the transition accrue to the Company.

Note: the annual savings are recurring.

E. Material Savings

Service providers have several methods for reducing the overall cost of chemicals purchased and services performed. Examples include:

- Consolidating all chemical purchases to achieve volume discounts
- Pooling your company's purchasing with other clients to achieve volume discounts
- Reducing the number of suppliers used, reducing transaction costs and increasing the volume purchased to achieve volume discounts
- Eliminating overbuying of a product (no longer forcing you to buy a dozen when you only need 2, causing you to throw the other 10 away)
- Improving the delivery containers to increase recycling, decrease spoilage, and decrease waste
- Reducing the volume of chemicals used and thus reducing the amount of waste generated
- Pooling the hazardous waste with other companies to achieve volume discounts with waste haulers.

Note: In the example, the annual savings are recurring, we add the savings of the previous year to the current year savings.

E1. Leveraged Savings for Chemicals

In Line E1 of our example, we assumed the service provider would achieve a 10% reduction in the cost of chemicals in Year 1 (see Line B1– total chemical costs are $18 million). In Years 2 and 3, we assumed additional reductions of approximately 7% and 5% respectively.

E2. Waste Savings

In Line E2, we assumed reductions in the cost of waste disposal of 5% in Year 1, an additional 5% in Year 2 and no further reductions in Year 3.

E3. Shared Material Savings

So, how are these material savings allocated between the company and the service provider? In this proposal, the savings are shared as follows: Company Y receives 50% of the material savings in Year 1 and 70% in Years 2 and 3 (based on total material savings–add Lines E1 and E2). The service provider receives 50% of the savings in Year 1 and 30% in Years 2 and 3. The rationale is that the service provider is investing greater resources in initiating the program than they are being compensated for in the management fee. The shared savings is a performance-based approach for additional compensation to the service provider. The proposal ensures an incentive for the service provider to continuously drive down costs and materials purchased in Years 2 and 3.

F. Efficiency Improvement Savings

One of the value-added services that a service provider can bring to the relationship is to seek out, identify, and help implement efficiency improvements. For example, a service provider may identify leaks in the system due to their closer oversight of chemical use and assist the Company in fixing it. Other improvements may include changes to a paint process that could reduce the volume of waste during application or suggestions for substitute chemicals that are less toxic. When an efficiency improvement is implemented, the expected savings should be calculated. In our example, the efficiency savings are shared 50/50 over the life of the contract (savings are calculated after implementation costs have been recovered). The shared savings is intended as an incentive for the provider to suggest and help implement improvements and for the Company to approve implementation and assign resources to make it happen.

In our example, we assumed that a service provider would not achieve any efficiency improvements in Year 1, but would achieve savings in Years 2 and 3. Our experience tells us that efficiency improvements are directly related to the level of cooperation between the Company and the service provider. As you can see from the example, the savings can be substantial, and in this case, more than offset the cost of the management fee.

G. Redirected Resources (Soft savings)

Redirected resources are savings realized through relieving personnel of part of their responsibilities. No personnel leave the company, but rather are redirected with other responsibilities. For example, a Procurement Manager spends 20% of her time managing chemical buyers. With the chemical services program, she will no longer have any chemical-related responsibilities. Instead, she will assume management of a different group of buyers. Other redirected resources include cost avoidances such as using fewer vehicles for chemical delivery, and needing less information management support, etc.

H. Management Fee

In this example, the service provider proposed a management fee of $1.2 million in Year 1, $1 million in Year 2, and $0.8 million in Year 3. The purchase cost of chemicals is passed through to the Company.

Adding up the savings

The outcome of the analysis is a better understanding of the total annual savings and cumulative savings your company can expect over the life of the contract. You can also roughly estimate the compensation that the chemical service provider will receive.

I. Total Company Y Savings

To calculate the total expected savings for the Company, add Lines D1, E3, F1, G1 and H1. (Remember Line H1 is a "cost" to the Company not a savings and will be subtracted when calculating the total savings.)

Testing the Model under Changing Assumptions

Once you have built this cost-benefit model, you can test it under various assumptions. You may want to ask questions like:

- What happens if the material savings are less than we expect?
- What happens if our annual chemical purchases drop by 15% due to successful chemical use reduction activities by our provider?
- What happens if the transition savings happen less quickly than we anticipate?

After you have run several scenarios for each bidder's proposal, you should give the Team a summary sheet of the information. You will be able to evaluate which compensation proposals are most favorable under a variety of conditions. This summary will serve as valuable input into the final decision-making process.

When a service provider is selected, the Company will likely go through several rounds of negotiations and these numbers will change. The Company may feel they should receive a greater share of the material savings in Year 1 or the service provider may want some of the transition savings. By developing a good model, you can continue to enter different proposals and estimate the bottom-line impact to your company.

DOWN-SELECT THE BIDDERS

After evaluating the proposals, the team should select the top two or three candidates with whom to conduct further discussions. Undoubtedly, questions

Cashing-in on the Savings:

It will be important to assign a "bean counter" —someone who will be responsible to verify savings and is agreeable to each party. Also, some of these savings can be difficult to estimate and document. Questions arise like: Whose idea was it? Who will pay for initial implementation costs? Is the saving an efficiency savings or a material savings? Issues like these need to be addressed as they arise. As your relationship with the service provider grows and deepens, these issues will be easier to resolve.

will arise from the remaining proposals and there may be additional information you need. You should solicit that information prior to the bidder presentations.

Organize Bidder Presentations

Inviting bidders on site to highlight their proposed program can provide insight into the depth of their understanding. You will probably want to develop a core list of questions or issues for each bidder to address, such as:

- Elaborate on your prior experience in terms of complexity of a given customer site. Include details such as chemical commodity variety and volume; quantity of deliveries/day; list of provided services; quantity of different customer interfaces; quantity of part numbers; etc.
- Discuss your experience with process efficiency improvements and give examples of chemical use reduction achievements.
- Give an example of a planned performance metric and how it would be met.
- What kind of information systems support do you have available and/or anticipate from us?
- Describe your existing shelf-life control system including capability for testing, recertification of materials, and storage of temperature-sensitive items.
- How do you propose to manage overages and returns?
- Describe your plan for solid waste minimization (e.g., packaging).
- Discuss controls on restricted materials and approach to assure approvals.
- How do you plan to ascertain quality requirements and what is your method to continually flow these to your suppliers?
- Discuss your transition and implementation plan.

The issues and questions posed for the presentation should be those that you feel are the most difficult to convey in a proposal; those that might benefit from an interactive discussion; and those that are of the highest importance. Based on the individual proposals, you may ask specific questions of specific bidders, but you should be wary of gathering information that is not comparable among your bidders.

Gather Reference Information

All evaluation up to this point will have been based on information the bidders have provided to you. A critical piece of the evaluation process is to talk with bidders' past or current customers. This exercise will provide the only third party perspective on a bidder you will have. It is, therefore, an extremely important step. Similar to the other steps of evaluation, this step will benefit from a somewhat organized, systematic approach.

Below is a sample slate of questions for bidder references. These are the types of questions you will want to ask to get the perspective of your peers regarding the overall quality and credibility of a bidder.

Table 7.3: Bidder References Inquiry

1. Provide background of the facility (or facilities) in which _____ provides chemical management services.
2. What services does _____ provide for you? (e.g., procurement; inventory management; chemical use reduction via process improvement suggestions, substitutions, consolidations; data management in support of environmental reporting; waste management; internal accounting, etc.)
3. What chemicals are included/excluded?
4. How is _____ compensated?
5. How long have you had a relationship with _____? How has it evolved over time? Do you expect to maintain the relationship for the foreseeable future?
6. Characterize your staff's interaction with _____. Who at _____ does your staff communicate with, by what means, and how often? How is their response time? Are you satisfied with the level of communication?
7. Has _____ exceeded your expectations or their promises in any way? Have they fallen short in any way?
8. Have you experienced any problems with _____ ? If so, how have they been resolved?
9. Has _____ always had sufficient resources *(information, expertise, personnel, etc.)* to meet your needs?

Bidder References Inquiry, cont'd.

10. Do you consider the services provided by _____ to be a good value to your facility?
Why or why not?

11. What are your goals in using _____ as a chemical service provider?
How has _____ helped you achieve these goals?

12. Provide examples of how _____ has suggested, initiated, and/or implemented improvements in your facility's management of chemicals.

13. Would you recommend _____ as a chemical management service provider?
Why or why not?

After reviewing all the information gathered above, the team must select a service provider. Once a service provider has been selected, the team needs authority to enter into negotiations and eventually sign a contract with the service provider.

If the team needs the approval of upper management to proceed, the next task is to develop a presentation for upper management. (See *Appendix 7* for a sample presentation.) Ideally, the upper management champion identified in the beginning of this process has been keeping upper management abreast of your progress. Therefore, the presentation should focus on a clear rationale of why the team has selected the service provider, complete with the cost-benefit analysis. If the team has authority to proceed with negotiations, it is still important to inform upper management of the team's selection and rationale.

T A S K S

- Develop evaluation criteria
- Evaluate the proposals
  - Analyze the cost of each proposal
- Down-select bidders and gather supplemental information
- Present recommendation to top management

Negotiations and Gearing up for Implementation

Just when you think all the hard work is done, negotiations begin. We have seen this process take anywhere from one to eight months. It is important to remember the major tenets of cooperation and mutual gain as you begin delving into the details of contract negotiation. There is a tendency to let the details overwhelm the intentions of this strategic partnership followed by threats to back out of the agreement. Find out what each party needs to make the program work and seek creative solutions to achieve a fair agreement.

When a contract is signed, celebrate! You have introduced a new way of doing business for your company and a better way to utilize the resources of your supplier. The transition phase is an opportunity to conduct a major communications outreach to your facility or company describing the new program, the expected benefits, and gearing people up for implementation.

Good luck!

D E C I S I O N P O I N T

Who is the best service provider for our company?

- Team acquires authority to enter into negotiations
- Award contract to service provider

Appendices

8.

Appendix 1

Chemical Service Program Case Studies

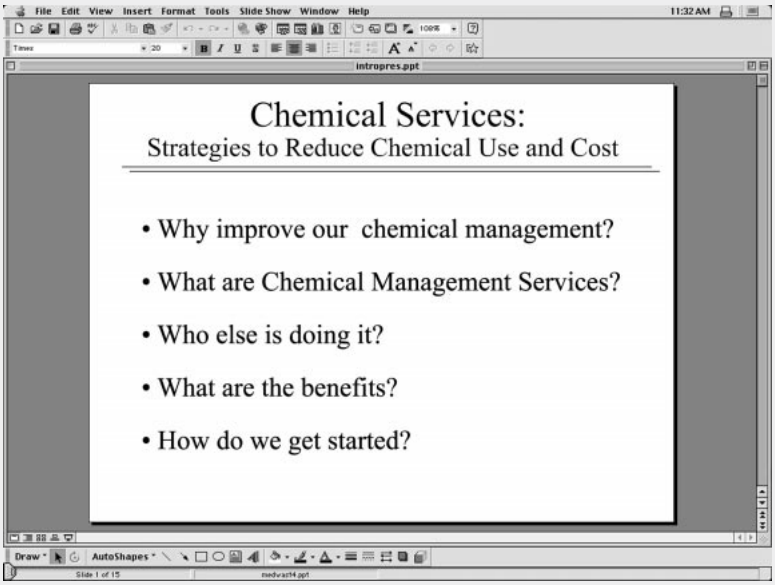
Company	Navistar	Ford	Chrysler	GM
Program Name	Chemical Management Services	Total Fluids Management & Total Solvents Management	Pay-as-painted	Chemical Management Program (CMP)
Supplier	**Castrol**	**PPG/Chemfil**	**PPG**	**Betz/Dearborn**
Chemical Footprint	▸ Coolants ▸ Cleaners ▸ Additives	▸ Most chemicals (excluding paint, sealer, lubricant)	▸ All active chemicals	▸ Water treatment ▸ Maintenance ▸ Purge ▸ Commodity
Contract Structure	▸ Fixed monthly fee ▸ Staffing fee ▸ Gainsharing ▸ Rebates	▸ Fixed fee per vehicle ("unit pricing") ▸ Fixed annual fee (not linked to production volume)	▸ Fixed fee for quantity of vehicles painted ("unit pricing")	▸ Fixed fee for quantity of vehicles painted ("unit pricing") ▸ Management fee (selected services)
Expectations	▸ Quality ▸ Performance ▸ Rust prevention	▸ Annual reduction in fee per vehicle ▸ "Productivity reduction" (negotiated saving target)	▸ Quality Performance ▸ "Quality finish"	▸ Steady/Declining unit prices ▸ Savings target ▸ Annual savings equal to 5% of contract value
Services	▸ Procurement ▸ Inventory mgmt. ▸ Distribution ▸ Container mgmt. ▸ QA/QC & testing ▸ Maintenance ▸ Product/process engineering ▸ EHS studies ▸ Training ▸ Process/waste problem solving	▸ Procurement Inventory mgmt. ▸ Distribution ▸ Container mgmt. ▸ QA/QC & testing ▸ Maintenance ▸ Product/process engineering ▸ EHS Studies ▸ VOC reduction training ▸ Process/waste problem solving	▸ Procurement ▸ Inventory mgmt. ▸ Distribution ▸ Container mgmt. ▸ QA/QC & testing ▸ Maintenance ▸ Product/process engineering ▸ EHS studies ▸ Training ▸ Process/waste problem solving	▸ Procurement ▸ Inventory mgmt. ▸ Monitor/Coord. chemical use ▸ Improve chemical performance ▸ Reporting & communication ▸ Product/process engineering ▸ EHS Studies Training ▸ Continuous waste minimization
Benefits	▸ Coolant usage reduced >50% ▸ Coolant waste reduced >90% ▸ $10,000/yr rebates in reduced usage ▸ Reduced downtime ▸ Improved quality ▸ Reduced waste ▸ Improved/reduced inventory ▸ Improved EHS ▸ Governor's Award	▸ VOC emissions reduced by 50% in 18 months ▸ Waste sludge reduced 27% (>$50,000/yr) ▸ Declining costs ▸ Improved quality ▸ Improved/reduced inventory ▸ Improved EHS ▸ Governor's Award	▸ >$1 million in savings in year 1 ▸ VOC emissions & waste reductions ▸ Improved quality ▸ Improved/reduced inventory ▸ Improved EHS ▸ Governor's Award	▸ >$1 million in savings in year 1 ▸ 8% decrease in costs ▸ Expanded services ▸ Improved/reduced inventory ▸ Product consolidation ▸ VOC emissions & waste reductions ▸ Reduced downtime & labor costs

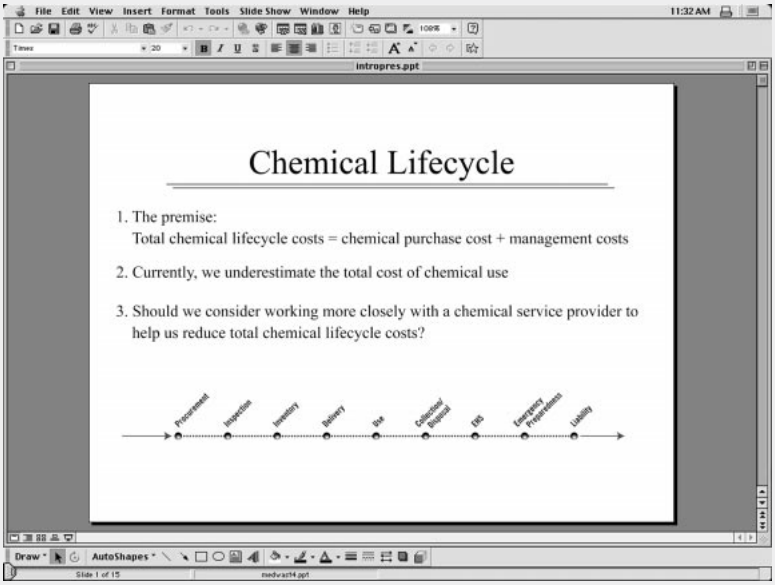
Adapted from:
Bierma, T.J., and Waterstraat, F.L., Chemical Management: Reducing Waste and Cost Through Innovative Chemical Supply Strategies, John Wiley & Sons, Inc., New York, (forthcoming)

POWERPOINT PRESENTATION: INTRODUCTION TO CHEMICAL SERVICES

Appendix 2

Presentation: Introduction to Chemical Services





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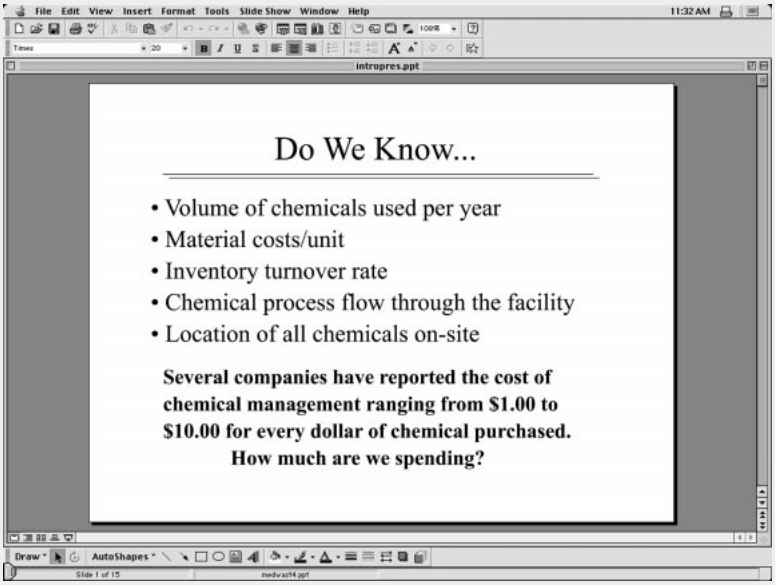
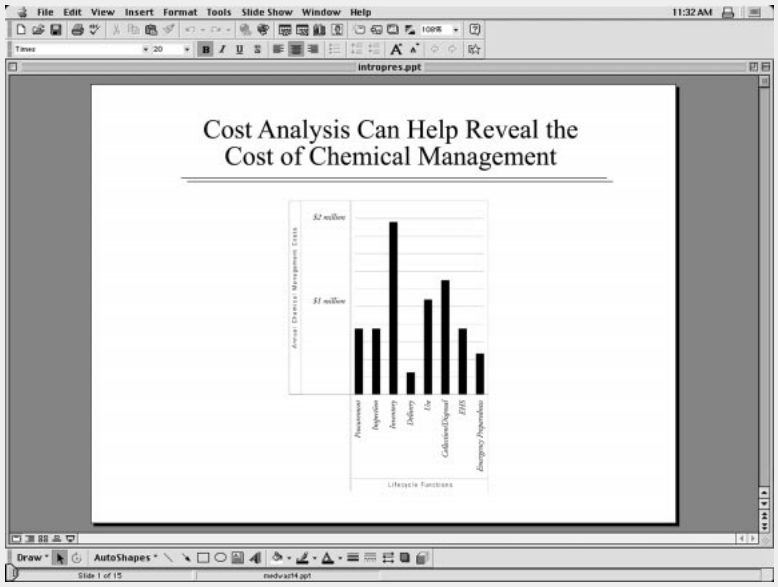
INTRODUCTION TO CHEMICAL SERVICES *continued*

Appendix 2

Presentation: Introduction to Chemical Services

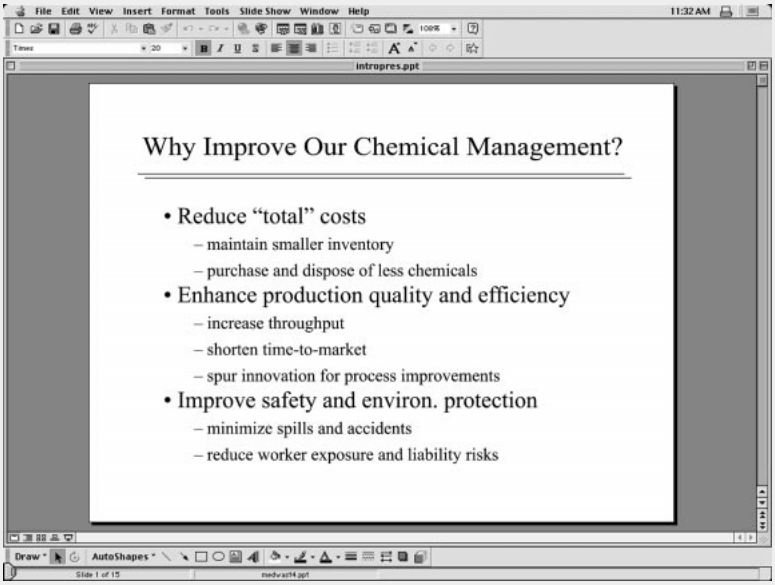


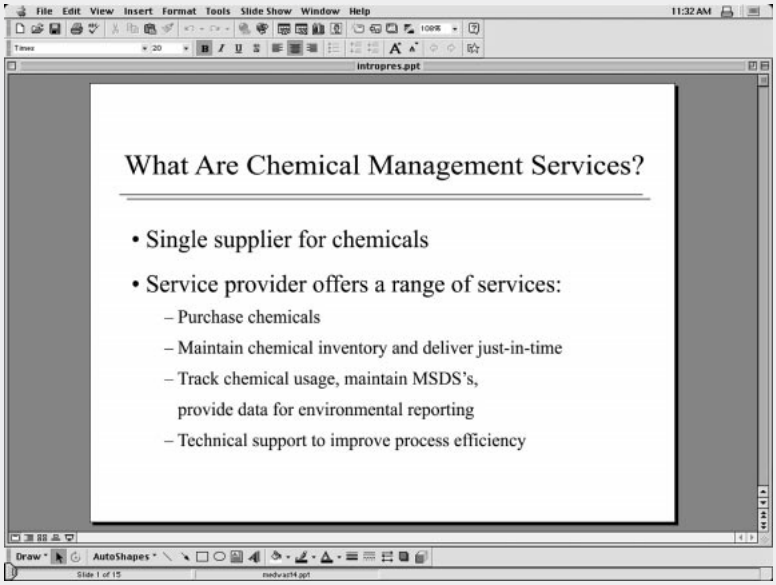


INTRODUCTION TO CHEMICAL SERVICES *continued*

Appendix 2

Presentation: Introduction to Chemical Services

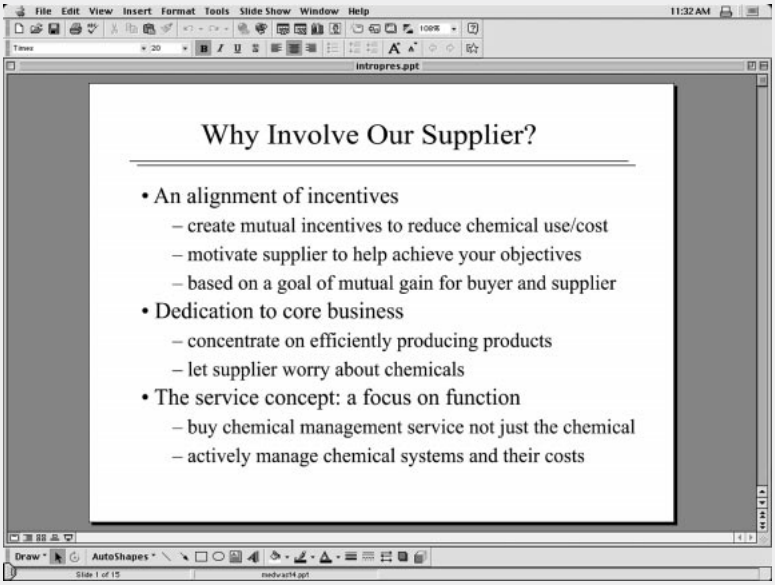


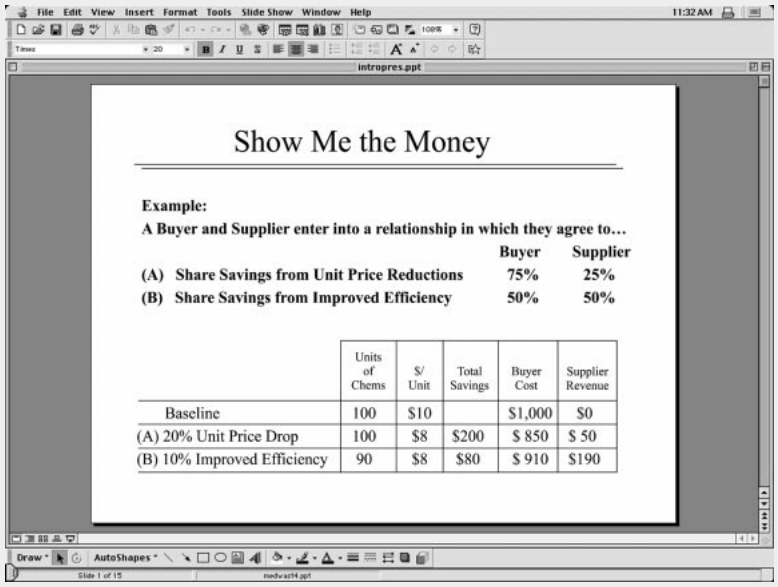


INTRODUCTION TO CHEMICAL SERVICES *continued*

Appendix 2

Presentation: Introduction to Chemical Services

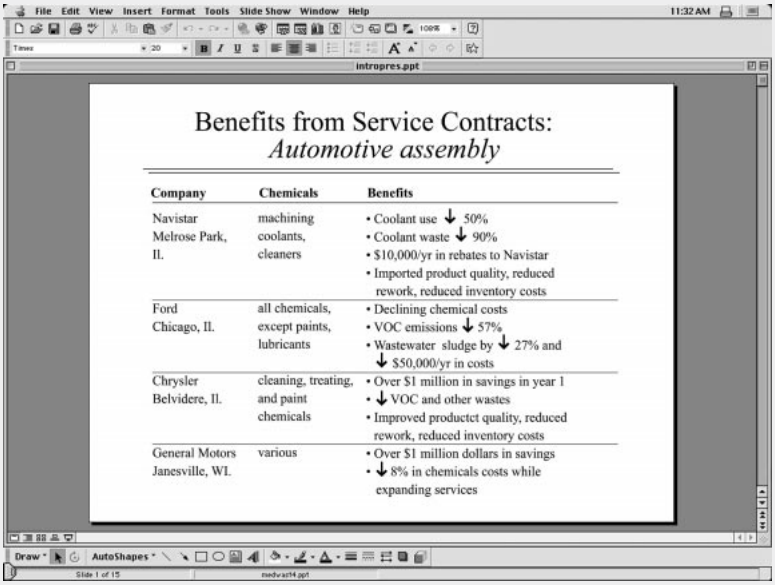




INTRODUCTION TO CHEMICAL SERVICES *continued*

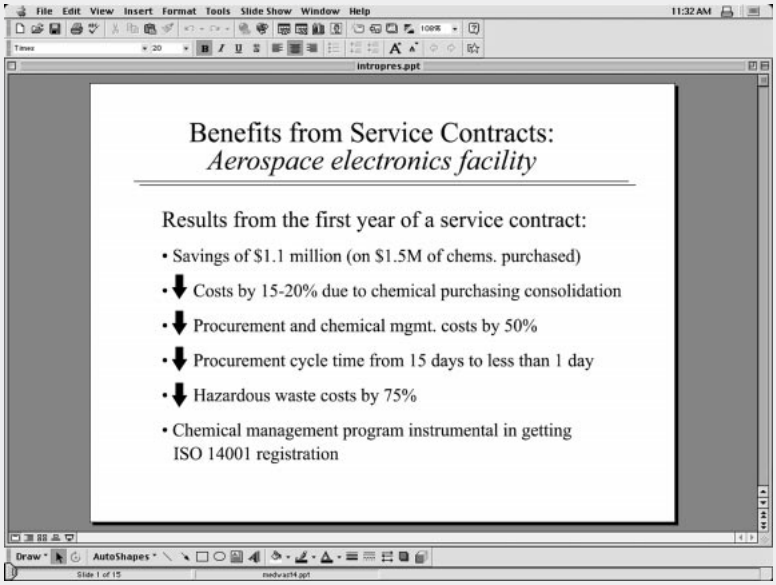
Appendix 2

Presentation: Introduction to Chemical Services



Benefits from Service Contracts:
Automotive assembly

Company	Chemicals	Benefits
Navistar Melrose Park, Il.	machining coolants, cleaners	• Coolant use ↓ 50% • Coolant waste ↓ 90% • $10,000/yr in rebates to Navistar • Imported product quality, reduced rework, reduced inventory costs
Ford Chicago, Il.	all chemicals, except paints, lubricants	• Declining chemical costs • VOC emissions ↓ 57% • Wastewater sludge by ↓ 27% and ↓ $50,000/yr in costs
Chrysler Belvidere, Il.	cleaning, treating, and paint chemicals	• Over $1 million in savings in year 1 • ↓ VOC and other wastes • Improved productct quality, reduced rework, reduced inventory costs
General Motors Janesville, WI.	various	• Over $1 million dollars in savings • ↓ 8% in chemicals costs while expanding services



Benefits from Service Contracts:
Aerospace electronics facility

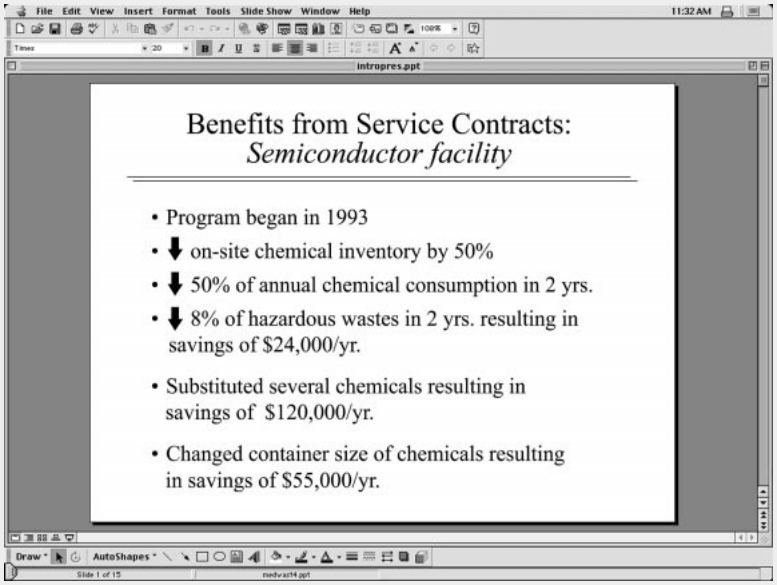
Results from the first year of a service contract:

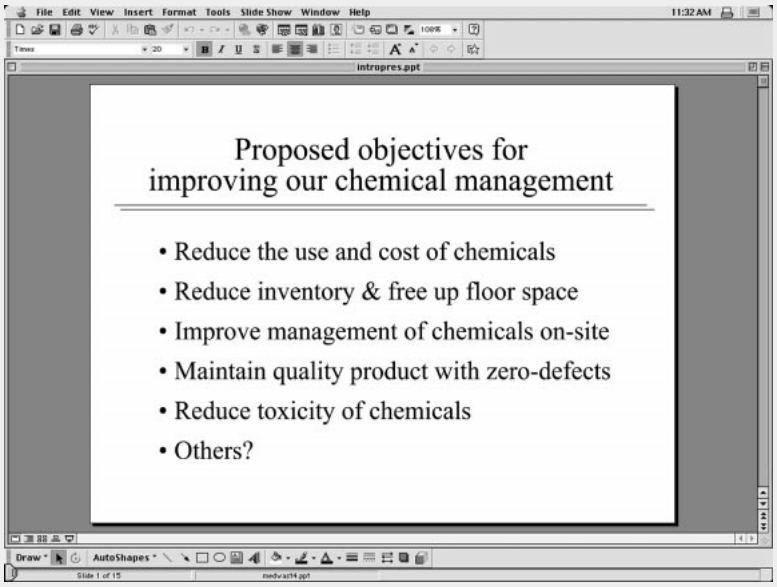
- Savings of $1.1 million (on $1.5M of chems. purchased)
- ↓ Costs by 15-20% due to chemical purchasing consolidation
- ↓ Procurement and chemical mgmt. costs by 50%
- ↓ Procurement cycle time from 15 days to less than 1 day
- ↓ Hazardous waste costs by 75%
- Chemical management program instrumental in getting ISO 14001 registration

INTRODUCTION TO CHEMICAL SERVICES *continued*

Appendix 2

Presentation: Introduction to Chemical Services

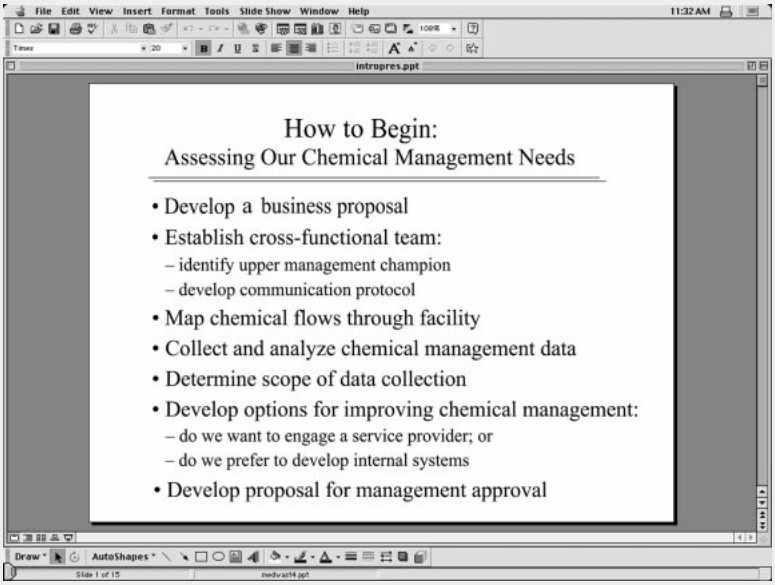


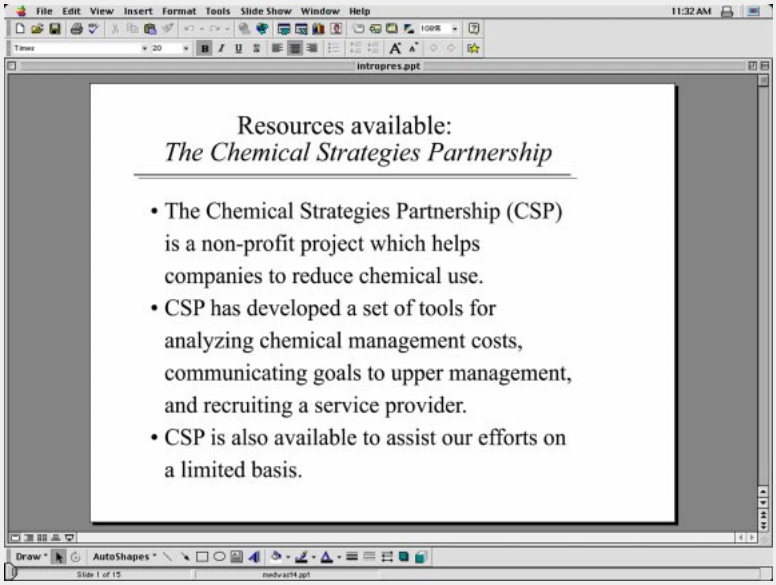


INTRODUCTION TO CHEMICAL SERVICES *continued*

Appendix 2

Presentation: Introduction to Chemical Services





Appendix 3

Sample Workplan

TASK 1: SELECT A FACILITY				
Action	**Lead**	**Deliverable**	**Due Date**	**Likely Sources of Information**
1.1 IDENTIFY A PILOT FACILITY. INITIAL CRITERIA INCLUDE: • **High volume of use-** gather data to determine volume of use • **Large expenditures on chemicals-** conduct a quick cost estimate of chemicals purchased • **Interest by facility personnel-** talk with facility managers to determine initial interest		▸ Decision on candidate facilities		▸ EHS Dept. ▸ Purchasing Dept.
1.2 KICK-OFF MEETING Meet with candidate facilities' environmental, engineering, and business personnel (e.g., accounting, purchasing, facility manager). This multi-departmental team is a resource for data gathering and review of data and results.		▸ Presentation at the facilities		▸ Develop a cross-functional team
1.3 FINALIZE CANDIDATE FACILITIES		▸ Conference call to finalize and begin collecting data		▸ EHS Dept ▸ Purchasing Dept
1.4 TOUR FACILITIES AND DETERMINE APPROPRIATE CANDIDATES. CRITERIA INCLUDE: • **Potential for chemical reduction through inventory-** factors to consider are whether there are problems with excessive scrappage, large inventory, or frequent work stoppage due to lack of inventory • **Potential for redesign, chemical phase out, or substitution-** there are several factors that should be considered here: the lifecycle of the processes and the timing on equipment changes; whether the process will exist in 3-5 years; and whether new technologies and other chemical substitutions exist • **Interest by facility manager-** as the list of facilities is narrowed, it will be important to talk with line managers to gauge their enthusiasm for working with the program. The project needs a supportive facility manager and supportive line managers for the first trial		▸ Summary of findings		▸ Manufacturing Engineering ▸ Facility Manager ▸ Facility Environmental Coordinator
1.5 SELECT A FACILITY Weigh pros and cons of working with the candidate facilities and make a final selection of a facility.		▸ Meeting with leaders to make a decision		

This workplan can be found on the floppy disk accompanying this manual.

Note: Task 1 may not be necessary if a facility is already interested.

Appendix 3

Sample Workplan

continued from previous page

TASK 2: CONDUCT A COST ANALYSIS OF CHEMICAL USE

Action	Lead	Deliverable	Due Date	Likely Sources of Information
2.1 DEVELOP CHEMICAL FLOWCHART Document how chemicals are currently ordered, purchased, and delivered to the user in a session with the whole team		▸ Chemical flowchart		Interviews with ▸ Purchasing Dept ▸ EHS Dept
2.2 BASELINE CHEMICAL USE AND PURCHASE COSTS • Collect data on chemicals and volume • Collect cost data on chemicals purchased ▸ by chemical category ▸ by unit price		▸ Memo documenting analysis and summarizing findings		▸ Purchasing Dept ▸ EHS Dept
2.3 COST ANALYSIS OF CHEMICAL MANAGEMENT AT FACILITY • **Conventional costs -** determine costs associated with chemicals and chemical management (including labor, administration, inventory, contractor services, maintenance, monitoring, etc) • **Less tangible costs -** estimate less tangible costs such as future liability, corporate image, safety • **Allocation -** allocate indirect costs to the facility • **Chemical cost relative to production cost-** determine the total cost of chemical use relative to total cost of production (or appropriate metric)		▸ Memo documenting analysis and summarizing findings		Accounting reports and interviews with ▸ Purchasing Dept ▸ Manufacturing ▸ Engineering ▸ Facility EHS ▸ Accounting ▸ Facility Manager
2.4 IDENTIFY POTENTIAL COST SAVINGS AND OTHER BENEFITS • **Chemical purchase savings-** estimate potential of savings in chemical purchase costs • **Inventory reduction-** reductions in the volume of spoiled materials, inventory carrying costs, freed up warehouse space, etc. • **Diverted facility personnel time-** estimate potential labor savings from the chemical service program (savings in purchasing dept., transportation dept, EHS reporting, etc.)		▸ Include in above memo		▸ Interviews and analysis

Appendix 3

Sample Workplan

continued from previous page

TASK 2: CONDUCT A COST ANALYSIS OF CHEMICAL USE *continued*

Action	Lead	Deliverable	Due Date	Likely Sources of Information
• **Chemical use reduction-** estimate potential savings in chemical use reduction and other materials from efficiency improvements (may be difficult to calculate until year 2 of the program) • **Intangible benefits-** reduced risk and liability, process improvements, quicker troubleshooting, etc.		▸ Presentation to Team		
2.5 PRESENT COST ANALYSIS RESULTS				

TASK 3: CONDUCT A PROCESS-LEVEL ANALYSIS (optional)

Action	Lead	Deliverable	Due Date	Likely Sources of Information
3.1 SELECT A PROCESS LINE FOR MATERIALS ACCOUNTING ANALYSIS Discussions with facility engineering and environmental personnel		▸ Process line selected		▸ Manufacturing ▸ Engineering ▸ Facility Manager ▸ Facility EHS
3.2 ASSEMBLE EXISTING DATA Gather data from the target processes for: • **Input materials/chemicals-** stored on site; brought on site as non-recycled raw materials; manufactured as products, co-products, or non-product output; and recycled out of process for reuse • **Output materials/chemicals-** stored on site; consumed or transformed internally; shipped out as product; and generated as "non-product output" • **Allocation-** allocate facility-level inputs to the product/process		▸ Detailed process flows (type, amount, delivery means, etc.) of inputs, outputs, and energy requirements for the target process		▸ Facility Manager ▸ Manufacturing ▸ Engineering ▸ Purchasing Dept ▸ Facility EHS
3.3 FINALIZE MATERIALS ACCOUNTING ANALYSIS • Check data against references • Collect final data • Analyze results: identify sources and volumes of pollution		▸ Materials Accounting analysis memo		
3.4 PRESENT RESULTS OF MATERIALS ACCOUNTING ANALYSIS WITH RESULTS FROM THE COST ANALYSIS		▸ Presentation		

Appendix 3

Sample Workplan

continued from previous page

TASK 4: DEVELOP THE SCOPE OF THE NEW CHEMICAL SERVICE PROGRAM

Action	Lead	Deliverable	Due Date	Likely Sources of Information
4.1 DETERMINE THE RANGE OF CHEMICALS TO INCLUDE IN THE PROGRAM				▸ Interviews with facility personnel & Purchasing dept.
4.2 DETERMINE THE ELEMENTS OF THE CHEMICAL LIFECYCLE TO INCLUDE IN THE PROGRAM				▸ Interviews with facility personnel
4.3 DEVELOP PRESENTATION FOR UPPER MANAGEMENT • Present proposed scope of new chemical services program to designated Champion for feedback • Contact key upper managers to give a preview of analysis results and proposed chemical services program scope • Give presentation to upper management and secure a decision to move to the RFP stage		▸ Presentation		▸ Team
4.4 DEVELOP A COMMUNICATIONS PLAN • Designate a leader for the communications effort • Develop a communications plan identifying who needs to be contacted and the various channels of communication that are effective for facility personnel (i.e., company newsletter, e-mail, phone calls, etc.) • Develop a standard presentation and message that will be used consistently by all team members to communicate with facility personnel.		▸ Communication map ▸ Internal presentation		▸ Team

Appendix 4: *Workplan: Selecting a Service Provider*

SAMPLE WORKPLAN FOR SELECTING A SERVICE PROVIDER

Action Item	Timeframe	Tasks
DISTRIBUTE RFPS		
DEVELOP A PROTOCOL TO RESPOND TO INQUIRIES		▸ Designate a point person
INFORM PERSONNEL THAT RFP IS ISSUED		▸ Issue an e-mail/memo instructing that all responses go to the team point person
BIDDERS CONFERENCE		▸ Organize a forum to allow bidders to ask questions about the RFP and provide a plant tour
DEVELOP CRITERIA TO EVALUATE THE PROPOSALS		▸ Work with facility to develop evaluation criteria ▸ Notify corporate support functions to alert them of the chemical service program
RECEIVE PROPOSALS		▸ Send out confirmation of receipt
EVALUATE RESPONSES		▸ Distribute proposals for team to review ▸ Meet to evaluate proposals • Cost Analysis • Capabilities Analysis ▸ Down select suppliers ▸ Bidder presentations: questions and discussions with bidder ▸ Interview bidders' current customers ▸ Draft implementation infrastructure changes needed at facility to implement the chemical service program
PRESENT RECOMMENDATION TO UPPER MANAGEMENT		▸ Develop presentation with key costs and benefits of the chemical service program and transition/implementation plan ▸ Make presentation and establish the range of authority to negotiate the contract
NEGOTIATE THE CONTRACT		▸ Award selection announced ▸ Negotiate contract

Appendix 4

Sample Workplan for Selecting a Service Provider

This workplan can be found on the floppy disk accompanying this manual.

Appendix 5

Process-level Analysis—Baselining your Chemical Costs

OBJECTIVE:

To identify specific opportunities for improving production efficiency and reducing chemical use.

Why This Analysis

An optional set of data and analysis can be conducted at the **process-level.** This involves a materials accounting (MA) of a process by identifying the material inputs and outputs. An MA is the identification of the material inputs and outputs for the process. Such a characterization of the material flows through a process or facility is a fundamental element in identifying opportunities for chemical use reduction. Once you have identified these flows, costs can be assigned to both material inputs and outputs, highlighting the true financial impact of the process.

This analysis helps to determine your facility's chemical use efficiency; expose existing data management systems (thereby identifying information gaps); and identify specific areas for improvement.

The process-level analysis is primarily a materials accounting (MA) of the process you select. MA serves the dual purpose of: 1) providing an understanding of how and where materials are used within a process; and 2) establishing a baseline of material flows against which subsequent improvements can be measured.

Once these flows have been identified, costs can be assigned to both material inputs and outputs to highlight the true financial impact of the process. This "decoding" provides management with the information needed to assess and prioritize bottom line improvements.

CSP has found that performing this somewhat detailed analysis on one process demonstrates significant room for improved chemical efficiency, and thus cost savings. It illuminates weak areas of your data management and other chemical management systems. It is likely that the opportunities you find here will apply to the facility as a whole.

In the Quality movement, there is a saying that "what gets measured gets managed." That is what we are aiming for here, essentially. Areas for improvement in chemical management are not a result of mismanagement, necessarily. More often they represent "creeping expenses" in a category of costs that most firms simply do not scrutinize.

Only through this detailed look at your operations are you likely to uncover such hidden costs. This point is important for two reasons. First, it shows that there may be hidden opportunities for improvement throughout the facility in terms of chemical efficiency. Second, it shows that focused attention placed upon typically overlooked areas can reveal those opportunities.

If chemical service providers have the means to track this sort of information, they should also have the ability to identify areas for improvement. Thus, this pilot MA can identify the data management needs to be built into your chemical management system specification.

Appendix 5

Process-level Analysis—Baselining your Chemical Costs

Within each facility, and to some extent each process, the steps required to perform an MA analysis vary. Elements contributing to the variation include the state of existing data systems; consistency, documentation, and automation of the process; and type of process flow (e.g., batch, continuous). Nevertheless, five fundamental stages may be identified:

1. Map the process
2. Review production history
3. Identify/quantify materials use
4. Calculate material outputs
5. Check the data against references

Select a Manufacturing Process

You should select a process for this analysis based on a few key criteria:

- It should be representative of the rest of the facility (in terms of chemical management).
- It should be of modest complexity: not so complex so that the analysis becomes prohibitively difficult. But not so simple as to compromise the informative value of the analysis.
- It should present some opportunity for improvement. Almost any process you select will have potential (no processes operate at 100% materials efficiency), but to best demonstrate the value of this type of analysis, you should pick a process that has not recently been optimized.
- Your success in identifying chemical efficiency improvements will support subsequent efforts in obtaining support for implementing the chemical service model. In other words, the more successful the results of this effort, the easier it will be to gather support for similar undertakings in the future.

Thus, when thinking about manufacturing processes with improvement potential, consider the volume of chemicals used; the characteristics of the chemicals (e.g., specialty versus commodity); engineering or other specification restrictions; disposition of engineering support staff; and regulations that might limit chemical selection.

For a more comprehensive description of how to undertake a materials accounting exercise, refer to: *New Jersey Department of Environmental Protection, Industrial Pollution Prevention Planning: Meeting Requirements Under the New Jersey Pollution Prevention Act, Office of Pollution Prevention, September, 1995.*

Appendix 5

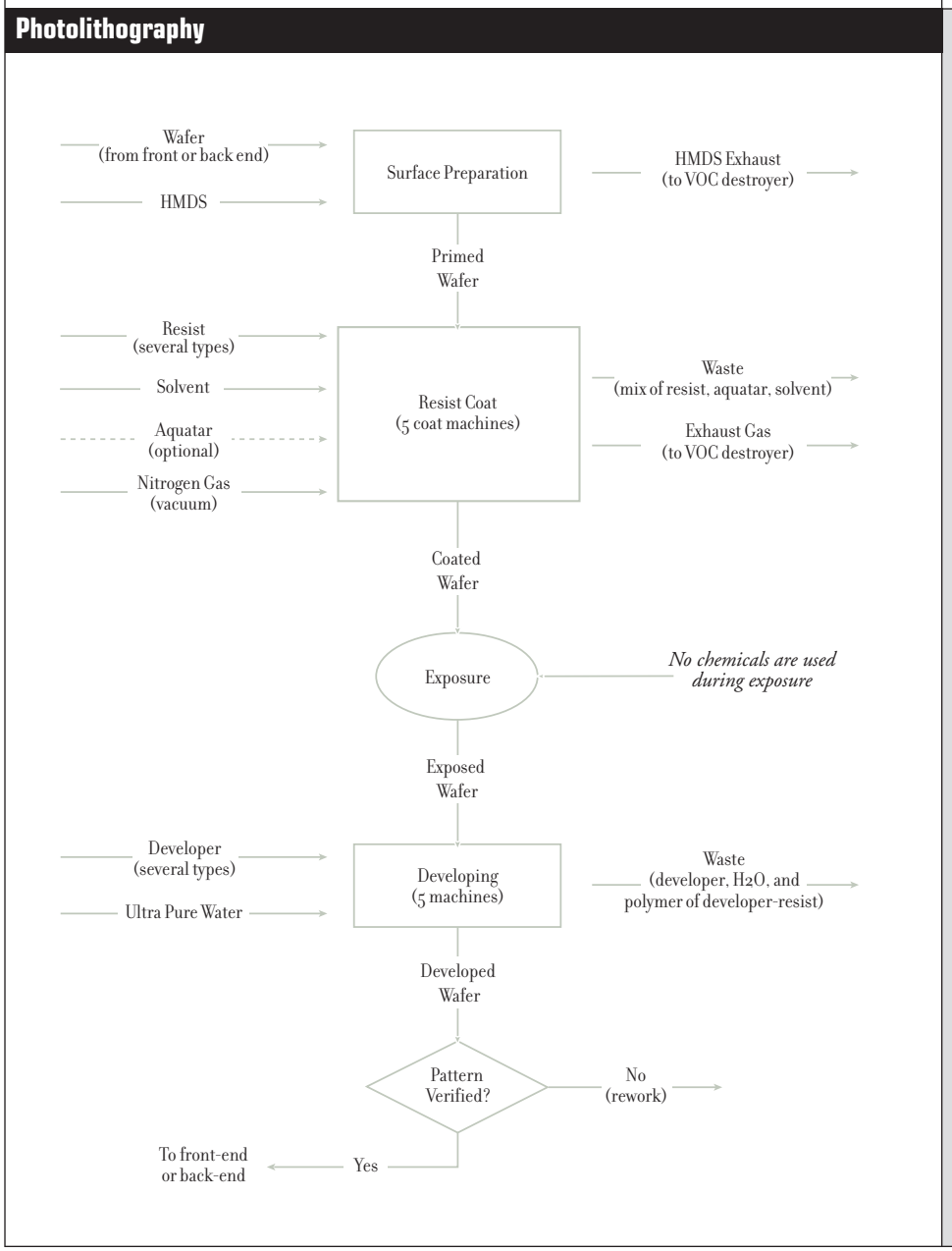
Process-level Analysis—Baselining your Chemical Costs

Map the Process

Once you have selected the process, the first step is to analyze the process and its material flows. Any process can be broken down into roughly discrete steps that can serve as a logical organizing framework. Segmenting down the process will both simplify the analysis and provide better insight into potential opportunities.

The operators and the process engineers who support the process will be your best reference for this step. The people who work the process on a daily basis know how it "really" works and how materials move. Process specification manuals, work instructions, task lists, etc. can also serve as valuable complemen-

Figure 1: Typical Material Flow Diagram



NOTE: In many cases, chemical volumes are not specified in requisition systems, engineering instructions, bills of materials, etc. Therefore, you may have to use measurement or estimation techniques to determine chemical volumes. Coupling chemical volume information with production volume from the previous step will give you a first-order estimation of the process' chemical application volume. To get the total chemical use for a given chemical, multiply your production volume numbers by the chemical application volume per unit of product. This can be considered what your system is currently "designed" to use. The application volume can be further divided into material embodies in product and non-product output.

tary sources of information. To help you best visualize and understand the material flows, consider constructing a simple process map like the one shown in *Figure 1*.

Through the steps below, you will gather the information to add the inputs and outputs, as shown in *Figure 1*, and ultimately to quantify them.

Review Production History

Once you have the process mapped, you need to determine the volume of material that is processed. For larger, single-part processes, this step may be relatively simple. For operations that process many different parts or components, this step may be more challenging.

First, determine how much variability there is in the production scheduling. For instance, how regular is the flow of parts through the operation? In a fairly stable operation, you can look at a relatively small window of production like the volume of each part processed per week. Where you have more variability, you need to choose a wide enough window so that you capture most of the parts that flow through the process.

In any case, your final product in this step is to know how many parts pass through your process within a certain time period. If it varies from part to part, you'll also need to know which process steps each part passes through.

Identify/Quantify Material Use

For each part identified in the previous step, you now have to determine which chemicals are used in which process steps. You will then need to quantify the chemical application volumes for each process step.

The process specifications, work instructions, or similar documentation you may have used to map the process will probably be a good source for this information. You can also consult purchasing, inventory, and/or requisition records. As before, the operators and process engineers may be your best and most direct information sources.

For complex processes requiring dozens of chemicals, you may want to select only a few key chemicals first and revisit whether doing all chemicals is warranted. Often, even at this interim stage of the analysis, a process level depiction is eye-opening simply because the process has not been scrutinized in this way before. It is rare if your estimated total chemical use (application volume per unit product multiplied by production volume) will meet the amount you have purchased. The difference is "unaccounted for" and is often waste. Getting down to the process level allows you to start to see if your process is wasteful and how you might improve it.

Appendix 5

Process-level Analysis—Baselining your Chemical Costs

TIP:

It is important to consider the trade-off between accuracy of information and cost of acquiring the information. You may find the "80/20 rule" applies here, and thus simplifies your task. In other words, a few chemicals may be responsible for the majority of the chemical use. By limiting data gathering to these chemicals, you may considerably simplify your effort without losing too much resolution.

Appendix 5

Process-level Analysis—Baselining your Chemical Costs

Calculate Material Outputs

Determining the chemical inputs to your process paints half of the picture; determining the outputs will complete the picture. Estimating the output side of the material process flow will likely pose more of a challenge, depending on the nature of the process. This is because it is sometimes difficult to ascertain how much of the chemical input becomes part of the product. This step, therefore, will probably require more observation, measurement, and operator interaction than the input analysis had required.

It may be easiest to first identify the waste streams that leave the process (e.g., wastewater, air emissions, hazardous waste, and non-hazardous solid waste). Some of this information can be found through environmental records, such as waste manifests and air emissions reports. There may also be metering devices measuring air and/or liquid outputs.

All of these flows tend to be aggregated such that their constituents and specific sources may be difficult to determine. However, knowing what they are—and their magnitude—provides a big-picture view of the process' outputs. With this expanded view, you can trace each waste stream backwards to the process stage that generates it.

For example, estimating specific output volumes can be estimated much as input estimation was done (if inputs had to be estimated). If this same approach will be used, it will make the most sense to do it simultaneously with the previous step. On a part-by-part basis, you can measure, or estimate, the destination of the various chemical inputs. Knowing the production history, you can then extrapolate your measurements to provide a first-order estimation of the process' chemical outflows. As before, associating the volume numbers to your process map will quickly illuminate which stages of the process are the least efficient, and thus, may offer the greatest opportunity for improvement.

Check Data Against References

By now you should have a rough picture of the chemical inputs and outputs for the process you selected. Before you begin to analyze the data, it's a good idea to perform a few quick checks to ensure the data are viable. This step is especially important if there was a lot of estimation involved in developing the numbers.

- To check the input side, compare the estimated numbers for the timeframe you chose against purchasing/inventory records for the process over a similar time period. If records are not available at the process level, compare available records with your data to see if the general order of magnitude and proportions seem reasonable.

Appendix 5

Process-level Analysis—Baselining your Chemical Costs

Table 1 Chemical Usage (in percentages and pounds)

Action Item	Total Usage	Consumed in Process		Managed as Waste		Emitted to the Air	
Fume Hood	300	92%	276	4%	12	4%	12
Paint Booths	2,800	62%	1,748	32%	900	6%	152
Cure Ovens	378	0%	-	0%	-	10%	378
Stencil Booths	4,100	57%	2,342	13%	538	30%	220
Open Cleaner	360	10%	36	71%	255	19%	69
Closed Cleaner	1,500	6%	91	81%	1,222	13%	187
Total	**9,438**	**48%**	**4,493**	**31%**	**2,927**	**21%**	**2,018**

- For the output side, you can similarly compare your results to any records that might be available (other than those you used to develop the data). You can also compare the output volume to the input volume. Of course, these numbers should be of similar magnitude. Where discrepancies arise, you will need to track down the cause and re-evaluate the raw data or adjust assumptions.

Analyze Results

There are two immediate objectives of the materials accounting exercise. The first is to provide an understanding of the process and the second is to identify opportunities for improving the chemical (and thus cost) efficiency of the process. By this stage, you may already have met both of these objectives. The data alone will indicate what chemicals are used in each stage of the process and how efficiently they are used.

For the quantitative aspect of the analysis, you should end up with the total amount of chemical usage per process stage, as shown in the samples in *Table 1*. The Total Usage column represents the number of pounds used in each stage, and the subsequent columns delineate the output disposition from each stage. The "Total" row at the bottom shows the total weight of chemicals used, consumed, managed, and emitted, and the weighted averages for each of the latter three.

In this example, the data indicate that roughly 52% of the chemicals used in this process. Roughly 4,945 pounds are not consumed in the process—they become waste.

Appendix 5

Process-level Analysis—Baselining your Chemical Costs

You will likely find instances where very high percentages of chemical inputs become chemical output (i.e., they do not become part of the products they are used to manufacture). Moreover, in some of these instances, you will discover that some portion of that output is generated needlessly. With this information, the operators and engineering staff can devise specific technical (e.g., equipment modification) or logistical (e.g., work process change) improvements.

An excellent example of cost and production improvement occurred during one of the MAs CSP conducted. Significant waste and emissions were calculated for one process area. The data was so compelling that engineers were able to strongly support their case for upgrading the equipment in that area. The investment cost was defensible in light of the short payback period expected from improving the rate of material "consumed in process." Thus, waste and emissions were reduced, while process capabilities were upgraded.

In addition to the quantitative examination, the MA will provide an understanding that probably will lead to some qualitative analysis. Our experience has revealed that the qualitative analyses are extremely valuable in highlighting process-oriented issues. This is not limited to a special process, but can extend benefits to the entire facility.

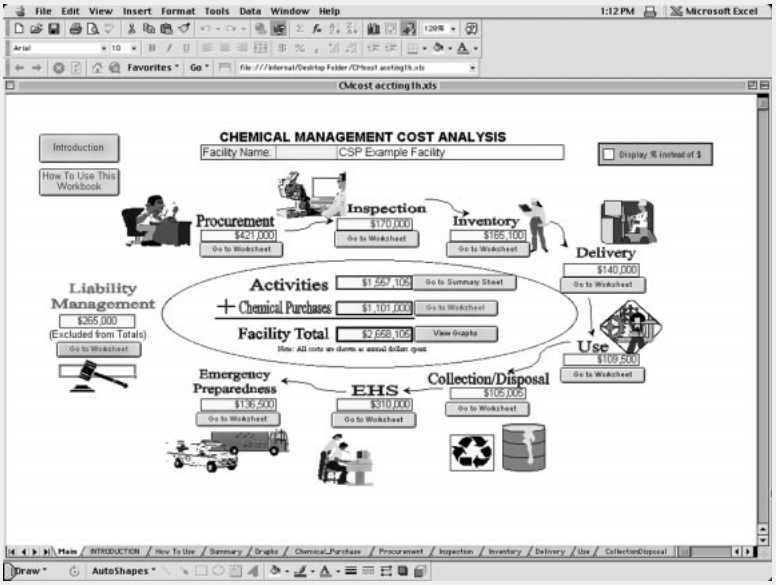
Returning to the example from above, CSP identified several qualitative issues that affected not only the process area, but the whole facility. For example, CSP's analysis revealed that the process (and resulting waste) varied with each operator, so standardization would help to improve materials efficiency. The analysis also showed that process-level data was virtually non-existent due to the information systems being used. This impeded tracking of chemical use at the process-level, which meant that departments could not be charged for the waste they generated.

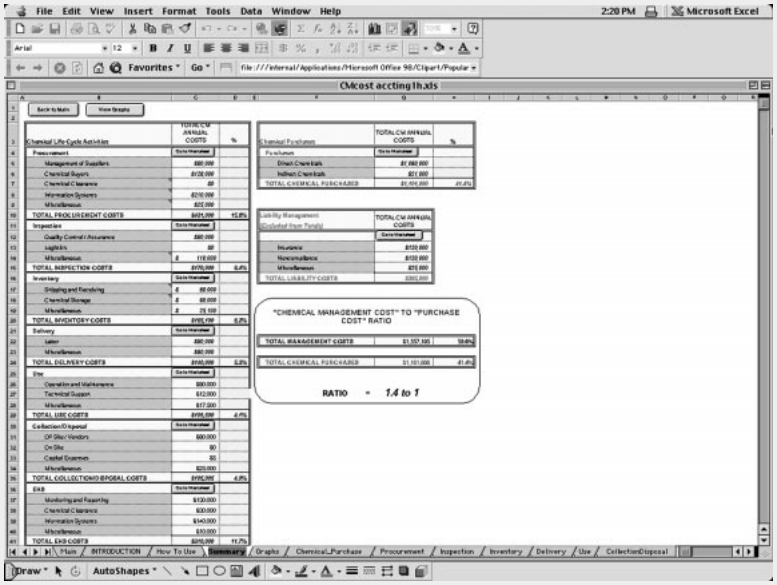
Other qualitative issues this analysis uncovered include how chemicals were stored and delivered; how many different and redundant chemicals were used; the inefficiency of chemical packaging and repackaging; and lack of good data causing difficulties for environmental reporting. Thus, the process-level analysis can lead to ideas for process efficiency and chemical use reduction improvements both at the process area and throughout the facility—and in both qualitative and quantitative measures.

EXCEL SPREADSHEET: CHEMICAL MANAGEMENT COST ANALYSIS

Appendix 6

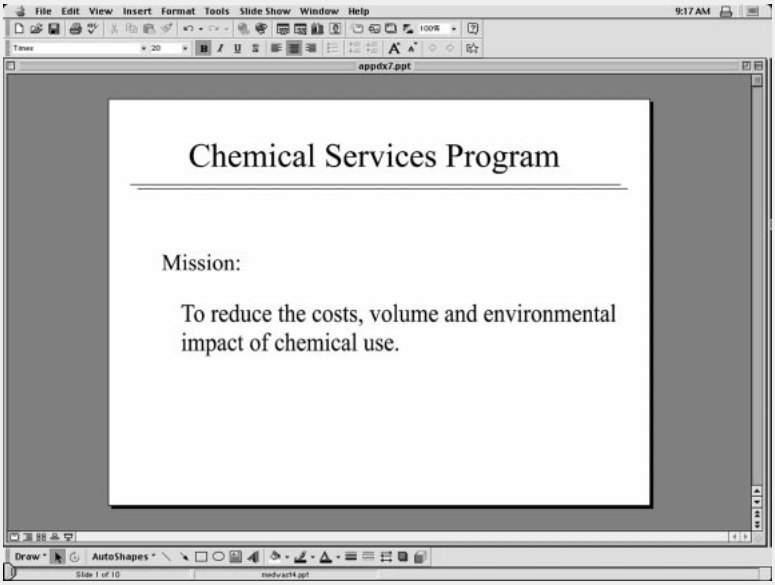
Chemical Management Cost Analysis Tool

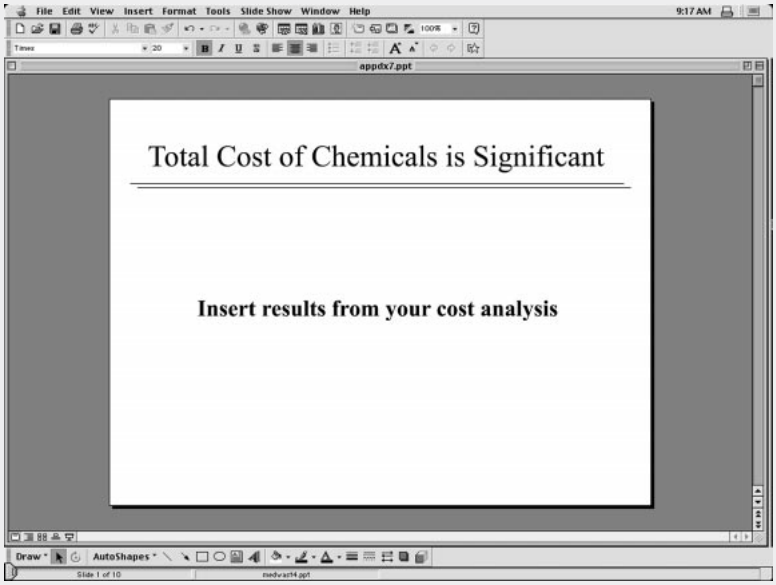




This tool can be found on the floppy disk accompanying this manual.

POWERPOINT PRESENTATION: COST ANALYSIS RESULTS AND RECOMMENDED ACTION





Appendix 7

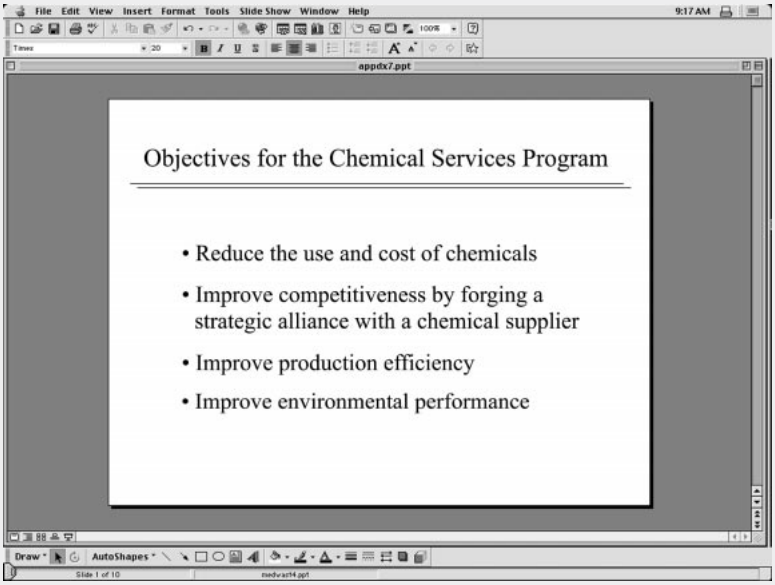
Presentation: Cost Analysis Results and Recommended Action

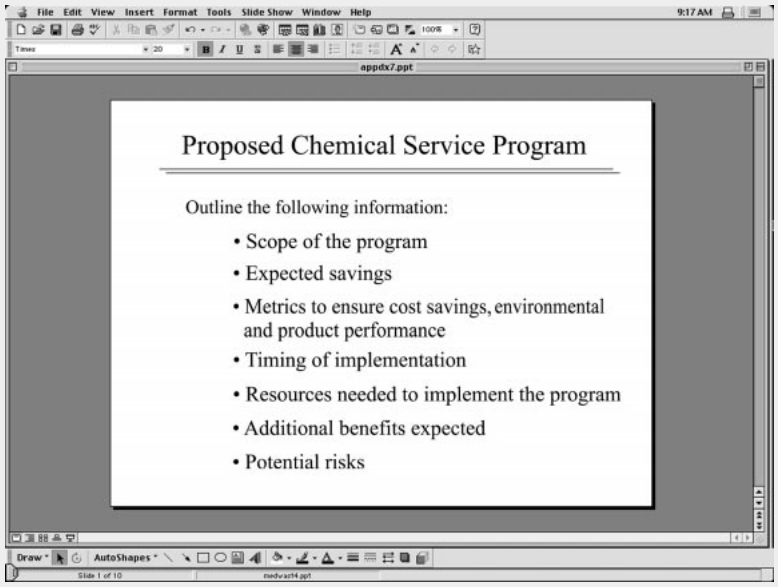
This presentation can be found on the floppy disk accompanying this manual.

COST ANALYSIS RESULTS AND RECOMMENDED ACTION *continued*

Appendix 7

Presentation: Cost Analysis Results and Recommended Action

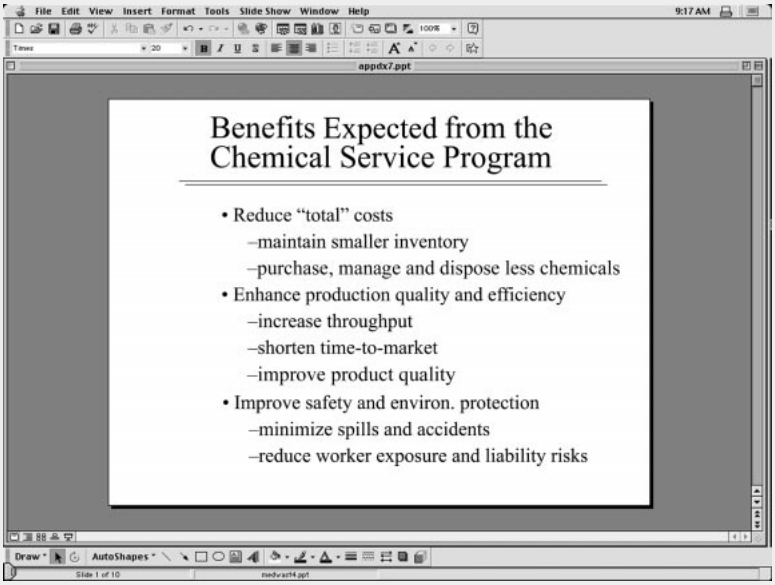


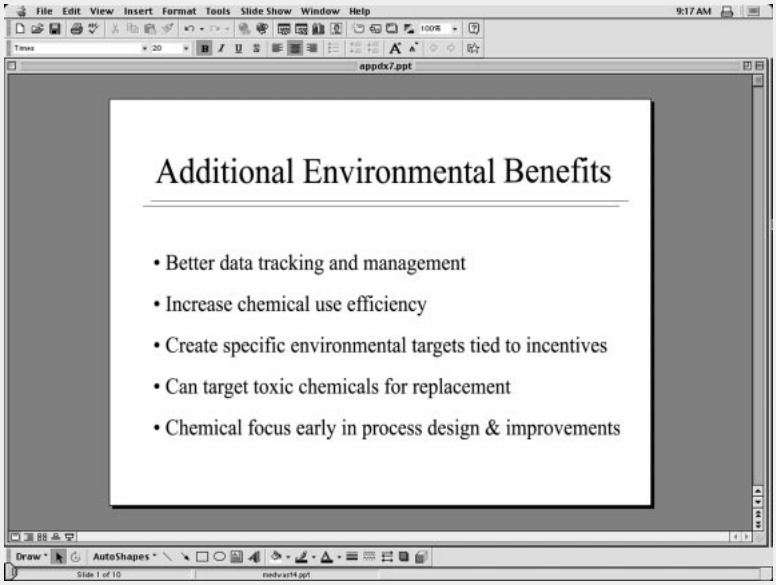


COST ANALYSIS RESULTS AND RECOMMENDED ACTION *continued*

Appendix 7

Presentation: Cost Analysis Results and Recommended Action

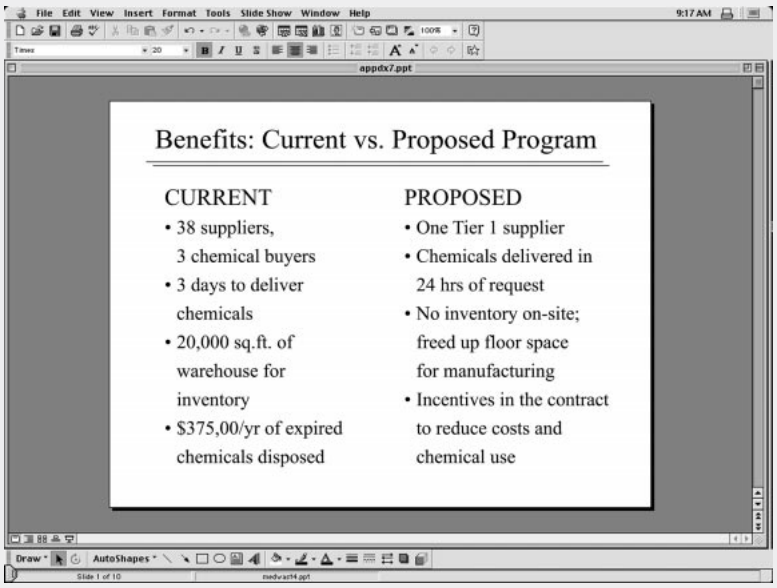


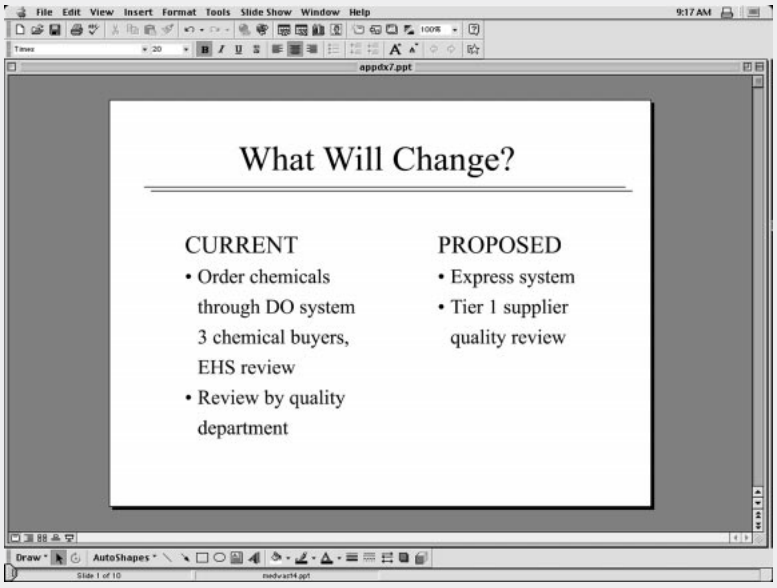


Appendix 7

Presentation: Cost Analysis Results and Recommended Action

COST ANALYSIS RESULTS AND RECOMMENDED ACTION *continued*

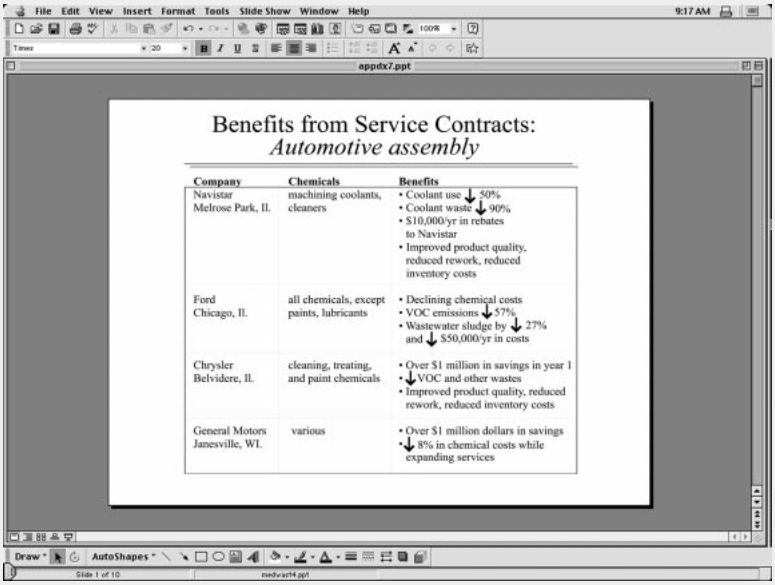




COST ANALYSIS RESULTS AND RECOMMENDED ACTION *continued*

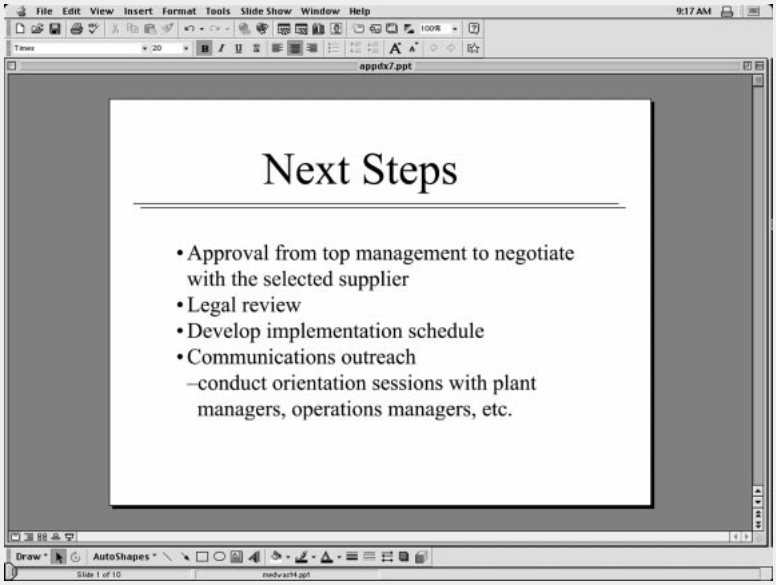
Appendix 7

Presentation: Cost Analysis Results and Recommended Action



Benefits from Service Contracts: *Automotive assembly*

Company	Chemicals	Benefits
Navistar Melrose Park, Il.	machining coolants, cleaners	• Coolant use ↓ 50% • Coolant waste ↓ 90% • $10,000/yr in rebates to Navistar • Improved product quality, reduced rework, reduced inventory costs
Ford Chicago, Il.	all chemicals, except paints, lubricants	• Declining chemical costs • VOC emissions ↓ 57% • Wastewater sludge by ↓ 27% and ↓ $50,000/yr in costs
Chrysler Belvidere, Il.	cleaning, treating, and paint chemicals	• Over $1 million in savings in year 1 • ↓ VOC and other wastes • Improved product quality, reduced rework, reduced inventory costs
General Motors Janesville, WI.	various	• Over $1 million dollars in savings • ↓ 8% in chemical costs while expanding services



Next Steps

- Approval from top management to negotiate with the selected supplier
- Legal review
- Develop implementation schedule
- Communications outreach
  - –conduct orientation sessions with plant managers, operations managers, etc.