

## Raytheon: A Chemical Management Services Case Study

### Summary

In May 1999, Raytheon Company entered into a comprehensive, far-reaching partnership with a chemical management service (CMS) provider, Haas TCM (formerly Radian International). The contract covered chemical management for all chemicals and gases including procurement, inventory, delivery, disposal, and data management. Additionally, the contract included incentives for “shared savings”, due to reduced chemical use and purchase costs and improved process efficiency. Now in its seventh year of operations, Raytheon’s chemical management services program has resulted in elevated performance and savings for the company by reducing chemical usage and streamlining chemical management throughout the chemical lifecycle.

### Background – CSP Pilot Program

The Raytheon-Haas contract resulted from a multi-year collaboration between Raytheon and the Chemical Strategies Partnership (CSP) begun in 1996. The collaboration took advantage of a merger between Raytheon and other defense contractors, which allowed the program to leverage major cost cutting initiatives and to be rolled out to the entire company.

Raytheon is one of the world's leading diversified technology companies, specializing in defense and government electronics, space, information technology, technical services, business aviation and special mission aircraft. Raytheon had more than 80,000 employees and \$20 billion in revenues in 2004.

Initially, CSP engaged in a pilot program with a Hughes Aircraft facility at Air Force Plant #44 in Tucson, Arizona to evaluate chemical management system options. (Subsequently, Raytheon Company acquired Hughes in 1997). The objective of the program was to identify chemical use reduction opportunities and consider chemical services as a strategy to improve management.

There were several drivers in Hughes’ decision to move forward with a pilot program, including an interest in reducing costs, a desire to outsource areas that were not included in core competencies, and the need for better data management for environmental reporting. The facility had previously contracted with a supplier for procurement and delivery of “indirect” (non-product) chemicals and Hughes managers, primarily from Safety, Health and Environmental Affairs (SHEA), were interested in investigating benefits from expanding the scope of services with the current supplier or contracting a more qualified CMS provider.

#### **What is the Chemical Strategies Partnership?**

The Chemical Strategies Partnership (CSP) is a non-profit organization seeking to reduce the use of toxic chemicals in U.S. manufacturing. CSP works with companies to help redefine the way they purchase and manage their chemicals. In this new model, manufacturers shift away from a traditional supplier relationship to a strategic alliance with a chemical service provider. Instead of purchasing chemicals, the manufacturer purchases *chemical services*: assistance in purchasing, managing, and tracking chemicals. This shift to chemical services often aligns the incentives of the service provider and manufacturer to reduce chemical use and costs.

The Pilot was completed in four primary stages: planning, data collection and analysis, program design, and implementation.

### 1. Planning

Hughes established a cross-functional team, with a senior management “champion” and representatives from engineering, procurement, warehousing, finance, materiel, legal, and SHEA. The Team laid out the following objectives:

- Manage stakeholder feedback and generate support for improved chemical management and use reduction
- Establish chemical use baseline data and improvement objectives
- Develop an accurate picture of true chemical use costs
- Build the financial argument and business case for chemical management improvements

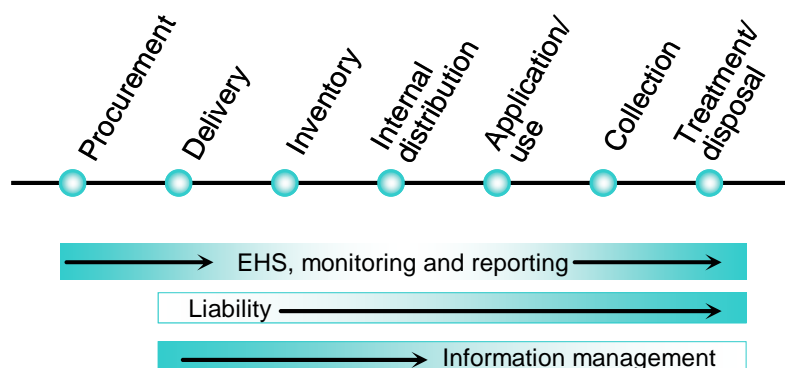
### 2. Data Collection and Analysis

#### *Chemical Management Cost Accounting*

The team recognized that knowing the “true” cost of chemical use and management functions (see Figure 1, Chemical Lifecycle) is a necessary prerequisite for understanding and establishing a fair and equitable relationship with a CMS provider.

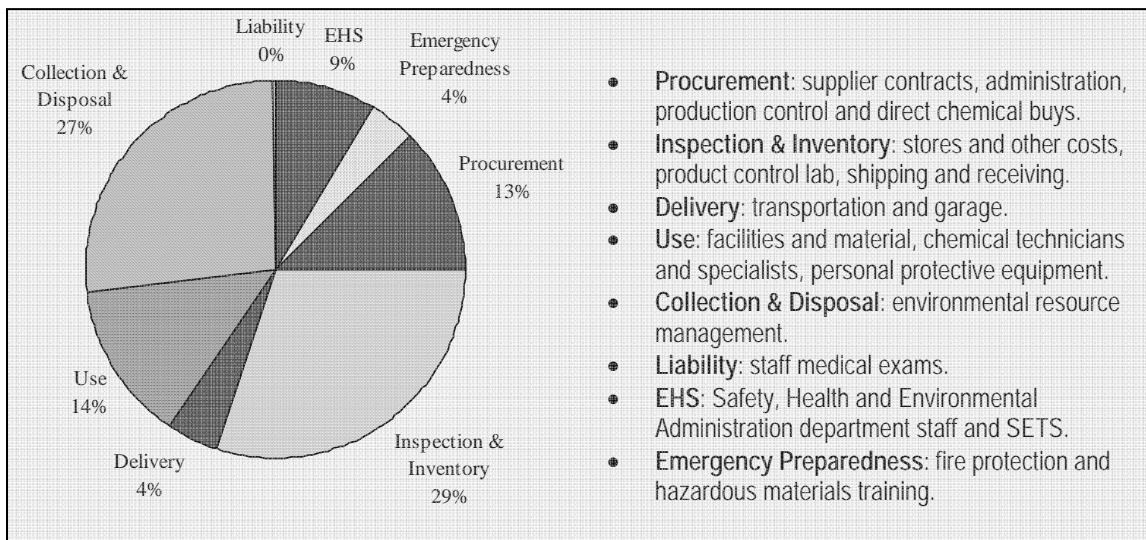
Through interviews with managers throughout the facility, the team gathered information required to 1) map the process flow for chemicals through the facility (i.e. what departments are involved in each stage) and 2) estimate “true and total” costs of chemical use and management at each lifecycle stage.

Figure 1: Chemical Lifecycle



This investigation identified six different information systems and more than twenty discrete organizational functions supporting chemical management. Including only quantifiable “hard” costs, the team estimated chemical management costs nearly equal to the purchase costs (i.e. for every dollar of chemical purchased, another dollar was spent managing it).

Figure 2: Chemical Management Costs Excluding Chemical Purchase Price



### *Production Process Materials Accounting*

In order to estimate costs of waste and potential opportunities for production process efficiency gains, the team also conducted materials and cost accounting for two production processes: paint shop and printed wiring board (PWB) production. These analyses resulted in immediate steps to reduce chemical use.

Paint application efficiency was boosted by a switch to powder paint and investments in transfer efficiency technologies, resulting in an estimated 71% decrease in paint waste. Subsequent investments were planned in a system to virtually eliminate paint shop solvent use and VOC emission and efforts were begun to eliminate redundant inks and paints that add to waste.

The PWB analysis revealed that management, focused on reducing hazardous waste, did not fully realize that general industrial waste represented a much higher cost. Changes to the facility's waste treatment processes were proposed with the potential to reduce energy use, treatment chemical consumption, and hazardous waste, for combined annual savings of \$400,000. (The changes were never implemented due to major restructuring of wastewater treatment operations.)

### *3. Program Design and Launch*

With insight into chemical use and costs, and ideas for potential reductions, interest in developing a CMS program gained momentum. However, at that point Hughes Aircraft merged with Raytheon, causing great uncertainty for the program's future. Corporate-wide teams were established to combine the companies' operations and develop plans for cost reductions. One such team was the "ChemTech" Team. Challenged with delivering continuous cost reductions over five years, the ChemTech Team was motivated to consider the lessons learned in the Tucson pilot and consider a CMS model for the entire Raytheon Company. The alternative of pursuing an integrated purchasing program (to reduce chemical procurement expenses and per unit costs), did not have the same potential for long-term cost and risk reduction. The chemical service approach also

aligned well with Raytheon's upper management mandate to "make our numbers" (i.e. via chemical cost and use reduction), "become one company" (i.e. via integrated nationwide management systems), and to focus on growth and productivity (i.e. via total life-cycle management).

With these goals in mind, the team moved ahead with developing the business case for company-wide CMS implementation. Raytheon had more than 100 facilities and developing detailed baseline chemical management data for each one would have been time and expense prohibitive. CSP instead helped develop a cost analysis for the top ten chemical using facilities, as well as two representative smaller facilities to provide an average estimate for the remaining facilities.

Based on this business case, the ChemTech team was authorized to issue an RFP seeking a CMS provider. Eight months later, Raytheon awarded a five-year contract to Radian International (since acquired by Haas TCM) that now covers over 45 sites and 98% of North American chemical spend.

The goals of the CMS program were as follows:

- Continuously reduce chemical use, risk, waste and life-cycle cost
- Ensure dependable, on-time supply of quality chemicals to operations
- Rationalize large, diverse supply base; develop strategic alliances and outsource non-core activities
- Reduce purchase and inventory costs
- Standardize materials and processes despite multiple systems and cultures from mergers
- Improve hazardous materials data management

In terms of scope and magnitude, it ranks among the most ambitious CMS programs ever launched. The contract scope covers the entire life cycle of chemical management, including:

- Sourcing and procurement of chemicals
- Supply side management of cylinder and bulk gases
- Inspection
- Inventory management (offsite)
- Just-in-time delivery
- Delivery to point of use (optional)
- Technical support and process optimization
- Data management and EH&S reporting (MSDS, tracking usage etc.)
- Management and disposal of wastes

The contract largely de-couples payment from chemical and waste volume. In addition to a fixed management fee, it includes "shared savings" incentives for reductions in chemical unit prices and improvements in process efficiency, as well as bonuses for hitting chemical use reduction targets.

In addition to analyzing cost and use data, CSP helped calculate the business case, present it to senior management for approval, determine CMS program scope, develop and issue the RFP, and design compensation mechanisms in the final contract.

#### ***4. Implementation: CMS Benefits Realized***

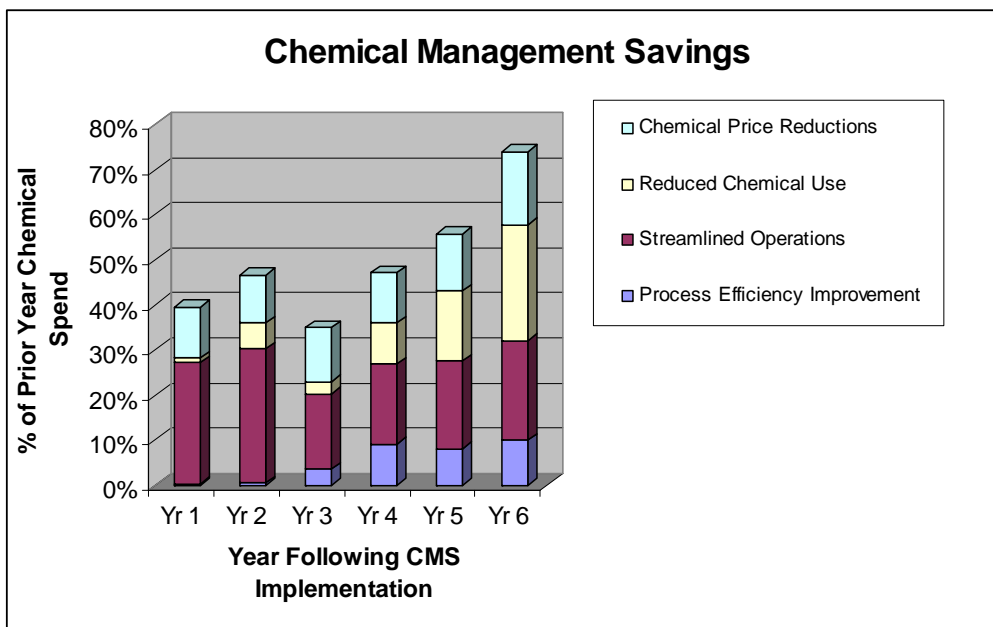
CMS program implementation produced significant initial and long-term benefits on top of the pre-implementation reduction in paint waste described above. In the first year of implementation, the CMS program demonstrated significant improvement in terms of purchase price, streamlined

operations and chemical use/waste reduction. In subsequent years, savings from process efficiency improvements contributed major savings as well.

Over the first 5 years, Raytheon's CMS program delivered an approximate 30-40% net reduction in chemical purchase and management costs, and included a payback period of less than 6 months. The savings breakdown for the 6 years of program operation is as follows:

- **Reduced Purchase Price:** Chemical purchase price was reduced by 15-45% (absolute vs. indexed) including leveraged / volume purchasing and supplier consolidation. Cost reductions from leveraged purchasing provided program payback in the first 6 months.
- **Streamlined Operations / Improved Service:** The program led to streamlined and automated ordering, chemical gate-keeping, on-line MSDS and EHS data for reporting, chemical use and waste generation tracking, and consolidated sourcing, procurement and inventory management. To date, over 75 full-time employees have been reallocated to higher-value activities. Sites benefited from improved service as on-time delivery rose from of 82% to 91% in the first 5 months, and is now greater than 96%. Order cycle time was reduced from 3-7 days to 2 days. Electronic inventory management, off-site storage and JIT point-of-use delivery reduced chemical storage floor space by 93% and inventory turns from 4 months to 1 week. Accounts payable were reduced from 5 to 1; chemical P.O.s were reduced from 43,000 to 0 per year.
- **Reduced Chemical Waste and Use:** Consolidated regional inventories and higher inventory turn rates led to lower scrap rates. The over-purchase waste was cut by 85% and inventory management was greatly improved. There was a 71% decrease in paint waste.
- **Process Efficiency Improvements:** Increased reclamation of precious metals and substitution for toxic chemicals contributed to use and waste reductions. To date, process efficiency improvements have led to significant savings for the company. Improvements include precious metal reclaim, chemical coordinator reductions, chemical substitutions, and transportation cost reductions for alcohols and acetone.

Figure 3: Chemical Management Savings



### Key Challenges

This was the third attempt to implement a CMS program at Raytheon, and there was much skepticism about the program's potential utility. Adding to that skepticism, there existed an inherent cultural bias at Raytheon that "we know best", which created some resentment by the team to outsource this function. In the beginning, the program lacked involvement and support from an upper management champion, leading to a more prolonged effort to get key players on board with the program. Also, union labor was generally opposed to the idea, though they were assured that no FTEs would be laid off as a result of the program.

In terms of process, once the cost analysis was in hand the members of the team struggled to define what their vision for chemical management should be. In hindsight, the process-mapping exercise should have been conducted in one of the first meetings. It brought to light for the entire team the complexity and costs of chemical management.

Finally, the merger between Hughes and Raytheon posed a significant challenge to the success of the program. Specifically, there was a lack of continuity in program management. Key personnel continued to change and depth in the site team was necessary for follow through. The merger also highlighted cultural differences between the two legacy companies that posed challenges to implementation.

## Elements for Success

The program really gained momentum when the CSP cost analysis and the initial successes of the materials analysis justified moving ahead with a comprehensive program. This cost analysis was replicated at the top 10 chemical using facilities, and that information provided the basis for the RFP.

Another important factor was that the major goals announced by the new CEO of Raytheon were directly in line with the CMS program – namely, reducing costs and usage and implementing an integrated, nationwide solution. Additional buy-in was achieved when the Department of Defense imperative for cost reduction forced commitment from upper management to consider major changes.

Finally, though it presented its share of logistical difficulties, the merger created an atmosphere of change, thus making it easier to propose a new program for managing chemicals.

## Lessons Learned

### *Pilot Program Lessons Learned*

The pilot program spanned approximately two and a half years ending with the signing of the chemical services contract between Raytheon and Radian. Below are thoughts on the successes and pitfalls encountered in this collaboration.

#### *CSP's Role*

This was the third attempt at implementing a chemical services program at the Tucson facility and there was much skepticism at the outset of the collaboration. Union labor was generally opposed to the idea and there was an inherent cultural bias at Raytheon that “we know best” - thus some resentment by the team to develop a chemical services program. Many on the Team acknowledged that CSP's role as a third party facilitator gave the program concept the credibility among Raytheon personnel it needed to be seriously considered. A critical step was when CSP identified a competitor who was already engaged in chemical services and facilitated a tour of Raytheon personnel to the competitor's site. By exposing the Team to chemical management best practices outside of Raytheon, it helped motivate Team members to develop their own program.

## **Cost Accounting**

In hindsight, the team should have conducted the chemical process-mapping exercise in one of the first meetings. It was the first time representatives from all the different management functions who touch a chemical sat together in one room. They realized the complexity and related costs of chemical management more quickly in that one session than reviewing the graphs and cost figures CSP had presented the previous months. Once the cost analysis data and process-mapping results were in hand, the Team got stuck on what their vision for chemical management should be. This is when a tour of other facilities implementing a chemical services program was important. In order to create a new vision, they needed to see what was possible.

The baseline cost analysis proved critical in two key ways:

1. It provided justification for Raytheon to move forward with chemical management services program company-wide.
2. The financial “snap shot” was used to restructure contracts with their chemical service provider to introduce performance based incentives that reward the chemical service provider for chemical use reduction and cost saving efficiency improvements.

### *Merger*

The seemingly untimely merger between Hughes and Raytheon at the outset of the collaboration, while it could have been a deal breaker, provided an opportunity to launch the program across the entire corporation. This was made possible for three main reasons: 1) the merger created an atmosphere of change making it easier to propose a new program for managing chemicals, 2) as a condition for approving the merger, the Department of Defense imperative for cost reduction forced commitment from upper management to consider major changes, and 3) the CEO's goals for the new company were directly aligned with the chemical services approach.

### *Communication*

Marketing the project internally was an ongoing aspect of the effort. It was crucial to the project that a consistent show of support from top management as well as the users existed before any changes were implemented. This effort led to management support at all levels of the company to take steps necessary to eventually engage a CMS provider.

## **Looking Forward**

The Raytheon Chemical and Gas Management Program (CGMP), continues to achieve new process efficiencies and to drive down the costs of chemical management through its CMS program. In 2004, Raytheon renewed its contract with Haas TCM for an additional five years. CMS is in effect at all seven of Raytheon's plants nationwide, and continues to offer cost savings, improved inventory management, reporting ease, and process efficiency improvements.

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