Managing Chemicals Using an Integrated Lifecycle Strategy at Pacific Northwest National Laboratory

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It's Time for a Change…

- Historically, chemical management at Pacific Northwest National Laboratory (PNNL) has been limited to inventory tracking and managing around fire loading limits within buildings.
- PNNL recognized the need to assess its current chemical management processes and costs. This was driven in part by:
  - PNNL's transition out of the 300 Area
  - DOE attention on unwanted and unneeded materials and chemicals. DOE property management requirements apply to chemicals.
  - Integrated Asset Management principle of stewardship and optimizing management of high risk assets.

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Let's get started…

- A team was established to determine PNNL specific needs, benchmark and initiate a pilot.
- A baseline analysis of our existing chemical management processes was conducted in August 2006. The baseline analysis evaluated current chemical management costs, purchase costs, and processes.
- Purchase cost ratio, including chemical lifecycle costs for procurement, receipt, delivery, inventory, waste, and Environment Safety Health & Quality and Information Technology support was estimated at a ratio of approximately 8:1.

Management Costs

- Management costs, including chemical lifecycle costs for procurement, receipt, delivery, inventory, waste and Environment Safety Health & Quality and Information Technology support were estimated at approximately $10,751,000 per year (FY05).
- In the same time period, an estimated $1,293,000 of chemicals were purchased or otherwise acquired.
- Costs were driven, in part, by:
  - multiple non-integrated data systems requiring quintuple data entry
  - researcher time sourcing supplies
  - the complexity of managing diverse processes and waste streams.

Management Costs, cont.

- The breakdown of chemical management costs by lifecycle stage and cost type is shown here. These costs are estimates based on a wide range of assumptions and should not be considered hard values.

Chemical Management Costs by Lifecycle Stage (estimated)		
	Lifecycle Stage Cost ($000)	**% of Total Mgmt. Cost**
Ordering/Approval/Procurement	$2,164	20%
Receipt/Inventory/ Delivery	$1,348	13%
Waste Collection & Management	$2,993	28%
Safety, Health and Environment	$3,983	37%
Information Technology	$263	2%
Total	$10,751	100%

Improvements to be made…

- The data collected during the base lining of costs was evaluated. It was determined that the largest gain in effectiveness and efficiency could be obtained in the *Ordering/Procurement/Inventory* lifecycle stages of chemical management.
- This conclusion was based on input from Chemical Strategies Partnership, on PNNL costs when compared with industry norms, as well as feedback from stakeholders.
- Although the focus will be on *Ordering/Procurement/Inventory* lifecycle stages, incremental improvements will follow in other areas.

A New Chemical Management Strategy

- The information gained during the baseline was used to develop the Laboratory's Chemical Management Strategy
- PNNL's Chemical Management Strategy establishes new, best-in-class management practices to meet the future needs of the Laboratory, including the Capability Replacement Laboratory (CRL) Project and supports the Office of Science Start Clean/Stay Clean and integrated asset management operating philosophies.
- The Laboratory's future vision is for chemicals to be a part of an integrated asset management system which allows us to efficiently and effectively manage and measure the performance of all aspects of the chemical management lifecycle, including: procurement, delivery/distribution, inventory, use, retention, collection, monitoring/reporting, treatment and disposal.

Chemical Management Goals

- Improvement goals for PNNL's Chemical Management System were identified to capture the endpoints that we aim to achieve through process improvement in procurement and inventory activities.
  - Improvement goals are:

    1.) Implement a streamlined chemical acquisition process that
    - improves the right-sizing of chemicals
    - provides 'just in time' delivery
    - reduces data management inefficiencies.

    2.) Reduce chemical inventory size, risk, scrap and carrying costs without constraining research creativity and productivity.

Chemical Management Objectives

- Objectives were identified to align with the goals for the chemical management process. The objectives will be adjusted to include quantifiable endpoints as baselines data are collected and evaluated.
  - The objectives are:
    - Decrease time for chemical order placement and transaction processing.
    - Source “stocked and common” chemicals from suppliers at renegotiated prices.
    - Implement a chemical information management system that facilitates single entry of chemical data with no manual re-keying.
    - Reduce chemical entry errors.
    - Increase the number of chemicals released to redistribution.
    - Decrease total number of containers wasted as unused or unopened scrap.
    - Improve the chemical container age profile by demonstrating a reduction in containers greater than 5 years old.
    - Demonstrate a reduction in weight of chemical inventory over baseline when normalized to business volume.

Chemical Management Metrics

- Metrics were established for measuring performance:
  - Chemical Acquisition costs (includes the labor and purchase cost)
  - Customer wait time
  - Researcher Satisfaction
  - Entry error costs
  - Wall to Wall costs
  - Liability costs
  - Scrap costs
  - Cost avoidance/redistribution
  - Weight/# of containers added to inventory/month
  - Total containers in inventory
  - Age of containers
  - # of containers removed from inventory/month
  - # of containers redistributed
  - Chemicals released for redistribution

Supporting the Chemical Management Strategy

- Three key processes were initiated to support the Chemical Management Strategy.
  - Contract Chemical Management Services
  - Chemical Justification Review
  - “ChemAgain” Chemical Redistribution Program

Contract Chemical Management Services

- PNNL benchmarked chemical management at two laboratory operations.
- In both cases, chemical management capabilities were contracted to experts that provided a “total system focus” resulting in potential cost savings and environmental gains.
- As a result, PNNL is outsourcing chemical management services at the Radiological Process Laboratory (a user facility funded by DOE) and the Bioproducts Sciences and Engineering Laboratory (a joint effort between Washington State University and PNNL, located on the WSU Tri-Cities campus).
- The scope of the project includes planning, procurement, delivery, receiving, storage, data, management and inventory control. The scope also includes facilitating utilization of the existing inventory available for redistribution.
- During FY08 a chemical management services Request for Proposal was approved and issued.
- It is anticipated that this approach to managing chemicals will be expanded to all of the PNNL facilities once the systems have been tested and adjusted to meet our needs.

Chemical Justification Review

- The current PNNL inventory of over 68,000 chemical containers is being reviewed by chemical owners to justify retaining these chemicals.
- In parallel, suitable chemicals not associated with a need are offered for redistribution for a period of one year to others who may have a need of the material.
- The goal of this effort is to find a use for chemicals that is environmentally preferable to waste, to establish start clean/stay clean behaviors, and to prepare the 300 Area facilities for transition.

"ChemAgain" Chemical Redistribution Program

- In FY07, PNNL implemented a Chemical Redistribution Center (CRC).
- The CRC temporarily houses chemicals when they are seen as likely to be of use to others, but not of immediate use to a known, internal researcher.
- Previously, if chemicals could not be easily transferred between research personnel, they were disposed of as waste, regardless of their reuse potential.
- The "ChemAgain" process will allow for those chemicals to be redistributed to a broader set of internal researchers, other DOE Sites, or externally (i.e., universities).
- In FY08 the chemical redistribution was integrated into the front end electronic chemical request form to encourage the use of existing inventory.

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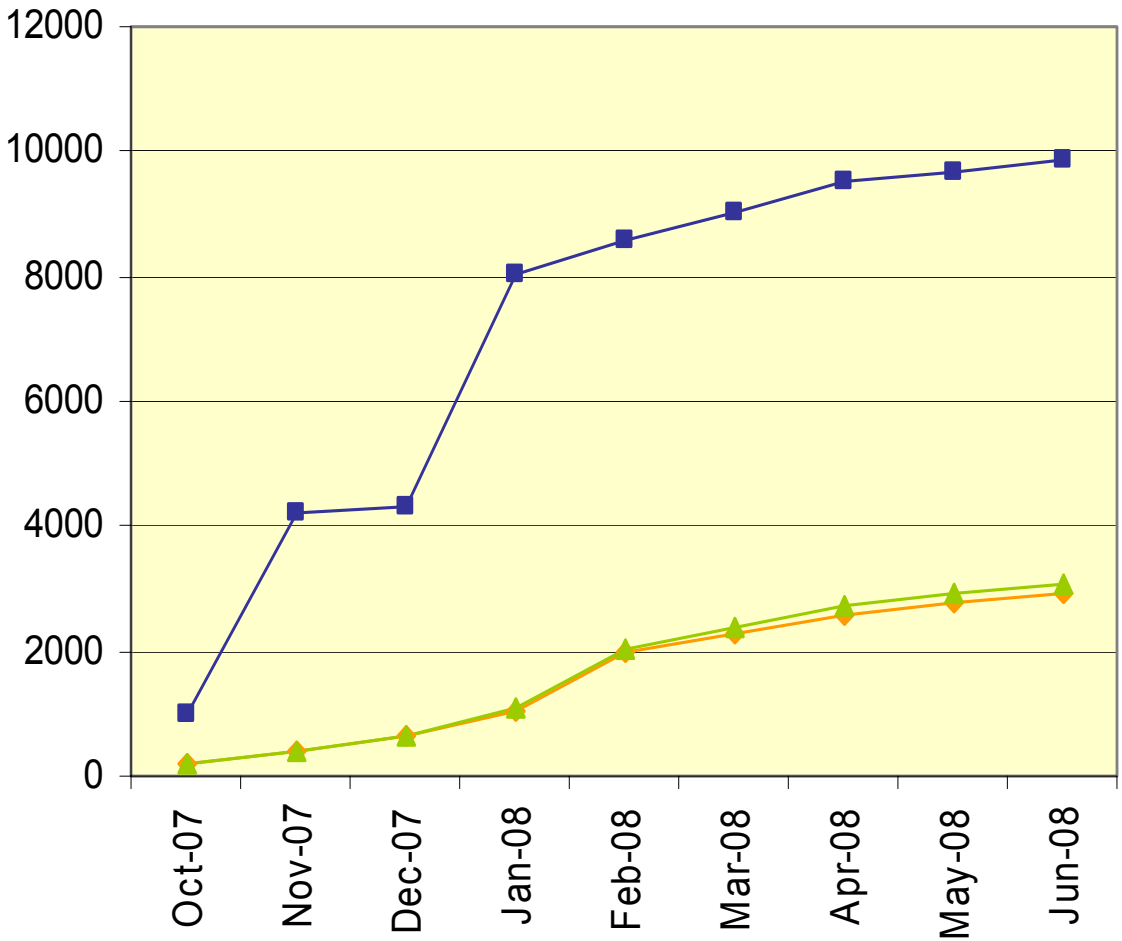
Fiscal Year 2008 Progress

- OBJECTIVE: Decrease total number of containers wasted as unused or unopened scrap
  - We have expected and seen an increase in the weight of unused chemicals that are disposed that is directly tied to the chemical redistribution effort (disposal of chemicals not suitable for redistribution). We expect to see a decline in this measure as refinements to acquisitions and redistribution processes mature.

Scrap Chemical Disposal, Year to Date



Scrap is defined as unused containers either opened or unopened.

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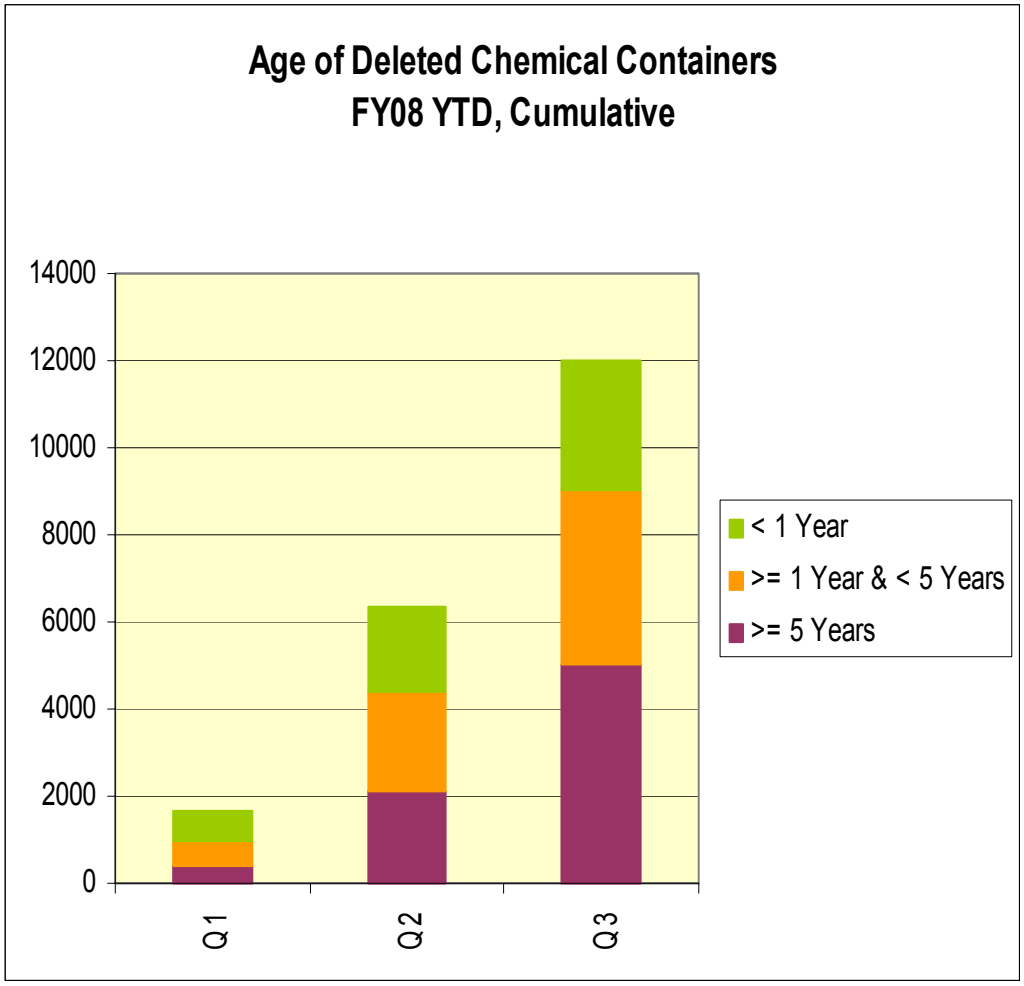
- OBJECTIVE: Improve the chemical container age profile by demonstrating a reduction in containers greater than 5 years old.
  - Containers greater than five years old have remained 56-57% of the total number of containers from October 2007 to present. No significant reduction is expected until containers not successfully redistributed are disposed.



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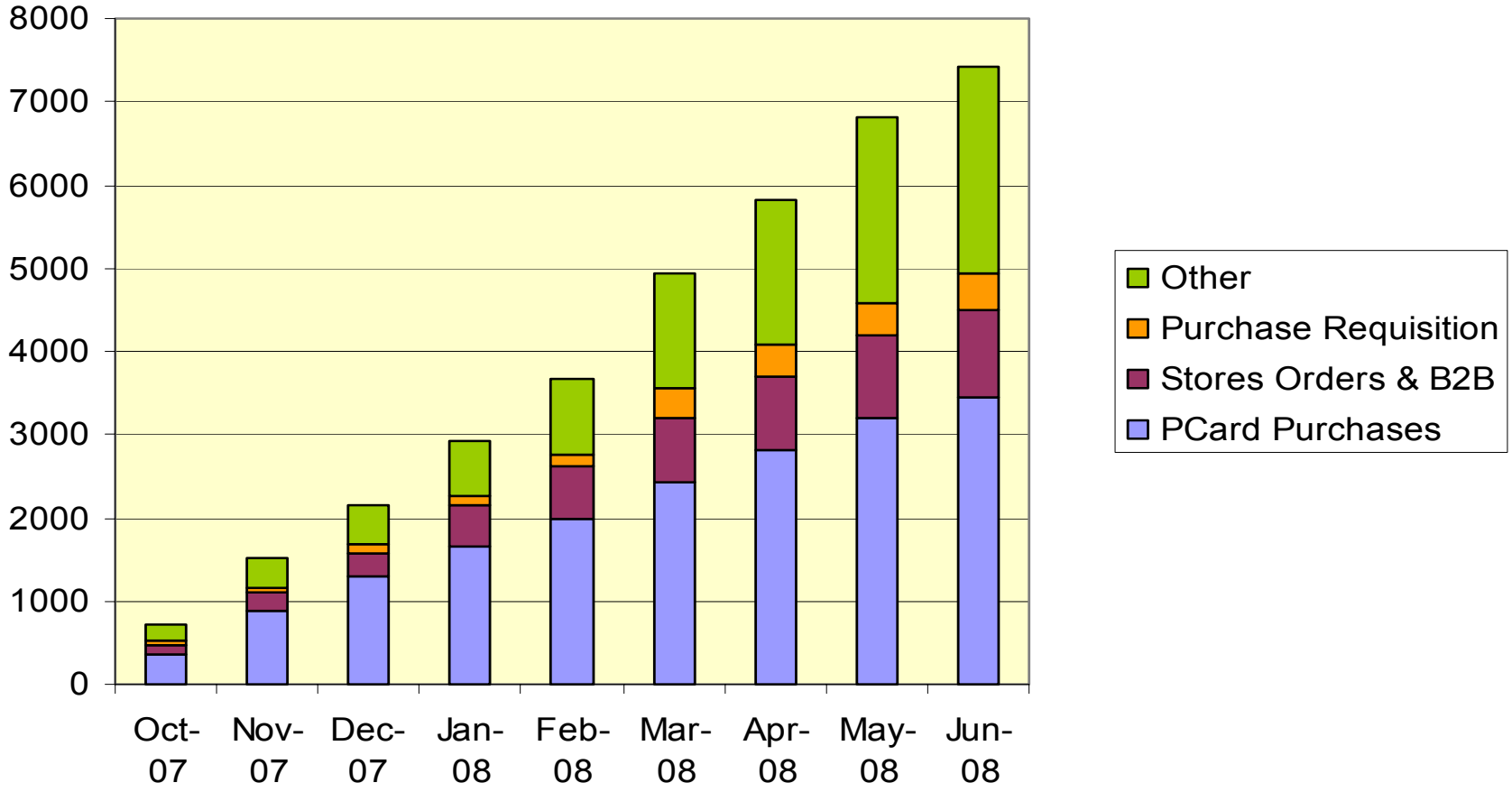
Fiscal year 2008 Progress

- OBJECTIVE: Source “stocked and common” chemicals from suppliers at renegotiated prices.
  - Approximately 30% of chemicals added to CMS through standard acquisition are obtained at negotiated prices. This is an improvement of about 50% over the baseline from CY2005. This improvement is attributed to increased use of B2B for acquiring chemicals.
  - The expectation is that leveraged pricing through B2B will increase with the move to a chemical services provider. Additional metric under development: Chemical purchase cost/container.

Container Additions by Purchase Type
FY08 YTD, Cumulative



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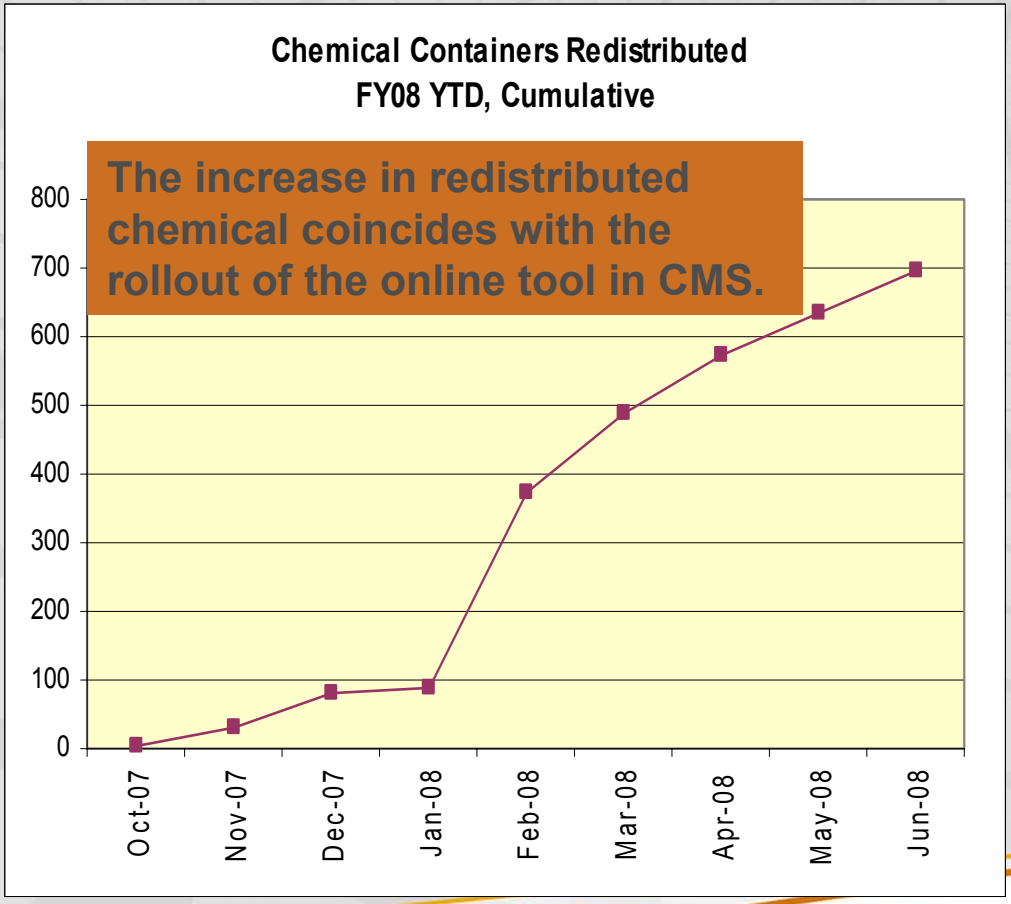
- OBJECTIVE: Increase the number of chemicals released to redistribution.
  - 9,313 containers are currently available for redistribution.
  - 882 containers have been redistributed since July 2007, with identified lifecycle costs avoided of $905,985.
  - 1,565 containers are currently stored in the newly established Chemical Redistribution Center.



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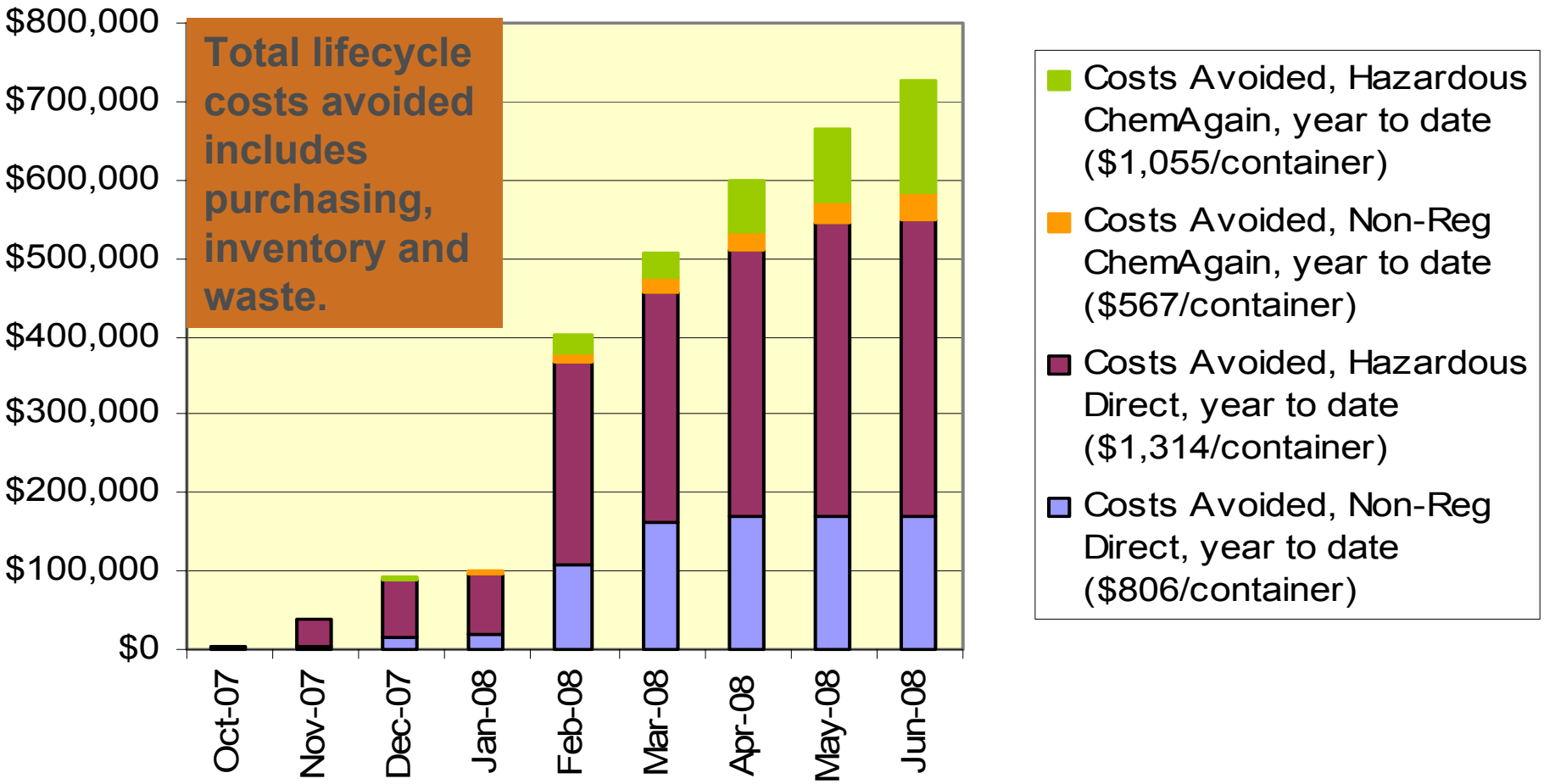
Costs Avoided by Chemical Redistribution
FY08 YTD, Cumulative



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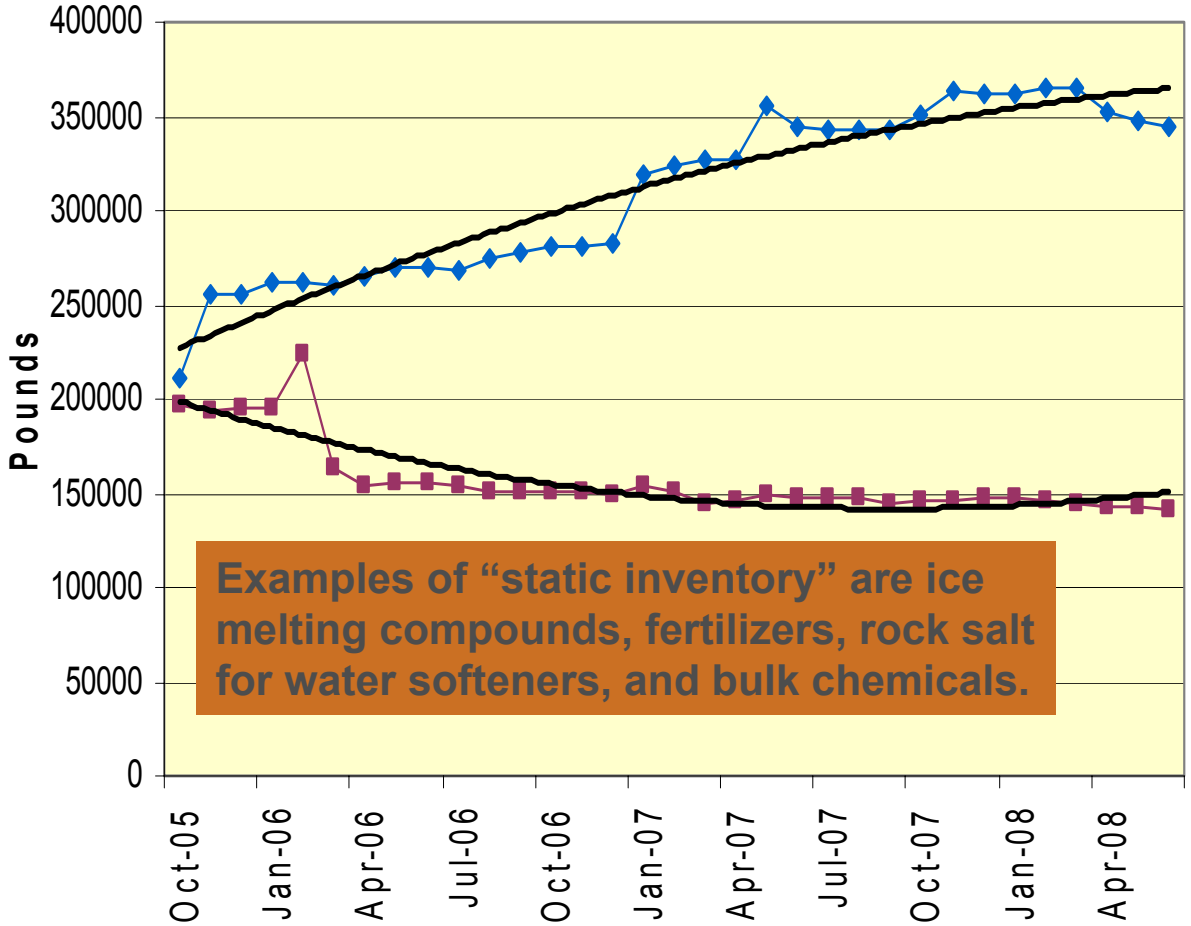
- OBJECTIVE: Demonstrate a reduction in weight of chemical inventory, over baseline, when normalized to business volume.
  - While the CMS container count has been trending downward over the past year, the weight of chemicals in inventory has been increasing; however, the inventory weight leveled off in the second quarter FY08.
  - Further analysis of our chemical inventory has revealed that the increase in weight is caused by a large volume of chemicals that are non-laboratory reagents.

Static vs. Non-static Inventory by Weight (FY06-FY07)

Line Chart - not stacked



The increase in weight is caused by large volume of chemicals that are non-laboratory reagents. These are maintenance chemicals which are placed on a "static" inventory.

Examples of "static inventory" are ice melting compounds, fertilizers, rock salt for water softeners, and bulk chemicals.

Although the static inventory weight has been increasing, the weight of laboratory reagents (non-static inventory) has been reduced by 9.2% through three quarters of the fiscal year.

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QUESTIONS?

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Lessons Learned/Challenges

- Be patient
- Team with stakeholders
- Get smart and stay open minded
- Communicate up, down and across your customer/client base