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LAWRENCE
BERKELEY
NATIONAL
LABORATORY

SELF ASSESSMENT REVIEW



Chemical Management | Janice E. Sexson - Gene Tucker

Facilities Self-Assessment Review

Chemical Management

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Jennifer Ridgeway
Facilities Division Director

Executive Summary

“It is the responsibility of all groups using chemicals at Berkeley Lab to keep a current and accurate inventory of chemicals in the Chemical Management System-Pub 3000 4.7.3.”

Current chemical inventory reports must be provided for compliance with DOE and the City of Berkeley regulations. An accurate chemical inventory is also required by the Emergency Planning and Community Right to Know Act.

The Facilities Division selected chemical management for this self assessment review knowing in advance that the process for tracking inventory has been neglected since 2008. Prior to starting the review, a user activity report was generated that revealed only 12.7% of the inventory had been updated since 01/29/2010 (Appendix A).

This assessment includes a review of 31 storage spaces¹ and 609 items (there were 860 items listed in the Chemical Management System (CMS) Database). Sixty-nine percent of the Facilities Division inventory was incorrect. The contents of chemical storage in every area did not match the contents shown in the chemical inventory system (Appendix C).

In 2010 EH&S summer student interns performed a partial inventory for one Facilities Division chemical custodian. Except for this partial inventory, the Chemical Management System had not been updated since 2008, up to the start of this assessment. As a result of this assessment, the Chemical Management inventory has been updated to reflect the results of the areas inspected.

The process for gathering inventory is inefficiently time consuming and had fallen away when the person previously assigned to enter the data into the Chemical Management System left the laboratory. A replacement was not assigned the duty of taking the Supervisor submitted hand written inventory and entering data into the system. None of the supervisors interviewed for this self assessment had ever been trained to or have used the Chemical Management System.

The Facilities Division has experienced tremendous growth and change in a relative short time. Shops, store rooms, and flammable storage cabinets in many locations moved multiple times. Some chemical storage locations were moved during this self-assessment process. Many of the chemical issues discovered during the assessment were not connected to any chemical custodian, craft or employee because the previously assigned chemical custodian had retired or changed their job position. It is an additional challenge to inventory what are essentially very migratory chemicals. During the assessment a number of hazardous conditions were discovered

¹ Storage locations not identified in the Chemical Management Database were discovered during the assessment.

and the Chemical Custodians were requested to immediately correct or eliminate the hazard. A follow up was performed to ensure that the hazardous conditions were rectified.

The Chemical Management Plan states that it is the work lead's responsibility to ensure that new chemicals are entered into the Chemical Management System within 30 days and that disposed of chemicals are removed from inventory within 30 days of disposal.

A number of other issues were discovered during this review:

Process Efficiency Issues

- Chemicals were found in nearly every location that were described by associated workers as "We never use that" items
- 378 (62%) new chemicals were not entered into the database
- 497 (58%) disposed chemicals had not been removed from the database
- The previous system for collecting and entering data into the system has fallen into disuse
- The Chemical Custodians have little knowledge of their responsibilities and have not been trained in the use of the database
- Summer interns updating the inventory reentered chemicals assigned to retired persons
- There is no dedicated person to enter chemical inventory data gathered by the chemical custodians. In spite of the assignment of responsibility to maintain the Chemical Management System to work leads, many interviewed believe it is more efficient to designate a single person to enter data into the system
- Bar codes are not used efficiently
- In most cases the chemical manufactures' name was not included in the inventory
- The use of craft nick-names for chemicals instead of actual names made chemicals difficult to compare and identify in the Chemical Management System
- Valuable storage space is wasted on never used chemicals
- Chemicals are strewn about-there is no system for easily locating similar chemicals. It appears that employees open new containers when they are unable to quickly locate what they need
- Refrigerants, or reclaimed refrigerants, and most gases are not included in the inventory
- Multiple unknown storage areas prevent chemical inventory control
- Lack of Controls

Safety Issues

- Gas containers were found stored without lids for hazardous liquid chemicals- Immediately resolved-CATS # 8666-13

- Most storage areas do not have secondary containment
- Representatives from every shop inspected said that abandoned chemicals keep showing up in their work areas
- Subcontractors leave behind paint and other chemicals that Facilities Painters will not use-Immediately resolved CATS # 8666-19
- Chemicals were found that remained unused or not disposed after 17 years
- Unlabeled containers were found in most areas
- Old rusty containers at the point of failure that contain solvents and other volatile chemicals were found in the storage areas -Immediately resolved -CATS # 8666-14
- Several leaking containers were also discovered- Immediately resolved -CATS # 8666-14
- Acetone was stored in a paint thinner can that was labeled with incorrect hazmat information -Immediately resolved-CATS# 8666-15
- Flammable liquid cabinets were missing the required door springs
- Flammable Items not stored in a flammable storage cabinet
- Two flammable gas cylinders are 2 years past their required retest date
- Acetylene and oxygen stored incorrectly less than 20 feet apart- Immediately resolved- CATS # 8666-16
- Five spools of lead solder were discovered in various locations
- Gasoline was stored in an old rusty, dented can- Immediately resolved-CATS # 8666-17
- Gas cylinders are secured with a single chain (double chain required)
- Gas cylinders have not been consistently entered into the database
- Containers of Flammable chemical are not stored inside a flammable liquid storage cabinet
- Olive cans, potato salad containers, and paint cans are often used as secondary containers

Recommended Corrective Actions

The following recommended correctives have been entered into the Corrective Action Tracking System (CATS) database - Cats # 8666-1:

- The Facilities Division should charter a continuous improvement initiative and create a Lean Kaizen project to consider implementing the following recommended improvements:
 1. Centralized chemical storage areas
 2. Limiting chemical purchasing to stores personnel

3. Stores personnel entering inventory into the Chemical Management System as chemicals are delivered
4. Enter into the Chemical Management System the maximum quantity allowable with limits posted at the storage locations
5. Assign new barcode numbers with the names of chemicals and the maximum quantity to be posted for ease of scanning
6. Responsibility to remove disposed items from the Chemical Management System within 30 days of disposal
7. Who is to update inventory not yet resolved in the Chemical Management System and affix or remove barcodes and inventory as appropriate
8. Turn rate for chemical use
9. EH&S and IT should consider modification of the Chemical Management System to accommodate the needs and additional fields contained in the Facilities Green House gasses, new and reclaimed refrigerants database, so that the Facilities database can be migrated into, and replaced by, the Chemical Management System
10. The Facilities Division will train chemical custodians on their inventory responsibilities. Training should include:
 - a. Scanning barcodes and affirming correct data on a yearly basis
 - b. Informing the dedicated inventory person of all new items within 30 days
 - c. Informing the dedicated inventory person of all disposed (items that will not be reordered) within 30 days
 - d. The need for inspection of storage and work areas for spills, correct labeling on secondary containment, container condition, housekeeping, and compliance
 - e. Retrain Division employees who use chemicals on the requirement for labeling secondary containers through tailgate type instruction, including the use of EH&S supplied labels

- Facilities should complete a 5'S Organization Process of chemical storage areas that includes the following-CATS # 8666-2:
 1. Store similar chemicals grouped together for ease of inventory and selection
 2. Store liquid hazardous chemicals on secondary containment and supply the secondary containment where needed to contain spills or leaks
 3. Chemical Custodians will ensure that all flammable chemicals are stored in flammable storage cabinet
 4. Chemical custodians will review the contents of their portion of the database and adjust entries that contain "nick-names" to reflect the manufacture's name
- Discontinue use of "found containers" not designed for secondary content-CATS # 8666-3
- Dispose of containers without labels, or containers improperly labeled-CATS 8666-4
- Facilities will install additional chains at B 76 gas cylinder storage locations where necessary –CATS 8666-5
- Facilities Safety Coordinator will modify the DBO2 template to help assure during inspections that cylinders are stored with the required two chains-CATS # 8666-6
- Employees who handle gas containers should understand storage requirements-CATS# 8666-7
- Facilities will review subcontractor attic practices and determine what materials remain as attic items (Resolved)-CATS# 8666-19
- The custodian of the two compressed gas cylinders 2 years past required retest in the regulator shop will replace or retest the cylinders-CATS # 8666-8
- Remove non chemical items from flammable storage cabinets (tools etc.)-CATS# 8666-9
- Determine if flammable storage cabinets should be removed from cargo containers as a best practice-CATS # 8666-10
- Properly dispose of lead solder located in trucks, work or storage areas-CATS # 8666-11
- Replace springs on flammable storage cabinets that are missing springs-CATS # 8666-12

Introduction

The purpose of the Chemical Hygiene and Safety Plan is to provide requirements and guidance to LBNL division Directors, Supervisors, Work Leads, Employees, Contractors, Casual and Participating Visitors, and Support Personnel for the safe handling, use, and storage of hazardous materials in laboratory, shop and office settings. The Facilities Division strives to conduct its operations in a manner that does not adversely affect the health, safety, and well-being of its employees, guests, or the environment, by maintaining effective chemical management practices.

The goal of this self assessment review is to understand the current status of the chemical inventory and determine if any improvements, noteworthy practices, or corrective actions are necessary.

This review examined all five ISM core values as they pertain to management of the chemical inventory.

- Define the work - Discussions with employees included storage conditions, missing labels, and locations of chemicals.
- Analyze the Hazards - Unreadable/missing labels inhibit employees from analyzing the hazards associated with chemical use, storage, required PPE, and spill cleanup. Difficult to locate chemicals could lead to over ordering and a buildup of unnecessary supplies or inventories over allowable limits. Chemicals were reviewed in the field by Industrial Hygiene Subject Matter Experts for appropriate use and storage.
- Develop Controls - Entries from the previous inventory were compared to the current inventory for accuracy. Controls need to include correctly entered inventory, required PPE, correct storage, and chemical use
- Perform the Work - Discussed with the existing and new chemical custodians issues revealed at each location. Maintaining the chemicals in an organized fashion (all thinners stored together, for example) is a time and budgetary efficiency. Removing old and out of use chemicals would prevent their accidental or inappropriate use.
- Obtain Feedback - Feedback was gained during field inventories. Employee, Work Lead, and Supervisor representatives discussed chemical management issues. Construction managers were queried about the process for subcontractors leaving chemicals behind.

Definitions

Acetylene (C₂H₂) - is a flammable gas commonly used for welding.

Consumer Products - Only hazardous or harmful (e.g. toxic, corrosive) consumer products such as bleach, paint thinner and products under pressure (aerosols) are required to be entered into the database. Consumer adhesives and sealants must also be inventoried.

Disposed Container - The chemical Inventory Management System allows a user to remove containers from the inventory. When a user removes or “disposes” a container from their inventory, it is removed from their ownership. Information about the container will remain in the Chemical Inventory Management System, but will no longer be listed under the user’s name in the active inventory. After the user has removed a container from their inventory, they have the option to retrieve it from the Chemical Inventory Management System, and place it back in their inventory.

Hazardous Chemical - The OSHA Hazard Communication Standard defines a hazardous chemical as a chemical that is either a *health hazard* or a *physical hazard*.

Hazardous Waste- Hazardous waste is waste that can cause serious injury to human health and the environment.

Health Hazard - A “Health hazard” is a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees.

Physical Hazard-A chemical is a physical hazard if it has flammable, combustible, explosive, oxidizing, pyrophoric, or reactive (including water reactive) properties, or if it is an organic peroxide or compressed gas.

Office Supplies-With the exception of sealants, adhesives, and products under pressure (aerosols), office supplies do not need to be entered into the database.

Methanol Alcohol - Is the simplest alcohol, and is a light, volatile, colorless, flammable, liquid with a distinctive odor that is very similar to but slightly sweeter than ethanol (drinking alcohol). Methanol has a high toxicity in humans. If ingested, as little as 10 ml can cause permanent blindness by damage to the optic nerve. 30 ml is potentially fatal.

Secondary Container –Chemicals transferred from the purchased container into another container.

Secondary Containment- Liquid hazardous materials such as petroleum products, antifreeze and solvents can present a threat to soil, ground water, and surface water if accidentally spilled or leaked. These substances must be stored so that if a spill or leak occurs the material remains contained and does not enter the environment. Secondary containment is required for the storage of all regulated hazardous materials. Secondary containment will be 110 percent of the primary container. Multiple containers will be 150 percent of the largest containers volume.

Focus Area Description

The key objective of this self-assessment is to examine the Facilities chemical inventory and storage process currently in place to determine its efficiencies and to verify conformity with the program. The assessment team worked with subject matter experts to determine if chemicals are stored appropriately and if conditions are within expectations of the program. The team further reviewed storage conditions in 29 locations² and examined 609 chemicals used in these locations to ensure proper storage, correct chemical use, separation of incompatible chemicals, container conditions, and correct labeling. The EH&S Industrial Hygienist Rob Connelly accompanied the inspection team on most inventory assessments.

Locations not inventoried include trucks, custodial closets, and some areas that were inaccessible.

Current Requirements

All chemicals must be entered into the database, with the following exceptions:

- Biochemical materials such as cell culture media, amino acids, or lipids
- Research-produced chemicals and mixtures
- Chemicals or chemical products transferred to secondary (non-manufacturer) containers for immediate use
- Radiological Materials
- Waste Chemicals

The following information must be included in the Chemical Management System (CMS) for each chemical:

- Container barcode (ID Number)
- Chemical or product name
- Container size
- Container unit (Kg, L, mL, etc.)
- Container type (glass bottle, can)

² Storage locations not identified in the Chemical Management Database were discovered during the assessment.

- Physical state (solid, liquid, gas)
- Manufacturer
- Building
- Room
- Owner

Additionally, the following must be included in the database:

- New and reclaimed refrigerants must be inventoried per the Refrigerant Management Program and the Green House Gas requirements (EPA 2008). A separate database is maintained, but is not linked to the Chemical Management System.
- Consumer products. If a chemical is used more frequently or in greater quantities than that normally used by a consumer, it is beyond consumer usage and should be tracked in the Chemical Management System. Because the frequency and quantity is judgmental, the best course is to inventory all but the most benign chemical (Appendix F Consumer Products Email). The Assessment team worked with an EH&S Industrial Hygienist to determine which chemicals did and which chemicals did not need to be inventoried. A few items were removed from inventory or not entered because they were clearly consumer items. Items such as hand soaps, detergents, and office supplies were not inventoried.
- All consumer adhesives and sealants must be inventoried.
- All gas cylinders (including inert gases and compressed air) must be entered into the CMS database.

Labels on primary containers must:

- Show the chemical identity or product name of the material (must be the same as listed on the MSDS)
- Provide hazard warning information appropriate for employee protection
- List the name and address of the manufacturer; and
- Be legible and prominently displayed

LBNL applies the labeling requirements of the OSHA Hazard Communication Standard to non-laboratory areas such as machine shops, paint shops and for uses such as custodial services. Secondary containers shall be labeled with the chemical identity or product name of the material and hazard warning. The chemical identity or product name must be the same as listed on the MSDS. In practical terms, this means that the name on the secondary container shall be the same as the name on the original container label. Product names such as "X-14" are permissible provided that they match the name on the label of the primary container. Listing individual chemical components of mixtures is not required. A hazard warning can be words, pictures, symbols, or a combination thereof, which provide at least general information regarding the hazards of the chemicals. Generally, the hazard warning can be the same as the

one listed on the primary container label. Listing the name of the person who transfers the material and the date of transfer is recommended but not required.

An optional stick on label has been developed for this purpose (pictured below) and is available from EH&S (ext. 2916). This is recommended for secondary containers of hazardous materials used in non-lab areas. The label contains space for the following information: Non-Laboratory Material, Material Name, Hazard, Owner (Optional). EH&S will make these labels available on line for download in the next few weeks.



Photograph 1-Label Available from EH&S

Assessment Scope

Facilities reviewed its entire chemical database. Facilities storage practices were reviewed to verify conformity with the Chemical Management Program.

- The team reviewed the Facilities Division chemical database inventory, flammable storage cabinets, and storage area contents and conditions
- The chemical inventory review did not include trucks, elevator closets or custodial closets
- Five supervisors, 2 work leads, and 8 employees were interviewed
- Reviewed issues with the LBNL Fire Marshall
- Discussed refrigerant tracking with the Refrigerant Management Program Subject Matter Expert
- Interviewed Construction Managers for large and small projects
- Reviewed the Chemical Hygiene and Safety Plan
- Reviewed Pub 3000 chapter 4.7 Chemicals
- Reviewed Pub 3000 chapter 7 Pressure Safety and Cryogenics
- Reviewed Pub 3000 chapter 4.7.2 Chemical Inventory
- Met with the HVAC mechanic tracking new/reclaimed refrigerants

Assessment Results

Previous to 2008, the inventory results were collected annually from the Supervisors. The results were entered into the chemical inventory by an administrative assistant. The administrative assistant is no longer with the laboratory and therefore no work groups updated their inventory since 2007/2008.

There is currently no single person dedicated to enter chemical inventory data gathered by the chemical custodians. In spite of the assignment of responsibility to maintain the Chemical Management System to work leads, many interviewed believe it is more efficient to designate a single person to enter data into the system.

During the summer of 2010, EH&S hired students who completed a partial inventory for one of the Maintenance Supervisors and for buildings 76 and building 81. The students did an inventory for some but not all of the Supervisor's direct reports. During this process the students located three containers that had been marked as "disposed" in the inventory. The students "un-disposed" these containers in the chemical management system and did not change the three retired/absent owners of the chemicals, resulting in an incorrect Chemical Management System user activity report (appendix B).

The Facilities Division was joined for many of the inspections by EH&S Industrial Hygienist Rob Connelly and the removal of old chemicals and containers was discussed with EH&S waste subject matter expert Mark Lasartemay. As issues were discovered, each chemical custodian / supervisor was alerted to the hazardous findings in each area. Chemical custodians were advised to not wait for the completion of this self assessment report to resolve these findings. Mark Lasartemay worked with several craft groups to remove surplus chemicals following the area's inspection. An inventory was performed to compare observations with items listed in the database.



Photograph 2 -154 Containers Removed from Paint Shop Storage Area

Overview of the Facilities Chemical Inventory

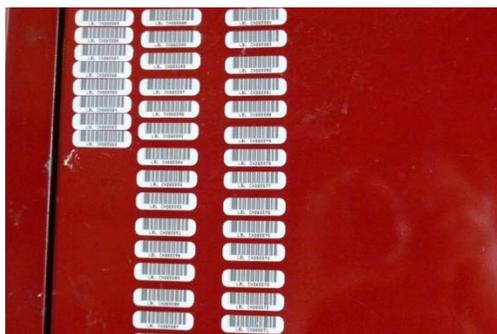
Barcodes

The Facilities Division Chemical Inventory was set up in 1994. The Chemical Management System identified containers with a barcode containing a six digit ID number. Originally the barcodes were attached to the individual containers. Many containers of chemicals have not been emptied and disposed of in 17 years as evidenced by the original bar codes affixed to the containers.

Approximately 8 years ago the process was modified by attaching the bar code to the shelf and not to the container. The intention was to assign a barcode number to groups of identical chemicals. For example, all 1 gallon containers of bleach located in building 31 would have the same barcode number. Bleach containers stored in a separate location would have a different barcode number.

The Chemical Management System may not track all of the data required by the mandatory Greenhouse gas reporting program. The self-assessment team met with EH&S Ned Borglin who is the Greenhouse Gas reporting subject matter expert and Lee Aleksich who manages the chemical management database. It was agreed that the refrigerant and reclaimed refrigerants should be individually barcoded and that unless the chemical management system is updated to track spilled, consumed, used, or leaked refrigerants as well as other greenhouse gasses, there will be a need to track these chemicals in the two databases.

Barcodes were found during this assessment stuck to shelves and doors. However, without a reference to the name of the chemical, the barcode is useless to the field person attempting to identify chemicals.



Photograph 3- Unlabeled Barcode Numbers

LEFT LOCKER

Chemical Name	LBL Bar Code
GAS CONTAINER	CH28001
SODIUM THIOSULFATE	CH28002
SP VL-TEX PATCHING CO.	CH28003
SCOF OFF	CH28004
HYDRAULIC FLUID	CH28005
TANAKA PERFECT MIX	CH28007
EVERCOLD FORMULANT	CH28008
WAGNER PISTON OIL	CH28009
OSACO THROAT SEAL	CH28010
DEVCON CLEANER 300	CH28011
HOMAX SLIP FREE	CH28012
SDC TEX ADDITIVE	CH28013
MASTER GROUT	CH28014
BUSTOLEUM CONCRETE	CH28015
CAUL CLEAR	CH28016
CHEMSEARCH CITRUS P.	CH28017
SHERM WILLIAMS CLEAR	CH28018
STAYEX PAINT THINNER	CH28019
FASTONK 30 HF GREEK	CH28020
ACETONE	CH28021
ZANDER BIN THINNER	CH28022
PAINT THINNER COBLEN	CH28023
EAGLE GAS CAN	CH28024

Photograph 4-Typed Barcode Numbers (non-scanable) and Chemical Name

Inventory collected without barcode numbers would involve the lengthy process of writing down the names, number of containers etc and then searching the database to update the most recent inventoried entry.

In some cases the supervisors had listed the name of the chemical next to the barcode number. While this was an improvement, the barcode number was still not being used in a manner that gave the user the ability to scan and then upload the data.

In a few areas the barcodes and the names of the containers were found affixed to the doorway. This at least gives the chemical custodian the ability to scan the data and then more efficiently upload the data. One drawback is the inability to easily relocate the attached information should a decision be made to relocate the chemicals.



Photograph 5-Barcodes and Chemical Names Permanently Affixed to Door

The chemical inventory process can be very time consuming if it is not set up in the correct manner. If the names of the chemicals and the barcodes were attached to the door or shelves in a plastic sleeve it would be simpler to look at the inventory and scan the data (example

Appendix E). Scanners are available for use from EH&S. Entering the maximum quantity that can be present at any point in time would eliminate the need to constantly add or remove chemicals within the 30 day requirement. The only time a chemical custodian would need to enter a chemical would follow the purchase of a never before used chemical. The chemical custodian would only need to dispose of a chemical on occasions when the decision was made to never purchase a chemical in the future. Setting the inventory up in this manner will take some time but will save time in the long run. Until the Chemical Management System is changed or improved this may be the best solution going forward. A barcode scanner could be used yearly to scan the posted barcodes and ensure inventory correctness.

Compressed Gas Cylinders

Hydrostatic testing as outlined in Title 49 CFR is required for vessels under pressure. Regulator testing helps to reduce the chances of failure or explosion due to weak points in the tank structure.

During the chemical inventory assessment two seldom used cylinders were stored on a welding cart located in the Regulator Shop. The Oxygen cylinder had a star on it indicating a 10 year testing requirement. The date of the last inspection was in 1999. The cylinder is 2 years past the regulator test requirement.



Star indicates cylinder meets requirements for 10 year retest - Compressed oxygen

1999 is date of last retest-2 years overdue

Photograph 6- Compressed Oxygen Cylinder

Information on the Acetylene cylinder was unreadable so it is not know when the cylinder was last tested. There did not appear to be a star on the cylinder indicating the cylinder requires a 5 year test.



Photograph 7 - Acetylene Cylinder

The Oxygen and Acetylene cylinders were both strapped into a cart that does not have a fire wall separating the cylinders. The cylinders were both chained into place on the cart.

Under the OSHA construction standard 1926.350 (a)(11), and NFPA 51 2-4.3 – oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1m) or by a noncombustible barrier at least 5 feet 1.5 high having a fire resistance rating of at least one-half hour if not used within a 24 hour period.

Photograph 8 - Current oxygen acetylene cart



Photograph 9 - Cart with Firewall Divider



Gas Cylinders in the downstairs cage at B 76 were secured incorrectly with single chains. One of the chains was attached loosely to the chain link fence and would likely not support the cylinders in the event of seismic activity.



Photographs 10 & 11- Gas Cylinders Single Chained to Cage



Photograph 12-Unchained Cylinder

In some areas cylinders were found unchained or sitting on the edge of shelves. Smaller cylinders were sitting on the edge of shelves that could easily fall as the door opened or during any seismic activity.



Photograph 13-Propane Cylinder on the Edge of Shelf

Storage Conditions

There is a clear need for some organization and housekeeping in most the chemical storage areas. Many of the flammable storage cabinets have shelves covered with grease. Rusty containers, leaky containers, and never used chemicals are issues that should be resolved by regular inspections and disposal.

In some cases hazardous chemicals are stored above eye height so that a person would need to lift the chemical down towards themselves. Two flammable storage cabinets inspected are elevated on a wooded step and the more hazardous chemicals are stored above eye height. One possible solution is to only store less hazardous capped materials on the top shelf. Items such as putty or spray paint should be stored on the top shelf leaving the more hazardous materials for the lower shelves.



Photograph 14-Lifting Chemicals From Above

There is no system for storing similar items together. This prevents a clear and quick “at a glance” inventory. In some instances there may be 5 partially filled containers of the same chemical stored in 3 different locations in the same shop. Chemicals may become lost and in some cases remain unused while new chemicals are then ordered. There were some empty containers sitting on the shelves that should be discarded. In two areas equipment and non chemical items were stored in flammable cabinets. Employees stated these items were stored in these locations either because of security reasons or because of the lack of storage space.

Flammable storage cabinets in B 76 room 236, the Plumber’s shop in B 53, and the roofer trailer are missing the required springs that ensure self closure.



Photograph 15-Flammable Storage Cabinet Missing Door Springs

Some areas were not inventoried because of inaccessibility. In the B 46 Bone yard only a partial inventory was performed because of this condition. Chemicals stored in this manner could challenge any worker attempting to locate or reach the chemical without placing an ergonomic strain on the workers body. One secondary container was used as a trash receptacle for empty

cans while items that should have been in secondary containment were sitting loose or in cardboard boxes.



Photographs 16 & 17 -Inaccessible Chemicals



Photograph-18 Chemicals under Shelf and Behind Storage Container



Photograph 19 -Empty Containers in Secondary Container at B 46 Bone Yard

Rolls of lead solder were discovered in the Regulator Shop, Stores, HVAC Shop and on a Plumber's truck. In stores the workers stated that although the lead solder stocked there is no demand. A request has been placed for the lead solder to be added to the dead item list preventing reordering and permitting the disposal of the existing lead solder.

The flammable storage cabinet located in the Roofer's cargo container was overfilled. Many containers were missing labels as well as container lids. Several plastic cans containing gasoline/kerosene were missing lids. The fumes in the cargo container were very strong at the time of the inspection. EH&S Industrial Hygiene personnel intend to retest the fumes during the heat of the summer.



Photograph 20- Chemicals Stored Missing Lid

This flammable storage cabinet contained evidence of many spills and was coated with greasy substances more than those observed in most areas. The cargo container is not plumbed for a sprinkler system and ventilation seems to be very poor. The roofer's quick cleanup greatly improved the storage area conditions and most of the chemicals were disposed. This area is not included in the Inventory Chart (Appendix D) because chemicals were removed before comparison data could be gathered.

Secondary Containment

There is no secondary containment in the most shops or in the flammable storage cabinets. One flammable storage cabinet was found with 1 secondary containment tub. The Chemical Hygiene and Safety Plan statement on secondary containment for liquids reads as follows:

“Store liquid hazardous materials (including squeeze and wash bottles) in secondary containment. This is to minimize the impact and spread of spills resulting from

broken/leaking containers. Secondary containment capacity must be 110% of the largest container or 10% of the aggregate volume of all containers, whichever is larger.”



Photograph 21-Secondary Containment

Building 76 room 133 is a large area that has been converted into document storage as well as a meeting area. The room also houses new and reclaimed refrigerants. The existing ventilation is turned off because it is a very noisy system. A concern was raised that there may not be enough ventilation in the case of a refrigerant leak. EH&S completed a calculation that determined the existing conditions support storage of refrigerants in this room.



Photograph 22- Refrigerants in Room 76-133

Container Conditions

Many containers were found in less than ideal conditions. Containers were missing all or part of their labels including relevant safe handling information. Rusted and dented containers could fail, spilling their contents. Some leaky containers were discovered and in many places the cabinet shelving was sticky and covered with unidentified substances.



Photograph 23 -Rusty Dented Can Containing Dap Linseed Oil Putty



Photograph 24 & 25 -Two of the Many Rusty Cans Near Failure Point



Photograph 26-Leaking Container Placed in Plastic Bag

A leaking container (see Photograph 26) of Nickel Safe Ice machine cleaner is a National Fire Prevention Association Standard 704 (NFPA 704) level 2 health hazard. The Material Safety Data Sheet describes it as an eye and skin irritant that may cause severe irritation or chemical burns. Excessive inhalation may cause respiratory tract irritation and central nervous system effects. This leaking container may expose workers to these irritations (Appendix G). A Plant maintenance technician placed this container in plastic bag at the request of the inspection team.

A container of Acetone was found in a paint thinner can. The cautionary and handling information listed on the container was for paint thinner, not Acetone.



Photograph 27-Acetone in a paint thinner container with a pasted on label

Photograph 28- Incorrectly Labeled Container is for Paint Thinner



Photographs 29 & 30- Examples of Obscured Safety Labels



Photograph 31 -Example of Unreadable Label-Mystery Chemical

Frequently found problems include containers missing labels, hazard information illegible because of spills that obscure the label or labels worn by age. Often the secondary containers contain limited information. Secondary containers that only have the contents inked in do not list the necessary safety information required to make safe, accurate working decisions such as required PPE, what to do in case of exposure, and flammability/ toxicity information, etc.



Photographs 32-35 – Examples of Containers Missing Labels or Incorrectly Labeled

Gasoline is an extremely flammable liquid fuel that should always be handled and stored properly in order to reduce the likelihood of fires and explosions. In two storage areas gasoline or kerosene was discovered stored incorrectly. Gasoline was stored in an old bent damaged paint thinner can and two containers of gasoline/kerosene were discovered missing the lids.



Photograph 36 -Gas Mix Stored in Rusty, Failing Paint Thinner Can

OSHA Standard 29 CFR 1926.152(a)(1) states: "Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved safety cans or Department of Transportation approved containers shall be used for the handling and use of flammable liquids in quantities of 5 gallons or less.

A safety can is (29CFR1926.155(1)) an approved, closed container, of not more than 5 gallons capacity, having a flash arresting screen, spring closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.



Photograph 37-Gas Cans Missing Lids

In the paint shop a glass container of Methyl Alcohol (commonly called wood alcohol) was sitting in one of the flammable storage cabinets. The Industrial Hygienist stated that this is a chemical Facilities painters should not have a need for use. During interviews with the painters it was determined that they have never used this chemical. The painters stated that a large percentage of the items in their flammable storage cabinets had migrated from other shops during moves.



Photograph 38-Methyl Alcohol

The painters indicated that a large number of chemicals including paints, fireproofing, concrete etching etch that had been abandoned by contractors around the lab and ended up at the paint shop. An investigative email was sent to Facilities Division Construction Managers requesting information about the process for contractors leaving chemicals on site. Capital Projects responded that the project specifications may required an "attic stock" be provided by the contractor and that arrangements are made with the shops to accept the material.

The smaller projects construction managers that responded to the query stated that subcontractors are advised to take all chemicals with them as they leave the laboratory following completion of their contracted work. This process has not been validated or documented to ensure that the subcontractors are actually removing the chemicals.

During an interview with a paint shop lead and supervisor it was determined that they do not have the storage capacity to accept contractor “attic stock.” The painters indicated they are unlikely to use these materials because they must be certain of its contents before using previously opened materials.



Photographs 39-41-Examples of Chemicals Left by Contractors

Usually these “attic” or abandoned items are eventually disposed of with the assistance of Waste Management.

It is a recurring theme that at each storage location, someone said “we never use that stuff” or “that doesn’t belong to us.” Every shop said that they have a problem with “others” abandoning chemicals in their storage areas.”

Once the inventory was completed in the paint/carpenter shop, the EH&S waste management employee and a Paint Shop Lead worked over 12 hours cleaning up and removing over 154 containers of paints, solvents, and thinners, etc. Failing rusty cans, subcontractor materials, never used materials, and abandoned items were all removed.



Photographs 42 & 43-Total of 154 Disposed Containers-# 1 Paints # 2 Thinners, Solvents, and Gasoline, etc.



Photographs 44 & 45-Improved Flammable Storage Cabinets Following Removal of 154 Containers

Divisional Findings

The 13 most significant findings are:

1. Gas containers stored without lids (immediately corrected)
2. Most areas do not have secondary containment
3. Unlabeled containers
4. Old rusty containers (solvents, gasoline's etc) found at the point of failure (immediately corrected)
5. Leaking containers discovered (Immediately corrected)
6. Acetone contained in paint thinner can with incorrect hazmat information on label (immediately corrected)

7. Three flammable storage cabinets missing required door springs
8. Flammable chemicals not stored in flammable storage cabinet
9. Acetylene and oxygen stored incorrectly less than 20 feet apart (corrected prior to completion of this report)
10. Five spools of lead solder discovered in various locations (immediately corrected)
11. Compressed gas cylinders secured with a single chain (double chain required)
12. Compressed gas cylinders have not been consistently entered into the database
13. Olive cans, potato salad containers, and paint cans are often used as secondary containers

Observations

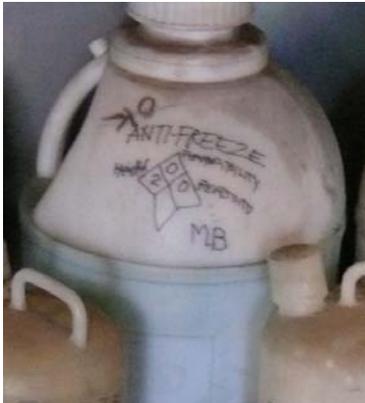
The following observations were derived from our interviews and physical inspections of field usage and conditions:

- Personnel from every shop said that abandoned chemicals keep showing up in their work areas
- Subcontractors leave paint and other chemicals that Facilities Painters will not use
- Old containers of chemicals remain in storage
- Lots of “we never use that” chemicals in nearly every location
- Large numbers of new chemicals were not entered into the database
- Large numbers of disposed chemicals had not been removed from the database
- The previous system for collecting and data entry fell into disuse
- Chemical Custodians have little knowledge of their inventory responsibilities and have not been trained in use of the database
- Summer interns doing inventory reentered chemicals assigned to retired persons (resolved via database change)
- There is no dedicated person to enter chemical inventory data
- Bar codes are not being used in an efficient manner
- In most cases the manufacture’s name was not included in the inventory
- Use of craft nick-names instead of actual names made the chemicals difficult to locate, compare and identify
- Valuable storage space wasted on never used chemicals
- Chemicals are scattered about – there is no system for easy locating similar chemicals (all adhesives stored together for example)

Noteworthy

We found the following to be noteworthy practices:

- Several new chemical custodians were assigned during the review and immediately set in motion the process to remove the excess unused chemicals and to fix issues
- PMT has been drawing NFPA 704 hazard labels on secondary containers



Photograph 46 Hand Drawn Hazard Level on Secondary Container

Recommended Corrective Actions

The following recommended correctives have been entered into the Corrective Action Tracking System (CATS) data base:

- The Facilities Division should charter a continuous improvement initiative and create a Lean Kaizen project to consider implementing the following recommended improvements-CATS # 8666-1:
 1. Centralized chemical storage areas
 2. Limiting chemical purchasing to stores personnel
 3. Stores personnel entering inventory into the Chemical Management System as chemicals are delivered
 4. Enter into the Chemical Management System the maximum quantity allowable with limits posted at the storage locations
 5. Assign new barcode numbers with the names of chemicals and the maximum quantity to be posted for ease of scanning

6. Responsibility to remove disposed items from the Chemical Management System within 30 days of disposal
 7. Who is to update inventory not yet resolved in the Chemical Management System and affix or remove barcodes and inventory as appropriate
 8. Turn rate for chemical use
 9. EH&S and IT should consider modification of the Chemical Management System to accommodate the needs and additional fields contained in the Facilities Green House gasses, new and reclaimed refrigerants database, so that the Facilities database can be migrated into, and replaced by, the Chemical Management System
 10. The Facilities Division will train chemical custodians on their inventory responsibilities. Training should include:
 - a. Scanning barcodes and affirming correct data on a yearly basis
 - b. Informing the dedicated inventory person of all new items within 30 days
 - c. Informing the dedicated inventory person of all disposed (items that will not be reordered) within 30 days
 - d. The need for inspection of storage and work areas for spills, correct labeling on secondary containment, container condition, housekeeping, and compliance
 - e. Retrain Division employees who use chemicals on the requirement for labeling secondary containers through tailgate type instruction, including the use of EH&S supplied labels
- Facilities should complete a 5'S Organization Process of chemical storage areas that includes the following-CATS # 8666-2:
 1. Store similar chemicals grouped together for ease of inventory and selection
 2. Store liquid hazardous chemicals on secondary containment and supply the secondary containment where needed to contain spills or leaks
 3. Chemical Custodians will ensure that all flammable chemicals are stored in flammable storage cabinets
 - Discontinue use of "found containers" not designed for secondary content-CATS# 8666-3
 - Dispose of containers without labels, or containers improperly labeled-CATS # 8666-4

- Chemical custodians will review the contents of their portion of the database and adjust entries that contain “nick-names” to reflect the manufacture’s name
- Facilities will install additional chains at B 76 gas cylinder storage locations where necessary –CATS 8666-5
- Facilities Safety coordinator will modify the DBO2 template to help assure during inspections that cylinders are stored with the required two chains-CATS # 8666-6
- Employees who handle gas containers should understand storage requirements-CATS # 8666-7
- Facilities will review subcontractor attic practices and determine what materials remain as attic items-Resolved –CATS # 8666-19
- The custodian of the two compressed gas cylinders 2 years past required retest in the regulator shop will replace or retest the cylinders-Resolved-CATS # 8666-8
- Remove non chemical items from flammable storage cabinets (tools etc.)-CATS # 8666-9
- Determine if flammable storage cabinets should be removed from cargo containers as a best practice-CATS# 8666-10
- Properly dispose of any lead solder located in trucks, work or storage areas-CATS # 8666-11
- Replace springs on flammable storage cabinets that are missing springs-CATS# 8666-12

Conclusion

It is clear that Facilities is not benefiting from an effective or efficient chemical management inventory process. The user activity report ran at the beginning of this review indicated there was only 12.7% usage of the Chemical Inventory Management System since January 2010. This 12.7 % was from the EH&S summer students (Appendix A) indicating that actual usage by chemical custodians is zero since 2008. At the conclusion of the self assessment, the activity rate increased to 94.1%. The assessment included a review of 31 storage spaces. The contents in every area did not match the contents shown in the chemical inventory system (Appendix C).

As the assessment progressed, chemical custodians were notified of the most serious issues or hazards and worked quickly in most cases to correct the problems.

Performing inventory by hand is very time consuming and tedious. The storage areas need to be set up in a manner that welcomes a quick at a glance inventory process. Some areas had

never been inventoried and there may be additional storage areas yet to be identified. Writing the data in long hand is slow compared to how the process should work with the assistance of a barcode scanner and organized chemical storage areas.

Overall chemical storage needs housekeeping improvements. Chemicals appear to be playing musical chairs with each work group reporting that “unknown others” abandon chemicals in their areas. It is not easy to determine where all of these migratory chemicals may have come from. In the paint shop many of the chemicals seem to be coming from subcontractors.

Many chemicals were initially entered into the database using a shortened field name. During the assessment it was frequently difficult and many times impossible to determine or trace the chemical. During the self-assessment chemicals were entered into the inventory data system using the official name on the container and the manufacturer. Adding the manufacturers name becomes another aid to identifying the chemical.

There are benefits to maintaining an accurate chemical inventory.

1. Saves time and money when ordering new materials or beginning new projects
2. Provide information about the hazards of your workspace
3. Opportunity to notice or locate deteriorating or incorrectly stored chemicals
4. Helps safety and emergency response teams identify hazards and respond more effectively in the event of an emergency
5. It is an assessment of chemical usage which would improve ordering
6. Reduces waste
7. Ease of locating needed chemicals once old or disused chemicals have been removed from storage shelves
8. Increased storage space

Supporting Documentation

The following documentation was reviewed as part of the self assessment.

- Reviewed Facilities Division chemical database, and flammable cabinets and storage area contents and conditions
- Reviewed Chemical Hygiene and Safety Plan
- Reviewed Pub 3000 chapter 4.7 Chemicals
- Reviewed Pub 3000 chapter 7 Pressure Safety and Cryogenics
- Reviewed Pub 3000 chapter 4.7.2 Chemical Inventory

Supporting Documentation Appendix A

Chemical Management System User Activity Report

Division: Facilities

Sat Jan 29 11:42:26 PST 2011

<u>Cont. Count</u>	<u>Building</u>	<u>Room</u>	<u>Last Activity</u>
1	006	2245	01/20/2011
7	031	0100	03/24/2008
17	031	0106	04/17/2008
3	031	null	11/17/2008
1	031A	0110	05/30/2007
18	031A	0114	03/22/2007
2	031E	0100	05/30/2007
7	034	0100	06/20/2010
2	046	null	12/02/2008
10	050A	0125	01/27/2009
5	050A	0125A	10/06/2008
1	050A	7101	07/14/2008
5	050B	1211	07/14/2008
1	050B	1237	08/03/2007
2	050B	null	08/03/2007
14	051	0001	10/06/2008
4	051	0004	06/06/2007
4	051	null	07/31/2008
11	053	0103	04/28/2008
2	065	A	01/27/2009
2	065	null	01/27/2009
7	065A	0101	05/12/2006
1	065A	null	01/27/2009
7	066	0101	07/14/2008
1	066	null	09/28/2010

3	070	0148	07/14/2008
2	070A	1101	07/14/2008
9	070A	1148	07/14/2008
1	072	0100	07/14/2008
3	074	0177	07/14/2008
5	076	0103	11/17/2008
3	076	0105A	02/21/2007
40	076	0109	11/14/2008
2	076	0109B	02/21/2007
91	076	0123	06/20/2010
1	076	0127	07/14/2008
44	076	0129	10/07/2008
6	076	0133	07/30/2008
4	076	0202	10/06/2008
9	076	0202A	07/14/2008
24	076	0212	06/27/2010
11	076	0222	06/21/2010
1	076	0233C	07/14/2008
19	076	0234	11/17/2008
2	076	0234D	03/24/2008
1	076	0235	01/28/2009
88	076	0236	01/28/2009
3	076	null	01/01/2010
6	076A	0100	07/14/2008
68	078	0101	04/01/2008
7	078	null	03/25/2008
70	081	0101	08/20/2010
4	090	0027A	07/14/2008
1	090	0102Q	07/14/2008
4	090	null	07/14/2008

12.7% of these are after 01/29/2010

Appendix B

Chemical Management System User Activity Report

Division: Facilities

Sat Jan 29 11:43:06 PST 2011

<u>Cont. Count</u>	<u>Owner</u>	<u>Last Activity</u>
11	Abenojar,Jaime B (001212)	10/06/2008
124	Begley,Larry E (198401)	07/23/2010
23	Bell,Sandra D (061772)	01/27/2009
175	Botello,Michael L (091047)	07/05/2010
4	Dong,Michael C (284901)	03/24/2008
23	Dupont,Patrick (175351)	03/24/2008
26	Elizalde,Michael D (249950)	04/17/2008
7	Fleming,Paul T (261351)	06/20/2010
47	Gano,Richard L (301965)	11/14/2008
1	Guldseth,Robert P (261551)	06/20/2010
75	Luiz Jr,Anthony D (229601)	04/01/2008
11	Mattson,William (813982)	04/08/2008
24	Rosas,George A (558003)	10/06/2008
22	Trigales,Kevin P (281851)	10/06/2008
1	Tully,John E (109301)	01/28/2009
2	Van Nieuwburg,Eric J (320051)	06/20/2010
1	Wright,Steve (000164)	06/20/2010

No Longer chemical
custodian

No longer works
at the laboratory

No longer
chemical
custodian

No longer works at the lab

35.3% of these are after 01/29/2010

Facilities
Retired
employee

Appendix C- Comparison Recorded Data vs Actual Inventory 76 - 129 Chemical Management System Container Search Results

Green –23 Correctly inventoried items

Red – 22 No longer found-Now Disposed

Yellow -28 New items not inventoried

Search Criteria: Building=076, Room=0129, Employee ID=288601, Container Division=FA, Container Division=FA

Container Barcode	Chemical Name
CH264703	OSI POLYURETHANE SEALANT
CH265350	NICKEL SAFE ICE MACHINE CLEANER
CH265354	ZEROL 200TD
CH265349	NU-CALGON THERMO TRAP
CH016180	AMER-BAC
CH016130	LATEX FIRE BARRIER CAULK
CH264701	DEVAN SEALANT
CH264698	CRC DRY MOLY LUBE
CH264696	TO BE VALIDATED-RUSTOLEUM ENAMEL SPRAY PAINT
CH264695	TO BE VALIDATED-MISTY FURNITURE POLISH
CH286294	TO BE VALIDATED-ZEROL 150 REFRIGERATOR OIL
CH286289	TO BE VALIDATED-MARS FOAM SEALANT
CH264694	DEGREASING SOLVENT
CH264702	TO BE VALIDATED-BUTYL SEALANT ALUMINUM AND METAL
CH292635	TO BE VALIDATED-POWER POINT ADVANCED 230 GRADE LATEX SEALANT
CH286126	CO2
CH286127	OXYGEN COMPRESSED
CH286128	ACETYLENE
CH286123	TO BE VALIDATED-BLACK GOLD VACUME PUMP OIL
CH286124	MEGA BUBBLE LEAK DETECTOR
CH016191	<u>ANTIFREEZE</u>
CH265353	<u>FORCE FLOW RO-5 HYDRAULIC OIL</u>
CH292652	TO BE VALIDATED-C-35 REFRIGERATION OIL
CH264689	<u>PETROLEUM OIL</u>
CH264710	<u>ALL PURPOSE OIL</u>
CH264709	<u>RECTOR SEAL 5</u>
CH264707	<u>LOCTITE 567 SEALANT</u>
CH264708	LEAK-LOCK
CH264685	<u>CHLORODIFLUOROMETHANE R-22</u>

CH265351	<u>NU-CALGON SPRAY ADHESIVE</u>
CH016146	<u>IMS-II</u>
CH058582	<u>LEAK-TEC 372E</u>
CH016115	<u>REFINED PETROLEUM OIL</u>
CH264700	<u>LAP SEALANT</u>
CH264699	<u>CRC 3-36</u>
CH264697	<u>SPORLAN TEST ALL</u>
CH016121	<u>REFINED PETROLEUM OIL</u>
CH264693	<u>SYNTHETIC POLYOL ESTER OIL</u>
CH264679	<u>TRIFLUOROMETHANE HEXAFLUOROETH ...</u>
CH264680	<u>R-14</u>
CH292638	<u>AIR CONDITIONING AND HEATING S ...</u>
CH292643	<u>FOOD GRADE SILICONE</u>
CH286125	<u>PVC PRIMER</u>
CH264682	<u>R-401B</u>
CH264681	<u>R-416A</u>
CH 349015	Texaco Capella WF 68 Oil
CH349016	York Coolant
CH349017	Propylene
CH349018	Prophane
CH349019	Prophne
CH349020	Krano Kroil Oil
CH349021	NuFoam Sealant
CH349022	Exterior Coil Cleaner
CH349023	NUCalgon refrigerator lubricant
CH349024	Cal Lube refrigerator lubricant
CH349025	Stay Brite Silver Solder
CH349026	Gas Leak Detector
CH349027	Vitaulis
CH349028	Hard Man Adhesives packets
CH349029	Cool Blue Plus Gas Leak Detector
CH349030	Weldon PVC 2711 Pipe Cement
CH349031	Hercules Cutting Oil
CH349032	Coil Shine
CH349033	Dupont 732 Multipurpose sealant
CH349034	Caribbean Blue Touch Up
CH349035	LPS Presolve Orange Degreaser
CH349036	Dow Corning 3145 RTV Adhesive Sealant
CH349037	Zoom Sprout Oiler
CH349038	SRI Grease
CH349039	Megaloc Thread Sealant

CH349040	RX Acid Scavenger
CH349041	Phase 3 Refrigeration Oil Acid Test Kit
CH349042	Nokorode Soldering Paste

	Inventoried Areas
	Newly Assigned Chemical Custodian
	Area Only Partially Inventoried/Access Issue

★ Inventory in this area did not include the cylinders in the adjacent cage

Appendix D: Self-Assessment Inventory Results

Responsible person	Location	Date of last Inventory	Previous inventory # of items	Assessment inventory # of items	# of new items not inventoried 2011	Inventoried items that are no longer at location	Items correct from last inventory	# of unlabeled containers
Abenojar	76-202A/B	5/30/2007	11	26	24	9	2	0
Begley	76-212	7/23/2010	14	0	0	14	0	N/A
Begley	76A-100	7/23/2010	6	0	0	6	0	N/A
Hudson	76-129	7/23/2010	61	51	28	22	23	1
Hudson	76-133	7/23/2010	6	10	8	4	2	0
Begley	81	6/17/2010	4	3	0	1	3	4
Dupont	B 76-233A	324//2008	23	36	27	16	7	6
Begley	74-177	7/14/2008	3					
Gano	76-109/103	2/21/2007	47	16	9	40	7	0
Botello	81-101	7/5/2010	70	47	10	30	40	0
Luiz Jr	79	Previously Not Inventoried	0	6	6	N/A	0	0
Begley	50B -243	Previously not Inventoried	0	3	3	0	0	0
Begley	70-183B	Previously not inventoried	0	16	16	0	0	2
Begley	70A-1101-1148	8/3/2007	11					

Responsible person	Location	Date of last Inventory	Previous inventory's # of items	Assessment inventory # of items	New items not inventoried 2011	Inventoried items no longer at location	Items correct from last inventory	# of unlabeled containers
Begley	70A-3329	Previously not inventoried	0	3	3	0	0	0
Begley	90-27A	7/14/2008	4	18	14	0	4	2
Begley	90-102Q	7/14/2008	1					
Begley	6-2245	11/13/2009	1					
Begley	76-233C	7/23/2010	1	0	0	1	0	0
Begley	72-100	7/14/2008	1					
Bell	50A/65A	1/27/2009	23	0	0	23	0	0
Botello ★	76-123	7/5/2010	91	76	18	33	57	3
Botello	76-212	7/5/2008	10	0	0	0	0	N/A
Botello	76-222	7/5/2010	175	0	0	175	0	N/A
Crofoot	78-119	Previously not inventoried	19	15	0	4	15	0
Hudson	78-103	Previously not inventoried	0	11	11	0	0	0
Dong	31-100	3/24/2008	4					
Doty	B 31E	4/17/2007	28	16	6	18	10	0
Fleming	81	6/20/2010	4	0	0	4	0	0
Fleming	34	6/20/2010	3					
Luiz jr	78/101	4/1/2008	75	42	9	42	33	0
Hudson	53	4/8/2008	11	22	20	0	2	0
Rosas	50A -125A	10/6/2008	5	32	32	5	0	0
Rosas	31A	10/6/2008	19	0	0	19	0	0
Crofoot	76-236	10/6/2008	88	137	80	31	57	8
Trigales	51-001	6/6/2007	22					

Responsible person	Location	Date of last Inventory	Previous inventory's # of items	Assessment inventory # of items	# of new items not inventoried 2011	Inventoried items no longer at location	Items correct from last inventory	# of unlabeled containers
Walling	79	Previously not inventoried	0	14	14	0	0	0
Begley	66-101	7/14/2008	6					
Begley	50B-1211-7001	7/14/2008	8					
Begley	70-148	8/3/2007	3					
Begley	2-129A/130	Previously not inventoried	0	9	9	0	0	0
Multiple	46		2	>33	31	0	2	>5

Appendix E: Possible Solution

Bar Code	Chemical Name	Upper limit Inventory	Location	Photo	Inventory Date
58656	Zep Penetrating Lubricant	4 at 1 gallon	Flammable storage cabinet # 1 top shelf B 76 exterior to room 123		4/22/2011
58655	Zep Brake Wash	4 at 1 gallon	Flammable storage cabinet # 1 Bottom shelf B 76 exterior to room 123		4/22/2011
342766	IPS Weld on P 70 Primer	3 at 8 oz	Flammable storage cabinet # 1 top shelf B 76 exterior to r 123		4/22/2011
342775	Aervoe Survey Marking Paint	2 at 17 oz	Flammable storage cabinet # 1 top shelf B 76 exterior to room 123		4/22/2011

Appendix F: Consumer Products Email

On Tue, Apr 5, 2011 at 2:14 PM, Lee Aleksich <lmaleksich@lbl.gov> wrote:

Hello Everyone,

The question of whether spray paint/aerosol cans need to be in the Chemical Management System (CMS), does not have a simple answer.

I will try to explain.

OSHA Hazard communication says that all hazardous materials need to be tracked. However, OSHA allows 'consumer products' to be excluded from this if they are being used as the manufacturer intends a consumer to use it. (This is assuming that the manufacturer has met their requirement of performing the appropriate exposure assessment for consumer use and it has been deemed safe for a consumer to use as instructed).

The example I always use is using bleach in a bio lab. If you are using it once a week to clean, it is comparable to consumer usage and doesn't need to be inventoried. If you are using it daily, this is beyond consumer usage and thus should be tracked in CMS.

So the questions are...

Are the items stored consumer products (available at a commercial business by the average consumer)?

Are they being used in an amount and frequency that is consistent with consumer usage, or are they used more often or in larger amounts?

The fire code limits for a building with flammables stored in a appropriate safety cabinet are as follows

Combustible Liquid

Combustible Liquid II	240 GAL
Combustible Liquid IIIA	660 GAL
Combustible Liquid IIIB	26400 GAL

Flammable Liquid

Flammable Liquid IA	60 GAL
Flammable Liquid IB	120 GAL
Flammable Liquid IC	180 GAL
Flammable Liquid IC,IB,&IA	240 GAL

Even at worst, you are allowed 60Gal of flammables.

Appendix G: Nu-Calgon MSDS



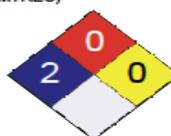
MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Product Name Nickel-Safe Ice Machine Cleaner (4287)
CAS # Mixture
Product use Descaler
Manufacturer Nu-Calgon
 2008 Altom Court
 St. Louis, MO 63146 US
 Phone: 314-489-7000 / 800-554-5499
 Emergency Phone: 1-800-424-9300 (CHEMTREC)

LEGEND HMIS/NFPA	
Severe	4
Serious	3
Moderate	2
Slight	1
Minimal	0

Health	2
Flammability	0
Physical Hazard	0
Personal Protection	X



2. Hazards Identification

Emergency overview WARNING
 EYE AND SKIN IRRITANT.

Potential short term health effects
Routes of exposure Eye, Skin contact, Inhalation, Ingestion.
Eyes May cause severe irritation or chemical burns.
Skin This product is non-corrosive based on test data. May cause mild skin irritation.
Inhalation Excessive intentional inhalation may cause respiratory tract irritation and central nervous system effects (headache, dizziness).
Ingestion Harmful if swallowed. May cause stomach distress, nausea or vomiting.
Target organs Eyes, Respiratory system, Skin.
Chronic effects Prolonged or repeated exposure to dilutions can cause drying, defatting and dermatitis.
Signs and symptoms Symptoms may include discomfort or pain, excess blinking and tear production, with marked redness and swelling of the conjunctiva.

3. Composition / Information on Ingredients

Ingredient(s)	CAS #	Percent
Phosphoric acid	7664-38-2	15 - 40
Citric acid	77-92-9	1 - 5

4. First Aid Measures

First aid procedures
Eye contact Immediately flush with cool water. Remove contact lenses, if applicable, and continue flushing for 15 minutes. Obtain medical attention immediately.
Skin contact Immediately flush with water. Wash with soap and water. Obtain medical attention if irritation persists.
Inhalation If symptoms develop move victim to fresh air. If symptoms persist, obtain medical attention.
Ingestion Do not induce vomiting. Rinse mouth with water, then drink one or two glasses of water. Obtain medical attention. Never give anything by mouth if victim is unconscious, or is convulsing.

Appendix H Room 133 Calculation

Hi Rob,

I ran a quick calculation on the instantaneous release of R22 in the HVAC shop. I assumed no ventilation and a room volume of 6000 cubic feet.

Losing a 100 pound cylinder instantaneously would result in an oxygen concentration of approximately 19.5%

Given the remote probability of such an event, I do not see the need for additional ventilation controls or relocating refrigerant storage to another area.

As we discussed, the only follow up would be to ensure the cylinders are seismically restrained with chains cables or a toe board on the shelves.

Sincerely,

Joe

--

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Attachment 1: Self Assessment Methodology

Chemicals used within the Division represent a regulatory and safety exposure to the Division and its workers that are controlled by its Chemical Management program. Since this program has not been reviewed for some time, this assessment will verify the success of the program and identify areas for improvement.

A. Persons conducting each Self-Assessment

1. This assessment was performed by Janice Sexson and Gene Tucker
2. Interviewees included Craft Workers, persons listed as chemical owners in the Chemical Management database and Craft Work Leads

B. Methodology

1. Chemical database review
2. A summary report will be submitted to the Facilities Division Director by May 30,2011
3. Compared inventory with baseline for correctness
4. Review Facilities Division Flammable cabinets and storage area contents
5. Meet with Industrial Hygienist to determine if all chemicals are stored correctly
6. Compare Material Safety Data Sheets for storage requirements
7. Meet with Facilities management to determine chemical ownership post Divisional reorganization and look for dual ownership conflicts

Attachment 2:

Lines of Inquiry

Chemical Management

- Is this process currently working as intended?
- If this process is not working as intended why not?
- What improvements would enhance the process?
- Who are the chemical custodians?
- Could efficiencies be gained?
- What are the benefits of the inventory process?