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INDUSTRIAL HYGIENE GROUP Standard Operating Procedure: Field Procedure	DATE 10/12/01
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SUBJECT: CHEMICAL MANAGEMENT SYSTEM	
Chemical Inventory Protocol: Field Application Of Barcodes To Containers	

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1.0 Purpose/Scope

This procedure provides standardization of the protocol used for the inventorying and bar-coding chemical containers at BNL. It also minimizes the Chemical Management System (CMS) Team's exposure to potentially hazardous substances.

The CMS Team is charged with inventorying, bar-coding and maintaining the BNL site-wide chemical inventory. In fulfilling this responsibility, the CMS Team routinely handles closed containers of chemicals to gather data about the chemical and the storage container itself for inclusion in the inventory database. Chemical containers are encountered in research laboratories, industrial areas, machine shops and warehouses.

2.0 Responsibilities

- 2.1 CMS Team: This procedure is implemented through the Chemical Management System Program Manager. At the present time, the Chemical Management System Team inventories and applies bar-code labels to chemical containers at BNL. The CMS team is responsible to follow all provisions of this procedure.
- 2.2 The inventorying of chemical containers shall be performed by or under the direct supervision of persons who have demonstrated the competence to satisfactorily perform

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this task as evidenced by experience and training.

2.3 Communication with, and cooperation from, RCD- Facility Support and Department/Divisional ESH Coordinators will also be needed to coordinate this activity.

3.0 Definitions

- 3.1 *Bar Code*: An adhesive label that provides a unique number, for a chemical container, in both human readable and electronic format.
- 3.2 *CMS*: Acronym for the Chemical Management System.
- 3.3 *MSDS*: Acronym for Material Safety Data Sheet.
- 3.4 *Contact Person*: Person listed in CMS database as the official owner of the chemical container.

4.0 Prerequisites

- 4.1 **Worker Qualification**: CMS Team member must be trained to the following or be in the presence of a lead team member so trained at all times:
 - 4.1.1 HazCom and Laboratory Standard
 - 4.1.2 All OSHA Regulated Carcinogen specific training
 - 4.1.3 DOT Basic Hazardous Waste Transportation modules 1 and 2
 - 4.1.4 Compressed Gas Safety
- 4.2 **Personal Protective Equipment**
 - 4.2.1 Hand: Contact with chemicals should be minimized and does not pose a significant health risk. Disposable gloves should be used as a precautionary measure. Acceptable elastomers are: Nitrile, PVC, and Natural Rubber. The preferred elastomer is Nitrile.
 - 4.2.2 Body: If contact of the body with chemicals could be reasonably anticipated, a laboratory coat should be worn. If contact with potentially contaminated surfaces is not expected, body covering is optional. However, if personal clothing items become contaminated, they must be surrendered for BNL cleaning or disposal.
 - 4.2.3 Foot: If contact with potentially contaminated surfaces is not expected, shoe coverings are optional. However, if personal shoes become contaminated, they must be surrendered for BNL cleaning or disposal.

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- 4.2.4 Respiratory: Under normal use, respiratory protection is not required. If chemical levels from contamination an area exceed the OSHA &/or ACGIH standards
- 4.2.4.1 CMS management must determine that exposure of the bar-coding team to an area of elevated chemical contaminant is absolutely mission critical
- 4.2.4.2 Engineering and administrative controls must first be considered to minimize exposure.
- 4.2.4.3 If respirators are required, the requirements of BNL's Respiratory Protection Program must be met.
- 4.2.5 Eye: Safety Glasses with side shields are required.

5.0 Precautions

- 5.1 Before handling containers, locate the nearest telephone, fire alarm pull-box, eyewash and/or safety shower in the area.
- 5.2 Do not work alone. If a sole CMS member is in a work area, at least one other person must be present in the vicinity of container handling and aware of the bar-coding work.
- 5.3 If any unusual or unacceptable condition is noted in the package or container, the CMS member is NOT authorized to proceed further. Stop work until assistance is available.
- 5.4 The CMS Team is **not** authorized to inventory or handle radiological sources, radioactive isotopes, radiologically activated chemicals or radiologically contaminated chemicals. When inventorying new chemicals arriving at T-89, the Receiving Warehouse, be sure **not** to open shipping cartons containing radiological items. To avoid opening shipping cartons containing radiological items, carefully read packing lists if included on the outside of the carton, shipping carton labels, and adhesive address labels to alert you to the presence of a radiological item.
- 5.5 **Hazard Determination:** It is not anticipated that bar-coding chemicals will result in chemical exposure because the containers are closed during all handling. If containers are encountered that are not properly sealed (such as shrink wrap bottle cap seals or outer polymer envelopes) or have a residue on the outside of the container, the CMS member(s) are authorized to stop work and not handle the container until the owner has rectified the condition.

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- 5.6 Read the hazard label on containers or packing paper and handle containers according to instructions.

6.0 Procedure

6.1 Equipment:

- Barcode labels
- Barcode Scanner
- Computer
- Gloves- Nitrile or latex splash type gloves
- Box cutting knife
- Safety Glasses
- CMS Green Tape
- Plastic Bags, Twist Ties
- CMS Red Tape
- Impulse Heat Sealer
- CMS Action Memo
- Nalgene Work Tray (Secondary Containment)

6.2 Pre-check of area:

- 6.2.1 Check with the *Contact Person* for any special instructions for working in the area, prior to entry. Inquire about areas that may not be entered, storage locations for delicate equipment or areas that should not be disturbed. With the help of the *Contact Person*, identify the areas with chemical storage and the chemical containers that need to be bar-coded. Have the Contact Person verify the safety in opening freezers, refrigerators, special storage cabinets, desiccators, etc.
- 6.2.2 Wear any protective equipment, including TLD, required for the area.

- 6.3 Determine whether the chemical container needs to be bar-coded by referring to Attachment 8.1.

- 6.4 **Applying the bar-code label:** Place the adhesive bar code labels on the chemical containers vertically, preferably to the right of the manufacturer's label. It is especially important for small diameter (<2 inch dia.) cylindrical containers, that the bar-code labels be placed vertically. If the bar-code labels are placed horizontally on cylindrical containers and the curvature of the bottle is sufficient, the bar-code labels will not be read by the laser bar-code scanners. For square containers or boxes, the bar-code label can be put horizontally above the manufacturer's label. When placing a bar-code label on a small chemical container, take care not to obscure pertinent information on the manufacturer's label. If the container is too small to avoid this, make a tab with clear transparent tape and apply the bar-code label to the tab.

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6.5 Ventilation of high hazard containers

6.6 Bar-coding in T-100 Receiving Warehouse: When inventorying new chemicals arriving at the Receiving Warehouse:

- 6.6.1 Collect all the pertinent information from the shipping carton, packing list and chemical container that is required to create a record in the Inventory database (see Attachment 8.2).
- 6.6.2 Before opening a shipping carton to inventory a chemical container, read any packing lists, shipping carton labels, and adhesive address labels on the outside of the carton to aid in the identification of the chemical and its related hazards.
- 6.6.3 When a chemical container is inside a shipping carton, carefully open the shipping carton to allow for later repackaging. Evaluate the state of the inner packaging. If further opening and/or removal of the inner packaging would compromise the chemical's integrity or purity (e.g. opening a hermetically sealed can or opening a foil wrapped pouch protecting a light-sensitive chemical) or cause a chemical exposure, go no further. Cut the bar-code label from the roll (without disturbing the bar-code backing) and tape it in a prominent location on the inner packaging. Be sure to apply the CMS sticker that directs the end user to apply the bar-code label to the primary container, immediately upon opening.
- 6.6.4 If further opening and/or removal of the inner packaging would *not* compromise the chemical's integrity or purity or cause a chemical exposure, open the inner packing and place the bar-code on the primary container.
- 6.6.5 All containers removed from the shipping packaging to apply barcode labels, must be handled in a secondary containment tray.
- 6.6.6 Utilize the Impulse Sealer to reseal any plastic bags that were cut open to facilitate applying the bar-code label. Carefully repackage the primary container using all the packaging provided and return the shipping carton to its original DOT compliant state. If the containment of the chemical has been compromised to the point where it cannot be resealed, obtain new packing materials from shipping and repackage the container properly to DOT regulations.
- 6.6.7 On the outside of the shipping carton write the CMS bar-code numbers that were applied. Seal the outside shipping carton with Green Text CMS packing tape if all the necessary information was provided. Seal the outside shipping carton with Red Text "Action Required " packing tape if there is information missing and

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affix the Action Required form on the outside shipping carton.

- 6.6.8 If the shipping carton is from an unfamiliar “manufacturer”, proceed with caution. It has been our experience that chemical containers shipped from small companies, universities and individuals; tend not to be as well packaged as those from chemical manufacturers. Use a polyethylene tub as a secondary container when opening a shipping carton arriving from an unfamiliar source.
- 6.6.9 If a MSDS is included with the shipment, the CMS Team is authorized to remove the MSDS in order to make a photocopy of it. The photocopy should then be stamped with the CMS rubber stamp to alert the end user that the MSDS has been captured for inclusion in the electronic MSDS database and placed in the shipping carton. The original MSDS sent with the shipment will remain with the CMS Team for processing.
- 6.6.10 **Emergency:** In case a broken or leaking container is encountered at the warehouse:
- 6.6.10.1 **Stop work on barcoding the package.** If you can safely do so, place the package in secondary containment such as the CMS Nalgene work tray or the drum spill containment pallet at the shipping and receiving building. Do not participate in any action that would place you at risk for exposure.
- 6.6.10.2 Leave the area.
- 6.6.10.3 Notify supervising personnel at the building that you have placed a damaged chemical container in the secondary containment.
- 6.6.10.4 If the container poses an immediate hazard to personnel in the area or the environment, summon assistance from BNL Emergency Services Division (x-2222).
- 6.6.10.5 Alert the CMS team manager or an IH Group Industrial Hygienist for advice on further action.
- 6.7 **Inventorying in laboratory and Hazard Communication Areas:** Prior to inventory any chemicals, conduct a brief walk through of the area with the Contact Person to identify any unusual hazards.
- 6.7.1 **Lab Shelves, counter tops, wall cabinets:** Chemicals are typically stored in these areas that pose low to moderate hazard from volatility, reactivity, flammability and toxicity. Have the Contact Person identify any unusual hazards in the storage locations.

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- 6.7.2 **Flammable Storage cabinets:** Chemicals are typically stored in these areas that pose a high flammability risk. Have the Contact Person identify any unusual hazards in the cabinet. Open the door in the presence of the Contact Person and have them verify that the status of the contents is safe and within their normal use condition (i.e. no odor or sign of spillage).
- 6.7.3 **Refrigerators/Freezers:** Chemicals are typically stored in a refrigerator/freezer to prevent them from degrading, to reduce the vapor pressure of volatile chemicals, and/or to attenuate their reactivity.
- 6.7.3.1 Have the Contact Person verify the safety in opening freezers and refrigerators.
- 6.7.3.2 Open the door in the presence of the Contact Person and have them verify that the status of the contents is safe and within their normal use condition (i.e. no odor or sign of spillage).
- 6.7.3.3 Minimize the time a chemical container is outside of the refrigerator/freezer.
- 6.7.3.4 If a large number of chemicals are present, take them out in small groups and close the door of the refrigerator/freezer to keep the remaining items cold. If practical, transfer them to hood and handle and barcode with exhaust ventilation protection.
- 6.7.3.5 If the chemical containers are in secondary containment, remove them from the refrigerator/freezer in the secondary containment. If the air outside the refrigerator is moist, condensation may form on the chemical container and this will increase the chance that the container could be dropped.
- 6.7.3.6 The bar-code labels do not adhere well to containers with condensation on the outside. To remedy this, wipe the area where the bar-code label will be placed with a paper towel just before it is applied. Apply cellophane tape over the barcode label and completely around the bottle to secure it.
- 6.7.4 **Desiccators:** Chemicals are stored in a desiccator because they are moisture-sensitive. Moisture may either cause the chemical to degrade and/or cause an unwanted reaction. Some desiccators are under a vacuum and cannot be opened without equalizing the pressure.
- 6.7.4.1 Always get approval from the Contact Person prior to opening a desiccator. Have the Contact Person verify the safety in opening the desiccator and open the desiccator.
- 6.7.4.2 Have the Contact Person verify that the status of the contents is safe and

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within their normal use condition (i.e. no odor or sign of spillage).

6.7.4.3 Homemade desiccators are usually comprised of several small chemical containers placed inside a larger jar that contains silica gel or drying agent. Sometimes the caps and necks of the chemical containers will be wrapped with Parafilm. This level of containment is usually an indication that the chemicals are moisture-sensitive, volatile, or have a stench, so proceed with caution. If it is necessary to open the homemade desiccator to inventory and bar code the chemical containers, it may be advisable to open the desiccator in a hood.

6.7.5 **Emergency:** In case a broken or leaking container is encountered:

6.7.5.1 **Stop work on barcoding the package.** If you can safely do so, place the package in secondary containment such as a work tray. Do not participate in any action that would place you at risk for exposure.

6.7.5.2 Leave the area.

6.7.5.3 Notify supervising personnel at the building that you have observed the damage container.

6.7.5.4 If the container poses an immediate hazard to personnel in the area or the environment, summon assistance from BNL Emergency Services Division (x-2222).

6.7.5.5 Alert the CMS team manager or an IH Group Industrial Hygienist for advice on further action.

7.0 References

BNL Memorandum on CMS Team Exposure at the T-100 Warehouse, October 2001.

8.0 Attachments

8.1 CMS Trackable Chemicals and Chemical Products

8.2 CMS New Chemical Container Data Form

The only official copy is on-line at the SHSD IH Group website.
 Before using a printed copy, verify that it is current by checking the document issue date on the website.

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9.0 Documentation

Document Review Tracking Sheet		
PREPARED BY: E. J. Schermerhorn Author 03/12/01	REVIEWED BY: R. Selvey Certified Industrial Hygienist 04/30/01	APPROVED BY: R. Selvey IH Group Leader 04/30/01
Filing Code: IH52QR.01		Effective Date: 04/30/01

Periodic Review Record		
Date of Review	Reviewer Signature and Date	Comments Attached
10/12/01	R. Selvey 10/12/01	Add clarification on Hazard Assessment in relation to refrigerator/freezers & Desiccators, spills.

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ATTACHMENT 8.1

CMS Trackable Chemicals and Chemical Products

What is entered into the CMS Database?

Some materials that ARE considered trackable chemicals or "chemical products" for the purposes of the CMS inventory and require containers to be individually bar-coded for inclusion in the inventory include the following:

Laboratory reagents	Dyes and stains
Solvents	Abrasive blasting agents
Liquid scintillation counting cocktail	Metal plating solutions
Photographic chemicals	Compressed gases*
Epoxy resin/hardener	Chemical kits**

* Compressed gases in lecture bottles or other small cylinders are individually bar-coded, all other compressed gas cylinders are usually tracked as static inventory.

** Chemicals in kit form are not excluded from the CMS inventory; they are generally recorded in the database under the kit name.

Some materials that ARE considered trackable chemicals or "chemical products" for the purposes of the CMS inventory and that require inclusion (usually under the static inventory designation and therefore NOT individually bar-coded) in the inventory include the following:

Corrosive cleaning agents	"ZEP"- and other cleaning type products
Oils, lubricants and greases	Water treatment chemicals
Paints and lacquers	Compressed gases (except lecture bottles and similar small cylinders)
Soldering pastes and fluxes	Vacuum pump fluid
Layout fluids	Pesticides
PVC pipe primers and cements	
Degreasers	

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ATTACHMENT 8.1 (Continued)

What is NOT entered into the CMS Database?

Some materials that are NOT considered trackable chemicals or "chemical products" for the purposes of the CMS inventory include the following:

Personal items for personal use Food or food additives (unless it will be used for R&D or operational purpose) Structural material and articles Normal office supplies (small quantities for office administrative purposes) Biological materials (including reproducing biological organisms such as bacteria, viruses, fungi, yeast, plant or animal tissues)	Pharmaceuticals, medication, including veterinary medicine Blood or blood products Enzymes and hormones Buffer solutions Growth media Batteries Photographic film
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Other materials that are NOT entered into the CMS Database:

- Chemical waste
- Chemical containers with incomplete or illegible information
- Empty chemical containers
- Secondary containers, working solutions, dilutions
- Consumer products when ordered/present in consumer quantities and used as appropriate
 - Examples: Hand cleaners, hand lotions, soaps, detergents, bleach, abrasive cleansers, and aerosol cans
- Research samples
- Radiological sources, chemicals, & waste

