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INTRODUCTION TO THE CHEMICAL MANAGEMENT SYSTEM

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INTRODUCTION TO THE CHEMICAL MANAGEMENT SYSTEM

In order to meet regulatory requirements, research laboratories, manufacturers, agricultural facilities, and many other organizations and facilities must maintain continual awareness of the following conditions:

- what chemicals are being held
- where those chemicals are being used
- the training status of individuals handling chemicals
- what chemicals employees may be exposed to through work location or activities over the term of employment.

The Pacific Northwest Laboratory (PNL)[a], a multiprogram national laboratory with a variety of laboratory facilities, has met this complex and critical challenge through its recently developed Chemical Management System (CMS).

OVERVIEW

The CMS, a Laboratory-wide electronic chemical inventory tracking system, will assist PNL by establishing comprehensive, integrated, Laboratory-wide databases supported by consistent and standardized procedures for chemical inventory management. While minimizing impacts on research activities, the system will provide PNL with the information needed to meet its current chemical management responsibilities and regulatory requirements, along with the flexibility to respond to additional requirements that it may face in the future.

The primary objectives of the CMS are to provide an inventory of all chemicals being held at PNL facilities, to provide a specific location for all chemical containers, to ensure that health and safety regulatory codes are being upheld, and to provide PNL staff and managers with hazardous-chemical information for better inventory management. The system is user friendly, and information within existing systems can be easily interfaced.

SYSTEM COMPONENTS

The CMS is composed of five modules: 1) Chemical Purchasing; 2) Chemical Inventory; 3) Chemical Names, Properties, and Hazardous Groups; 4) Reporting; and 5) System Manager. These are described briefly below.

Chemical Purchasing Module

Users of the CMS are able to submit orders for chemical products by entering a purchase requisition. This information is forwarded to the

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(a)   PNL is operated for the U.S. Department of Energy by Battelle Memorial Institute.

procurement system. Chemical purchase data are validated at point of entry. For example, employee and work package (funding) information is validated when it is entered. If an incorrect charge account is entered, the user is notified and required to enter valid information. Users can order as many line items per purchase requisition as they desire.

At PNL, all chemical orders are monitored by the CMS Manager, an employee of the Laboratory Safety Department. Several reports exist that allow the CMS Manager to examine orders that contain chemicals that are not presently in the CMS database, and chemicals that do not have a Material Safety Data Sheet (MSDS) on-site. The CMS Manager uses this information to procure an MSDS before the chemical arrives at the laboratory.

In addition to initiating the procurement process, the Chemical Purchasing Module also creates an inventory record for every chemical container that has been ordered. Users no longer need to make separate entries into procurement and inventory systems.

Chemical Inventory Module

The Chemical Inventory Module serves as a window into the entire laboratory's chemical inventory, which, at PNL, currently lists 80,000 al containers. Users can update chemical inventory information that was ced into this module by the Chemical Purchasing Module.

Users can also enter inventory records directly into this module. This capability is necessary because chemicals are not always ordered through the Purchasing Module; vendors sometimes provide free samples, and certain chemicals may be purchased at local stores (Acetone and some general-purpose cleaners). Users are able to retrieve information from the Chemical Inventory Module on the basis of several different factors: location, chemical name, container attributes, responsible party, expiration and inventory dates, concentration values, and others.

The CMS also provides an easy mechanism to conduct physical inventories. Each chemical container at PNL is given a bar code label. When a staff member needs to conduct a physical inventory, a hand-held scanner is used to read the bar code labels. The CMS is equipped with functions that allow the scanner data to be imported into the system. Once these data have been loaded, a number of edits are performed; the user is then notified about the status of the operation. The CMS provides lists of containers that have been moved, containers that last appeared in the scanned room but were not found in the scanning process, and container numbers that are not in the system. The time to conduct physical inventories has been greatly reduced.

Tracking the entire organization's inventory enables compliance with various regulatory agencies. For example, each night all PNL-held chemicals that belong to certain hazardous group (such as flammable or highly toxic) are summed by location, and the total is compared to a building load limit established by a government agency. If the sum of any type of chemical exceeds the limit, the appropriate building manager is notified so that necessary actions can be taken.

Chemical Names, Properties, and Hazardous Groups Module

The Chemical Names, Properties, and Hazardous Groups Module provides researchers and health and safety workers with important information about various chemical attributes. For example, the CMS can track chemical synonym information. Chemicals are often known by many names--some chemicals have 30 to 40 synonyms! The ability to maintain chemical synonym information allows CMS users to use names with which they are familiar. For example, if a container of "Carbon Oil" is ordered, the CMS recognizes this as a "Class 1B Flammable Liquid" as well as a "Carcinogen" and associates it with its preferred name, "Benzene".

The CMS also contains information about chemical properties: chemical density, molecular weight and formula, short-term exposure limit values, LD50 information, Chemical Abstract Services (CAS) number, and other values.

In addition, each chemical is associated with one or more hazardous groups, for example, carcinogens, reproductive toxins, flammables, reactives, highly toxics, and air toxics. CMS users can use this module to quickly determine hazards associated with a particular chemical.

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The CMS is equipped with over 75 reports. These are divided into three major categories: 1) inventory reports, 2) hazardous chemical group reports, and 3) compliance reports.

Users can generate inventory reports in a variety of ways. They can confine output to specific building(s) or even room(s). They can list chemicals in a particular lab that may span several rooms. They can focus on organizational information, as well as chemical name and CAS number. At PNL, inventory reports are often placed outside of each room to notify workers of potential hazards.

The CMS can also produce reports based on hazard group classification. For example, a chemical inventory manager or safety worker can generate a list of all carcinogens in a given location, or simply a summation of those chemicals. The system currently tracks the following hazardous groups: Carcinogens, Reproductive Toxins, Flammables, Ignitables, Reactives, Corrosives, Reportable Quantities (RQ's), Highly Toxics, and Air Toxics.

Compliance reports can also be generated on the CMS. These are specialized reports designed to meet certain regulatory requirements such as SARA reporting and the Hazardous Communication Act.

System Manager Module

The System Manager Module consists of 20 functions and six reports that allow the CMS Manager to maintain the application and its data. This module contains functions for entering new chemicals, assigning chemicals to hazardous groups, designating new hazardous groups, resolving data anomalies, and adding building load information.

APPLICATION PLATFORM

The Chemical Management System was developed on a Sequent Symmetry multi-processing computer running a POSIX-compliant version of Unix. The development tools included Oracle RDBMS Version 6.0, SQLForms Version 3.0, C code embedded with SQL using Oracle's Pro*C precompiler, Unix C Shell and Perl scripts, and Menueze menuing software.

STATUS AND CONTACT

This system is currently being implemented at PNL. Inquiries are invited, and should be directed to

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