

Effective Waste Chemical Lifecycle Management

How to increase employee and environmental safety while reducing material and removal costs

by Fred Vangroningen

Effective lab chemical management is a day-in, day-out affair. It requires constant attention supported by well-articulated, well-communicated procedures. Any new process or chemical should be evaluated to ensure safe handling, storage and removal. Comprehensive databases are helpful in identifying chemical compounds and creating a well-managed chemical lifecycle program that significantly increases employee and environmental safety, while reducing material and removal costs.

Federal and provincial regulations require the proper handling, storage and disposal of hazardous waste materials. They require comprehensive site-specific waste management plans, as well as training and, for some chemical handlers, registration with provincial environment ministries.

Hazardous materials and chemicals require controlled handling throughout their lifecycles, which have three distinct phases in research or industry. The first is procurement and inventory storage in vendor-supplied sealed containers (*see sidebar, page 16*); the second is use in a manufacturing process or research program; and the third is post-use including removal and disposal.

The two latter phases are more problematic when it comes to safe handling.

MATERIALS USE AND STORAGE

Industrial users and researchers are concerned with the safe handling of the materials while in use and are less likely to focus on storage and removal. This leads to some potential problems in chemical lifecycle management.

Researchers often neglect to properly label chemicals in secondary containers that are poured off from original containers or filled with waste material at their stations. "They know" what is in the containers. This is efficient for the researcher, but the container contents must be treated as unknown substances by anyone else who comes in contact with them. These chemicals may require testing, special handling and disposal, even if the material is still located at the researcher's station.

The places where waste chemicals are stored, including a researcher's station, are considered satellite accumulation areas by regulators and may be subject to inspection. Therefore, researchers should not be allowed to store chemicals at their stations. Instead, a sufficient

number of properly organized storage areas should be conveniently positioned to serve several researchers.

The best practice is to immediately move hazardous materials to the local storage area and label all secondary containers with the full chemical name in accordance with hazardous communication (HAZCOM) regulations. The most effective waste storage container labels list every specific chemical in the lab's inventory that can be safely added to the container. This provides another level of verification and eliminates unexpected reactions between seemingly compatible materials.

TRACKING THE REMOVAL AND DISPOSAL PROCESSES

The most efficient way to manage waste chemical storage/removal through the disposal stage is to rely on a dedicated staff member responsible for the last phase of the lifecycle: removal from the local storage areas plus storage in a main storage location; packing and disposal. They are the only ones authorized to transport material from local storage areas to the main storage. This approach removes the responsibility from researchers and reduces the number of personnel who must be trained in provincial and federal environmental and



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transportation regulations. This approach also provides the opportunity for trained staff to periodically visit all of the local storage facilities to ensure that proper procedures (labeling, secondary containment, etc.) are being followed at each location.

Most progressive hazardous material managers rely on software or online tracking systems to facilitate the movement, inventorying and packing, as well as documenting the transfer of the material to a certified waste hauler.

Many labs develop spreadsheet applications to manage their inventories. Although a step in the right direction, spreadsheets are not up to the task of comprehensive lifecycle management. Spreadsheets lack the ability to easily sort and search against expiration dates and other criteria. They tend to be standalone applications without built-in reporting mechanisms unless someone takes the time and the effort to create the reports. Most importantly, spreadsheet programs generally do not extend beyond the internal organization to include any outside documentation.

Moving to an in-house application built on a generic database, such as Access, can address some of these issues but generally falls short on reporting and integration with other systems, unless custom extensions are developed.

Specialized software and online chemical waste management systems available today address all of the important criteria, such as movements, storage time limits — generally 90 days by provincial regulation — and chemical expiries. More sophisticated applications assign cost center allocations. Templates and data export

facilities that make management and Environmental Health & Safety (EH&S) reporting more efficient are also generally included in hazardous waste management applications.

The most sophisticated databases provide comprehensive profiles of thousands of chemicals that can be selected to quickly build an accurate custom database. The systems are generally flexible enough to enable managers to quickly and easily create new profiles or edit existing ones. They also maintain accurate inventory details by generator location including container number, shipping name, drum size, shipping volume, waste codes, days-in-location and description.

Advanced systems include online portals that handle the in-house management of the entire chemical lifecycle and extend to waste disposal and reporting, as well as distributed online and web reporting. They also support direct links with the company's hazardous waste hauler to report containers that are ready for packing and/or pick-up. This approach is more cost effective since Materials Safety Data Sheets (MSDSs) and packing lists can be automatically generated directly from the database. An integrated management system creates a complete, auditable chemical lifecycle management report for each chemical and shipment.

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