Sigma-Aldrich's Waste Management System – A Case Study

Paper # 762

Richard Evans

Sigma-Aldrich Co., 3500 Dekalb Street, St. Louis, MO 63118

John F. Takacs and Paula J. Olsson

HighPoint Software Services, Inc., P.O. Box 874, Westminster, MA 01473

ABSTRACT

A cradle-to-grave waste management system was developed for Sigma-Aldrich Co. to streamline their waste handling procedures. The system starts with the various waste generators notifying environmental of the need to collect waste and then tracks the material through waste collection, containerization, as well as the storage and manifesting process.

The waste management system is both intranet- and Windows-based. The system was developed to allow the environmental department to streamline their operations by maximizing the input of information by the waste generators in intranet modules along with using barcode scanners to easily and quickly track and follow waste throughout the system.

The waste management system tracks hazardous and non-hazardous waste from the waste generators in the form or liquid or solid waste through liquid bulk shipments, lab pack containers, and drums. The system also contains a compliance tickler system that alerts environmental when regulatory clocks require action.

The reporting module prints summaries of waste in storage areas, waste manifested and detailed reports of the cost associated with the waste management process.

The waste management system has allowed the environmental department to increase their capability to handle and process a larger volume of waste with a reduced number of staff as compared to the pre-waste management system operations.

INTRODUCTION

A cradle-to-grave waste management system was developed for Sigma-Aldrich Co. to streamline their waste handling procedures. The system starts with the various waste generators in over 200 laboratories covering multiple facility locations notifying environmental of the need to collect

waste. The system then tracks the material through waste collection, containerization, as well as the storage and manifesting process.

The waste management system is both intranet- and Windows-based. The system was developed to allow the environmental department to streamline their operations by maximizing the input of information by the waste generators in intranet modules along with using barcode scanners to easily and quickly track and follow waste throughout the system.

The waste management system tracks hazardous and non-hazardous waste from the waste generators in the form or liquid or solid waste through liquid bulk shipments, lab pack containers, and drums. The system also contains a compliance tickler system that alerts environmental when regulatory clocks require action.

The reporting module prints summaries of waste in storage areas, waste manifested and detailed reports of the cost associated with the waste management process.

The waste management system has allowed the environmental department to increase their capability to handle and process a larger volume of waste with a reduced number of staff as compared to the pre-waste management system operations.

SYSTEM OVERVIEW

The Sigma-Aldrich Waste Management System was developed to replace the manual system of processing and tracking hazardous and non-hazardous material. In the manual system, each department disposing of material would fill out a paper Waste Transfer Form (WTF) requesting a pick-up of material and then send these forms to Environmental Services through inter-office mail. Delivery of the forms through inter-office mail usually would take a day to arrive. Once Environmental Services received these forms, the material to be collected was classified by an environmental technician. The technician would research each material on the company mainframe to classify its DOT proper shipping name. The technician then would write the physical properties and shipping information on the collected form. This research effort was a very time consuming process and had to be done for every form even if the same material has been handled before, since the material's property information may have been updated since last handled.

After the classification process was complete, the material was collected and brought to Environmental Services for containerization. As material was placed in the containers, the hand written forms were then organized by container with a master coversheet form manually filled out for the container. The containers were then sealed and placed in approved storage locations prior to shipment. A daily inventory of the storage areas was taken and Environmental Services personnel who manually logged the inventory into logbooks.

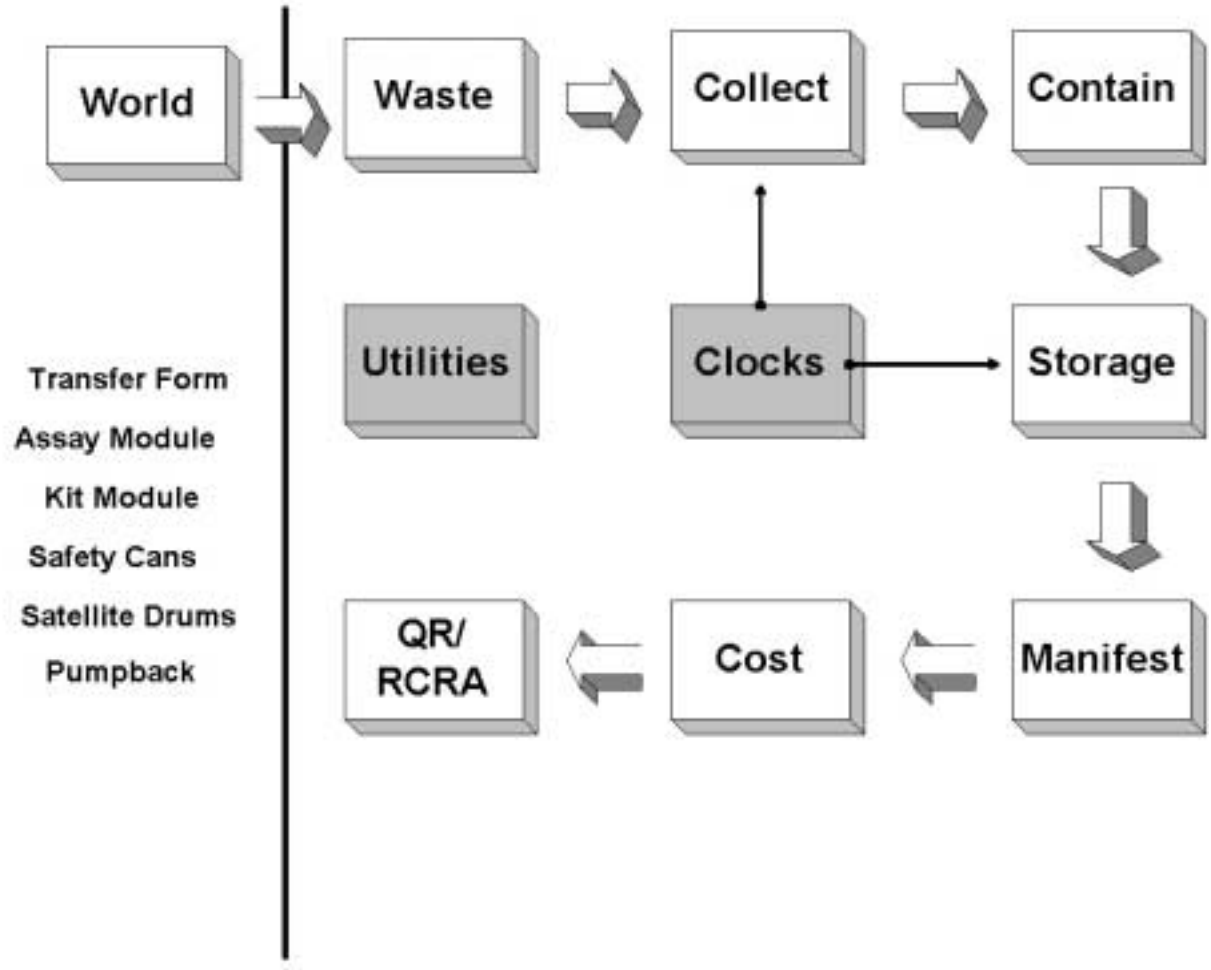
At the time of shipping, manifests were manually prepared and all follow-up costs charged back to each department was also manually prepared using spreadsheets.

The Sigma-Aldrich Waste Management System was developed to speed-up and streamline, what was once a manual system of material processing and tracking.

The Sigma-Aldrich Waste Management System was developed using Microsoft's Visual Basic 6. The underlying databases used throughout the system are Oracle and Microsoft Access. The reports that are produced in the system use Crystal Decision's Crystal Reports.

The system is comprised of two sections: intranet web-based applications available facility-wide, and a Window-based application only available to users in Environmental Services. Figure 1 shows the overall layout of the waste management system.

Figure 1. Overview of the Waste Management System.



The section labeled “World” represents the intranet applications by which individuals throughout the 200 plus laboratories at various locations alert Environmental Services of material ready for pick-up. The volume of waste now processed via the intranet modules numbers in the thousands of individual pieces per month whereas with the previous manual process only hundreds per month were processed.

These intranet modules include:

- Waste Transfer Forms
- Assay Module
- Kit Module
- Safety Cans
- Satellite Drums
- Pumpback

The Windows-based modules are used by Environmental Services personnel to manage, process, ship and report the materials collected from various laboratories on-site.

The new system also contains many administrative utilities that are maintained by Environmental Services and the data in these utilities are used to fill drop lists in the other programs to minimize the typing required by a user.

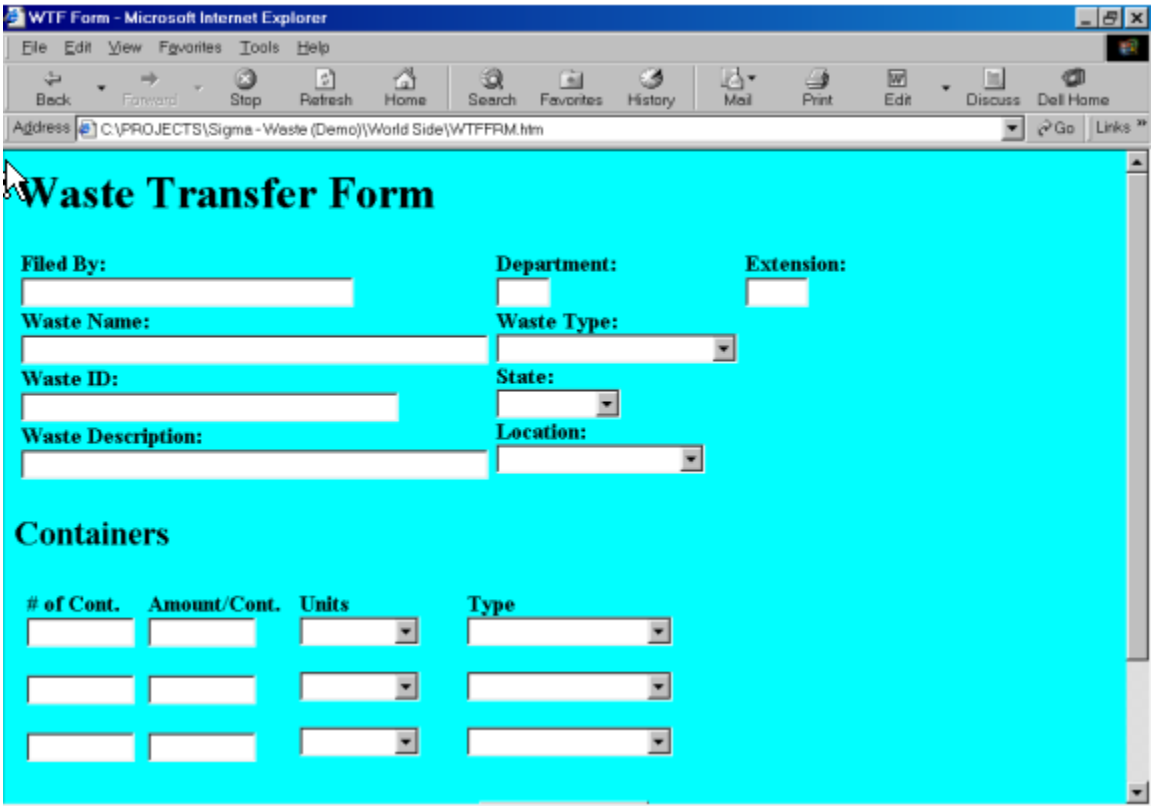
The key support databases in the system are as follows:

- Chemicals
- EPA / State Codes
- Destination Facilities
- Transporters
- Research History
- Facility Information
- Storage/Site Locations
- Container Types
- Material States/Types
- Units of Measurement

The Waste Transfer Form intranet application (Figure 2) allows users to alert Environmental Services personnel of material to be picked-up by filling out online an electronic Waste Transfer Form (WTF). The reason for this module being an intranet application is due to the volume of users and the ease of updating the program when required. With personnel from over 200 laboratories entering waste information, having a visual basic program for this function would require an inordinate amount of maintenance every time an update was released. As an intranet HTML application, every time users run the application in the browser they are running the most recent version.

The WTF requires the user to enter their name, department, telephone extension, building location and the Sigma-Aldrich specific catalogue, stock or unique material profile ID number of the material. The system then looks up the research information on the material in an on-line history file and adds all physical properties and DOT handling and shipping information to the electronic WTF.

Figure 2. Waste Transfer Form.



When a material is not found in the on-line research history database, a new record is added with any physical property data provided by the user. This new material information is then added to the history database and will now be available for future requests.

The intranet users also enter the number of containers to be collected along with the container type and weight. Each WTF request is then given a unique tracking number and the local requestors can printout a hard copy of the request.

Environmental Services is then electronically notified and a hard copy form is printed at Environmental Services indicating what materials need to be picked-up and where they are located. Both the local printout in the laboratory and the Environmental Services copy contain a barcode corresponding to the WTF's tracking number (Figure 3).

Figure 3. Waste Transfer Form Printout Example with Barcode.

990300001

MATERIAL TRANSFER FORM

Date of Generation: 03/05/99

Catalog Number : W1000

Material Name : WHEAT GERM OIL

Log Number : 990300001

Description of Material : WHEAT GERM OIL

Material Type : MISC. LAB, LIQUID/SOLID

Material State : LIQUID

Department Number : 89

Location : Site 1

Filed By : JOHN DOE

Extension : 1234

Container Number	Container Quantity	Units	Container Type
2	100.00	MILLILITERS	GLASS
1	500.00	MILLILITERS	GLASS

Material to be collected by Wednesday, March 10

If not, Please call Ext. 9876 - Tech 1
5432 - Tech 2
1987 - Supervisor

From the printouts that arrive in Environmental Services, a collection is made of the waste indicated on the received WTFs. Using portable barcode scanners, Environmental Services personnel scan the printed pickup request sheet in the laboratory during the pick-up run to verify collection and then they attach the sheet with the material. The collected material is then taken to one of five Environmental Services sites for sorting and containerization.

The data from the hand-held scanner is downloaded and the WTFs are automatically marked in the system as collected along with the date. The system tracks that the requested material is picked up from the requestor by Environmental Services within the regulatory prescribed 3-day period.

The collected material is then sorted by Environmental Services and packed in larger containers. Since the system has already classified the material from the on-line research database, the sorting of material by its DOT proper shipping name and hazard class is much easier. Environmental Services personnel use the system to track via barcode scanning what material is placed in the various containers. Technicians first use the system to record the opening of a new container (Figure 4), then scan the container number, and then scan each of the items as they are placed in the container (Figure 5).

Figure 4. Containerization Screen to Open a New Container in the System.

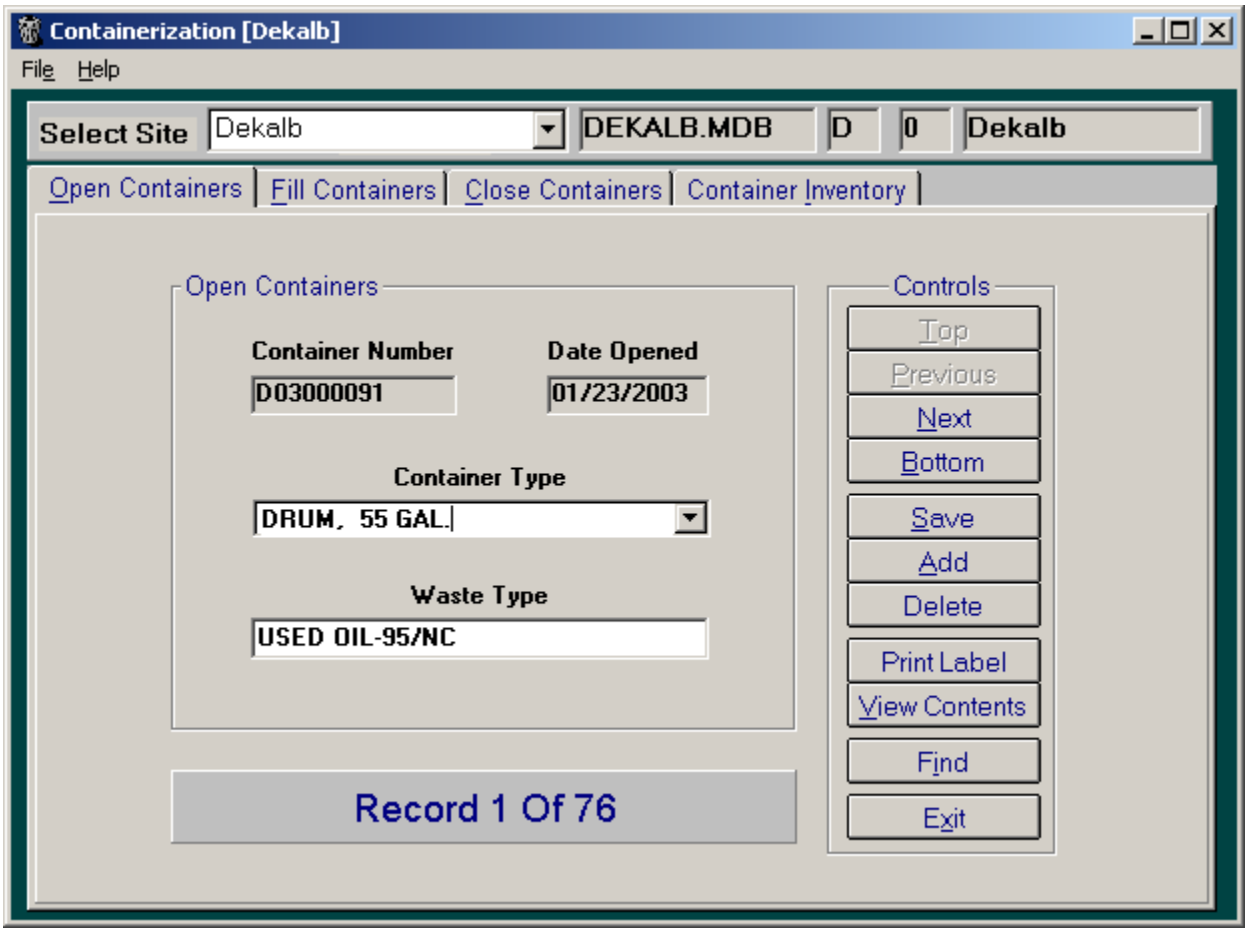
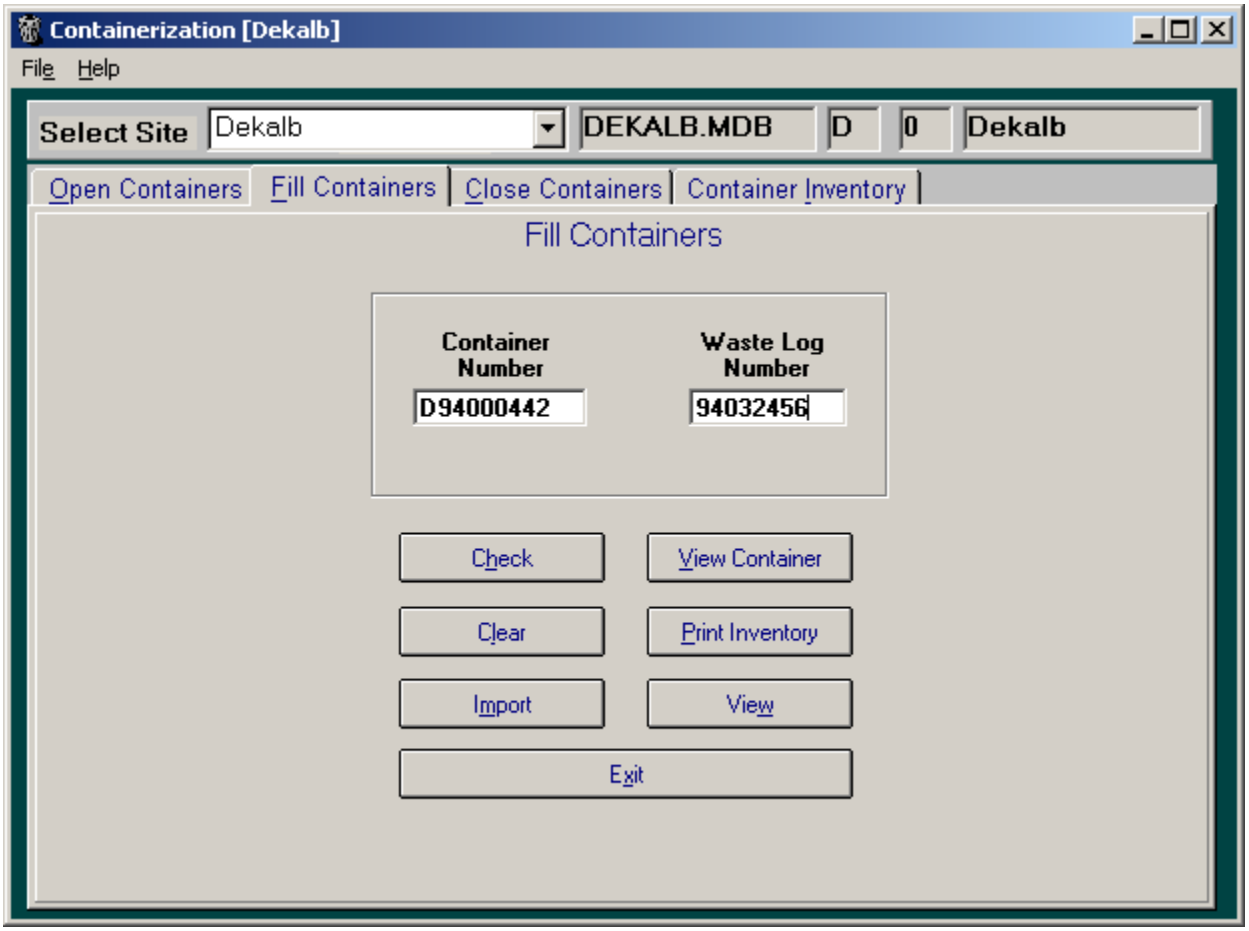


Figure 5. Containerization Screen for Recording the Placement of Material into Containers.



When a container is filled and sealed, the system is used to print a container inventory of all packed material (Figure 6). The sealed containers are then moved to storage locations to await shipping to an approved facility (Figure 7).

Figure 6. The Containerization Screen to Close and Classify a Container.

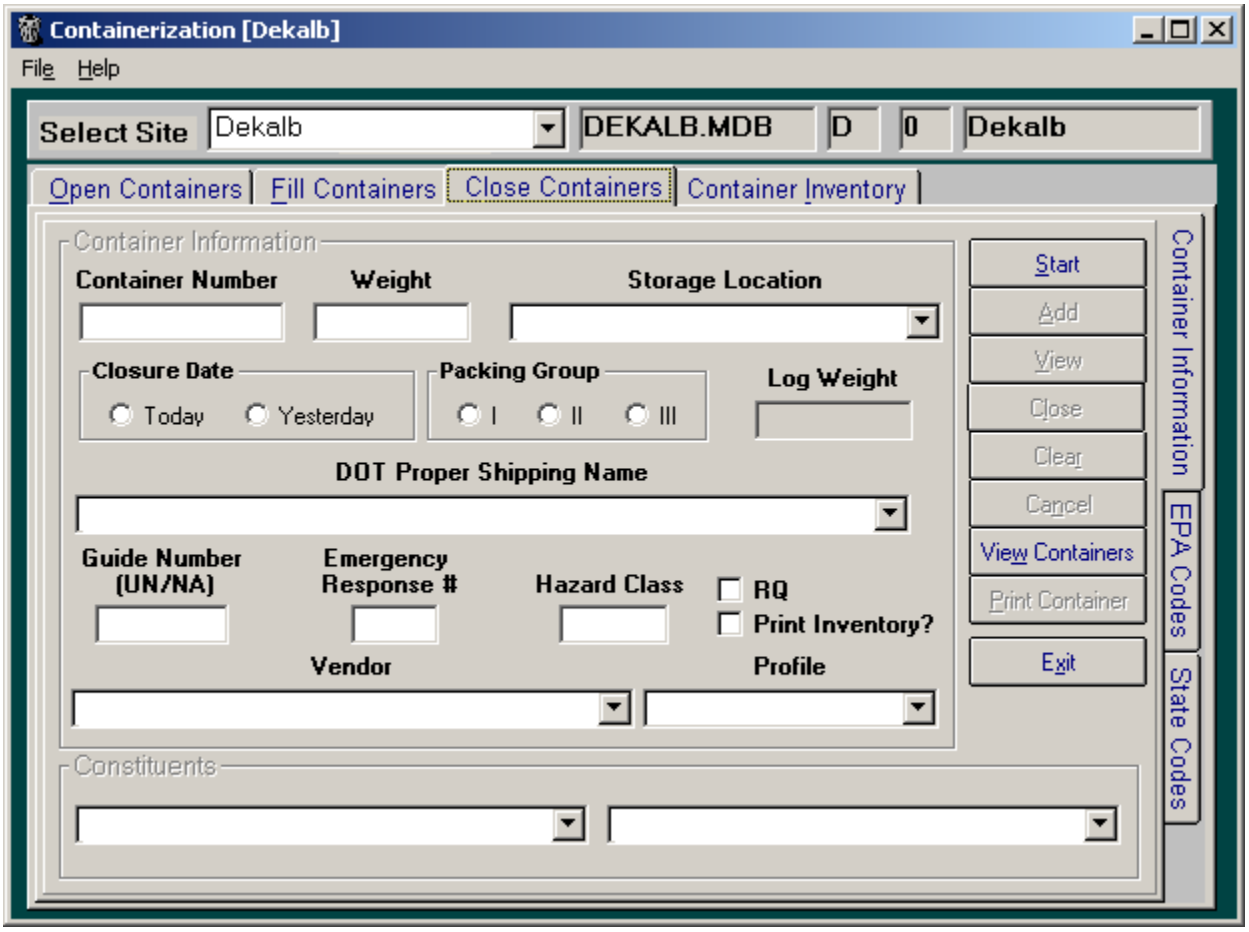
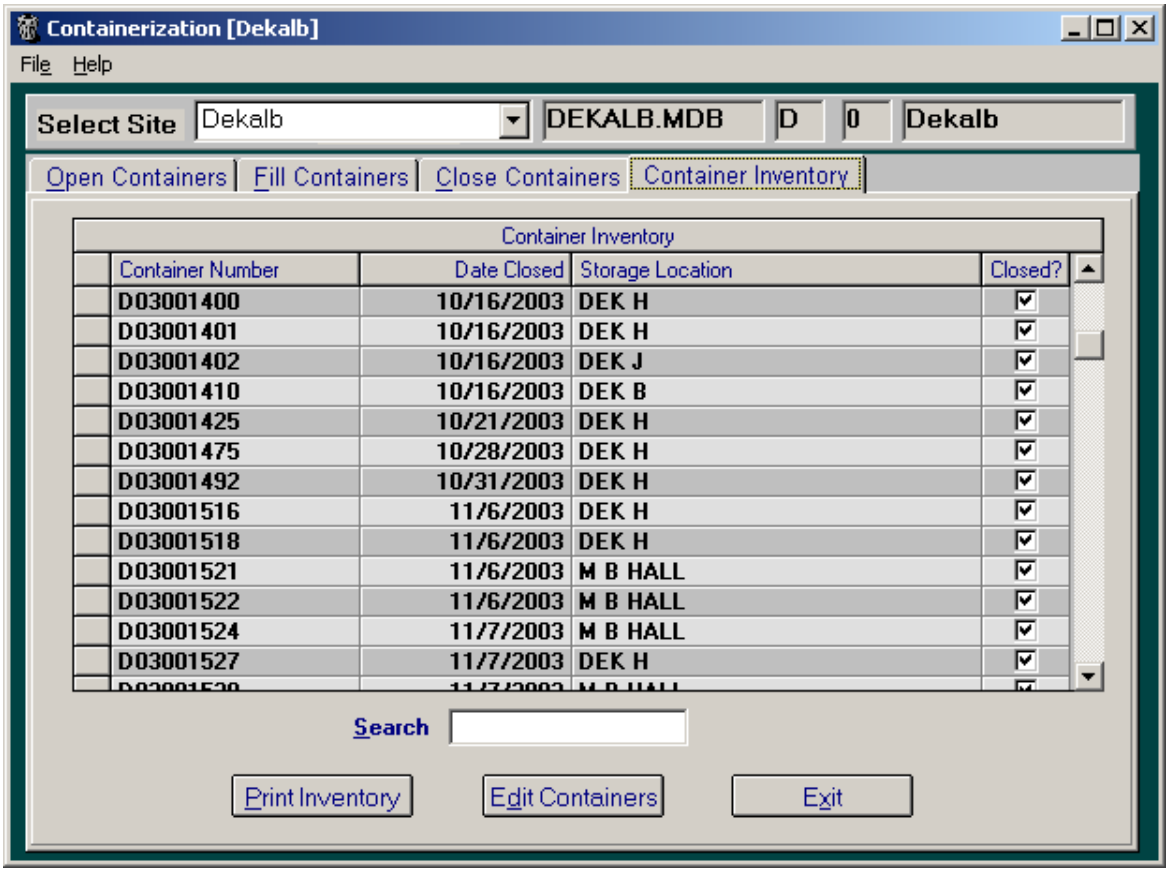


Figure 7. Containerization Screen - Storage Location of Closed Containers



The Storage Module in the system tracks the location of each container and how long it has been stored on-site (Figures 8 & 9). The system also automatically checks regulatory compliance clocks to make sure containers stored at the storage locations are not approaching any daily time limits on material storage. Printed reports are available to aid Environmental Services personnel in grouping material for shipment off-site.

Figure 8 Storage Location Module - Specific Information About a Container.

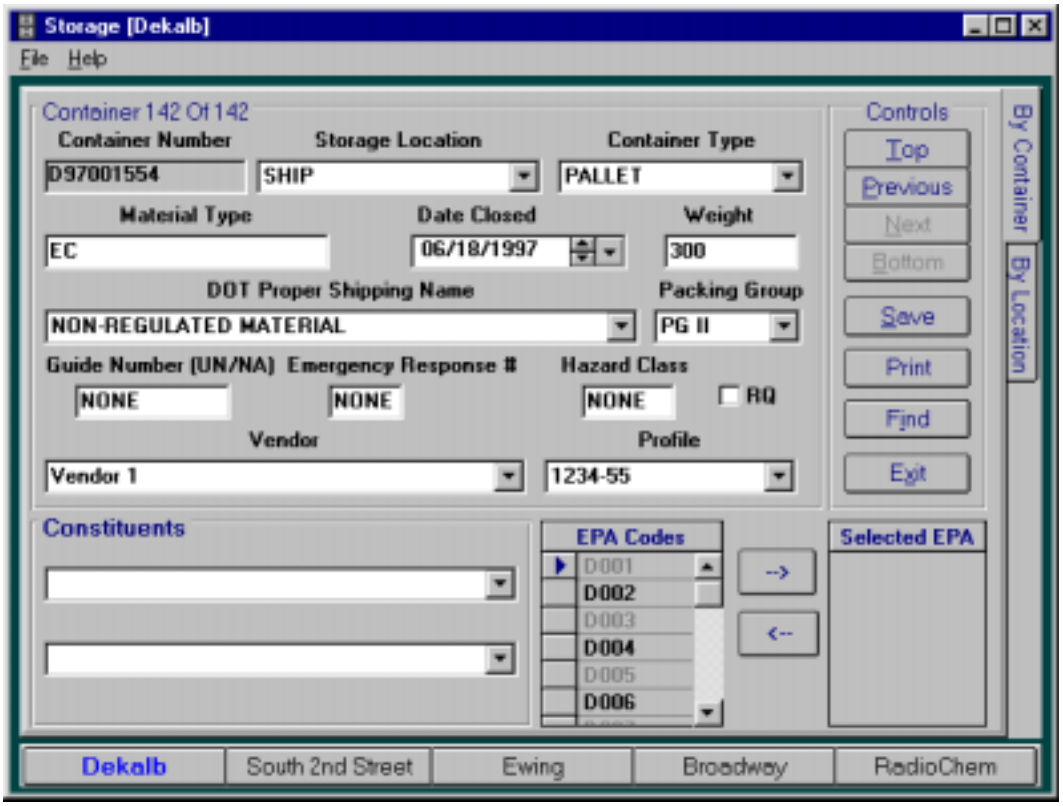
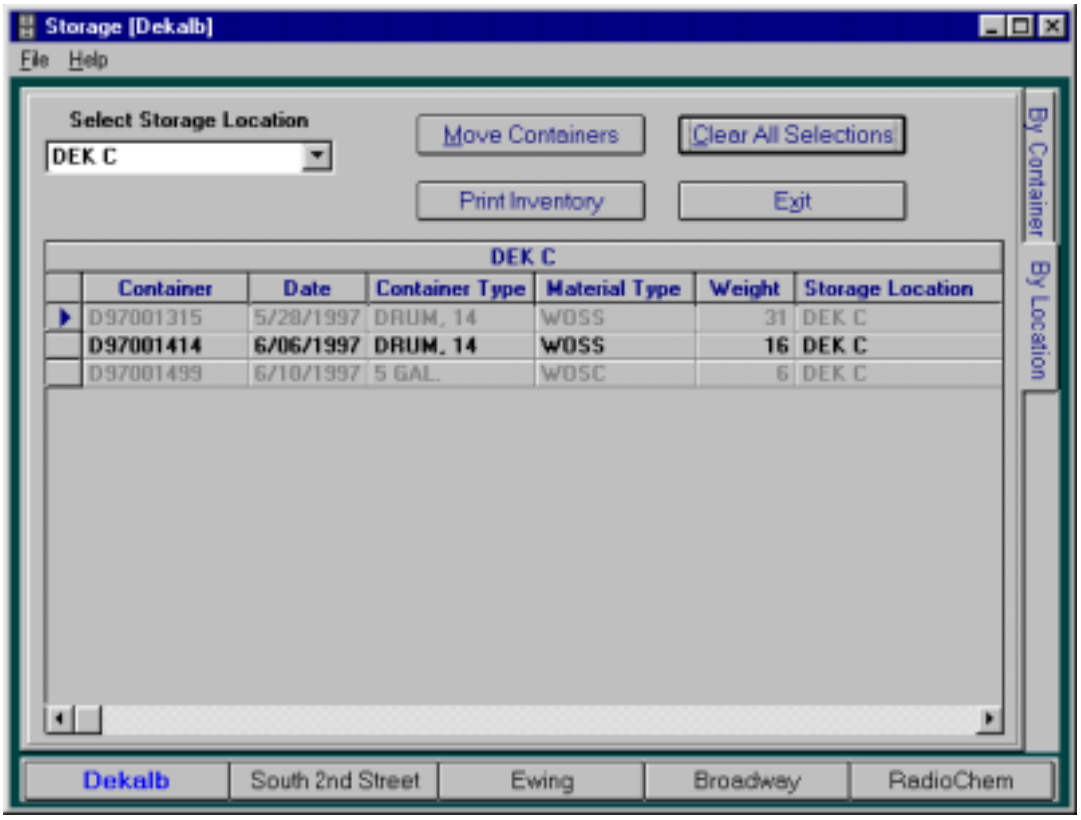


Figure 9. Storage Module Screen of Container Inventory at a Location.



The Manifesting module allows Environmental Services personnel to create shipments using the material in storage to approved disposal sites (Figures 10 - 12). The Manifesting module allows the user to easily build shipments, view completed manifests (Figures 13-15) and print manifests on individual state forms. Since each container has been already classified, the system is used to prevent incompatible materials from being placed on the same shipment. When material is shipped off-site, all of the tracking data for each shipment is archived to prevent the system database from growing too large, but still allowing access to satisfy environmental requirements.

Figure 10. Manifesting Screen Used to Build a Shipment of Containers.

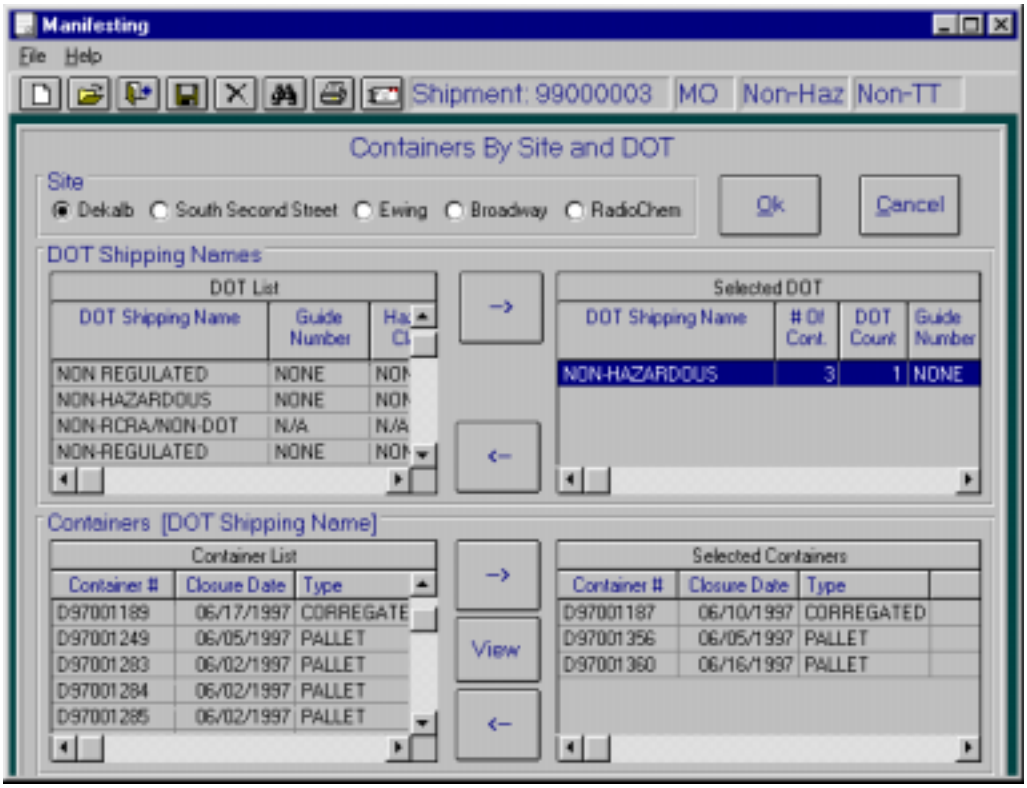


Figure 11. Manifesting Screen for Bill of Lading Showing Facilities Used.

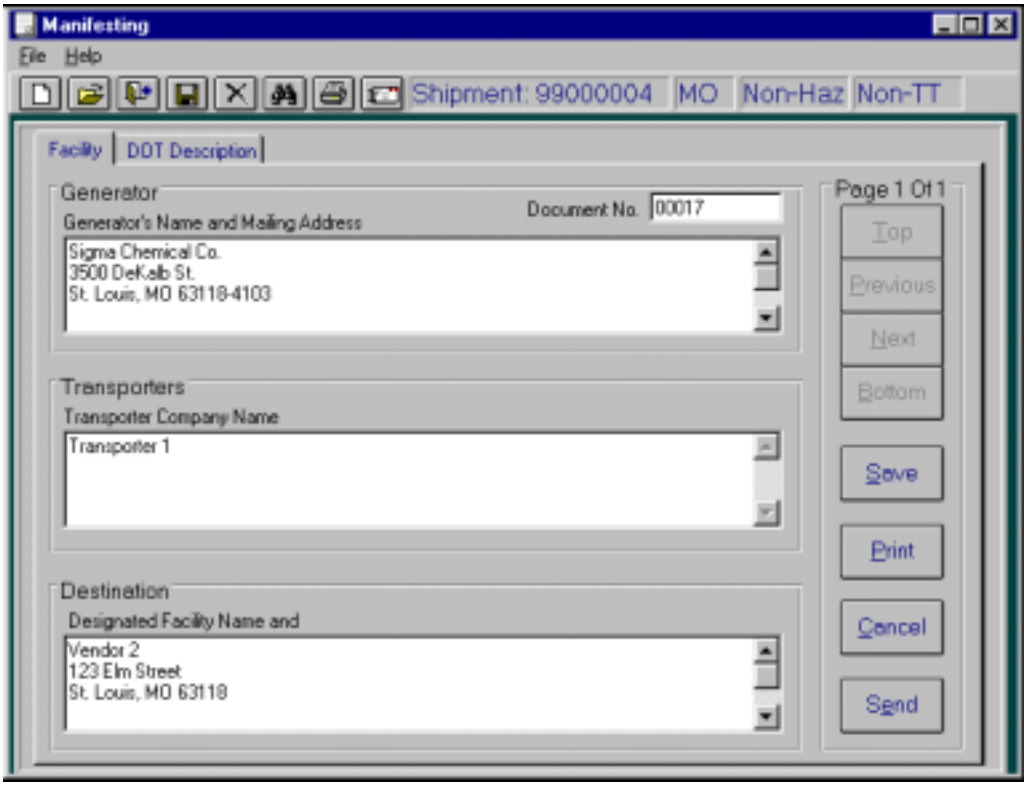


Figure 12. Bill of Lading Showing Material Shipped.

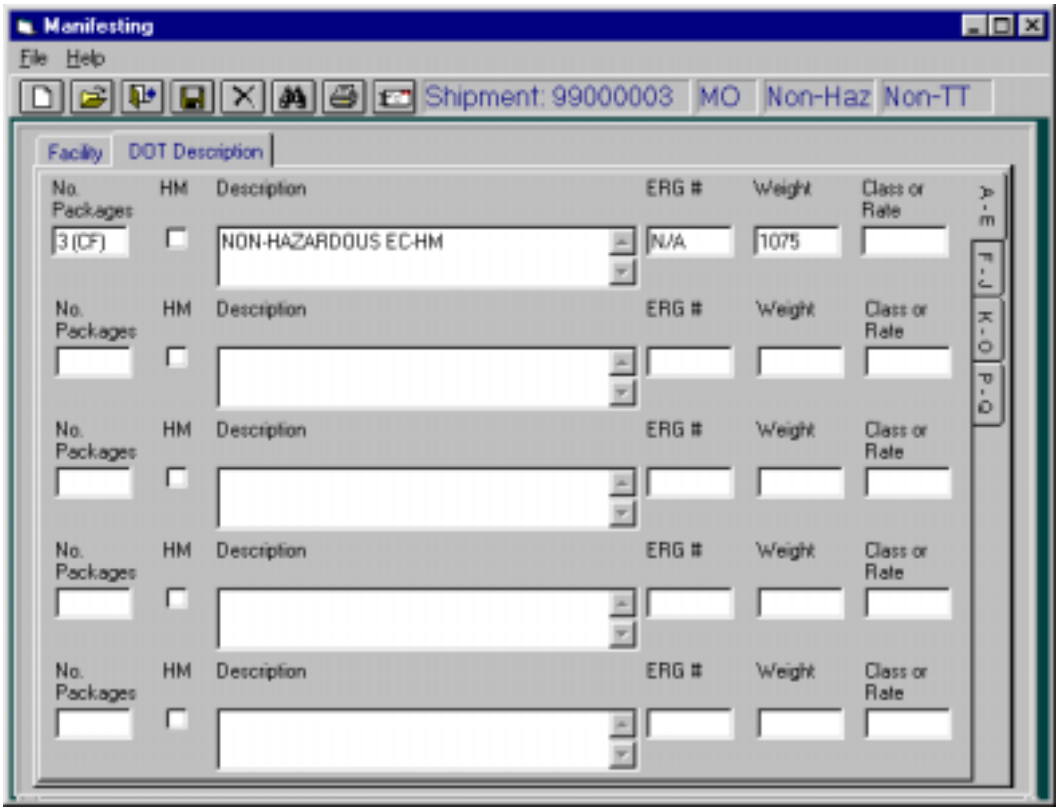


Figure 13. Manifest Viewer Facility Information.

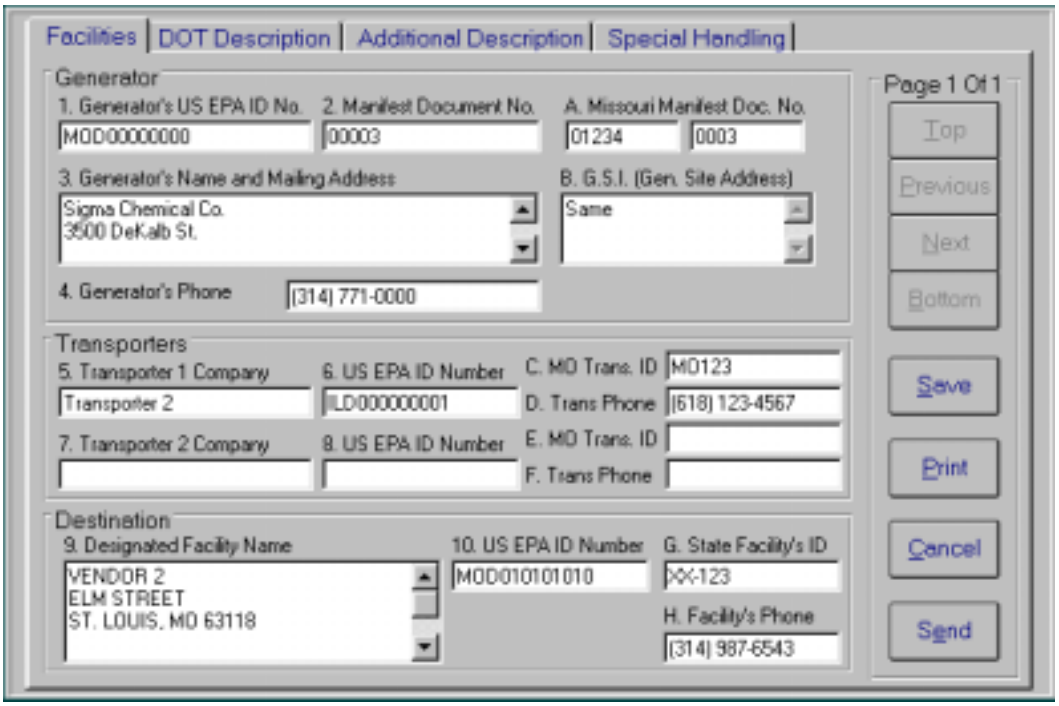


Figure 14. Manifest Viewer Showing Material in Shipment.

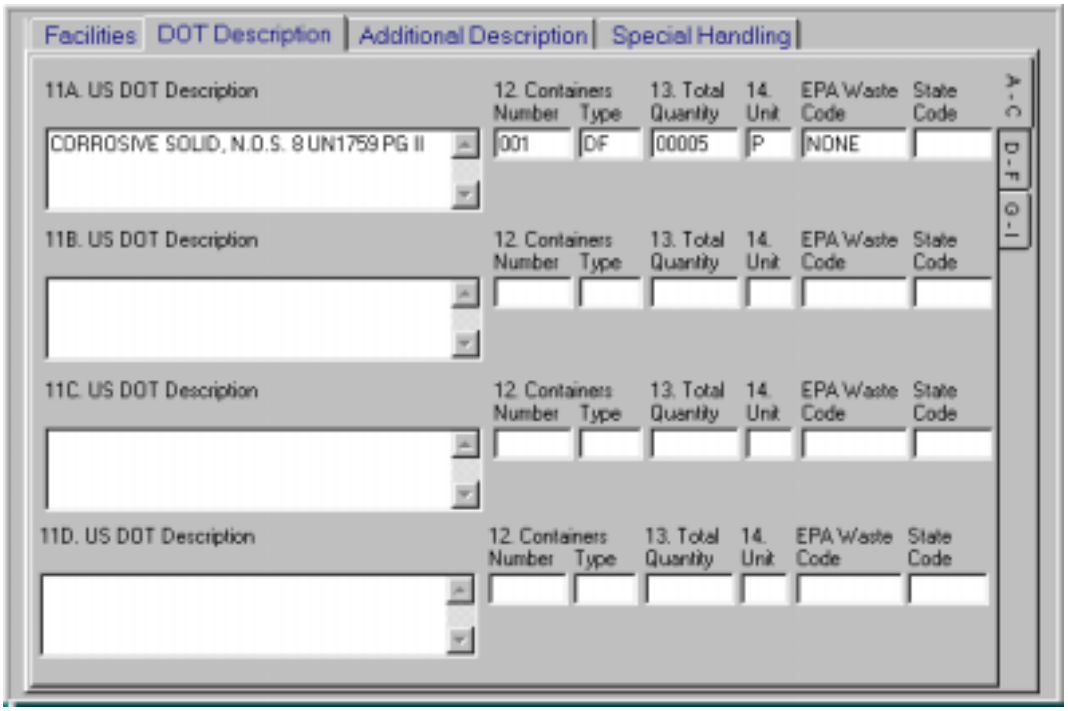
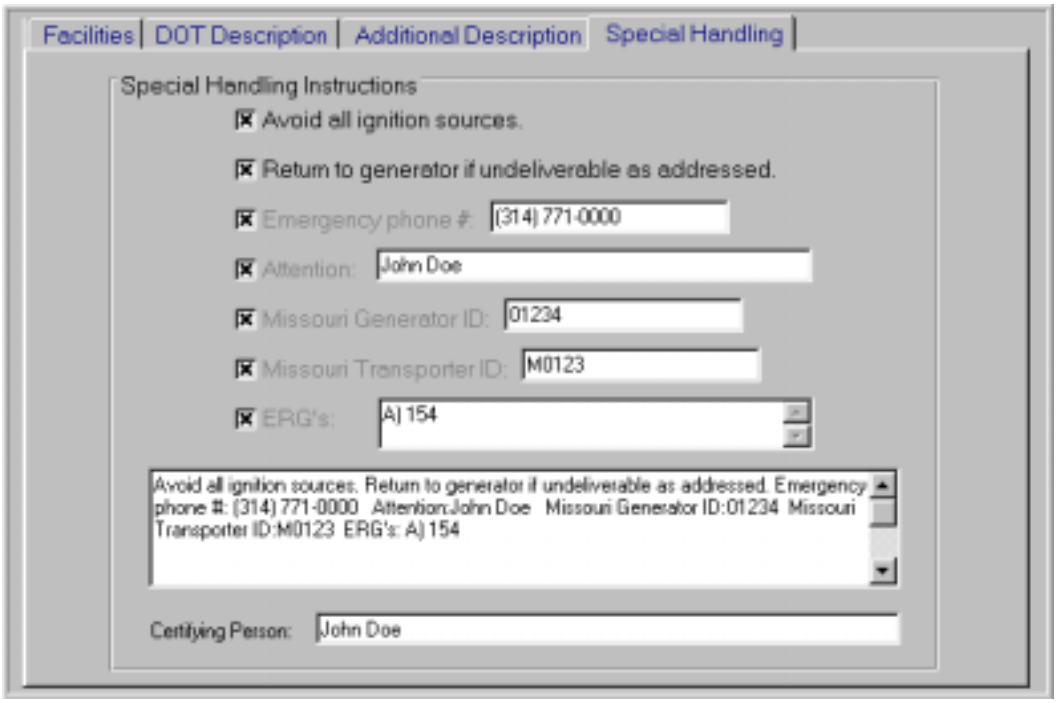
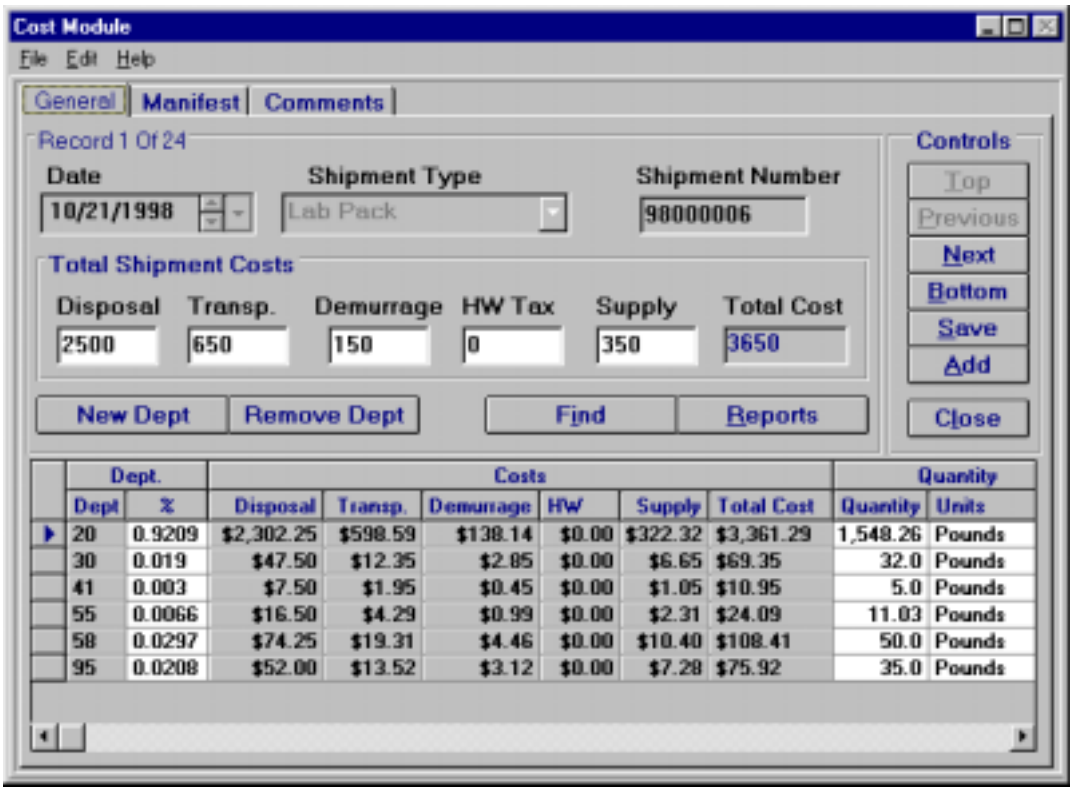


Figure 15. Manifest Viewer Showing Special Handling Instructions.



After material is shipped off-site, it is tracked in the systems costing module (Figure 16). The costing module also contains information on the return of manifest copies and the certificate of destruction. The final cost of the transportation and disposal is entered into this module for each shipment and a charge is issued back to each department from which the material was disposed.

Figure 16. Costing Module - Charge Breakdown Screen by Material Shipment.



CONCLUSION

The Sigma-Aldrich Waste Management System was designed to improve upon the manual process of collecting, processing, shipping and reporting of waste disposal. The fluid integration of this system into the Environmental Services business practices has allowed the department to streamline their operation and to process and manifest more material than thought was possible.

With this system the Environmental Services group has been able to increase throughput almost an order of magnitude with less personnel on staff. The system is also very dynamic and easily modified to incorporate new modules and reports to help increase efficiency.

KEY WORDS

EIMS, EMIS, Software, Management Systems, Waste Management System, Environmental Data Management