Title V Continuous Compliance Data Management

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ABSTRACT

Mallinckrodt Baker, Inc. (MBI) has realized that the hardest part about compliance with Title V requirements is not the initial permit application, but the ongoing compliance and certification process. In late 1995, the Phillipsburg New Jersey plant elected to begin the development of an Air Compliance Module. This Air Module is a component of the overall Environmental Information Management System (EIMS). The purpose of this module is to meet the needs for continuous compliance and certification of that compliance.

The Air Module meets three functional needs. The first need is to verify permit compliance. The permit limitations for each emission unit are contained in this module. These limitations do not just include emissions, but also include operational limitations such as, hours of operation and product throughputs. The second need is to calculate and track emissions. The emissions from each emission unit are calculated and compared to the annual limitations. Reports are generated for total emissions and for emission units that are approaching permit limits. The third need is for production tracking. This system tracks production, hours of operation, scrubber parameters and most of the information required by the compliance plan. In addition, specific business information such as; quality parameters and safety inspections is recorded. This is where this module becomes a business system; providing data accumulation, tracking and reporting not possible using the current manual systems.

Data from all of the operations at the plant are captured by the production tracking system. This information is fed into the emission calculator to calculate the emissions for each emission unit. The emission data and other operating parameters are then compared to the requirements of the compliance plan stored in the permit limitations. This is then used to produce the semi-annual compliance report.

INTRODUCTION

Mallinckrodt Baker, Inc. (MBI) is a manufacturer and supplier of Specialty and Laboratory Chemicals and a division of Mallinckrodt, Inc. The MBI plant has been located at the same site, in Phillipsburg, New Jersey, since 1904. The site encompasses approximately 65 acres, of which 25 acres are used for the manufacturing and warehousing operations.

In the late 1980's, MBI began to submit air permit applications for all of the existing operations on the site which would require permits if they were being installed as new sources. Currently

there are more than 120 sources which have New Jersey issued Permits to Operate. MBI is also a Title V Major Source, due to the Potential to Emit NOX, VOC's, HAP's and SOX. The actual emissions for the plant are also over the Title V thresholds. Therefore, MBI decided it would be better to apply for and obtain a Title V permit instead of becoming a synthetic minor source. The State of New Jersey has established an application submission schedule based on SIC code, and MBI's application was submitted in February 1998.

Many types of chemicals are produced at the MBI site. The facility is broken into three major areas. These areas process inorganic acids, organic acids and organic solvents. Also, a variety of organic and inorganic salts are produced. A number of discreet unit operations are used to produce and package the products. Some of these operations are; storage tanks, distillation, blending, reacting, evaporating, liquid packaging and dry powder packaging. There are other permitted sources, such as a boiler house and waste water treatment plant, at the site to support the manufacturing operations. Over two hundred different chemicals are processed through permitted equipment at the site in a typical year. Prior to the Title V permit, this production information was tracked and reported by several different, and mostly manual systems.

Program Background

In early 1995, Mallinckrodt decided that a consistent corporate-wide Environmental Information Management System (EIMS) was needed. The development of EIMS modules was be done under a corporate license, with different plants taking the lead for the development of different modules. All Mallinckrodt plants are able to use the finished modules as is or the individual plants could customize the modules to meet any specific needs.

In late 1995, the Phillipsburg plant elected to begin the development of the Air Module.   The Air Compliance Module of EIMS is a Windows-based system using Microsoft's Visual Basic as the programming language. All reporting in the system is done using Crystal Report. The underlying database used to store all of the emission unit and production information is Microsoft ACCESS. The Air module is on the plant LAN and is available to environmental personnel and all of the production areas. Production information is directly entered by operators in their work area. Security is built into the system to only allow the authorized access by each department to their data.

Air Module Component Outline

MBI has realized that the hardest part about compliance with Title V requirements is not the initial permit application, but the ongoing compliance and certification process. The Air Module was not designed to perform the application process. The purpose of this module is to meet the needs for continuous compliance and certification of that compliance.

The Air Module meets three functional needs. The first need is to verify permit compliance. The permit limitations for each emission unit are contained in this module. These limitations do not

just include emissions, but also include operational limitations such as, hours of operation and product throughputs. The second need is to calculate and track emissions. The emissions from each emission unit are calculated and compared to the annual limitations. Reports are generated for total emissions and for emission units that are approaching permit limits. The third need is for production tracking. This is where the Air Module becomes more than just an environmental system. This is where this module becomes a business system; providing data accumulation, tracking and reporting not possible using the current manual systems.

Structure

Data from all of the operations at the plant are captured by the production tracking system. This information is entered by the production operators at their work areas. This information is fed into the emission calculator to calculate the emissions for each emission unit. The emission data and other operating parameters are then compared to the requirements of the compliance plan stored in permit compliance. This is then used to produce the semi-annual compliance report.

Permit Compliance

The permit compliance module contains source information submitted in the Title V permit application as well as emission limitations. There are six support databases which contain information needed to calculate emissions. The Building, Unit Operation Type and Equipment Group databases are lists of those data. The Chemical database includes; molecular weight, CAS number, water solubility, specific gravity, boiling point, default control efficiencies, vapor pressure (either a look-up table or Antoine Coefficients) and regulatory categories. The Location database includes location and stack parameters (flow, temperature, size, etc.). The Equipment database includes; ID number, unit operation type, building, equipment group, emission point and other data that is unit operation specific. (Figures 1-3).

There are three separate modules for calculating emissions; batch emission calculator, continuous emission calculator and tank emission calculator. Each of these use information from the support databases, supplemented by source specific data.

The batch emission calculator is used to calculate primarily organic emissions. The formulas used to calculate batch emissions is based on EPA derived methods. The actual methods have been published in the 1978 OAQPS Guideline Document, <u>Control of Volatile Organic Emissions from Manufacture of Synthesized Pharmaceutical Products</u> or the 1993 Guideline Series, <u>Control of Volatile Organic Compound Emissions from Batch Processes.</u> To use the batch emission calculator you first enter the known data about the annual batch production limits; size of a batch, number of batches, hours per batch, etc. Next, the specific process steps are defined. Equipment, chemicals, control devices, unit operations, and any specific information needed to calculate the emissions are entered. Then the uncontrolled and controlled emissions from the specific process steps are calculated. Finally, the total batch emissions are calculated and the annual limit established. (Figures 4 - 7).

The continuous emission calculator is used to calculate emissions for continuous sources using emission factors. The emission factors can be either known factors, such as AP-42 factors for

combustion, or user defined, such as based on stack test data. Generally, non-VOC emissions are calculated using this module. The source is first defined and then specific information is entered. Raw materials, emission factors, control devices and efficiencies, and operating data (hours per year, hours per day, days per week, etc.) is entered and the uncontrolled, controlled and maximum allowable emissions are calculated. Both combustion and process emissions can be combined in the same source. Then the total source emission is calculated. (Figures 8-12)

The last emission calculation module is for storage tanks. Specific tank operation data is entered and feeds into the EPA Tanks3 program to calculate the permit allowable emissions.

Once the permit allowable emissions for an emission unit is calculated, this module is archived, and only changed if the permit is modified.

Calculate and Track Emissions

This module is where the actual plant operating data is used to calculate actual emissions, which is then compared to permit allowable emissions. This module links the permit compliance module with the production tracking module. An exception report is generated to indicate permit exceedences. A separate report lists each emission unit which exceeds 90% of the permit maximum of emissions or operating limitations.

Production Tracking

MBI has five departments that individual software modules were developed for :

- Acids

- Solvents

- Salts

- Utility

- New Business Development

Each department at MBI was involved in the planning and development of the EIMS Air module software. Each department provided their data collection forms that were previously used to manually track emission and production information. As modules were developed each department was actively involved in the testing process, until a module was developed to meet all of the emission and production data gathering and reporting needs. All of the terminology used in this module was provided by the production operators. The intent was to provide a tool which was consistent with their current practices. Even the reports have been formatted to look like the manual data collection forms. None of the in-place practices needed to be changed to accommodate the use of this computer based tracking system. However, several departments used this process as an opportunity to evaluate their data collection needs, and expanded the scope of the data collection now that it was easy to do.

Each production operation has unique data management needs, from both a business and environmental standpoint, which we have tried to address. However, the types of data were similar. Here we will present some examples of the formats.

Tank Truck Unloading/Storage Tanks

Figures 13 and 14 show the forms used to track the unloading of chemicals from tank trucks to storage tanks. These forms provide information on the chemical unloaded and the storage tank filled. This information is used to calculate fugitive emissions due to working losses. This module simplifies the input of this information by minimizing the amount of manual entry of data by an operator by using drop down pick lists. The use of pick lists over manual data entry also minimizes the chance of the operator entering erroneous information.

To collect information on storage tank emissions, a module was developed to track storage tank chemical levels and record inspection results on a shift and daily basis, shown in Figures 15 and 16. Now, instead of a weekly report sent to the production planners of tank inventory, all of the planners have real time access to the tank inventories.

These modules will also be used to record and track the data necessary for discharge prevention monitoring requirements.

Manufacturing

A day planner format is used consistently for the tracking of manufacturing processes. Different processes have different data needs, including the frequency of data recording. For example, inorganic salt manufacturing records data every hour, while packaging operations record data every 15 minutes. Examples are shown in Figures 17 - 21. However, the format is kept consistent. The operator selects an activity from a pull down box. For each time increment that that activity is performed, the time is clicked. The data only needs to be entered once. For some of the activities, a data card is then displayed. This is where the operator enters production specific information. Most of this information is business, not regulatory, information. In the manual data collection system, production data was kept, but very little information was gathered on downtime. It was just too cumbersome and time consuming to do anything with the information. Now, downtime is attributed to specific activities. Reliability reports are generated showing % operating and quantifying lost time.

Next Steps
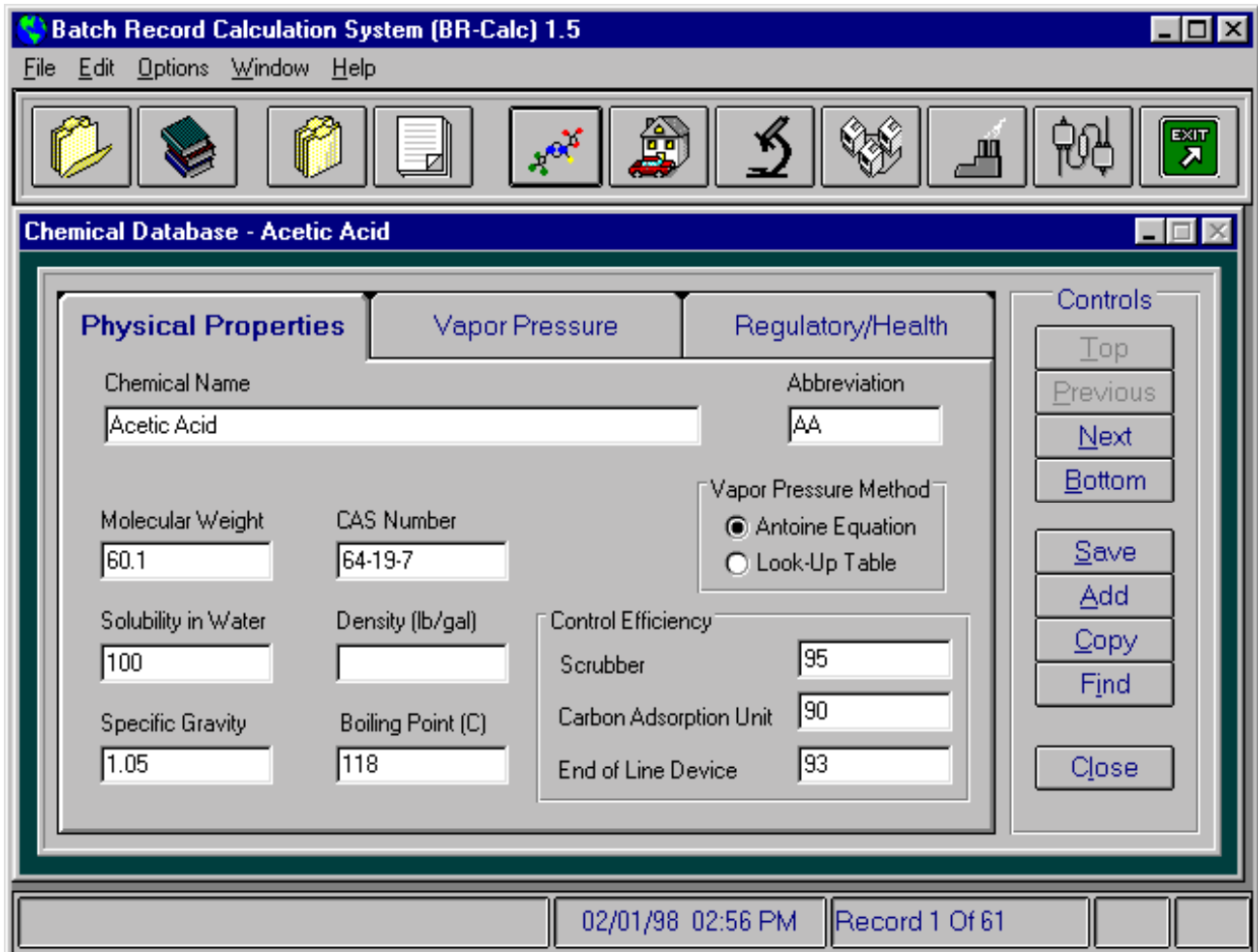
Currently all of the information is entered manually into PC's. Automation of some of the data collection will be considered next. Readings from process instruments, such as level indicators and flowmeters, would be automatically recorded. Bar code scanners could be installed on packaging lines to record production on-line. Then, the only operator data entry would be for when the packaging line is not operating. These enhancements will be evaluated after the current system has operated for approximately 2 years.

Conclusions

MBI has realized that the hardest part about compliance with Title V requirements is not the initial permit application, but the ongoing compliance and certification process. Acquiring the information to demonstrate ongoing compliance was basically a manual process by each of the production departments and environmental personnel. The EIMS Air Module was designed and implemented to give environmental the tools to track real time compliance and make production information readily available. This system not only makes the data more readily available, it also automates the data tracking in the production departments. The production departments are now able to more easily record production information as well as track parameters that were not manually recorded previously.

The EIMS air module has become a vital tool at MBI to quickly and accurately track the requirements and limitations of our Title V Operating permit to demonstrate ongoing compliance.

Figure 1. Chemical database.

Figure 2. Emission point database.

Figure 3. Equipment database.

Figure 4. Batch record calculator campaign definition.
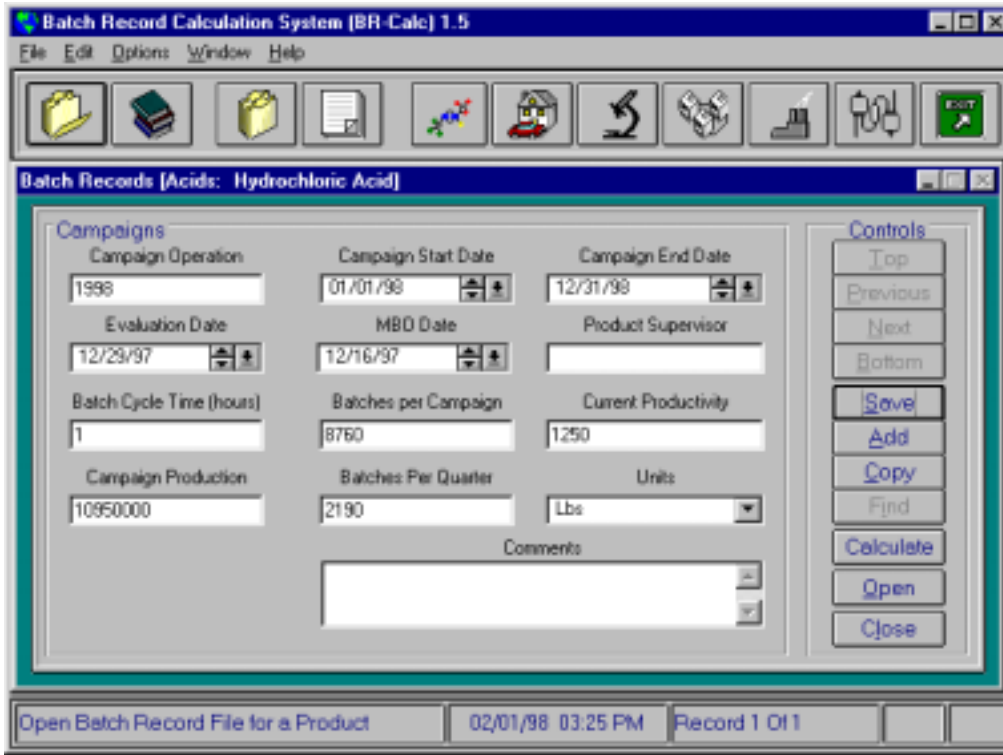
Figure 5. Batch record calculator - unit operation definition.
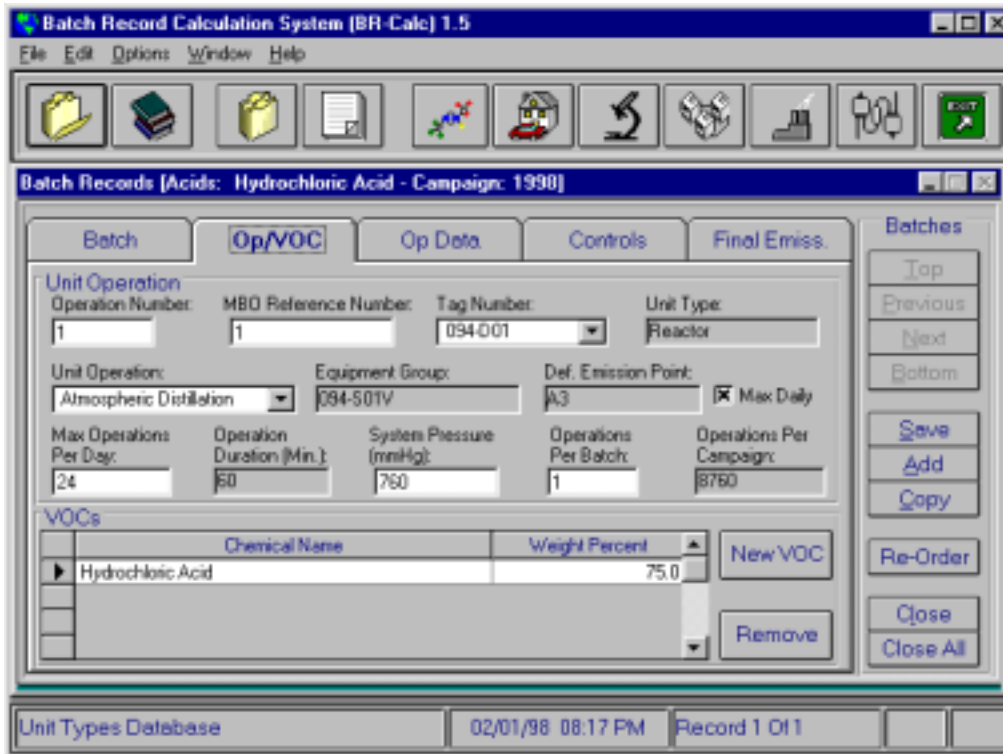
Figure 6. Batch record calculator uncontrolled emission calculation.

Figure 7. Batch record calculator control device definition and emission calculation.

Figure 8. Continuous emission calculator - fuels database.

Figure 9. Continuous emission calculator - emission factors.
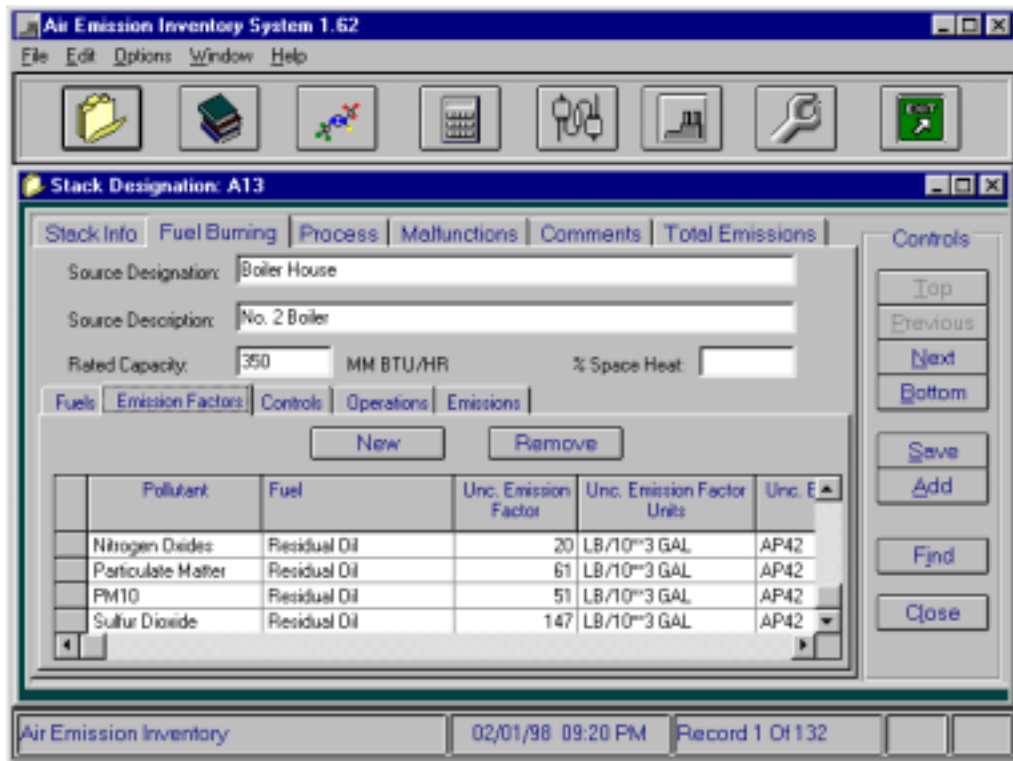
Figure 10. Continuous emission calculator - controls database.
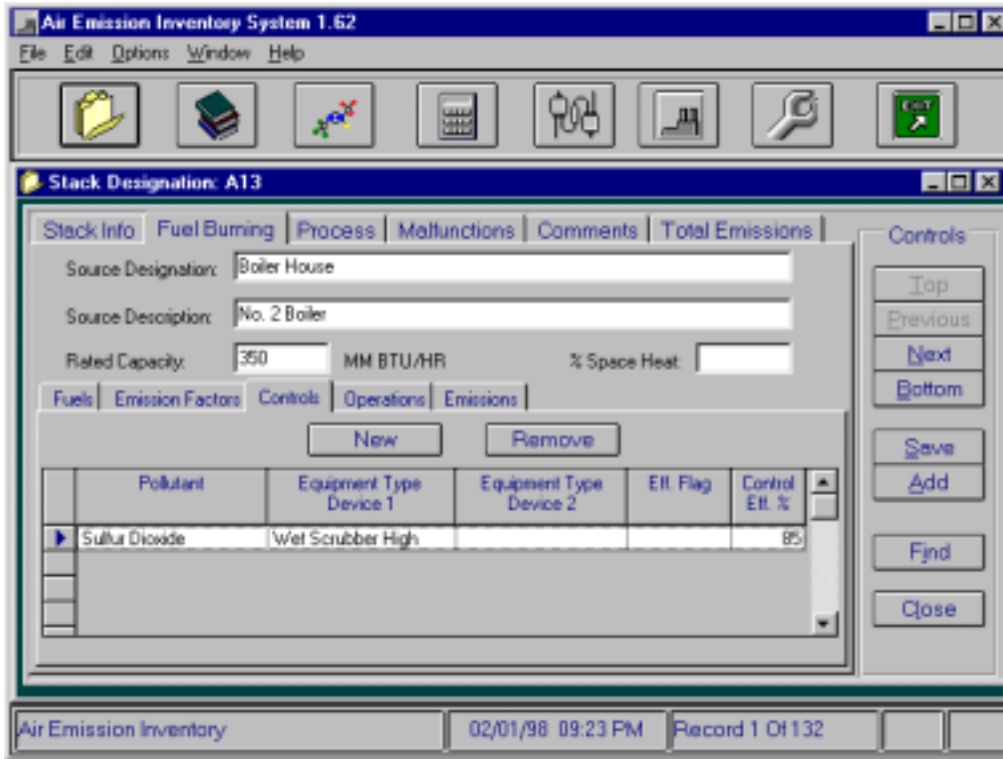
Figure 11. Continuous emission calculator - operations database.
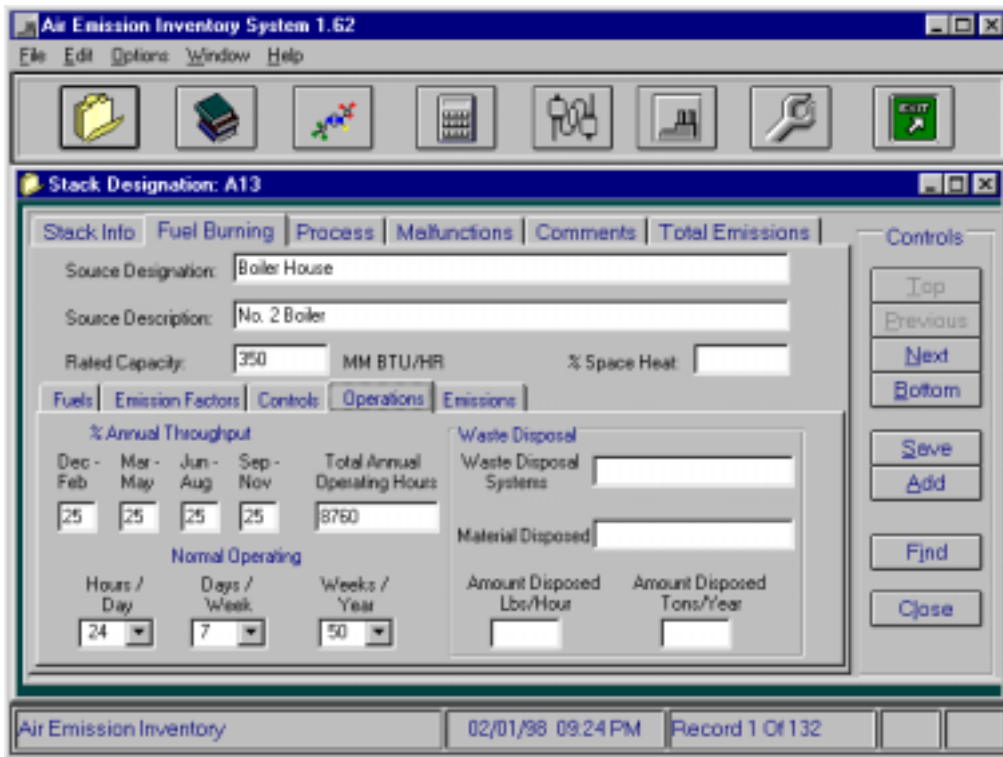
Figure 12. Continuous emission calculator - emission summary.

Figure 13. Tank truck unloading form.

Figure 14. Storage tank information linked to tank truck unloading.

Figure 15. Storage tank daily inventory.

Figure 16. Daily storage tank inspection.
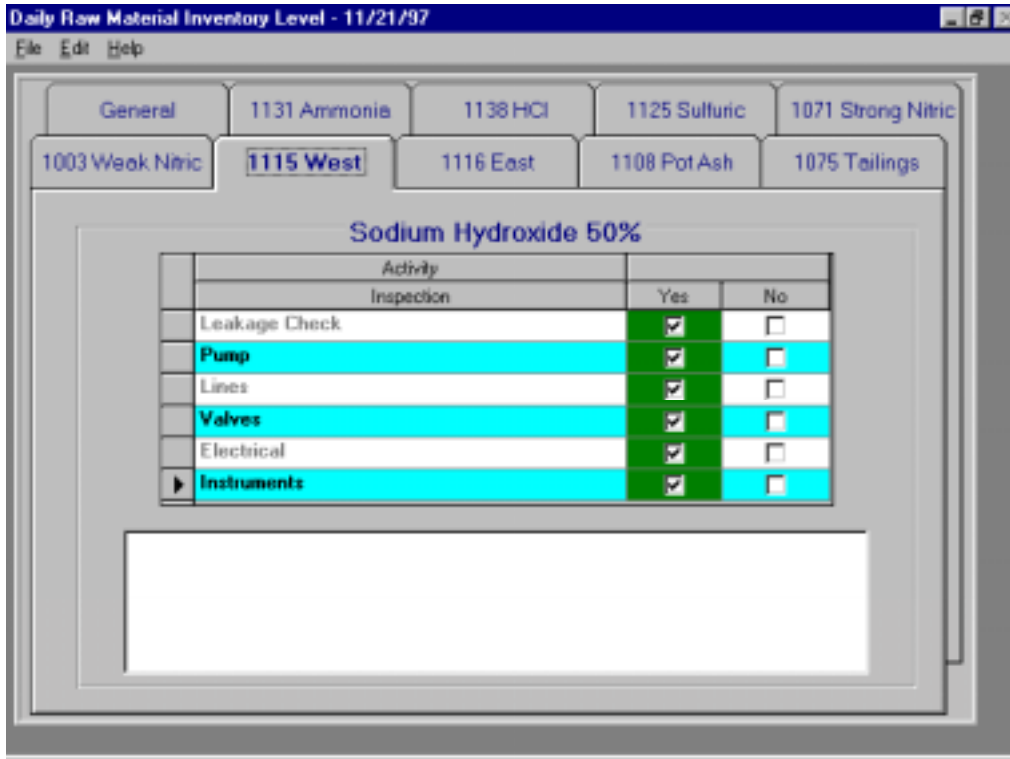
Figure 17. Packing log showing format and activities.
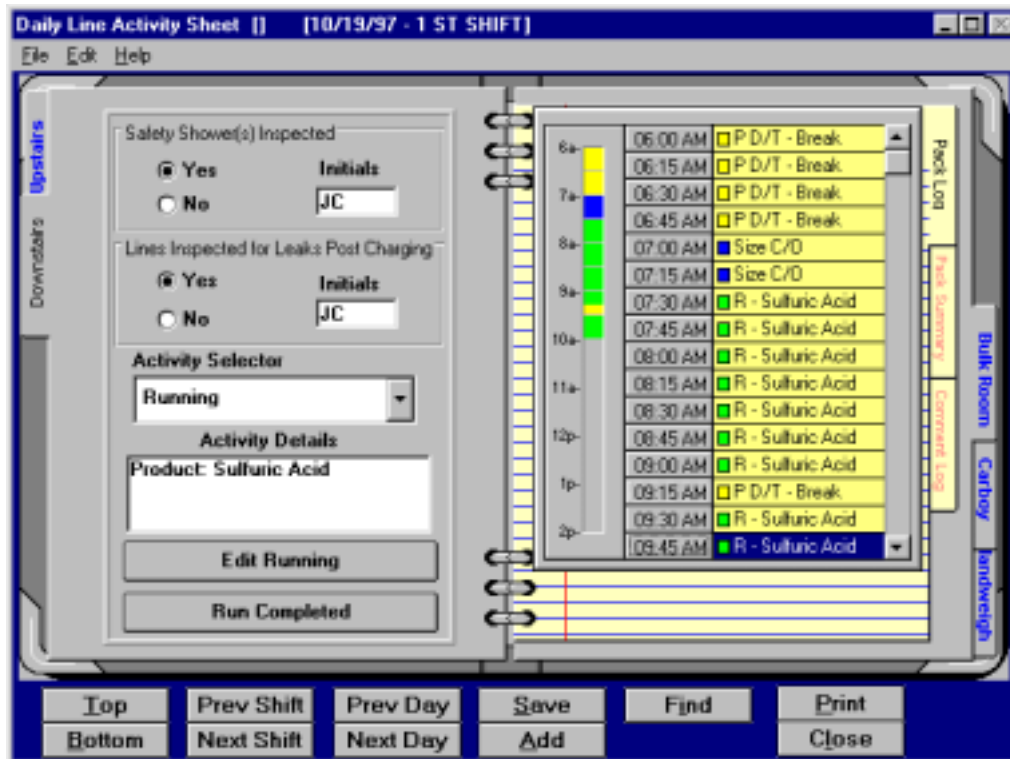
Figure 18. Packing log showing data attached to running activity.

Figure 19. Packing log showing data attached to downtime activity.
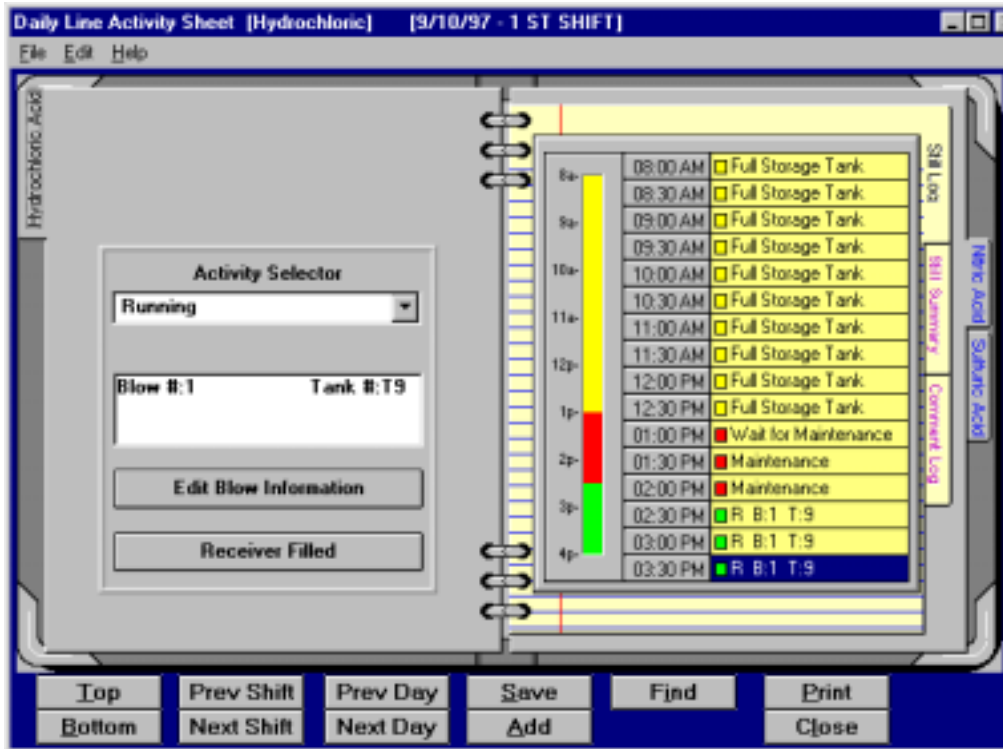
Figure 20. Making log showing format and activities.

Figure 21. Making log showing data attached to running activity.