New Jersey Institute of Technology

Digital Commons @ NJIT

1-31-1993

Computerizing occupational safety and health information

James Luke
New Jersey Institute of Technology

Recommended Citation

ABSTRACT

COMPUTERIZING
OCCUPATIONAL SAFETY AND HEALTH INFORMATION
by
James Luke

Various regulations increase the responsibility of
employers to retain appropriate safety and health
information, for as long as several years. Handling this
increasing volume of safety and health information
manually is impractical, time consuming and hence, not at
all cost effective.

The purpose of this research is to examine the
various aspects of computerizing safety and health
information, and to evaluate a number of commercially
available safety software packages.

This paper initially discusses the impact of OSHA on
retaining safety and health information, and the different
areas which can benefit from computerization. It also
provides guidelines to analyze existing safety and health
information systems in an establishment, and develops
general guidelines for selecting and developing a
computerized safety and health information system.

The work concludes with an analysis of nine of the
most widely used commercially available safety software
packages using data obtained from product catalogues and
demo diskettes.

COMPUTERIZING
OCCUPATIONAL SAFETY AND HEALTH
INFORMATION

by
James Luke

A Thesis
Submitted to the Faculty of
New Jersey Institute of Technology
in Partial Fulfillment of the Requirements for the Degree of
Master of Science

Occupational Safety and Health Engineering
Department of Mechanical and Industrial Engineering

January, 1993

Blank Page

APPROVAL PAGE

Computerizing
Occupational Safety and Health
Information

James Luke

Dr. Howard Gage, Thesis Adviser
Associate Professor of Industrial Engineering, NJIT

Dr. Suebsack Nanthavanij, Committee Member
Assistant Professor of Industrial and Management
Engineering, NJIT

Dr. Min-Yong Park, Committee Member
Assistant Professor of Industrial Engineering, NJIT

BIOGRAPHICAL SKETCH

Author: James Luke

Degree: Master of Science in Occupational Safety and
Health Engineering

Date: January, 1993

Undergraduate and Graduate Education:

o Master of Science in Occupational Safety and Health
Engineering, New Jersey Institute of Technology,
Newark, NJ, 1993

o Bachelor of Science in Mechanical Engineering,
University of Kerala, Trivandrum, India, 1981

Major: Occupational Safety and Health Engineering

ACKNOWLEDGEMENT

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

In the past fifty years, industrial technology has developed more new equipment and processes than were developed in the preceding several centuries. Some advancements have improved society whereas some have been detrimental. Technology has created expanded requirements and the need for accident prevention in workplace. Many tasks have become increasingly complex and demanding, and the potential for serious injury has heightened.

Society has responded to the safety and health risks placed on them by technology, primarily through regulation and litigation. Federal, state and local governments have passed many laws and regulations dealing with safety and health issues. At least ten percent of the new laws passed each year involve safety and health (1).

Recognizing the need to curb escalating work related injuries and illnesses, Congress enacted the Occupational Safety and Health Act (OSHAct) in 1970. Since then, the Occupational Safety and Health Administration, the federal agency created by the OSHAct, has promulgated various safety standards to make the workplace safer.

Due to the dramatic development of technology and the increasing number of regulations, there has been a rapid growth in the volume of data handled by safety and health

professionals. Some time ago, there was little need for information other than accidents and incidents. Today, it is essential to keep track of personal protective equipment, and other items issued for safety purposes, environmental exposures of employees, training given to workers and when training must occur again, and hazardous materials. It is required to keep the material safety data sheets (MSDS) for all chemicals used or stored in the facility. It may be important to keep track of fire extinguishers, hoses, hydrants and data about them, such as manufacturer, date of purchase, date of inspection, and tests performed. In safety analysis, both hazards and the types of controls implemented must be recorded.

The rapid growth of computer technology has enhanced the capability of computer professionals and software developers to design complicated computer programs. They have introduced various database management systems (DBMS) for use in different areas of the safety and health. Most of these are userfriendly so that personnel with minimal experience in computers can easily use the programs. Many DBMS products have security features that limit the access of some people to certain data. Network versions of the safety software packages are also available, which enables centralizing safety and health information for an organization with multiple sites.

Computerization of safety and health information involves the analysis of the current system and the identification of those areas which will stand to benefit. A thorough investigation of the present system will also be useful in justifying the expenditures for the new system by demonstrating consistent cost savings.

As computerization involves expenditures, software professionals should be cautious in selecting new software. During the selection process, the important parameters such as information to be computerized, types of reports to be generated, availability of computer technology in the organization, operational adaptability, and financial feasibility all should be taken into account. Each of these parameters are discussed in the following chapters.

A computerized safety and health data system can put safety professionals in a position to provide timely and effective information needed to perform their functions such as: effectively pinpointing those areas that have the potential to cause harm, property damage or both, providing safety reports from which the management can make precise decisions and avoid costly interruptions due to injuries and damage; reporting dollars-and-cents savings, and contributions to profits on a consistent basis. Due to the computer's high speed and random search capability, it can accomplish the above noted functions

faster and more accurately than can be done manually.

    In addition to the savings realized from the computer's speed, computer usage reduces not only the man-power requirements to produce reports from a large quantity of data, but also allows more data to be accessed and analyzed in a brief time period. Thus, better and more timely reports can be available to direct management's efforts toward areas where the savings are potentially the greatest.

CHAPTER 2

IMPACT OF THE OCCUPATIONAL SAFETY AND HEALTH ACT

The Occupational Safety and Health Act, which is considered a landmark piece of legislation, became law in 1970. It made safety and health on the job a matter of law for thousands of American businesses and millions of their employees. Congress enacted the legislation recognizing the fact that the number of job related fatalities and injuries was escalating.

The purpose of OSHA is "to assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources". The act mandates employers to provide their employees a place of employment free from recognized hazards that might cause serious injury or death. On the other hand, the act requires that all employees must comply with all safety and health rules, standards, and orders applicable under this act.

The OSHAct covers all employers and employees in such varied fields as manufacturing, construction, longshoring, agriculture, law, medicine, charity and disaster relief, organized labor, and private education. However, certain areas are not covered by this act such as self employed persons, farms at which only immediate members of the farm employer's family are employed, and work places already

protected by other federal agencies under other federal statutes, such as the Atomic Energy Act and the Coal Mine Health and Safety Act (2).

The OSHA act requires employers to provide their employees with a safe work place. In addition, the act entrusts the following responsibilities to the employers.

1. Ensure that the workplace is in compliance with OSHA standards.

2. Keep records of work related injuries and illnesses.

3. Provide employees information regarding their rights under the OSHAct.

4. Minimize or reduce accidents.

5. Maintain records of employee exposure to toxic materials and harmful physical agents.

6. Provide medical examinations required by OSHA standards and maintain those records.

7. Report to the nearest OSHA office each prescribed fatality and accident reporting within 48 hours.

8. Abate cited violations of the OSHA standards within the prescribed period.

In carrying out its duties, the Occupational Safety and Health Administration (OSHA), is responsible for promulgating legally enforceable standards. OSHA standards are safety standards which may require certain conditions, or the adoption or use of one or more

practices, means, methods, operations, or processes necessary to protect workers on the job.

OSHA standards fall in to four major categories: including general industry, construction, maritime, and agriculture. These standards are contained in the Code of Federal Regulations (CFR- 29). OSHA promulgates new standards or amendments, from time to time, as necessary in different areas.

OSHA mandates employers to keep safety and health information such as records of injuries and illnesses, employee training, employee exposure to certain hazardous materials, and medical examinations. Various standards require employers to monitor the workplace atmosphere and make sure that their employees are not exposed to certain chemicals or gases above the limit (PEL - Permissible Exposure Limit) set by the OSHA. For instance, OSHA standards for asbestos (29 CFR 1910.1001) limit the PEL to 0.1 fibre/cc, and require employers to keep records of employee exposure for 30 years. Several OSHA standards stipulate that employees must be trained in their jobs, and in certain cases, must be retrained annually. The OSHA hazard communication standard mandates employers to keep the Material Safety Data Sheets (MSDS) of all chemicals present in the work place. These must be readily available to the employees.

In general, OSHA regulations dramatically increase the importance of keeping safety and health information. OSHA issues citations and assesses penalties for not keeping safety and health information properly. The traditional way of keeping these enormous quantities of information has now become difficult and time consuming. As a result, employers and safety professionals are leaning towards computerizing safety and health information to make the task easier and more financially efficient.

CHAPTER 3

MAJOR AREAS WHICH CAN BENEFIT FROM COMPUTERIZATION

3.1 Recordkeeping

The first national system of industrial safety
recordkeeping was established by the National Safety
Council. Later American National Standards Institute
(ANSI) standardized the system which was designated as
Z16.1 (3). In 1970, when OSHA came into effect, the
recordkeeping became mandatory.

Computer systems will be useful in improving the
efficiency of safety professionals in keeping records. In
injury or illness cases, the computer can accept several
information sources (even 50 or more items) for each case.
The computer can sort the information and can generate
reports in specified format, which are easier to analyze.
Comparisons can be made for separate items of information
for each case. For example, the computer can list the
information for comparison by type of case, department,
location of injury, job function of the injured,
management factors, and even cost. Computerization of
recordkeeping not only eliminates the manual labor
involved in searching files, but also eases follow-up
procedures.

3.1.1 OSHA 200 Log

OSHA requires that the employers with eleven or more employees keep injury and illness records in a nationally standardized form, called OSHA 200 (Log for Occupational Injuries and Illnesses). As a general rule, the OSHA 200 log must be available in individual facilities and should be kept for at least a period of five years.

Computer programs are available which allow users to enter the data connected with employee's injuries and illnesses, and generate printouts on standardized OSHA 200 log forms. OSHA also allows employers to keep these records in a centralized location provided that a copy of the OSHA 200 log, current to within 45 calendar days, is available in each establishment. Therefore, computerization makes it easier to implement a centralized recordkeeping system while the program generates OSHA 200 forms for individual locations.

3.1.2 Incidence Rate

Incidence rate is the statistical frequency-rate calculation used by both OSHA and the Bureau of Labor Statistics. The incidence rate system is based on 100 workers working 40 hours per week, 50 weeks per year, for a total of 200,000 annual worker hours. The 100 workers are considered as the average workforce for a plant in the United States. The incidence rate calculation uses

injuries or illnesses that are recordable on the OSHA 200

log. Recordable injuries include both lost work day cases

(lost time cases) and medical-treatment injuries. A lost-

workday case is defined as a case in which the worker

cannot return to work on the next regularly scheduled

shift. A medical-treatment case is one in which a medical

professional performs a procedure that cannot be done by a

non-professional trained only in first aid.

Total Incidence Rate = Recordable cases x 200,000

for a period $\overline{\hspace{4cm}}$

                        Number of worker hours for the

                        period

where, Recordable cases = Number of lost work day cases +

                        Number of medical-treatment cases

3.1.3 Severity Rate

Severity rate is calculated based on the number of lost

workdays resulting from disabling injuries. OSHA does not

make any charge other than for the actual days lost due to

an injury. Severity rate is calculated for 200,000 work

hours, or the same as in the case of total incidence rate.

Severity Rate = Number of lost time days x 200,000

                   $\overline{\hspace{6cm}}$

                    Number of employee hours worked

      Both incidence and severity rates systems generate

statistical information. These rates provide a

statistical basis to describe the number of events that

are occurring over a given period of time. A plant may

have a high incidence rate, but the injuries may be minor, or, a plant may have a low incidence rate, but the injuries may be severe. Therefore, both these rates should be considered in measuring safety performance.

Computerization makes the rate calculations much easier. Some of the safety software packages perform these calculations provided the user enters the total number of hours worked. They are even able to calculate the rates by department, location, and type of injures for a specific period. This enables the safety professional to make comparisons between different departments, locations, and types of injury for a particular period of time.

3.2 MSDS and Chemical Inventory

OSHA Hazard Communication Standard (29 CFR 1910.1200) requires that chemical manufacturers and importers assess chemicals and supply the information to their customers. Under this standard, employers are required to develop hazard communication programs which must include labelling of chemicals, material safety data sheets (MSDS), and training of employees. Employers are required to keep the material safety data sheets for chemicals which they use and store in their facilities. MSDS's should also be readily available to employees for reference.

The information on any chemical in a material safety data sheet primarily consists of: trade and chemical names and synonyms; chemical family and possibly the formula; list of hazardous ingredients; physical data; information on fire and explosion hazards; data on reactivity; proper procedures for cleaning up spills or leaks; special protection needed; special precautions that should be followed when using the chemical; and first-aid procedures in the event of an accident.

Computerizing the chemical inventory and MSDS's simplifies the retrieval task of a safety professional and enables quick access to the information. Safety software packages designed to store and retrieve such information are commercially available. The user can enter the information into the computer and get a print-out of the MSDS in its standard format. The MSDS of a chemical can be quickly retrieved in different ways such as by chemical name, or by Chemical Abstract Number (CAS#).

Computerization is particularly advantageous for companies which have establishments in different locations. Computerization enables them to store this information in a centralized location. At the same time, personnel of each facility can access the information through network systems. Even though the data is stored in a central location, the programs can sort out the MSDS related to an individual facility.

Computer programs are also available which track the chemicals. As in the case of MSDS's, computerization is advantageous for maintaining centralized inventory systems. Some of the software packages not only keep track of the chemicals but also produce tier reports as required by EPA-SARA regulations.

3.3 Records of Employee Training

Training is one of the effective methods that can be used to influence human behavior for the purpose of developing sound and safe work habits. Safety training is generally needed for newly hired employees, employees reassigned to other jobs, and when new equipment or processes are introduced or installed in the work place. Training can also help improve and update safe work practices and procedures. The success of a safety program strongly depends on how well the employees are trained.

Various federal and state regulations mandate employers to train their employees in certain areas. For instance, OSHA hazard communication standard (29 CFR 1910.1200) requires employers to train their employees who work with hazardous chemicals in their workplace. This training should be given to the employees initially and whenever a new hazard is introduced to the workplace. In certain states, under employee right-to-know regulations, employees should be retrained annually. OSHA can issue

violations and assess penalties on employers for inadequately training their employees.

Computer programs are commercially available which store employee training records. They have the ability to track to employee training and education by facility, department, employee type, and many other categories. Therefore, the safety professional will be able to quickly determine which employees have been trained for a particular job, or those who require retraining. They also generate reports categorized by employee, department, or training categories. Thus the computerization of employee training information makes it easier for a computer professional to keep track of employee training and assist in scheduling the training programs.

3.4 Accident Investigation

An accident investigation is a process in which a competent person, usually from management, collects information pertaining to an accident and interprets facts. Accident investigation generally involves various processes such as interviewing of victims and witnesses, surveying the scene, evaluating evidence, researching facts, developing findings, and writing reports.

Generally, accidents causing death or serious physical injury are investigated. But it is also worthwhile to investigate "near-miss" accidents that might

have caused death or serious physical injury, and outbreaks of minor injuries. The degree of thoroughness of accident investigation is directly proportional to the seriousness of the accident.

The first step after accident investigation is preparation of an accident report. The important parts of an accident report are description of the accident, the recommended actions to prevent recurrence, and sometimes, corrective actions taken.

Computer professionals can save time by computerizing the information needed in the accident investigation process. This will enable them to quickly access any of the previous files, which in turn makes follow-up tasks easier.

CHAPTER 4

ANALYSIS OF CURRENT SYSTEM

One of the important steps in computerizing safety and
health information is the detailed analysis of the current
system used by an organization. This analysis can be of
assistance in developing or selecting a new computerized
safety data system.

4.1 Accident Reporting System

Accident reporting systems are one of the major areas
which needs detailed analysis. Each part of the current
system is important and needs to be examined. Among them
are the types of summary reports to be sent to management,
the investigation and reporting cycle, the nature and uses
of the current injury case file, and how accident costs
are developed. Knowledge of the present system enables an
intelligent review of the advantages and disadvantages of
the new system.

A report is an effective tool if it can provide solid
information on which to make decisions. The purpose of
good safety information is to reduce down-time and work
stoppages by controlling injuries. The basic intention of
the report should be directed towards this purpose. The
analysis of current safety reports raises several
questions such as:

1. How is information regarding injuries and illnesses presented in the report?

2. Is the incidence rate is calculated and the proper explanation given?

3. Is the incidence rate compared to another period, department, or location?

4. Does the report include all kinds of cases such as lost-time, medical treatment, first aid, near-miss, property damage, and other incidents or just some of them?

5. Are the costs are included in the report?

The answers to these questions will help to uncover the present structure of the safety report system.

The procedure for filling up and keeping OSHA 200 logs as mandated by OSHA can also be analyzed. Various aspects such as whether the organization is functioning in a single location or multiple locations, whether the OSHA 200's are maintained in a centralized location, and in case of a centralized system, how they are made available to be examined in each location. Even though the law allows the employers to keep OSHA 200 logs in a centralized location, the log pertaining to each location should be available at the corresponding location and should be updated at least every 45 days.

4.2 MSDS and Chemical Inventory

Maintenance of MSDS sheets and chemical inventory are the other areas to be explored. The procedure of updating MSDS files and the chemical inventory system may be examined in detail. If it is a multiple site organization, the investigation should include various aspects such as, whether there is a centralized MSDS filing system, and how quickly the MSDS of any particular chemical can be accessed for examination.

The research on the present chemical inventory system should include the number of chemicals used, as well as information about the quantity of chemicals on hand at any time and the types of reports (Tier reports) required by the EPA-SARA regulations.

4.3 Accident Investigation

The major aspects of an accident investigation report which are to be analyzed are, the content and format of the reports, the receiver of the reports, the feedback that was received, and whether or not injury cost data were included in any of the reports.

The investigation reports contain, at a minimum, data on the injury events. The depth and breadth of information included will depend on the events investigated and the scope of the investigation. It is worthwhile to look into the policy of the organization in

accident investigation, such as the types of injuries/accidents which are investigated, for example first aid, medical treatment, and lost time cases. In general, the evaluation of the types of cases that are investigated can show which events are only noted as happenings and which are investigated and reported.

The information form should be thoroughly reviewed to see the types of information it will yield. Poorly designed forms may elicit misleading data that can cause those who analyze, compile, and report the data to reach ineffective conclusions. An accident investigation form should contain such information as case identification, people involved, description of the occurrence, findings, analysis of the causes, and recommendations for action.

Various parameters which can be used to measure the quality of investigation reports are: timeliness of completion, completeness, description, cause development, recommendations, and follow-up actions.

In general, searching for information in the current system is an excellent method to test its efficiency. It may be necessary to conduct test searches to see how much time it takes to retrieve information. During this procedure, the following information should be recorded:

1. Time taken to complete the search

2. Difficulties encountered during the search

3. Numbers of errors and false starts during the search

4. Time required to prepare a report based on the information collected from each search.

When a large amount of money is spent on a project and the project requires the services of other departments, justification for the project is normally required. The justification must convince management that the change will increase efficiency and improve profitability. Therefore, a detailed and thorough analysis of the current safety and health information system can be useful not only as part of such a justification, but also may be of help in developing a computerized safety data system.

CHAPTER 5

BASIC TERMINOLOGY USED IN COMPUTERIZATION

Among microcomputer based systems, IBM-PC and compatible computers are the most popular ones found in the business world. A survey conducted among safety and health professionals showed that 80% of them are using IBM-PC, XT, AT or IBM-PC compatible computers (4).

5.1 Hardware

The level of computer support can generally be classified into the following three categories.

Microcomputer: uses a micro processor and integrated circuitry for its central processor. Generally, it is small, portable or desktop, and is mainly intended for a single user.

Minicomputer: is for multiuser systems which contain more powerful storing and and processing capabilities than a microcomputer.

Mainframe: is a large scale computer system intended for many users. It is capable of processing very large volumes of data at high speed.

In microcomputer applications, the IBM-PC standard is significant because of the wide availability of peripheral devices and software. These two compatibility features are relevant because of the ability to use

22

hardware and to run software designed and written for the IBM system.

Random Access Memory (RAM): is considered as the number of characters of data or software the computer can handle internally.

Data Storage: The least expensive and easiest mass storage technique uses floppy disks. For microcomputers, two disk drives are recommended as this feature enhances floppy disk copying. A typical IBM format stores approximately 360,000 characters (bytes) of data on each disk.

Hard disk drives can also be used to store data. Hard disks are available with memory capacity in megabytes. The most common hard disk drives store 10 or 20 megabytes.

The new technology for mass storage, Compact Disk Read Only Memory (CDROM), is relevant in safety and health applications. Large volumes of data and digitized pictures can be stored in the read-only format, and then randomly accessed using computers. Inexpensive distribution of high volume data such as material safety data sheets can be accomplished by these methods.

Local Area Networks (LAN): Local area networks allow the physical interconnection of microcomputers to exchange data and share data bases stored on a central hard disk.

LANs also make it possible to share peripheral devices such as printers.

In general, for databases which include tens of thousands of records with hundreds of daily transactions, a minicomputer and mainframe implementation is required. If only a few users need multiple access (3 or 4), a high end multiuser microcomputer may be sufficient. If many users need access to the same data, a local area network (LAN) or larger scale computer system is required.

5.2 Software

Operating System: (OS) is computer software which allows the user to load and run application programs. It also provides standard routines to operate peripheral devices such as the keyboard, display, and disks. The OS also carries out utility functions such as listing the files that are stored on a disk or copying data or programs from one disk to another. Single tasking operating systems like PC-DOS allow only one program at a time to be loaded for operation, whereas multiple tasking operating systems provided by some of the windowing extensions to PC-DOS (Windows, Concurrent PC-DOS), permit several applications. For example, a word processing program and a spreadsheet may be loaded into memory at the same time.

Applications software (word processors, spreadsheets, etc.) will only operate in conjunction with a specific

operating system; even though another OS may be available for the computer.

Database Management Systems (DBMS): A database management system (DBMS) is a collection of software tools which allow definition of file formats and provide data entry and retrieval.

For a single user microcomputer, PC-DOS is recommended. A majority of application software is written based on that system. A windowing OS is recommended if enough RAM is available for simplified user interfaces.

In general, various factors such as hardware, operating systems, people, and the procedural categories play an important role in the development of a computerized safety and health system. It is also important to consider future applications. Ultimately, the information system developed should be able to support management's decision making activities, rather than just reduce the volume of clerical work.

CHAPTER 6

SELECTION CRITERIA FOR
SAFETY AND HEALTH INFORMATION SOFTWARE

Once a thorough analysis of the present system has been
done, the safety professional may have an outline of how
the new system should work and what information requires
quick retrieval. The following discussion concerns the
different parameters for developing or selecting a
computerized safety and health information system.

6.1 Information to be computerized

A first step towards the computerization process is to
determine what information needes to be computerized. The
detailed analysis of the current system assists in
identifying those areas where manual handling of data is
time consuming and costly. This can involve injury and
illness data, material safety data sheets, or employee
training information. In general, frequently handled
information will serve greater advantage from
computerization.

6.2 Types of Reports

Generally, safety people need to generate different types
of reports. These reports are sometimes sent to upper
management or circulated among floor supervisors.

Identifying the content of the report and its general format is an important factor in the selection of software. Inquiring about the reports to be sent to management from various departments such as production, quality control, maintenance, and warehouse will be helpful in conceptualizing the format of the safety reports. If personnel are accustomed to seeing and preparing reports in a certain format, then one of similar format and appearance may be accepted more readily.

Sometimes producing reports by department, location or type of work is required. Generating other forms or reports such as OSHA 200, and EPA-SARA tier reports mandated by different regulatory agencies may also be necessary.

Charts and graphs are a better way of presenting such information. Therefore before selecting a software package, one should determine whether the computerized system will have the ability to generate compatible charts and graphs to accompany the reports.

6.3 Availability of Computer Technology

Computer technology is a rapidly changing field where new systems are introduced quite often. Software developers offer packages suitable to different computer environments (hardware and operating systems) with several options available for the customer. For example, some safety

software is designed for network systems while the others are intended for PC based systems.

If a company uses a network system, safety software which is suitable for such a system will provide the greatest advantage. In this case, the safety information system probably can be centralized with less expense. It gives users the ability to enter information from different locations. At the same time the information can be accessed by personnel in different locations using the main database system.

Generally, if the company functions in a single location and does not have a network system, PC based single user software packages are more feasible.

6.4 Operational Adaptability

It is a common trend among software developers to develop packages which can be used by minimally experienced computer users. The software should be user friendly especially when it is being used by personnel who are not experts in computers. If the software is easy to use, then it will save time and money as it takes less time to train people. The ease of using the software program can be evaluated, to a certain extent, by experimenting with demo diskettes and interviewing users of the software.

6.5 Financial Feasibility

Financial feasibility is an important aspect of any new project. Analyzing the present information system (as explained in earlier chapter 4) is an important step in studying the feasibility of the new system. Safety professionals usually need to provide financial feasibility reports to management in order to obtain their consent to purchase the new system.

Safety professional can gather information about the software from product catalogues, sales representatives, and/or from people already using it. Most software developers provide product support to their customers by onsite training or by providing information over the phone.

CHAPTER 7

ANALYSIS OF
COMMERCIALLY AVAILABLE
SAFETY AND HEALTH SOFTWARE

As the volume of safety related information increases,
safety professionals are relying more and more on
computerization. Software developers responded to this
need by developing different software packages.

Several software packages on the market handle
different areas of safety and health information.
For analysis purpose, nine widely used software packages
have been selected. These packages have been analyzed for
use in handling safety and health information. The
analysis is based on the information given in product
catalogues and demo diskettes, as collected from different
software developers.

7.1 SAFETY1

Developer: C. Alexander Associates, Inc.

460 Vista Roma, Dept. 13

New Port Beach, Ca 92660.

Phone: (714)644-5829

(800)433-3761

System Requirements: IBMPC, XT/AT and all compatible

DOS 2.0 and later

RAM 405K

Printer - Laser or 132 dot matrix.

Keeping proper records and analyzing accidents and injuries are important in preventing accidents. Continuous monitoring is one of the key elements of a successful safety program. Safety1 software is very helpful for recording and keeping track of injuries and illnesses.

The entire program is menu driven, which enables a person with limited computer background to use the program. The program enables users to add new data or modify or delete any of the records. This program can produce various reports based on department, location, types of injuries, etc.

Different graphs can be produced based on results. These assist the safety professional in presenting the data in an organized manner.

There is provision in this program to retain data on loss control such as number accidents and injuries occurring and the dollar amount spent. The user can obtain the compiled data based on employee, department, location, etc..

OSHA-200, the log for injuries and illnesses can be printed out using this program. Employers are mandated by the Occupational Safety and Health Act to keep OSHA-200 logs at each facility. Safety1 allows users not only to keep a centralized data system, but also can generate

OSHA-200 logs for individual locations.

The price of this software package is $750.00.

7.2 OSHALOG 200 Series

Developer: Safety Software Inc.

2030 Spottswood Road, Suite 200

Charlottesville, VA 22903-1245

Phone: 1-800-932-9457

Fax: 804-296-1660

System Requirements: PC, XT, AT

RAM 640K

Hard drive: 4-6 MB Space

Dos 2.x or higher

OSHALOG 200 Series software is an easy to use management tool for making cost effective decisions and maintaining safety and health recordkeeping. This software is very helpful for measuring and controlling losses. It can be used by a variety of people from small business owners to corporate safety or risk management professionals.

This software series is marketed in four different packages. They are:

OSHALOG 200   - Recommended for small

businesses

OSHA 200 Plus   - Recommended for medium sized

businesses

OSHALOG 200 Manager   - Recommended for large

businesses

OSHALOG 200 Manager Plus - Recommended for large

businesses

These four packages are user friendly and are based

on OSHA 200 Form. This database can be modified according

to the user's operational needs and requirements.

Any part of the series can be used for a company's

single location, or combined through the data

Export/Import capability. Using this software, it is

possible to review or control multiple location facilities

at divisional, regional, or corporate level.

One of the more important factors in analyzing injury

and illness data is to determine whether the case is OSHA

recordable or not. Special provisions in this program are

helpful for determining the recordability of each case.

There are two modes for entering data in the system, "Test

Recordability Mode" and "Fast Entry Mode". When using the

Test Recordability Mode, the following questions are

asked.

1. Did the event/exposure occur in employee's premises?

   Yes/No

2. Did the injury/illness result from a work accident or

   from exposure in the work environment? Yes/No

3. Was there medical treatment for the injury (other than

   first aid)? Yes/No

If the user respond "Yes" to all of these questions, then the case is considered OSHA recordable, and should appear in the OSHA 200 log. If the answer is "No" in the second step, then the program goes to another screen for checking incident's recordability. At this stage, the user can select from one of the following depending on the specifics of the case.

a. Work-Related

b. Work-required

c. Travel-For-Work

d. Own-Activity

Once the user selects one of these categories, the program then goes to the third step. Generally untrained personnel can determine recordability using this approach for most occupational illness or injuries. But sometimes, the cases may be somewhat more complicated, and the user will require the assistance of a safety professional to determine recordability. At the same time, using the Fast Entry Mode, an experienced person can make a quick data entry.

The OSHA 200 Series will also produce an OSHA 200 log for injuries and illnesses. This form can be generated for individual locations or for all locations in general. They generate analysis reports to pinpoint problem areas which have caused losses, or analyze various trends related to the cases. Both OSHA 200 Manager and Manager

Plus can also give information about the cost of each case.

OSHA 200 Manager and Manager Plus have the ability to generate graphs (Bar graphs and Pie charts), which will support certain analytical needs.

Manager and Manager Plus can be used with password protection to protect financial and medical information. They take basic accident factors and worker's compensation costs to determine direct and indirect loss expenses for the executive summary.

These programs can also be applied with network systems so that initial data relating to on the job injuries/illnesses can be entered with password protection, while other off the job data can be entered by other departments.

The optional incident rate calculator can be integrated into the system. It can compute total case and lost time rates by both department and location.

The cost of this program ranges from $125.00 to $750.00.

7.3 BeSafe

Developer: Azimuth Technologies, Inc.

P.O.Box 5787

Pasadena, CA 91117.

Marketed By: United Technical Service

Phone: (714)646-4155

Fax: (714)646-4364

System Requirements

1. IBM Personal Computer (AT,PS2) or compatible, The system should contain 640 Kilobytes of RAM, a 40 Mbyte or larger hard disk drive, and a 3 1/2" or 5 1/4" floppy drive. The presence of both types of diskette drives is preferable.

2. PC-DOS or MS-DOS version 3.1 or higher

3. A color graphics monitor - either an Enhanced Graphics Adapter (EGA) or Very High Resolution Graphics Adapter (VGA) is preferable.

4. A printer capable of printing 132 columns per line of test in normal or compressed mode.

BeSafe computer programs are developed by Azimuth Technologies, Inc.. The program is written in C and Assembly languages.

The program is intended to help commercial businesses to comply with various federal regulations and performance standards of governing bodies such as the Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), and Department of Transportation (DOT).

This program is offered in different modular sets, which are sold separately. This is useful in recording

and analyzing information-related employee health and
safety and general environmental concerns. More
specifically, the areas covered by this program are:
employee right-to-know, worker health and safety,
community right-to-know, and environmental affairs. The
BeSafe program is sold in different modules, covering
different areas in health and safety and environmental
affairs.

1. Multilevel Password Protection

This module provides three levels of access to overall
system records, all usage is via the built-in access log.

2. Employee Injury, Accident and Illness Tracking

With this module, various data regarding employee injuries
and illnesses can be recorded. This program analyzes the
data and produces graphs and charts, and generates various
reports, such as injury detail reports, injury type
profiles, injury source profiles, injury nature profiles,
injury body part profiles, and OSHA 200 logs.

3. Employees Workers Compensation Log System

This module enables employers to keep track of employee
demographic records, including individual claim records.
This program tracks costs related to workers compensation
and generates various reports.

4. Employee Medical Surveillance Manager

Using this module, it is possible to keep track of not only employee demographic records, but also various medical records such as: baseline history, audiometric testing, vision testing, pulmonary functions, and hematology and blood chemistry. This material also helps in scheduling employee medical examinations. Various reports related to such examinations can also be generated using this module.

5. Employee Training Records Tracking System

This module enables employers to keep track of employee demographic records as well as training history. This data may also help in planning training programs. Various reports categorized by employee, department, or training category can be generated from this module.

6. Automobile Accident Tracking System

Using this module, various kinds of information connected to automobile accidents such as: cause, accident history, vehicle information, property damage, as well as information regarding injured person(s) can be recorded.

7. Employee Exposure Monitoring System

Employee demographic records, exposure monitoring, and sampling data can be recorded. This module contains

built-in values for Industry Standard Exposure Limits, and
also can generate various reports.

8. Workplace Environment Monitoring

A statistical area sampling database can be assembled
using this module. It has the capability of computing
Time Weighted Averages (TWA) and also contains built-in
(programmable) Industry Standard Coding. Various reports
such as area sampling reports and air survey reports with
optional graphing capability can be generated.

9. Hazardous Waste Management

This module enables users to compose a hazardous waste
manifest. This manifest helps in tracking transporter
identification, disposal facility identification, and
waste generator identification. The module also can
generate manifests and various reports such as quarterly
and annual reports, as well as and generator and
treatment, storage, and disposal facility (TSDF) annual
reports.

10. Waste Container Summarization Module

This module helps in keeping records of containers used
for the collection of wastes. It also prints labels for
these containers and produces reports regarding container
aging and status.

11. Hazardous Materials Inventory Management

Various databases such as hazardous substance dictionary (which is user updatable), status of chemicals in different locations, and material safety data sheets (short form database) can be created by this module. It is also capable of producing different reports such as tier reports, ad hoc reports, and Form R Generation Aid reports.

12. Material Safety Data Sheet Management

From the comprehensive Material Safety Database, listings can be made by CAS number, MSDS number, trade name, and manufacturer's name.

13. Inspections Management

Using this module, statistical databases of inspections can be compiled. Inspection worksheets and different reports can be generated. These materials can be of great help in writing reports. The module also has the ability to produce graphs based on inspection results.

The prices of these modules range from $1,000.00 to $5,000.00.

7.4 ACCUSAFE Version 2.1

Developer: Robert Douglas Inc.

Rosemont, IL

&

Zeal Inc.

Prospect Heights, IL

Distributed by : National Safety Council (NSC)

444 North Michigan Avenue

Chicago, IL 60611-3991

Phone: (312)527-4800

System Requirements: IBM or Compatible

640K memory

DOS 3.3 or higher

Printer - 132 column dot-matrix or

laserjet

Accusafe Version 2.1 software is designed to record and retrieve the information regarding injuries and illnesses affecting employees. This user friendly software can be used by a person with minimum computer background. The entire program is menu driven. The main menu consists of the following.

1. Enter/Edit Case Records

2. View Case Records

3. Print Case File

4. Print Case Listing

5. Print OSHA 200 Log

6. Display Report Menu

7. Maintain Files

8. Quit

Enter/Edit Case Records

Information about an employee injury or illness can be entered using this menu. Both OSHA recordable and non-recordable cases can be entered. There is also provision to enter data regarding accident costs. Once the data has been entered, the program calculates the total cost of the accident. There are altogether 53 items which cover virtually all significant aspects of the incident.

View Case Records

Using this option, a particular case which has already been entered can be quickly located.

Print Case Profile

The user can extract the printout or hard copy of the data entered for an incident.

Print Case Listing

From this menu, a list of all cases entered can be printed out. The list can be limited for a particular company or division, or for a particular time period.

Print OSHA 200 Log

The program produces OSHA 200 logs from its menu. The log can be produced by company, division or department, or to cover a particular time period. Only those cases with an OSHA severity code of 2,3,4, or 5 are reported in the log. This information is entered in item # 26 during initial entry.

Display Report Menu

ACCUSAFE can produce more than thirty seven reports. Once the data is entered, several reports for any particular period can be generated. Reports which show accident costs by employee, total cost by department, employees with lost or restricted work days, or even incidents by body part or injury source can be generated.

Maintain Files

This menu helps to maintain system utilities such as enter or edit passwords, backup or restore system data, and maintain system values. From this menu, it is also possible to enter or edit user defined response files. The data from this file pop-up during data-entry, which helps the user to enter data quickly.

Motor Vehicle Tracking

A motor vehicle tracking module can be added to the
ACCUSAFE program for an additional cost. With this
module, it is possible to track additional information
about a case whenever a motor vehicle is involved. The
entry screen for this module will appear whenever the user
responds "YES" to question #9 on the initial entry screen.
This software records location, vehicle information,
driver information, environmental conditions, as well as
the accident description. Different reports such as
company-wide vehicle accident reports, accidents by
vehicle type and accident type, and vehicle analysis can
be generated from the report menu.

Graphics Module

This is an optional module which can be added to the
ACCUSAFE. With this program a series of preselected
reports can be printed in bar chart format. These charts
are relatively easy to understand and explain. Most
graphics reports will automatically pick the top five
departments or occupations with the greatest number of
incidents. But it is also possible to select any five
departments or occupations for graphing.

Price

Module	Member of NSC	Nonmember of NSC
ACCUSAFE	$995.00	$1295.00
Motor Vehicle Tracking	$595.00	$750.00
Graphics	$325.00	$595.00

7.5 HITS Version 2.0

Developer: BSI Systems Inc.

16890 West Bernardo Drive

Santiago, CA 92127

Hardware Requirements: IBM or IBM compatible XT, AT or

386 computer

RAM 640K

Hard disk space - 12 MB (Based on

single user version)

Hazards Inventory Tracking System (HITS) Version 2.0 has been developed to guide and assist the user to comply with SARA Title III and OSHA Hazard Communication Standards regulations. HITS has a built-in database that helps the user identify which chemicals are currently defined as hazardous chemicals, hazardous substances, or extremely hazardous substances.

The main menu of this program consists of the following.

Data Definition

The data definition module allows the user to describe the substances of interest and enter facility and administrative information for use in compliance activities and reports.

Report Generation

Using this module, the user can generate a number of reports such as MSDS's, Tier I, and Tier II reports along with dozens of other management reports.

System Utilities

A system utilities module enables users to view the built-in database of 2,500 commonly used chemicals. It may even be expanded by importing up to 24,000 additional chemicals while maintaining the integrity of the user's data files.

With the HITS program, the user does not need to retype important information such as chemical and physical property data or the locations where hazardous chemicals are stored. When the chemical's name or Chemical Abstract Number (CAS#) is entered, the program will automatically fill in the missing data, if it finds the chemical in its built-in database.

HITS automatically adds the quantities of all like chemicals found in different locations and determines whether these quantities exceed Threshold Planning

Quantities. If a chemical spill occurs, this program
compares the spilled quantity with the Reportable Quantity
and tells the user if a report is needed. It also does
mathematical calculations such as converting volumes to
weights and determine the percentages of a chemical in a
given mixture.

Users of this program will find it easy to keep track
of chemical inventories by facility, department, building,
floor, room, or container. It has the ability to track
both pure chemicals as well as mixtures.

HITS allows the user to add tradename chemicals to
the database and develop any needed MSDS's which can be
subsequently printed out.

Employee Training

There is a provision in the HITS program to create
databases for employee training. HITS has the ability to
keep track of employee training and education by facility,
department, employee type, and many other categories.
Therefore, the user will be able to quickly determine
which employees have been trained for particular tasks, or
those whose certification (if applicable) is due for
renewal.

Different versions are available which are suitable
for single users or for multiusers in a Local Area Network
(LAN). When installed in a LAN system, up to 256 separate

terminals can access this program.

The software is priced at $1495.00 for the single user version, while the multiuser version for LAN systems is priced at from $ 5,995.00 to $ 14,999.00 depending on the number of users.

If the purchaser subscribes to its customer support and update service, BSI systems Inc. will send periodic updates of the software. The cost for this customer service is 15% of the purchase price, which is charged annually.

7.6 Chris Plus 2.0

Developer: HRD Software

22 amherst Road

Amherst, MA 01002.

System Requirements: IBM PC, AT, PS/2 and compatible

RAM 384 K

Chris Plus 2.0 is a comprehensive program which stores material safety data sheets and keeps track of hazardous chemicals. It is also capable of generating several reports such as EPA Tier I and Tier II reports, accident reports, chemical inventory reports sorted in different ways, and toxic chemical lists.

The main menu of this program consists of the following:

A. Product Information

B. MSDS Information

C. Chemical Information

D. Supplier/manufacturer information

E. Work Location Information

F. Employee Information

G. Training Session Information

H. Employee Requests/Incident Reports

I. Special Reports

When the user selects one of the items in the main menu, the program proceeds to a sub-menu. For example, if the user selects "Product Information" from the main menu, then the next screen will show the following sub menu.

(A) Enter New Product

(B) Inventory Information

(C) Add Product Synonym

(D) Add Product Composition

(E) Add Product Supplier

(F) View/Change Product Description

(G) View/Change Product Composition

(H) View/Change Product Synonyms

(I) Delete Product

(J) Delete Product Supplier

(K) List Products

Users can then select one of the items from the sub-menu according to their requirement.

The program enables users to enter all important

information connected with a particular chemical including EPA classifications and National Fire Protection Association (NFPA) codes.

Users will be able to enter information on a chemical in the OSHA recommended MSDS format. He/she can print the MSDS for a particular chemical. The program also displays a listing of MSDS sheets or MSDS indexes.

With this program, the user will be able to extract information about a chemical such as locations where that chemical is being used or stored, quantity in stock, and all of its significant physical and chemical properties.

The program assists users in tracking the employees who have undergone training for particular chemicals. It also enables the user to search by location for a particular chemical. There is provision in the program to enter data on accidents/illnesses which have occurred to employees. Only a brief description can be entered. However, the program does not produce OSHA 200 forms, the log for occupational injuries and illnesses.

Chris Plus 2.0 is capable of producing more than 35 reports describing chemical inventory, OSHA training, accident history, and SARA Tier I and Tier II reports. It also prints out MSDS's and lists of toxic chemicals for public safety requirements.

Chris Plus 2.0 software program is priced at $1450.00.

7.7 TOXIC ALERT

Developer: Hazox Corporation

640 Lancaster Lane

Frazer, PA 19335

Phone: (215)296-7190

Fax: (215)889-9081

System Requirements: IBM-PC or Compatible

RAM 320 K

IBM Compatible printers

The TOXIC ALERT safety program is designed to manage toxic material emergency responses and services, access to chemical spill procedures, immediately retrieve critical information from an MSDS database, record and store information on emergencies, and simplify "Right-to-Know" compliance.

The entire program is menu driven and has the ability to provide prompt information in the following areas.

Emergency Services

Users can quickly access emergency telephone numbers and other emergency service information.

Chemical Emergency Response

The program provides access to manufacturer MSDS's, specified procedures, and unknown chemical procedures. It

generates incident record noting date, time, chemical, and person using the system.

Material Safety Data Sheets

It is possible to access manufacturer MSDS's through any one of seven possible choices such as: chemical name, synonym or Trade name, manufacturer's name, chemical family name, CAS number, DOT classification, NA number, and UN number.

Right-to-Know

It is possible to access manufacturer MSDS's and user specified procedures and print them. The program can also produce incident records noting date, time, chemical, and/or names of employee and supervisor involved.

Chemical Inventory

The program enables users to maintain quantity and storage information. It tracks chemicals by: chemical name, manufacturer, vendor name, stock number, location, and/or department.

Facility Inspection

It is possible to record results of inspections in user-defined questionnaires. Users need only to enter "YES" or "NO" for each question posed. The program automatically

generates a discrepancy for each "NO" answer. These discrepancies become incident records if not closed within a user defined time limit.

Storage Tank Monitoring

The program enables users to record results of periodic tank monitoring. It automatically generates an incident record if the calculated tank level deviates from the measured tank level by more than a user specified percentage.

TOXIC ALERT software program has the capability of communicating with external data sources via a modem with the option of capturing any information which appears on the screen.

The price of the software is $1490.00 for a single user, and from $3000.00 and up for the network version depending on the number of users involved.

7.8 PRO-AM RAINBOW Software

Developer: Pro-Am Software

P.O.Box 1290

4432 Route 910

Gibsonia, PA 15044.

Phone: (412)443-0410

800-852-7316

System Requirements: IBM XT, AT or compatible

340K RAM memory, 640K for networking

Operating System: PC DOS or MS DOS

2.1 or higher, 3.1 for networking

Printer: IBM Pro-Printer or

compatible, HP Laserjet Series II and

above. Monitor: Red Green Blue (RGB)

or Monochrome

Rainbow safety software have been developed in four modules to provide assistance in different areas of safety and health.

Safety Director

This software module is designed to enter data related to employee accident/illness data and generate various reports.

This program guides the user through various screens making sure that all of the necessary fields are entered. It also relies on onscreen windows from which the user can select data. The user can either have the system automatically enter a given responses or type in a new response.

The Safety Director module compiles the data and generates OSHA 200 Logs either by the entire company or a specific site. This program can also produce OSHA 101 forms, which are used to record more detailed information

about an accident or illness.

Once the user has entered the data, the program is able to compile it and translate the statistical data into meaningful forms such as pie charts and bar graphs. These results can either be viewed on the screen or printed on a variety of printers. It is possible to run comparisons between various departments or locations. In addition to the graphics, the program provides a wide variety of accident and illness reports that can be run in numerous standard sort categories. This program also has the capability to produce charts that use business statistics formulas to project future trends based on the current data.

The Safety Director also allows us to record "near miss" accidents and the vehicular damage or property damage associated with an accident.

This program has the ability of accepting the medical information associated with an accident. This information includes: date of visit, treatment received, and scheduled follow up appointments. It is also possible to enter the information contained in doctor's or nurse's notes.

The Safety Director has an in-built calendar which keeps track of all date specific and time sensitive information stored within the system. This calendar can be brought to the screen from anywhere in the program. When highlighting a specific date, the user can view the

information for that day. This calendar is very useful

for a safety professional who can use it to be reminded

about training schedules, completion dates when corrective

action is due, and other activities needed to follow up on

a particular case.

Another feature of this program is that it

automatically calculates OSHA recordable lost or

restricted days (if any) in connection with a particular

incident.

If the user wants to add special fields to track

specific information or to generate special reports, may

be customized to fill such needs.

A single user version of the Safety Director software

costs $4995.00.

Rainbow MSDS

The Rainbow MSDS module is designed primarily to create an

organized database of the company's Material Safety Data

Sheets and to quickly access the information contained

therein.

The program allows the user to enter information in

the original company MSDS. Each field in the program has

a limit of 65,000 characters, which provides ample space

and virtually no restriction to the number of letters and

numbers that can be entered on a line. This feature helps

the user enter exceptionally long names and long lists of

chemical ingredients. Even company policies and procedures in connection with spills, leaks, and fires can be entered here. This program builds a supplier database that eliminates rekeying the company's name, address, and phone number on each successive MSDS's.

Material Safety Data Sheets can be accessed in different ways such as by MSDS ID#, common name, chemical name, CAS number, supplier, location, a specific ingredient, and any other field the user chooses. The program can also supply print outs of any number of MSDS's, or a batch of MSDS's by location, supplier, or any field the user chooses. The program can also sort and list the products alphabetically, numerically, by common name, by supplier, or by location.

The program enables users to create their own reports using subroutines known as: Ad Hoc Report Writer and Universal Reports. AdHoc Report Writer enables the user to select specific fields of data for the report, as well as the order and length of those fields. These reports can be limited to periods between certain target dates. Using Universal Reports, the user can select the desired fields. The report is printed out following a preformatted design. With these two methods, the user has several options to search, select, and report on the data contained in the MSDS.

The purchase price of a single user Rainbow MSDS module is $1995.00.

7.9 OSHA-Soft Compliance Manager

Developer: OSHA-Soft Corporation

Route 122 - Amherst Station

P.O. Box 668

Amherst, NH 03031-0668

Hardware Requirements: IBM PC, XT, AT, PS/2, or compatible

RAM 512K, 6 MB Hard Disk Space

Monochrome or color monitor

Printer (optional)

Compliance manager helps users comply with OSHA's Hazard Communication Standard (also known as the worker Right-to-Know regulation). This regulation requires employers to keep track of information on chemical inventories, employee training, and Material Safety Data Sheets (MSDS's).

The main menu of this program consists of:

1. Chemical Inventory Information

2. Data Sheet Information (MSDS)

3. Reports

4. System Maintenance

5. Training Information

The program allows the user to enter data in an organized way. The user can enter all data commonly found

on MSDS's and perform fast searches and sorts based on locations, products, chemicals, CAS numbers, and training categories.

With this program, the user can instantly determine what products contain certain chemicals and the locations where they are being used. It generates print-outs of MSDS's following the OSHA recommended format. It also enables the user to keep track of all products which require MSDS's.

The regulation mandates that employees must be properly trained if they work with hazardous chemicals. For this purpose, this program allows users to discover which employees need to be trained and which products fall into various training categories. The training menu helps to assign employees in the facility to specific locations, organize products into various training categories, and keep records of employees training.

Compliance Manager is capable of generating various types of reports by chemical, manufacturer, plants, departments, etc. This program also prints out the MSDS in standard format.

This software is priced at $650.00.

CHAPTER 8

COMPARISON OF SAFETY SOFTWARE PACKAGES

Software developers have developed software packages to
handle information in different areas of safety and
health. These packages are also written in different
computer languages, each with their own unique features.
Nine safety software packages, which are widely used, have
been analyzed in detail.

Generally, major areas of concern are: injury and
illness recordkeeping, handling MSDS's, and tracking
hazardous chemicals. The important provisions and the
different areas addressed by each software are summarized
in Table 1. Certain packages are sold in different
modules, while some offer additional provisions at extra
cost.

Safety1, OSHA200 Series, BeSafe, AccuSafe Version
2.1, and Rainbow Safety Software packages are primarily
designed for recordkeeping. In the case of BeSafe and
Rainbow packages, particular modules should be purchased.
All of these packages have the ability to produce graphs
and charts. OSHA 200 Series, BeSafe, and AccuSafe Version
2.1 programs can calculate incidence rates. Users who
require a network version should purchase either OSHA 200
Series or BeSafe Programs. Considering various aspects of
recordkeeping, OSHA 200 Series software has the best

features at the lowest price, which ranges from $125.00 to $750.00 for a single user.

BeSafe, HIts 2.0, Chris Plus 2.0, Toxic Alert, Rainbow Safety Software, and OSHA-Soft Compliance Manager all have the ability to handle MSDS's. They also generate print outs of MSDS's in the standard format. All of these packages, except Toxic Alert, can track hazardous chemicals. BeSafe program is comparatively expensive. HIts 2.0, Chris Plus 2.0, and Toxic Alert are more or less in the same price range, which is $1500.00. OSHA-Soft Compliance Manager is priced at $650.00. Though its price is somewhat high, Hits 2.0 has the best options. Only Chris Plus 2.0 and Toxic Alert offer network versions.

BeSafe and AccuSafe Version 2.1 can also track motor vehicle accident data. BeSafe is the only package which can record and track hazardous wastes.

Table 1 Comparison of Safety Software Packages

Software --> Provisions	Safety1	OSHA-200 Series	BeSafe	Accu Safe	Hits Version 2.0
Record Illness or Injuries	X	X	X*	X	
Generate OSHA 200 Log	X	X	X*	X	
Calculate Incidence Rate		X*	X*	X	
Produce Graph and Charts	X	X*	X*	X**	
Record MSDS Information			X*		X
Print MSDS			X*		X
Record & Track Hazardous Chemicals			X*		X
Record & Track Employee Training			X*		X
Record Motor Vehicle Accident Data			X*	X**	
Inspection Management			X*		
Calculate Expenditure of Accidents	X	X*		X	
Record & Track Hazardous Waste			X*		
Availability of Network Version		X	X		X

"Table 1 (Continued)"

Software --> Provisions	Chris-Plus 2.0	Toxic Alert	PRO-AM RAINBOW Software	OSHA-Soft Compliance Manager
Record Illness or Injuries			X*	
Generate OSHA 200 Log			X*	
Calculate Incidence Rate				
Produce Graph and Charts			X*	
Record MSDS Information	X	X	X*	X
Print MSDS	X	X	X*	X
Record & Track Hazardous Chemicals	X	X		X
Record & Track Employee Training	X			X
Record Motor Vehicle Accident Data				
Inspection Management		X		
Calculate Expenditure of Accidents				
Record & Track Hazardous Waste				
Availability of Network Version		X		

* Available in certain modules
** This provision can be added with additional cost

CHAPTER 9

CONCLUSIONS

Computerization is the best available solution to handle the increasing volume of safety and health information. With computerization, safety and health professionals can achieve the ability not only to access certain basic information quickly, but also to keep track of other information such as employee's injuries and illnesses, MSDS's, chemical inventory, and employee training. Ability of the software programs to analyze data and produce graphs and charts enables users to present data in an organized manner.

Analysis of the present manual system in an organization plays an important role in deciding whether or not to computerize the process of collecting and storing needed safety and health information. Each software package is unique in its design. Therefore, in order to select a proper software package, the safety professional has to have a prior idea about the information to be computerized and the types of reports to be produced. He/she also should consider information such as the number of potential users, availability of computer technology within the organization, and the availability of finances.

As computer technology is a rapidly growing and continuously changing field, software developers

frequently update their products and introduce new versions. Therefore, current safety software may not be indicative of the packages which will be availabe in the future. Finally, any software purchased should be flexible to permit convenient alterations and upgrades as requirements change and the state of the art advances.

WORKS CITED

1. Brauer, L. R. "Safety and Health for Engineers." New York: Van Norstrand Reinhold. (1990): 3-9.

2. Anton, J. T. "Occupational Safety and Health Management." New York: McGraw-Hill. (1989):169-190.

3. Asfahl, C. R. "Industrial Safety and Health Management." Englewood Cliffs, New Jersey: Prentice Hall, Inc. (1984): 14-24.

4. McNicholas, W. C. "Information System Building Blocks." Microcomputer Applications in Occupational Health and Safety. Chelsea, Michigan: Lewis Publishers, Inc. (1987): 123-165.

REFERENCES

American National Standards Institute. 1976. USA Standard Method for Recording and Measuring Work Injury Experience. Z16.1. New York: ANSI.

American Society of Safety Engineers. 1987. Directory of Safety Related Computer Resources. Desplaines: ASSE.

Bird, E. Frank. Jr. 1974. Management Guide to Loss Control. Atlanta: Institute Press.

DeReamer, Russel. 1980. Modern Safety and Health Technology. New York: John Wiley & Sons, Inc.

Gloss, S. Gloss, and Miriam Gayle Wardle. 1984. Introduction to Safety Engineering. New York: John Wiley & Sons.

Hammer, Willie. 1989. Occupational Safety Management and Engineering. Englewood Cliffs, New Jersey: Prentice-Hill, Inc.

Heinrich, H. W. 1959. Industrial Accident Prevention. New York: McGraw-Hill.

Kuhlmann, A. 1986. Introduction to Safety Science. New York: Springer-Verlag.

Lowry, G. George, and Robert C. Lowry. 1986. Handbook of Hazard Communication and OSHA Requirements. Chelsea, Michigan: Lewis Publishers, Inc.

Petersen, Dan. 1980. Analyzing Safety Performance. New York: Garland STPM Press.

Petersen, Dan, and Jerry Goodale. 1980. Readings in Industrial Accident Prevention. New York: McGraw-Hill,Inc.

Ridley, John. 1986. Safety at Work. 2nd Edition. Boston: Butterworth & Co Ltd.

Ross, W. Charles. 1984. Computer Systems for Occupational Safety and Health Management. New York: Marcel Dekker, Inc.

Tarrants, E. William. 1980. The Measurement of Safety Performance. New York: Garland STPM Press.