OCCUPATIONAL HEALTH SURVEY OF THE CHICAGO METROPOLITAN AREA

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FOREWORD

Although great strides have been made in preventing occupational diseases and controlling hazardous exposures in the workplace, these benefits are enjoyed by only a minority of American workers. The worker, the producer of the fruits of our society, must be assured that his productive years as well as his retirement years will not be threatened or compromised by occupational injury and disease. The Bureau of Occupational Safety and Health, Environmental Control Administration, in cooperation with the State and local occupational health agencies, strives toward the goal of protecting the health of the 80 million workers of this nation.

The results of the Occupational Health Survey of the Chicago Metropolitan Area have indicated the scope of the occupational health problems in this urban community. If the problem of health and safety in industry is to be solved effectively, many of the answers and most of the support for the necessary action must come from within the community. The Bureau of Occupational Safety and Health has defined the problem and stands ready to offer further assistance. The initiative, as shown by a desire to solve the problem and the support required for an action program, must now come from the community itself.

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ACKNOWLEDGMENTS

The Chicago Survey is actually a continuation, with some enlargement and refinement, of previous occupational health surveys conducted on a state- or area-wide basis. The work of the many individuals involved in these previous studies must be recognized, for this survey draws heavily on their contributions, particularly the unique ways in which they faced and solved their problems and their desire to improve this technique for evaluating the work environment.

The support of local professional and health orientated groups and the sponsorship by the Institute of Medicine of Chicago were, of course, essential to the survey, as was the wide cross-section of experience and training provided by the field survey personnel who came from all sections of the Bureau.

Dr. Charles H. Powell, Chief of Technical Services, Bureau of Occupational Safety and Health, at the time of the survey, was responsible for the overall direction of the project, and Vernon E. Rose, William L. Dyson, and Marshall E. LaNier supervised the field survey teams. Computer programming and analysis were accomplished under the direction of Mr. James E. Nelson. This report was prepared by Vernon E. Rose and William L. Dyson.

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SUMMARY

The Bureau of Occupational Safety and Health, in cooperation with the Environmental Health Studies Section of the Institute of Medicine of Chicago, conducted a study to assess the occupational environmental factors which may affect the health of the working population in the Chicago metropolitan area. There are approximately 2.25 million workers in 120,000 establishments in this six-county area. Based on experience of other similar studies, certain of these establishments have been found to have a relatively low prevalence of potential occupational health hazards and were thus excluded from the study. Thus the "universe" consisted of approximately 14,000 workplaces with more than 1.5 million workers. The survey sample, selected from this universe, included 803 establishments employing 260,000 workers.

The industrial hygiene walk-through survey was used to appraise environmental conditions and collect other data concerning the workplace. An analysis of the information developed from the survey indicates the following:

HAZARDS

The "potentially at risk" group in the Chicago area involves slightly more than 10,000 plants having one or more employees at risk to an occupational health hazard and an estimated total of one-third of a million workers are exposed to a potential health hazard. In the opinion of our surveyors, about 900 of these 10,000 plants have conditions which are significant enough to warrant immediate corrective actions. Consequently, in-depth surveys should be conducted in these plants by qualified industrial hygienists as soon as possible in order to determine the extent of action necessary. In addition, about 3000 plants have conditions which may require corrective action within one year. It is interesting to note that in three out of four plants surveyed, management

did not recognize any health hazards in their plant, while in the surveyor's judgment only one out of four plants did not have any employees at risk to an occupational health hazard. More than half of the plants surveyed had sanitary deficiencies, primarily in small plants where adequate eating facilities were not provided for employees.

SICK-ABSENTEEISM DATA

Almost all plants maintain records of employee absences. However, since most of the plants use timecards for such records, few plants (40%) would note that such absence was the result of sickness, and very few (10%) maintain records which would show the type of sickness. Generally, it was the larger plants that maintained such information.

HEALTH AND WELFARE

The great majority of the workers are covered by a workman's compensation system. Only the larger plants have a doctor or nurse on duty in the plant; however, since these are large plants, a significant percentage of employees are affected. Approximately 95% of the inplant employees are covered by a situation where there is a physician present or the company has made arrangements with one, on an on-call basis. Just over 30% of the plants provide some type of pre-employment physical and less than 20% conduct some type of periodic physical examination. Again, the larger plants were more likely to conduct such examinations.

INTRODUCTION

Several professional, political, and civic groups in the Chicago area expressed an interest in studying the effects of the urban environment on the health of the population in that metropolitan area. Their overall objective was to determine what environmental factors affect the health of the seven million people living in the Chicago metropolitan area.

There are approximately 2.25 million workers in the Chicago area.[1] Since they spend 25% of their time in the workplace, the analysis of the potential of the workplace to affect an individual's health is a major factor in evaluating the total environment. It is the first step to be taken in assessing the environmental factors which may influence the health of the urban citizen.

Prior to 1951, the industrial hygiene activities for the State of Illinois were performed by both the Department of Labor and the Department of

Public Health. In 1951 the industrial hygiene program was made the sole responsibility of the Department of Labor.[2] At the time of the survey in 1968, the Department of Labor had two professional industrial hygienists for occupational health services in the entire State of Illinois, including Chicago where their facilities are located. Since the total workforce of Illinois is 4.7 million, Illinois thus has the lowest ratio of industrial hygiene staff members per workers for any State with an occupational health program.[3] In Chicago itself there is no industrial hygiene program as such. The Chicago Board of Health has established an advisory committee for industrial hygiene activities and hired a medical consultant. Some elements of environmental health are covered by other health programs within the Chicago Board of Health or by State programs. These include air pollution, radiological health, and industrial sanitation.

Limited industrial hygiene evaluations were conducted in 1939 for the entire State[4] and in 1946 for Chicago and Cook County.[5] These are the only definitive surveys of the occupational environment in the Chicago area. Therefore, a need existed for a current evaluation so that a comprehensive program for occupational health could be recommended. Such a study could be the basis for developing methodology to evaluate other environmental factors which affect the health of the population in the Chicago metropolitan area.

With this background the survey was conducted for the Institute of Medicine of Chicago by the Bureau of Occupational Safety and Health of the United States Public Health Service. Communication and coordination with the following groups were maintained:

(a) Chicago Board of Health,
(b) Illinois Department of Labor,
(c) Illinois Bureau of Employment Security,
(d) Industrial Medical Association,
(e) American Industrial Hygiene Association - Chicago Section,
(f) U.S.P.H.S. Regional Office, and the
(g) American Medical Association - Occupational Health Council.

The survey started on April 22, 1968. It included the six counties of the Chicago Standard Metropolitan Statistical Area[1] - Cook, DePage, Kane, Lake, McHenry, and Will.

METHODOLOGY

The method used was the preliminary or walk-through industrial hygiene survey. It consists of a short interview with the management and a brief tour of the establishment by a well-qualified industrial hygienist. A survey form, as shown in Appendix A, was completed for each establishment, and the data obtained were analyzed using a computer. The Bureau of Occupational Safety and Health has utilized this technique to survey workplaces in six state and metropolitan areas.[6]

A list of the establishments in the Chicago metropolitan area as of March 1967 was obtained from the Illinois Bureau of Employment Security. The list included the name, address, account number, ZIP code, standard industrial classification (SIC) number,[7] employment size, and number of separate plants for each establishment. A condensed version of the SIC system is shown in Appendix B. A statistical sample of randomly selected establishments was taken from the list.

The basic criterion for this survey was that in those industries to be surveyed each worker in the area should have an equal opportunity to be selected. This was accomplished through the use of a proportional probability sampling scheme.[8] This same sampling scheme had been utilized in previous surveys.[6]

The establishments were selected from the following four broad SIC groups: Manufacturing, SIC numbers 19 to 39; Transportation and public utilities, SIC numbers 41 through 49; Selected wholesale and retail trade, SIC numbers 50, 55, and 59; Selected services, SIC numbers 70 through 76, 79, 80, 82, 84, and 89. Analysis of previous survey data indicated that certain SIC groups such as banking, insurance, and real estate; certain retail trades; government services; and some establishments in the service category could be excluded because of their relatively low prevalence of potential occupational health hazards. Other groups such as mining, agriculture, and construction either have very few establishments in metropolitan Chicago[5] or present a practical difficulty in surveying and were also excluded. In order to inspect situations involving as many workers as possible only establishments with 20 or more employees were considered for selection. An exception to this was in the manufacturing

group (SIC 19-39) where establishments with 8 to 19 employees were also included. The establishments were then sub-divided into the following six groups according to the number of employees per establishment: 8-19 (for SIC 19 to 39), 20-49, 50-99, 100-249, 250-499, and more than 500. This gave 21 employee-size SIC sub-groups, one in the 8-19 employee size group and four each in the other five employee size groups. The number of plants and the corresponding number of employees in each of the 21 sub-groups were then obtained from the Bureau of Employment Securities list. These data (Tables 1 and 2) form the "cells" from which the sample plants were randomly selected. These data also represent the "universe," to which the results from the survey plants were projected.

After considering the number of qualified industrial hygienists available and the amount of time required to conduct the study, it was determined that 800 plants were to be selected. Because of the large number of employees in those plants with greater than 500 employees, the proportional probability scheme required a sample of more plants than were available for selection in the four sub-groups. In these sub-groups, a sample of 50%, or approximately 200 establishments, was used.

This left 600 plants to be divided among the remaining 17 sub-groups. The ratio of the number of employees in each sub-group to the total for the 17 sub-groups was used to prorate the 600 plants among the sub-groups. The proportional probability of plants based on the number of employees in each sub-group would represent the lowest number of plants to be surveyed in each sub-group.

Furthermore since there were 311 establishments in the Manufacturing sub-group with more than 500 employees, it was decided to use only 25% of the establishments in this sub-group. As a consequence, an extra 80 establishments were obtained, and were divided among the sub-groups in the smaller employee size range. Thus, a "proportional probability sample plus" was obtained in the smaller employee size sub-groups. This redistribution reduced the number of plants in the universe that each sample plant represented. The number of plants and employees for each sub-group of the sample are shown in Tables 3 and 4.

The sample of randomly selected plants totaled 814. A randomly selected list of alternates was also obtained. Ninety-five such alternates were used during the survey.

Eleven plants refused to cooperate in the survey; therefore, the sample actually surveyed contained 803 plants. The results presented in this report are based on data from these 803 plants actually seen by the industrial hygienists. They are projected to the universe of 14,424 plants and 1,458,631 workers.

CHICAGO SURVEY

A questionnaire (Appendix A) was used by each surveyor for his interview with the management of the selected establishment. Questions designed to elicit the desired information had been pre-tested in previous surveys.

During the tour of the establishment, the surveyor evaluated the environmental conditions in the workplace. Detailed instructions and carefully defined criteria were prepared to guide the surveyors in their appraisal and to assure consistency between surveyors. Each surveyor had a manual containing a complete set of instructions, criteria, and guidelines.

A training and orientation session for survey personnel was held to assure that the same criteria were used by all surveyors, and to orient them in the techniques for obtaining the necessary information. The purpose of the survey, the intent of the questions, and the methods to be used were discussed.

The number of workers potentially at risk to a given occupational hazard was determined by the surveyor in his walk-through survey of the in-plant work area. Office workers, outside salesmen, and similar workers were not considered to be at risk by the criteria used in the survey. Wherever surveyors determined that workers were potentially exposed to toxic materials or harmful physical agents, they used the criteria and guidelines to estimate the effectiveness of engineering control measures. The controls were rated as adequate, inadequate, or marginal. The marginal group included only those control measures the surveyor could not judge by inspection and for which instrumental measurements were deemed necessary for evaluation.

Plants were rated as follows: those with potentially serious hazards that should be evaluated as soon as possible were rated "A," those with conditions that should be evaluated within a year were rated "B," those which required evaluation at longer intervals, up to three years, were rated "C," and those in which no one was listed at risk to a potential hazard were rated "D."

All information from the questionnaires was recorded on a standard form, coded, rechecked, and prepared for computer input. Programs were then designed to provide the information shown in the following sections of this report.

RESULTS

The results of the Chicago Survey are presented in tabular form, utilizing the basic outline of 21 sub-groups based on employment size and SIC groups. Results are presented on either a total number basis or on a percentage basis. Where results are shown as percentages, the basis for reference is the total number of plants and workers in the area as shown in Tables 1 and 2. The data presented in the sections on Health Services, Sick-Absenteeism Data, and Other Information (Age of Plant and Water Supply) were provided by management. Information included in Survey Observation, and Need for Assistance, was developed by the surveyor during and after his walk-through of the work area.

HEALTH SERVICES

The health services available to the workers in the area and related information are shown in Tables 5 through 26. This is summarized below.

Workman's Compensation

Tables 5 through 6(a) - Information was collected on how workman's compensation is provided, either through insurance companies or self-insurance. The results presented indicate only the plants and corresponding number of workers, on both an actual number and a percentage basis, for which workman's compensation is not available. As shown, fewer than one quarter of one percent of the workers are not covered by compensation insurance and these workers are in the very small plants in Manufacturing and Services.* However, it should be remembered that under the criteria developed for the survey, the very small plants were excluded. Therefore, in the Manufacturing plants with fewer than 8 employees and in the other three SIC groups with less than 20 employees, one would expect to find a higher percentage of workers not covered by compensation insurance.

*The Illinois Act on workman's compensation provides that those employers not automatically covered by the Act may voluntarily elect to participate.

CHICAGO SURVEY

Physician's Services

Tables 7 through 14 - The services of a physician available to the worker are grouped into three types; three percent of the plants including 20% of the employees had the service of a full-time physician, Tables 7 and 8; one percent of the plants including seven percent of the employees had a part-time physician, Tables 9 and 10; and 84% of the plants with 68% of the workers had an arrangement with a physician on an on-call basis, Tables 11 and 12. The remaining 12% of the plants and four percent employees, as shown in Tables 13 and 14, do not have the services of a physician available in any manner. The primary employers of full-time physicians are large plants (greater than 500 employees), especially in the Manufacturing group. The use of part-time physicians does not appear to be a popular practice. It is confined primarily to the large industries with an increasing number seen in groups other than Manufacturing. The arrangement between a company and a physician for an on-call relationship is very popular in all types of industries surveyed regardless of the size of plant. The obvious questions, however, arise concerning the knowledge of the on-call physician about conditions in the plant, the potential occupational health hazards to which the worker is exposed, and the number of times he visits and observes the work area. It must be assumed that the primary objective of such a part-time relationship is the medical management of traumatic industrial accidents. Those employees which do not benefit from the services of a physician under any circumstance are found primarily in small establishments especially in the Services group.

Nurse's Service

Tables 15 and 16 - This survey question was designed to obtain information on the utilization of registered nurses on either a full- or part-time (regularly scheduled) basis. The results indicate that very few plants (less than five percent) outside of the very large Manufacturing companies, provide the service of a registered nurse to their workers. However, 45% of the workforce surveyed are employed in plants where the services of a registered nurse are available on some regularly scheduled basis.

Employee Responsible for First-Aid

Tables 17 and 18 - The practice of designating an employee(s) responsible for providing first-aid in emergency situations was fairly widespread in the industries surveyed. A very high percentage of employees, better than 70%, apparently had available to them the services of a trained individual who recognized as his, the responsibility to provide first-aid in an industrial accident situation.

Occupational Health Assistance

Tables 19 through 22 - Slightly less than 50% of the plants have had assistance in occupational health from any source; including their own staff, insurance companies, governmental agencies, etc. The larger plants, especially those in Manufacturing, were more likely to have had such assistance. The primary source of such assistance is through insurance companies.

Pre-Employment and Periodic Physical Examinations

Tables 23 through 26 - The use of pre-employment and/or periodic medical examinations is essentially restricted to the larger plants with greater than 500 employees. The industries most likely to provide such examinations are those in the SIC groups 40 through 49, which include Transportation and Public Utilities. The likelihood that plants in this group would have a mechanism for giving medical examinations, for whatever reason, is strikingly greater than any of the other industrial groups. A further refinement of the data, to indicate what industries provide periodic medical examinations for workers in hazardous jobs, revealed that less than nine percent of the total plants do so. This includes mandatory, as well as voluntary examinations. This percentage is only slightly greater when only Manufacturing establishments are considered.

SICK-ABSENTEEISM DATA

The availability of worker's sick-absenteeism information was determined to see if this could be an approach for collecting information to establish morbidity and occupational disease occurrence data.

Records on Employee Absences

Tables 27 and 28 - A great majority of plants covered in the survey maintain information on employee absence. The primary mechanism for accomplishing this is through the use of timecards.

Records Which Indicate Reason for Absence

Tables 29 through 32 - If records were kept of employee absences, additional questions were asked to ascertain whether the employer questioned the reason for a worker's absence. Tables 29 and 30 indicate the plants and corresponding number of workers where the employer would record, as one reason, the fact that the worker's absence was a result of sickness. The results indicate that the larger plants, especially in the Transportation and Utilities sub-group, were more likely to keep records showing that the absence was because of sickness.

Since the larger plants are more likely to record this information, a higher percentage (approaching two-thirds) of the workforce is included in this group. If the plants were maintaining records which gave sickness as a reason for the absence, management was then questioned to determine if their records were even more specific in noting the type of sickness that kept the employee away from work. No notice was taken of the source of this information, i.e., the employee or his physician; nor was management queried as to their policy, if any, for verifying such information. Many of the companies who maintained such records were willing to supply information such as the type of sickness and the worker's occupation and home ZIP code without identifying the worker by name.

OTHER INFORMATION

In addition to information on Employee Health Services and Sick-absenteeism, management was questioned as to their knowledge of health hazards in their plant. In cooperation with the Bureau of Water Hygiene, U. S. Department of Health, Education, and Welfare, and the Chicago Bureau of Water, information was obtained on drinking water sources available to the in-plant workers.

Knowledge of Health Hazards

Tables 33 and 34 - At the end of the questioning period and just before going into the work area, the surveyor asked the following question, "Many processes or materials used at work can be dangerous to the health of workers. Sometimes it is fairly hard to control such hazards. In your plant do you feel that there are any hazards, even if you have them under control?" Approximately three-fourths of the management personnel interviewed did not feel a health hazard existed in their plant. The results of this question indicate that as the plant size became larger, management was more likely to be of the opinion that there were hazards in the work area. It should be remembered that this question was asked of only one individual from the company being visited, the one assigned the task to provide information on an occupational health survey.

Drinking Water Sources

Tables 35 through 50 - This information essentially indicates the sources used by the plants for drinking water and the potential for cross-connections inside the plant as evidenced by other liquids under pressure or use of booster pumps. Once in the work area, the surveyor obtained a one-gallon sample of water for analysis of trace metals, and a smaller sample for bacteriological analysis. These samples were obtained from drinking water sources in the in-plant work area,

not from the front office area. Much of the information collected on this subject is included in a paper by McCabe and Vaughn.[9]

SURVEY OBSERVATIONS

The general results of the industrial hygienists' walk-through surveys are contained in Tables 51 through 76, and are summarized below.

Questionable Sanitation

Tables 51 and 52 - The evaluation of the plant sanitation covered the five main areas of housekeeping, the availability of drinking water, and the adequacy of toilet, washing, and eating facilities. Copies of the United States of America Standards Institute's Standard on Industrial Sanitation[10] were made available to the surveyors. The evaluation of plant sanitation was an area of subjective judgment. The surveyor did not make a point-for-point comparison between conditions and the Standard. His judgment as to adequacy of the situation was based on his general knowledge of the Standard and his experience. The percentage of plants with questionable sanitation as shown in Table 51 reflects the number of plants receiving an inadequate rating in any one of the five sanitation categories. As the data indicate, the smaller plants were more likely to receive an unsatisfactory rating. This appears to have resulted primarily from the lack of adequate eating facilities. One was much more likely to find employees eating in the work area, with no other place to sit, in the small plants than in the large plants. The major concern in this regard is the potential for the contamination of the food with any toxic agents in the workshop and the resulting consequences of ingesting these materials.

Poor Lighting

Tables 53 and 54 - Although light measuring instruments were not used in the survey, the judgment as to the adequacy of lighting for a particular operation was probably one of the easier determinations required of the industrial hygienist in a walk-through survey. As can be seen in Table 53, the existence of poor lighting is not widespread. It is essentially concentrated in the smaller plants in Manufacturing and in Transportation and Public Utilities.

Workers Potentially at Risk to an Occupational Health Hazard

Tables 55 through 57(a) - Presented in these tables are the numbers and percentages of plants which have either no workers at risk, or which have one or more workers potentially at risk to an occupational health hazard. Also included are the number and percentage of workers projected to be potentially at risk. Table 56(a) indicates that the

possibility that a plant will have one or more workers "at risk" increases, as would be expected, with the plant size and is more likely to occur in Manufacturing and in Transportation and Public Utilities. As shown in Table 57, the number of workers in the Chicago metropolitan area who are "at risk" to a potential hazard is approximately one-third of a million. This represents about one out of every three workers whose job location is in the "in-plant" area. This one-third of a million workers experience almost three-quarters of a million exposures as shown in Table 57(b). Here an exposure indicates a worker and a hazard(s). Therefore, a worker exposed to heat, noise, and carbon monoxide would count as only one worker "at risk," but would generate three exposures. From these results it appears that on the average each worker is exposed to 2.25 hazards in his workplace. This information is shown in Table 57(c).

Exposures to Marginally or Inadequately Controlled Hazards

Tables 58 through 67 - The results included in these tables define the number of plants which have some employees exposed to a potential health hazard which, in the opinion of the surveyor, was inadequately or marginally controlled. Included are total hazards, general chemical hazards, unidentified chemical hazards, physical agents, and dust hazards. Also enumerated is the number of potential exposures to these same categories of health hazards which are inadequately or marginally controlled. The term "unidentified chemical hazard" refers to the fact that an employee was exposed to an unknown chemical, the identity of which could not be obtained from the worker, the individual accompanying the surveyor, or from container labels. Note that the number of exposures is not the same as number of workers exposed. The number of exposures is the product of one worker multiplied by the number of hazards to which he is exposed. For example, if one worker is exposed to carbon monoxide, lead, heat, noise, two unidentified chemicals, free silica dust, and asbestos, only one worker is involved, but a total of eight exposures are present, two general chemicals, two unidentified chemicals, two physical agents, and two dust exposures. The largest number of inadequately or marginally controlled exposures concern general chemicals, physical agents second, unidentified chemical agents third, and dust fourth. Overall, there are almost one-half million potential exposures to marginally or inadequately controlled health hazards (Table 59), with the overwhelming majority (86%) being found in Manufacturing. When this information is compared with the total number of exposures in Table 57(b), it is seen that almost 63% of the hazards recorded, were rated as marginally or inadequately controlled.

NEED FOR ASSISTANCE

The priority rating of the plant - i.e., the ranking of the need of its employees for assistance in occupational health - involves a judgment

based on the integration of all of the information collected in the discussion with management and the observations made during the walk-through of the work area. The rating is not a weighted average or a calculated value for the plant. It is an estimate of the potential for this plant to have serious occupational health problems. As a result, one or two workmen exposed to a poorly controlled operation involving carbon tetrachloride or a similar hazardous agent could result in the plant being rated as needing immediate assistance. The four possible rating categories are:

Immediate

Tables 68 and 68(a) - The plant should be visited as soon as possible and an in-depth evaluation made because of the high level of hazard involved. The need for corrective action is highly probable. Overall some 916 plants, representing 6.3% of the total plants, were projected as being in this category.

Assistance Within One Year

Tables 69 and 69(a) - Although the potential risk to the health of workers is significant, further study and evaluation could be delayed up to one year. Corrective action, however, may still be required. This group contains 3,150 plants which represent 21.8% of the total plants.

Delayed

Tables 70 and 70(a) - The plant appears to have hazards under control but should have a follow-up visit within one to three years. This group contains 6,501 plants, or 45.0% of the total.

No Assistance Required

Tables 71 and 71(a) - The plant apparently has no exposures to toxical chemicals or physical agents, and can anticipate no exposures in the near future. This group contained 3,865 plants, representing 26.7% of all of the plants.

Comparison of Plant Rating and Plant Age

Tables 72 through 76 - Included in these tables is the distribution of plants by number of years at the location surveyed according to categories of up to 5 years, 5 to 10 years, 10 to 20 years, and 20 years or longer. As shown in Table 76, based on the single variable of plant age, no apparent effect on the rating of the plant as to the need for occupational health assistance appears except for the 20 years or longer category. In this category there appears to be a significant shift in number of plants into the immediate need for assistance group.

INDIVIDUAL HAZARDS

In evaluating exposures of workers to specific potentially hazardous agents, the surveyor was requested also to evaluate the adequacy of control of the situation. Table 77 lists the top ten potential hazards on the basis of the total number of workers exposed. Also shown in the table are the number of workers potentially exposed to inadequately (I) or marginally (M) controlled situations based on the observations made in the walk-through survey. It should be remembered, that in reviewing information as specific as this, only a small sample of the entire workforce was surveyed. Therefore, when the results indicate that for a given hazard, a high or low percentage of the workers were exposed to an inadequate or marginally controlled situation, this should not be taken as an absolute fact, but should be considered as an indicator of a potentially hazardous situation. Likewise, the total number of workers exposed to an individual hazard is also a projection and should be considered as such.

DISCUSSION

From the inception of the survey through its various modifications, the goals of the survey did not include the development of specific recommendations or courses of action. The following short discussion is intended to be only an example of the type of recommendations which could be generated from the survey information. The concepts presented, in combination with other factors of a social, economic, and political nature, which are particular to the area itself, can form the basis for developing a method for the control of occupational disease.

When the results of this survey are projected to the 1.3 million workers and 14,424 plants from which the survey sample was drawn, the basic outline of the problem is provided. There are approximately 340,000 workers at risk to some occupational health hazard, and there are more than 4000 plants which should be surveyed immediately or within one year. Possibly of more importance are the almost one-half million potential exposures to chemical, physical, or dust hazards, the control of which is questionable.

To develop an action program to reduce the number of questionably controlled exposures, it is necessary to consider where these exposures occur with respect to size and type of industry. For example, an occupational health program concentrating solely on plants with 500 or more employees would affect, if 100% efficient, 86% of these potential exposures. However, in reviewing the other information gathered in the survey, it is immediately apparent that trained health personnel as well as other necessary components of a healthy work environment, are already in existence for most of the workers in this group. Information developed on the availability of in-plant health services and related information for this group indicates that 100% of the workers are covered by some form of workmen's compensation, 47% work in plants which maintain absenteeism records which identify the worker's sickness, 55% work in plants where there is a full-time physician, 100% are in plants which have some type of arrangement with a physician, and more than 97% are in plants which utilize the service of a registered nurse on a regularly scheduled basis. In addition,

almost 75% of the workers in this group are employed in plants which have received assistance in occupational health.

Bringing together all of the information that applies to this major group makes it readily apparent that many of the elements which are a part of a program to prevent occupational disease are already in existence in the Chicago metropolitan area. At the present time these resources are apparently not being effectively channeled towards this goal. Developing and more effectively utilizing these valuable resources is one course of action which could result from this survey. However, it is important to remember that as a result of the survey design, the very small plants, especially those with seven employees or less in the Manufacturing group and with 19 or less employees in the Transportation and Utilities group, were not included in the survey. Table 57(a) indicates that as the size of the plant decreases, the percentage of workers potentially at risk increases. Therefore, on an overall evaluation, these small plants will contribute a large number of potential problems. Here again we are faced with the "small plant occupational health problem," and how to solve it.

The industrial hygiene walk-through survey, the technique used in this survey, is far from being a simple procedure and, as a result, it and the results it produces may be misinterpreted and misused. It is a preliminary survey and, thus, is a method by which one tries to make an initial estimate of the problem. It does not go into great depth or detail, and more importantly it does not use environmental measurements to assist the surveyor in making his assessment of the workplace. It is similar to a preliminary diagnosis and, therefore, it should be only the first step in assessing and solving the problem.

Since the walk-through survey does not include any measurements of contaminants in the environment, the validity of the data depends upon the knowledge, training, and thoroughness of the individuals conducting the survey. When a surveyor observes an exposure to dust, he cannot quantitatively evaluate whether or not the exposure exceeds an acceptable value, but he must make a judgment. When he surveys an operation involving the handling of a chemical which may give rise to excessive concentrations of a vapor, or he attempts to assess exposure to carbon monoxide, he may be dealing with agents which are odorless, colorless, and tasteless; and in such situations he makes a subjective determination as to the worker's exposure.

These comments are intended not to downgrade but instead to point out the complexity of the inplant environmental walk-through survey. In turn this discussion of the technique should lead to a better understanding of how the results can best be used.

CHICAGO SURVEY

The survey conforms with the basic principles of industrial hygiene: identify, evaluate, and prescribe. First the hazards in the work environment are cataloged - those resulting from the solids, liquids, and gaseous materials used by the worker and those found as the environmental by-products generated by the equipment and processes in the workplace. Included in the latter group are such things as carbon monoxide from a diesel fork lift; noise from a drop forge; ultraviolet light, which in turn produces ozone and oxides of nitrogen, from a welding operation. The surveyor, in cataloging these environmental contaminants, cannot measure the seriousness of the situation; and therefore he defines these conditions as "potential exposures to harmful substances." In conducting this part of the survey, the surveyor has at his disposal several guides or aids to assist him in identifying harmful materials. Much of the survey manual is devoted to identifying process hazards. The manual lists the potentially hazardous gases and chemicals, and provides the surveyor with other information he needs to catalog the potentially hazardous exposures he observes in the workplace.

In evaluating, the surveyor observes what engineering control techniques or natural conditions mitigate the potential exposure; e.g., the use of local exhaust ventilation on a welding operation, the fact that temporary shielding and warning lights and barriers are employed in field industrial X-ray applications, the effect of general dilution as affected by the size of the warehouse in which fork lift trucks are used.

After observing the potential hazard, evaluating the seriousness which it poses to the health of the worker, and observing the man-made or natural conditions which may mitigate (or enhance) this potential exposure, the surveyor must then decide whether or not the exposure is adequately or inadequately controlled. In making such an evaluation, the surveyor is actually determining the priorities which should be established for further in-depth surveys and possible corrective action. With this information he is in a position to rate a plant on its need for assistance.

CONCLUSION

With this background information, it should be more readily apparent to what uses this survey can be put. It does not give final answers, which have an unassailable accuracy. It is a preliminary technique to get at the broad outlines of the occupational health problem. The results cannot be subdivided and refined to any great extent, but they can be extrapolated to the metropolitan area as a whole, with the ultimate goal of providing the worker with a safer and healthier work environment.

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TABLE 1

PLANTS IN CHICAGO AREA BY SUB-GROUPS

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	3,000	2,583	1,301	1,062	412	311	8,669
40 - 49	--	458	198	152	57	31	896
50,55,59	--	1,880	626	268	64	27	2,865
70 - 89	--	1,251	420	220	66	37	1,994
Total	3,000	6,172	2,545	1,702	599	406	14,424

TABLE 2

EMPLOYEES IN CHICAGO AREA BY SUB-GROUPS

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	37,653	80,954	91,974	164,796	142,236	451,456	969,069
40 - 49	--	13,714	13,494	22,832	18,902	70,890	139,832
50,55,59	--	56,830	41,930	40,707	20,923	31,539	191,929
70 - 89	--	37,871	28,881	32,645	23,084	35,320	157,801
Total	37,653	189,369	176,279	260,980	205,145	589,205	1,458,631

TABLE 3

PLANTS IN SAMPLE BY SUB-GROUPS

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	48	79	67	116	87	81	478
40 - 49	--	20	15	15	13	14	77
50,55,59	--	57	32	28	14	13	144
70 - 89	--	40	23	23	17	12	115
Total	48	196	137	182	131	120	814

TABLE 4

EMPLOYEES IN SAMPLE BY SUB-GROUPS

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	621	2,468	4,915	18,025	30,647	126,287	182,963
40 - 49	--	611	1,068	2,438	4,234	21,346	29,697
50,55,59	--	1,728	2,125	4,282	4,797	15,417	28,349
70 - 89	--	1,255	1,443	3,498	5,898	11,624	23,718
Total	621	6,062	9,551	28,243	45,576	174,674	264,727

TABLE 5

NUMBER OF PLANTS WITH NO
WORKMAN'S COMPENSATION INSURANCE
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	62	0	0	0	0	0	62
40 - 49	--	0	0	0	0	0	0
50,55,59	--	0	0	0	0	0	0
70 - 89	--	62	18	0	0	0	80
Total	62	62	18	0	0	0	142

TABLE 5(a)

PERCENTAGE OF PLANTS WITH NO
WORKMAN'S COMPENSATION INSURANCE

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	2.0	0.0	0.0	0.0	0.0	0.0	0.7
40 - 49	--	0.0	0.0	0.0	0.0	0.0	0.0
50,55,59	--	0.0	0.0	0.0	0.0	0.0	0.0
70 - 89	--	4.7	4.7	0.0	0.0	0.0	3.9
Total	--	0.9	0.7	0.0	0.0	0.0	0.9

TABLE 6

NUMBER OF WORKERS NOT PROTECTED
BY WORKER'S COMPENSATION
(Projected)

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	484	0	0	0	0	0	484
40 - 49	--	0	0	0	0	0	0
50,55,59	--	0	0	0	0	0	0
70 - 89	--	1,751	1,800	0	0	0	3,551
Total	--	1,751	1,800	0	0	0	4,035

TABLE 6(a)

PERCENTAGE OF WORKERS NOT PROTECTED
BY WORKER'S COMPENSATION

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	0.9	0.0	0.0	0.0	0.0	0.0	0.1
40 - 49	--	0.0	0.0	0.0	0.0	0.0	0.0
50,55,59	--	0.0	0.0	0.0	0.0	0.0	0.0
70 - 89	--	4.4	5.4	0.0	0.0	0.0	0.0
Total	--	0.6	0.9	0.0	0.0	0.0	0.2

TABLE 7

PERCENTAGE OF PLANTS WITH
FULL-TIME PHYSICIAN*

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	2.0	1.2	2.9	3.4	6.0	22.2	2.9
40 - 49	--	3.2	7.1	0.0	0.0	11.8	4.6
50,55,59	--	0.0	0.0	3.7	0.0	0.0	0.3
70 - 89	--	7.1	4.7	4.1	6.6	8.3	6.3
Total	--	2.3	2.7	3.2	4.8	18.9	3.0

* Includes plants for which the full-time physician may work out of a location other than the establishment surveyed. (such as a corporate headquarters)

TABLE 8

PERCENTAGE OF EMPLOYEES IN PLANTS
WITH FULL-TIME PHYSICIAN

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	2.0	1.1	20.8	2.4	4.8	54.8	27.4
40 - 49	--	4.1	8.4	0.0	0.0	24.6	12.8
50,55,59	--	0.0	0.0	7.3	0.0	0.0	1.1
70 - 89	--	5.2	6.0	3.0	10.8	14.1	7.2
Total	--	1.3	12.9	2.9	4.5	46.3	20.0

TABLE 9

PERCENTAGE OF PLANTS WITH
PART-TIME PHYSICIAN

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	0.0	0.0	1.4	3.4	4.8	18.4	1.4
40 - 49	--	0.0	0.0	0.0	0.0	17.6	0.7
50,55,59	--	0.0	0.0	0.0	0.0	20.0	0.1
70 - 89	--	0.0	0.0	0.0	0.0	8.3	0.1
Total	--	0.0	0.7	2.1	3.3	17.3	0.9

TABLE 10

PERCENTAGE OF EMPLOYEES IN PLANTS
WITH PART-TIME PHYSICIAN

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	0.0	0.0	1.5	10.4	15.4	10.6	8.8
40 - 49	--	0.0	0.0	0.0	0.0	23.9	11.2
50,55,59	--	0.0	0.0	0.0	0.0	14.3	2.0
70 - 89	--	0.0	0.0	0.0	0.0	6.0	1.0
Total	--	0.0	0.8	6.9	11.0	12.0	7.1

TABLE 11

PERCENTAGE OF PLANTS WITH
PHYSICIAN ON CALL

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	83.3	92.5	91.0	88.8	89.0	59.0	87.3
40 - 49	--	68.4	85.7	100.	100.	61.8	79.7
50,55,59	--	86.2	100.	88.8	100.	80.0	89.7
70 - 89	--	59.5	76.1	75.0	73.3	83.3	65.2
Total	--	82.0	90.6	88.0	89.6	63.0	84.3

TABLE 12

PERCENTAGE OF EMPLOYEES IN PLANTS
WITH PHYSICIAN ON CALL

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	87.3	93.2	73.9	82.6	79.7	34.6	61.1
40 - 49	--	79.8	90.0	100.	100.	48.8	72.8
50,55,59	--	94.3	100.	88.1	100.	85.7	93.4
70 - 89	--	63.0	66.3	77.1	70.2	79.8	70.5
Total	--	88.5	79.3	84.3	82.4	41.5	68.4

TABLE 13

PERCENTAGE OF PLANTS HAVING
NO ARRANGEMENT WITH A PHYSICIAN

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	14.5	6.2	4.4	4.2	0.0	0.0	8.1
40 - 49	--	26.3	7.1	0.0	0.0	0.0	14.8
50,55,59	--	13.7	0.0	7.4	0.0	0.0	9.7
70 - 89	--	33.3	19.0	20.8	20.0	0.0	28.2
Total	--	15.6	5.7	6.5	2.0	0.0	11.6

TABLE 14

PERCENTAGE OF EMPLOYEES IN PLANTS
HAVING NO ARRANGEMENT WITH A PHYSICIAN

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	10.5	5.5	3.6	4.4	0.0	0.0	2.1
40 - 49	--	16.0	0.6	0.0	0.0	0.0	3.0
50,55,59	--	5.6	0.0	4.4	0.0	0.0	3.3
70 - 89	--	31.7	27.5	19.7	18.8	0.0	21.1
Total	--	10.0	6.8	5.7	2.0	0.0	4.2

TABLE 15

PERCENTAGE OF PLANTS WITH NO NURSE

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	100.	100.	98.5	96.5	74.3	10.1	95.2
40 - 49	--	100.	92.8	93.7	84.6	67.6	95.0
50,55,59	--	98.2	100.	96.2	100.	70.0	98.3
70 - 89	--	88.0	95.2	79.1	86.6	50.0	87.6
Total	--	96.9	97.9	93.9	79.4	22.8	94.7

TABLE 16

PERCENTAGE OF EMPLOYEES
IN PLANTS WITH NO NURSE

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	100.	100.	80.2	84.4	62.8	2.7	46.8
40 - 49	--	100.	91.5	89.4	80.5	51.5	71.7
50,55,59	--	51.5	100.	96.4	100.	14.4	64.0
70 - 89	--	87.4	96.9	80.2	76.8	37.4	78.0
Total	--	75.3	88.1	86.0	69.4	10.1	54.7

TABLE 17

PERCENTAGE OF PLANTS WITH NO EMPLOYEE RESPONSIBLE FOR FIRST-AID

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	58.3	43.7	35.8	21.3	14.6	11.5	42.4
40 - 49	--	73.6	71.4	56.2	69.2	35.3	68.2
50,55,59	--	55.1	66.6	59.2	38.4	20.0	57.5
70 - 89	--	59.5	71.4	58.3	33.3	16.7	60.1
Total	--	52.6	51.8	35.2	24.6	15.0	49.5

TABLE 18

PERCENTAGE OF EMPLOYEES IN PLANTS WITH NO EMPLOYEE RESPONSIBLE FOR FIRST-AID

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	42.8	43.3	51.3	17.7	12.7	11.9	21.2
40 - 49	--	81.1	66.8	51.7	62.8	20.2	43.0
50,55,59	--	22.7	67.2	51.6	37.0	71.9	42.2
70 - 89	--	59.9	69.7	62.8	31.3	20.0	51.9
Total	--	38.1	59.0	30.4	21.4	17.1	29.5

TABLE 19

PERCENTAGE OF PLANTS RECEIVING OCCUPATIONAL HEALTH ASSISTANCE FROM AN INSURANCE COMPANY

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	39.5	45.0	55.2	59.8	65.8	63.2	48.0
40 - 49	--	31.5	35.7	37.5	30.7	23.5	33.2
50,55,59	--	37.9	42.4	55.5	38.4	30.0	40.4
70 - 89	--	19.0	19.0	25.0	26.6	25.0	20.0
Total	--	36.4	44.9	52.4	55.2	54.1	41.7

TABLE 20

PERCENTAGE OF EMPLOYEES IN PLANTS RECEIVING OCCUPATIONAL HEALTH ASSISTANCE FROM AN INSURANCE COMPANY

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	43.8	44.7	64.0	57.5	68.5	49.3	54.2
40 - 49	--	47.7	35.7	39.6	37.0	23.2	32.1
50,55,59	--	74.1	38.2	61.8	34.5	12.6	54.9
70 - 89	--	18.1	18.4	20.1	26.0	35.2	22.6
Total	--	54.8	48.7	52.4	58.0	43.5	49.5

TABLE 21

PERCENTAGE OF PLANTS WHICH RECEIVE
NO OCCUPATIONAL HEALTH ASSISTANCE

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	54.1	46.2	41.7	25.6	20.7	12.8	43.5
40 - 49	--	68.4	50.0	43.7	15.3	41.2	55.4
50,55,59	--	56.8	48.4	29.6	38.4	30.0	52.0
70 - 89	--	76.1	76.1	75.0	66.6	41.7	75.1
Total	--	57.2	49.3	34.5	26.8	19.4	50.3

TABLE 22

PERCENTAGE OF WORKERS IN PLANTS WITH
NO OCCUPATIONAL HEALTH ASSISTANCE

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	41.4	45.8	33.7	22.3	19.4	26.4	27.8
40 - 49	--	52.2	52.7	45.5	14.1	41.4	40.8
50,55,59	--	23.2	50.6	29.1	40.7	9.1	27.6
70 - 89	--	77.9	74.2	79.8	63.1	29.3	67.2
Total	--	40.3	45.7	31.6	25.6	26.9	32.6

TABLE 23

PERCENTAGE OF PLANTS WHICH DO NOT GIVE PRE-EMPLOYMENT EXAMINATIONS

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	87.5	73.7	61.1	45.2	34.1	14.2	69.3
40 - 49	--	31.5	50.0	12.5	0.0	5.9	28.8
50,55,59	--	81.0	57.5	51.8	30.7	10.0	71.6
70 - 89	--	83.3	71.4	66.6	66.6	16.7	77.4
Total	--	75.0	61.0	46.0	33.6	13.4	68.5

TABLE 24

PERCENTAGE OF WORKERS IN PLANTS WHICH DO NOT GIVE PRE-EMPLOYMENT EXAMINATIONS

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	74.7	75.9	49.3	39.9	28.6	5.9	28.9
40 - 49	--	38.8	52.5	11.4	0.0	3.0	12.8
50,55,59	--	38.0	55.3	47.6	27.3	3.1	36.4
70 - 89	--	82.0	68.0	63.9	65.8	14.0	61.3
Total	--	57.0	54.1	41.2	29.9	5.8	32.0

TABLE 25

PERCENTAGE OF PLANTS WHICH DO NOT GIVE PERIODIC PHYSICAL EXAMINATIONS

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	87.5	91.2	92.5	76.0	65.8	40.6	85.4
40 - 49	--	36.8	71.4	31.2	38.4	17.6	42.4
50,55,59	--	86.2	81.8	74.0	46.1	40.0	82.9
70 - 89	--	80.9	90.4	66.6	66.6	33.3	79.8
Total	--	83.7	87.9	70.3	61.0	37.8	81.5

TABLE 26

PERCENTAGE OF WORKERS IN PLANTS WHICH DO NOT GIVE PERIODIC PHYSICAL EXAMINATIONS

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	89.2	90.9	75.0	70.8	67.6	23.0	52.1
40 - 49	--	43.5	71.1	24.2	38.0	21.8	31.4
50,55,59	--	39.3	83.4	69.2	44.6	82.8	57.5
70 - 89	--	81.5	92.0	64.9	57.5	40.1	70.0
Total	--	62.7	79.5	65.9	61.8	27.6	53.0

TABLE 27

PERCENTAGE OF PLANTS WHICH KEEP
RECORDS OF EMPLOYEE ABSENCES

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	91.6	87.5	86.3	94.8	97.5	98.6	90.5
40 - 49	--	89.4	100.	87.5	100.	88.2	91.9
50,55,59	--	84.4	84.8	100.	92.3	90.0	86.1
70 - 89	--	92.8	95.2	87.5	93.3	91.7	92.6
Total	--	87.8	88.4	93.9	96.8	96.6	90.0

TABLE 28

PERCENTAGE OF EMPLOYEES IN PLANTS WHICH KEEP
RECORDS OF EMPLOYEE ABSENCES

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	94.1	86.6	90.5	94.5	99.5	98.5	95.8
40 - 49	--	89.8	100.	90.4	100.	79.8	87.5
50,55,59	--	94.1	85.1	100.	92.8	97.3	94.0
70 - 89	--	93.8	89.3	89.8	94.5	84.7	90.5
Total	--	91.4	89.7	94.4	98.4	95.8	94.3

TABLE 29

PERCENTAGE OF PLANTS WHICH KEEP RECORDS
OF EMPLOYEE ABSENCES DUE TO SICKNESS

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	25.0	32.5	44.7	58.1	62.1	71.2	37.5
40 - 49	--	42.1	64.2	50.0	100.	82.4	53.6
50,55,59	--	36.2	39.3	51.8	53.8	90.0	39.0
70 - 89	--	45.2	42.8	50.0	66.6	66.7	46.3
Total	--	36.9	44.5	55.3	65.6	72.4	40.0

TABLE 30

PERCENTAGE OF EMPLOYEES IN PLANTS WHICH
KEEP RECORDS OF ABSENCE DUE TO SICKNESS

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	30.4	32.4	58.5	55.0	69.0	80.7	65.5
40 - 49	--	34.8	52.4	57.3	100.	67.1	64.6
50,55,59	--	72.1	37.5	45.5	52.4	97.3	64.8
70 - 89	--	57.4	41.8	46.0	72.3	58.5	53.8
Total	--	55.0	50.6	52.9	70.5	79.4	64.2

TABLE 31

PERCENTAGE OF PLANTS KEEPING ABSENTEEISM RECORDS WHICH NAME TYPE OF SICKNESS

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	6.2	10.0	13.4	19.6	18.2	31.3	11.5
40 - 49	--	5.2	28.5	25.0	53.8	41.2	18.5
50,55,59	--	6.8	3.0	11.1	15.3	30.0	6.7
70 - 89	--	7.1	14.2	0.0	13.3	16.7	8.0
Total	--	8.1	12.0	16.2	21.0	31.0	10.4

TABLE 32

PERCENTAGE OF EMPLOYEES IN PLANTS KEEPING ABSENTEEISM RECORDS WHICH NAME TYPE OF SICKNESS

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	3.9	7.4	12.1	20.9	30.1	47.2	30.9
40 - 49	--	4.1	21.6	31.2	58.3	43.9	36.8
50,55,59	--	52.0	3.6	4.5	17.5	9.5	28.5
70 - 89	--	11.8	15.1	0.0	17.9	13.1	11.1
Total	--	28.9	11.4	17.2	30.1	42.8	29.1

TABLE 33

PERCENTAGE OF PLANTS WHERE MANAGEMENT REPRESENTATIVE DID NOT THINK THERE WERE ANY HEALTH HAZARDS

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥500	Total
19-39	79.1	70.0	67.1	63.2	52.4	36.8	70.0
40-49	--	84.2	85.7	75.0	61.5	44.1	79.7
50,55,59	--	75.8	84.8	77.7	76.9	50.0	77.8
70-89	--	85.7	76.1	83.3	73.3	58.3	82.7
Total	--	76.0	74.4	69.2	58.1	39.9	73.9

TABLE 34

PERCENTAGE OF EMPLOYEES IN PLANTS WHERE MANAGEMENT REPRESENTATIVE DID NOT THINK THERE WERE ANY HEALTH HAZARDS

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥500	Total
19-39	78.7	73.6	55.0	63.2	57.1	30.1	48.5
40-49	--	85.7	85.9	71.6	70.0	31.1	55.2
50,55,59	--	80.8	80.6	75.9	75.2	12.7	69.8
70-89	--	87.5	83.7	86.7	66.0	52.7	77.6
Total	--	79.7	67.5	68.3	60.9	30.1	55.4

TABLE 35

PERCENTAGE OF PLANTS WHICH USE
MUNICIPAL WATER FOR DRINKING

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	87.5	90.0	96.9	95.7	96.3	93.7	91.3
40 - 49	--	78.8	78.8	87.5	84.2	100.	81.6
50,55,59	--	82.7	93.9	100.	100.	80.0	87.1
70 - 89	--	93.2	85.6	100.	93.1	91.7	93.8
Total	--	88.1	93.1	96.1	95.1	93.4	90.2

TABLE 36

PERCENTAGE OF EMPLOYEES IN PLANTS
WHICH USE MUNICIPAL WATER FOR DRINKING

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	89.8	90.4	98.1	95.9	96.0	85.3	90.8
40 - 49	--	85.4	91.0	79.4	81.1	100.	88.8
50,55,59	--	88.2	91.8	100.	100.	24.7	80.5
70 - 89	--	96.6	84.4	100.	99.4	89.7	93.8
Total	--	90.9	94.2	95.7	95.6	83.3	89.9

TABLE 37

PERCENTAGE OF PLANTS WHICH USE
PRIVATE WELLS FOR DRINKING WATER

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	2.0	3.7	1.4	4.1	3.6	6.3	2.9
40 - 49	--	5.0	7.0	12.4	14.0	0.0	7.2
50,55,59	--	1.7	0.0	0.0	0.0	20.0	1.2
70 - 89	--	2.3	0.0	0.0	0.0	8.3	1.6
Total	--	2.9	1.2	3.7	3.9	6.6	2.6

TABLE 38

PERCENTAGE OF EMPLOYEES IN PLANTS WHICH USE
PRIVATE WELLS FOR DRINKING WATER

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	1.9	3.8	0.9	4.0	3.9	14.7	8.1
40 - 49	--	0.0	3.5	20.5	18.8	0.0	8.7
50,55,59	--	0.3	0.0	0.0	0.0	75.3	13.1
70 - 89	--	1.6	0.0	0.0	0.0	10.3	2.0
Total	--	2.3	0.7	4.2	4.3	16.7	8.0

TABLE 39

PERCENTAGE OF PLANTS WHICH USED BOTTLED WATER FOR DRINKING

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	8.3	4.9	1.4	0.0	0.0	0.0	4.6
40 - 49	--	15.6	14.1	0.0	0.0	0.0	10.7
50,55,59	--	15.5	6.0	0.0	0.0	0.0	11.5
70 - 89	--	2.3	14.0	0.0	5.1	0.0	4.3
Total	--	8.3	5.4	0.0	0.5	0.0	6.3

TABLE 40

PERCENTAGE OF EMPLOYEES IN PLANTS WHICH USED BOTTLED WATER FOR DRINKING

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	6.3	4.6	0.8	0.0	0.0	0.0	0.8
40 - 49	--	14.5	5.4	0.0	0.0	0.0	2.4
50,55,59	--	11.3	8.1	0.0	0.0	0.0	6.3
70 - 89	--	1.6	15.5	0.0	0.5	0.0	0.0
Total	--	6.4	5.0	0.0	0.1	0.0	1.8

TABLE 41

PERCENTAGE OF PLANTS WHICH HAVE WATER AND OTHER PIPED LIQUIDS UNDER PRESSURE

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	0.0	7.4	19.3	23.0	37.6	47.4	11.2
40 - 49	--	15.6	21.1	6.2	22.8	23.5	15.8
50,55,59	--	12.0	18.1	25.8	15.2	70.0	15.1
70 - 89	--	9.5	14.0	3.9	5.1	41.7	10.1
Total	--	9.8	18.3	19.3	30.4	45.9	12.1

TABLE 42

PERCENTAGE OF WORKERS IN PLANTS WHICH HAVE WATER AND OTHER LIQUIDS UNDER PRESSURE

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	0.0	8.3	14.1	26.7	47.2	61.9	40.5
40 - 49	--	3.0	15.3	19.9	27.7	22.1	19.4
50,55,59	--	11.7	16.0	32.7	29.4	95.2	31.2
70 - 89	--	4.6	13.1	3.2	7.0	51.7	13.9
Total	--	8.3	14.3	23.8	41.1	61.2	35.6

TABLE 43

PERCENTAGE OF PLANTS WHICH HAVE
EXPERIENCED INADEQUATE WATER PRESSURES

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	10.4	8.7	14.8	12.7	15.8	11.5	11.1
40 - 49	--	5.0	7.0	6.2	14.0	11.8	6.5
50,55,59	--	8.6	15.0	14.6	15.2	10.0	10.7
70 - 89	--	4.7	4.6	8.2	25.8	8.3	5.7
Total	--	7.5	12.7	11.8	16.6	11.1	10.0

TABLE 44

PERCENTAGE OF WORKERS IN PLANTS WHICH
HAVE EXPERIENCED INADEQUATE WATER PRESSURES

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	7.9	7.3	12.9	10.4	12.3	16.7	13.2
40 - 49	--	1.6	0.7	13.5	9.4	6.6	7.5
50,55,59	--	28.7	10.1	29.3	13.0	6.0	20.4
70 - 89	--	2.6	3.8	7.7	31.6	7.6	8.2
Total	--	12.5	10.2	11.8	14.1	15.3	13.2

TABLE 45

PERCENTAGE OF PLANTS WHICH USE BOOSTER PUMPS ON WATER SYSTEM

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	12.5	8.7	17.3	31.5	40.2	64.4	17.4
40 - 49	--	10.3	35.3	31.0	22.8	29.4	21.0
50,55,59	--	13.7	6.0	33.2	37.2	60.0	14.5
70 - 89	--	14.2	47.3	45.6	39.6	50.0	25.4
Total	--	11.5	20.6	33.6	38.1	59.7	18.2

TABLE 46

PERCENTAGE OF WORKERS IN PLANTS WHICH USE BOOSTER PUMPS ON WATER SYSTEM

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	9.5	10.3	14.3	43.3	40.6	78.0	50.3
40 - 49	--	3.0	43.6	50.5	28.7	12.3	26.6
50,55,59	--	12.3	2.9	40.4	51.1	86.7	30.1
70 - 89	--	12.4	55.4	58.1	49.6	55.8	43.3
Total	--	11.0	21.7	45.4	41.2	74.3	46.3

TABLE 47

PERCENTAGE OF PLANTS WHICH HAVE
EXPERIENCED UNPLEASANT TASTING WATER

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	18.7	6.2	11.9	8.4	8.3	3.5	11.6
40 - 49	--	5.0	0.0	12.4	7.0	0.0	5.2
50,55,59	--	1.7	2.9	3.4	15.2	30.0	2.6
70 - 89	--	7.0	0.0	3.9	5.1	8.3	5.3
Total	--	4.9	6.9	7.4	8.5	5.0	8.6

TABLE 48

PERCENTAGE OF WORKERS IN PLANTS WHICH
HAVE EXPERIENCED UNPLEASANT TASTING WATER

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	13.2	3.9	8.8	6.4	7.2	3.9	5.8
40 - 49	--	8.8	0.0	22.5	2.2	0.0	7.0
50,55,59	--	0.3	6.2	7.1	24.9	82.0	18.1
70 - 89	--	4.0	0.0	3.3	7.0	10.3	4.3
Total	--	3.0	6.4	7.1	7.7	7.7	6.9

TABLE 49

PERCENTAGE OF PLANTS WHICH GIVE
ADDITIONAL TREATMENT TO WATER SUPPLY

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	10.4	9.9	10.3	18.7	25.4	28.6	12.5
40 - 49	--	0.0	14.1	6.2	36.8	11.8	7.0
50,55,59	--	8.6	2.0	18.1	0.0	50.0	8.3
70 - 89	--	19.0	28.3	29.1	39.6	25.0	22.6
Total	--	10.7	11.5	18.8	25.4	27.9	12.8

TABLE 50

PERCENTAGE OF WORKERS IN PLANTS WHICH
GIVE ADDITIONAL TREATMENT TO WATER SUPPLY

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	8.9	12.0	7.9	16.2	22.0	39.8	25.6
40 - 49	--	0.0	16.0	10.8	42.3	6.7	13.9
50,55,59	--	10.0	1.4	20.2	0.0	88.3	22.3
70 - 89	--	12.5	25.0	37.4	38.4	35.2	27.4
Total	--	11.0	10.5	18.8	23.8	40.4	24.9

TABLE 51

PERCENTAGE OF PLANTS WITH QUESTIONABLE SANITATION*

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	58.3	63.7	64.1	42.7	45.1	32.6	57.4
40 - 49	--	57.8	42.8	43.7	38.4	11.8	48.9
50,55,59	--	53.4	48.4	37.0	7.6	20.0	49.6
70 - 89	--	52.3	52.3	45.8	26.6	37.5	50.5
Total	--	57.8	56.7	42.3	38.5	30.2	54.4

TABLE 52

PERCENTAGE OF IN-PLANT EMPLOYEES
IN PLANTS WITH QUESTIONABLE SANITATION*

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	66.2	61.6	50.5	43.3	39.7	40.9	45.3
40 - 49	--	69.8	40.0	46.2	47.3	12.2	36.9
50,55,59	--	38.7	45.8	45.4	19.7	1.4	33.4
70 - 89	--	46.7	45.4	48.4	29.1	23.8	41.1
Total	--	51.8	48.4	44.3	38.1	36.9	43.2

* Includes adequacy of housekeeping, water supply, toilet, washing, and eating facilities.

TABLE 53

PERCENTAGE OF PLANTS WITH POOR LIGHTING

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	22.9	16.2	17.9	10.2	10.9	1.0	17.3
40 - 49	--	15.7	7.1	31.2	0.0	0.0	15.1
50,55,59	--	5.1	3.0	7.4	0.0	0.0	4.7
70 - 89	--	2.3	0.0	0.0	0.0	0.0	1.5
Total	--	9.9	10.5	10.4	7.5	1.8	12.4

TABLE 54

PERCENTAGE OF IN-PLANT EMPLOYEES
IN PLANTS WITH POOR LIGHTING

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	29.7	13.5	14.7	6.9	10.5	0.4	7.1
40 - 49	--	9.1	10.6	30.8	0.0	0.0	9.9
50,55,59	--	3.1	1.7	11.1	0.0	0.0	3.3
70 - 89	--	1.6	0.0	0.0	0.0	0.0	0.4
Total	--	7.6	9.7	8.0	8.3	0.3	6.1

TABLE 55

NUMBER OF PLANTS WITH NO EMPLOYEES FOUND TO BE AT RISK
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	875	392	97	147	14	3	1,528
40 - 49	--	114	52	50	26	6	248
50,55,59	--	759	294	96	23	4	1,176
70 - 89	--	719	146	76	23	12	976
Total	875	1,984	589	369	86	25	3,928

TABLE 55(a)

PERCENTAGE OF PLANTS WITH NO EMPLOYEES FOUND TO BE AT RISK

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	29.1	15.0	7.4	13.6	3.6	1.0	17.6
40 - 49	--	26.3	28.5	31.2	46.1	17.6	28.6
50,55,59	--	39.6	45.4	37.0	38.4	20.0	40.5
70 - 89	--	54.7	38.0	33.3	40.0	33.3	48.3
Total	--	31.6	23.4	21.4	15.4	6.8	27.2

TABLE 56

NUMBER OF PLANTS WITH ONE OR MORE EMPLOYEES AT RISK TO A POTENTIAL OCCUPATIONAL HEALTH HAZARD (Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	2,125	2,191	1,204	915	398	308	7,141
40 - 49	--	344	146	102	31	25	648
50,55,59	--	1,121	332	172	41	23	1,689
70 - 89	--	532	304	144	43	25	1,018
Total	2,125	4,188	1,956	1,333	513	381	10,496

TABLE 56(a)

PERCENTAGE OF PLANTS WITH ONE OR MORE EMPLOYEES AT RISK TO A POTENTIAL OCCUPATIONAL HEALTH HAZARD

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	70.9	85.0	92.6	86.4	96.4	99.0	82.4
40 - 49	--	73.7	71.5	68.8	53.9	82.4	71.4
50,55,59	--	60.4	54.6	63.0	61.6	80.0	59.5
70 - 89	--	45.3	62.0	66.7	60.0	66.7	51.7
Total	--	68.4	76.6	78.5	84.6	93.2	72.8

TABLE 57

NUMBER OF EMPLOYEES AT RISK TO ONE
OR MORE POTENTIAL OCCUPATIONAL HAZARDS
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	18,483	28,503	27,283	57,371	38,649	91,979	262,268
40 - 49	--	2,979	1,360	2,274	1,071	10,477	18,161
50,55,59	--	9,442	5,102	7,505	1,597	5,026	28,672
70 - 89	--	6,402	6,300	4,138	2,628	3,195	22,663
Total	18,483	47,326	40,045	71,288	43,945	110,677	331,764

TABLE 57(a)

PERCENTAGE OF IN-PLANT EMPLOYEES AT RISK
TO ONE OR MORE POTENTIAL OCCUPATIONAL HAZARDS

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	46.3	42.6	33.4	39.7	36.1	27.4	33.8
40 - 49	--	45.0	25.4	17.7	11.9	57.8	35.0
50,55,59	--	20.6	24.9	45.0	23.6	27.0	26.5
70 - 89	--	20.0	24.5	16.7	19.5	18.0	19.9
Total	--	31.3	30.1	35.9	32.3	28.4	31.6

TABLE 57(b)

TOTAL NUMBER OF POTENTIAL EXPOSURES
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	52,237	77,998	61,130	119,636	88,793	209,267	609,061
40 - 49	0.0	7,638	2,331	6,561	1,800	19,782	38,112
50,55,59	0.0	16,384	11,110	15,323	1,711	7,238	51,766
70 - 89	0.0	11,083	24,340	7,272	6,076	7,005	55,776
Total	52,237	113,103	98,911	148,792	98,380	243,292	754,715

TABLE 57(c)

AVERAGE NUMBER OF HAZARDS PER EMPLOYEE AT RISK*

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	2.83	2.74	2.24	2.09	2.30	2.28	2.34
40 - 49	--	2.56	1.71	2.89	1.68	1.89	2.10
50,55,59	--	1.74	2.18	2.04	1.07	1.44	1.81
70 - 89	--	1.73	3.86	1.76	2.31	2.19	2.46
Total	--	2.39	2.47	2.09	2.24	2.20	2.27

* Average number of hazards = number of exposures ÷ number of workers at risk.

TABLE 58

PLANTS WHICH HAVE SOME EMPLOYEES POTENTIALLY EXPOSED TO MARGINALLY OR INADEQUATELY CONTROLLED HAZARDS (Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	1,687	1,536	853	754	329	239	5,398
40 - 49	--	229	92	70	17	24	432
50,55,59	--	693	137	115	27	14	986
70 - 89	--	375	183	124	31	21	734
Total	1,687	2,833	1,265	1,063	404	298	7,550

TABLE 59

NUMBER OF POTENTIAL EXPOSURES CONSIDERED MARGINALLY OR INADEQUATELY CONTROLLED (Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	43,268	48,904	41,663	86,489	57,656	127,209	405,189
40 - 49	--	1,680	1,020	2,575	634	8,734	14,643
50,55,59	--	7,402	5,417	7,163	303	1,178	21,463
70 - 89	--	6,070	11,160	2,938	3,591	4,401	28,160
Total	43,268	64,056	59,260	99,165	62,184	141,522	469,455

TABLE 60

PLANTS WITH POTENTIAL EXPOSURES TO GENERAL CHEMICAL HAZARDS-MARGINALLY OR INADEQUATELY CONTROLLED
(Projected)

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	1,000	1,111	446	533	272	167	3,529
40 - 49	--	160	66	50	13	22	311
50,55,59	--	429	98	105	13	12	657
70 - 89	--	281	183	48	23	18	553
Total	1,000	1,981	793	736	321	219	5,050

TABLE 61

NUMBER OF POTENTIAL EXPOSURES TO GENERAL CHEMICAL HAZARDS-MARGINALLY OR INADEQUATELY CONTROLLED
(Projected)

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	16,119	27,945	11,968	27,370	22,268	29,703	135,373
40 - 49	--	918	831	592	252	7,011	9,604
50,55,59	--	2,928	1,477	2,964	162	404	7,935
70 - 89	--	2,778	6,540	176	2,570	564	12,628
Total	16,119	34,569	20,816	31,102	25,252	37,682	165,518

TABLE 62

PLANTS WITH POTENTIAL EXPOSURES TO UNIDENTIFIED CHEMICAL HAZARDS-MARGINALLY OR INADEQUATELY CONTROLLED
(Projected)

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	875	817	543	441	197	159	3,032
40 - 49	--	91	52	40	13	15	211
50,55,59	--	462	78	57	9	6	612
70 - 89	--	125	91	57	0	15	288
Total	875	1,495	764	595	219	195	4,143

TABLE 63

NUMBER OF POTENTIAL EXPOSURES TO UNIDENTIFIED CHEMICAL HAZARDS-MARGINALLY OR INADEQUATELY CONTROLLED
(Projected)

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	5,999	11,545	16,643	18,832	12,617	38,227	103,863
40 - 49	--	380	176	1,316	85	332	2,289
50,55,59	--	3,191	1,950	3,040	35	293	8,508
70 - 89	--	1,177	3,500	548	0	2,799	8,024
Total	5,999	16,293	22,269	23,736	12,737	41,650	122,684

TABLE 64

PLANTS WITH POTENTIAL EXPOSURES TO PHYSICAL HAZARDS-
MARGINALLY OR INADEQUATELY CONTROLLED
(Projected)

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	437	588	407	469	188	186	2,275
40 - 49	--	45	13	20	8	12	98
50,55,59	--	198	78	28	9	6	319
70 - 89	--	156	36	57	15	9	273
Total	437	987	534	574	220	213	2,965

TABLE 65

NUMBER OF POTENTIAL EXPOSURES TO PHYSICAL HAZARDS-
MARGINALLY OR INADEQUATELY CONTROLLED
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250 - 499	≥ 500	Total
19 - 39	11,150	7,707	9,649	34,389	19,752	56,379	139,026
40 - 49	--	380	12	667	297	1,388	2,744
50,55,59	--	1,052	1,024	779	105	480	3,440
70 - 89	--	1,842	960	2,194	670	912	6,578
Total	11,150	10,981	11,645	38,029	20,824	59,159	151,788

TABLE 66

PLANTS WITH POTENTIAL EXPOSURES TO DUST HAZARDS-
MARGINALLY OR INADEQUATELY CONTROLLED
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	437	228	310	211	61	60	1,307
40 - 49	--	0	0	0	0	0	0
50,55,59	--	132	39	9	0	2	182
70 - 89	--	31	18	9	3	6	67
Total	437	391	367	229	64	68	1,556

TABLE 67

NUMBER OF POTENTIAL EXPOSURES TO DUST HAZARDS-
MARGINALLY OR INADEQUATELY CONTROLLED
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	9,999	1,705	3,403	5,897	3,017	2,919	26,940
40 - 49	--	0	0	0	0	0	0
50,55,59	--	230	965	380	0	2	1,577
70 - 89	--	271	160	18	351	126	926
Total	9,999	2,206	4,528	6,295	3,368	3,047	29,443

TABLE 68

PLANTS WHICH REQUIRE IMMEDIATE
OCCUPATIONAL HEALTH ASSISTANCE
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	187	130	213	82	79	30	721
40 - 49	--	0	0	0	0	6	6
50,55,59	--	66	19	9	0	2	96
70 - 89	--	93	0	0	0	0	93
Total	187	289	232	91	79	38	916

TABLE 68(a)

PERCENTAGE OF PLANTS WHICH REQUIRE
IMMEDIATE OCCUPATIONAL HEALTH ASSISTANCE

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	6.2	5.0	16.4	7.6	20.7	10.4	8.3
40 - 49	--	0.0	0.0	0.0	0.0	17.6	0.7
50,55,59	--	3.4	3.0	3.7	0.0	10.0	3.3
70 - 89	--	7.1	0.0	0.0	0.0	0.0	4.6
Total	--	4.6	9.2	5.3	14.2	10.0	6.3

TABLE 69

PLANTS WHICH REQUIRE OCCUPATIONAL HEALTH ASSISTANCE WITHIN ONE YEAR (Projected)

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	687	719	368	432	122	136	2,464
40 - 49	--	45	26	50	13	12	146
50,55,59	--	198	39	48	0	8	293
70 - 89	--	125	36	67	7	12	247
Total	687	1,087	469	597	142	168	3,150

TABLE 69(a)

PERCENTAGE OF PLANTS WHICH REQUIRE ASSISTANCE WITHIN ONE YEAR

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	22.9	27.5	28.3	40.1	31.7	47.2	28.4
40 - 49	--	10.5	14.2	31.2	23.0	35.3	17.0
50,55,59	--	10.3	6.0	18.5	0.0	40.0	10.1
70 - 89	--	9.5	9.5	29.1	13.3	33.3	12.3
Total	--	17.3	18.7	34.6	25.5	44.4	21.8

TABLE 70

PLANTS WHICH REQUIRE DELAYED OCCUPATIONAL HEALTH ASSISTANCE (WITHIN 1-3 YEARS)
(Projected)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	1,437	1,438	587	441	173	113	4,184
40 - 49	--	229	79	70	17	12	407
50,55,59	--	858	294	124	41	8	1,325
70 - 89	--	281	183	86	23	12	585
Total	1,437	2,806	1,138	721	254	145	6,501

TABLE 70(a)

PERCENTAGE OF PLANTS WHICH REQUIRE DELAYED OCCUPATIONAL HEALTH ASSISTANCE (WITHIN 1-3 YEARS)

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	47.9	55.0	44.7	41.0	45.1	39.2	48.3
40 - 49	--	52.6	42.8	43.7	30.7	35.3	46.8
50,55,59	--	44.8	45.4	48.1	69.2	40.0	45.7
70 - 89	--	21.4	47.6	37.5	40.0	33.3	28.9
Total	--	44.7	45.2	41.8	45.6	38.6	45.0

TABLE 71

PLANTS WHICH DO NOT REQUIRE OCCUPATIONAL
HEALTH ASSISTANCE UNDER PRESENT CONDITIONS
(Projected)

SIC Groups	Employment Size Grou s						
	8 - 19	20 - 49	50 - 99	100 - 249	250-499	≥ 500	Total
19 - 39	687	327	135	119	9	7	1,284
40 - 49	--	160	79	40	26	2	307
50,55,59	--	792	294	76	18	2	1,182
70 - 89	--	813	164	76	27	12	1,092
Total	687	2,092	672	311	80	23	3,865

TABLE 71(a)

PERCENTAGE OF PLANTS WHICH DO NOT REQUIRE OCCUPATIONAL
HEALTH ASSISTANCE UNDER PRESENT CONDITIONS

SIC Groups	Employment Size Groups						
	8 - 19	20 - 49	50 99	100 - 249	250-499	≥ 500	Total
19 - 39	22.9	12.5	10.4	11.1	2.4	2.4	14.8
40 - 49	--	36.8	42.8	25.0	46.1	5.9	35.3
50,55,59	--	41.3	45 :	29.6	30.7	10.0	40.7
70 - 89	--	61.9	42.8	33.3	46.6	33.3	54.0
Total	--	33.3	26.7	18.1	14.5	6.3	26.7

TABLE 72

PERCENTAGE OF PLANTS 0-5 YEARS
AT LOCATION SURVEYED

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥ 500	Total
19 - 39	35.4	33.7	22.3	19.6	8.5	10.1	28.9
40 - 49	--	42.1	28.5	12.5	7.6	17.6	30.5
50,55,59	--	29.3	36.3	18.5	15.3	0.0	29.4
70 - 89	--	21.4	19.0	20.8	40.0	33.3	21.6
Total	--	30.3	25.9	18.9	12.4	12.6	28.1

TABLE 73

PERCENTAGE OF PLANTS 5-10 YEARS
AT LOCATION SURVEYED

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥ 500	Total
19 - 39	12.5	18.7	4.4	17.0	18.2	12.8	14.0
40 - 49	--	26.3	21.4	25.0	30.7	29.4	25.5
50,55,59	--	27.5	12.1	37.0	23.0	20.0	24.8
70 - 89	--	23.8	14.2	20.8	20.0	0.0	21.1
Total	--	23.0	9.1	21.3	20.2	13.6	17.8

TABLE 74

PERCENTAGE OF PLANTS 10-20 YEARS
AT LOCATION SURVEYED

SIC Groups	Employment Size Groups						
	8-19	20-49	50-99	100-249	250-499	≥500	Total
19 - 39	22.9	23.7	26.8	24.7	20.7	15.3	23.6
40 - 49	--	21.0	14.2	25.0	46.1	17.6	21.9
50,55,59	--	17.2	24.2	11.1	38.4	30.0	18.7
70 - 89	--	33.3	28.5	20.8	13.3	16.7	30.1
Total	--	23.5	25.5	22.2	24.4	16.8	23.4

TABLE 75

PERCENTAGE OF PLANTS 20 YEARS OR MORE
AT LOCATION SURVEYED

SIC Groups	Employment Size Groups						
	8-19	20-49	50 99	100-249	250-499	≥500	Total
19 - 39	29.1	23.7	46.2	38.4	52.4	60.4	33.3
40 - 49	--	10.5	35.7	37.5	15.3	29.4	21.9
50,55,59	--	25.8	27.2	33.3	23.0	50.0	26.9
70 - 89	--	21.4	38.0	37.5	26.6	50.0	27.0
Total	--	22.9	39.3	37.4	42.8	56.2	30.4

TABLE 76

YEARS AT LOCATION VS NEED FOR ASSISTANCE - PLANTS

Years at Location	Need For Assistance				
	Immediate	Within 1 Year	Delayed	Very Seldom	Total
0 - 5	4.7(1)	14.4	46.0	34.9	100.0
5 - 10	2.4	19.6	46.1	31.8	100.0
10 - 20	4.9	21.3	45.2	28.6	100.0
> 20	11.4	30.3	43.3	14.9	100.0
All Plants	6.3(2)	21.8	45.0	26.7	100.0

(1) Of all the plants which have been at a location for 0-5 years, 4.7% require immediate assistance.

(2) Overall, 6.3% of the plants in the survey require immediate assistance.

TABLE 77

THE TOP TEN POTENTIAL HAZARDS BASED
ON NUMBER OF WORKERS EXPOSED
(Projected)

AGENT	TOTAL NUMBER OF WORKERS EXPOSED	INADEQUATELY (I) OR MARGINALLY(M) CONTROLLED EXPOSURE	% OF WORKERS EXPOSED TO AN I OR M CONDITION
Noise, Continuous	63,970	56,345	88.1
Carbon Monoxide	56,069	31,381	55.9
Welding Gases, Unspec.	40,630	33,056	81.3
Cutting Oil Mist	30,495	13,989	45.8
Heat Stress, Dry	27,003	22,549	83.5
Noise, Intermittant	23,681	21,243	89.7
Ketones	22,830	15,176	66.4
General Solvent Vapor	22,098	13,654	61.7
Metal Fume	20,101	14,707	73.1
Ink Solvent Vapor	18,136	8,129	44.8

APPENDIX A

Form Approved
Budget Bureau No.68-R0944

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
Consumer Protection and Environmental Health Service
Environmental Control Administration
Bureau of Occupational Safety and Health
Cincinnati, Ohio 45202

INDUSTRIAL HYGIENE SURVEY (REVISED)

Item No.	Item	For Office Use Only
	I am_____representing the_____. Assurance is hereby given that your identity and relationship to any information obtained by reason of your participation in the Occupational Health Survey will be kept confidential within the Public Health Service. As you may know, we are studying occupational health needs in selected areas in the United States. To help in planning we need to know what kinds of first aid, safety, and other health services employers provide. I also need to walk through your facility with you to look especially at those areas where workers may encounter potential health hazards such as solvents, welding fumes, dust and gases.	☐ 1
1	Date__/__/__/__	☐☐☐☐☐☐ 2-7
2	Establishment Name_____Co. No._____ Address_____ City_____Zip Code_____	☐☐☐ 8-10

ECA-32 (Cin)
(3-69)

3 Interview Name_____
Title_____ 11-15

4 Rating /__/1 /__/2 16

5 What is your chief product or service?_____
_____ 17-20 SIC

6 21 Size

7 Do you have more than one shift? /__/1 Yes
/__/2 No 22

8 How many people do you have on your payroll just now?_____ 23-27

8a How many are typists, bookkeepers, secretaries or other office workers?_____

8b How many are outside salemen or deliverymen whose primary work is outside your facility?_____
_____

9 That leaves about_____in the work area. Is this correct? 28-32

10 Of those in the work area, how many are male?
_____ 33-36

11 Of those in the work area, how many are female?
_____ 37-40

12 How many years has this plant been in operation at this location? 41
0-5 /__/ 5-10 /__/ 10-20 /__/ 20 /__/

13 Is your workmen's compensation insurance carried with an insurance company or are you self-insured? 42

Insurance Company /__/1
Self-Insured /__/2
None /__/3

ECA-32 (Cin)
(3-69)

14 Do you have an agreement with a physician to give your employees emergency or other medical care? 43

- Yes, Full Time ☐1
- Yes, Part Time ☐2
- Yes, On Call ☐3
- No ☐4

15 Do you have a registered nurse in your facility at a regular time? 44

- Yes, Full Time ☐1
- Yes, Part Time ☐2
- No ☐3

16 Do you have an employee responsible for giving first aid when no doctor or nurse is present? 45

- Yes ☐1
- No ☐2 Q. 17 N.A.
- N.A. ☐3 Q. 17 N.A.

17 Does he have any special first aid training? 46

- Yes, Red Cross ☐1
- Yes, Armed Service Medic ☐2
- Yes, Other ☐3
- D.K. ☐4
- No ☐5
- N.A. ☐6

18 Do you receive additional assistance in occupational health from: 47

- Insurance Company ☐1
- Your Own Company ☐2
- Other ☐3
- None ☐4

ECA-32 (Cin)
(3-69)

19 When you hire a new employee do you get information from him about his health on some regular form? ☐ 48

Yes ☐/1

No ☐/2

20 Before you hire a new employee do you require him to take a medical examination? ☐ 49

Yes, All ☐/1

Yes, Some ☐/2

No ☐/3

21 Do you have an arrangement for any of your employees to take a periodic medical examination? ☐ 50

Yes ☐/1

No ☐/2 Q. 22, 23, & 24 N.A.

22 For which employees?

23 Are the examinations required or voluntary?

24 How often are the examinations given?

Which Employees?	No	Arranged For Req'd	Arranged For Voluntary	How Many Times a Yr.? Less than Once	Once	More than Once	
All	☐/1	☐/2	☐/3	☐/1	☐/2	☐/3	☐☐ 51-52
Executive & Supervisory	☐	☐	☐	☐	☐	☐	☐☐ 53-54
Those in hazardous jobs	☐	☐	☐	☐	☐	☐	☐☐ 55-56
Truck Drivers	☐	☐	☐	☐	☐	☐	☐☐ 57-58
Food Handlers	☐	☐	☐	☐	☐	☐	☐☐ 59-60

ECA-32 (Cin)
(3-69)

Others ☐ ☐ ☐ ☐ ☐ ☐ 61-62

25 Do you have an arrangement for your employees to get shots or immunizations for any of these diseases? 63-64

Flu ☐/1 Tetanus ☐/2

Typhoid ☐/4 Any Other ☐/8

None ☐/16

26 Do you offer your employees any educational material about health or illness? 65

Yes ☐/1

No ☐/2

27 Do you keep payroll records of all employees absences from work? 66

Yes ☐/1

No ☐/2

28 Do you keep payroll records of all employee absences from work due to sickness? 67

Yes ☐/1

No ☐/2 Q. 29 & 30 N.A.

29 Do your records show the name of the sickness that caused the absence? 68

Yes ☐/1

No ☐/2

30 Could I have a list of zip codes and occupations of those employees who were absent from work due to sickness two weeks ago today?

31 Many processes or materials used at work can be dangerous to the health of workers. Sometimes it is fairly hard to control such hazards. In your plant do you feel that there are any health hazards, even if you have them under control? 69

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(3-69)

Yes ☐ 1

No ☐ 2

31 What kind of hazards? _____

_____

_____

ECA-32 (Cin)
(3-69)

Hazard Source and Occupation	Hazard Code	Occ. Code	Total at risk	Exposures By Control			Vent. Type
				A	M	I	
ECA-32 (Cin) (3-69)							

ACTUAL SURVEY OBSERVATIONS

Company No. ☐☐☐ 8-10

Using ASA Standards on Industrial Sanitation does this plant meet the criteria for:

1	Housekeeping	Yes ☐1	No ☐2	☐ 40
2	Water Supply	☐1	☐2	☐ 41
3	Toilet Facilities	☐1	☐2	☐ 42
4	Washing Facilities	☐1	☐2	☐ 43
5	Eating Facilities	☐1	☐2	☐ 44

6 Plant Lighting

Good ☐1
Average ☐2
Poor ☐3

☐ 45

7 Comfort Ventilation

Adequate ☐1
Inadequate ☐2

☐ 46

8 Estimated total number of employees at risk for all operations._____ ☐☐☐☐ 47-50

9 Estimated number of exposures rated I or M. _____ ☐☐☐☐ 51-54

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(3-69)

10 Estimated number of exposures rated A. _____ 55-58

11 How many hours are required to routinely survey this plant? _____ 59-60

12 How often in years should this plant be routinely surveyed? _____ 61

13 Plant rating. 62

- ☐ A
- ☐ B
- ☐ C
- ☐ D

ECA-32 (Cin)
(3-69)

APPENDIX B

ABRIDGED VERSION

STANDARD INDUSTRIAL CLASSIFICATIONS*

(As Used for Chicago Survey)

Major Group	
19	Ordnance and Accessories
20	Food and Kindred Products
21	Tobacco Manufactures
22	Textile Mill Products
23	Apparel and Other Finished Products Made From Fabrics and Similar Materials
24	Lumber and Wood Products, Except Furniture
25	Furniture and Fixtures
26	Paper and Allied Products
27	Printing, Publishing, and Allied Industries
28	Chemicals and Allied Products

* Standard Industrial Classification Manual. Prepared by the Office of Statistical Standards, Bureau of the Budget, Superintendent on Documents, U. S. Government Printing Office, Washington, D. C., 1967.

29	Petroleum Refining and Related Industries
30	Rubber and Miscellaneous Plastics Products
31	Leather and Leather Products
32	Stone, Clay, and Glass Products
33	Primary Metal Industries
34	Fabricated Metal Products, Except Ordnance, Machinery, and Transportation Equipment
35	Machinery, Except Electrical
36	Electrical Machinery, Equipment, and Supplies
37	Transportation Equipment
38	Professional, Scientific, and Controlling Instruments; Photographic and Optical Goods; Watches and Clocks
39	Miscellaneous Manufacturing Industries
41	Local and Suburban Transit and Interurban Passenger Transportation
42	Motor Freight Transportation and Warehousing
44	Water Transportation
45	Transportation By Air
46	Pipeline Transportation
47	Transportation Services
48	Communication
49	Electric Gas and Sanitary Services
50	Wholesale Trade
55	Automotive Dealers and Gasoline Service Stations
59	Retail Trade - Miscellaneous Retail Stores
70	Hotels, Rooming Houses, Camps, and Other Lodging Places

72	Personal Services
73	Miscellaneous Business Services
75	Automobile Repair, Automobile Services, and Garages
76	Miscellaneous Repair Services
79	Amusement and Recreation Services Except Motion Pictures
80	Medical and Other Health Services
82	Educational Services
84	Museums, Art Galleries, Botanical and Zoological Gardens
89	Miscellaneous Services