

AD A11266H

**PRELIMINARY SPECIFICATIONS FOR A NAVY OCCUPATIONAL
HEALTH INFORMATION MONITORING SYSTEM (NOHIMS)**

**W. M. PUGH
D. D. BECK**

REPORT NO. 81-36

**DTIC
SELECTED
MAR 29 1982
H**



NAVAL HEALTH RESEARCH CENTER

P. O. BOX 85122
SAN DIEGO, CALIFORNIA 92138

**NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND
BETHESDA, MARYLAND**

DTIC FILE COPY

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution unlimited

88

2

PRELIMINARY SPECIFICATIONS FOR A
NAVY OCCUPATIONAL HEALTH INFORMATION
MONITORING SYSTEM (NOHIMS)

William M. Pugh* and
Donald D. Beck**
with the editorial assistance of
Diane M. Ramsey-Klee

Naval Health Research Center
P. O. Box 85122
San Diego, California 92138



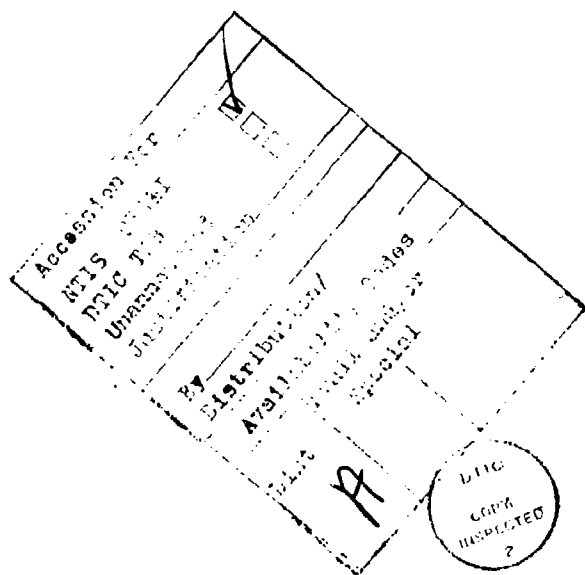
Report No. 81-36 was supported by the Naval Medical Research and Development Command, Bethesda, Maryland, Department of the Navy under research Work Unit MF58.524.023-2022. The views presented in this paper are those of the authors. No endorsement by the Department of the Navy has been given or should be inferred.

* Health Care Systems Department

** ADP Services

ACKNOWLEDGMENTS

The authors gratefully acknowledge the assistance and guidance of Captain Thomas V. McManaman, Commander Chris Holmes, Andrew L. Bryson, Anne K. Burton, and other staff members of the Environmental Health Service, San Diego Naval Regional Medical Center; Captain John Osborne, Lieutenant Tyrone Cormier, Alan M. Watanabe, and other staff members of the Environmental Health Service, Naval Regional Medical Clinic, Hawaii; Captain Richard Nelson, Dr. Glenn H. Randall, and other staff members of the Navy Environmental Health Center; HMCM W. H. Anders and other staff members of the NRMC Branch Clinic, NAS, North Island, San Diego; and Matt Rosa, Safety and Health Manager, Naval Air Rework Facility, NAS, North Island, San Diego.



SUMMARY

The objective of the Navy Occupational Health Information Monitoring System (NOHIMS) development project is to provide an information system that will coordinate the components of the Navy's occupational health program in order to meet the requirements of the Occupational Safety and Health Act of 1970, thus helping to provide a safe and healthful working environment for employees in Navy industrial facilities. This report describes the initial phases of the design and development of NOHIMS. The system is being designed and developed by the Naval Health Research Center (NHRC), San Diego, to insure that not only environmental health data are included but also that the data obtained can be used for epidemiological analyses.

Initial work on this project involved a comprehensive systems analysis of the recordkeeping and reporting requirements of a typical naval industrial facility--the North Island Naval Air Rework Facility (NARF) located at the Naval Air Station, San Diego. Preliminary specifications for collecting, processing, and displaying medical and environmental data within a prototype system were developed. In the design of this prototype system, extensive consultation was conducted with personnel from the Naval Regional Medical Centers in San Diego and Pearl Harbor because the regional medical centers are viewed as the primary users of the system.

The systems analysis accomplished the following. First, the types of data needed to design an integrated occupational health information monitoring system were identified. Second, reference tables were compiled from authoritative sources so that these data could be placed in a meaningful context. Third, reports were developed so that information could be passed along to appropriate users. Fourth, the logical receivers of these reports were identified. Fifth, where possible, appropriate actions to be taken in response to these reports were defined.

With the systems analysis completed, work began on designing a fully automated NOHIMS. Functional specifications for implementation of the system currently are being developed, and software and hardware alternatives are being considered. However, in the meantime it has been possible to implement a semi-automated interim system for testing design concepts. The first phase of the start-up of the fully automated system will be devoted to acquiring the necessary equipment; installing it in appropriate spaces at the Naval Regional Medical Center Branch Clinic, NAS, North Island, and at NHRC; and initiating the procedures for entering into the system illness, treatment, and physical examination data for all dispensary patients. During this initial phase, the primary focus will be on software modification and implementation, and on personnel orientation and training in the use of the program modules and interfaces. The second phase of start-up will concentrate on data collection and report generation.

Pilot testing of the NOHIMS prototype system will be conducted in two phases--an in-house NHRC phase followed by a field test at NAS, North Island. At this point a determination will be made as to whether the prototype NOHIMS has substantially fulfilled the preliminary specifications and system design criteria.

Out-year efforts will concentrate on expansion of the system to include the Pearl Harbor Shipyard to further demonstrate the adaptability and flexibility of NOHIMS, the utility of the communications networking concept, and the ability to conduct epidemiological analyses. Ultimately, it is expected that NOHIMS will be turned over to the Navy Environmental Health Center for installation at all of the Naval Regional Medical Centers.

CONTENTS

	Page
OBJECTIVE	1
BACKGROUND	1
OVERVIEW OF NOHIMS DEVELOPMENT	3
SYSTEMS ANALYSIS	6
Components of an Occupational Health Program	6
Current Information Exchange at the North Island NARF	9
Database Files, Reference Tables, and Reports	11
Database Files	11
Medical Data	11
Environmental Data	13
Personnel Data	13
Reference Tables	16
Job Titles	16
Operational Categories	16
Normal Limits	16
Threshold Limit Values	16
Reports	19
Management Reports	19
Local Information Reports	19
Report Users	21
Industrial Hygienists	27
Occupational Health Nurse	27
Occupational Health Physician	28
Safety Specialists	28
Special Requests	28
SYSTEM DESIGN	29
The Semi-automated Interim System	29
The Fully Automated System	31
FUTURE PLANS AND CONSIDERATIONS	33
Start-up of NOHIMS	36
Pilot Testing of the NOHIMS Prototype System	37
Extension of the NOHIMS Prototype System to a Second Site	38

Page

APPENDICES

A - Examples of Standard Forms	A-0
B - Sources of Information for the NOHIMS Reference Tables	B-0

LIST OF TABLES

		Page
Table 1	Data Sources for NOHIMS	17
Table 2	Example Page from NAVAIREWORKFACINST 4854.2C	18
Table 3	Derivation of the Risk Assessment Code (RAC) . . .	22
Table B-1	Sources of Information for the NOHIMS Reference Tables	B-1

LIST OF FIGURES

		Page
Figure 1	Basic Information Flow from Database to Users	5
Figure 2	Components of the Current Occupational Health Program at the North Island NARF, San Diego	7
Figure 3	Current Information Exchange at the North Island NARF	10
Figure 4	Medical Encounter Form for Naval Dispensary Use	12
Figure 5	Laboratory Test Results Form for Naval Dispensary Use	14
Figure 6	Industrial Hygiene Survey Form	15
Figure 7	Example of the Industrial Hygiene Survey Report (IHSR)	20
Figure 8	Example of the Excessive Exposure Report (EER)	23
Figure 9	Functional Flowchart for Producing the IHSR and the EER	24
Figure 10	Example of CIER-A for the Occupational Health Nurse	25
Figure 11	Example of CIER-B for the Occupational Health Physician	26
Figure 12	The Navy Occupational Health Information Monitoring System	32
Figure 13	Communications Network for Linking Occupational Health Data from a Variety of Sources	34

OBJECTIVE

The objective of the Navy Occupational Health Information Monitoring System (NOHIMS) development project is to provide an information system that will coordinate the components of the Navy's occupational health program in order to meet the requirements of the Occupational Safety and Health Act of 1970, thereby helping to provide a safe and healthful working environment for employees in Navy industrial facilities. In addition, NOHIMS will help satisfy the requirement that the Chief, Bureau of Medicine and Surgery (BUMED) develop a program for medical surveillance, establish appropriate records for an occupational health program, and provide an audit trail of actions taken or not taken and why.

This report describes the initial phases of the design and development of NOHIMS. The system is being designed and developed by the Naval Health Research Center (NHRC), San Diego, to insure that not only environmental health data are included but also that the data obtained can be used for epidemiological analyses. Once a prototype version of NOHIMS becomes functional, the system will be handed over to those responsible for managing the Navy's occupational health program. At that time, NHRC will operate as one component of the overall system--a research component that will identify unusual patterns of illness and correlate environmental factors with occupational disorders.

The initial site selected for the implementation of NOHIMS is the Naval Air Rework Facility (NARF) located at the Naval Air Station, San Diego. This NARF site will serve as a test bed for developing the prototype system. As a result, some of the system characteristics may be unique to that site. However, NOHIMS is expected to be sufficiently flexible for adaptation to most, if not all, Navy industrial facilities.

BACKGROUND

In 1970 Congress enacted the Occupational Safety and Health Act (Public Law 91-596) requiring all employers to provide safe and healthful working conditions for their employees. To implement the OSH Act in the Navy, the Secretary of the Navy and the Chief of Naval Operations have issued SECNAV-INST 5100.10D, OPNAVINST 5100.8E, and OPNAVINST 5100.23A. In SECNAVINST 5100.10D, the Department of the Navy occupational safety and health policy is established and responsibility for Navy programs is assigned. This instruction notes that operational readiness can be enhanced by reducing accidents and injuries in the Navy's work force and directs that a "comprehensive, aggressive, and effective occupational safety and health program..." be established. The Navy Safety and Occupational Health (SOH) program was then established by OPNAVINST 5100.8E. This instruction specified that the Chief

of Naval Material; Chief, Bureau of Medicine and Surgery; Chief of Naval Personnel; and the Commander, Naval Safety Center were to develop procedures and provide instructions for each support area specified and outlined the role that each activity was to take in the SOH program. Finally, OPNAVINST 5100.23A established the Navy Occupational Safety and Health (NAVOSH) program which is somewhat more limited than SOH. In addition, it established the Navy Occupational Safety and Health Inspection Program (NOSHIP) which employs an Oversight Inspection Unit to provide an inspection system covering the total NAVOSH program. In this instruction (OPNAVINST 5100.23A), it is specifically stated that:

"Integral to the proper establishment of a comprehensive occupational health program, is that it be organized and administered by Navy occupational health professionals. Efficient and proper use of these health professionals dictates that the program be directed and administered on a regional basis under the respective naval regional medical center, rather than on an activity basis under an industrial/operational command." Further, the Chief, Bureau of Medicine and Surgery is directed to (a) "design and provide comprehensive workplace monitoring plans...", (b) "develop and implement personnel medical surveillance...", (c) "provide other industrial hygiene and occupational health support...", (d) "conduct annual audits of each industrial/operational activity workplace monitoring program...", (e) provide training and certification for command personnel assigned to perform workplace monitoring," and (f) "establish...appropriate records relating to workplace monitoring and the comprehensive occupational health program."

Carrying out these programs, however, requires the close coordination of several different activities, including the personnel department, the dispensary, the industrial hygienist, the health care providers including the occupational health physician and occupational health nurse, and work center supervisors. The key to establishing the required coordination among these activities is communication. By gathering, storing, and passing along information in a systematic fashion, the above activities become components of an overall occupational health program. For example, the work of the industrial hygienist becomes part of an occupational health program when data obtained during an environmental survey are made available to the work center supervisor and to dispensary personnel. Given this information, the supervisor then can take steps to prevent the exposure of workers in the area. Likewise, when personnel from the area surveyed are treated or examined in the dispensary, potentially affected organ systems can be accorded special consideration given that dispensary personnel have been alerted to the environmental survey findings. By routinely gathering specified data and systematically passing on selected information, it would be assured that activities with a need for certain information would be promptly informed about events in their area of concern.

OVERVIEW OF NOHIMS DEVELOPMENT

The Navy employs hundreds of thousands of workers (both civilian and military) who are scattered across the country, involved in a variety of diverse industrial operations, and exposed to multiple health risks from an array of chemicals and other agents. The Naval Regional Medical Center (NRMC), San Diego is responsible for managing occupational health programs for approximately 150,000 naval employees in the immediate area, of which approximately 85,000 men and women are active duty military members, the remaining 65,000 being civilian employees.

In order to design an information system that monitors occupational health, it first was necessary to conduct a systems analysis of the various activities that would contribute information to the databases to be maintained in the system. The various activities that play a role in occupational health need to be identified, and the functions performed by each activity must be described in detail. Only when the results of the systems analysis become available can system design alternatives be rationally considered.

Therefore, initial work on this project involved a comprehensive systems analysis of the recordkeeping and reporting requirements of a typical naval industrial facility--the North Island NARF in San Diego. Preliminary specifications for collecting, processing, and displaying medical and environmental data had previously been developed within the dispensary serving the North Island NARF.* In the design of the prototype system, extensive consultation was conducted with personnel from the Naval Regional Medical Centers in San Diego and Pearl Harbor because the regional medical centers are viewed as the primary users of the system.

The systems analysis conducted as an initial phase of this project identified the eight functions described below as crucial components of a prototype Navy Occupational Health Information Monitoring System. The individual or activity performing each function appears in parentheses following the function.

- Maintaining a list of all employees and their work histories (the personnel department/the division clerk).
- Monitoring work place hazards (the industrial hygienist).
- Monitoring workers and work practices in the work place (the work center supervisor).

* Hermansen, L., & Pugh, W. M. A system for monitoring employee health in a Navy occupational setting (Report No. 81-3). San Diego, CA: Naval Health Research Center, 1981.

- Training workers in safety procedures, issuing protective gear, and investigating accidents and injuries in the work place (the safety specialist).
- Identifying which employees are at risk and ensuring that high risk personnel and personnel exposed to hazardous substances have appropriate examinations (the designated occupational health staff coordinator).
- Treating sick and injured personnel and medical surveillance of employees (the occupational health physician).
- Conducting epidemiological studies of the correlates of high or increased incidence of illness/injuries in worker populations (the epidemiological researcher).
- Program management and analysis.

The successful performance of these eight functions is dependent on access to three databases and exchange of information. The three types of data needed to design an integrated occupational medical surveillance system are personnel data, environmental data (work place survey data), and medical data. However, the data contained in these databases may not be informative by themselves. That is, it may be necessary to compare a data measurement to a reference table to be able to interpret the significance of the observed value. For example, the measured amount of a contaminant found in the work place needs to be compared to a table of Threshold Limit Values* to determine if the exposure level presents a health risk to workers. Similarly, the result of a laboratory test on a patient needs to be referred to a table containing the range of normal values for that test to determine if the patient's result is abnormal. Thus, raw data need to be placed in a context that can provide a reference for interpretation and evaluation.

Once data measurements have been compared to standard reference points, it becomes possible to compile reports and to exchange this information on a timely basis. This fundamental flow of information from the collection or capture of raw data to the interpretation and evaluation of these data and their compilation in a report to users is shown in Figure 1.

* Registered trademark of the American Conference of Governmental Industrial Hygienists.

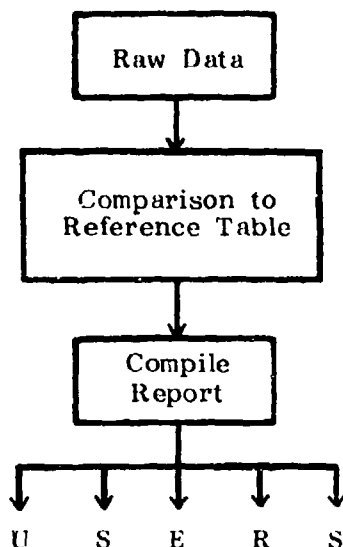


Figure 1. Basic Information Flow from Database to Users.

In summary, the systems analysis accomplished the following. First, the data needed in an integrated occupational health information monitoring system were identified. Second, reference tables were compiled from authoritative sources so that these data could be placed in a meaningful context. Third, reports were developed so that information could be passed along to appropriate users. Fourth, the users or logical receivers of these reports were identified. Fifth, where possible, appropriate actions to be taken in response to these reports were defined.

With the systems analysis completed, work began on designing a fully automated NOHIMS. Functional specifications for implementation of the system currently are being developed, and software and hardware alternatives are being considered. However, in the meantime it has been possible to implement a semi-automated interim system for testing design concepts. This interim system has been of benefit because basic reports can be produced which not only have practical use but also enable users to visualize what the fully automated system will do to support their information needs. In addition, the semi-automated system has been helpful in evaluating both the content and format of these basic reports. Finally, it is felt that the implementation of the semi-automated system will ease the transition from the current practices to the fully automated NOHIMS.

The remainder of this report describes the systems analysis and design process in detail. The information sources that were used are documented, and examples of standard forms and computer-produced reports are included. The report concludes with a discussion of future plans and considerations for continued development and implementation of NOHIMS.

SYSTEMS ANALYSIS

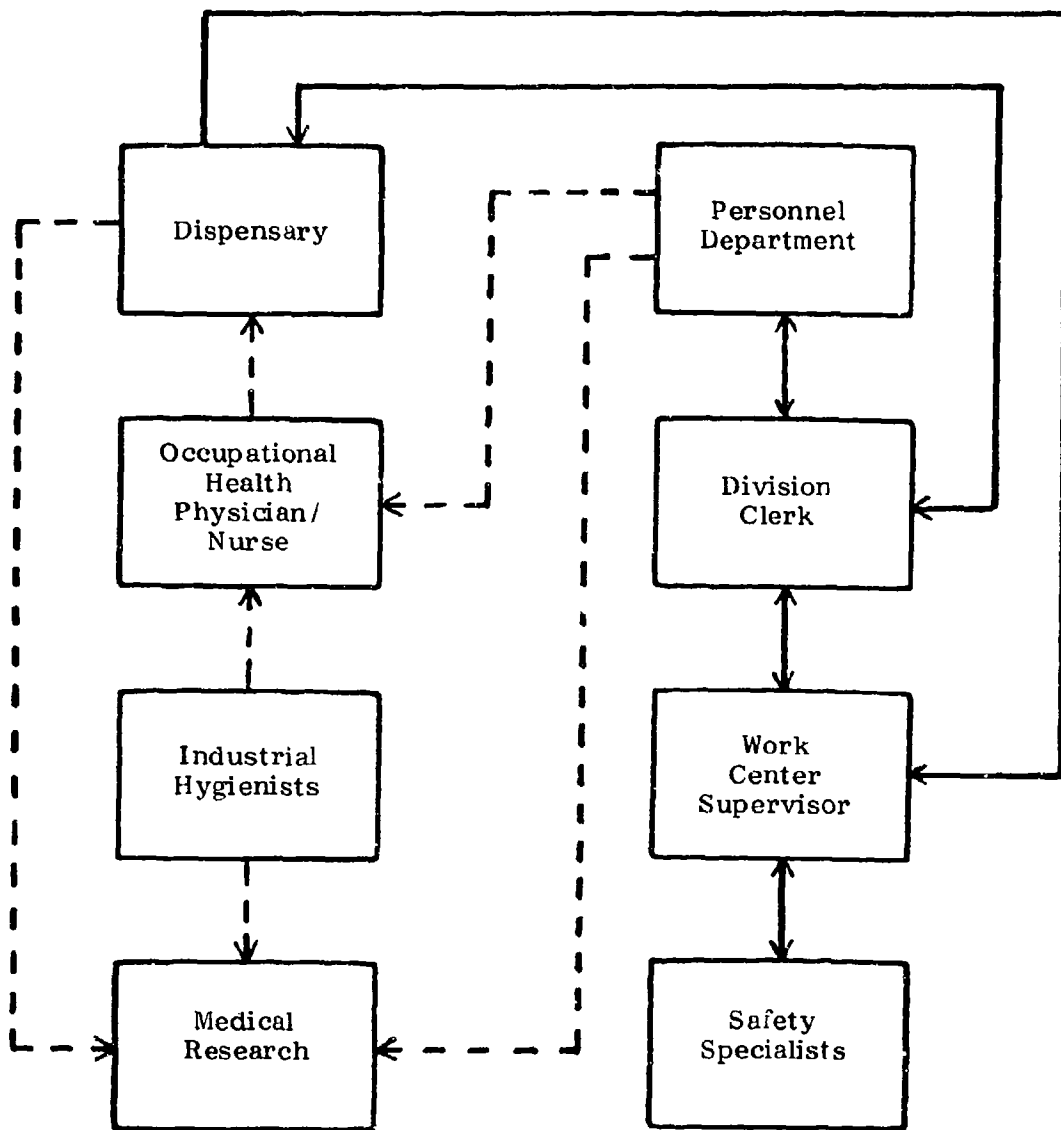
A comprehensive systems analysis of the occupational health program at the North Island Naval Air Rework Facility (NARF), San Diego was conducted over a period of eight months. In addition to this intensive analysis at the North Island NARF, a number of discussions were held with representatives of the Pearl Harbor Shipyard to make certain that system design features would take into consideration the similarities and differences between naval shipyards and naval air rework facilities. These two types of work sites employ thousands of workers, both civilian and military, and have the potential of exposing employees to health risks by the nature of the repair work they do. Industrial operations in these facilities are diverse and include extensive rip-out, maintenance, and repair of many types of Navy ships (such as submarines, aircraft carriers, and surface vessels); full dry-dock operations; and repair and maintenance of a variety of naval aircraft.

Components of an Occupational Health Program

The systems analysis conducted at the North Island NARF identified eight vital components in their occupational health program. These eight components are shown schematically in Figure 2. These same eight components are vital in the occupational health program of naval shipyards, although the communication links among the components are somewhat different in certain cases.

The dispensary/clinic is one of the first components that comes to mind in a listing of those activities that play a role in occupational health. The first function one might consider is the treatment of sick and injured personnel--certainly an important function. However, in the context of occupational health, the focus shifts toward preventive medicine, and therefore, pre-employment, exit, and periodic physical examinations are particularly important. In this regard, the dispensary must determine if an employee is medically qualified to perform specific tasks in an area where certain hazards and chemical substances are present. Thus, it is necessary for employees to be sent to the dispensary at appropriate times accompanied by information regarding type of work performed and hazardous materials in the person's work area. In addition, information should be provided on the potential effects of the hazards to guide the selection of tests to be performed, and normal limits for laboratory results should be defined to insure that a consistent program is applied to all employees. Finally, the information on dispensary visits needs to be stored so that it can be reviewed periodically in order to determine if any significant illness trends exist.

While the dispensary monitors the health of the employees, the industrial hygienists monitor the environment. Through periodic surveys and surveys motivated by concern over a potential exposure of personnel to toxic substances, industrial hygienists obtain data on the contaminants in various work spaces, measure their concentration, rate the probability of a mishap as



LEGEND :

- Current Communication Links
- - - - - Proposed Communication Links

Figure 2. Components of the Current Occupational Health Program at the North Island NARF, San Diego.

well as the potential severity, and assess work practices. These data are first compared to various standards and regulations and then used to compile a report documenting the conditions found and specifying any remedial action that should be taken.

Occupying a position between the dispensary and the industrial hygienists is the health care provider. The occupational health physician and the occupational health nurse are responsible for identifying which employees are at risk and insuring that high risk personnel and personnel who have been exposed to hazardous substances have appropriate physical examinations. Also, the occupational health nurse is needed to follow through and make certain that corrective action is taken when a person has manifested ill effects as a result of a work place exposure.

The personnel department is involved in occupational health primarily because this department maintains a list of all employees and their work histories. Prior to employment, inquiries are made to determine if an individual has a physical condition that would preclude the performance of required tasks (see Standard Form 78 and Standard Form 93 in Appendix A). Also, information about where the person works and the type of work performed is maintained. This latter information, which can be used to track an individual through the work environment, is particularly important when trying to document trends or when a substance is found to have an effect after a long latency period.

Because occupational health deals with the illnesses and injuries that result from exposures in the work place, the work center supervisor is another key figure in the occupational health program. The supervisor must constantly monitor the work situation, sending new workers or workers with new assignments to the dispensary for medical certification and to training sessions to learn proper work procedures. The supervisor must monitor workers to insure that proper procedures are followed and that appropriate protective gear is used and worn properly. The supervisor also must be aware of what substances in the work place constitute a hazard and report the existence of these materials whenever the exposure to a hazardous substance may be of special interest at the time that an employee reports to the dispensary.

The division clerk functions between the personnel department and the work center supervisor and maintains communication with the dispensary. The clerk receives information from the work center supervisor about any changes in an employee's status and records these changes in the files maintained by the personnel department. The clerk also passes from personnel to the supervisor reminders that certain employees are due for an examination, schedules appointments for examinations, prepares the necessary forms prior to the exam, and records any significant exam results after the exam.

Safety specialists work closely with the work center supervisors providing training courses for the workers, issuing protective gear, and investigating the circumstances surrounding accidents and sending the appropriate reports (see OPNAV Instruction 5102.1) on to the Naval Safety Center. In addition, the safety specialists monitor the introduction of new materials into work spaces through the material data safety sheets.

Finally, on either a formal or informal basis there is a medical research function which first monitors illness and the laboratory results of medical examinations in order to detect any trend toward increased illness among groups of employees. Upon the identification of any such trend, demographic and environmental correlates are investigated in an attempt to identify causal factors.

Current Information Exchange at the North Island NARF

A diagram of the current information exchange at the North Island NARF is shown in Figure 3. The numbers in parentheses on the diagram correspond to the numbers in parentheses in the following text that describes the figure. At the present time, there is a manual system for linking at least some of the components described above. In the procedures prescribed in NAVAIWORKFAC Instruction 6260.3B of 4 March 1981, (1) supervisors are to alert the division clerk whenever an employee is placed in a hazardous work environment and indicate which "operational categories" apply. (2) The division clerk then is to update the "personnel extract file" (PEF), maintained by the personnel department, to show that the employee is to have a periodic physical examination and, using the operational category information, indicate the type of examination and exam schedule to be used. In this manual system, (3) the division clerk receives a list of personnel due for a physical examination each month. (4) The clerk then schedules an appointment for each person. (5) Upon confirmation of the time by the supervisor (who also notes the type of metals the employee works with), (6) the clerk prepares a Form 5100/9 (Dispensary Permit), (7) contacts the employee, and has the worker report to the dispensary. Meanwhile, on the day prior to each scheduled visit, (8) a technician, working for the occupational health nurse, uses the information placed in the PEF by the division clerk regarding the type of exam to be performed to make up laboratory charts. (9) When the employee reports for the exam, the tests are performed. (10) Upon receipt of the lab results, the employee proceeds to the physician. (11) The physician completes the exam, notes any physical restrictions on the Form 5100/9, and sends the employee back to the work center supervisor (12) who routes the 5100/9 back to the division clerk. (13) The clerk then updates the PEF if there is any change in the medical requirements of the work, thus completing the cycle.

An interesting observation about Figure 3 is that there currently is a noticeable lack of involvement of the occupational health nurse and the industrial hygienists in the exchange of information. The NOHIMS design remedies this deficiency.

WORK CENTER

PERSONNEL DEPARTMENT

DISPENSARY

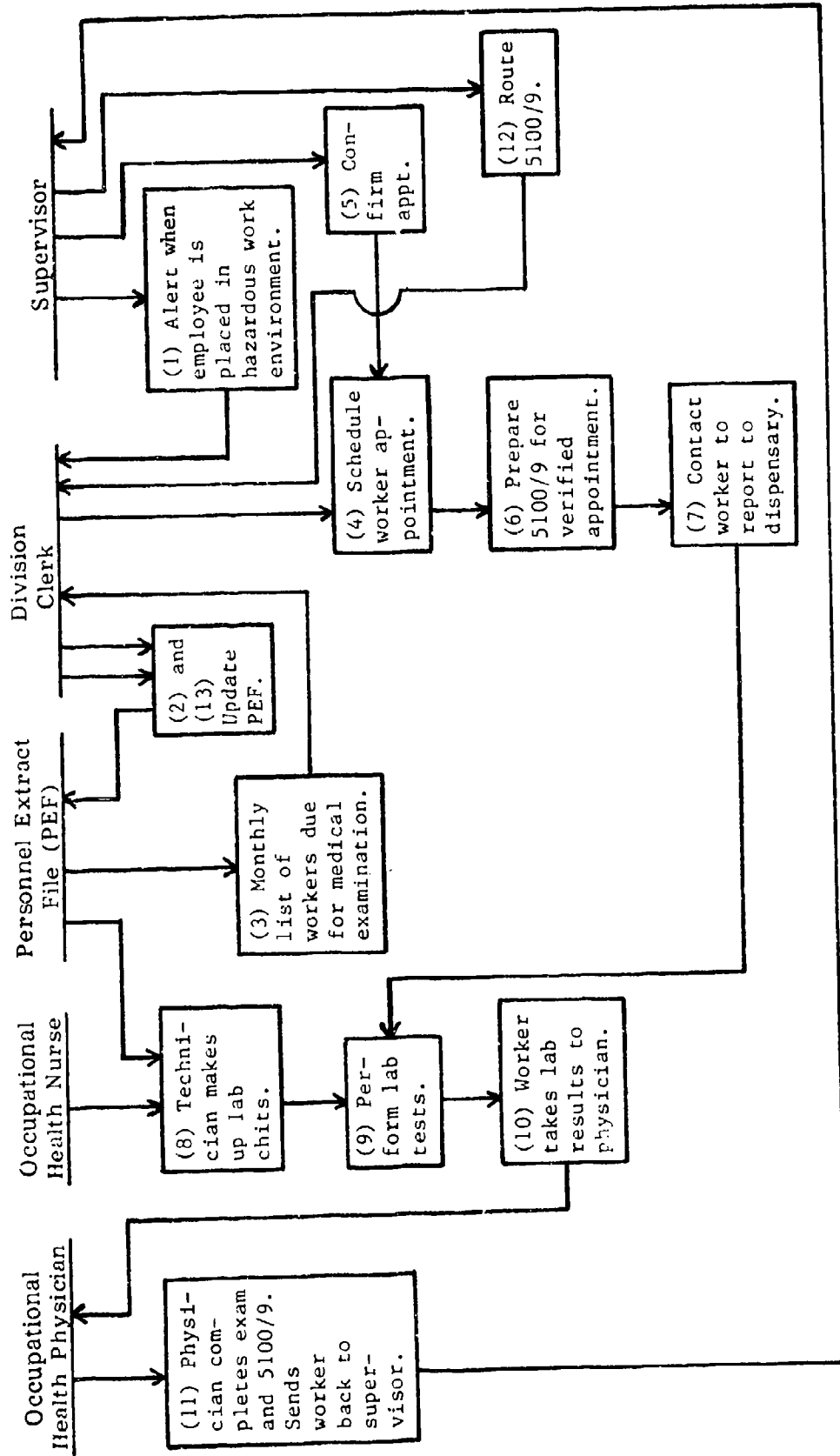


Figure 3. Current information Exchange at the North Island NARF (from NAVAIWORKFACINST 6260.3B, 4 March 1981.

Database Files, Reference Tables, and Reports

Data stored in database files are compared to reference tables to interpret and evaluate their significance. Evaluated data then can be aggregated in various ways and tabulated in summary reports. The database files, reference tables, and reports analyzed thus far are described below.

Database Files. Three basic types of data were identified. These include medical data, environmental data, and personnel data. Each of these is a distinct data set, not only because of its content but also because different activities or commands are responsible for obtaining and maintaining the different types of data. But given these three data sets, it becomes possible to track individuals through environments (using personnel data), determine environmental exposures (using industrial hygiene data) and thus who is at risk (and should be examined), and finally establish who has been examined for possible effects due to environmental contaminants (using dispensary data). By interrelating these three data sets in a systematic way, the medical certification of personnel for work assignments can be standardized.

Medical Data. The medical data file then would consist of information needed to compile management reports or information needed to assist in the systematic medical certification of employees. Because the bulk of the management information is forwarded via the Medical Services and Outpatient Morbidity Report (NAVMED 6300/1) and the Report of Occupational Health Services (NAVMED 6260/1), these forms (examples of which are included in Appendix A) were used to construct a basic set of data elements for the medical data file. Thus, the medical data file includes data regarding the type of visit (e.g., illness or injury, occupational or nonoccupational, physical examination, etc.); a list of illnesses, injuries, and symptoms; adjunct services provided; causative agents for occupational medical conditions; initial and final disposition; and the type of service provided.

The specific data elements needed to capture the required medical information were determined, and a patient encounter form (see Figure 4) was designed for dispensary use. However, many of the categories present on the NAVMED 6300/1 and NAVMED 6260/1 report forms were expanded. This expansion is most notable in the augmented list of injuries, illnesses, and symptoms. For example, rather than using a general category such as "acute respiratory diseases, incl. URI" found on the NAVMED 6300/1 form, more specific disease identifiers were used such as bronchitis, pharyngitis, or tonsillitis. The expanded list of categories permits a comparison of the data obtained with data coded according to the ICDA (International Classification of Diseases - Adapted) codes or with a variety of other coding schemes. Finally, it should be noted that the 104 illness categories listed on the patient encounter form developed for naval dispensary use are based on the results of a previous survey conducted at a dispensary serving a naval air rework facility.*

* Hermansen, L., & Pugh, W. M. A system for monitoring employee health in a Navy occupational setting (Report No. 81-3). San Diego, CA: Naval Health Research Center, 1981.

For medical certification purposes, additional information is needed about the individual's medical history including information about past medical conditions or chronic disorders (such as hay fever, asthma, or recurrent back pain) as well as laboratory test results. Such data are partially documented on Standard Form 93 - Report of Medical History shown in Appendix A. However, because allergies are not well covered by Standard Form 93, it may be advisable to collect that information on the patient encounter form. Finally, to collate and document laboratory results, a new form for laboratory test results was developed (see Figure 5). This form has space for the results of any laboratory test that can be performed at the North Island NARF dispensary.

A final item included on the patient encounter form and the laboratory test results form is the time and date that the assessments were made. These data are necessary in order to identify any trends that may emerge over time.

Environmental Data. The environmental data consist of those data obtained by the industrial hygienists during a work area survey. The basic information includes the area identification (building and shop number in the case of the NARF), a list of the contaminants present, and the measured concentration of each contaminant. In addition, the industrial hygienist rates, in accordance with OPNAVINST 5100.23A, the mishap probability and hazard severity of the substances identified so that a risk assessment can be derived. An Industrial Hygiene Survey Form developed by the San Diego Navy Regional Medical Center's Environmental Health Service to capture the required data is shown in Figure 6.

Personnel Data. Of most importance for occupational health is a complete accounting of all employees. In addition to a role call list, data elements needed from the Personnel Department include demographic items, work location, and work type. At the NARF most of these data elements can be found in a computerized database called the personnel extract file (PEF) currently being maintained in accordance with NAVAIWORKFACINST 4854.2C. From the PEF the following data elements can be obtained: employee name, social security number (for identification purposes), birth date, sex, permanent building and shop number, temporary building and shop number, and civil service series code (which can be converted to a job title). Also included on the PEF is a notation indicating whether a person is to have a periodic physical examination, the months the examinations are to take place, and a set of "operational categories" which indicate the clinical tests that should be performed.

Other data to be obtained from the personnel department include ethnic origin and information regarding functional requirements (i.e., type of physical activity required) for the job an employee is to perform. This information (except for ethnic origin) is documented on Standard Form 78 - United States Civil Service Commission Certificate of Medical Examination (an example is included in Appendix A).

SAMPLING OR MEASURED RESULTS SUMMARY

- DRAGER TUBE
- VENTILATION NOTES
- MANUFACTURERS LITERATURE
- GENERAL OBSERVATIONS

- JH LAB ANALYSIS
- COMMERCIAL LAB

COMPANY OR MAJOR FACILITY _____

INTERVIEW WITH _____

BUILDING NUMBER	LOCATION, CODE, SHOP	CONTAMINANTS	CONCENTRATIONS (USE CHEMICAL OR PHYSICAL SYMBOLS WHERE NECESSARY)	PERMISSIBLE EXPOSURE LIMITS (PEL)	PERSONNEL, NAME, SSN, JOB NUMBER	JOB TITLE	NUMBER (TOTAL EXPOSED)	HAZARD ASSESSMENT	MEDICAL EXAM REQUIRED	FREQUENCY

APPROVED

NON-APPROVED

SIGNATURE _____

DATE _____

TITLE _____

Figure 6. Industrial Hygiene Survey Form.

The various sources of data needed for NOHIMS are listed in Table 1.

Reference Tables. As explained earlier, in order to make the various types of data meaningful, they often must be placed in some context. This context is contained in a series of tables. The tables that have been identified include a table of job titles, a table of operational categories, a table of normal limits for laboratory results, and a threshold limit value (TLV) table.

Job Titles. The table of job titles is the most straightforward. It simply provides a translation of civil service series codes to a corresponding job title. Nevertheless, the ability to provide an actual job title to a physician, an industrial hygienist, or an occupational health nurse is very important for occupational health because it connotes information about the job processes an employee engages in and thus the worker's exposures can be inferred.

Operational Categories. The next table in order of complexity is the table of operational categories (see Table 2). This table is based on NAVAIWORKFACINST 4854.2C, Vol. 4, Chapter III, Sec. C. With this table, the operational category codes on the PEF can be converted to a set of job processes, and these in turn define the relevant clinical tests to be performed (e.g., X-ray, pulmonary function test, CBC, etc.). However, this table needs to be revised because terms such as SMA-4 and SMA-12 do not adequately define the tests required.

Normal Limits. The table of normal limits is the next most complex table and possibly not considered the most complex because it is the least developed table thus far. Information for this table is available from COMSCINST 6000.1B CH-1, however. This table provides a set of normal ranges for the laboratory test results that are obtained. Complexity is introduced into this table by the fact that the normal range for a test may vary according to sex, ethnic origin, and age.

Threshold Limit Values. The final and most complex table is the threshold limit value (TLV) table. This table contains a list of all the contaminants that may be found at the North Island NARF. For each contaminant both the threshold limit value (TLV) and the permissible exposure level (PEL) are given. In most cases, the TLV and PEL are similar. When they differ, the TLV is a more recent and generally a more conservative reference. Values for the TLVs and PELs are presented as time-weighted averages, and when appropriate, the ceiling level is also indicated. Further, the various limits are available both as a measure in parts per million (PPM) and as milligrams per cubic meter (MG/M³). Also indicated for each contaminant are the areas for special medical consideration (i.e., organ systems potentially affected), the frequency that periodic physical examinations should be conducted for screening purposes, and two flags used to indicate whether a substance is a carcinogen or a prohibited substance.

The sources of information for the NOHIMS reference tables are cataloged in Appendix B. Complete citations are provided for the nine documents in which pertinent information was found. Also identified in this appendix are the types of information and pointers to associated data.

Table 1

Data Sources for NOHIMS

Medical Sources

Patient Encounter Form

Laboratory Test Results Form

Standard Form 93 - Report of
Medical History

Allergies*

Personnel Sources

Personnel Extract File (PEF)

Standard Form 78 - United States
Civil Service Commission Certifi-
cate of Medical Examination

Ethnic Origin*

Environmental Sources

Industrial Hygiene Survey Form

* Data elements which are needed
but not currently available.

Table 2
Example Page from
NAVAIREWORKFACINST 4854.2C

<u>CODE</u>	<u>OPERATIONAL CATEGORY</u>	<u>CLINICAL TESTS</u>	<u>SCHEDULE</u>
12	Lead Azide Workers Explosive Handlers	Physical Examination for pathological factors which may associate with exposure to the particu- lar explosive Pulmonary Function * Blood-Heavy Metal Ion Used Urine Mercury EKG	Annually Annually Semiannually Semiannually Pre-employment & biennial after 35 years of age
13	Paint Strippers	Physical Examination SMA-4 SMA-12 Chest X-ray Blood Acetone	Annually Semiannually Semiannually Annually Semiannually
14	Chlorinated Hydro- carbon Process Workers such as using: Trichloroethylene Freon Methyl-chloroform (trichloroethane) Methyl-chloride	Physical Examination SMA-12	Annually Semiannually
15	Plastic Trade Workers Waxes, Patches, Tar, Resins, Fiberglass Lay-Up Workers	Physical Examination Skin Examination for Dermatitis SMA-12 Pulmonary Function Chest X-ray	Annually Annually Semiannually Pre-employment & annually thereafter Annually
16	Spray Painters using non-pigmented paints	Physical Examination SMA-4 Blood Acetone SMA-12 Pulmonary Function Chest X-ray	Annually Semiannually Semiannually Semiannually Pre-employment & semiannually thereafter Semiannually

NAVAIREWORKFACINST 4854.2C CH-40
Vol. 4, Chap. III, Sec. C
7 October 1976

Reports. Reports are the basic medium for passing information and thus facilitating the coordination of various activities. In general there are two types of reports. The first type of report informs a higher authority of how the system is functioning, and these will be referred to as management reports. The second type of report simply makes available the information of one or more activities to another, and these will be called local information reports.

Management Reports. As mentioned earlier, there are two management reports already in routine use at Navy dispensaries--the Medical Services and Outpatient Morbidity Report (NAVMED 6300/1) and the Report of Occupational Health Services (NAVMED 6260/1). It is proposed that an additional report, called the Exam Compliance Report (ECR), be devised to assess compliance with requirements for the routine examination of employees working with hazardous substances. In addition, it should be noted that there is an entire set of management reports, required by the Naval Safety Center in the case of an accident, which document the conditions surrounding any accident. These reports are covered by OPNAV Instruction 5102.1.

Local Information Reports. The only existing local information report is the Dispensary Permit Form, OPNAV 5100/9 (an example is included in Appendix A). This form in the context of the occupational health program is used to inform the employee of an appointment for a physical examination, to convey to the dispensary information regarding the employee's work environment, and to return to the work center supervisor information regarding any changes in medical requirements that may have resulted from the employee's medical examination. Standard Form 78 - United States Civil Service Commission Certificate of Medical Examination (see Appendix A) also could be considered a local information report because it is a form initiated by the personnel department that also has input from the dispensary and then is returned to personnel. However, Standard Form 78 has already been considered as a basic data source provided by the personnel department.

The remaining NOHIMS reports consist of local information reports designed to fill as yet unmet needs of the Navy's occupational health program. These reports include the Industrial Hygiene Survey Report (IHSR), the Excessive Exposure Report (EER), and the Comprehensive Individual Exposure Report which includes version A for the occupational health nurse (CIER-A) and version B for the examining physician (CIER-B).

The IHSR (see Figure 7) is a report that is designed to combine information from various sources into a single document for each work area at a Navy industrial facility. For the North Island NARF, the IHSR identifies each work area by building and shop number and then provides a list of the contaminants present and the personnel assigned to the area. For each contaminant the industrial hygienist's measurement of the concentration is shown as well as the hazard severity rating and the mishap probability. These latter two ratings then are combined as specified in OPNAVINST 5100.23A to

BUILDING NUMBER	LOCATION CODE	SHOP	CONTAMINANTS	CONCENTRATION	PERMISSIBLE EXPOSURE LIMIT	HAZARD ASSESSMENT SEVERITY	PROB RAC	EXAMINATION REQUIRED	FREQUENCY
0001	93435		ACETONE	750 PPM	750PPM	1780MG	II D	4	RESPIRATORY
			DIOXANE	10 PPM	25PPM	90MG			SKIN EYES KIDNEY LIVER SKIN EYES KIDNEYS LIVER SKIN BLOOD EYES KIDNEY LIVER RESPIRATORY SKIN URINARY RESPIRATORY CNS RESPIRATORY SKIN CNS EYES G?
			ETHYLENE DICHLORIDE	45 PPM	10PPM	40MG			
			HYDRAZINE	ND	0.1PPM	0.1MG	I B	1	
			ISOCYANATES	93 DBA	02PPM	14MG	III C	4	
			MEK	1250 PPM	200PPM	590MG	III B	2	
			METHYL ALCOHOL	-	200PPM	260MG	II D	4	
			NOISE	93 DBA	84DBA	-	III C	4	
			NOISE	93 DBA	84DBA	-	III C	4	
			NOISE	105 DBA	80DBA	-	III C	4	
			TOLUENE	150 PPM	100PPM	375MG	III B	2	
			X-RAY	0.04 MR	-	-	II D	4	
			ZINC CHLORIDE	1 MG	-	1MG	III B	3	

JOB TITLE	PERSONNEL NAME	NUMBER
ROTOR BLADE MECH	DOE JOHN	12345
	DOE ANNE	34567
	DOE LARRY	45678

Figure 7. Example of the Industrial Hygiene Survey Report (IHSR).

generate the risk assessment code (RAC) as shown in Table 3. The RAC represents the risk associated with an uncorrected deficiency in the working environment and combines the elements of hazard severity and mishap probability. By accessing the TLV table, the threshold limit value, the area of special medical consideration, and examination frequency are also provided for each substance. In addition, the job title as determined by the civil service series code is given.

The EER (see Figure 8) is essentially an extract of the IHSR in which those areas are listed where the actual concentration of a contaminant exceeds the TLV. A schematic showing how the various sources of data are combined to form the IHSR and the EER is shown in Figure 9.

The CIER is similar to the IHSR in that information is drawn from the industrial hygienist survey file, the TLV table, and the PEF to generate the report. It is different, however, because the IHSR was designed to document the conditions within a work area whereas the CIER shows the exposures and other information for a particular individual. Thus, data from the PEF include not only job title (as determined by the civil service code), but also the job processes that the employee engages in and the type of examination(s) required by those job processes. It should also be noted that the CIER is designed to be generated for an employee on the month(s) that he or she is scheduled to be examined. Following the information from the PEF is a list of the contaminants the employee works with and the areas of special medical consideration. In order to present the list of contaminants to the occupational health physician in an organized fashion, contaminants are listed in the following sequence: prohibited substances and carcinogens appear first, followed by those requiring medical surveillance, then substances in excess of the TLV/PEL, and finally any other contaminants found in the employee's work space. Figures 10 and 11 show respectively the occupational health nurse's version of the CIER (CIER-A) and the physician's version (CIER-B).

Report Users. After a report has been generated, it must be sent to some destination where the information can be put to use. In the case of standard reports such as the Report of Occupational Health Services (NAVMED 6260/1), the Medical Services and Outpatient Morbidity Report (NAVMED 6300/1), and the Dispensary Permit (OPNAV 5100/9), users have been specified. OPNAV 5100/9 serves for local communication among the work center supervisor, the division clerk, and the dispensary, while NAVMED 6260/1 and NAVMED 6300/1 forward dispensary data to BUMED.

The proposed new reports that have been developed in this project were designed to more fully integrate certain activities into the NARF occupational health program. Thus, some specific uses guided the development of the proposed reports, and these considerations will be discussed below according to user.

Table 3
Derivation of the Risk Assessment Code (RAC)

		<u>Mishap Probability</u> **			
		A	B	C	D
<u>Hazard Severity</u> *	I	1	1	2	3
	II	1	2	3	4
	III	2	3	4	5

* Hazard Severity

- I - Catastrophic: The hazard may cause death or loss of a facility.
- II - Critical: May cause severe injury, severe occupational illness, or major property damage.
- III - Marginal: May cause minor injury, minor occupational illness, or minor property damage.

** Mishap Probability

- A - Likely to occur immediately or within a short period of time.
- B - Probably will occur in time.
- C - May occur in time.
- D - Unlikely to occur.

CONTAMINANT CONCENTRATION ABOVE PERMISSIBLE EXPOSURE LIMITS						
BUILDING	SHOPS	CONTAMINANT	CONCENTRATION	JOB CODE		
1	1378	95424	NOISE	90DBA	3806	33 840BA
2	000M	93422	NOISE	90DBA	3806	33 840BA
3	000M	93423	NOISE	90DBA	3806	33 840BA
4	000M	94153	NOISE	90DBA	2892	33 840BA
5	000M	94251	NOISE	90DBA	2614	33 840BA
6	000M	95415	NOISE	90DBA	3606	33 840BA
7	000M	95731	NOISE	90DBA	8801	33 840BA
8	000M	95731	NOISE	90DBA	8852	33 840BA
9	001	93244	NOISE	93DBA	4604	33 840BA
10	001	93421	ETHYLENE DICHLORIDE	45PPM	8807	-- 10PPM
11	001	93421	MEK	1250PPM	8807	22 200PPM
12	001	93421	NOISE	93DBA	3806	33 840BA
13	001	93421	NOISE	105DBA	8807	33 840BA
14	001	93421	TOLUENE	150PPM	8807	22 100PPM
15	001	93422	NOISE	93DBA	3806	33 840BA
16	001	93423	NOISE	93DBA	3806	33 840BA
17	001	93431	ETHYLENE DICHLORIDE	45PPM	8807	-- 10PPM
18	001	93431	MEK	1250PPM	8807	22 200PPM
19	001	93431	NOISE	105DBA	8807	33 840BA
20	001	93431	TOLUENE	150PPM	8807	22 100PPM
21	001	93432	ETHYLENE DICHLORIDE	45PPM	8807	-- 10PPM
22	001	93432	MEK	1250PPM	8807	22 200PPM
23	001	93432	TOLUENE	150PPM	8807	22 100PPM
24	001	93433	ACETONE	1400PPM	4352	23 750PPM
25	001	93433	DIETHYLENE TRIAMINE	5PPM	4352	23 1PPM
26	001	93433	ETHYLENE DICHLORIDE	45PPM	8807	-- 10PPM

Figure 8. Example of the Excessive Exposure Report (EER).

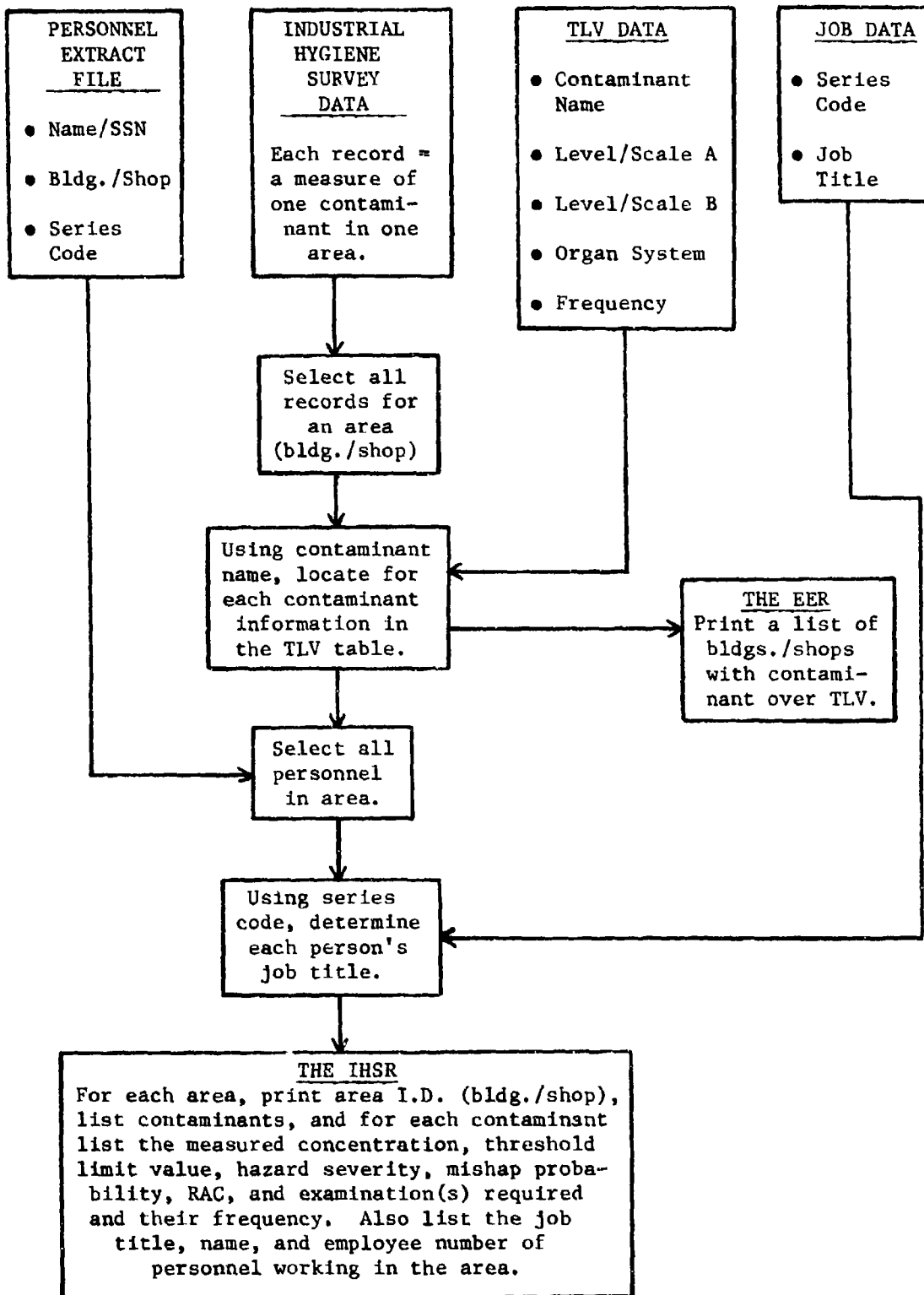


Figure 9. Functional Flowchart for Producing the IHSR and the EER.

NARF MEDICAL MONITORING PROGRAM
 COMPREHENSIVE INDIVIDUAL EXPOSURE REPORT - FORM A
 SEPTEMBER 1982

```

*****
NAME DOAKES, JOSEPH A.          SSN 123-45-6789  SEX  MALE    BIRTH DATE 16-12-56  AGE  24
BLDG  SHOP  54321  EMPLOYEE NO 13579  JOB CODE 4321  JOB TITLE  PAINTER
*****
  
```

```

S.A.F.E. CLINICAL TESTS
*****
JOB PROCESSES
  13 PAINT STRIPPING
  
```

```

*****
MEDICAL SURVEILLANCE
  PHYSICAL EXAMINATION
  
```

```

*****
LAB TESTS REQUIRED
  SMA-4
  SMA-12
  CHEST X-RAY
  BLOOD ACETONE
  
```

```

*****
  16 SPRAY PAINTING USING
  NON-PIGMENTED PAINTS
  
```

```

*****
MEDICAL SURVEILLANCE
  SMA-4
  SMA-12
  CHEST X-RAY
  BLOOD ACETONE
  PULMONARY FUNCTION
  
```

```

*****
POTENTIAL HAZARDOUS EXPOSURES
*****
CONTAMINANT TYPE LEVEL TLV PEL HAZARD ASSESSMENT MEDICAL SURVEILLANCE
ACETONE OTHER 500 PPM 750 PPM B III 3 RESPIRATORY SKIN
TOLUENE ABOVE TLV 115 PPM 110 PPM C II 3 BLOOD CNS KIDNEYS LIVER SKIN
  
```

Figure 10. Example of CIER-A for the Occupational Health Nurse.

NARF MEDICAL MONITORING PROGRAM
 COMPREHENSIVE INDIVIDUAL EXPOSURE REPORT - FORM B
 SEPTEMBER 1982

```

*****
NAME          SSN          AGE          JOB TITLE
DOAKES, JOSEPH A.  123-45-6789  24          PAINTER
*****
  
```

```

MEDICAL SURVEILLANCE
*****
JOB PROCESSES          MEDICAL SURVEILLANCE          LAB TESTS REQUIRED
13 PAINT STRIPPING    RESPIRATORY                    SMA-4
                        SKIN                          SMA-12
                        CHEST X-RAY                    CHEST X-RAY
                        BLOOD ACETONE                 BLOOD ACETONE
16 SPRAY PAINTING USING BLOOD
   NON-PIGMENTED PAINTS  CNS                             SMA-4
                        KIDNEYS                    SMA-12
                        LIVER                      CHEST X-RAY
                        SKIN                       BLOOD ACETONE
                        PULMONARY FUNCTION
*****
  
```

```

POTENTIAL HAZARDOUS EXPOSURES
*****
PROHIBITED SUBSTANCES  * DOAKES, JOSEPH A.  123456789  WAS EXAMINED ON
                        *
CARCINOGENS           * COMMENTS:
MONITORED SUBSTANCES *
SUBSTANCES ABOVE TLV/PEL
TOLUENE                *
OTHER SUBSTANCES      *
ACETONE                *
                        *
                        * EXAMINING PHYSICIAN
*****
  
```

Figure 11. Example of CIER-B for the Occupational Health Physician.

Industrial Hygienists. The IHSR (the Industrial Hygiene Survey Report) and the EER (the Excessive Exposure Report) are of particular value to the industrial hygienists. During a routine survey of a work area, the IHSR would serve as a guide or a reference. For example, the hygienists would know what contaminants to expect and be able to determine immediately what contaminants had been introduced recently. Special attention then could be given to the procedures used in handling the new materials. In addition, the IHSR would provide the hygienists with a list of personnel said to be assigned to the area. This list could be used to verify that information and to check on the medical certification of the employees.

The EER would be useful to the hygienists because the list of areas previously identified as having an excessive concentration of a contaminant would serve as a guide in the selection of sites to be surveyed.

Occupational Health Nurse. The occupational health nurse, as well as the hygienists, would be interested in the IHSR and the EER. These reports would allow the nurse to review the decision regarding a worker's need to have a periodic physical examination and would provide information allowing the nurse to recommend examinations not previously required. For example, a work center supervisor may find that a worker is not involved in any job processes identified as hazardous. However, the nurse may determine that the hygienist found hazardous substances in the person's work area and, therefore, the worker should have an examination. Or, the nurse may find that additional tests beyond those required by the worker's job processes should be performed because of substances found by the hygienist.

From the EER the occupational health nurse may note that certain workers were exposed to some particularly harmful substance and may use that information to immediately schedule examinations for the affected personnel.

In addition to the IHSR and the EER, the occupational health nurse would also have an interest in the Comprehensive Individual Exposure Report (CIER-A). This report would be generated monthly for those people due for a periodic physical examination. This report, first, would let the nurse know who was scheduled for an examination. For each person, the worker's job title, the job processes engaged in, and the clinical tests to be performed as a consequence of those job processes would appear. In addition, industrial hygiene survey data would be printed along with recommended medical surveillance and information showing whether the concentration of any materials exceeded the TLV, PEL, or ceiling levels. With this type of information available, more appropriate guidance could be provided for the medical examination to be given the employee.

The final report that the occupational health nurse would be concerned with is the Examination Compliance Report (ECR). This report is compiled by the nurse each month, and it shows for each division the number of people to be examined, the number who made appointments, the number who kept their appointments, and the number of "no shows." The number of people making appointments and the number of "no shows" also would be represented as

percentages. This report, then, would show at a glance whether appointments were being made and kept, and which divisions were remiss. It could be used to inform the head of the Environmental Health Service at the Naval Regional Medical Center of the degree of compliance being achieved.

Occupational Health Physician. The only report that is intended for the physician is the "B" version of the Comprehensive Individual Exposure Report (CIER-B). This report is designed to provide the examining physician with a summary of the potential and actual hazards that an employee is exposed to by showing the job processes and actual substances encountered by the employee. It also shows for each process or substance the appropriate type of medical examination, and then a list of laboratory tests ordered by the occupational technician is shown. Upon examining the employee, the physician would sign and date this document showing receipt of the information.

Safety Specialists. The IHSR is one report of special interest for the safety specialists. By comparing information on this report regarding the type of material employees are actually working with to the type of training those workers have had, it could be determined if there was anyone working with materials for which they have no training.

Special Requests. The reports described above reflect the present state of the occupational health program at the North Island NARF and some new proposals about how reporting in that program may be augmented to more fully use the contributions of the industrial hygienists and occupational health nurse. However, as the program may change or as the various activities involved learn how such reports can be generated from a computer database, it is expected that the existing reports will be modified and augmented. In addition, as new situations arise, special reports can be generated. For example, the occupational health nurse may need a list of all persons exposed to asbestos. Or, someone may want to compare the incidence of respiratory illness among all patients during the past month to the incidence in previous months. Or, someone may wish to follow the incidence of dermatitis in a particular work area over time and compare any change in the incidence to the list of contaminants present at different times.

SYSTEM DESIGN

The findings of the systems analysis, described in the preceding section, are being used to design a fully automated NOHIMS. Functional specifications for implementation of the system are currently being developed, and software and hardware alternatives are being considered. However, in the meantime it has been possible to implement a semi-automated interim system for testing design concepts. This interim system will soon be made operational. Both the semi-automated and the fully automated system are described in more detail below.

The Semi-automated Interim System

In the semi-automated system, a set of basic reports will be generated. These reports will be given to certain activities to inform them of critical assessments and to be available for reference. The basic reports currently needed for occupational health appear to be NAVMED 6300/1, NAVMED 6260/1, the IHSR, and the EER. These reports will be printed as computer listings by accessing the medical data, environmental data, and the personnel data stored in the respective files of each activity.

In this interim system, the patient encounter form will be used to capture data needed for management reporting required from the dispensary. The first section of this form will be filled in by the patient, and the physician will complete it, primarily by checking the appropriate boxes. The completed encounter forms then will be used as a feeder report for NAVMED 6300/1 and NAVMED 6260/1. Trial testing at the NARF dispensary has demonstrated that the specially designed patient encounter form can be used to complete the NAVMED 6300/1 and the NAVMED 6260/1 forms and that even a manual tally of the data recorded on the encounter form was better than the previous procedures for compiling the data for these reports. It was also demonstrated that the data from the encounter form could be keypunched and these punched cards fed into a computer program to automatically compile the data for the above reports and print the results. However, such a semi-automated system is too labor intensive for long-term implementation. In contrast, a system in which the data were to be keyed in through a computer terminal and stored with other medical data would constitute a more efficient system.

The two remaining reports of the semi-automated system--the IHSR and the EER--will be generated monthly as computer listings, with copies being given to the industrial hygienists, the occupational health nurse, and the safety specialists. These reports will serve as reference material for the hygienists and the safety specialists, and the occupational health nurse will use the IHSR when scheduling patients for periodic physical examinations to determine if any tests should be performed other than those which reflect the job processes that the employee engages in. Also, in the event that there is a question about whether a person should remain on the list of employees to be examined periodically, the nurse could use the IHSR to make an informed decision. Note that currently at the NARF the work center supervisor makes the ultimate decision about who should be examined and when. Armed with the IHSR, the occupational health nurse would be in a better position to fulfill that decision-making role. A version of the Comprehensive Individual Exposure Report also will be included in the semi-automated system. However, instead of being generated automatically, this report will be drawn up by the occupational health nurse. Thus, upon the scheduling of an employee, the nurse will note the job processes an employee engages in and the substances the worker is exposed to. This information will be written on a form that the patient carries to the examination to inform the physician of the worker's actual and potential exposures. The nurse will also note on this form any laboratory tests that have already been ordered and any special sensitivities or allergies that the employee may have.

Using the EER, the occupational health nurse will identify people exposed to hazardous materials and, in the case of serious exposures, have the employees scheduled for a physical examination. Based on this information the nurse also may decide to identify certain personnel on the PEF as needing a periodic examination.

Finally, in the semi-automated system the nurse will receive a copy of the PEF listing showing all of the people due for a physical examination. During the month the nurse will note when each of these people made an appointment and when and if the appointment was kept. At the end of the month the nurse will count how many people were to be examined, how many made appointments, and how many appointments were kept. This information then should be forwarded to the head of the Environmental Health Service at the Naval Regional Medical Center, San Diego.

A schematic depicting the interim semi-automated system is shown in Figure 2 (page 7). The solid lines in this figure denote the existing system at the NARF. The dotted lines show the new functions that will be added with the operational implementation of the semi-automated system. It is evident from the pattern of solid and dotted lines that the introduction of the semi-automated system will serve to integrate the industrial hygienists and the occupational health nurse into the occupational health program.

The Fully Automated System

The fully automated system in general will perform the same functions as the semi-automated system. However, in the fully automated system the reports that previously were manually generated will be computer produced. These computer-generated reports will be stored in computer storage as a file that can be accessed at any time by means of a computer terminal.

Thus, NAVMED 6300/1 and NAVMED 6260/1 will be generated automatically. Also, the CIL that was generated manually by the occupational health nurse in the semi-automated system to inform the physician also will be generated automatically. In addition, two versions of the CIER will be produced--one for the nurse and one for the physician. Finally, the Examination Compliance Report (ECR) could be automatically compiled from information found in the PEF showing which examinations had come due and from patient encounter form data indicating who had been examined. At the same time, reports that were computer printed in the semi-automated system (i.e., the IHSR and the EER) will not be printed. Instead, the data contained in these reports will be accessible when needed via a computer terminal.

The fully automated system also will allow many functions of the occupational health program to be "data driven." For example, when a person comes due for an examination, the system could automatically schedule the worker for an examination and supply the CIER when the person reported to the dispensary. Also, laboratory results could automatically be compared to normal limits, and if a discrepancy was found, the employee could be automatically rescheduled for an appointment and notified.

The above description of the fully automated NOHIMS is somewhat tentative because the functions that are possible with suitable computer hardware and software are so abundant. However, a diagram of the minimal set of functions that NOHIMS can be expected to perform for the Navy occupational health community is presented in Figure 12.

The design of the fully automated system is now nearing the final stages of hardware and software selection for the prototype installation, and any necessary modifications and new program modules are being specified. As the final functional specifications for the prototype system are being defined, NOHIMS design concepts incorporated in the semi-automated interim system will be tested and evaluated.

THE NAVY OCCUPATIONAL HEALTH INFORMATION MONITORING SYSTEM

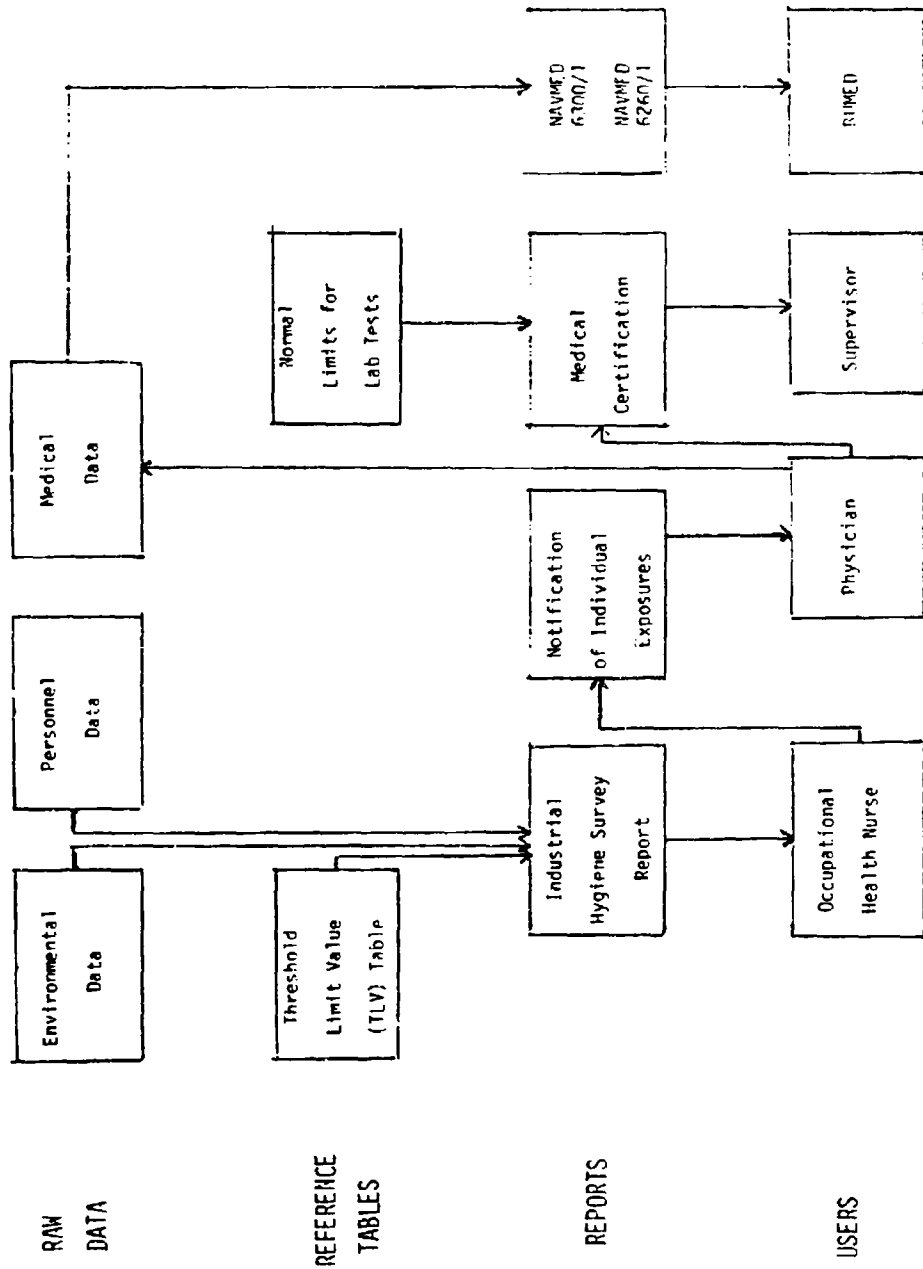


Figure 12. The Navy Occupational Health Information Monitoring System.

FUTURE PLANS AND CONSIDERATIONS

The initial focus of this project has been on developing a system for transmitting information that will enhance the functioning of the Navy's occupational health program. However, not only must the Navy provide safe and healthful working conditions for its employees, it must also be able to document what action was taken. Therefore, in addition to having active data files of medical, environmental, and personnel information, the Navy must also maintain archive files of these data for periods ranging up to 50 years.

Because of the massive storage requirements needed in order to comply, the approach being taken in developing NOHIMS is to employ a distributed database configuration. Thus, the separate activities participating would be responsible for maintaining their own files, and the burden of storing vast quantities of data involved would be spread among many different activities. Such a system has the added benefit of making the autonomy of the separate facilities an inherent part of the system as well as adding to the privacy and security of the respective files.

In the NOHIMS design, the networking of a set of separate databases is not limited to a single facility or location. Eventually, it is planned that NOHIMS will be able to combine information from two or more different industrial facilities (e.g., a NARF and a shipyard). A schematic diagram for linking the occupational health data from a variety of sources is shown in Figure 13. With such a network a typical sequence of events would begin with a question, the answer to which is needed in order to make an informed decision on the management of health care resources. This question would be received at the system support management and service node where it would be determined if the question came from an authorized source and, if so, who could supply relevant data. Next the interface/relay node would access the required data from one or more separate data files and perform any data conversion or transformation necessary to make all the information compatible. Finally, the network control node would manage the transmission of the information, being responsible for the routing and security of the data as well as striving to make the information transmission as efficient as possible.

It is recognized that many of the specific data elements and procedures discussed in this report may be unique to the North Island NARF. Thus, the system being developed is designed to be highly flexible, allowing it to be quickly adapted to a variety of sites. Therefore, the important features of the system are the specification of the types of data that will be needed, the types of tables, and the types of reports but not specific data elements or items.

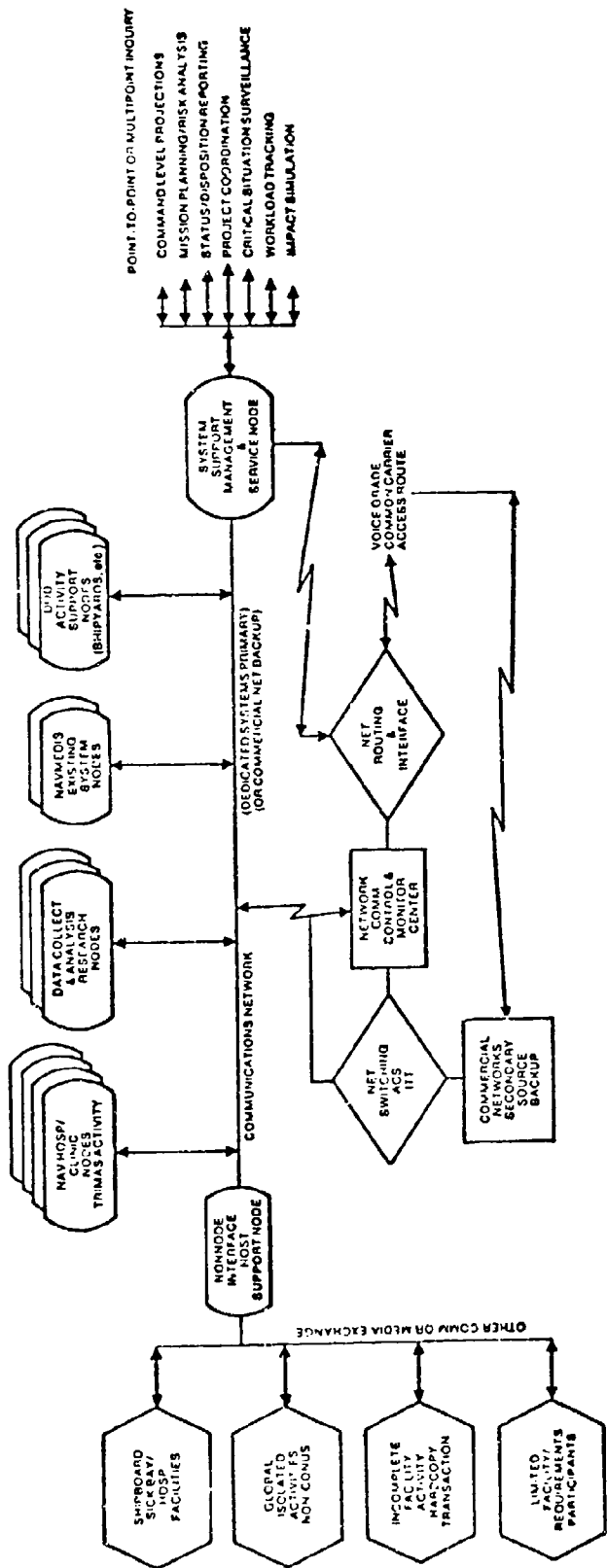


Figure 13. Communications Network for Linking Occupational Health Data from a Variety of Sources.

An existing system which appears to be a suitable vehicle for the implementation of NOHIMS is the Computer Stored Ambulatory Record (COSTAR) system developed initially at the Massachusetts General Hospital. A less expensive and more exportable version of COSTAR, called COSTAR V, was subsequently developed for application in smaller ambulatory care settings as a result of a National Center for Health Services Research Intramural Research activity that involved the resources of the George Washington University, the Massachusetts General Hospital, and the Digital Equipment Corporation. A preliminary assessment of COSTAR V indicates that it is an extremely complete and stable medical information management system that has an overall functional schema which is virtually in complete accord with all major design criteria for the NOHIMS system requirements.

COSTAR V has been written in the American National Standards Institute (ANSI) standard MUMPS language. MUMPS is a high level interpreter language specifically designed to efficiently handle medically oriented text string transaction data and provide a self-optimizing hierarchical disk file structure. The language has the unique capability to execute MUMPS code indirectly from variables, arrays, and file structures as well as alter its own in-memory or stored coding. These language attributes are of critical importance in the NOHIMS design. They allow for functionally independent modules that can be either self-modifying or generated by the system itself according to specifications parameters. This is necessary so that NOHIMS will have the flexibility required to adapt such a general processing system to a variety of potential site parameters with reasonable implementation effort and maintain operational efficiency and functional integrity.

COSTAR V was specifically created as a "user friendly" system and incorporates extensive user help, aids, and explanation techniques. This feature is of particular importance to NOHIMS since the use, operation, and NOHIMS system maintenance schema are devoid of requirements for professional ADP personnel as integral or essential to the successful operation of any aspect of the system. The single negative aspect of COSTAR V is the need to examine and comprehend the existing extensive and technically complex COSTAR program modules, file structures, and procedural relationships so that alteration and augmentation of the system can be accomplished without affecting the system's operational integrity. Overall, however, COSTAR V is considered an excellent vehicle that will provide the functional support modules needed to fulfill the medical information requirements of NOHIMS and allow the additions and extensions necessary to implement the environmental monitoring aspects of the NOHIMS design.

Start-up of NOHIMS

The first phase of the start-up of the fully automated NOHIMS will be devoted to acquiring the necessary equipment; installing it in appropriate spaces at the Naval Regional Medical Center Branch Clinic, NAS, North Island, and at NHRC; and initiating the procedures for entering into the system illness, treatment, and physical examination data for all dispensary patients. These data will be used to generate summary medical reports and information on NARF employees, and will be retained in the occupational health information monitoring system developed for the North Island NARF. During this initial phase, the primary focus will be on software modification and implementation, and on personnel orientation and training in the use of the program modules and interfaces. It is expected that medical data entry will be performed by designated clerical personnel from the dispensary and will involve transfer of printed information on an encounter form to a computer file via a computer input terminal. Environmental data will be collected on encounter forms that will be completed by industrial hygienists who will forward the information to NHRC for entry into the system. A program module will be designed to prompt the user for information and to perform preliminary edits.

The second phase will concentrate on data collection and report generation. As each system component becomes operational, report generation capabilities will be developed for the respective files. For example, the Medical Services and Outpatient Morbidity Report (NAVMED 6300/1) and the Report of Occupational Health Services (NAVMED 6260/1) will be generated automatically from information supplied by the dispensary. Because NOHIMS is being designed to be extremely flexible with regard to report generation, additional reports will be added as the dispensary, industrial hygienists, or other users may desire.

During the data collection phase, efforts will begin on developing the communication links between the medical and environmental files, the PEF data, and the central processing unit so that data can be passed from one component to another, thus allowing databases to be combined through a database networking capability. This will be an essential step that is needed to (1) demonstrate that data from several sources can be pooled, and (2) show that a variety of files can be combined so that complex epidemiological analyses can be performed.

Pilot Testing of the NOHIMS Prototype System

Pilot testing of NOHIMS will be conducted in two phases--an in-house NHRC phase followed by a field test at NAS, North Island. For the in-house phase a sample of work history data, work environment measures, and medical examination data will be obtained from the North Island NARF and dispensary. These data will be used first to determine if the various program modules can store the data in a readily retrievable form. Then, interrelated operations among all system components will be exercised using a set of scenarios designed to encompass the entire scope of activity expected at the target site. These test scenarios will be developed in collaboration with dispensary personnel and industrial hygienists. The results obtained from each test scenario will be compared with expected results reflected by the preliminary specifications incorporated in each scenario.

Upon obtaining satisfactory results from all the test scenarios, system generation and corresponding test materials and procedures will be modified to exercise the self-adjusting and variable aspects of the NOHIMS system design. This procedure will verify the system's adaptability with respect to differences between the in-house test material and procedures and actual data processing at the pilot test site. This phase is not intended to be a test of the full scope of adaptive capability of the system but rather a method for establishing the system's ability to adjust to data variations that may be experienced during the prototype installation at the pilot site.

The second phase of NOHIMS testing will consist of system generation and installation at the pilot site. Initial operation will be in parallel with existing manual procedures. Verification of systems operations will continue until all functions and products are assured and complete in content and in production consistency. Development and testing of information transfer and epidemiological analysis of occupational health data will be initiated and proceed concurrently with the pilot operation. At this point a determination will be made as to whether the prototype NOHIMS has substantially fulfilled the preliminary specifications and system design criteria.

These operations will be documented in a series of reports specifying the actual time, hardware, and personnel requirements needed to prepare the site and perform the initial system generation; the problems encountered during the orientation and training of dispensary personnel; the problems encountered during the orientation and training of the industrial hygienists; and steps taken to develop the communication links and merge program components already available at the local site.

Extension of the NOHIMS Prototype System to a Second Site

The continued development of a Navy occupational health information monitoring system dictates the trial implementation at a pilot site in order to generate a test database large enough to demonstrate capabilities for examining occupational health trends and relationships. This prototype system should be supplemented at a second site to explore transferability issues and the feasibility of an occupational health data communications network that could be expanded to Navywide use. Such a network would have many important implications for management and research.

Out-year efforts will concentrate on extension of the system to include the Pearl Harbor Shipyard to further demonstrate the adaptability and flexibility of NOHIMS, the utility of the networking concept, and the ability to conduct epidemiological analyses. Ultimately, it is expected that NOHIMS will be turned over to the Naval Environmental Health Center for installation at all of the Naval Regional Medical Centers.

APPENDIX A
EXAMPLES OF STANDARD FORMS

SF 78	United States Civil Service Commission Certificate of Medical Examination
SF 93	Report of Medical History
OPNAV 5100/9	Dispensary Permit
NAVMED 6260/1	Report of Occupational Health Services
NAVMED 6300/1	Medical Services and Outpatient Morbidity Report

NOTE TO EXAMINING PHYSICIAN: The person you are about to examine will have to cope with the functional requirements and environmental factors circled on the other side of this form. Please take them, and the brief description of job duties above them, into consideration as you make your examination and report your findings and conclusions.

1. HEIGHT: _____ FEET, _____ INCHES. WEIGHT: _____ POUNDS.

2. EYES: _____ 20 _____ 20 _____ 20 _____ 20

(A) Distant vision (Snellen): without glasses: right _____ left _____ ; with glasses, if worn: right _____ left _____
 (B) What is the longest and shortest distance at which the following specimen of Jaeger No. 2 type can be read by the applicant? Test each eye separately.

Jaeger No. 2 Type
 employees in the Federal classified service as may be requested by the Civil Service Commission or its authorized representative. This order will supplement the Executive Orders of May 29 and June 18, 1923 (Executive Order, September 4, 1924).

without glasses: with glasses, if used:
 R. _____ in. to _____ in. R. _____ in. to _____ in.
 L. _____ in. to _____ in. L. _____ in. to _____ in.

(C) Color vision: Is color vision normal when Ishihara or other color plate test is used? YES NO
 If not, can applicant pass lantern, yarn, or other comparable test? YES NO

3. EARS: (Consider denominators indicated here as normal. Record as numerators the greatest distance heard.)
 Ordinary conversation: RIGHT EAR _____; LEFT EAR _____
 Audiometer (if given):

250	500	1000	2000	3000	4000	5000	6000	7000	8000
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

4. OTHER FINDINGS: In items a through l briefly describe any abnormality (including diseases, scars, and disfigurements). Include brief history, if pertinent. If normal, so indicate.

a. Eyes, ears, nose, and throat (including teeth and oral hygiene)	e. Abdomen
b. Head and back (including face, hair, and scalp)	i. Peripheral blood vessels
c. Speech (note any malfunction)	g. Extremities
d. Skin and lymph nodes (including thyroid gland)	h. Urinalysis (if indicated) Sp. gr. _____ Sugar _____ Blood _____ Albumen _____ Casts _____ Pus _____
l. Respiratory tract (X-ray if indicated)	
j. Heart (size, rate, rhythm, function) Blood pressure _____ Pulse _____ EKG (if indicated)	
k. Back (special consideration for positions involving heavy lifting and other strenuous duties)	
l. Neurological and mental health	

CONCLUSIONS: Summarize below any medical findings which, in your opinion, would limit this person's performance of the job duties and/or would make him a hazard to himself or others. If none, so indicate.

No limiting conditions for this job
 Limiting conditions as follows:

FOR AGENCY USE ONLY

Part A. TO BE COMPLETED BY APPLICANT OR EMPLOYEE (typewrite or print in ink)

1. NAME (last, first, middle)	2. SOCIAL SECURITY ACCOUNT NO.	3. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	4. DATE OF BIRTH
5. DO YOU HAVE ANY MEDICAL DISORDER OR PHYSICAL IMPAIRMENT WHICH WOULD INTERFERE IN ANY WAY WITH THE FULL PERFORMANCE OF THE DUTIES SHOWN BELOW? <input type="checkbox"/> YES <input type="checkbox"/> NO <i>(If your answer is "YES" explain fully to the physician performing the examination)</i>		6. I CERTIFY THAT ALL THE INFORMATION GIVEN BY ME IN CONNECTION WITH THIS EXAMINATION IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. _____ (signature of applicant)	

Part D. TO BE COMPLETED BY AGENCY MEDICAL OFFICER (if one is available)

NOTE: Review the attached certificate of medical examination and make your recommendations in item 1 below. If the medical examination was done for pre-appointment purposes, circle the appropriate handicap code in part F.

1. RECOMMENDATION: <input type="checkbox"/> HIRE OR RETAIN. DESCRIBE LIMITATIONS, IF ANY, HERE. <input type="checkbox"/> TAKE ACTION TO SEPARATE OR DO NOT HIRE. EXPLAIN WHY.		
2. AGENCY MEDICAL OFFICER'S NAME (type or print)	3. LOCATION (city, State, ZIP Code)	4. DATE

Part E. TO BE COMPLETED BY AGENCY PERSONNEL OFFICER

NOTE: Enter the action taken below. If this form is used for pre-appointment purposes, be sure the appropriate handicap code in part F is circled. IMPORTANT: See FPM Chapter 293, Subchapter 3; FPM Chapter 339; and FPM Supplement 339-31 for disposition and/or filing of both parts of this form, either separately or together.

1. ACTION TAKEN: <input type="checkbox"/> HIRED OR RETAINED. <input type="checkbox"/> NON-SELECTED FOR APPOINTMENT, OR ELIGIBILITY OBJECTED TO. <input type="checkbox"/> ACTION TAKEN TO SEPARATE.		
2. AGENCY PERSONNEL OFFICER'S NAME (type or print)	3. SIGNATURE	4. DATE

Part F. HANDICAP CODE (to be completed only in pre-appointment cases)

If the person examined has or had a handicap listed below, circle the code number which pertains to that handicap. If more than one handicap applies, circle the one considered most limiting. If none of the handicap codes apply, circle code "00".

00 No handicap of the type listed 10 Amputation—one major extremity 11 Amputation—two or more major extremities 20 Deformity or impaired function—upper extremity 21 Deformity or impaired function—lower extremity or back 30 Vision—one eye only 31 No usable vision	40 Hearing aid required 41 No usable hearing 42 No usable hearing, with speech malfunction 43 Normal hearing, with speech malfunction 50 Tuberculosis—inactive pulmonary 51 Organic heart disease (compensated)—valvular, arrhythmic, arteriosclerosis, healed coronary lesions	52 Diabetes—controlled 53 Epilepsy—adequately controlled 54 History of emotional behavioral problems requiring special placement effort 55 Mentally retarded 56 Mentally restored
--	--	---

1. EXAMINING PHYSICIAN'S NAME (type or print)	3. SIGNATURE OF EXAMINING PHYSICIAN _____ (signature) _____ (date)
2. ADDRESS (including ZIP Code)	IMPORTANT: After signing, return the entire form intact in the pre-addressed "Confidential-Medical" envelope which the person you examined gave you.

YES	NO	CHECK EACH ITEM YES OR NO. EVERY ITEM CHECKED YES MUST BE FULLY EXPLAINED IN BLANK SPACE ON RIGHT
		15. Have you been refused employment or been unable to hold a job or stay in school because of: A. Sensitivity to chemicals, dust, sunlight, etc. B. Inability to perform certain motions. C. Inability to assume certain positions. D. Other medical reasons (If yes, give reasons.)
		16. Have you ever been treated for a mental condition? (If yes, specify when, where, and give details.)
		17. Have you ever been denied life insurance? (If yes, state reason and give details.)
		18. Have you had, or have you been advised to have, any operations? (If yes, describe and give age at which occurred.)
		19. Have you ever been a patient in any type of hospital? (If yes, specify when, where, why, and name of doctor and complete address of hospital.)
		20. Have you ever had any illness or injury other than those already noted? (If yes, specify when, where, and give details.)
		21. Have you consulted or been treated by clinics, physicians, healers, or other practitioners within the past 5 years for other than minor illnesses? (If yes, give complete address of doctor, hospital, clinic, and details.)
		22. Have you ever been rejected for military service because of physical, mental, or other reasons? (If yes, give date and reason for rejection.)
		23. Have you ever been discharged from military service because of physical, mental, or other reasons? (If yes, give date, reason, and type of discharge: whether honorable, other than honorable, for unfitness or unsuitability.)
		24. Have you ever received, is there pending, or have you applied for pension or compensation for existing disability? (If yes, specify what kind, granted by whom, and what amount, when, why.)
<p>I certify that I have reviewed the foregoing information supplied by me and that it is true and complete to the best of my knowledge. I authorize any of the doctors, hospitals, or clinics mentioned above to furnish the Government a complete transcript of my medical record for purposes of processing my application for this employment or service.</p>		
TYPED OR PRINTED NAME OF EXAMINEE		SIGNATURE
<p>NOTE: HAND TO THE DOCTOR OR NURSE, OR IF MAILED MARK ENVELOPE "TO BE OPENED BY MEDICAL OFFICER ONLY." 5. Physician's summary and elaboration of all pertinent data (Physician shall comment on all positive answers in items 9 through 24. Physician may develop by interview any additional medical history he deems important, and record any significant findings here.)</p>		
TYPED OR PRINTED NAME OF PHYSICIAN OR EXAMINER	DATE	SIGNATURE
		NUMBER OF ATTACHED SHEETS

REVERSE OF STANDARD FORM 93

not
 Copy
 permit any further reproduction.

U.S. GOVERNMENT PRINTING OFFICE

DISPENSARY PERMIT
OPNAV 5100/9 (REV. 11-76)
S/N 0107-LF-031-0046

PRIVACY ACT
STATEMENT ON REVERSE

CASE NUMBER

SUPERVISOR'S REPORT		TO DISPENSARY (Location)		DATE OF REPORT	
EMPLOYEE'S NAME		TIME & DATE OF INJURY		TIME LEFT JOB	TIME RETURNED
SOCIAL SECURITY NO.	GRADE, RATE, JOB TITLE			OCCUPATIONAL <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> QUESTIONABLE	
REASON FOR REFERRAL <input type="checkbox"/> INJURY <input type="checkbox"/> ILLNESS <input type="checkbox"/> EMPLOYEE'S REQUEST <input type="checkbox"/> OTHER (Specify)					
REMARKS					
SUPERVISOR'S SIGNATURE		SHOP/OFFICE		TELEPHONE NUMBER	
MEDICAL OFFICER'S REPORT		TIME REPORTED		TIME RELEASED	
OCCUPATIONAL <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> QUESTIONABLE		TIME & DATE OF FIRST RE-TREATMENT		TIME & DATE OF SECOND RE-TREATMENT	
DEGREE OF INJURY <input type="checkbox"/> FIRST AID <input type="checkbox"/> DISPENSARY <input type="checkbox"/> HOSPITAL <input type="checkbox"/> PERSONAL PHYSICIAN <input type="checkbox"/> SENT HOME <input type="checkbox"/> OTHER (Explain)					
DISPOSITION OF EMPLOYEE <input type="checkbox"/> RETURN TO PERM. JOB _____ <input type="checkbox"/> TEMP. TRANSFER TO ANOTHER JOB <input type="checkbox"/> TERMINATION OF EMPLOYMENT <input type="checkbox"/> RESTRICT ACTIVITY UNTIL _____ <input type="checkbox"/> PERM. TRANSFER TO ANOTHER JOB <input type="checkbox"/> OTHER (Explain)					
REMARKS					
MEDICAL OFFICER'S SIGNATURE		INITIAL TREATMENT DETERMINATION <input type="checkbox"/> DISCHARGED, TREATMENT COMPLETED <input type="checkbox"/> RE-TREATMENT REQUIRED			

PRIVACY ACT STATEMENT

Authority: SECNAVIST 5100.10B and OPNAVINST 5100.14

Principal Purpose: To control and monitor treatment and disposition of civilians at Naval Dispensaries in cases of occupational injury or illness.

Routine Use: To ensure prompt investigation of occupational injuries, and to initiate any necessary immediate corrective action.

Disclosure: Voluntary. Treatment will be provided without regard to employee's willingness to divulge all or part of the requested information.

REPORT OF OCCUPATIONAL HEALTH SERVICES
NAVFORM 8260/1 (Rev. 6-73)

REPORT SYMBOL MED 8260-1
REPORT PERIOD 1 July 72-31 December 72
DATE OF REPORT 15 January 1973
FACILITY UIC CODE 00000

(SAMPLE)

REPORTING FACILITY Anywhere Naval Facility
Anywhere, USA 00000

L. ACTIVITIES EMPLOYING CIVILIAN PERSONNEL SUPPORTED BY OCCUPATIONAL HEALTH SERVICES

LINE NO	ACTIVITY OR FACILITY	TOTAL	MILITARY	CIVILIAN	NONAPPROPRIATED
					FUND PERSONNEL
A	B	C	D	E	
1	Naval Shipyard	6802	72	6310	420
2	Naval Supply Center	779	49	610	120
3	Naval Station	2360	1540	720	100
4	Supy. Shipbuilding	74	59	15	
5					
6					
7					
8					
9					
10	TOTALS	10015	1720	7655	640

M. CIVILIAN INJURIES AND MEDICAL CONDITIONS

TYPE OF CASE	LINE NO	CATEGORY	TOTAL CASES	INJURIES	MEDICAL CONDITIONS
A	B	C	D	E	
OCCUPATIONAL	11	New Cases	550	450	100
	12	Lost-Time Cases	20	15	5
	13	Retreatments	432	382	50
NON-OCCUPATIONAL	14	Treated on Job	2013	23	1990
	15	Referred or Admitted	312	23	289

N. OCCUPATIONAL MEDICAL CONDITIONS

OCCUPATIONAL MEDICAL CONDITIONS DUE TO:	LINE NO	CAUSATIVE AGENT	TOTAL CASES	INITIAL DISPOSITION			FINAL DISPOSITION		
				DUTY	HOSPITAL	HOME	SAME JOB	CHANGE OF JOB	OTHER
A	B	C	D	E	F	G	H	I	
EXPOSURE TO SKIN IRRITANTS AND SENSITIZERS	16	Solvents	33	29		4	29	3	1
	17	Petroleum Products	10	10			10		
	18	Epoxies & Organics	8	4		4	5	3	
	19	Acids & Alkalies	0						
	20	Explosives & Pyrotechnics	1		1		1		
	21	Mechanical & Physical Agents	1			1	1		
INHALATION HAZARDS	22	Other Industrial soap	5	5			3	2	
	23	Organic Vapors	18	10	3	5	12	3	3
	24	Gases	8	3	2	3	5	1	2
	25	Fumes & Mists	0						
	26	Dusts	1	1				1	
	27	Oxygen Depletion	0						
PHYSICAL AGENTS	28	Other	0						
	29	Ionizing Radiation	1		1				1
	30	Nonionizing Radiation	2			2	2		
	31	Noise	6	3		3	2	2	2
OTHER OCCUPATIONAL ILLNESSES	32	Thermal Stress	2		1	1	1	1	
	33	Other	0						
	34	Specific Folliculitis	4		1	3	3		1
TOTAL OF OCCUPATIONAL MED. CASES	37	Grand Total	100	65	9	26	74	16	10

Enclosure (2)

(SAMPLE)

IV. OCCUPATIONAL HEALTH SERVICES					
PROGRAM	NO /	COMPONENTS	TOTAL	CIVILIAN	MILITARY
A		B	C	D	E
PHYSICAL EVALUATIONS	38	Preemployment & Preplacement	350	350	
	39	Periodic Physical Evaluations for Health Monitored Occupations	1082	1010	72
	40	Return from Sick Leave Evaluations	691	691	
	41	Food Handler Examinations	210	210	
	42	Fitness for Duty Evaluations	35	35	
	43	Disability Retirement Evaluations	15	15	
	44	Other (TAD, Key Personnel)	400	300	100
CHEST DISEASE PROGRAM	45	Chest X-rays	2073	2073	//////////
	46	Pulmonary Function Tests	1082	1010	72
	47	Tuberculin Skin Tests	310	310	//////////
	48	Suspicious Findings	50	50	//////////
BIOLOGICAL MONITORING	49	Hematology Examinations	2323	2151	172
	50	Urinalysis Examinations	2433	2261	172
	51	Liver and Kidney Function Tests	1432	1310	122
SIGHT CONSERVATION	52	Sight Screening Examinations	2130	2010	120
	53	Refractions Performed	350	200	150
	54	Tonometries	250	200	50
	55	Plano Spectacles Issued	1310	1210	100
	56	Corrective-Protective Spectacles Provided	350	200	150
	57	Other (Sit Lamp, Field of Vision)	60	50	10
HEARING CONSERVATION	58	Number of Audiometric Tests	2357	2157	200
	59	Number Requiring Follow-up	540	510	30
	60	Ear Protective Devices Issued	4670	4370	300
RADIOLOGICAL HEALTH PHOTODOSIMETRY	61	Medical & Dental X-ray Personnel	7	5	2
	62	Industrial Radiographers	5	5	
	63	Other			
RADIOLOGICAL HEALTH MONITORING	64	Surveys, Consultations, & Investigations	182	130	52
	65	Radon Breath Samples	24	24	
	66	Body Counting or Scanning			
	67	Other Special Investigations (e.g. TLD)			
	68	Other (Radiochemical Urinalysis)	12	12	

V. HAZARDOUS OCCUPATIONAL EXPOSURES					
PROGRAM	NO /	COMPONENTS	TOTAL	CIVILIAN	MILITARY
A		B	C	D	
	69	Requiring Respiratory Protection	200	188	12
	70	Requiring Eye Protection	3350	3250	100
	71	Requiring Ear Protection	2748	2670	78
	72	Working with Laser Radiation	10	8	2
	73	Working with Nonionizing Radiation	80	65	15
	74	Requiring Periodic Physical Evaluation	2150	2050	100
	75	Working in Hazardous Occupations	6110	6000	110

VI. NARRATIVE REPORT (Continue on Separate Sheets as Needed)

SIGNATURE

NAVMED 4260/1 (Back)

Enclosure (2)

NAME, ADDRESS, ZIP CODE OF FACILITY	FACILITY AND LOCATION CODE						REPORT PERIOD				
	F	F	E	F	F	F	L	L	Y	Y	M

SECTION I - GENERAL WORKLOAD

LINE NO.		ACTIVE DUTY - US UNIFORMED SERVICES					DEPENDENTS	
		A NAVY	B MARCORPS	C ARMY	D AIR FORCE	E OTHER U.S.	F NAVY	G MARCORPS
01	OUTPATIENT VISITS							
02	INPATIENT VISITS							
03	ADMITTED TO QUARTERS							
04	QUARTERS PATIENT DAYS							
		DEPENDENTS				SPECIAL CATEGORIES		
		A ARMY	B AIR FORCE	C OTHER U.S.	D RET/DRG	E RETIRED	F U.S. CIV	G OTHER
05	OUTPATIENT VISITS							
06	INPATIENT VISITS							

SECTION II - ADJUNCT SERVICES

		A OUTPATIENT	B INPATIENT			C OUTPATIENT	D INPATIENT
07	LABORATORY TESTS			PHARMACY UNITS			
08	PULMONARY FUNCTION STUDIES			X-RAY FILM EXPOSURES			
09	AUDIOGRAMS			DIAGNOSIS PROCEDURES			
10	COBALT/CESIUM			EEGs			
11	ECGs			FLUOROSCOPIC EXAMS			
12	RADIOISOTOPE STUDIES			RADIUM & RADIOISOTOPE THERAPY			
13	OTHER DEEP THERAPY						

SECTION III - OTHER SERVICES

OPHTHALMOLOGY					MISCELLANEOUS			
A REFRACTION MC	B REFRACTION MSC	SPECTACLES ORDERED		E FABRICATED SINGLE VIS	F FLIGHT PHYS EXAM	G OTHER COMP PHYS EXAM	H IMMUNIZATIONS	I LIMITED SERVICES
		C SINGLE	D BIFOCAL					
14								

SECTION IV - SELECTED DATA

SECTION V - ACTIVE DUTY AVERAGE STRENGTH

A FETAL DEATH	VASECTOMIES		D PEAK CENSUS	E NAVY	F MARCORPS	G ARMY	H AIR FORCE	I
	AD NMC	OTHER						
15								

SECTION VI - INDIVIDUAL CLINIC/SERVICE WORKLOAD

	A LIMITED SERVICES	VISITS		D LIMITED SERVICES	VISITS		
		B OUTPATIENT	C INPATIENT		E OUTPATIENT	F INPATIENT	
16	ALLERGY				ANESTHESIOLOGY		
17	CARDIOLOGY				CHEST DISEASE		
18	DERMATOLOGY				EMERGENCY ROOM		
19	ENDOCRINOLOGY				GASTROENTEROLOGY		
20	GENERAL INTERNAL MED				GENERAL PRACTICE		
21	GENERAL SURGERY				GYNECOLOGY		
22	HEMATOLOGY				NEUROLOGY		
23	NEUROSURGERY				OBSTETRICS		
24	OCCUPAT. THERAPY				OPHTHALMOLOGY		
25	ORTHOPEDICS				OTOHINDLARYNGOLOGY		
26	PEDIATRICS				PHYSICAL THERAPY		
27	PLASTIC SURGERY				PODIATRY		
28	PHOTOLOGY				PSYCHIATRY		
29	PSYCHOLOGY				THORACIC SURGERY		
30	UROLOGY				OPTOMETRY		
31	FAMILY PRACTICE						

CIVILIAN	SECTION VII - OUTPATIENT INFIRMARY - ACTIVE DUTY NAVY AND MARINE CORPS PERSONNEL						NEW CASES	REVISITS					
	ITEM	A	B	ITEM	C	D			ITEM	E	F		
33	Infective and Parasitic Diseases			Respiratory System Diseases									
34	Acute Gastroent, Diarrhea, Dysentery			Acute Respiratory Diseases, Incl URI									
35	Gonorrhea			Influenza Syndrome									
36	Syphilis			Occupational Inhalation Diseases									
37	Genital Herpes Virus			All Other Respiratory Diseases									
38	Nongonococcal Urethritis			Digestive System Diseases									
39	Other Sexually Transmitted Diseases			Genitourinary System Diseases									
40	External Parasites			Comp of Pregnancy, Childbirth, Puerperium									
41	Fungal Diseases, Athlete's Foot			Skin and Subcutaneous Diseases									
42	All Other Infective & Parasitic Diseases			Cellulitis, Pyoderma, and Abscess									
43	Neoplasms			Occupational Dermatitis									
44	Neoplasms			Heat Rash									
45	Endocrine, Nutr. & Metabolic Diseases			Nonoccupational Allergic Dermatitis									
46	Endocrine, Nutr. & Metabolic Diseases			Moles, Warts, and Cysts									
47	Blood Diseases			All Other Skin Diseases									
48	Blood Diseases			Musculoskeletal System Diseases									
49	Blood Diseases			Congenital Anomalies									
50	Normal Disorders			Signs, Symptoms, & Ill-defined Conditions									
51	Alcoholism			General Malaise, Fatigue									
52	Marijuana			Headache									
53	Narcotic Drugs			Fever of Undetermined Origin									
54	Non-narcotic Drugs			All Other Signs and Symptoms									
55	Combination												
56	All Other Mental & Behavioral Diseases												
57	All Other Mental & Behavioral Diseases												
58	Nervous System & Sense Organ Diseases												
59	Nervous System & Sense Organ Diseases												
60	Circulatory System Diseases												
61	Circulatory System Diseases												

REMARKS

SIGNATURE AND TITLE

DATE SUBMITTED

APPENDIX B

SOURCES OF INFORMATION FOR THE
NOHIMS REFERENCE TABLES

Table B-1

Sources of Information for the NOHIMS Reference Tables

MNEMONIC IDENTIFIERS OF INFORMATION TYPES**

<u>DOCUMENT SOURCE*</u>	<u>OCCP→PEE</u>	<u>OCCP→PE</u>	<u>OCCP→EE</u>	<u>TOX→PEE</u>	<u>TOX→PE</u>	<u>TOX→EE</u>	<u>TOX→TLV (TWA)</u>	<u>TOX→TLV (STE)</u>	<u>TOX→CEILING</u>	<u>TOX→PEL</u>	<u>TOX→SYNONYMS</u>	<u>TST→RANGE</u>
SEALIFT	X	X	X	X	X	X						X
SIMA	X	X	X									
NARF		X										
HEW				X	X					X	X	
NASA				X	X							
NRMC					X							
NIOSH					X					X	X	
ACGIH							X	X	X			
NAVSEA									X	X		

* See the following list of document citations.

<u>MNEMONIC IDENTIFIERS</u>	<u>INDEXING INFORMATION (POINTER TO)</u>	<u>ASSOCIATED DATA</u>
OCCP→PEE	Occupation (or Job Process)	Pre-employment Exam
OCCP→PE	Occupation (or Job Process)	Periodic Exam
OCCP→EE	Occupation (or Job Process)	Exit (or Pretermination) Exam
TOX→PEE	Toxic Substance	Pre-employment Exam
TOX→PE	Toxic Substance	Periodic Exam
TOX→EE	Toxic Substance	Exit (or Pretermination) Exam
TOX→TLV (TWA)	Toxic Substance	Threshold Limit Value (Time-Weighted Average)
TOX→TLV (STE)	Toxic Substance	Threshold Limit Value (Short-Term Exposure)
TOX→CEILING	Toxic Substance	Ceiling Level
TOX→PEL	Toxic Substance	Permissible Exposure Level
TOX→SYNONYMS	Toxic Substance	Synonyms
TST→RANGE	Laboratory Test	Normal Range

DOCUMENT
SOURCE

DOCUMENT CITATION

SEALIFT Military Sealift Command Medical Manual, COMSCINST 6000.1B
CH-1, M-4M, 23 May 1980.

SIMA (Shore Intermediate Maintenance Activity) Memorandum: Recommended medical department procedures and periodic examinations related to the employment of naval employees, to include active military personnel, civil service employees, non-appropriated fund employees, and civilian employees of Military Sealift Command, 29/TVM:hm, 12000, 16 February 1977.

NARF NAVAIROWORKFACINST 4854.2C CH-40, Vol. 4, Chap. III, Sec. C.

HEW Key, Marcus M., Henschel, Austin F., Butler, Jack, Lizo, Robert N., Thabershaw, Irving R., & Ede, Lorice (Eds.). Occupational Diseases: A Guide to Their Recognition, U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute of Occupational Safety and Health. U.S. Government Printing Office Stock No. 017-033-00766-5.

NASA OSHA Medical Surveillance Requirements and NIOSH Recommendations for Employees Exposed to Toxic Substances and Other Work Hazards, prepared by BioTechnology, Inc., 3027 Rosemary Lane, Falls Church, VA 22042, for the NASA Occupational Health Office, National Aeronautics and Space Administration, Washington, DC 20546, January 1980.

NMRC Medical Monitoring Requirements, NAVREGMEDCENSIEGAINST 6260.1A, 27 April 1979.

NIOSH (National Institute of Occupational Safety and Health) Mackison, Frank W., Stricoff, R. Scott, & Partridge, Lawrence J., Jr. (Eds.). NIOSH/OSHA Pocket Guide to Chemical Hazards, DHEW (NIOSH) Publication No. 78-210, U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, 4676 Columbia Parkway, Cincinnati, OH 45226, September 1978.

ACGIH TLV's - Threshold Limit Values for Chemical Substances in Workroom Air. Adopted by ACGIH for 1980, Publications Office, American Conference of Governmental Industrial Hygienists (ACGIH), P.O. Box 1937, Cincinnati, OH 45701.

NAVSEA Command Occupational Safety and Health Control Manual (OSHCM) for Naval Shipyards, 07C, 5100.23, Ser. 002, 9 January 1981.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 81-36	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Preliminary Specifications for a Navy Occupational Health Information Monitoring System (NOHIMS)		5. TYPE OF REPORT & PERIOD COVERED Interim
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) William M. Pugh and Donald D. Beck		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Health Research Center P.O. Box 85122 San Diego, California 92138		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS MF58,527,1C2-0001
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Medical Research & Development Command Bethesda, MD 20014		12. REPORT DATE 10 Dec 1981
		13. NUMBER OF PAGES 63
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Bureau of Medicine & Surgery Department of the Navy Washington, DC 20372		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) occupational health data base medical monitoring information retrieval systems analyses environmental surveillance		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Navy Occupational Health Information Monitoring System (NOHIMS) is being developed to help coordinate various components of the Navy's occupational health program. The design of NOHIMS was based upon a comprehensive systems analysis of a Naval Air Rework Facility (NARF). This systems analysis identified (1) the types of data required, (2) the reference tables needed, (3) the reports to be generated, (4) the distribution of these reports, and (5) the appropriate actions to be taken in response to the reports. The planned		

DD FORM 1473
1 JAN 73EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-LF-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

implementation of NOHIMS as a semi-automated system that would be replaced by a fully automated system is discussed.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)