



Prepared by
Oak Ridge Associated
Universities

Prepared for
U.S. Nuclear
Regulatory
Commission's
Region III Office

Supported by
Safeguards and
Materials Programs
Branch;
Division of
Inspection Programs;
Office of
Inspection and
Enforcement

EVALUATION
OF THE
EMERGENCY PREPAREDNESS
AND FIRE PROTECTION PROGRAMS
AT THE
HONEYWELL, INC. FACILITY
NEW BRIGHTON, MINNESOTA

G. L. MURPHY AND J. D. BERGER

Radiological Site Assessment Program
Manpower Education, Research, and Training Division

FINAL REPORT
NOVEMBER 1986

8810120109 871210
REG3 LIC40
SUB-0971

PNU

EVALUATION
OF THE
EMERGENCY PREPAREDNESS AND FIRE PROTECTION PROGRAMS
AT THE
HONEYWELL, INC. FACILITY
NEW BRIGHTON, MINNESOTA

Prepared by

G.L. MURPHY AND J.D. BERGER

Radiological Site Assessment Program
Manpower Education, Research, and Training Division
Oak Ridge Associated Universities
Oak Ridge, Tennessee 37831-0117

Prepared for

Safeguards and Materials Programs Branch
Division of Inspection Programs
U.S. Nuclear Regulatory Commission
Region III Office

FINAL REPORT

November 1986

This report is based on work performed under Interagency Agreement DOE No. 40-816-83 NRC Fin. No. A-9076-3 between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy. Oak Ridge Associated Universities performs complementary work under contract number DE-AC05-76OR00033 with the U.S. Department of Energy.

TABLE OF CONTENTS

	<u>Page</u>
List of Figures	ii
1.0 Executive Summary	1
2.0 Introduction	3
2.1 Purpose and Scope	3
2.2 Site Description	4
2.3 Administration and Organization	4
3.0 Staffing/Training	9
3.1 Staffing	9
3.2 Training	10
4.0 Emergency Preparedness	12
4.1 Plans and Procedures	12
4.2 Facilities	14
4.3 Operating History	16
5.0 Fire Protection	17
Appendices	
Appendix A: Audit Team Bibliographies	
Appendix B: Schirmer Engineering Corporation, Fire Protection Evaluation	

LIST OF FIGURES

	<u>Page</u>
FIGURE 1: Map of the Minneapolis-St. Paul Area Showing the Location of the Twin Cities Army Ammunition Plant (TCAAP)	5
FIGURE 2: Map of the Twin Cities Army Ammunition Plant Indicating Facilities Operated by Honeywell Company, Inc.	6
FIGURE 3: Emergency Control Organization	8

1.0 EXECUTIVE SUMMARY

At the request of Nuclear Materials Safety and Safeguards, Nuclear Regulatory Commission (NRC) Region III, Glen Ellyn, Illinois, the Radiological Site Assessment Program (RSAP) of Oak Ridge Associated Universities (ORAU) performed an evaluation of the fire protection and emergency preparedness programs at Honeywell, Incorporated's Defense Systems Division facilities in New Brighton, Minnesota. This section presents a summary of the recommendations as they relate to specific program areas.

The Honeywell staff was very cooperative, and demonstrated a receptive attitude for the recommendations discussed in the audit. In general, the facility has a good fire protection program, and has implemented an effective emergency plan. It was not the purpose of this task to evaluate compliance with federal, state, and local radiological protection regulations; however, facilities and operations were reviewed with respect to applicable fire protection codes and generally accepted industry practices. Implementation of the recommendations will strengthen the overall safety program.

RECOMMENDATIONS

Staffing

Provide formal health physics training for at least one technical level employee per shift, or add an health physics technician to the Environmental Management Staff.

Training

Improve the records keeping/documentation for training activities related to emergency preparedness.

Provide formal instruction in emergency fire response procedures for fire marshals and wardens working in the depleted uranium (DU) area.

Provide fire extinguisher use training for a small number of additional employees throughout the plant.

Emergency Preparedness

Develop a procedure requiring health physics monitoring of potentially contaminated injuries. Establish a requirement for monitoring medical facilities in cases where potentially contaminated accident victims are treated.

Conduct annual meetings with offsite agencies which could be requested to respond to an incident involving DU.

Improve documentation related to emergency preparedness.

Review the current machine and ventilation system cleaning procedures.

Establish a system of checks and controls to ensure the equipment is cleaned thoroughly at the end of each shift.

Fire Protection

The automatic sprinkler system should be reviewed and brought into compliance with current NFPA standards.

Inspect all portable fire extinguishers to insure proper location, mounting and fitness for service.

Inspect and repair the accelerators on the dry pipe valve.

2.0 INTRODUCTION

2.1 Purpose and Scope

At the request of Nuclear Materials Safety and Safeguards, Nuclear Regulatory Commission Region III, Glen Ellyn, Illinois, the Radiological Site Assessment Program of Oak Ridge Associated Universities performed an evaluation of the fire protection and emergency preparedness programs at Honeywell's Defense Systems Division facilities in New Brighton, Minnesota. This evaluation was performed August 5-6, 1986, by an audit team composed of:

- | | |
|-----------------|--|
| J.D. Berger | - Certified Health Physicist, Program Manager,
RSAP/ORAU |
| G.L. Murphy | - Health Physicist, Assistant Program Manager,
RSAP/ORAU |
| R.J. Vigliaturo | - Fire Protection Engineer, Schirmer Engineering
Corporation, Deerfield, Illinois |

Biographical sketches of the audit team members are provided in Appendix A. The Nuclear Regulatory Commission was represented at the evaluation by Mr. James Lynch, Radiation Specialist.

The scope of the evaluation included a review of organization, staffing, policies, procedures, training and drills, facilities, and operating history as related to emergency preparedness and fire protection. It was not the purpose of this task to evaluate compliance with federal, state, and local radiological protection regulations; however, facilities and operations were reviewed with respect to applicable fire protection codes and generally accepted industry practices.

Honeywell personnel contacted during the review were:

- | | |
|-------------------|---------------------------------|
| James Fitzsimmons | - Radiation Management Engineer |
| Thomas Nelson | - Safety Engineer |
| Carmine Carbone | - Building Engineer |

A brief close-out meeting was held on August 7, 1986, identifying areas where minor problem areas were felt to exist.

2.2 Site Description

Honeywell's Defense Systems Division occupies Building 502 at the Twin Cities Army Ammunition Plant (TCAAP) in New Brighton, Minnesota (Figures 1 and 2). Several types of U.S. Government ordnance are manufactured at this facility. One of the products is a DU armor penetrator, manufactured under NRC Source Material License SUB-971. This license authorizes possession of 750,000 kg of DU. Production of the penetrator involves shearing, heat treating, machining, encapsulation, and final projectile assembly. The assembled projectiles are shipped to the Joliet, Illinois, facility for addition of explosive charges, and testing is conducted at the Elk River, Minnesota proving grounds.

Building 502 was originally constructed in approximately 1942 by the Department of the Army. It is leased by Honeywell from the Federal Cartridge Corporation, the TCAAP management contractor for the Army. Honeywell has occupied this building since 1969 and has been conducting assembly or fabrication of DU penetrators since 1973.

The building is mixed construction (wood frame, masonry, and sheet metal) with a main floor area of about 27,350 m² and a second floor office and administration area of approximately 6090 m². DU production and assembly activities occupy less than 25% of the facility floor space.

2.3 Administration and Organization

Honeywell organizational charts are proprietary and not available for inclusion in this report.

Mr. Donald Beck is the manager of Honeywell's New Brighton operations. The New Brighton facility has a total work force of about 450, and it is estimated that only 20 employees are directly involved in DU operations. The health physics and safety professional staffs do not report



FIGURE 1: Map of the Minneapolis-St. Paul Area Showing the Location of the Twin Cities Army Ammunition Plant (TCAAP)

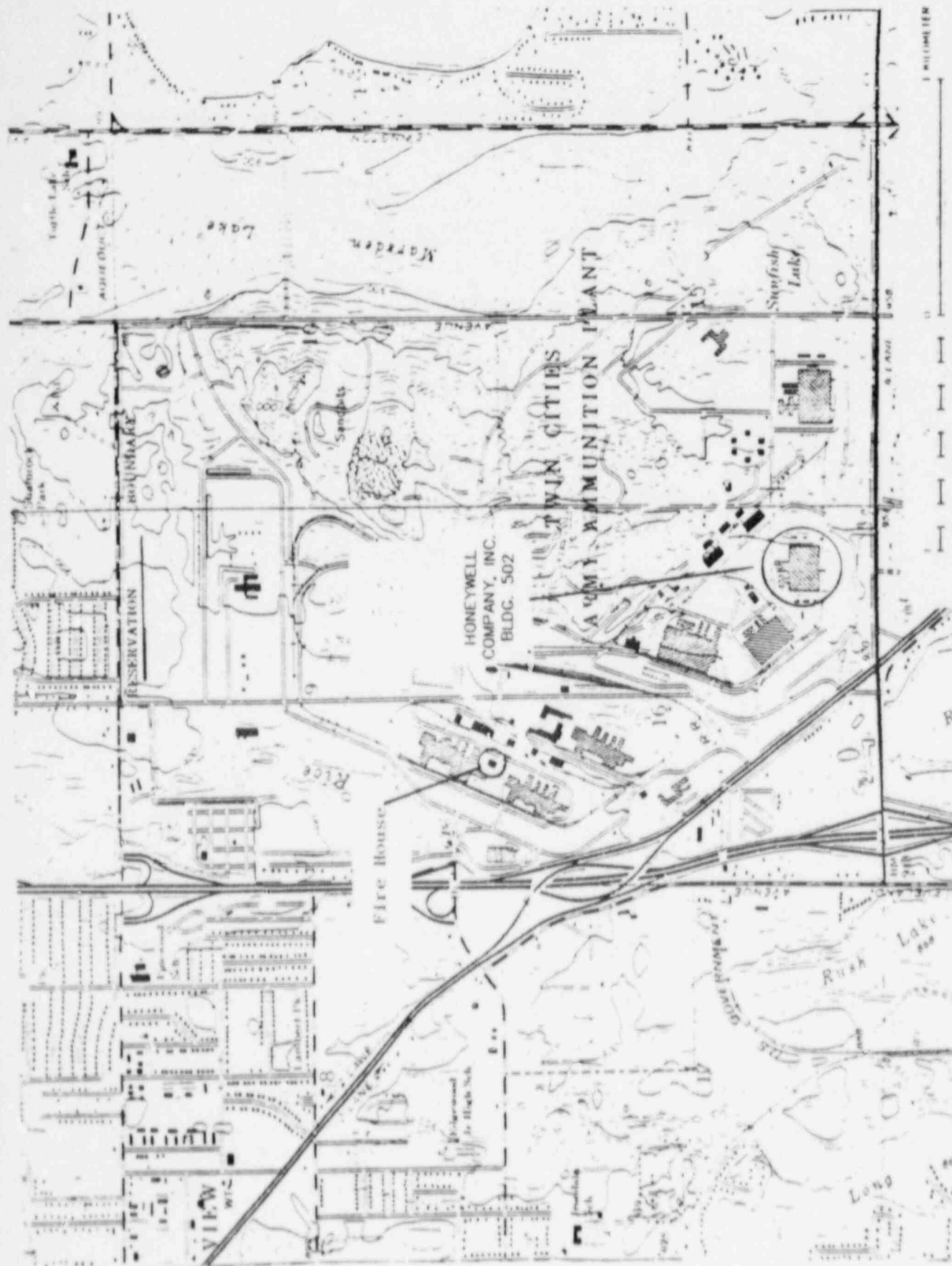


FIGURE 2: Map of the Twin Cities Army Ammunition Plant Indicating Facilities Operated by Honeywell Company, Inc.

administratively within the plant. They are part of a separate division; however, they interface directly with site personnel and participate functionally in regular plant operations. Additional information concerning health physics and safety is provided under Section 3.1.

The facility emergency response organization (Figure 3) consists of the safety and security organizations, a building fire marshal, assistant fire marshal, zone fire marshals, and fire wardens.

NB502 EMERGENCY PLAN
CHAIN OF COMMAND

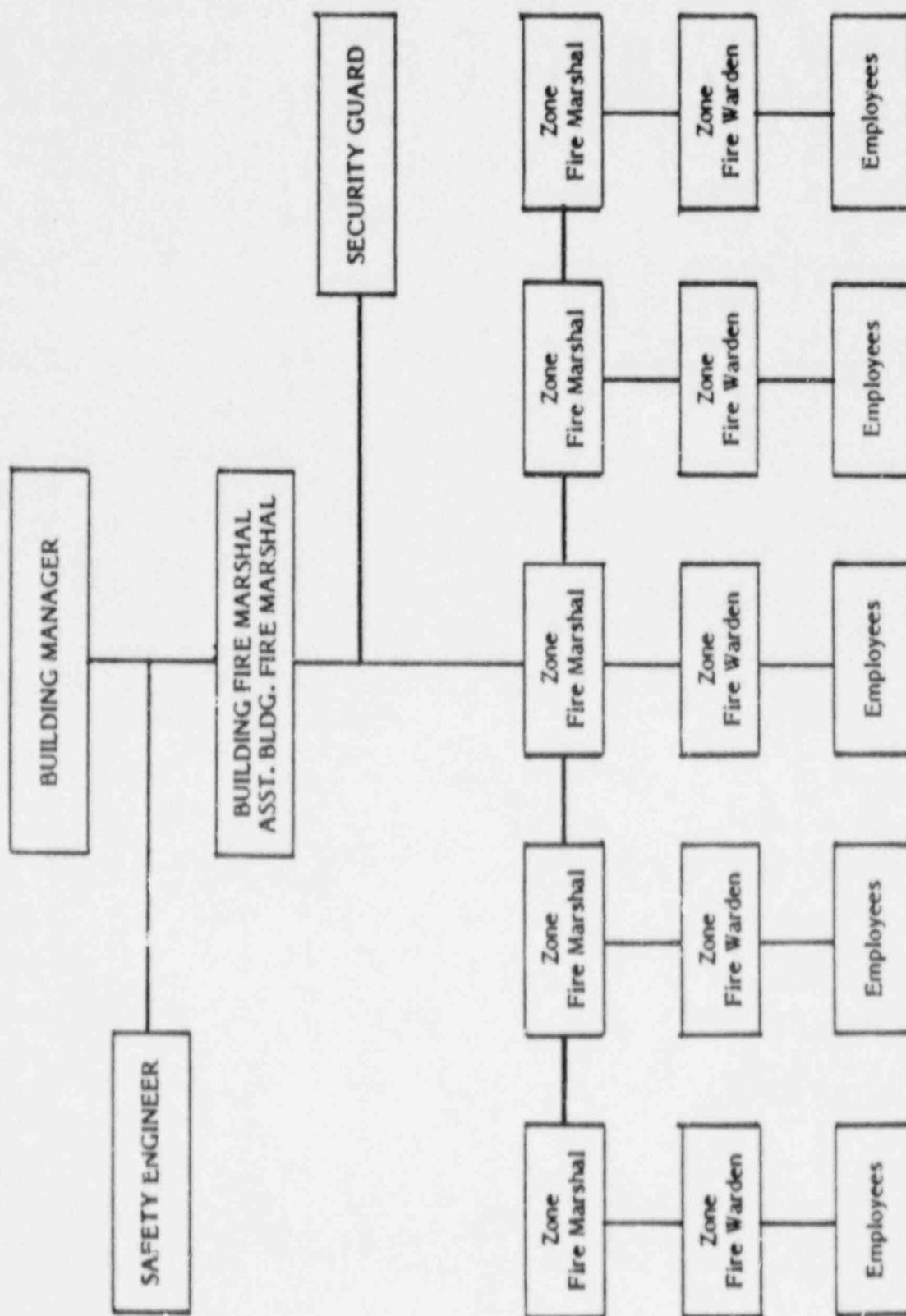


FIGURE 3: Emergency Control Organization

3.0 STAFFING/TRAINING

3.1 Staffing

- ° Health physics is administered through the Environmental Management Section under Mr. James Fitzsimmons. The group includes 5 professional level personnel plus clerical support. Mr. Fitzsimmons has been in his present position for about 5 years.
- ° The Environmental Management Section does not have any technicians on the staff. Technician support for monitoring, sampling, analyses, waste processing, etc., is provided by the chemistry lab and plant production staff. Approximately 7 employees perform these activities with overview by the professional level staff. These "technicians" have not received formal training in radiation safety fundamentals.
- ° The Occupational Safety and Health staff includes 3 safety engineers and 2 industrial hygienists. This staff is part of Human Resources section, which is a parallel unit to the Environmental Management section. The medical staff, consisting of a first shift nurse in Building 502 and a 2nd shift nurse in Building 103 (another Honeywell facility at TCAAP) is also part of the Human Resources sections.
- ° Mr. Thomas Nelson, safety engineer, has been responsible for Building 502 safety matters for only 4 months; prior to that time he was associated with Honeywell activities in Building 103 at TCAAP.

Recommendations

Provide formal health physics training for at least one technical level employee per shift, or add an health physics technician to the Environmental Management Staff.

3.2 Training

Findings

- ° All employees in DU operations receive introductory training covering the following topics:

- Characteristics of DU
- Radiation Hazards Associated with DU
- Regulatory Guides and Standards
- Other DU Toxic Hazards
- Safety and Health Precautions
- Environmental Surveys for DU
- DU Waste Disposal Practices

Individuals are tested following completion of this training activity. Annual retraining is also provided to all DU employees.

- ° The training material was reviewed and appears adequate. Records of training and testing are prepared but are not maintained in a consistent and easily understood manner.
- ° A training program is presented to the TCAAP fire department, staffed by Federal Cartridge Corporation. This training program is presented annually and covers such topics as:

- Introduction to Honeywell
- Characteristics of DU
- Radiation Terminology
- Other DU Toxic Hazards
- DU Fire Procedures

- ° Fire department training records for 1982 through 1985 were reviewed. The program and supporting documentation appear adequate.

- ° The fire marshals, fire wardens, and employees in the DU operations have obtained knowledge and experience in fighting minor DU fires through on-the-job situations. Formal training in emergency fire fighting has not been provided.
- ° Fire wardens have been provided with CPR training which has been expanded to include life saving first aid techniques. All personnel undergoing the expanded CPR training receive a Minnesota First Aid and Rescue Certificate.
- ° Security personnel are provided with first aid training.
- ° Honeywell is establishing a Pilot Program - Emergency Response Team, which will be trained in CPR and first aid.
- ° Documentation of first aid, CPR, and other emergency response training is not consistent and is not maintained in a central file.
- ° Mr. Fitzsimmons has recently completed a health physics training course at the University of Lowell.

Recommendations

In general, improve the records keeping/documentation for training activities related to emergency response (e.g., radiation protection, first aid, CPR, fire fighting, etc.)

Provide formal instruction in emergency DU fire response procedures for fire marshals and wardens working in the DU area. Training in fire extinguisher use should also be considered for a small number of additional employees throughout the plant.

4.0 EMERGENCY PREPAREDNESS

4.1 Plans and Procedures

- ° Roger's and Associates Engineering Corporation performed an Identification and Assessment of Potential Accidents, associated with the DU operations at TCAAP, in October 1983. The findings were that the most probable accidents involved exhaust system malfunctions and minor fires. None of the postulated accidents are expected to result in significant offsite releases of DU or exposures to the general public.
- ° Honeywell has developed an Emergency Plan for Building 502. This plan is comprehensive and covers all credible emergencies at the facility.
- ° The Emergency Plan is to be thoroughly reviewed every 2 years with more frequent updates of names, phone numbers, facility changes, etc., as necessary. The last major revision was in September 1984. The copy provided for the evaluation team review did not include updates such as the change to the 911 emergency telephone number, replacement of W. McMurty with T. Nelson, and other important emergency personnel changes.
- ° The general emergency procedures require an individual to notify/call the security guard in any emergency situation. Security will notify the necessary on/off site agency(s), contact the on call chemistry lab technician (off-duty hours), or call the personnel on emergency call list.
- ° The security gate has a copy of the Emergency Plan with critical areas highlighted, revised call lists, and specific response check sheets. The revised telephone call lists in this manual are undated.
- ° The Health Physics Procedure Manual was reviewed. Pertinent procedures are:
 - 7.3 Emergency Decontamination
 - 8.1 Fire Procedures - DU Room
 - 8.2 Procedure for Power Failure - DU Room

8.4 Medical Surveillance Program - Depleted Uranium

8.5 DU Lung Counting

9.1 Personnel Authorization and Training - Radioactive Material and Devices

All procedures have been revised within the past 2 years and appeared adequate for the Honeywell operation.

- ° Procedures do not require that a health physicist perform surveys of potentially contaminated injuries or that health physics monitors accompany potentially contaminated personnel to offsite medical facilities.
- ° Letters of agreement between Honeywell and local hospitals, ambulance services, police, or state agencies for support during a radiological emergency do not exist.
- ° The projected ambulance response time from the local ambulance service is 3 minutes. The ambulance services and medical care facilities have not been advised of the possibility of potentially contaminated patients.
- ° Tornado drills are performed every two years; evacuation drills of selected plant areas are performed in the off year. No records/documentation of emergency drills were available for inspection.
- ° Communication drills and general building evacuation drills are not conducted.

Recommendations

Implement a procedure to assure more frequent updates (quarterly suggested) of emergency response lists and phone numbers. Date all emergency plan documentation.

Develop a procedure requiring health physics monitoring of potentially contaminated injuries and establishing requirements for monitoring of medical facilities in cases of potentially contaminated accident victims.

Conduct annual meetings with offsite agencies/facilities which could be requested to respond to an incident involving DU. The meeting should be followed by correspondence which documents the agencies awareness of the Honeywell operation.

Conduct periodic (annual suggested) general building evacuation drills.

Improve documentation related to emergency preparedness and response. Document results of all training drills and emergency responses.

4.2 Facilities and Activities

Findings

- * There are 25 exhaust ventilation systems located in the DU production/assembly area. The ducts are monitored for flow rate, and are provided with smoke and heat detectors. The smoke and heat detectors are hard wired to annunciator panels located in the guardhouse and outside the DU assembly area.
- * Grinding operations are exhausted through a gross particulate bag filter and 2 HEPA filters in series. Other ventilation systems use pre- and HEPA filter combinations or mist eliminator/HEPA filter combinations.
- * All stacks are sampled continuously and the collection medium is changed weekly.
- * All machining equipment must be manually restarted in the event of power failure, and the ventilation systems must be operating in order for the machining equipment to be started.

- ° The alarm systems are provided with a four hour battery back-up, in the event of power failure. An emergency generator has been approved for the facility and will be ordered in the immediate future.
- ° The entire DU production area has been dammed to a height of 4 inches, to prevent spread of water borne contamination to the environment, or non-restricted areas.
- ° Procedures require cleaning of chips and sludge from machines on a regular basis and/or at the end of each shift. This is controlled administratively; there is no documentation of cleanout or specified frequency of cleanout.
- ° The highly pyrophoric DU grinding sludge is mixed in concrete, usually within 2 hours, to reduce the fire hazard.
- ° Facility emergency notification systems include:

Red phones - direct to TCAAP Fire House

Other phones - to security gate

Sprinkler trips - to TCAAP Fire House

Building alarm annunciators

Ventilation system, smoke, and heat detectors

Off hours paging systems for safety, health physics, security, and medical personnel

Marked evacuation routes and posted maps and instructions.

Recommendations

Review the current machine and ventilation system cleaning procedures, with emphasis on more frequent or more thorough cleaning. Establish a system of checks and controls to ensure the equipment is cleaned thoroughly at the end of each shift.

4.3 Operating History

Findings

- ° Accident/incident reports for 1984, 1985, and 1986 were reviewed. These reports are prepared in several different formats and information is not always complete.
- ° Accidents are mainly minor (local) fires in grinders, presses, and ventilation systems. These occur at the rate of one every 1-2 weeks. More recently several incidents of exploding waste drums, due to nonhomogeneous sludge mixing, have occurred.
- ° Many of the fires occur early on second shift, i.e., between 3:30 and 6:30 pm. This raises a question as to the effectiveness of the administrative machine cleanout procedures.
- ° Most fires are extinguished by DU facility personnel. TCAAP fire department personnel respond about once every 1-2 months.
- ° Previous ventilation system fires have resulted in burn through of the HEPA filters, but the contamination discharged to the environment was determined to be minimal.
- ° The DU committee minutes were reviewed for the period January through June 1986. Problems of continuing concern were noted in several areas (e.g., housekeeping, high DU concentrations in air, DU diking process). The DU committee minutes did not routinely discuss resolution of the problems, nor make direct assignments to individuals for resolution of the problems.

Recommendations

Improve record keeping and followup on accident/incident reports and DU committee activities.

5.0 FIRE PROTECTION

Findings

- ° The review of the Honeywell fire protection program was conducted by Robert Vigliaturo, Fire Protection Engineer, with Schirmer Engineering Company, Deerfield Illinois. The full evaluation is presented in Appendix B.
- ° Existing fire protection consists of extinguishers, alarms, sprinkler systems, and TCAPP fire department.
- ° Building 502 was constructed in 1942, with additions in 1979, 1980, and 1985, and is in excellent repair.
- ° The main floor occupies 27,350 m² and the second floor occupies 6090 m².
- ° The construction is mixed, concrete block, brick, frame, transite siding and pre-cast concrete.
- ° The main floor is occupied by general manufacturing areas, offices, repair shops, paint storage and spray booth, shipping and receiving areas, and employee break areas. The second floor is occupied by offices, conference rooms, storage areas, laboratories, and the employee kitchen and cafeteria.
- ° Exposures from other hazards are very light.
- ° General storage is considered satisfactory.
- ° Several facility manufacturing hazards are noted in the Schirmer report.
- ° The facility is protected by a private fire department operated on the TCAAP site by Federal Cartridge Corporation. The fire station is manned 24 hours a day, and is located about 1.6 miles from the site. The fire alert system is direct line telephone link.

- ° Several deficiencies in sprinkler system design/installation were observed in various areas of the plant.
- ° The facility has an adequate number of portable fire extinguishers. The fire extinguishers were last serviced in January 1986 and had all been hydrostatically tested and in compliance with current NFPA standards.

Recommendations

The automatic sprinkler system should be reviewed and brought into compliance with current NFPA standards. This will require modifications to the existing system, as well as, installation or extension of additional coverage.

The sprinkler system covering the hood, duct and cooking appliances in the kitchen should be interlocked with the gas fuel supply, so that the fuel will be shut off if the sprinkler system is activated.

Relocate the LPG cylinders on the southwest dock to a storage shed at least 50 feet from building 502.

Inspect all portable fire extinguishers to insure proper location, mounting and fitness for service.

Inspect and repair the accelerators on the dry pipe valves.

Inspect all gas cylinders for proper location (e.g. oxidizers vs. fuel should be separated by at least 20 feet) and storage (e.g. place in stand or secure with clamps/chains).

Install a "No Smoking, Shut-Off Engines" sign adjacent to or near the ground level gasoline dispensing tank.

APPENDIX A
AUDIT TEAM BIBLIOGRAPHIES

BIOGRAPHICAL SKETCH

James D. Berger
Oak Ridge Associated Universities
Oak Ridge, Tennessee

Manager, Radiological Site Assessment Program at ORAU from 1980 to present. Main duties include technical assistance to DOE and NRC in areas of radiological environmental surveys and evaluation of effluent and environmental monitoring programs. Prior positions at ORAU include Department Head, Health and Safety Office, 1975 to 1980; Radiation and Chemical Safety Officer, 1970 to 1975; and health physicist, 1967 to 1970. Also, Health Physics Team Leader for the ORAU Radiation Emergency Assistance Center from 1975 to 1985. Additional professional experience as industrial hygienist at Bettis Atomic Power Laboratory, 1963 to 1966, and instrument development physicist with the Bureau of Radiological Health, 1960 to 1963.

Education

B.S. in Physics from Bowling Green State University, 1960.

M.S. in Radiological Health from Northwestern University, 1968.

Professional Society Affiliations

Health Physics Society

American Industrial Hygiene Association

Certified by American Board of Health Physics

Publications

Author or co-author of approximately 10 published reports, guidebooks, and book chapters in various areas of health physics.

Author of numerous unpublished (internal use only) reports describing findings or results of technical assistance for DOE and NRC.

BIOGRAPHICAL SKETCH

Glenn L. Murphy
Oak Ridge Associated Universities
Oak Ridge, Tennessee

Currently the Assistant Program Manager, Radiological Site Assessment Program at ORAU to provide technical assistance to DOE and NRC in the areas of radiological environmental surveys and evaluation of effluent and environmental monitoring programs. Prior work history includes Senior Health Physics Consultant with Lockheed Technology Corporation from 1983 to 1985. Research Coordinator/Physicist, Center for Applied Isotope Studies, University of Georgia from 1985 to 1975-1980. Radiation Safety Officer, University of Georgia, and North Carolina Memorial Hospital, 1975-1978. University of Georgia 1975-1978.

Education

B.S. in Mathematics from Virginia Polytechnic Institute, 1971.
M.S. in Applied Nuclear Science from Georgia Institute of Technology, 1975.

Professional Society Affiliations

Health Physics Society

Publications

Author or co-author of publications on decommissioning of a luminous dial painting facility and comparative analytical methods for environmental gamma ray dose rate assessments.

Author of unpublished (internal use only) reports describing findings of results of technical assistance for DOE, NRC, and EPA.

BIOGRAPHICAL SKETCH

Robert J. Vigliaturo
Schirmer Engineering Corporation
Deerfield, Illinois

Loss Control Engineer with Schirmer Engineering Corporation from 1972 to present. Schirmer is a worldwide fire protection loss control engineering firm doing consulting on major commercial, industrial and residential projects. Schirmer provides services such as fire, casualty, OSHA, security, alarm and fire suppression system design and analysis. Schirmer also provides inspection and survey services, as well as code evaluation and consulting.

Education

A.S. in Fire Protection Engineering Technology,
Oklahoma State University, 1972.

B.A. History, Political Science and Business Administration,
University of Minnesota, 1970

Professional Society Affiliations

National Fire Protection Association
Society of Fire Protection Engineers
National Safety Council
Minnesota Fire Protection Council
Fire Instructors of Minnesota
National Automatic Sprinkler and Fire Control Association
Extra Alarm Association of the Twin Cities

APPENDIX B

HONEYWELL COMPANY, INC.
SPRINKLERED DEFENSE SYSTEM MANUFACTURING PLANT
NEW BRIGHTON, N.N.

Schirmer

SCHIRMER ENGINEERING CORPORATION
707 LAKE COOK ROAD
DEERFIELD, ILLINOIS 60015-4997
(312) 277-8340

FIRE PROTECTION ENGINEERS
SAFETY ENGINEERS
CODE CONSULTANTS

OAK RIDGE ASSOCIATED UNIVERSITIES, INC. SEC LOC. NO.: 31700
The Honeywell Company, Inc. ORIGINAL
James Fitzsimmons - Radiation Management Engineer
Donald Beck - Plant Manager
Building #502, On site of Twin Cities Arsenal
Arden Hills
MN 55112-9999

CLASS OF RISK: Sprinklered Defense Systems Manufacturing Plant

ENGINEER: R. J. Vigliaturo INSPECTION DATE: August 4-7, 1986

SUMMARY

OWNER OF REALTY: United States Army (Federal Cartridge Corporation, Licensed Operator.

GENERAL STRUCTURAL DATA: Part two story, mixed construction (wood frame, non-combustible, masonry joisted and fire resistive) building.

SPRINKLER PROTECTION: Single source, private water main, to one wet, hydraulically calculated, and eighteen dry pipe, automatic sprinkler systems.

WATCH AND ALARM SERVICE: 24 hour, seven day per week watchman service. Local and proprietary burglary alarm system. Local and remote station sprinkler waterflow, manual pull stations and automatic fire detection alarm systems.

FIRE DEPARTMENT: Fully paid, in-plant Federal Cartridge Corporation fire department located 1.6 miles distant.

PROTECTION GRADING: Non-graded location.

LOSS ESTIMATES

RISK GRADES: Good in class as a sprinklered defense systems manufacturing plant.

FIRE AREAS: Risk is all one fire area and total values are subject to one fire.

MAXIMUM FORESEEABLE LOSS ESTIMATE: 100% based on one fire area.

PROBABLE MAXIMUM LOSS ESTIMATE: 25% based on automatic sprinkler systems with local and remote station fire alarm systems in service.

SPRINKLER LEAKAGE LOSS ESTIMATE: 2%.

EXTENDED COVERAGE: Windstorm classification is ordinary and wind-resistive. inherent explosion hazard is light and well safeguarded.

Risk is subject to moderate smoke damage.

Risk is located in a government industrial complex area which apparently is not subject to civil disturbance or vandalism.

WATER DAMAGE: No unusual exposure.

FLOOD: No unusual exposure.

COLLAPSE: Building structure appears to be sound for local area conditions.

EARTHQUAKE: Risk is located in zone 1 seismic area, and would be subject to minor damage as defined by the Uniform Building Code.

CONSTRUCTION

Building was constructed in 1942, 1979, 1980 and 1985 and is in excellent repair.

Construction is 1% fire resistive, 8% noncombustible, 3% masonry joisted and 88% frame.

AREA: Second Floor - 65,140 sq. ft.

Main Floor - 294,153 sq. ft.

TOTAL AREA: 359,293 sq. ft.

HEIGHT: Part two story and numerous small penthouses 15,17,20,29, and 51 ft. above grade.

WALLS: Part 4" brick on 8" hollow concrete block, part transite siding on wood framing and part pre-cast, pre-stressed tilt-up concrete walls.

ROOF: Mostly pitch and gravel, composition on wood plank on wood joists, beams and columns, part transite on exposed steel framing and part pre-cast, pre-stressed concrete double tees on pre-cast, pre-stressed concrete tilt-up walls.

CEILING: Main floor is mostly exposed wood framing, part exposed steel framing and part pre-cast, pre-stressed concrete double tees. Second floor is part plasterboard on wood framing and part noncombustible mineral tile suspended in a metal "t" bar grid system.

FLOORS: Main floor is reinforced concrete on earth. Second floor is various overlays, (carpet, tile and hardwood) on wood plank on wood joists, beams and columns.

VERTICAL OPENINGS: There is one masonry enclosed freight elevator serving both levels with metal fire doors at both levels. There are seven wood stairways serving both levels, mostly unprotected. Only two of the stairways are protected by self-closing metal unlisted, unlatch type doors, located at both levels. The freight elevator is enclosed in a concrete shaft with unlisted metal doors at both levels.

OCCUPANCY

Second Floor - Offices, washrooms, conference rooms, storage rooms, employee cafeteria, kitchen and various laboratories.

Main Floor - General Manufacturing areas, offices, washrooms, employee break areas, various repair shops, paint storage room, paint spray booth room.

Main Floor - Shipping and receiving areas, storage areas, and assembly areas.

Risk is in the business of manufacturing ordinances for the United States Government.

EXPOSURES

Exposures are light.

NORTH: Open, Land and roadway.

SOUTH: Open, Land and parking lot.

EAST: Open, Land.

WEST: Open, Land and roadway and buildings beyond 100'.

HAZARDS

SMOKING: "No Smoking" rule is enforced EXCEPT AS NOTED IN RECOMMENDATIONS.

TRASH: Trash and floor sweepings are properly disposed of.

HOUSEKEEPING: Housekeeping is good EXCEPT AS NOTED IN RECOMMENDATIONS.

ELECTRICAL SYSTEMS: Power transformers are located outside of the building on concrete pads on the ground.

Electrical wiring installed in conduit.

20 ampere circuit breakers protect branch circuits.

No overheating noted.

Electrically heated devices are equipped with pilot lights.

HEATING, VENTILATION AND AIR CONDITIONING SYSTEM: Heat is steam supplied from remote source.

Air conditioning compressors are located on the roof, and on the ground, outside of the building.

Refrigerant is Freon.

COOKING EQUIPMENT: Gas cooking equipment installed in the cafeteria kitchen.

Automatic sprinkler extinguishing system provided protecting hood, duct and cooking surfaces.

Fuel supply IS NOT interlocked with extinguishing system.

Ducts are cleaned quarterly by Honeywell Company maintenance employees.

"Hood and Duct" label is attached. Hood was found clean. Ducts were found clean.

Filters are provided and were found clean. Filters are cleaned as needed.

STORAGE: Storage consists of various ordinance projectiles in cardboard containers.

OTHER HAZARDS

Flammable liquids and gases are properly stored and handled in approved containers and storage cabinets throughout the plant, with spare and empty pressurized gas cylinders stored outside of the building, on the dock.

Underwriters' Laboratories listed waste receptacles are provided for disposal of oily rags in the maintenance shops.

Combination oxygen and acetylene cutting sets are in use, with some equipped with Underwriters' Laboratories listed flashback preventors. Gas and electric welding equipment is used in a safe manner in the shops.

Material handling equipment consists of several liquefied petroleum gas powered forklifts, with fueling conducted outside of the building by exchanging cylinders.

Scrap metal grindings and filings are cleaned and removed from machinery on a daily basis.

Depleted uranium dusts are frequently removed from grinding areas and machinery and mixed with "Environstone", then placed in plastic bagged lined 55 gallon steel drums and then disposed of outside of this facility at an approved dump site.

Paints are stored in a cut-off sprinkler room. Flammable liquids are stored in approved containers and also in approved flammable liquid cabinets throughout the plant.

There is a cafeteria kitchen which contains gas fueled cooking equipment consisting of two deep fat fryers, two combination grill/ovens, one stove and one convection oven. Two automatic sprinkler lines are installed protecting hood, duct and cooking surfaces. Interlocking of sprinklers to the gas supply piping could not be verified.

Various shops have fusible link actuated large parts wash tanks using stoddard type solvent.

There are several small and large part spray booths, protected by unisolated sprinklers in the booth and plenum.

The tracer assembly area is protected by two 2½ gallon wet chemical manual and automatic (photoeye) fire extinguishing systems.

There are two small tracer storage cabinets, with a storage limit of 3,000 tracers, protected by a 165°F fusible pallet portable sprinkler system, containing a tank of approximately five gallons of water under pressure, above each cabinet.

PUBLIC PROTECTION

None.

PRIVATE PROTECTION

PROTECTION GRADING: Class Non-graded.

This facility is protected by a private fire department, owned by Federal Cartridge Corporation. This fire department is fully manned with approximately eight to nine men on duty per shift, on a 24 hour, seven day a week basis.

Motorized equipment consists of a 1,000 gpm, a 750 gpm and a 500 gpm pumper, and one 35' junior aerial ladder truck.

The private corporation fire department has three mutual aid packs with two private corporation fire departments (Blaine, Spring Lake Park and Mounds View and Lake Johanna), and a public volunteer fire department (New Brighton).

FIRE DEPARTMENT: Paid company 1.6 miles distant. Fire alarm by telephone.

PUBLIC WATER SUPPLY : None.

PRIVATE WATER SYSTEM: Gravity pumping system from reservoir. There are six wells to water treatment plant to a 1,000,000 gallon underground reservoir.

Hydrants are adequate.

AUTOMATIC SPRINKLER EQUIPMENT: Entire building is sprinklered EXCEPT AS NOTED IN RECOMMENDATIONS.

DATE OF INSTALLATION: 1942, 1953, 1985.

TYPE OF SYSTEMS: One 4" wet. Reliable "E" 1985 alarm valves. Eighteen dry. Grinnell, GEM "E-2", "F300" 1942, 1981, 1982 and 1985 dry valves. Dry pipe valves are equipped with Grinnell Model A-5 accelerators.

VALVES: Inside OS&Y and outside post indicator control valves. Valves found locked open EXCEPT AS NOTED IN RECOMMENDATIONS.

Dry systems protect most of the building, except the 1985 addition. Dry valves last trip tested on an UNKNOWN date by Federal Cartridge Corporation maintenance employees. Tests were satisfactory.

PIPING SCHEDULES: Pipe sizes mostly 1940 and 1953 standard schedule for Systems #1 - #18. Ordinary pipe sizes with 64 sq. ft. spacing in the manufacturing area. The "DU" wing has extra-hazard pipe sizes with 90 sq. ft. spacing.

SPRINKLERS: Grinnell and various other manufacturers, Duraspeed and various other models, 1942 and various other years, sprinklers installed.

165°F sprinklers in most of the manufacturing plant.

Corrosion resistant sprinklers ARE NOT installed under dock canopy.

SPRINKLER WATER SUPPLIES: from private water system, consisting of underground reservoir.

Eight inch connection from 10" and 12" private main.

One 2½" x 2½" x 4" fire department connection for sprinkler system #19. Systems #1-#18 have no standard fire department connection.

Two inch drain test reduced pressure from 56, 55 to 52, 50 psi.

ALARM EQUIPMENT

Fire Alarm System: Local watermotor sprinkler waterflow alarms installed. Tested satisfactorily.

American District Telegraph Company and Honeywell Company and Faraday Company (at fire station) sprinkler waterflow alarms and automatic fire alarm system installed covering this plant with signals transmitted to local panel and fire department.

Alarm system tests were satisfactory.

Supervisory alarm service is not provided on valves and dry pipe air.

Burglar Alarm System: Honeywell Company (This system protects only the "DU" wing of the plant) burglar alarm system is installed. Signals are transmitted to proprietary panel located at guard house building.

FIRE EXTINGUISHING EQUIPMENT: There are an adequate number of portable fire extinguishers for this location, consisting of (5 lb., 10 lb., and 15 lb.) CO₂, (2 1/2 lb., 10 lb. and 20 lb.) ABC dry chemical, 13 lb. 1211 Halon, and 30 lb. Met-L-X dry powder. Fire extinguishers are checked on a monthly basis. This location also has numerous wet 1 1/2" hose stations with 75' to 100' of hose. Found in satisfactory condition EXCEPT AS NOTED IN RECOMMENDATIONS.

Extinguishers were last serviced in January 1986.

Extinguishers were last hydrostatically tested on various dates, all in compliance with current NFPA Standards.

WATCH SERVICE: Uniformed guard protection is maintained 24 hours per day at this site, on a seven day per week basis.

Two rounds on weekdays and three rounds on weekends watch tours made to 19 stations using portable clock.

Coverage is adequate. Records were found satisfactory.

FIRE DOORS: Fire doors are in good operating condition EXCEPT AS NOTED IN RECOMMENDATIONS.

LOSS PREVENTION: Fire Brigade or Emergency Organizations ARE NOT organized.

Monthly Loss Prevention Inspections are being made. Inspections are being recorded.

REMARKS

ACTIVITY: Five days per week, sixteen hours per day except Saturday, 8 hours. (The "DU" wing operates on Saturday). Men are on duty during idle hours.

AREA AND AUXILIARY LOCATIONS: There are no auxiliary buildings covered under this report.

SPECIAL REMARKS

Emergency lighting is installed, and tested satisfactorily.

Inspection was made with Mr. Tom Nelson, Safety Engineer and Mr. Carbine Carbone, Building Engineer and discussed with them and Mr. Glenn Murphy and Mr. Jim Berger, Oak Ridge Associated Universities and Mr. James Fitzsimmons, Mr. Donald Beck, Mr. Richard Hillman and Mr. Frank Kvam, Honeywell employees.

RECOMMENDATIONS

86-8-1-40 A formal employee fire brigade should be organized to fight incipient stage fires, an organizational chart posted, and monthly recorded drills/meetings conducted.

86-8-2-13 The burned out exit light bulbs in several locations should be replaced.

86-8-3-80 The askewed sprinkler in the second floor machine shop, adjacent to the Chem Lab should be relocated in the perpendicular position.

86-8-4-20 The detached electrical receptacle in the second floor engineering supply room should be reinstalled in the junction box provided.

86-8-5-82 Automatic sprinkler protection should be provided in the following areas:

- a) All portable small offices.
- b) Second floor vault.
- c) Second floor cafeteria cooler.
- d) Plant engineering closet.
- e) Northwest cafeteria stock room.
- f) Below the soffit in the drafting office.
- g) Storage room, adjacent to the tool crib.
- h) Old explosion venting shifts - pattern shop, bending area, two carpenter shops, shear shop, two millwright shops, welding shop, plumbing shop, and maintenance crib.
- i) X-ray exam area.
- j) Three humidity control rooms for bar stock.
- k) Humidity control room adjacent to the high bay.

86-8-6-83 The dry pipe sprinkler control valves should be changed to wet sprinkler systems for rapid fire suppression.

86-8-7-83 All sprinkler systems should be fitted with a standard fire department connection. (Only system #19 has a fire department connection.)

86-8-8-82 Automatic sprinkler protection should be restored in the lath/tool room.

86-8-9-30 The missing fire extinguisher on Column N-16 should be replaced.

86-8-10-30 The fire extinguisher showing low pressure for Column M-10 should be recharged, date tagged and sealed.

86-8-11-20 The "pulled" conduit on the steel coil feeding machine in the northeast stamping area should be repaired.

86-8-12-35 The sprinkler system covering the hood, duct and cooking appliances in the cafeteria kitchen should be interlocked with the gas fuel supply, so that the gas fuel will be stopped to the cooking appliances in the event of a fire.

86-8-13-65 Underwriters' Laboratories listed back flow preventors should be provided on the hose lines of the oxygen/acetylene cutting sets in the following locations:

- a) Dyna-cast area.
- b) Welding shop.

86-8-14-82 Corro-proof 165°F automatic sprinklers should be provided on all exterior sprinkler branch lines. (Southwest dock area.)

86-8-15-50 The liquefied petroleum gas cylinders located on the southwest dock should be relocated at least 50' from the building, stored in a secured, noncombustible rack or shed.

86-8-16-50 The 30 lb. Met-L-X fire extinguisher in the cafeteria should be removed from this location.

86-8-17-35 The shut-off valves to the sprinkler systems to the hood, duct and cooking appliances in the cafeteria kitchen should be labeled and identified, and sealed open.

86-8-18-20 The fire extinguisher in the southwest dock area, adjacent to the shipping office should be wall mounted.

86-8-19-25 A clear aisleway should be maintained at all times to the west exit from the machine laboratory.

86-8-20-80 The dry pipe valves should be trip tested every year, and test data noted on trip test tags.

86-8-21-10 Low and high air supervision should be provided on all eighteen dry pipe valves with alarms transmitted to the in-plant fire department.

86-8-22-10 The gate valves to all sprinkler risers should be electrically supervised to the local in-plant fire department.

86-8-23-80 The inoperative accelerators on several of the dry pipe valves should be repaired and placed back into service.

86-8-24-81 An indicating type shut-off valve should be provided for the sprinklers in the plenum and hood of all paint spray booths.

86-8-25-45 The crated merchandise in the pathway of the side hinged fire doors between the "DI" room entrance and main aisleway should be removed so that this door will close completely in the event of a fire.

86-8-26-30 The 30 lb. Met-L-X fire extinguisher on Column AJ-21 should be hydrostatically tested.

86-8-27-80 The covered sprinklers in the following areas should be uncovered:

- a) Main plant spray booth.
- b) Aisleway east of the GAU/8 painting area.
- c) Paint storage room.
- d) Southwest machine area.

86-8-28-50 All oxydizers and fuel compressed gas cylinders should be separated from each other by at least 20'. (Dock area.)

86-8-29-82 The upright sprinklers in the pendent position in the GUA/8 paint spray booth should be changed to Underwriters' Laboratories listed 165°F pendent automatic sprinklers.

86-8-30-80 The missing hydraulic calculation nameplate for the wet sprinkler System #19 should be provided, affixed to the riser.

86-8-31-82 Automatic sprinkler protection in the following areas should be reworked for proper sprinkler coverage:

- a) Second floor copy room.
- b) Program manager's office.

86-8-32-50 The freestanding acetylene cylinder in the air conditioning shop should be chained in the upright position or fitted with a stand.

86-8-33-60 The fusible link should be rearranged from the rear to the front bottom portion of the lid on the paint brush cleaning tank, located in the main paint spray booth room.

86-8-34-45 The painted fusible links on several of the fire doors should be replaced with new, unpainted fusible links.

86-8-35-65 The practice of by-passing the safety devices on the small five gallon dip cans adjacent to the lightweight 30 mm paint spraying area, should be discontinued and the self-closing device placed back into service.

86-8-36-80 The plexiglass blocking discharge spray from the sprinkler in the lightweight 30 mm paint spray (small) booth should be removed or lowered so that the top of the plexiglass is below the sprinkler deflector.

86-8-37-60 The missing fusible link on the following items in the following areas should be replaced:

- a) Parts wash tank in the punch-press shop.
- b) Small dip tank in the GUA/8 paint area.

86-8-38-80 A small scale, color coded diagram showing limits of each sprinkler system, location of main valves, auxiliary drains, and inspector's test valves should be posted at the main sprinkler riser, for each system.

86-8-39-75 A "NO SMOKING, SHUT-OFF ENGINES" weather-proof sign should be provided adjacent to or on the ground level gasoline dispensing tank at the northwest area, outside the building.

86-8-40-55 The high piled stock in the cafeteria stock room, second floor, should be kept at least 18" below the sprinkler deflectors.

86-8-41-50 The following items should be complied with for the flammable liquids storage room for full compliance with NFPA #30:

- a) Underwriters' Laboratories listed dispensing pumps should be provided on the 55 gallon drums containing flammable liquids, for proper transfer of these liquids into small containers.
- b) The obstructed, "off the floor" venting (ductwork) should be freed of foreign matter, and all items removed from in front of this ductwork.
- c) "Bonding" with the use of flexible copper wiring and alligator clips should be provided with either the 55 gallon drums or the copper grounding bar.
- d) Verify adequate earth grounding from copper bar stock to earth ground.
- e) A floor drain should be provided on both sides of the division wall in this room, with drain leading to an approved receiving dump area or tank.

86-8-42-45 Underwriters' Laboratories listed Type "X" 5/8" sheet rock should be provided on the ceilings of the four humidity control rooms.

86-8-43-75 A "NO SMOKING" plan should be implemented, to eliminate smoking from all manufacturing, storage and shop areas. Designated smoking areas should be established.

This report contains information supplied by The Honeywell Company, Inc. and observations made at the time of inspection. The report is to be used by Oak Ridge Universities, Inc. relative to fire and extended coverage. No responsibility for action regarding this report or implementation of recommendations is assumed by Schirmer Engineering Corporation.
