Exhibit F

APPENDIX A

Corporate Manual on Health Safety, Environmental Protection and Loss Control for Operating Facilities

SIGNAL ENVIRONMENTAL SYSTEMS INC.

Corporate Manual

on

H E A L T H

S A F E T Y

ENVIRONMENTAL PROTECTION

and

L O S S C O N T R O L

for

O P E R A T I N G F A C I L I T I E S

T A B L E O F C O N T E N T S

I. INTRODUCTION

A. PURPOSE

The Corporate Manual on Health, Safety, Environmental Protection and Loss Control has been developed to enable Signal Environmental Systems Inc. (SESI) to fulfill its responsibilities towards its employees, the community, and government agencies.

The Program contained in the Manual has been established at the Corporate level in order to accomplish the following:

1) Assure that health, safety, environmental protection and loss control programs exist at each operating facility, are given the proper priority and attention, and are achieving the required results.

2) Coordinate health, safety, environmental protection and loss control activities among the operating facilities, maintaining consistency in procedures and the required level of performance.

3) Assist new and existing facilities in developing and/or revising health, safety, environmental protection and loss control programs by interacting with each facility and providing external resources for its use.

B. SCOPE

The Manual contains requirements for a health, safety, environmental protection and loss control program within the operating facility, and also outside the facility to the extent the program involves communication and/or interaction with Corporate, outside consultants, government agencies, etc.

The program requirements are based on the potential health and safety hazards, environmental impairments, and operating and property losses to which the facilities had a significant exposure on the date of publication of the Manual. The Manual will be revised as necessary to add requirements and procedures involving newly-identified exposures.

C. CONTENTS

The Manual consists of Policies, Responsibilities, Requirements and Guidelines.

Policies
Section II contains the Corporate Policy Statement which identifies and explains the policy of SESI. The Policy Statement also reflects the support of Management for the Program and establishes the authority and responsibility for establishing and complying with the Program requirements.

Responsibilities
Section III assigns and explains the four levels of Responsibility involved in developing, maintaining and implementing the program. Each level of Responsibility is accountable for the personnel, operations and equipment/facility on its own level and also for its required interaction with the next higher and lower levels, as applicable.

Requirements
The Program Requirements are contained in Sections IV, V, VI, VII, VIII and IX.

Section IV establishes the requirement that Committees are formed to identify, discuss and develop solutions to health, safety, environmental and loss control problems.

Section V establishes the requirement that Training sessions are conducted to inform supervisors and employees of the requirements of the Program and to instruct them in obeying its rules and following its procedures.

Section VI establishes the requirement that Rules on health, safety, environmental protection and loss control are developed and documented, and are enforced with adequate and consistent Disciplinary Measures.

Section VII establishes the Requirements and prescribes the Procedures for individual activities and/or Program elements involving health, safety, environmental protection and loss control. The Requirements are based on corporate policy, federal and state regulations, consensus standards and recommendations by industrial and

insurance company consultants. The Procedures specify each step to be taken in fulfilling each requirement; the Procedures identify, as applicable, the individuals, qualifications, equipment, documentation, etc. involved in following the Procedure. The Manual is organized in a manner which permits the Procedures to be extracted and duplicated for distribution and on-the-job reference and use.

Section VIII establishes the requirement that all reportable Accidents and qualifying Incidents are properly Investigated, Documented and reported to appropriate agencies and organizations.

Section IX establishes the requirement that periodic audits and surveys are conducted by designated individuals and/or organizations, and that all findings and recommendations are promptly reviewed and implemented.

Guidelines

Section X contains guidelines for responding to OSHA inspections, findings and citations.

II. CORPORATE POLICY STATEMENT

Loss Control

Signal Environmental Systems Inc.
Statement of Corporate Policy

We recognize management's responsibility to provide our employees safe and healthful working conditions. In this regard, it is the policy of this company:

a. To avoid accidents and the resulting human suffering, operational delays and the potential loss of earning power.

b. To maintain effective management controls which will be given the same priority as our operating procedures relating to other good management practices.

c. To observe all federal, state, local and company safety regulations.

It is the responsibility of the Plant Manager to develop an effective and continuous loss control program within his respective jurisdiction which will be in accordance with and in support of this policy. Corporate staff will be available to provide assistance in establishing loss control programs. Specifically, each level of management will be held accountable for accidents, fires and environmental work conditions and the resulting economic loss.

Management at all levels will be measured by the results attained from their safety and loss control program activities, as determined from lost time injuries, damage to company property, insurance and other indirect costs associated with accidents.

I consider the safety of personnel in our plants and offices of paramount importance and give you my personal as well as official support in your efforts to reduce accidents and injuries.

(Signature)

III. RESPONSIBILITIES

A. PLANT MANAGER

Health, safety, environmental protection and loss control are as essential to proper management of a refuse-to-energy facility as are its operations and earnings. Furthermore, accidents, environmental impairments and losses may adversely affect operations and earnings to an extent that has not been anticipated.

Therefore, it is incumbent upon the Plant Manager to have at his facility, a health, safety, environmental protection and loss control program that is both comprehensive and effective. His individual responsibilities in this regard are as follows:

1) Require the establishment of an effective health, safety, environmental protection and loss control program at the Facility,

2) Require that the program function in accordance with the Corporate Manual.

3) Maintain primary responsibility for OSHA inspections and communication, but assign responsibility for the balance of the program to the Operations Manager and hold him accountable for its function and effectiveness,

4) Commit the necessary resources to establish and sustain an effective program,

5) Extend the authority necessary to properly implement the program, and

6) Support the program by giving it personal endorsement, by exhibiting personal interest, and by committing to the program its proportionate share of personal involvement.

B. OPERATIONS MANAGER

The health, safety, environmental protection and loss control program can be effective only if properly administered. Like any other such endeavor, its success is dependent upon, and is directly proportional to the amount of concern and attention given to the program by the individual in charge of its development and implementation.

The Operations Manager is charged with managing personnel, equipment, the facility and its operation, all of the elements which create health, safety, environmental and loss control problems, but which in turn must be used to solve or prevent these problems. The Operations Manager must, therefore, manage the resources under his command in a manner which not only complies with, but also promotes the program and its goals. His individual responsibilities are as follows:

1) Establish an effective health, safety, environmental protection and loss control program at the Facility,

2) Assure that the program functions in accordance with the Corporate Manual.

3) Maintain primary responsibility for:

   a. The organization and meetings of health, safety, environmental protection and loss control committees,

   b. The organization and conduct of all training classes,

   c. The establishment and enforcement within supervision of health, safety, environmental protection and loss control rules and disciplinary measures,

   d. Compliance with health, safety, environmental protection and loss control requirements and procedures which must be handled at the management level,

   e. Investigation and documentation of accidents/incidents to the extent that management involvement is required, and

   f. Participation in facility audits and surveys.

4. Administer, but assign responsibility as appropriate, for:

   a. The enforcement among employees of health, safety, environmental protection and loss control rules and disciplinary measures,

b. Compliance with health, safety, environmental protection and loss control requirements and procedures which may be handled at the supervisory level, and

c. Investigation and documentation of accidents/incidents.

C. SUPERVISION

Health, safety, environmental protection and loss control are daily concerns which must be dealt with on a continuing basis and must involve, to the fullest extent necessary, all employees, applicable equipment, the facility and its operations.

The Supervisor assigns and oversees activities into which steps taken to solve or prevent health, safety, environmental and loss control problems are incorporated. He must, therefore, assure that these activities are performed in accordance with the purpose and requirements of the program. His individual responsibilities are as follows:

1) At the direction of the Operations Manager,

   a. Conduct and/or participate in meetings of health, safety, environmental protection and loss control committees, and

   b. Conduct and/or participate in employee training classes.

2) As primary Supervisory responsibilities,

   a. Enforcement among employees of health, safety, environmental protection and loss control rules and disciplinary measures,

   b. Compliance with health, safety, environmental protection and loss control requirements and procedures, and

   c. Investigation and documentation of accidents/incidents.

D. EMPLOYEES

Employees perform activities into which steps taken to solve or prevent health, safety, environmental and loss control problems are incorporated. Therefore, the Employee, by his/her

actions, can help to solve or prevent problems or on the other hand, create or allow the problems to exist. Ultimately, the success of the program depends upon the willingness of Employees to fulfill their own designated responsibilities. They are as follows:

1) Obey health, safety, environmental protection and loss control rules, and

2) Follow health, safety, environmental protection and loss control procedures.

IV. COMMITTEES

Committees shall be formed to implement the Corporate Policy as described in Paragraph II.B. The primary responsibilities of these committees are to identify and discuss health, safety, environmental and loss control problems, and to develop and effect solutions to the problems.

The number of committees, the scope of their activity and the membership of each may be at the discretion of the Operations Manager. However, each committee must:

1) Have its scope precisely defined (in terms of health, safety, environmental protection and/or loss control concerns) in order to assure that proper attention is given to each matter,

2) Include, as members, those persons having adequate knowledge of the specific area(s) (health, safety, environmental protection and loss control) to identify problems accurately and discuss them intelligently, and

3) Include, as members, those persons having the understanding and authority necessary to develop and implement effective solutions to the problems.

Committee activity should include as much employee participation as possible. Therefore, each committee should include, as appropriate, employees as members and, perhaps, a rotational membership which allows each employee to serve on the committee at some time.

Each committee shall:

1) Meet regularly,

2) Develop and follow an agenda,

3) Review the status of matters with which is dealing,

4) Perform periodic inspections of areas about which it is concerned, and

5) Record what was accomplished during each meeting and what was discovered during each inspection.

The Committee is an integral part of the health, safety, environmental protection and loss control program and should be given proper attention and recognition. It gives the employee an opportunity to participate in the decision-making process, which should create a stronger interest in identifying problems and a greater willingness to obey and follow established rules and procedures.

V. TRAINING

Training Sessions shall be conducted to inform supervisors and employees about the health, safety, environmental protection and loss control program and its requirements, and to instruct them in obeying its rules and following its procedures.

Training sessions should be both instructional and motivational and address, as appropriate, the specific elements of the program, its requirements, rules and procedures, as well as health, safety, environmental protection and loss control matters in general.

The training program should be established on the basis of health, safety, environmental protection and loss control priorities, with most important matters scheduled for earliest and most-often repeated sessions. However, it is essential that appropriate persons be trained in all matters in which they are involved within a reasonable period of time, and certainly with regard to critical matters before becoming involved at all.

In addition to formal classroom sessions, each instance of instruction about rules and procedures should be considered a training session. Each training session should meet the following requirements:

1) The session should be documented,

2) The instructor, trainees and other participants should be identified,

3) The source document or audio/visual presentation if one, should be identified, and

4) The format should, to the extent appropriate, be as follows:

   a) State what will be taught.

   b) Teach what is to be taught.

   c) Review what was taught.

   d) Answer any questions.

VI. RULES & DISCIPLINE

Rules governing activities relating to health, safety, environmental protection and loss control shall be established and enforced by appropriate disciplinary measures.

The rules should be developed to address problems which involve employee activities and conduct not related to the requirements listed in Section VII for which written procedures are developed. Problems to be dealt with by rules include personnel protective equipment not necessarily related to specific operating activities, drugs and alcohol, smoking, hygiene, horseplay and fighting, trash disposal, etc. All rules shall be documented and shall be posted in conspicuous locations and/or distributed to employees, as appropriate.

The rules shall be enforced by disciplinary measures which are consistently applied and are appropriate for the nature and circumstances of the violation.

VII. HEALTH, SAFETY, ENVIRONMENTAL PROTECTION AND LOSS CONTROL REQUIREMENTS & PROCEDURES

This section contains the requirements and procedures for dealing with health, safety, environmental protection and loss control matters. Each requirement is identified and explained in the following paragraphs; each procedure for implementing the requirement is contained in the procedure section which follows.

A. HEALTH

1) PRE-EMPLOYMENT PHYSICALS
(Forthcoming)

2) MEDICAL AND FIRST AID

Medical and First Aid personnel and facilities shall be available to employees who are injured or become ill in the course of their employment. Consultation, treatment, medical supplies and emergency transportation shall be approved as being adequate for anticipated injuries and illnesses. The program shall, as a minimum, conform to the requirements of 29 CFR 1910.151 and be in compliance with Procedure No. A-2.

3) HAZARD COMMUNICATION PROGRAM

A Hazard Comminication Program which informs employees of hazardous chemicals in the workplace, alerts employees to the nature and consequences of the hazards and trains employees in proper methods of avoiding the hazard or minimizing its consequences, shall be in effect in the facility. The program shall conform to the requirements of 29 CFR 1910.1200 and shall be in strict compliance with Procedure No. A-3.

For a facility located in a state which has adopted its own additional requirements, a supplemental procedure which implements these additional requirements shall be developed.

4) HEARING CONSERVATION PROGRAM
(Forthcoming)

5) LEAD EXPOSURE
(See "Lead Exposure Compliance Plan")

B. SAFETY

1) PERSONNEL PROTECTIVE EQUIPMENT

Personnel Protective Equipment shall be provided for employees to eliminate, or at least minimize injuries and illnesses caused by hazards in the workplace. Each personnel protective device shall be suitable for the associated hazard and shall conform to applicable OSHA requirements. Selection and use of Personnel Protective Equipment shall be in compliance with Procedure No. B-1.

2) EMERGENCY ACTION PLAN

A written Emergency Action Plan for dealing with all reasonably-expected emergencies and all activities associated with handling emergencies shall be in effect in the facility. The Plan shall, as a minimum, conform to the applicable requirements of 29 CFR 1910.38 and be in compliance with Procedure No. B-2.

3) LOCK & TAG
(Forthcoming)

4) CUTTING & WELDING
(Forthcoming)

5) ZERO MECHANICAL STATE

A program which assures that inspection and maintenance activities are performed safely by neutralizing energy sources in equipment and systems shall be in effect in the facility. The program shall, as a minimum, comply with the requirements of Procedure No. B-5.

6) CONFINED SPACE
(Forthcoming)

7) MATERIAL HANDLING

A program which assures that material handling is performed safely and with proper regard for equipment and supplies shall be in effect in the facility. The program shall, as a minimum, conform to the applicable requirements of 29 CFR 1910, Subpart N-Materials Handling and Storage and be in compliance with Procedure No. B-7.

C. ENVIRONMENTAL PROTECTION

1) BULK STORAGE
(Forthcoming)

2) EMISSIONS
(Forthcoming)

D. LOSS CONTROL

1) FIRE HAZARDS/FIRE FIGHTING

A program for identifying and dealing with Fire Hazards and for Fire Fighting shall be in effect in the facility. The program shall, as a minimum, conform to the applicable requirements of 29 CFR 1910, Subpart L-Fire Protection and be in compliance with Procedure No. D-1.

2) OVERHEAD CRANES

An overhead crane inspection and maintenance program which assures the safe and reliable operation of the equipment shall be in effect in the facility. The program shall, as a minimum, conform to the requirements of 29 CFR 1910.179 and be in compliance with Procedure No. D-2.

3) PRESSURE VESSELS
(Forthcoming)

4) FIRE DETECTION & ALARM SYSTEMS

A program which assures that fire detection and alarm systems are suitable for their intended use and location and that they are properly maintained and tested shall be in effect in the facility. The program shall, as a minimum, conform to the applicable requirements of 29 CFR 1910.164 and 1910.165 and be in compliance with Procedure No. D-4.

5) AUTOMATIC SPRINKLERS & FIXED FIRE EXTINGUISHING SYSTEMS

A program which assures that automatic sprinklers & fixed fire extinguishing systems are maintained in a state of adequacy and readiness shall be in effect in the facility. The program shall, as a minimum, conform to the applicable requirements of 29 CFR 1910.159 and 1910.160 and be in compliance with Procedure No. D-5.

VIII. ACCIDENT/INCIDENT INVESTIGATION AND DOCUMENTATION

All reportable accidents and qualifying incidents shall be investigated, documented and reported appropriately and in a timely manner. A reportable accident is one in which any person requires first-aid or medical treatment, or property damage in excess of $500 has been sustained; any release of a hazardous substance is considered a reportable accident. A qualifying incident is one in which a hazard is created which could cause serious injury or significant property damage.

The investigation should be conducted immediately and, if possible, completed within twenty-four hours after the occurrence. The investigation should focus on fact-finding without expressing conclusions or opinions. Except to eliminate a serious hazard, all conditions giving rise to or resulting from the occurence should remain unchanged until the investigation is completed and proper authorization has been given. The investigation should attempt to identify all persons, equipment and materials involved in the occurrence, all witnesses to the occurrence, all conditions prior to, during, and after the occurrence and all activities giving rise to, or involved with the occurrence including any instructions given in regard to the activities.

Facts obtained during the investigation should be documented as they are received or as soon afterwards as possible. The information shall be recorded on the appropriate forms(s) and reported as required.

A. CORPORATE REQUIREMENTS

Every injury requiring first-aid or medical treatment shall be recorded on an injury log which is maintained at the operating facility.

Every reportable accident and qualifying incident shall be recorded on an investigation report which is maintained at the operating facility.

A monthly accident/incident report shall be completed and forwarded to Corporate Management, Legal, Personnel and Risk Management.

B. STATE AND OSHA REQUIREMENTS

Every reportable occupational injury or illness shall be recorded on the Employers First Report of Injury Form and forwarded to the local State Department of Labor, or other such agency, as required.

Every recordable occupational injury or illness shall be recorded on OSHA form number 200 and maintained as specified. Annual summary totals shall be recorded, certified and posted as specified.

IX. AUDITS AND SURVEYS

Periodic audits and surveys shall be conducted by Corporate personnel, Facility Management, Health, Safety and Environmental Consultants and Property Loss Control Consultants.

A. CORPORATE

Representatives from Corporate Management, Legal, Personnel and/or Risk Management shall conduct periodic audits to verify that the responsibilities identified in the program are fulfilled, that the requirements are met and that the guidelines are followed.

B. FACILITY MANAGEMENT

Facility Managers shall conduct periodic audits to verify that the program requirements are being met by conformance with their prescribed procedures.

C. HEALTH, SAFETY AND ENVIRONMENTAL CONSULTANTS

Consultants shall conduct periodic surveys to assess the status and adequacy of the program in its dealing with health, safety, and environmental problems.

D. PROPERTY LOSS CONTROL CONSULTANTS

Consultants shall conduct periodic surveys to assess the status and adequacy of the program in its dealing with property loss control problems.

All findings and recommendations generated from the audits and surveys shall be promptly reviewed and implemented, as appropriate, either immediately or in accordance with an established schedule for implementation.

X. OSHA INSPECTIONS AND COMMUNICATION

1. If an OSHA Representative comes to the plant he should be asked to remain in the reception area until the Plant Manager and the Operations Manager are ready to meet with him. The Inspector should be brought directly to the Plant Manager's office without going through any part of the plant. In the Plant Manager's office the OSHA inspector should be asked the following:

   - o To identify himself and produce his credentials as well as provide his office address and the name of his supervisor.
   - o Ask him if he has a search warrant.
   - o If he does NOT have a search warrant, the following questions should be asked:
     - a. Is he there as a result of an employee complaint?
     - b. If yes, ask him what was complained of.
     - c. If no employee complained, ask him how the company was selected for an inspection.
     - d. Does he suspect any particular violation?
     - e. What is the purpose of the inspection?
     - f. What areas does he desire to inspect?
   - o Merely listen to what the OSHA Inspector says without comment.
   - o Do Not agree to an inspection. Do Not make any statements regarding any alleged violations. Do Not make any statements regarding the Company's Operations or any of the other plants and Do Not make any statements regarding safety devices, programs, or any other matter. In short the company representatives meeting with the OSHA inspector are limited to merely listening to what the inspector has to say.
   - o After this initial conversation politely tell the OSHA representative that company policy requires that you consult with the Corporate Office. Immediately call Richard G. Murphy and James A. Wilkinson to discuss the matter further. A decision will be made at this point in consultation with counsel as to whether to permit the inspection with certain restrictions or to require a warrant.

- o If a decision is made that the inspection will not be permitted without a warrant the investigator should be asked to leave and escorted to the door, again avoiding any portion of the company.

2. Once the inspector has been turned away it is possible that he will never return and it is likely that if he does return it will not be for several days, weeks or months. During this time the plant personnel should be preparing for an OSHA inspection.

3. If and when the inspector reappears with a warrant, the following procedure should be adhered to:

   - o Ask for the warrant and the warrant application. Make a photostatic copy of both these documents.

   - o Read the warrant carefully. If it refers to any other documents ask for copies of those documents and make a photostatic copy of these as well.

   - o Ask the inspector the following questions:

     a. Is the warrant based upon an employee complaint?

     b. If yes, ask him what was complained of.

     c. If no employee complained, ask him the basis for the warrant.

     d. How was the company selected for inspection?

     e. Does he suspect any particular violation?

     f. What is the purpose of the inspection?

   - o Merely listen to what the inspectors says.

   - o Again, Do Not agree to an inspection, Do Not make any statements regarding alleged violations, Do Not make any statements regarding the company's operations, Do Not make any statements regarding safety devices, programs, or any other matter. Again, authority is limited to listening to the OSHA inspector.

- After this conversation the inspector should be told politely that the company policy requires that you first contact legal counsel to review the warrant before an inspection can be permitted. Tell him that this policy is based on the company's constitutional right not to permit an inspection without a valid court issued search warrant. Also, tell him that you have no authority to permit him to inspect the premises at this time. Immediately contact Richard G. Murphy and James A. Wilkinson. They in turn will contact legal counsel.

- At this point a decision will be made as to whether to permit the inspection to proceed with restrictions or asking the OSHA inspector to leave and have him contacted by the company's attorney (however refusing the inspection could result in a contempt of court citation).

SESI
Procedure No. A-2, Issued: 10/03/86
MEDICAL AND FIRST AID

1.0 SCOPE

1.1 This procedure contains the requirements for employer compliance with OSHA Medical and First Aid Standard 29 CFR 1910.151 and Corporate employee health policies.

2.0 REFERENCES

2.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910 of the Code of Federal Regulations
Section 1910.151, Medical and First Aid

3.0 RESPONSIBILITIES

3.1 Responsibility for compliance with this procedure rests with the following individuals or groups for the activities referenced:

3.1.A Operations Manager
Reference Paragraphs 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 6.1 and 7.1

3.1.B Medical Professional
Reference Paragraphs 4.1.A, 4.1.B and 7.1

3.1.C First Aid Person
Reference Paragraphs 5.1.A, 5.1.B, 5.1.C, 5.1.D, 5.1.E, 5.1.F, 8.1, 8.2 and 8.3

3.1.D Supervisors
Reference Paragraph 8.1

3.1.E Employees
Reference Paragraph 8.1

4.0 MEDICAL SERVICES

4.1 The Operations Manager shall establish a relationship with a Medical Professional who is qualified to perform the following functions:

4.1.A Provide, or make suitable referral for consultation services and treatment of employee major injuries and major illnesses, and

4.1.B Review and approve, or make recommendations concerning the adequacy of first aid treatment capability and supplies, and emergency transportation measures.

4.2 The Operations Manager shall establish a relationship with a Paramedic Service, if available, which is qualified to provide emergency treatment for employee major injuries and major illnesses.

4.3 The Operations Manager shall establish a relationship with a Medical Facility which is qualified to provide treatment for employee major injuries and major illnesses.

4.4 The Operations Manager shall post the name and telephone number of the Medical Professional and Paramedic Service and the name, address and telephone number of the Medical Facility in one or more conspicuous and convenient locations.

5.0 FIRST AID

5.1 The Operations Manager shall appoint First Aid Persons who have been trained and are qualified to administer first aid and to provide emergency medical diagnosis and assistance. A sufficient number of First Aid Persons shall be appointed to provide adequate coverage for each shift and in the event of absenteeism.

First Aid Persons shall perform the following functions:

5.1.A Control inventory and condition of first-aid supplies and stretchers and condition of First-Aid Station,

5.1.B Treat minor injuries and minor illnesses,

5.1.C Provide emergency medical diagnosis and assistance when required,

5.1.D Supervise in-plant transportation of non-ambulatory injured or ill employees,

5.1.E Contact the Medical Professional Paramedic Service and the Medical Facility as required, and arrange for medical consultation and treatment, and

5.1.F Complete all applicable reports. (See Section VIII of Manual).

5.2 The Operations Manager shall establish a First Aid Station which is conveniently located, suitably clean and illuminated, and adequately supplied.

6.0 EMERGENCY TRANSPORTATION

6.1 The Operations Manager shall establish Emergency Transportation Measures for in-plant transportation of non-ambulatory injured or ill employees and the emergency transfer of employees to the Medical Facility.

6.1.A In-plant transportation measures should include, as applicable, stretchers, baskets, harnesses, lifelines and portable air supplies.

6.1.B Emergency transfer measures should include, as applicable, paramedic service, ambulance service, and designated employee drivers and company or private vehicles.

7.0 PROGRAM REVIEW AND APPROVAL

7.1 The Operations Manager shall submit the first aid treatment capability and supplies, and the emergency transportation measures to the Medical Professional for review and request approval or at least comments and recommendations concerning their adequacy. The review should include, as appropriate, discussions with involved persons and inspection of the facility, the First Aid Station, supplies and equipment.

8.0 INSTRUCTIONS

8.1 When an employee sustains an injury or becomes ill, the employee must notify his or her supervisor immediately. The supervisor shall accompany the employee to the First Aid Station.

For emergency or serious injuries or serious illnesses, a fellow employee should summon the First Aid Person and supervisor.

8.2 Minor injuries and minor illnesses should be treated, as required, by the First Aid Person.

For medical emergencies, the First Aid Person should provide emergency diagnosis and treatment, as required, to the extent to which the First Aid Person has been trained and is qualified. The Paramedic Service should be summoned for emergency medical care and emergency transportation, as required.

8.3 For serious injuries, serious illnesses and conditions which are ordinarily minor but, in the specific instance, have created doubt as to diagnosis and/or treatment, the employee should be transferred to the Medical Facility. Transportation should be arranged by the First Aid Person and provided by the paramedic service, ambulance or fellow employee, as appropriate.

SESI
Procedure No. A-3, Issued: 8/1/86
HAZARD COMMUNICATION PROGRAM

1.0 SCOPE

1.1 This procedure contains the requirements for employer compliance with OSHA Hazard Communication Standard 29 CFR 1910.1200 as applicable to operating facilities.

2.0 IMPLEMENTATION SCHEDULE

2.1 The activities required by this procedure shall be performed by May 25, 1986 and continuously, as specified, thereafter.

3.0 REFERENCES

3.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910, Title 29 of the Code of Federal Regulations
Section 1910.1200, Hazard Communication

4.0 RESPONSIBILITIES

4.1 Responsibility for compliance with this procedure rests with the following individuals or groups for the activities referenced:

4.1.A Operations Manager
Reference Paragraphs 5.1, 7.2, 9.1, 9.2, 10.1, 10.2, 10.3, 11.1, 11.3, 11.4, 12.1, 13.1 and 13.2.

4.1.B Purchasing Agent
Reference Paragraphs 5.1.A and 6.1

4.1.C Warehouse Supervisor
Reference Paragraphs 5.1.B, 7.1 and 8.1

4.1.D Maintenance and Operation Supervisors
Reference Paragraph 5.1.C

4.1.E All Employees using hazardous chemicals
Reference Paragraph 9.3

5.0 CHEMICAL LIST

5.1 The Operations Manager shall compile a List of all chemicals present or used in the facility. The List shall, as a minimum, be based on the following sources of information:

5.1.A The Purchasing Agent shall furnish a list of all chemicals purchased for the facility.

5.1.B The Warehouse Supervisor shall furnish a list of all chemicals present in the facility.

5.1.C Maintenance and Operation Supervisors shall identify all chemicals used in their areas of responsibility.

5.1.D The Operations Manager shall contact outside contractors to learn the identity of all chemicals used by them in the facility.

Each source of information shall immediately inform the Operations Manager of any new chemicals to be used before such chemical is purchased or brought into the facility.

The Chemical List shall identify each chemical by its precise chemical name and any other trade or common names which are applicable.

The Chemical List should identify where each chemical is used in the facility and for what purpose.

The Operations Manager shall maintain the Chemical List along with the associated Warning Labels (Paragraph 9.0) and Material Safety Data Sheets (Paragraph 10.0) at a designated location.

6.0 CHEMICAL PURCHASE

6.1 The Purchasing Agent shall incorporate into each purchase order for checmicals the requirement that the chemical supplier provide:

6.1.A Certification* that the checmical is not hazardous as defined in 29 CFR 1910.1200, or

6.1.B Warning Labels (Paragraph 9.0) and Material Safety Data Sheet* (Paragraph 10.0) with the chemical, each as required by 29 CFR 1910.1200.

*Certification or a Material Safety Data Sheet need not be requested each time a specific chemical is ordered if a current and acceptable Certification or MSDS is already on file. However, a chemical initially thought to be non-hazardous may subsequently be discovered to be hazardous, and information expressed on a MSDS may be subsequently revised or updated. Therefore, the Purchasing Agent should periodically request a current Certification or MSDS whenever a new vendor is used or if a long period of time has elapsed since the Certification or MSDS was issued.

7.0 ACCEPTANCE OF CHEMICALS FOR USE

7.1 The Warehouse Supervisor shall verify that the requirements of 29 CFR 1910.1200 contained in the purchase order (Certification or Warning Labels/MSDS) have been received and approved by the Operations Manager before accepting the purchased chemical for use in the facility.

7.2 For chemicals brought into the plant by outside contractors, the Operations Manager shall verify that facility employees are either not exposed to hazardous chemicals, or if exposed, their use of the chemical complies with the requirements of this procedure.

8.0 RELEASE OF CHEMICALS FOR USE

8.1 The Warehouse Supervisor shall, before releasing hazardous chemicals for use, verify that:

8.1.A The container in which the chemical is issued or into which it will be transferred conforms to the Labelling requirements of Paragraph 9.0, and

8.1.B The individuals to whom the chemical is issued or who will be exposed to the chemical during its use have been Informed and Trained in accordance with Paragrph 11.0.

8.2 Non-hazardous chemicals may be released for use in accordance with established practice.

9.0 WARNING LABELS

9.1 The Operations Manager shall review each Warning Label used on containers of hazardous chemicals to verify that the Label meets the following requirements:

9.1.A The Label must identify the chemical. The chemical may be identified by chemical name or by trade or common name, but the identification must correspond with the name recorded on the Chemical List (Paragraph 5.0) and stated on the Material Safety Data Sheet (Paragraph 10.0),

9.1.B The Label must contain an appropriate hazard warning. The warning must identify each acute physical and health hazard, the consequences of the hazard and the steps to be taken to avoid or minimize its consequences; chronic hazards, if serious, should also be identified,

9.1.C The Label must be legible, accurate and in the English language,
and

9.1.D The Label must be prominently displayed.

The Operations Manager shall maintain a file of approved Warning Labels.

9.2 The Warning Label provided by the chemical supplier should be used if it meets all of the requirements of Paragraphs 9.1.A through D; if it does not, the Operations Manager shall develop and use a Label which meets these requirements.

9.3 Each container of hazardous chemical and each container into which hazardous chemical will be transferred must contain a Warning Label.*

Each person who has a container of hazardous chemical under his control shall verify that the proper Warning Label is attached and is legible and prominently displayed; if not, the chemical must not be transferred or used until these requirements are met.*

The Warning Label on a container of hazardous chemical shall not be removed or defaced unless a new label is immediately attached.

*Portable containers of hazardous chemical may not require a Label if an employee transfers the chemical from a Labelled container into the portable container and uses the portable container himself. However, the employee may not transfer the unlabelled container to another employee.

10.0 MATERIAL SAFETY DATA SHEETS

10.1 The Operations Manager shall review each Material Safety Data Sheet (MSDS) to verify that it contains the following information:

1) Identification of the chemical by both its chemical and trade or common names,

2) Its physical and chemical characteristics,

3) All physical hazards,

4) All known acute and chronic health effects and related health information,

5) The primary routes of entry into the body,

6) Information on exposure limits,

7) Whether the chemical is a carcinogen,

8) Precautions for the safe handling and use of the chemical,

9) Control measures for use of the chemical,

10) Emergency and first aid procedures,

11) The date of preparation of the MSDS, and

12) The identity of the person responsible for preparing or distributing the MSDS and who can provide additional information, if necessary.

The MSDS shall not be approved and the chemical shall not be used if the MSDS is incomplete or known to be inaccurate. If unacceptable, an acceptable MSDS must be requested, received, reviewed and approved before the chemical may be used.

The Operations Manager shall maintain a file of approved Material Safety Data Sheets which shall be the sole source from which additional reference and distribution copies are made.

SESI

Procedure No. B-7, Issued: 3/03/87
MATERIAL HANDLING

1.0 SCOPE

1.1 This procedure contains the requirements for handling equipment and supplies in accordance with applicable OSHA and industry standards.

2.0 REFERENCES

2.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910, Title 29 of the Code of Federal Regulations
Subpart N-Materials Handling and Storage
Section 1910.176, Handling Materials-General
Section 1910.178, Powered Industrial Trucks
Section 1910.179, Overhead and Gantry Cranes
Section 1910.184, Slings

3.0 RESPONSIBILITIES

3.1 Overall responsibility for compliance with this procedure rests with the Operations Manager; each employee involved in material handling and his/her supervisor are responsible for complying with the specific requirements of this procedure.

4.0 MATERIAL HANDLING-GENERAL

4.1 CLEARANCE

4.1.A Sufficient safe clearance shall be provided for aisles, at loading docks, through doorways and wherever turns or passage must be made.

4.1.B Aisles and passageways shall be clear and in good repair with no obstructions that could create a hazard.

4.1.C Permanent aisles and passageways shall be appropriately marked.

4.1.D Where clearance is limited, clearance warning signs shall be posted.

4.2 STORAGE

4.2.A Equipment and supplies which are stored in tiers shall be stacked, blocked, interlocked and limited in height so that they are stable and secure against sliding or collapse.

4.2.B Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion or pests.

5.0 MATERIAL HANDLING BY POWERED INDUSTRIAL TRUCKS

5.1 OPERATOR TRAINING

5.1.A A method shall be established for training operators in the safe operation of powered industrial trucks.

5.1.B Only trained and authorized operators shall be permitted to operate powered industrial trucks.

5.2 TRUCK OPERATION

5.2.A Trucks shall not be driven up to anyone standing in front of a fixed object.

5.2.B No person shall stand or pass under the elevated portion of the truck, whether loaded or unloaded.

5.2.C Only the operator shall be permitted to ride on a powered industrial truck.

5.2.D Arms and legs shall not be placed between the uprights of the mast or outside the running lines of the truck.

5.2.E When a powered industrial truck is left unattended, load engaging means shall be fully lowered, controls shall be neutralized, power shall be shut off and brakes set. Wheels shall be blocked if the truck is parked on an incline.

5.2.F A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock or platform.

5.2.G Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks or trailers while loading or unloading. Fixed jacks may be necessary to support a semi trailer during loading or unloading when the trailer is not coupled to a tractor. The flooring of trucks and trailers shall be checked for breaks and weakness before they are driven onto.

5.2.H Sufficient headroom shall be provided under overhead installations, lights, pipes, sprinkler systems, etc.

5.2 I An overhead guard shall be used for protection against falling objects which are representative of the job application.

5.3.J A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward.

5.2.K Only approved industrial trucks shall be used in hazardous locations.

5.2.L Fire aisles, access to stairways and fire equipment shall be kept clear.

5.3 TRAVELING

5.3.A All traffic regulations shall be observed, including authorized plant speed limits.

5.3.B The right of way shall be yielded to vehicles in emergency situations.

5.3.C The operator shall slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, the operator shall travel with the load trailing.

5.3.D The operator shall look in the direction of, and keep a clear view of the path of travel.

5.3.E Grades shall be ascended or descended slowly.

5.3.F When ascending or descending grades in excess of 10 percent, loaded trucks shall be driven with the load upgrade.

5.3.G On all grades, the load on load engaging means shall be tilted back, if applicable, and raised only as far as necessary to clear the road surface.

5.3.H Under all travel conditions, the truck shall be operated at a speed that will permit it to be brought to a stop in a safe manner.

5.3.I Stunt driving and horseplay shall be prohibited.

5.3.J The operator shall slow down for wet and slippery floors.

5.3.K Dockboards or bridgeplates shall be properly secured before they are driven over, and they shall be driven over carefully and slowly. Their rated capacity shall not be exceeded.

5.3.L Elevators shall be approached slowly, and then entered squarely after the elevator car is properly leveled. Once on the elevator, the truck controls shall be neutralized, power shut off and the brakes set.

5.3.M Motorized hand trucks shall enter elevator or other confined areas with load end forward.

5.3.N Running over loose objects on the roadway surface shall be avoided.

5.3.O While negotiating turns, speed shall be reduced to a safe level by means of turning the hand steering wheel in a smooth, sweeping motion. Except when maneuvering at a very low speed, the hand steering wheel shall be turned at a moderate, even rate.

5.4 LOADING

5.4.A Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.

5.4.B Only loads within the rated capacity of the truck shall be handled.

5.4.C The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted.

5.4.D Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load.

5.4.E A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stablize the load.

5.4.F Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated shall be prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack. When stacking or tiering, only enough backward tilt to stabilize the load shall be used.

5.5 OPERATION OF THE TRUCK

5.5.A If at any time a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the truck shall be taken out of service until it has been restored to safe operating condition.

5.5.B Fuel tanks shall not be filled while the engine is running. Spillage shall be avoided.

5.5.C Spillage of oil or fuel shall be carefully washed away or completely evaporated and the fuel tank cap replaced before restarting engine.

5.5.D No truck shall be operated with a leak in the fuel system until the leak has been corrected.

5.5.E Open flames shall not be used for checking electrolyte level in storage batteries or gasoline level in fuel tanks.

6.0 MATERIAL HANDLING BY OVERHEAD CRANE

6.1 Note: No single factor can affect crane safety or maintenance costs as much as the skill of the operator, or the lack thereof. A careless or untrained operator can negate the effect of any safety device which might be installed on a crane. An unskilled operator can greatly add to maintenance costs, especially in regard to electrical equipment which can be damaged or destroyed by only a few hours of improper operation.

A good crane operator can do much to reduce maintenance costs and prolong the life of the crane by careful manipulation of the controls, allowing the motors to accelerate gradually to avoid heavy impacts, high current requirements and swinging loads, and then coasting to stop rather than making sudden stops by plugging the motor or making vicious applications of the brakes resulting in skidding of the wheels.

6.2 OPERATOR QUALIFICATIONS

6.2.A Cranes shall be operated only by qualified persons such as operators, trainees and maintenance personnel (when it is necessary to perform their duties).

6.2.B Crane operators should be required to pass a written and/or oral examination after completion of training and should be required to pass a periodic physical and visual examination.

6.2.C Crane operators should be capable of exercising good judgment and extreme care when operating a crane. Alertness, concentration and a rigid adherence to proven operating rules and practices are vital.

6.3 OPERATING PROCEDURES

6.3.A Before operating a particular crane, the operator should carefully read and study the operation manual supplied with the crane by its manufacturer and note any special instructions not given previously by the instructor or supervisor.

6.3.B Before starting the crane, make sure all controllers are in the "off" position. Next, close the main line switch and press the "on" or "reset" button so that power is "on".

6.3.C HANDLING THE BRIDGE TRAVEL MOTION

1) Before a load is lifted, the bridge should be brought in position so that it is directly over the load. Otherwise it will be impossible to "spot" the trolley and hoist hook over the load. Be sure the hook is high enough to clear any obstruction or person below.

2) Every bridge should have a brake, operated by a foot pedal for cab control or electrically operated for floor or remote control. The purpose of this brake is to permit stopping the bridge exactly where desired. After the operator has learned the distance that the bridge travels after power is shut off, he will be able to judge distances so that the need to employ the bridge brake will be greatly reduced. On floor or remote controlled cranes, the electric brake will set automatically when the control device is released. In order to drift into position, it is necessary to hold the device in the first step.

3) Start the bridge slowly and bring it up to speed gradually. Approaching the place where it is desired to stop the bridge, reduce the bridge speed. If the operator finds that the bridge is going to overtravel the desired stopping point, apply the bridge brake. For exact positioning follow the practice of jogging; namely, move the operating device rapidly "on" and "off". This practice should be followed only as necessary because it causes extra wear on the controller contacts and the electric brake (when used) and extra heating of the motor.

6.3.D HANDLING THE TROLLEY TRAVEL MOTION

1) Next, the trolley should be brought directly over the load that is to be handled, in the same manner as for the bridge.

2) If the trolley is not equipped with a brake, this motion may require more careful handling than other motions of the crane. As the operator becomes familiar with the trolley he can gauge the amount of "drift" and allow for it. In case of overtravel, the operator can quickly reverse the trolley motor to bring the trolley to a stop.

If the trolley is equipped with a brake, follow the instructions given for controlling the bridge.

6.3.E HANDLING THE HOIST MOTION

1) After the hook has been brought over the load, lower it until the hooker on the floor can place the slings on the hook. As the hook approaches this level, reduce the speed so that lowering can be stopped smoothly and quickly.

2) After the slings are in place* on the load and the operator is signalled to start hoisting, the hook should be started upward slowly until all slack has been taken out of the slings. Then stop! When the signalperson signals to continue hoisting, the load should be lifted slowly until it is clear of all obstructions. The hoist should then be increased to full speed and maintained until the desired height is reached.

* The load shall be attached to the load block by means of slings or other approved devices.

3) When lowering loads, the lowering speeds should be gradually increased to full speed and maintained until the load is near the place where it is to be stopped. The speed may then be reduced for final lowering into position. Final spotting should be accomplished by following the practice of jogging described in "Handling the Bridge Travel Motion".

4) When it is necessary that loads be raised or lowered extremely short distances, particularly when raising loads off the floor or out of tools, jogging may also be used.

5) At the beginning of the shift, the operator should try out the upper limit device of each hoist under no load. Extreme care must be exercised: the block should be "inched" into the limit or run at slow speed. If the device does not operate properly, the operator should notify the supervisor.

6.3.F PRECAUTIONS

1) Start all motions slowly, and move the operating device step by step until the fastest speed is reached.

2) Stop slowly, by bringing the operating device to the "off" position step by step.

3) Learn to judge the "drift" of each motion of the crane after the power is shut off. When this is done, there will be little use for the brakes, except for holding the load or the crane in place.

4) Minimize the number of jogging operations.

5) Do not operate any motion at less than full speed for more than 15 seconds, unless the electrical equipment has been specially designed for such service. Extended low-speed operation will result in damage to motors, resistors and wiring. Electrical equipment for overhead and gantry cranes is designed on a short-time-rated basis. The intermediate control points are intended for positioning and accelerating use only.

6.4 OPERATING RULES

The following rules are based on recommendations made by the Crane Manufacturer's Association of America, by the American National Standards Institute, and by OSHA.

6.4.A Each crane operator should be held directly responsible for the operation of the crane. Whenever there is any doubt as to SAFETY, the crane operator should stop the crane and refuse to handle loads until (1) safety has been assured or (2) the operator has been ordered to proceed by the Supervisor, who then assumes all responsibility for the SAFETY of the lift.

6.4.B The operator shall respond only to signals from the person who is directing the lift. When a signalperson is not required as part of the crane operation, the operator is then responsible for the lifts. However, the operator shall obey a stop signal at all times, no matter who gives it.

6.4.C The operator shall not close the main disconnect switch until certain that no person is on or adjacent to the crane. If there is a warning sign or lock on the switch, it shall not be energized until the sign or lock is removed by the person who placed it there. Before closing the main switch, the operator shall see to it that all controllers are in the "off" position to prevent inadvertent starting. Prior to resuming normal operations, operating motions shall be checked for proper direction, in case phase reversal of the power supply may have occurred.

6.4.D The warning device shall be activated each time before traveling and intermittently when approaching workers.

6.4.E The crane operator should stand up when necessary to improve vision. Be especially alert for any unusual sounds or warnings. Danger may be present that the operator cannot see.

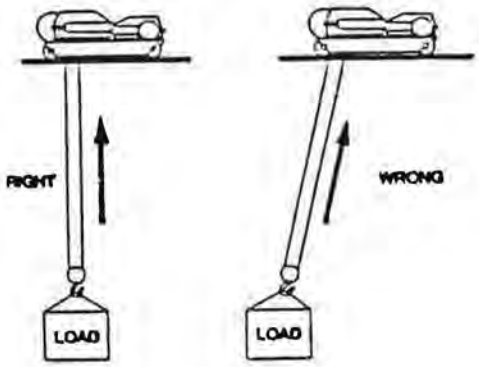
6.4.F The crane shall not be loaded beyond its Rated Load except for test purposes. To do so is a violation of OSHA regulations.

6.4.G All controls including hoist limit switches shall be tested by the operator before beginning a shift. If any controls do not operate properly they should be adjusted or repaired before operations are started.

6.4.H Crane controls should be moved smoothly and gradually to avoid abrupt, jerky movements of the load. Slack must be carefully removed from the sling and hoisting ropes before the load is lifted.

6.4.I Center the crane over the load before starting the hoist to avoid swinging the load as the lift is started. Loads should not be swung by the crane to reach areas not under the crane.

The hoist rope shall be free from kinks or twists. Crane hoist ropes should be kept vertical. Do not make side pulls with the crane and do not drag loads or hitching equipment. Side pulls may cause hoist ropes to contact and burn on electric conductors or cause undue wear on ropes, drums and other crane parts.



6.4.J Do not lower the block below the point where less than two full wraps of rope remain on the hoisting drum (except when a lower limit device is used). Should all rope be inadvertently unwound from the drum, be sure it is rewound in the correct direction or otherwise the rope will be damaged, and the hoist limit switch may not operate to stop the hoist in the high position.

6.4.K On near-maximum loads, the hoist brakes should be tested by moving the operating device to the "off" position after raising the load a few inches off the floor. If the load is held, then the brake is functioning properly. If the hoist brakes do not hold, do not operate the crane. Report the defect immediately.

6.4.L All slings should be removed from the crane hooks when not in use.

6.4.M The operator should not use a limit switch to stop motion under normal operating conditions. This is purely a protective device and is not to be used as an operating control.

6.4.N Contacts with runway stops or other cranes shall be made with extreme caution.

6.4.O Never move or bump another crane that has a warning sign displayed.

6.4.P Operators should be familiar with the operation and care of fire extinguishers on the crane.

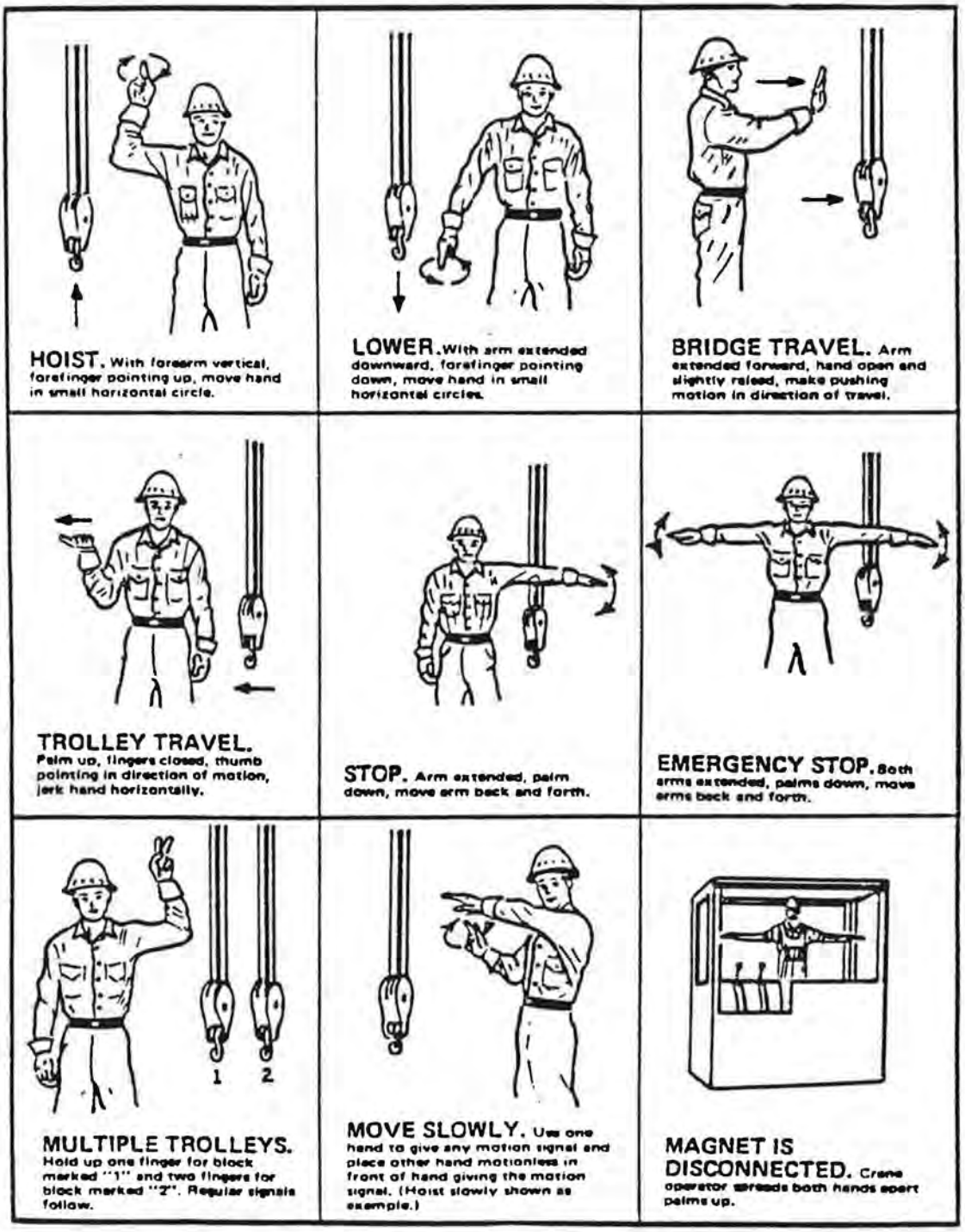
6.4.Q No movement of the bridge, trolley, or hoist shall be made while any employee is on the hook or load.

6.4.R Loads should not be carried over people.

6.4.S The operator shall not leave the crane controls while a load is suspended.

6.5 SIGNALS

6.5.A Hand signals shall be posted conspicuously and should be recommended by ANSI Standard B30.2.0 as follows:



7.0 SLINGS

7.1 SAFE OPERATING PRACTICES

7.1.A Slings that are damaged or defective shall not be used.

7.1.B Slings shall not be shortened with knots or bolts or other makeshift devices.

7.1.C Sling legs shall not be kinked.

7.1.D Slings shall not be loaded in excess of their rated capacities.

7.1.E Slings used in a basket hitch shall have the loads balanced to prevent slippage.

7.1.F Slings shall be securely attached to their loads.

7.1.G Slings shall be padded or protected from the sharp edges of their loads.

7.1.H Suspended loads shall be kept clear of all obstructions.

7.1.I All employees shall keep clear of loads about to be lifted and of suspended loads.

7.1.J Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.

7.1.K Shock loading is prohibited.

7.1.L A sling shall not be pulled from under a load when the load is resting on the sling.

SESI
Procedure No. D-1, Issued 1/13/87
FIRE HAZARDS/FIRE FIGHTING

1.0 SCOPE

1.1 This procedure contains the requirements for fire hazard detection and fire prevention in accordance with Corporate policies and insurance industry recommendations, and for fire fighting in accordance with applicable portions of OSHA Fire Protection Standard 29 CFR 1910, Subpart L.

2.0 REFERENCES

2.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910, Title 29 of the Code of Federal Regulations
Section 1910.38(b), Fire Prevention Plan
Subpart L - Fire Protection
Section 1910.157, Portable Fire Extinguishers
Section 1910.158, Standpipe and Hose Systems

3.0 RESPONSIBILTIES

3.1 Responsibility for compliance with this procedure rests with the Operations Manager as specified in Paragraphs 4.1.A-C and with respect to fire hazards and fire fighting in general.

3.2 Each employee is responsible for the specific fire hazard identification, fire prevention and fire fighting duties assigned to him/her by the supervisor or manager, and for observing fire safety requirements and regulations involved in specific activities and in general.

4.0 FIRE HAZARDS

4.1 Efforts shall be made to identify all fire hazards within the facility by performing each of the following activities:

4.1.A Fire Hazard Inspections shall be conducted at least once a month to discover any conditions which create a fire hazard, and also any violations of fire prevention procedures. Results of inspections shall be documented and submitted to the Operations Manager for review and corrective action, as appropriate.

4.1.B Hazard Evaluation of each process and operation shall be conducted to identify the fire hazards associated with human error and/or equipment malfunction. The results of each evaluation shall be documented and submitted to the Operations Manager for review and establishment of preventive measures, as appropriate.

4.1.C Insurance Company Recommendations shall be carefully reviewed and analyzed to identify the nature and magnitude of the fire hazard(s) addressed by each recommendation. Recommendations which are not resolved by full compliance shall be submitted, with the results of the analysis, to business and engineering management for review.

4.2 Steps shall be taken to eliminate, or at least minimize the creation/existence of fire hazards by performing each of the following activities:

(Note: The following activities are listed in order of importance based on the causes of fires and explosions experienced by a major property insurer during a recent five-year period).

4.2.A Employees shall be thoroughly trained in all aspects of the work they are performing with special emphasis given to safety and fire hazards. Fire evacuation and fire fighting drills shall be conducted on a regular basis to assure that employees are fully aware of their responsibilities and totally competent in fulfilling them.

4.2.B Electrical Inspection and Maintenance shall be performed on a regularly-scheduled basis to discover and correct any electrical deficiencies which could create a fire hazard.

4.2.C Smoking Regulations shall be established and strictly enforced by disciplinary measures.

4.2.D Security Surveillance shall be performed to the extent necessary to minimize the possibility of incendiary fires and to permit their early discovery.

4.2.E Hot Work (such as welding, burning and other activities which produce sparks or flames or create hot surfaces) shall be performed under controlled conditions and only after fire hazards have been eliminated or minimized and a properly-authorized hot work permit, or the equivalent, has been issued.

4.2.F Machinery Inspection and Maintenance shall be performed on a regularly-scheduled basis to discover and correct any mechanical problems which could create a fire hazard.

4.2.G Proper Housekeeping shall be strictly enforced to eliminate or minimize the accumulation of combustible materials and any debris which could impede fire fighting or evacuation efforts.

4.2.H Hazardous Materials shall be properly handled and stored, and they shall be used under controlled conditions in limited quantities away from sources of ignition with appropriate fire extinguishers readily available.

4.2.I Construction and Remodeling shall be controlled by procedures which assure that the requirements of preceding Paragraphs 4.2.A - 4.2.H are complied with, as applicable.

5.0 FIRE FIGHTING

5.1 Fire fighting at operating facilities shall conform to the following requirements:

5.1.A All employees shall be trained in the use of fire extinguishers and Class II (1 1/2") standpipe and hose systems. Training shall be conducted at least once a year by the local fire department or other qualified organization.

5.1.B Upon discovery of a fire, the local fire department shall be summoned immediately. While the fire is in its incipient stage (initial or beginning stage), employees shall respond, as directed, to fight the fire using the equipment identified in Paragraph 5.1.A. If the fire cannot be controlled by portable fire extinguishers or standpipe and hose systems, or if fighting the fire requires protective clothing or breathing apparatus, all employees shall evacuate the facility. If the employees succeed in extinguishing the fire before the arrival of the fire department, the fire department shall be contacted so that it may recall its equipment.

5.1.C For internal structural fires, the local fire department shall be summoned and all employees shall immediately evacuate the facility.

5.1.D The facility shall develop a fire response plan listing general procedures in the event of a fire and also identifying specific individuals and their responsibilities. Copies of the plan shall be posted at conspicuous locations throughout the facility.

5.2 Fire extinguishers and standpipe and hose systems shall conform to the following requirements:

5.2.A For Class A fires (ordinary combustible materials such as paper, wood, cloth and some rubber and plastic materials), suitable fire extinguishers shall be distributed in the facility so that the travel distance to any extinguisher is 75 feet or less. Uniformly spaced standpipe and hose systems may be used instead of Class A fire extinguishers if they provide total coverage of the area to be protected.

5.2.B For Class B fires (flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials), suitable fire extinguishers shall be distributed in the facility so that the travel distance to any extinguisher is 50 feet or less.

5.2.C For Class C fires (energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media), suitable fire extinguishers shall be distributed in the facility on the basis of the appropriate pattern for extinguisher Class A or B hazards. For fires involving deenergized electrical equipment, extinguishers for Class A or Class B fires may be used.

5.2.D Fire extinguishers shall be given an annual maintenance check. (Stored pressure extinguishers do not require an internal examination). A record of the maintenance date must be kept for one year after the last entry.

5.2.E Stored pressure dry chemical extinguishers requiring a twelve year hydrostatic test must be emptied and subjected to applicable maintenance procedures every six years. (Dry chemical extinguishers with disposable containers are exempt).

5.2.F An alternative means of protection shall be provided while extinguishers are removed from service for maintenance, recharging, testing, etc.

5.2.G The facility shall develop a detailed fire suppression equipment manual which identifies all fire suppression equipment in the facility and prescribes procedures for its location, operation, inspection and maintenance.

6.0 DOCUMENTATION

6.1 All records generated as a result of inspections, evaluations, reviews and training shall be maintained permanently on file.

6.2 Records of fire extinguisher inspection, maintenance and testing shall be maintained on file at least until the activity is again performed and documented, unless otherwise specified.

SESI
Procedure No. D-2, Issued: 11/11/86
OVERHEAD CRANES -
INSPECTION AND MAINTENANCE

1.0 SCOPE

1.1 This procedure contains the requirements for inspection and maintenance of overhead cranes as required by OSHA Standard 29 CFR 1910.179 and as recommended by the equipment manufacturers.

2.0 REFERENCES

2.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910 of the Code of Federal Regulations
Section 1910.179, Overhead and Gantry Cranes

American National Standards Institute
ANSI B30.2.0-1976
Overhead and Gantry Cranes

3.0 RESPONSIBILITIES

3.1 Responsibility for compliance with this procedure rests with the Plant Engineering Manager and the inspection/ maintenance personnel assigned the specific duties stated herein.

4.0 INSPECTION

4.1 Frequency

4.1.A Inspection of overhead cranes shall be performed daily and at intervals of time classifed as "frequent" and "periodic", depending upon the nature of the components and the degree of their exposure to wear, deterioration, or malfunction. Frequent inspection is performed at daily to monthly intervals; periodic inspection is performed at one to twelve month intervals.

4.1.B Components requiring daily inspection must be inspected on a daily basis. For components requiring "frequent" inspection (one to thirty day intervals) or "periodic" inspection (one to twelve month intervals), the frequency must be within the interval range specified and should be governed by the class of service in which the crane is operating, its operating environment, the age and overall condition of the crane and the results of previous inspections.

4.2 Daily Inspection

4.2.A Daily inspection shall be performed on the following components in the described manner and to the criteria specified:

1) Operate each crane motion (bridge, trolley, hoist) and each attachment (bucket, claw) in both directions through its operating range to verify proper function without interference. Any interference should be reported and corrected immediately.

2) Check each limit switch under no-load conditions for proper function by slowly operating the motion into its limit switch. If the limit switch fails to operate, it should be repaired or replaced immediately. If the limit switch permits excessive drift to within close proximity of the travel limit (end stop, sheave nest) it should be adjusted immediately.

3) Visually examine each air or hydraulic system for leakage in lines, tanks, valves, pumps and other components, as applicable. Each sign of leakage should be reported, evaluated and repaired when necessary.

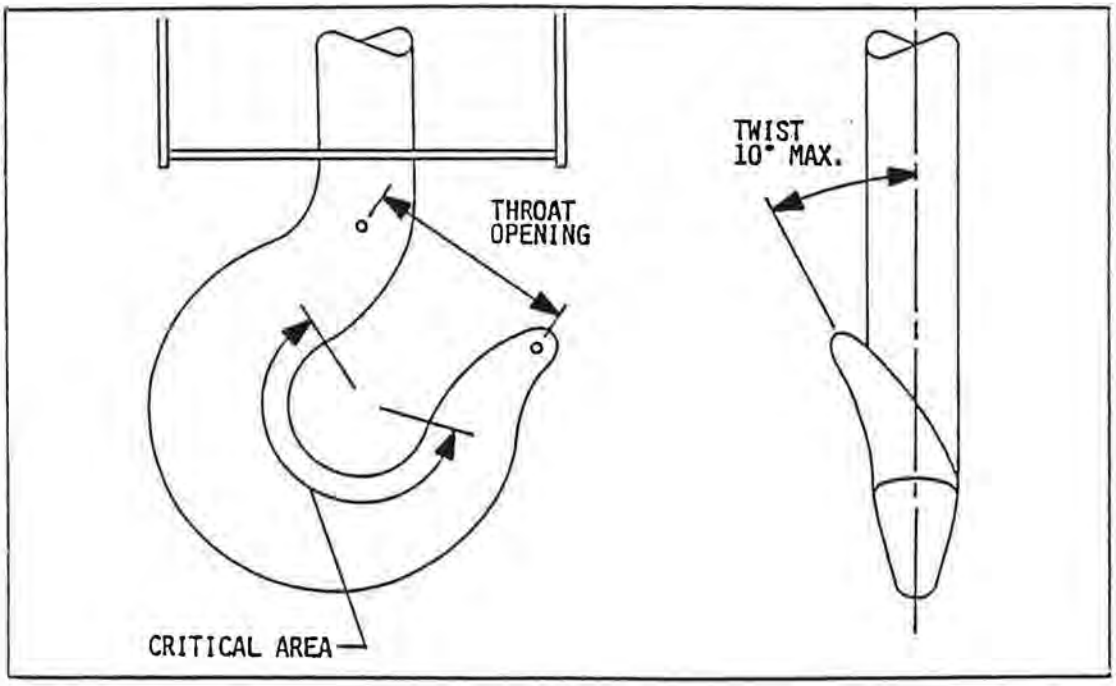
4) Each hook shall be visually examined for excessive wear, gouging, visible transverse cracks in the critical area, visible cracks at the threads, excessive throat opening, and excessive twist. Evidence of any of the following conditions shall be reported and evaluated. If deemed significant, the hook should be replaced as soon as possible.

a. Wear at the bowl exceeds 10% of the original hook depth at the bowl.

b. Throat opening exceeds 115% of the original throat opening.

c. Twist at the tip exceed 10°.

d. Visible transverse cracks exist in the critical area.



5) Hoist wire rope shall be visually examined for broken strands, reduced diameter, twisting, kinking or excessive wear.

Evidence of any of the following conditions shall be reported and evaluated. If deemed significant, the rope should be replaced as soon as possible:

a. Twelve randomly distributed broken wires in one strand in one rope lay.

b. Wear of one-third the original diameter of outside individual wires.

c. Kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure.

d. Evidence of heat damage.

e. Reductions from nominal diameter of more than 1/64 inch for diameters up to and including 5/16 inch, 1/32 inch for diameters 3/8 inch to and including 1/2 inch, 3/64 inch for diameters 9/16 inch to and including 3/4 inch, 1/16 inch for diameters 7/8 inch to and including 1-1/8 inch, and 3/32 inch for diameters 1-1/4 inch to and including 1-1/2 inch.

6) Wire rope end clamps or clips shall be visually examined for tightness. Evidence of looseness or wire rope slippage shall be reported and corrected immediately.

7) Hook latches, if applicable, shall be visually examined for condition and retention capability. Any evidence of damage should be reported and corrected immediately.

8) Rope reeving shall be checked to verify that the rope direction has not been reversed due to over-lowering and that the wire rope is not wound across grooves on the drum.

4.3 Frequent Inspection

4.3.A Prior to performing Frequent or Periodic Inspections (or Maintenance-Section 5), the following preparations and precautions shall be completed, as applicable:

1) The crane should be cleaned as thoroughly as possible to allow components and structures to be clearly visible for inspection and to eliminate the hazard of slippery surfaces while on the crane for inspection or maintenance purposes.

2) All personnel involved in the use of the crane or working in its vicinity shall be informed that inspection or maintenance will be performed.

3) The crane shall be moved to a location where it will cause the least interference with other cranes and operations.

4) All controllers shall be placed in the "off" position.

5) The main power disconnect switch shall be locked in the open position and tagged.

6) Warning or "Out of Order" signs shall be placed on the crane and also on the floor beneath or on the hook or attachment where visible from the floor.

7) The main runway conductor power supply should be locked in the open position and tagged. If it is absolutely necessary to keep the runway power on to operate other cranes, rail stops or other effective means shall be installed to prevent a collision between cranes, and an insulating cover shall be placed over open runway conductors in the area of the out-of-service crane.

4.3.B The following components shall be inspected at frequent intervals (one to thirty days) with the results documented:

1) Load blocks and sheaves shall be inspected as follows:

a) Hook shall be inspected as described in Paragraph 4.2.A.4.

b) Running sheaves (upper and lower blocks) shall be visually examined for excessive wear. Lift wire rope out of the sheave groove at a few typical places to inspect contact surface.

c) Equalizer sheave shall be checked to verify that the rope is in the sheave groove and the sheave is free to rotate. (Equalizer sheave rotation does not normally exceed 15°).

d) Hook nut shall be checked to verify that it is secure on the hook shank and has not turned on the shaft.

2) Wire rope shall be inspected as described in Paragraph 4.2.A.5.

3) Hydraulic brake lines and cylinders shall be checked for leaks.

4) Hydraulic brake pedal shall be checked to verify firm pressure.

A spongy pedal response may indicate air in the brake lines. Bleed air from lines as instructed in the hydraulic brake maintenance manual.

5) Brake shoes shall be checked to verify proper adjustment as described in the hydraulic brake maintenance manual.

6) Hoist system couplings shall be checked for loose bolts, elongated holes and tightness of keys. Tighten or replace all loose bolts and keys.

7) Hoist system bearings shall be checked for wear, signs of damage or overheating and proper lubrication.

8) Hoist system shafts shall be checked for wear and signs of damage or misalignment.

10.2 Each revised or updated MSDS shall be forwarded to the Operations Manager for review. After approving the MSDS, the Operations Manager shall replace all obsolete copies of the MSDS with the new version. The Operations Manager shall maintain a file of each MSDS received (original, corrected, revised, updated, etc.) for a minimum of thirty (30) years.

10.3 The Operations Manager shall verify that binders containing copies of the current, approved MSDS for each hazardous chemical in use in the facility are maintained for employee reference and review at or near the place where chemicals are issued for use and also in a non-work area such as the employee lunchroom.

11.0 EMPLOYEE INFORMATION AND TRAINING

11.1 The Operations Manager shall conduct Information and Training sessions on hazardous chemicals.

11.1.A An Information and Training session on a particular hazardous chemical shall be conducted for all employees who will be involved with or exposed to the chemical.

11.1.B The session shall be conducted prior to the employees assignment to a task involving use of the chemical or into an area where they will be exposed to the chemical.

11.1.C Another session shall be conducted for all employees in a work area whenever a new hazard or new hazardous chemical is introduced into their work area.

11.2 The Information and Training Session shall include, as a minimum, the following:

11.2.A Information shall be given regarding:

1) The requirements of 29 CFR 1910.1200,

2) All operations in the employees work area involving hazardous chemicals,

3) All hazardous chemicals present in the employees work area,

4) The location and availability of this procedure,

5) The location and availability of the hazardous Chemicals List, and

6) The location and availability of Material Safety Data Sheets.

11.2.B Training shall be given regarding:

1) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area,

2) The physical and health hazards of the chemicals in the work area,

3) The measures employees should take to protect themselves from the physical and health hazards,

4) The details of this procedure,

5) An explanation of the Warning Label system and requirements,

6) An explanation of the Material Safety Data Sheet, and

7) How hazard information can be obtained and should be used.

11.3 Information and Training sessions shall be documented, and the Operations Manager shall maintain a file of all records of sessions.

11.4 An Information and Training Certificate shall be completed for each participating employee, and the Operations Manager shall maintain a file of all completed certificates. This information shall be made available to Supervisors and the Warehouse Supervisor.

12.0 NON-ROUTINE TASKS AND UNLABELED PIPES

12.1 The Operations Manager shall survey the operating facility to identify all non-routine tasks which involve the use of hazardous chemicals and all unlabeled pipes containing hazardous chemicals.

Employees involved with, or exposed to these chemicals shall be Informed and Trained in accordance with Paragraph 11.0.

13.0 INFORMING CONTRACTORS OF HAZARDOUS CHEMICALS

13.1 The Operations Manager shall meet with the contractor before work is performed in the facility to review the nature of the work and the area(s) in which it will be performed.

13.2 The Operations Manager shall provide the contractor with a list of facility-supplied hazardous chemicals to which the contractor's employees may be exposed in performing their work. The list shall identify each chemical, its use and the location(s) where it is used, transferred or stored.

The Operations Manager shall offer assistance to the contractor by providing copies of Material Safety Data Sheets for reference and use by the contractor's employees.

14.0 OSHA INSPECTIONS

14.1 When an OSHA inspection is conducted to verify compliance with 29 CFR 1910.1200, the following may be presented as objective evidence:

1) This procedure constitutes the Written Hazard Communication Program required by 29 CFR 1910.1200, Subsection (e),

2) The Chemical List (Paragraph 5.0) in response to requirements therefor,

3) Warning Labels (Paragraph 9.0) and Material Safety Data Sheets (Paragraph 10.0) in response to requirements therefor, and

4) Records of Information and Training sessions, if requested.

SESI
Procedure No. 8-1, Issued: 10/09/86
PERSONNEL PROTECTIVE EQUIPMENT

1.0 SCOPE

1.1 This procedure contains the requirements for selection and use of personnel protective equipment in operating facilities in accordance with applicable OSHA and industry standards and Corporate employee safety policies.

2.0 REFERENCES

2.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910, Title 29 of the Code of Federal Regulations
Subpart I - Personal Protective Equipment
Section 1910.132, General Requirements
Section 1910.133, Eye and Face Protection
Section 1910.134, Respiratory Protection
Section 1910.135, Occupational Head Protection
Section 1910.136, Occupational Foot Protection
Section 1910.137, Electrical Protective Devices

The American National Standards Institute (ANSI)

ANSI Z87.1 - 1979[1], Eye and Face Protection

ANSI Z88.2 - 1980[2], Standard Practice for Repiratory Protection

ANSI Z89.1 - 1981[3], Safety Requirements for Industrial Head Protection

ANSI Z41.1 - 1981[4], Men's Safety-Toe Footwear

3.0 RESPONSIBILITIES

3.1 Responsibility for compliance with this procedure rests with the following individuals or groups for the activities referenced:

3.1.A Operations Manager
Reference Paragraphs 4.1.H, 4.1.I, 5.2, 6.5, 7.2, 8.2 and 9.3

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1 OSHA references ANSI Z87.1 - 1968

2 OSHA references ANSI Z88.2 - 1969

3 OSHA references ANSI Z89.1 - 1969

4 OSHA references ANSI Z41.1 - 1967

3.1.B Department/Individuals responsible for eye and face protective devices
Reference Paragraphs 4.1.F and 4.1.G

3.1.C Individual responsible for respirators
Reference Paragraphs 6.2, 6.3, 6.3.A-6.3.C, 6.4, 6.4.A, 6.4.B and 6.5.A-6.5.E

3.1.D Department/Individuals responsible for protective clothing and equipment
Reference Paragraph 8.2

3.1.E Employees, in general
Reference Paragraphs 4.1.A-4.1.E, 5.1, 6.1.A-6.1.D, 7.1, 8.1.A-8.1.D, 9.1 and 9.2

3.1.F Employees using respirators
Reference Paragraphs 6.6.A-6.6.C

4.0 EYE AND FACE PROTECTION

4.1 Eye and face protection shall be provided by the operating facility to employees and authorized visitors, and such persons shall wear the protective devices at all times under the following circumstances[5]:

4.1.A Safety glasses shall be worn by all employees and visitors in all locations within the facility except for the lunch room and offices.

4.1.B Safety glasses with side shields shall be worn by all employees and visitors exposed to areas where particles may be propelled by grinding, air-blast cleaning and the like.

4.1.C In addition to safety glasses, a full face shield shall be worn by employees involved in air-blast cleaning, chipping, chiselling, concrete breaking, equipment wash-down, grinding, handling and using chemicals, high-speed sawing, inspecting furnace fires, melting or pouring molten metal, power brushing or buffing, sand blasting, steam cleaning and working through openings to the gas side of a boiler in service.

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5 The requirements contained in Paragraphs 4.1.A through 4.1.E are the minimum requirements for the described circumstances and may be expanded by the supervisor.

4.1.D In addition to safety glasses, cutting goggles shall be worn for all torch cutting or burning operations.

4.1.E In addition to safety glasses, a welding hood shall be worn by all employees performing, assisting or observing welding, burning or cutting operations. Shaded or tinted lenses shall meet the following requirements:

Arc weld over 400 amps	Shade 14
Arc weld 200-400 amps	Shade 12
Arc weld 75-200 amps	Shade 10
Arc weld 30-75 amps	Shade 8
Arc weld up to 30 amps	Shade 6
Heavy gas, weld and cutting	Shade 8
Medium gas, weld and cutting	Shade 6
Light weld, cutting and brazing	Shade 4 or 5

4.1.F Eye and face protective devices shall conform to the requirements of ANSI Z87.1 - 1979.

4.1.G Eye and face protective devices shall:
1) Be reasonably comfortable, yet fit snugly and not unduly interfere with the movement of the wearer, and
2) Be kept clean and in good repair.

4.1.H The Operations Manager shall designate the department and/or individual responsible for the issuance, care and control of each type of eye and face protective device.

4.1.I The Operations Manager shall post signs identifying eye and face protection requirements at appropriate locations.

5.0 HEARING PROTECTION

5.1 Hearing protection shall be provided by the operating facility to employees and authorized visitors, and such persons shall wear the protective devices in all areas of the plant where sound levels exceed 90 decibels on the "A" scale.

5.2 The Operations Manager shall post signs identifying hearing protection requirements at appropriate locations.

5.3 (See Manual Paragraph VII.A.4 and Procedure No. A-4 for Hearing Conservation Program requirements).

6.0 RESPIRATORY PROTECTION

6.1 Respiratory protection shall be provided by the operating facility to employees and authorized visitors, and such persons shall wear the protective devices under the following circumstances[6]:

6.1.A While in the ash room or in ash-handling areas, inside furnaces or in any dust laden area.

6.1.B While handling refuse on the tipping floor, air-blast cleaning equipment, spray painting or using solvents.

6.1.C While exposed to harmful gas, vapor or particulate contaminants.

6.1.D While in oxygen-deficient areas and vessels.

6.2 Respiratory protection devices shall be selected as follows:

Hazard	Respirator
OXYGEN DEFICIENCY	Self-contained breathing apparatus. Hose mask with blower. Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
GAS AND VAPOR CONTAMINANTS Immediately dangerous to life or health.	Self-contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with chemical canister (gas mask). Self-rescue mouthpiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Not immediately dangerous to life or health.	Air-line respirator. Hose mask without blower. Air-purifying, half-mask or mouthpiece respirator with chemical cartridge.

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6 For areas in the facility where lead is present in excess of 30 micrograms per cubic meter of air, refer to the "Lead Exposure Compliance Plan" and "Respiratory Protection Selection and Use Procedure"

Procedure No. B-1, Issued: 10/09/86
PERSONNEL PROTECTIVE EQUIPMENT

PARTICULATE CONTAMINANTS Immediately dangerous to life or health	Self-contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with appropriate filter. Self-rescue mouthpiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Not immediately dangerous to life or health.	Air-purifying, half-mask or mouthpiece respirator with filter pad or cartridge. Air-line respirator. Air-line abrasive-blasting respirator. Hose mask without blower.
COMBINATION GAS, VAPOR AND PARTICULATE CONTAMINANTS Immediately dangerous to life or health.	Self-contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with chemical canister and appropriate filter (gas mask with filter). Self-rescue mouthpiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Not immediately dangerous to life or health.	Air-line respirator. Hose mask without blower. Air-purifying, half-mask or mouthpiece respirator with chemical cartridge and appropriate filter.

6.3 Respiratory protection devices shall be maintained as follows:

6.3.A Respirators shall be regularly cleaned and disinfected. Those used by more than one person shall be thoroughly cleaned and disinfected after each use.

6.3.B Respirators shall be stored in a convenient, clean and sanitary location.

6.3.C Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use such as self-contained devices shall be thoroughly inspected at least once a month and after each use.

6.4 When issuing respiratory protection devices for use, the following requirements shall be met:

6.4.A Each person who is issued a respirator shall be instructed and trained in its proper use and limitations.

6.4.B Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. The local physician shall determine what health and physical conditions are pertinent. The respirator user's medical status should be reviewed periodically.

6.5 The Operations Manager shall appoint a responsible individual who will be responsible for the following:

6.5.A Selection and issuance of proper respiratory protection devices.

6.5.B Maintenance of respiratory protection devices.

6.5.C Instruction and training of respirator users in conformance with 29 CFR 1910.134.

6.5.D Surveillance of work area conditions and degree of employee exposure or stress.

6.5.E Inspection and evaluation of the respiratory protection program to determine its effectiveness.

6.6 Persons who are issued a respiratory protection device are responsible for the following:

6.6.A The device shall be used in accordance with the instructions and training received.

6.6.B The device shall be protected against damage.

6.6.C Any malfunction shall be immediately reported to the responsible person.

7.0 HEAD PROTECTION

7.1 Head protection shall be provided by the operating facility to employees and authorized visitors, and such persons shall wear head protection in all locations within the facility except for the main control room, lunch room and offices.

7.2 The Operations Manager shall post signs identifying head protection requirements at appropriate locations.

7.3 Head protection shall conform to the requirements of ANSI Z89.1 - 1969.

8.0 PROTECTIVE CLOTHING and EQUIPMENT

8.1 Protective clothing and equipment shall be provided by the operating facility to employees and authorized visitors, and such persons shall wear protective clothing and use protective equipment under the following circumstances:

8.1.A Fire-resistant gloves, spats, aprons and sleeves shall be worn when performing or observing welding, heating or cutting operations and when handling heated objects.

8.1.B Chemical resistant rubber gloves and aprons shall be worn when using or handling strong chemicals.

8.1.C Safety harnesses shall be used when working on unprotected platforms, surfaces or structures ten feet above the floor or greater.

8.1.D Fire resistant coats or aprons and rubber gloves with leather protectors shall be worn when performing electrical switching operations or other activities on or near electrical equipment. Rubber matting, insulating blankets, etc. shall be used when required.

8.2 The Operations Manager shall designate the department(s) and/or individual(s) who will be responsible for the care, inspection, repair or replacement and control of protective clothing and equipment.

9.0 FOOT PROTECTION

9.1 Employees and authorized visitors shall wear shoes or boots which are suitable for the areas of the facility in which they are working or visiting.

9.2 Employees shall wear shoes or boots of substantial design and construction and the soles shall be strong and in good enough condition to prevent slipping on smooth, wet or loose surfaces and to resist penetration by nails or debris.

9.3 The Operations Manager shall identify areas of the facility and work activities which require safety shoes, steel-toe shoes, toe guards, shin guards or metatarsal protection.

SESI
Procedure No. B-2, Issued: 1/22/87
EMERGENCY ACTION PLAN

1.0 SCOPE

1.1 This procedure contains the requirements for developing and documenting an Emergency Action Plan in accordance with OSHA standards and insurance industry recommendations.

2.0 REFERENCES

2.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910 of the Code of Federal Regulations
Section 1910.38(a), Emergency Action Plan

3.0 RESPONSIBILITIES

3.1 Responsibility for compliance with this procedure rests with the Operations Manager in regard to developing, documenting and enforcing the Emergency Action Plan and with respect to handling emergencies in general.

3.2 Each employee is responsible for the specific emergency duties assigned to him/her by the supervisor or manager and for observing emergency action requirements in general.

4.0 DEVELOPING THE PLAN

4.1 All reasonably-expected emergencies shall be identified and addressed in the Emergency Action Plan. Emergencies should be categorized and/or grouped together according to their nature and how and by whom they are handled.

4.1.A Emergencies such as bomb threats, riots, demonstrations, work stoppages, etc. require management to take administrative action and, in some cases, perform operations-related activities. Matters involving public and media relations should be handled through proper corporate channels. All management and staff personnel involved in these types of emergencies should be informed of their duties and responsibilities, and these should be documented, as appropriate.

4.1.B For natural disasters, all precautions necessary to protect personnel and plant equipment should be documented and appropriately posted in the facility.

4.1.C Fire/explosion emergencies shall be handled in accordance with the fire response plan required by Procedure No. D-1, Paragraph 5.1.D.

4.1.D The Plan should address emergency conditions related to the facility, equipment and operations such as utilities' outages, sprinkler leakage, release of hazardous materials, equipment malfunction, etc. These emergencies may arise by themselves or may result from the emergencies discussed in the preceding paragraphs. Critical conditions requiring prompt action should be covered by documented procedures which are made available to all involved persons.

4.2 The Emergency Action Plan shall identify the means by which employees are made aware of emergency conditions and appropriate persons/organizations are summoned for assistance, as required.

4.2.A Emergency signals, whether activated automatically or manually, should be distinct from non-emergency signals and should be supplemented by a backup means of communication in the event of a power failure.

4.2.B The Emergency Action Plan should state the proper response to emergency signals (evacuate, provide assistance, summon outside help, etc.) and the specific responsibility of each individual or group in this regard.

4.2.C The Emergency Action Plan should list the names and telephone numbers of persons/organizations to be summoned in an emergency and the employee(s) responsible for making such calls. Where an alarm is automatically transmitted to outside help (such as fire or police departments), confirmation of the notification should be made immediately.

4.3 The Emergency Action Plan shall include evacuation procedures and escape routes and a means of accounting for all employees.

4.3.A Evacuation procedures and escape routes should be posted at conspicuous locations within the facility. Special attention should be given to isolated or remote locations and enclosures or confined spaces where an occupant may require assistance.

4.3.B The Emergency Action Plan should establish a system for accounting for all employees at all times during an emergency.

4.4 The Emergency Action Plan should address, as appropriate, the operation and/or shutdown of critical equipment and processes during an emergency. The operation of fire suppression equipment shall be addressed in the fire response plan (Procedure No. D-1, Paragraph 5.1.D)

5.0 TRAINING and PRACTICE

5.1 All employees shall be properly trained in implementing the Emergency Action Plan, and practice exercises should be conducted at regular intervals not less than annually to assure that responses to emergencies are prompt and appropriate to the emergency condition.

6.0 DOCUMENTATION

6.1 The Emergency Action Plan shall be documented as described within this procedure with copies readily available for reference and use by employees and for review when requested by an OSHA representative.

6.2 Training classes and practice sessions should be documented with the records maintained on file.

SESI
Procedure No. B-5, Issued: 2/12/87
ZERO MECHANICAL STATE

1.0 SCOPE

1.1 This procedure contains the requirements for placing equipment and systems in a Zero Mechanical State as defined by ANSI Z241.1-1981.

2.0 REFERENCES

2.1 American National Standards Institute
ANSI Z241.1-1981
Paragraph 2.69, Zero Mechanical State (ZMS)

3.0 RESPONSIBILITIES

3.1 Overall responsibility for compliance with this procedure rests with the Operations Manager; each employee who is assigned inspection or maintenance work is responsible for complying with the specific requirements of the procedure.

4.0 ZERO MECHANICAL STATE - PURPOSE

4.1 The purpose of placing equipment and systems in Zero Mechanical State during inspection and maintenance is to prevent injuries to personnel and damage to equipment caused by sudden movement of mechanical components or sudden discharge from tanks, pipes, hoses, etc.

4.2 Serious accidents are usually the result of an inexperienced person being unaware of the hazard or an experienced person failing to properly deal with the hazard. By placing the equipment or system in a zero mechanical state, hazards are eliminated or at least effectively controlled.

5.0 ZERO MECHANICAL STATE - DEFINITION

5.1 Zero Mechanical State exists in equipment or in a system when all energy has been neutralized to include the following, as applicable:

5.1.A Every power source has been locked off,

5.1.B Pressurized air, gas, steam or fluid power lockoffs (shut-off valves) will block pressure from the power source and will reduce pressure on the equipment side part of the valve by venting to atmosphere or draining to tank,

5.1.C Accumulators and air surge tanks are reduced to atmospheric pressure or are treated as power sources and locked off,

5.1.D Mechanical potential energy is at its lowest practical value,

5.1.E Pressurized air, gas, steam or fluid in lines, cylinders or other components is not capable of producing motion or a hazardous discharge,

5.1.F Kinetic energy of components is at its lowest practical value, and

5.1.G Loose or freely moving components and members are secured against accidental movement.

6.0 ZERO MECHANICAL STATE - INSTRUCTIONS

6.1 NOTIFY OTHERS - Appropriate management and supervisory personnel and all employees who are involved with the equipment or system shall be informed of the work to be done and that the equipment or system will be placed in a zero mechanical state.

6.2 REVIEW THE PROCEDURE - The work should be thought through step by step to verify the following:

6.2.A The correct equipment or system is being locked out and worked on,

6.2.B All switches are labeled correctly so the right ones can be locked out,

6.2.C Any related equipment or systems that need to be shut down are placed in zero mechanical state, and

6.2.D All persons involved in the work are wearing the required personal protective equipment.

6.3 IDENTIFY ALL ENERGY SOURCES - The equipment or system shall be carefully examined to identify all sources of energy, which need to be neutralized to place the equipment or system in zero mechanical state. Consideration should be given to both kinetic and potential energy, and all electrical circuits, hydraulic systems, pneumatic systems, gravity systems, spring energy plus air, gas, steam and fluid lines should be examined.

6.4 NEUTRALIZE ALL ENERGY - All energy sources shall be neutralized as follows:

6.4.A Electrical power shall be turned off by breaking the circuit,

6.4.B All suspended parts and components shall be lowered to rest or adequately supported,

6.4.C Movable parts or components shall be blocked or restrained,

6.4.D Air pressure from pneumatic lines, pressure reservoirs, accumulators, air tanks, etc. shall be vented,

6.4.E Hydraulic lines shall be drained or bled,

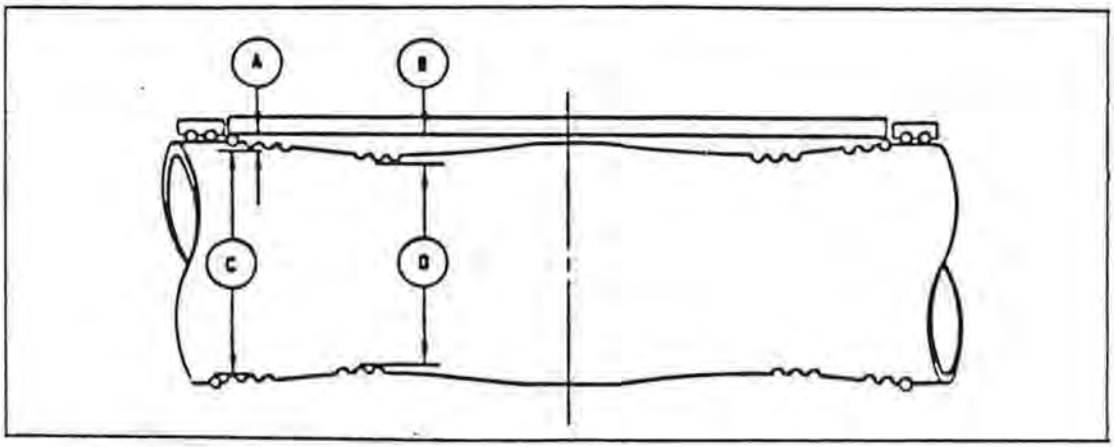
6.4.F Spring energy shall be released or blocked, and

6.4.G Gas, steam and fluid lines shall be drained or their source of supply closed off.

6.5 LOCK OUT POWER - As each energy source is neutralized, it shall be locked out to the extent possible and, in all cases tagged to warm others about the work in progress and the prohibition against doing anything to alter its zero mechanical state.

6.6 TEST EQUIPMENT OR SYSTEM - Before beginning the work, each energy source in the equipment or system shall be tested to verify that it has been neutralized.

9) Hoist drum(s) shall be checked for wear, such as some grooves worn deeper or sides of grooves worn to a point. Wear will normally show up first near the center of the drum. The groove depth near a rope anchor may be used as a reference and measurement may be performed using the following methods:



Method 1 - Using straight edge over unworn ropes near rope anchors measure depth "A" of unworn groove. Then measure depth "B" of any groove with maximum wear. When "B" exceeds "A" more than 25% of rope diameter, replace drum.

Method 2 - Use large calipers to determine "C" & "D". When the difference between "C" & "D" becomes more than 50% of rope diameter, replace drum.

Most cranes are designed with stub shafts pressed into drums and welded. These welds should be wiped clean and inspected carefully for cracks. Overloads, side pulls or other crane abuse may cause cracks in this area. If detected, consult crane manufacturer for recommended procedure for correction.

10) Hoist brakes shall be checked as follows:

Holding Brakes

These brakes are spring-set and electrically released. Braking torque is applied whenever power is removed from the brake.

a. Check for worn, grooved, cracked or broken brake wheels.

b. Check for worn pins and linkage.

c. Check for broken actuating springs.

d. Check tightness of brake wheel on shaft.

e. Check for cracked or broken brake shoes.

f. Check adjustment for shoe equalization.

g. Check adjustment for lining wear.

h. Tighten coil connections.

i. Check oil level in solenoid case (if used). Add oil or refill as needed. Refer to manufacturer's instructions for type of oil recommended. Do not substitute.

j. Check coil case oil seal for leakage (if used). Clean any dirt from around seal.

k. If the brake has a self-adjusting mechanism, this should be backed out of adjustment, then the brake released repeatedly by hand to determine if the adjustment device is ratcheting and if the solenoid stroke is within specified limits when it stops ratcheting.

l. Check for lining wear.

⚠ **WARNING**

PERSONNEL MAY BE STRUCK BY LOAD

BRAKE LININGS ARE THE MOST FREQUENTLY REPLACED CRANE PARTS. LININGS ARE ATTACHED TO THE SHOES BY RIVETS OR CEMENT. SHOES WITH CEMENTED LININGS SHOULD BE REPLACED WHEN LININGS ARE WORN TO 1/16" THICKNESS. LININGS WHICH ARE RIVETED ON SHOULD BE REPLACED BEFORE WEARING DOWN TO THE RIVET HEADS, OR THEY WILL CUT GROOVES IN THE BRAKE WHEEL. GROOVED BRAKE WHEELS SHOULD BE REPLACED.

IF THE BRAKE WHEEL IS FOUND TO HAVE SURFACE CRACKS, IT SHOULD BE REPLACED IMMEDIATELY. THIS THERMAL FATIGUE CONDITION PROGRESSES RAPIDLY TO DESTROY THE LINING AND TO COMPLETE DISINTEGRATION OF THE WHEEL. RAPID LINING WEAR MAY ALSO INDICATE THE LOAD BRAKE OR EDDY-CURRENT BRAKE IS NOT WORKING.

Eddy Current Load Brakes

This is a speed-control device intended to maintain motor speed at some value below synchronous speed by placing an additional load on the motor. It is not intended to (and will not) hold the load stationary. That is the function of the holding brake.

1. Clean any dirt from housing.

2. Check air gap between rotor and stator.

3. Check condition of bearings.

4. Visually inspect shafts for cracks or loose keys.

4.4 PERIODIC INSPECTION

4.4.A The following components shall be inspected at periodic intervals (one to twelve months) with the results documented:

1) Runways and Rails shall be checked to the following criteria in the manner specified:

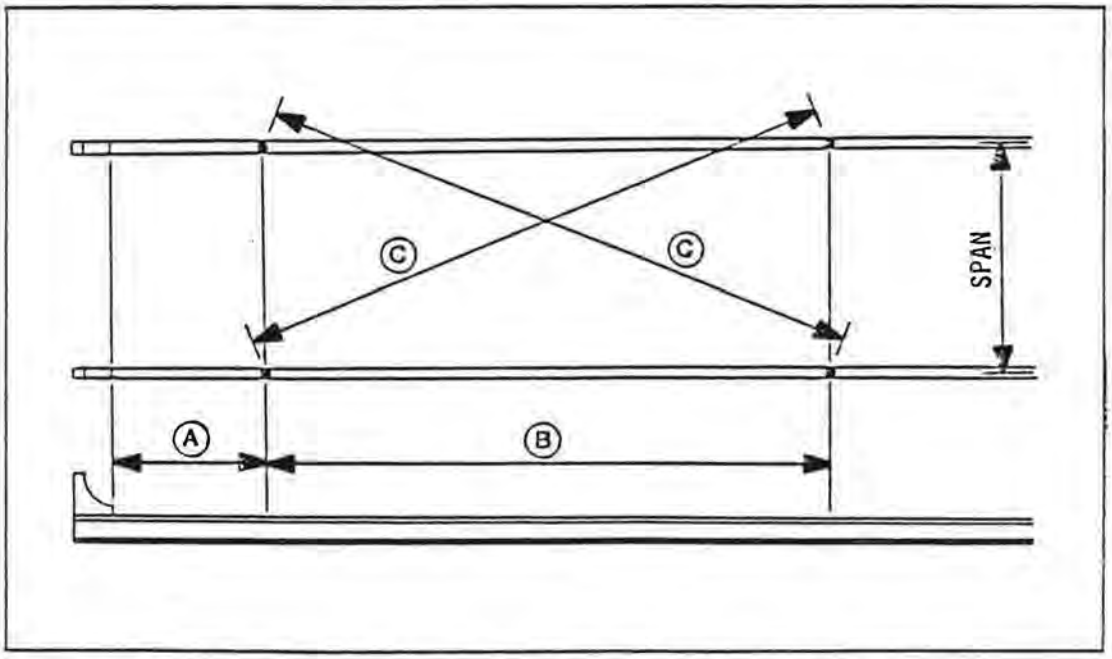
Most problems with bridge drives, wheels, axles, trucks and truck-to-girder connections are caused by poor runway condition and alignment. Runway girders and columns should be reasonably straight and parallel. Girders should be sized to deflect not more than 1/800 of their span under maximum wheel load. Runway should have rails sized for maximum wheel load, tightly spliced with close and staggered joints, and with rail heads neither cracked, spalled nor mashed to a sharp cutting edge (which will quickly destroy wheel flanges).

Rails should be kept clean and free of paint, oil and grease. These contaminants cause drive wheels to slip, skid and chatter, causing rapid tread wear, premature failure of bearings, shafts and gearing, and skewing of the bridge due to different friction conditions at opposite ends of the crane.

Rails must be straight, level, and set at the correct span within ±1/8 inch. Rails must be securely fastened to the girders. J-bolts require frequent inspection and adjustment.

Columns should be plumb, well-seated on their foundations, and rigidly attached to them by tight, sound anchor bolts. The rail should not breathe, sway, or lean toward the crane while the crane is traveling along the runway by any amount sufficient to pinch the bridge wheel flanges. Runway structure should be checked periodically for tightness of bolts and/or rivets, soundness of all welds, tight brackets, seats or girder connections to columns, and absence of rust or sagging of girders between columns.

2) Bumper Stops should be square with the rail. A method for checking squareness is shown in the following figure:



a) First make sure rails are parallel and set at correct span.

b) Measure equal distance (A) from bumper stops. Put center punch mark in center of rail.

c) Measure (B) equidistant from these marks (20' or 30'); put center punch marks in center of rail at these points.

d) Diagonals (C) should be equal. If not equal, bumpers are out of square.

3) Check to verify the following:

a) Columns plumb.

b) Columns well-seated on foundations.

c) Columns rigidly bolted to foundations with tight, sound anchor bolts.

d) Girders do not sag between columns.

e) Girder connections to columns tight and well-seated.

f) Column pads or structure sound and not eaten away by rust.

g) Runway does not sway or breathe as crane passes over.

h) Rails level within ±1/8 inch in 20 feet.

i) Rail straight within 1 inch in any 400 feet.

j) Rail span to specified dimension ±1/8 inch. Check every 20 feet with tape with spring scale so same tension is pulled when taking measurement.

k) Rail joints close and splice bars tightly-bolted.

l) Rail heads not cracked, indented, spalled out, mashed-down to a sharp edge or worn on the side.

m) Rail clips tightly-welded or bolted to runway girder.

Any variations from this list should be corrected. If above inspection shows runway and rail conditions are O.K., proceed to check crane squareness.

4) Bridge squareness shall be checked as follows:

Cranes, when assembled at the factory, are aligned for parallelism, with the end trucks squared such that diagonals between corner wheels are equal within 1/4".

This squareness is maintained by use of reamed holes and tolerance-body bolts. However, the following conditions or abuse can repeatedly overstress the connections to the point where the bolt holes are enlarged, permitting the bridge to assume a diamond shape:

a) Ramming crane at high speed into other cranes on same runway.

b) Striking end stops at high speed.

c) End stops not on a line square with runway rail.

d) Rail span which varies more than ±1/8 inch.

e) Breathing or swaying of columns due to spongy footings or loose anchor bolts.

f) Floating rails.

g) Vertical waviness in runway rail, causing crane to warp and twist.

h) Unequal wheel tread circumferences.

i) Loose bolts at the end-truck-to-girder connections can be detected by tapping the head or nut end of the bolt with a hammer. Tight bolts give a ringing sound; loose bolts, a dull thud.

Loose bolts are caused by crane skewing and by girder flexing, twisting and pounding, due to runway out-of-level waviness or broken rail ends. The out-of-level condition is usually caused by settlement of building columns.

When loose bolts are found in girder-to-truck connections or girder end ties, it is important to correct the cause of the condition, not just tighten the nuts. Otherwise the problem will quickly return and continue to get worse.

If the condition of the structural connections or the flanging of the bridge wheels indicates severe skewing, a manufacturer's service representative should be hired to check the bridge squareness.

Procedure No. D-2, Issued: 11/11/86
OVERHEAD CRANES

Bridge squareness should be checked by the following method:

Drop plumb bob from identical points at 4 corners of crane on end truck. Most cranes have a machined surface on the bearing strap next to the axle. Drape the plumb line over the shaft at these points. Put center-punch mark under point of plumb bob, on runway girder top flange.* Check diagonals between punch marks with tape and scale. The two diagonals should not differ by more than 1/4 inch per 100 feet.

* On some cranes it may be preferable to drop plumb bob from center line of wheel tread to rail head and place center punch mark there.

If the crane is suspected of being out of square, check for following structural and mechanical conditions:

1) Check end trucks for damage, bending or cracks.

2) Check worn wheel flanges or runway rail worn on side of the rail head. If worn on inside flanges only, the rail span is too short. If wheels are worn on outside flanges on 2 opposite corners, and on inside flanges on other corners, crane may be out of square or wheels are of unequal diameter, and running skewed.

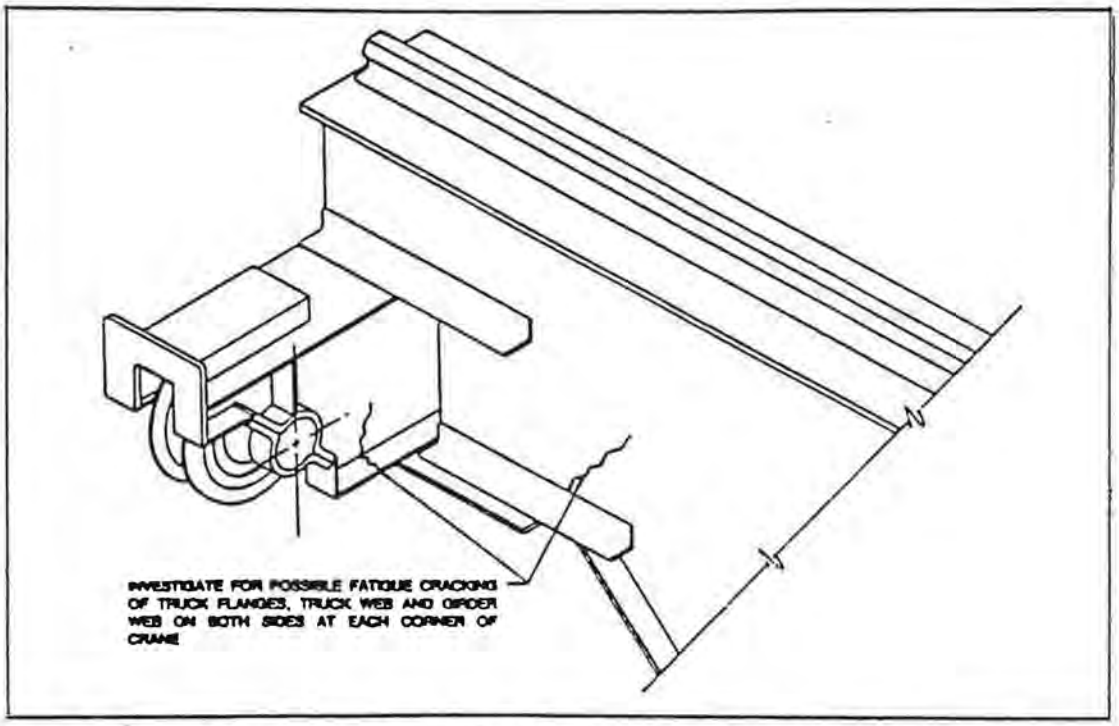
3) Check bolts for tightness on end trucks, girder end connections and girder tie connections.

4) If shifting of trucks is suspected, remove bolts and check for elongation of bolt holes or mashing of the shank on body-bound bolts. This will show whether truck has been moving relative to girders.

If crane is out of square, contact the manufacturer for assistance in re-establishing alignment. When the crane is realigned and before it is returned to service, it will be necessary to ream all accessible bolt holes and drive in larger turn-bolts.

5) Check for Structural Damage as follows:

Examine girder ends for cracks in webs, truck flanges, and truck webs as shown in the Figure which follows. If these conditions are found, consult with the manufacturer for repair or replacement of parts. Such cracks may be the result of a poor runway or may result from continually running the trolley into the bridge at high speed.



Loss of camber in girders indicates the crane has been overloaded. If there is loss of camber, the trolley will tend to roll toward center of span. Loss of camber can be checked with a transit or with taut piano wire. An estimate of camber can be obtained by sighting along the top of the bridge rail. Some upward camber should remain when the empty trolley is run to the center of span.

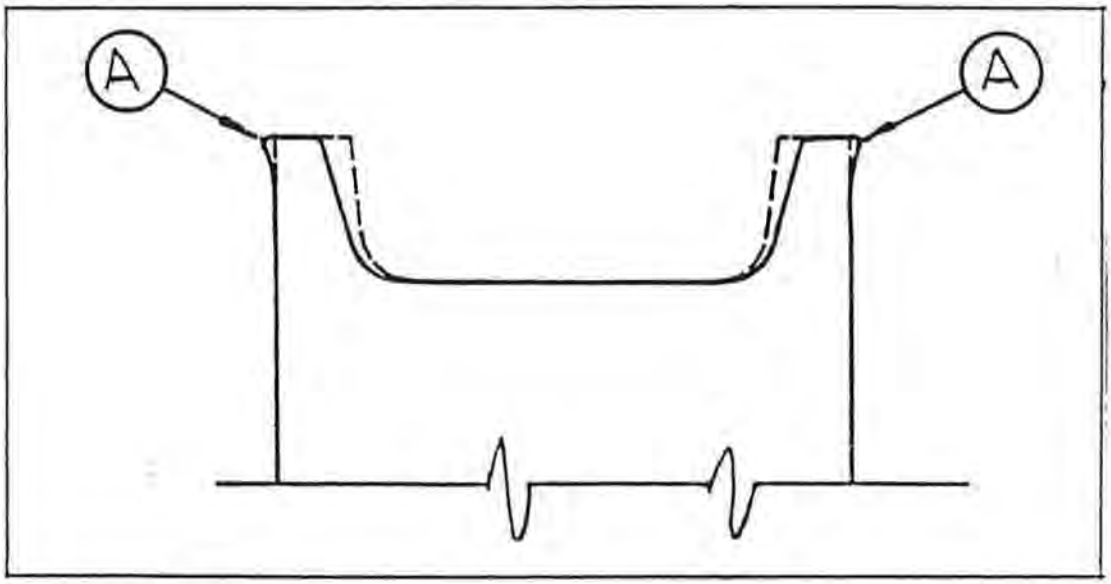
Examine gear unit and motor supports for loose bolts, structural cracks, or cracked weld which might result from fatigue conditions produced by motor torque reversals.

Footwalks, trap doors, toeboards, handrails and ladders should be inspected to assure that they are in sound structural condition and are not bent, loose, broken or missing. Footwalks must be kept clean and free of debris, such as grease, oil, loose parts, or tools. If the walk is of wood, it should be inspected for rot, oil absorption, or damage; if of steel, inspect for severe rusting or corrosion. Particular attention should be given to the means of operator and maintenance access (platforms or ladders) on cab-operated cranes.

6) Check Trolley Rails and Rail Clips for alignment, tightness and wear.

7) Check Wheel Assemblies as follows:

Check wheels for excessive wear and flanging. If present, check drive wheel diameters and/or circumferences. The two drive wheels should have the same diameter within 0.010 inches or the same circumference within 0.0625 (1/16) inches.



Wheels should be replaced when wheel flanges become thin and visible curling begins to appear at (A).

DRIVE WHEELS MUST BE REPLACED IN PAIRS. NEVER CHANGE ONLY ONE DRIVE WHEEL.

Check axle bearing housing for breakage due to side pulls or bad runway conditions.

8) Gear Units shall be inspected as follows:

a) Gear unit inspection covers should be cleaned and then opened.

b) Visually check for excessive backlash, wear or cracks in gears and pinions. Check that gears are in contact across the full gear face.

c) Check that gearing and bearings are being splash lubricated.

d) Gears should be rotated slowly so that all teeth on all gears can be visually checked for pitting on flanks and along the pitch line, and for featheredges at the tips of the teeth. Gear rotation can be accomplished by manually releasing the brake(s) and rotating the motor coupling by hand.

e) Check for broken or worn bearings.

f) Check oil level at dipstick. Drain a small amount of oil from gear unit and check for metal particles or other foreign material. If none is present, refill gear unit to level indicated on dipstick. Do not overfill! (This will cause leakage of lubricant.)

g) If this inspection indicates that there may be trouble in the gear unit, the unit should be taken apart for a closer look using the following procedure.

⚠ WARNING

HANDS OR FEET MAY BE CRUSHED

WHEN VERTICALLY MOUNTED GEAR CASES ARE DISASSEMBLED, PRECAUTIONARY MEASURES MUST BE TAKEN TO PREVENT THE INTERMEDIATE GEAR, PINION AND SHAFT ASSEMBLY FROM ROLLING OUT OF THE CASE WHEN THE GEAR CASE COVER IS REMOVED. TO AVOID THIS, LOCK THE BRAKE TO PREVENT THE SHAFT FROM TURNING BEFORE REMOVING THE COVER.

⚠ WARNING

LOAD-DROPPING HAZARD

DO NOT REMOVE THE TOP HALF OF THE HOIST GEARCASE WHILE THE LOAD BLOCK IS HANGING FROM THE CRANE; THE BLOCK MAY DROP. BEFORE LOOSENING GEARCASE BOLTS, LOWER THE BLOCK TO THE FLOOR OR OTHER FIRM SUPPORT. DO NOT ATTEMPT TO OPERATE THE HOIST UNDER POWER WHILE THE TOP HALF OF THE GEARCASE IS REMOVED.

a) Drain oil (if any) in the gearcase to be inspected. Inspect oil for foreign material and overall condition.

b) Remove gearcase cover (see (**WARNING**) and inspect gears for burrs, chipped teeth, unusual wear and general condition.

c) Clean gearcase with non-flammable cleaning solvent.

d) Inspect cleaned gearcase for cracks and general condition.

e) With the use of a magnet, probe into all corners and other areas in which magnetic material could be lodged. If foreign material is found, inspect gears and bearings for its origin.

f) Inspect gearcase cover seals for general condition, flexibility, cuts, nicks and placement.

g) Replace gearcase cover and secure.

h) Add oil to the level indicated on the dipstick. Do not overfill! Refer to the Manufacturer's Lubrication Chart for the recommended lubricant.

i) A hoist gear unit having a mechanical load brake should also be checked for brake wear and adjustment. Refer to instructions in maintenance manual.

9) Drive System Couplings shall be checked for loose bolts, elongated holes and tightness of keys.

10) Drive System Bearings shall be checked for wear, signs of damage or overheating and proper lubrication.

11) Drive System Shafts shall be checked for wear and signs of damage or misalignment.

12) Drive Brakes shall be checked as described in Paragraph 4.3.B.10.

13) Bridge and Trolley Bumpers shall be checked to verify that they are intact and securely bolted to the trucks, that coil springs (if used) are not broken, and that restraining cables (if used) are in place.

14) All Machinery and Structural bolts shall be checked to verify that they are not loose.

15) All Open Electrical Components, Connections, and Wiring shall be inspected to verify that they are guarded such that persons cannot come in contact with them under normal operating conditions.

Appropriate **HIGH VOLTAGE, DANGER** and/or **WARNING** signs should be in place and in good condition.

16) Motors shall be checked as follows:

a) Check brushes for wear, even contact and breakage.

b) Check brush springs for tension.

c) Check slip rings or commutators for pitting and wear.

d) Check wires and terminals for tightness.

e) Replace motor inspection covers and conduit box covers if missing.

17) Control Panels shall be checked as follows:

a) Manually check each contactor and relay for binding or excessive looseness.

b) Inspect contact tips for evidence of burning, pitting, or wear. Replace if damaged.

c) Check fuses and/or circuit breakers.

d) Securely remount any loose contactors or relays.

e) Tighten loose wire connections.

f) Look for parts which may have fallen to the bottom of the enclosure. Such parts may provide a clue to inoperative components. Replace parts in their proper location.

g) Look for disconnected wires and reconnect.

h) Check setting of timers.

i) Make sure the enclosure doors close and lock. Replace door seals if necessary.

18) Resistors shall be checked as follows:

a) Check for broken or burned-out grids.

b) Check for broken insulators.

c) Tighten loose wires.

19) Master Switches or Pendant Pushbuttons shall be checked as follows:

a) Check for free and complete operation in both directions.

b) Check for automatic return to neutral (if used).

c) Check for off-position detent (master switches). Adjust detent, if necessary.

d) Check that each motion is correctly and legibly marked.

e) Check condition of contacts.

f) Tighten loose connections.

g) Check covers for proper fit.

20) Limit switches shall be checked as follows:

a) Check contacts for tightness, corrosion, pitting and burning.

b) Tighten loose wires.

c) Check for and remove any jumpers that may have been installed to by-pass the upper limit.

d) Check operating arms for free operation (weight-type).

e) Check condition of weight guide (weight-type).

f) Check condition of limit switch cable and cable sheave (if used).

g) Check limit switch coupling (screw-type).

21) Collectors and Conductors shall be checked as follows:

a) Visually observe runway conductor alignment. Conductors must be straight, level, and parallel to the runway rail.

b) Check runway collectors for wear. (Wheel collectors usually wear at the bushing first).

c) Check insulators (if used) for cracks.

d) Tighten loose connections.

e) Check bridge conductors and trolley collectors for Items a through d.

f) If festooned conductors are used, check the following:

1) Track straightness.

2) Alignment of towing arm (on trolley).

3) Towing chain (between carriers).

4) Wear of carrier wheels.

5) Cable clamp tightness.

6) Excess bending or cracking of conductors or sign of conductor overheating.

7) Tightness of wires in junction boxes.

22) Disconnect Switches shall be checked as follows:

a) Check manual type for complete engagement and disengagement.

b) Check contactor in magnetic type for freedom of movement.

c) Check fuses or circuit breakers.

d) Check physical condition of operating handles.

e) Make sure all doors close and lock tightly.

5.0 MAINTENANCE

5.1 Crane maintenance involves both correction of the deficiencies detected during the inspection performed in Section 4 and routine preventive measures intended to maintain the equipment in good condition. The minimum preventive activities which shall be performed and documented are as follows:

5.1.A Lubrication

1) Wire Rope shall be maintained in a well-lubricated condition using a lubricant which does not hinder visual examination and is compatible with the original lubricant provided.

2) All Shaft and Axle Bearings shall be lubricated at regular intervals.

⚠ **CAUTION**

CRANE MAY BE DAMAGED

DO NOT OVERLUBRICATE AXLE BEARINGS. EXCESS GREASE MAY RUN ONTO WHEEL TREADS AND RAIL HEADS. THIS WILL CAUSE LOSS OF WHEEL TRACTION, RESULTING IN DAMAGE TO BEARINGS, GEARING, COUPLINGS AND SHAFTS.

3) Oil level in Gear Units shall be maintained at proper level with the oil changed as specified in the maintenance manual.

⚠ **CAUTION**

PERSONNEL MAY SLIP AND FALL OR CRANE MAY BE DAMAGED

DO NOT OVERFILL GEAR UNITS! CHECK DIPSTICK!

4) Slow-Speed Gears, if applicable, shall be lubricated with grease at regular intervals.

5) Load Blocks and Attachments or other devices shall be lubricated at regular intervals.

5.1.8 Cleaning

1) The Crane shall be cleaned at regular intervals to facilitate inspection and maintenance and to prevent the accumulation of grease, oil, debris, dirt or any substances which create a safety hazard, interfere with the proper operation of the crane or its components or cause the corrosion of structural or mechanical components.

6.0 DOCUMENTATION

6.1 Inspection and Maintenance activities shall be documented on the Report Forms which follow.

6.2 Completed Forms shall be submitted to the Plant Engineering Manager for review and retention.

OVERHEAD CRANE **DAILY** INSPECTION REPORT

Crane Serial No._____Location:_____Position: Circle One N S E W
Date of Inspection:_____Performed By:_____

Reference No.	Description	O.K.	Not O.K., Explain
4.2.A.1	Bridge Motion		
	Trolley Motion		
	Main Hoist Motion		
	Aux. Hoist Motion		
	Bucket		
	Claw		
4.2.A.2	Bridge Limit Switches		
	Trolley Limit Switches		
	Main Hoist Limit Switch(es)		
	Aux. Hoist Limit Switch(es)		
4.2.A.3	Air System(s)		
	Hydraulic System(s)		
4.2.A.4	Main Hook		
	Aux. Hook		
4.2.A.5	Main Hoist Wire Rope		
	Aux. Hoist Wire Rope		
4.2.A.6	M.H. Wire Rope Clamps		
	A.H. Wire Rope Clamps		
4.2.A.7	Main Hook Latch		
	Aux. Hook Latch		
4.2.A.8	Wire Rope Reeving		

Additional Comments:_____

_____

_____

_____

_____ _____
Signature Date

OVERHEAD CRANE FREQUENT INSPECTION REPORT

Crane Serial No._____ Location:_____ Position: N S E W (Circle One)
Date of Inspection:_____ Performed By:_____

Reference No.	Description	O.K.	Not O.K., Explain
4.3.B.1.a	Main Hook		
	Aux. Hook		
4.3.B.1.b	Main Hoist Sheaves		
	Aux. Hoist Sheaves		
4.3.B.1.c	M.H. Equalizer Sheave		
	A.H. Equalizer Sheave		
4.3.B.1.d	Main Hook Nut		
	Aux. Hook Nut		
4.3.B.2	Main Hoist Wire Rope		
	Aux. Hoist Wire Rope		
4.3.B.3	Hydraulic Lines		
4.3.B.4	Hydraulic Brake Pedal		
4.3.B.5	Hydraulic Brake Shoes		
4.3.B.6	Main Hoist Couplings		
	Aux. Hoist Couplings		
4.3.B.7	Main Hoist Bearings		
	Aux. Hoist Bearings		
4.3.B.8	Main Hoist Shafts		
	Aux. Hoist Shafts		
4.3.B.9	Main Hoist Drum		
	Aux. Hoist Drum		
4.3.B.10	Main Hoist Brakes		
	Aux. Hoist Brakes		

Additional Comments:_____

_____

_____

_____ _____
Signature Date

OVERHEAD CRANE **PERIODIC** INSPECTION REPORT - Sheet 1

Circle One
Crane Serial No._____Location:_____Position: N S E W
Date of Inspection:_____Performed By:_____

Reference No.	Description	O.K.	Not O.K., Explair
4.4.A.1	Runways & Rails		
4.4.A.2	Bumper Stops		
4.4.A.3	Runway Columns		
	Runway Girders		
	Runway Rails		
4.4.A.4	Bridge Squareness		
4.4.A.5	Structural Damage		
4.4.A.6	Trolley Rails & Clips		
4.4.A.7	Bridge Wheel Assemblies		
	Trolley Wheel Assemblies		
4.4.A.8	Bridge Gear Unit		
	Trolley Gear Unit		
	Main Hoist Gear Unit		
	Aux. Hoist Gear Unit		
4.4.A.9	Bridge Couplings		
	Trolley Couplings		
4.4.A.10	Bridge Bearings		
	Trolley Bearings		
4.4.A.11	Bridge Drive Shafts		
	Trolley Drive Shafts		
4.4.A.12	Bridge Brakes		
	Trolley Brakes		
4.4.A.13	Bridge Bumpers		
	Trolley Bumpers		
4.4.A.14	Bridge Machinery Bolts		
	Bridge Structural Bolts		
	Trolley Machinery Bolts		
	Trolley Structural Bolts		
4.4.A.15	Electrical Guards		
4.4.A.16	Bridge Drive Motor		
	Trolley Drive Motor		

OVERHEAD CRANE **PERIODIC** INSPECTION REPORT - Sheet 2

Crane Serial No._____Location:_____Position: Circle One N S E W
Date of Inspection:_____Performed By:_____

Reference No.	Description	O.K.	Not O.K., Explain
	Main Hoist Motor		
	Aux. Hoist Motor		
4.4.A.17	Bridge Control Panel		
	Trolley Control Panel		
	M.H. Control Panel		
	A.H. Control Panel		
4.4.A.18	Bridge Resistors		
	Trolley Resistors		
	M.H. Resistors		
	A.H. Resistors		
4.4.A.19	Master Switches/		
	Pendant Pushbuttons		
4.4.A.20	Bridge Limit Switches		
	Trolley Limit Switches		
	M.H. Limit Switch(es)		
	Aux. Hoist Limit Switch(es)		
4.4.A.21	Bridge Conductors		
	Bridge Collectors		
	Trolley Conductors		
	Trolley Collectors		
4.4.A.22	Bridge Disconnect Switch		
	Trolley Disconnect Switch		

Additional Comments:_____

_____

_____

_____

_____ _____
Signature Date

OVERHEAD CRANE MAINTENANCE REPORT

Crane Serial No._____Location:_____Position: Circle One N S E W

Reference No.	Description	Performed By	Date	Comments
5.1.A	Lubrication:			
5.1.A.1	M.H. Wire Rope			
	A.H. Wire Rope			
5.1.A.2	Bridge Bearings			
	Trolley Bearings			
	M.H. Bearings			
	A.H. Bearings			
5.1.A.3	Bridge Gear Unit			
	Trolley Gear Unit			
	M.H. Gear Unit			
	A.H. Gear Unit			
5.1.A.4	Slow Speed Gears			
5.1.A.5	M.H. Load Block or Attachment			
	A.H. Load Block or Attachment			
5.1.B	Cleaning:			
	(Describe)			

_____ _____

Signature Date

SESI
Procedure No. D-4, Issued: 1/27/87
FIRE DETECTION & ALARM SYSTEMS

1.0 SCOPE

1.1 This procedure contains the requirements for providing, maintaining and testing fire detection & alarm systems in accordance with applicable OSHA standards, Corporate policies and insurance industry recommendations.

2.0 REFERENCES

2.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910 of the Code of Federal Regulations
Section 1910.164, Fire Detection Systems
Section 1910.165, Employee Alarm Systems

3.0 RESPONSIBILITIES

3.1 Responsibility for overall compliance with this procedure rests with the Operations Manager who may assign certain duties and delegate specific responsibilities to other employees.

4.0 FIRE DETECTION SYSTEMS

4.1 Fire detection systems which are intended to start fire extinguishing or suppression systems shall be designed to respond quickly enough to extinguish or control the fire.

4.2 Fire detection systems which are intended to alert employees to a fire shall be designed to provide a suitable warning to allow prompt emergency action and safe evacuation.

4.3 Alarms or devices initiated by fire detectors shall not be intentionally delayed for more than 30 seconds unless the delay is necessary for the immediate safety of employees.

4.4 The number, location and spacing of fire detectors shall be based on established applicable NFPA standards and insurance industry recommendations.

4.5 Fire detection equipment installed outdoors or in corrosive atmospheres shall be protected from corrosion by a suitable means.

4.6 Fire detection equipment shall be located or otherwise protected from mechanical or physical impact which could render it inoperable.

4.7 Fire detectors shall be supported independently of their attachment to wires or tubing.

4.8 Fire detection equipment shall be maintained in an operable condition at all times unless being repaired or maintained. Systems shall be promptly restored to operation after each test or alarm.

4.9 Fire detectors and fire detection systems shall be tested and adjusted as often as necessary to assure proper reliability and operating condition but not less than annually. Maintenance shall be performed by properly trained persons who are knowledgeable about the equipment.

5.0 ALARM SYSTEMS

(Note: The following requirements apply only to alarm systems which alert employees to emergencies. They do not apply to discharge or supervisory alarms on fixed equipment unless such alarms are also intended to serve as employee warning systems).

5.1 Alarm systems shall be designed to provide sufficient reaction time to allow prompt emergency action and safe evacuation.

5.2 Employee alarm systems shall be audible/visible above ambient noise/light levels and shall be distinctive and recognizable as the signal for emergency response and/or evacuation.

5.3 Employee alarm systems shall be maintained in an operable condition at all times unless being repaired or maintained. Systems shall be promptly restored to operation after each test or alarm. Maintenance shall be performed by properly trained persons who are knowledgeable about the equipment.

5.4 Nonsupervised employee alarm systems shall be tested every two months to verify their adequacy and reliabiity. For multiactuation systems, a different actuation device shall be used in consecutive tests.

5.5 Power supplies for employee alarm systems shall be maintained or replaced as often as necessary to assure their fully operational condition. A backup system of alarms or communication shall be provided when primary systems are out of service.

5.6 Manually operated actuation devices shall remain conspicuous, unobstructed and readily accessible.

6.0 IMPAIRMENTS

6.1 An impairment exists whenever a fire protection or detection system or component thereof is out of service accidentally, intentionally or unknowingly. All impairments to fire detection and alarm systems shall be treated as emergency situations and restoration of these systems shall be given highest priority.

6.2 Authorization for planned impairments of the fire detection and alarm system shall be given only by the General Manager, Operations Manager, Chief Engineer or Shift Superintendent. Authorization shall be given only after appropriate persons have been notified and the required precautions have been taken.

6.3 For any impairment, the individuals identified in Paragraph 6.2 shall be notified if each is not already aware, and all employees who may be working in the area for which protection is impaired shall be notified of the nature and extent of the impairment.

6.4 The following individuals/organizations shall be notified immediately upon discovery of accidental or hidden impairment of the entire alarm system and at least 48 hours in advance of an alarm system impairment scheduled to last longer than one shift:

Richard A. Heatherton
Risk Manager
or
Philip M. Jarosz
Claims Administrator
THE HENLEY GROUP, INC.
603/926-5911

John Crouch
STARR TECHNICAL RISK AGENCY
(Insurance Company)
Los Angeles, CA
213/480-3766

6.5 During an impairment of the fire detection or alarm system, the area affected shall be given increased surveillance with hazardous processes shut down and hot work limited as much as possible. Smoking in the area should be prohibited.

7.0 DOCUMENTATION

7.1 Tests of employee alarm systems shall be documented with the results maintained on file at least until the next test is conducted

SESI
Procedure No. D-5, Issued: 1/29/87
AUTOMATIC SPRINKLERS & FIXED FIRE EXTINGUISHING SYSTEMS

1.0 SCOPE

1.1 This procedure contains the requirements for maintaining automatic sprinklers & fixed fire extinguishing systems in accordance with applicable OSHA Standards, Corporate policies and insurance industry recommendations.

2.0 REFERENCES

2.1 U. S. Department of Labor
Occupational Safety and Health Administration
General Industry Standards
Part 1910 of the Code of Federal Regulations
Section 1910.159, Automatic Sprinkler Systems
Section 1910.160, Fixed Extinguishing Systems, General

3.0 RESPONSIBILITIES

3.1 Overall responsibility for compliance with this procedure rests with the Operations Manager, who may assign certain duties and delegate specific responsibilities to other employees.

4.0 AUTOMATIC SPRINKLERS

4.1 A main drain flow test shall be performed annually on each sprinkler system. The sprinkler system 2" drains and inspector's test valve shall be opened at least once per month to assure that the sprinkler system operates properly and that the waterflow alarm is sending signals to the Control Room. The residual or flowing pressure and the static pressure should be recorded by reading the pressure gauge below the alarm check valve. In order to do this properly, one of the fire pumps must be running on manual start otherwise you will have problems with the pump stopping and restarting unnecessarily. The procedure should be to turn the pump on manually and then open all the 2" drains and inspector test valves (one at a time). The 2" drain test will indicate that the riser control valve (either OS&Y on riser or PIV outside) is fully open.

4.2 The automatic water supply for each sprinkler system shall be capable of providing design water flow for at least 2 hours.

4.3 Hose connections for fire fighting use may be attached to wet pipe sprinkler systems provided that the water supply satisfies the combined design demand for sprinklers and standpipes.

4.4 Sprinkler system piping shall be protected from freezing and exterior surface corrosion.

4.5 Sprinklers shall be protected from mechanical damage and shall be replaced with identical sprinklers only, unless the use of a specific alternate sprinkler has been approved by engineering.

4.6 Systems of more than 20 sprinklers shall have a remote alarm to the Control Room and a local water flow alarm which sounds an audible signal on the premises when water flow through the system equals the flow from a single sprinkler.

4.7 Building contents shall be arranged to minimize interference with the sprinkler discharge pattern and shall be limited in height to not less than 18 inches vertical distance from sprinklers. Combustible material shall only be stored in areas protected with automatic sprinklers or detection systems.

5.0 FIXED FIRE EXTINGUISHING SYSTEMS

(Note: The following requirements apply to fixed fire extinguishing systems, such as Halon and CO_2 systems but excluding automatic sprinkler systems.)

5.1 For systems where the discharge is not immediately recognizable, an alarm system sounding an audible and visual alarm in the Control Room shall be present to indicate that the fire suppression system is discharging. For total-flooding systems with automatic actuation, a predischarge alarm shall be provided to allow employees sufficient time to safely evacuate the area before the discharge.

5.2 Effective safeguards shall be provided to warn employees against entry into discharge areas where the atmosphere remains hazardous to health or safety. Personal protective equipment shall be provided for rescuing employees trapped in hazardous atmospheres created by the discharge.

5.3 Hazard warning signs shall be posted at the entrance to, and inside of areas protected by fixed extinguishing systems using agents in concentrations known to be hazardous to health or safety.

5.4 Fixed extinguishing systems shall be inspected annually by a person knowledgeable in the design and function of the system to assure that it is in good operating condition. Employees performing inspection, maintenance, operation or repair of systems shall be properly trained with their performance reviewed annually.

5.5 The pressure of refillable containers shall be checked at least every two months. Container weight shall be checked semiannually. Containers showing a loss in net content or weight greater than 5% or a loss in pressure greater than 10% shall be restored to proper levels. Factory-charged nonrefillable containers without pressure indication shall be weighed at least semiannually. Containers showing a loss in net weight greater than 5% shall be replaced.

5.6 Date of inspection and maintenance of containers shall be recorded on the container, on a tag attached to the container, or in a central location. Records shall be maintained at lease until the next inspection or maintenance is completed.

5.7 For systems operated by manual devices, the hazard against which they will provide protection shall be identified.

6.0 FIRE SUPPRESSION EQUIPMENT MANUAL

6.1 The fire suppression equipment manual (Procedure No. D-1, Paragraph 5.2.G) shall identify all automatic sprinklers & fixed fire suppression systems in the facility and prescribe procedures for their inspection, testing and maintenance.

7.0 IMPAIRMENTS

7.1 An impairment exists whenever a fire protection system or components thereof are out of service accidentally, intentionally or unknowingly. Components of the system include water supplies, extinguishing agents, pumps, valves, sprinklers, detection equipment, alarms and actuating devices.

All impairments shall be treated as emergency situations and restoration of fire protection systems shall be given the highest priority.

7.2 For sprinkler systems with two independent water supplies, at least one source of supply shall remain in service at all times. For other systems, other forms of protection shall be made available before the impairment is made or, for accidental or hidden impairments, as soon as the impairment is discovered.

7.3 Authorization for a planned impairment shall be given only by the General Manager, Operations Manager, Chief Engineer or Shift Superintendent. Authorization shall be given only after appropriate persons have been notified and the required precautions have been taken.

7.4 For any impairment, the individuals identified in Paragraph 7.3 shall be notified if each is not already aware, and all employees who may be working in the area for which protection is impaired shall be notified of the nature and extent of the impairment.

7.5 For all major impairments, the following individuals/organizations shall be notified immediately upon discovery of accidental or hidden impairments and at least 48 hours in advance of planned impairments:

Richard Heatherton
Risk Manager
or
Philip Jarosz
Claims Adminstrator
THE HENLEY GROUP
(603) 926-5911

John Crouch
STARR TECHNICAL RISK AGENCY
(Insurance Company)
Los Angeles, California
(213) 480-3766

Major impairments at operating facilities include, but are not limited to:

1. One of the fire pumps out-of-service or power outage at local utility for more than one shift.

2. A portion of the underground fire water loop out-of-service.

3. Refuse pit sprinkler system out of service.

4. Turbine generator sprinkler system out of service for more than one shift.

7.6 During an impairment, the area in which protection is impaired shall be given increased surveillance with hazardous processes shut down and hot work limited as much as possible. Smoking in the area should be prohibited.

8.0 DOCUMENTATION

8.1 Inspections and tests of automatic sprinkler systems and fixed fire suppression systems shall be documented with the results maintained on file at least until the next inspection or test is conducted.