Selected Occupational Fatalities Related to Pulp, Paper and Paperboard Mills as Found in Reports of OSHA Fatality/Catastrophe Investigations

U.S. Department of Labor
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Selected Occupational Fatalities Related to Pulp, Paper and Paperboard Mills as Found in Reports of OSHA Fatality/Catastrophe Investigations

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Preface

This study of occupational fatalities related to Pulp, Paper and Paperboard Mills that occurred during the period 1979-1984 continues the utilization of the Occupational Safety and Health Administration's (OSHA) fatality/catastrophe investigation reports as a source of information on how fatal workplace incidents occur. Sixty-five selected case files are utilized involving 72 fatalities.

The purpose of the analysis is to provide information that would highlight areas of interest for standards review and development, to aid in regulatory assessment, in training and educational programs, in consultation programs and in targeting compliance effects. Accident information which is available within OSHA is used.

The study was conducted by the Office of Statistics, Stephen A. Newell, Director, within the Division of Data Analysis under the direction of Joseph J. DuBois, Ph.D., Chief, who developed the methodology for computerizing the information in the abstracts of the OSHA Compliance Officers' case files used in the report. The report was prepared by William W. Cloe with the assistance of Jacqueline Gilmore who aided in organizing and summarizing the material and Linda Harrell who typed it. Draft copies were reviewed in the Directorate of Safety Standards Programs and the Bangor, Maine District Office of OSHA Region I.

Each incident was assigned to one of four categories of factors most likely responsible for precipitating the incident even though several factors may have been present. These categories are: Operating Procedures, Equipment/Material/ Facility Related, Environmental Conditions or Other. Employee activity at the time of the incident is examined. Standards cited that are directly related to the incident are summarized. All sixty-five cases are included as case studies in this report.

Two categories by accident type accounted for nearly one-half of the 72, fatalities. These were: caught in or between rotating rolls, equipment, etc., (28%), and struck-by falling, tumbling objects and equipment parts (18%).

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I. INTRODUCTION

In response to the need for descriptive data on how fatal workplace incidents occur, the Division of Data Analysis, Office of Statistics of the Occupational Safety and Health Administration (OSHA) has conducted this study of selected occupational fatalities related to the pulp, paper and paperboard mill industries. This information is useful for standards review and development, as an aid in regulatory assessment, in developing training and educational programs, in providing consultation and in targeting compliance efforts. It follows previous studies of occupational fatalities that utilize case reports of OSHA fatality/catastrophe investigations by the compliance officers.

OSHA regulations require that all workplace fatalities be reported to the nearest Area Office in State and Federal jurisdictions within 48 hours of the event. A preliminary Fatality/Catastrophe Event Report (OSHA Form 36) is completed and reviewed by the Area Director to determine if an investigation is warranted. If an investigation is performed, the compliance officer files a report in the Area Office containing a description of the incident, statements of witnesses, a listing of citations to be issued for violations of standards and other related information. Copies of case files are obtained from the Area Offices under Federal jurisdiction* and are the basis for this report and those proceeding it.

The information in the case files are used for descriptive information on how fatal accidents may occur. In addition, an analysis of citations for violation of existing standards is made. Short narratives of the incidents are presented.

* In the time period of this report, there were 25 State Plan States and jurisdictions. Those states and territories are: Alaska, Arizona, California, Connecticut (for state and local government employees only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, New York (for state and local government employees only) Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming.

II. MATERIALS AND METHODS

A. Materials

Sixty-five selected cases involving seventy-two fatalities are examined in this study. These are cases, which occurred during the period 1979-1984, were identified by the Standard Industrial Classification (SIC)* for pulpmills (SIC 2611), paper mills (SIC 2621)** and paperboard mills (SIC 2631) and obtained from the Area Offices.*** Pulpmills may be combined with paper or paperboard mills in one establishment and are included in that industry's (paper mills or paperboard mills) SIC designation. The sixty-five cases do not represent all accidents for the time period covered; the seventy-one fatalities represent some fraction of the total number of fatalities.

For the purposes of this report, these three SIC's are treated as a continuous operation with the production of pulp being the beginning stage of paper and paperboard production. In brief, the following operations are in sequence; woodyard operations, pulping operations, bleaching operations, chemical recovery operations, stock preparation operations, paper making operations, surface treatment of paper, e.g., sizing, coating, coloring, etc., and finally, finishing operations. Each operation is separate and distinct although each contributes sequentially to the formation of the final manufactured product.

The case files include, in varying amounts of detail, description of the incident, statement of witnesses, other supporting documents, and a listing of issued citations of standards violated. In some cases, the accident information may be partially conjectural as the event may not have been observed at the moment of occurrence. Also, there is no standard accident investigation procedure used, hence all points important for reconstructing the event may not have been included.****

* Office of Management and Budget, Standard Industrial Classification Manual, 1972

** Except building paper

*** The relative sizes of the three industrial classifications are indicated below for the United States in CY 1984:

SIC	Employees	Establishments
(261) Pulpmills	17,395	52
(262) Papermills	129,795	322
(263) Paperboard Mills	54,789	234

SOURCE: Bureau of the Census, County Business Patterns 1984, United States Department of Commerce, August 1986

**** The use of OSHA Form 170, Investigation Summary (in general use since January 1985) has improved this situation

B. Methods

Summaries of accident codes show little to indicate what led to and caused fatal incidents. Details provided by an in-depth accident investigation are required. Information from the case files are examined and a sequence of events determined.

The clustering of similar occurrences are noted and classification schemes devised, keeping in mind future standards modification and development. Citations issued that are relevant to the incident are examined. Finally, all sixty-five cases are presented to provide insight into how they occurred. Although cross tabulations of variable classifications are presented, the numbers should be interpreted only as indicators of problem areas.

After reviewing all cases, four classification systems for the data were used. These were based on (1) the type of incident, (2) type of accident,* (3) employee activity at the time of the fatal injury, and (4) work location. These classifications are discussed in the following sections.

1. Types of Incident Classification

The incident classification is based on the type of activity that seemed to be the precipitating event resulting in death. The behavior of humans, the malfunctioning of equipment, environmental conditions, or other events resulted in the fatal incidents. If these can be identified, preventive measures could be developed and implemented more effectively. Often there are several factors involved. The factor that appears most likely to be the one that precipitated the incident is used to classify the event. These factors tend to cluster as (a) operating procedures, (b) equipment/material/facility related factors, (c) environmental conditions, or (d) other.

(a) Operating Procedures

These are incidents that resulted from the employee or employer not following designated work and safety procedures, or there were none available. They include safeguarding the work area, the use of appropriate personal protection equipment and all work activities under the control of the worker and supervision.

* Webster's New Collegiate Dictionary defines "accident" as a "happening without intent or through carelessness and often with unfortunate results". This should not imply that the accident could not have been prevented by supervisory controls and proper training of the employees.

(b) Equipment/Material/Facility Related

These are incidents that resulted from malfunctioning or failure of equipment, hazardous materials, collapse of structures, etc.

(c) Environmental Conditions

These are incidents that resulted from unusual weather conditions such as heavy rains, excessive heat or coldness, or strong, gusty winds. There were no incidents classified in this study as resulting directly from environmental conditions.

(d) Other

These are incidents that cannot be specifically assigned to operating procedures, equipment/material/facility related or environmental conditions.

2. Types of Accident Classification

The accident type reflected to a large extent, the specific operations of the three industries; pulp, paper and paperboard mills. For example, accidents involving chippers are usually found in the pulp making process, a step necessary to both paper and paperboard manufacture. Accidents involving being caught in in-running nip points of rotating rolls, for example, occur in the manufacture of paper and paperboard. Other accident types such as electrocutions, vehicle mishaps and asphyxiation/poisoning by hazardous chemicals cut across all three related industries. Listed below are main types of accidents observed in the cases:

(a) Caught In and Crushed Between Rotating Rolls

The employee, in the process of threading or other related activities, was caught by in-running nip points and pulled into rotating rolls.

(b) Caught Between Components of Equipment/Surface

The employee was crushed by closing gates, crushed between equipment or equipment components and other surfaces, etc.

(c) Struck by Falling/Tumbling Objects

Employees were crushed by falling or tumbling bales of materials, rolls of paper and other large objects.

(d) Falls from Elevations

The employee fell from platforms, catwalks, and other elevated work surfaces.

(e) Thermal Burns

The employee was burned by hot liquors, boiler explosions and other sources of intense heat.

(f) Electrocutions

The employee was electrocuted when he came in contact with sources of electrical current while grounded by a wet surface, contact with energized conductors, etc.

(g) Caught Between Moving Vehicles or Vehicles and a Surface

The employee was crushed between two vehicles or a vehicle and a surface such as a wall.

(h) Other Type Accidents

These included fatal injuries resulting from chemical burns, asphyxiation/poisoning by hazardous chemicals, drowning, etc.

3. Employee Activity at the Time of Injury Classification

The employee activity at the time of the fatal incident is the third classification of these occurrences. While it is recognized that what the worker was doing at the time of the accident may or may not be the direct cause of the accident, the activity was an integral part of the event and intersected with the other three classifications, incident type, accident type and work location. When the activity of the deceased is known at the moment the accident occurs this information is used. Otherwise, the assigned general activity, e.g., threading paper, operating a forklift, adjusting machinery, etc., is used.

(a) Performing Normal Job

The worker performing basic tasks such as operating machinery, loading or unloading bales of fiber pulp, or re-threading paper that had broken on the paper machine. The employee may have been preparing for the job or cleaning up afterwards. He or she may have been moving from one work area to another or changing work positions in the performance of the job.

(b) Performing Other Than Normal Job

The worker was engaged in an activity that was not related to assigned work tasks. He or she may have been performing a task not usually done by the worker, failed to follow instructions, in a wrong location, etc., or on break, lunch or other non-work activities.

(c) Unknown Activity

It was not reported or it was not clear what type of work/non-work activity was taking place at the time of injury.

4. Work Location at the Time of Injury Classification

This classification describes the location of the worker when the incident occurred. For most cases, the worker was at a location related to paper and paperboard machines.

After the cases were coded by type of incident, type of accident, employee activity and work location, relevant data summaries were made. All sixty-five cases are included as case studies in this report and are presented by incident type classification.

III. ANALYSIS

The analysis consisted of seven parts.

1. Review of all available pulp, paper and paperboard fatal incidents found in the compliance officer's case files.

2. Review for incident type classification.

3. Identification of accident types, e.g., caught in rolls, struck by vehicles, etc.

4. Identification of employee activity at the time of the incident.

5. Identification of work location at the time of the incident.

6. Identification of secondary and other contributing factors mentioned in the case files.

7. Examination of citations of standards violated as a result of, or related to these incidents.

Basic pulp, paper and paperboard terms used in the study follow. See Appendix C for a more detailed list of definitions.

Woodyard Operations: Pulpwood is delivered to the pulp mill where it undergoes slashing (cut into prescribed lengths), barking (removal of bark, debarking), chipping (reducing logs to chips), screening (separating out acceptable chips) and storage (in chip piles, bins or silos).

Pulping Operations: The separation of cellulose fibers in cellulosic material from other components present permitting the fibers to bind together into a web that may be formed into paper. Mechanical pulping, chemical pulping and other methods involving both chemical and mechanical pulping are used in these operations.

Bleaching Operations: This is an operation used to increase the whiteness of the pulp. Peroxide is primarily used in oxidative bleaching of mechanical pulp. Chlorine is used in the bleaching process for chemical pulps. Other chemicals are used in place of and in addition to those mentioned for these processes.

Chemical Recovery Operations: Although not technically necessary to produce chemical pulp, and chemical recovery operations are an integral part of the chemical pulping process and are an economic and environmental necessity.

Papermaking Operations: Two basic types of papermaking machines are used to form paper, paperboard or building board from pulp; the fourdrinier and cylinder machine. The sections that form the paper or paperboard sheet are different on the fourdrinier (formed by an endless belt or "wire") and cylinder (formed by cylinders) machines. However, pressing, drying and calendering sections are similar for both machines. Papermaking machine operations are automated but require modification by operators and monitoring. The operators include the machine tender who is responsible for operations that lead to sheet formation and the backtender, who with the assistance of the third, fourth and fifth hands, is responsible for operations that control the properties of the formed sheet after it had been dried. Various surface treatments as sizing, coating, and coloring can be applied to paper or board at several points in the papermaking process.

Finishing Operations: These operations begin after the last operation on the papermaking machine. Included, in order, are: supercalendering, rewinding and slitting, cutting and sheeting, trimming, packaging and shipping.

* These definitions are based on Appendix A of Pulp and Paper Mills. NIOSH, U.S. Department of Health and Human Service, July 1981.

These fatal incidents occurred in the pulp, paper and paperboard manufacturing processes beginning with the woodyard operations and ending with the finishing operations in preparation for product shipment to the customer. Although, each of the foregoing, pulp, paper, and paperboard manufacturing, are separate industries, there is a continuous process flow from pulpwood to the finished paper rolls and sheet reams. The case narratives are identified by industry type but they are not grouped as such in this report.

Sixty-five incidents involving seventy-two fatalities are examined. For each incident type, a summary of findings is followed by case studies* of all 65 cases in the appropriate categories. They are as follows:

A. Types of Fatal Incidents

Operating Procedures

These incidents occurred when worker(s):

- Used improper/unsafe/dangerous work procedures or practices. (see cases 1 through 8)
- Were not provided with adequate machine guarding at exposed nip points, rotating parts, etc. (see cases 9 through 13)
- Used dangerous/awkward body positions in the performance of their work. (see cases 14 through 17)
- Failed to follow lock-out procedures or failed to immobilize and chock equipment. (see cases 18 through 21)
- Were unsafe or careless in the operation of vehicles or used unsafe vehicles. (see cases 22 through 25)
- By-passed or circumvented safety devices. (see cases 26 through 28)
- Were not provided or did not use adequate fall protection. (see cases 29 through 31)
- Experienced lack of audible/visual communication. (see cases 32 through 34)

* The word deceased is used in some narratives at points prior to the exact time of the fatal incident for better identification and clarity. Under the heading injury, the following codes are used: F, fatality, H, hospitalized injury, and N, non-hospitalized injury.

- Failed to test atmosphere for toxic and explosive gases/vapors and oxygen deficiency. (see case 35 through 36)

- Mistakenly flipped wrong switch to de-energize conductors. (see case 37)

- Did not take proper safety precautions around flammable materials. (see case 38)

- Practiced unsafe operations of mobile equipment. (see case 39)

- Used unsafe loading/unloading practices. (see case 40)

- Failed to follow instructions. (see case 41)

CASE NUMBER: 1 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Burned when Manhole Cover of Bark Fired Boiler was Removed DATE OF INCIDENT: 5/4/82

WORK LOCATION: Near Hopper of Boiler TIME OF INCIDENT: 4:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Maintenance Man

DESCRIPTION OF INCIDENT:

A supervisor and maintenance man were in the process of clearing ash plugs from the bark burning boiler. The boiler was operating on oil, not bark, because of the plugs.

As they removed the manhole cover from the air preheater hopper, sparks and hot ashes came out. When he fell as he attempted to leave the area, the maintenance man's clothing was set afire. He sustained burns which were fatal ten weeks later.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(2)	Employees clearing ash plugs in the hopper of a bark fired boiler were not adequately protected with personal protective equipment or other adequate precautions taken to protect employees from contact with hot particles.

CASE NUMBER: 2 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture of Various Types of Paper SIC: 2631

ACCIDENT TYPE: Caught in Nip Point of Machine at Paperboard Mill DATE OF INCIDENT: 4/26/82

WORK LOCATION: At Paper Machine TIME OF INCIDENT: 5:50 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	F	45	Fifth Hand

DESCRIPTION OF INCIDENT:

An employee, working as the fifth hand on a paper machine was in the process of preparing a reel of paper for turn up*. She preferred to hand carry the tape to the back, according to coworkers. She would place the tape on the floor inside the machine, under the turn up drum on the front side. She would then crawl under the machine, pick up the tape at the tied loop end and carry it under the machine, reach up and place it on the bolt. Then she would walk back under the machine to the front where she would place the paper tab on the rod. The company policy for this operation included the use of a rod to carry the tape which made crawling under machine unnecessary.

As the employee was carrying the tape, she entered the nip point created by the turn up drum and reel. She was fatally injured.

This procedure of using the tape had just recently been introduced to the kraft paper section of the company and, according to the tape salesman, the tape supplied to the company was not for use on the board mill machine. The employee had been using her preferred system for approximately six days prior to the incident. She had worked for the company for 15 years and had been in the company's paper operation for 8 years. Employee training in the use of the tape and rod had been minimal.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.212 (a)(1) Ingoing nip points at the turn up drum on a machine in the board mill were not protected by guards or by other means such as training and instructing employees in safe operating procedures and enforcing those safe operating procedures.

* Paper from a winding reel is transferred to a turn up drum reel by breaking paper and wrapping it around the empty drum reel while both reels are in motion.

CASE NUMBER: 3 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Buried under Wood Chips DATE OF INCIDENT: 3/7/80

WORK LOCATION: Inside Chip Bin TIME OF INCIDENT: 12:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Laborer

DESCRIPTION OF INCIDENT:

A laborer, working alone, was punching hardwood chips at the outfeed conveyor to increase the flow of chips to the digester. He was located within the bin and was using a 12 foot (3.7 m) piece of conduit.

When the woodyard operator came to check on the operation, he found that the chips had fallen and had completely covered the laborer. Coworkers dug the laborer free. He was transported via ambulance to the hospital where he died three days later. The cause of death was attributed to anoxia.

There were no witnesses. The laborer had been employed by this company for two months.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(5)	Lifeline and safety harness was not worn while entering a chip bin nor was a person stationed outside to handle the line and summon assistance in the case of an emergency.

CASE NUMBER: 4 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture Paper Products SIC: 2621

ACCIDENT TYPE: Heat Exhaustion in Stock Chest DATE OF INCIDENT: 3/28/83

WORK LOCATION: Inside Base Machine Stock Chest TIME OF INCIDENT: 12:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Back Tender

DESCRIPTION OF INCIDENT:

A back tender, who had completed one shift of eight hours, stayed on the job to clean and drain the stock from the base machine stock chest that required maintenance because of an agitator breakdown. The back tender requested a lockout on the breaker feeding the agitator at approximately 3:00 am.

Between 7:30 am to 8:00 am the back tenders body was found by two employees when they entered the chest. The back tender was found lying on his back in a slightly reclined position in chest deep water. The preliminary autopsy report indicated death caused by exposure to intense heat and pulmonary edema.

There were no witnesses. A millwright had entered the chest the previous week. The temperature was estimated at 135 to 140 degrees fahrenheit (57.2 to 60.0 ^{o}C).

STANDARDS CITED RELATED TO THE INCIDENT:

1910.134 (e)(3)	Written procedures were not prepared covering safe use of respirators in dangerous atmospheres.
1910.134 (e)(4)	Frequent random inspections were not conducted by a qualified individual to assure that respirators were properly maintained.
1910.134 (e)(5)	Both supervisor(s) and worker(s) were not instructed in proper selection, use and maintenance of respirators by competent person(s).

CASE NUMBER: 4 (cont'd)

1910.134 (f)(2)(ii)	Respirators not routinely used but kept ready for emergency use were not inspected monthly to assure satisfactory working conditions.
1910.134 (f)(2)(iv)	Respirators maintained for emergency use did not have current records of inspection date and findings.

CASE NUMBER: 5 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Arm Caught in Nip Point of Paper Machine DATE OF INCIDENT: 1/5/84

WORK LOCATION: Near Paper Machine TIME OF INCIDENT: 7:12 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	59	Shift Supervisor

DESCRIPTION OF INCIDENT:

The night shift in the papermill told the incoming day shift supervisor that the first press on the paper machine was putting a black line on the paper being made. The machine tender was attempting to remove the cause of the line by sanding the roll with emery paper. Sanding the outgoing side of the roll did not remove the line.

The shift supervisor reached into the ingoing side of the press with his left arm to sand the lower roll. His arm was only an inch (2.54 cm) from the felt carrying the paper onto the rolls and only eight inches (20.3 cm) from the nip point. Suddenly, his left hand was pulled into and through the nip point. His arm was practically amputated just below the elbow by the steel frames of the two rolls.

A tourniquet was applied to his arm. At the hospital it was found necessary to amputate his arm below the elbow. Eleven days after the incident he suffered an acute massive pulmonary embolism due to the crushing injury to his left arm and died.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 6 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Manufacture SIC: 2621

ACCIDENT TYPE: Crushed between Spool and Drum of Paper Machine DATE OF INCIDENT: 7/8/82

WORK LOCATION: Paper Machine, Back End TIME OF INCIDENT: 2:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	50	Back Tender

DESCRIPTION OF INCIDENT:

Two back tenders were in the process of feeding the paper from a tissue making machine onto the reel spool. The winding speed while threading the roll is 1500 F.P.M. (457.2 m/min.).

According to the witness, the back tender attempted to throw the paper across to the other back tender instead of handing it to him. The back tenders left hand entered the nip point between the two reels and he was pulled completely through. He was transported to the hospital via ambulance. He expired at the hospital from multiple crushing injuries.

The back tender had been employed by this company for twelve years and had been a back tender for the last 10 years.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.212 (a)(1)	There was no protection from employee contact with the running nip point on the reel of the paper machine when hand feeding the nip point.

CASE NUMBER: 7 OPERATING PROCEDURE

TYPE OF
ESTABLISHMENT: Manufacture Paper SIC: 2621

ACCIDENT TYPE: Ruptured Intestine while Pushing Paper Roll DATE OF INCIDENT: 4/22/83

WORK LOCATION: Embosser Machine Area TIME OF INCIDENT: 12:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	29	Laborer

DESCRIPTION OF INCIDENT:

The laborer was working as an embosser operator and was maneuvering a 40 inch (1 m) diameter by 45.75 inches (1.1 m) wide roll that weighed about 1,200 pounds (544.3 kg). He had pushed the roll on to a corner which consisted of a 45 inch (1.1 m) wide, 2 foot (.6 m) long, 0.75 inch (1.9 cm) thick piece of wood which allows the roll to be turned. He turned the roll 90 degrees then pushed it 25 feet (7.6 m) to the second corner.

As he attempted the second turn, he felt a sharp pain in his side. He was taken to the hospital, examined and released. The following morning he was still in pain and called the doctor. The next day he was admitted to the hospital. During surgery for a ruptured intestine he went into cardiac arrest. He was revived but remained in a coma until his death 24 days later.

The laborer had been employed by this company for over 4.5 years.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 8 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Fell into and Drowned in White Water Pit DATE OF INCIDENT: 12/26/81

WORK LOCATION: Paper Machine over Water Pit TIME OF INCIDENT: 6:15 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Reel Handler

DESCRIPTION OF INCIDENT:

A patch had come off the wire on a paper machine. The wire is a moving wire mesh screen belt at the start of the paper machine which collects the paper fibers and forms a soft sheet which is passed to the drying and pressing rolls of the paper machine. Below the wire is the wire pit which catches the excess water and stock from the wire and drains it to the lean white water pit. The wire pit was 2 feet (.6 m) deep except at the corner where the lean white water pit was located. The lean white water pit was about 15 feet (4.6 m) deep on one side, 10 feet (3.0 m) deep on the other, and 12 feet (3.7 m) wide.

The wire could not be removed, so the employee was attempting to repatch the wire on the bottom at a point directly over the lean white water pit. He apparently lost his balance and fell head first into the lean white water pit. He could not swim. He was not wearing a restraining harness.

The employee was located after the pit was drained, and he was given mouth to mouth resuscitation. He did not respond.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (k)(5)	Opening to the lean white water pit was not guarded nor was a restraining harness and flotation device used to prevent the employees from falling into the lean white water pit and drowning.

CASE NUMBER: 9 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paperboard Manufacture SIC: 2631

ACCIDENT TYPE: Caught and Crushed between Two Paper Rolls DATE OF INCIDENT: 7/23/81

WORK LOCATION: Reel Stand, Paper Machine TIME OF INCIDENT: 5:45 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	20	Spareman

DESCRIPTION OF INCIDENT:

Four employees were in the process of rethreading the paper rolls on the reel stand. The foreman and the back tender nipped the sheet and passed it under the bottom roll to the spareman and the fourth hand. There was approximately 4 inches (10.2 cm) between the top and bottom rotating rolls.

As the spareman and the fourth hand were placing the paper on the rotating bottom roll, they both got their hands caught in the nip point. The fourth hand pulled his hand out and reached around the side of the machine and hit the stop bottom. He was not injured. The spareman was pulled into the nip point and his head was crushed. He was removed from the machine and transported via ambulance to the hospital where he was pronounced dead on arrival.

The spareman had been employed by the company for four months, immediately prior to the incident but had worked for a year for the company previously. The company had instituted a policy of requiring at least 8 inches (20.3 cm) between rotating rolls of paper.

STANDARDS CITED RELATED TO THE INCIDENT:

Section 5 (a)(1)	There was no guard provided to protect employees entering reel stack from the nip point created when both reels were nearly full, nor was there a safe operating procedure that was strictly enforced.
1910.212 (a)(1)	Machine guarding was not provided to protect operator(s) and other employees from hazards(s) created by in-running nip points.

CASE NUMBER: 10 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paperboard Manufacture SIC: 2631

ACCIDENT TYPE: Crushed when caught in Nip Point on Paper Machine DATE OF INCIDENT: 12/9/82

WORK LOCATION: Winding Table, Paper Machine TIME OF INCIDENT: 11:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Fourth Hand

DESCRIPTION OF INCIDENT:

Two employees, the fourth and sixth hand, were standing on the winding table of a paper machine, slitting the paper into rolls. The rollers were moving slowly, approximately 200 to 250 feet per minute (60.9 to 76.2 m per min.).

The fourth hand apparently either stepped or slipped on to a roller and was pulled into the machine. The machine was stopped, the employee was removed from between the rollers. He was transported to the hospital. The employee sustained multiple bruises, contusions and internal injuries to his lower body. He died twenty-three weeks later of kidney and liver complications.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (k)(26)(i)	Nipping points on drum winder and rewinder on the operators side were not guarded by a barrier guard interlocked with the drive mechanism.
1910.261 (k)(31)	A nonskid surface was not provided in the front vicinity of the winder to prevent accidental slipping.
1910.261 (k)(1)	Stopping device(s) were not located so that any person working on the paper machine can quickly disconnect machine from the source of power in case of emergency.

CASE NUMBER: 11 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paperboard Mill SIC: 2631

ACCIDENT TYPE: Caught and Battered by Rotating Shaft DATE OF INCIDENT: 11/9/82

WORK LOCATION: Basement Machine Room TIME OF INCIDENT: 8:54 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	40	Foreman

DESCRIPTION OF INCIDENT:

The tour foreman had entered the basement machine room to perhaps check the suction section of the felt machine, located next to an unguarded felt return roll shaft.

The foreman's body was found by coworkers lying between the felt machine and the north wall of the basement. He was face down in approximately 1 to 4 inches (2.54 to 10.2 cm) of water. Under his body was a portable metal ladder. He had sustained fatal head injuries.

There were no witnesses. The police investigators surmised that the foreman was standing on the ladder when his clothing became entangled on the unguarded rotating shaft, 97 inches (2.5 m) above the floor, of the felt return roll. Pieces of clothing were wrapped around the shaft and the foreman's rubber overboots were found 10 feet (3.0 m) from his body. The nature of injuries seem to indicate the foreman rotated on the shaft, according to police. The metal ladder used by the foreman, did not have slip resistant rungs or feet.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (k)(2)(iii)	The rotating shaft of the north end of the felt return roll for the second press section was not guarded.
1910.261 (a)(3)(v)	The portable metal ladder was used without safety shoes or a foot ladder board so that the base ends of the tubular metal side rails were secure when placed on wet concrete. (SEC. 5.3.3 ANSI A14.2-1956)
1910.261 (a)(3)(v)	The portable metal ladder did not have slip resistant rungs. (SEC. 3.1.5 ANSI A14.2-1956)
1910.261 (a)(3)(v)	The ladder without slip-resistant rungs was not removed from service. (SEC. 5.2.7 ANSI A14.2-1956)

CASE NUMBER: 12 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Pulp and Paper SIC: 2621

ACCIDENT TYPE: Caught in and around the Head Sprocket of Reclaimer Conveyer DATE OF INCIDENT: 9/26/82

WORK LOCATION: Reclaimer Conveyor TIME OF INCIDENT: 10:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	22	Laborer

DESCRIPTION OF INCIDENT:

A laborer, working as second helper on the bark boiler, was in the process of unjamming a stoppage caused by bark and sawdust on the reclaimer chain going into the boiler where the bark was used as fuel.

The worker apparently fell or slipped and fell in and was caught in the head sprocket of the reclaimer conveyor. When he did not answer his radio telephone, his coworkers started looking for him and found him entangled around the sprocket. He was taken to the hospital where he was pronounced dead on arrival. The cause of death was multiple amputations and fractures.

There were no witnesses. The laborer was working a double shift and was in the eleventh hour of work when the incident occurred.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (a)(3)(x)	One or more methods of machine guarding were not provided on the bark boiler reclaim chain to protect the employees in the area from hazards such as those created by point of operation, ingoing nip points, rotating parts nor were there any lifelines safety belts or lanyards. ANSI Section 611, safety code for conveyors, cableways and related equipment, ANSI B20.1 1957, as adopted by 29CFR 1910.261 (a)(3)(x).
1910.261 (a)(3)(x)	There was no convenient means for stopping the motor/engine at the motor/engine location at the loading point. (ANSI Section 611, ANSI B20.1 1957)

CASE NUMBER: 13 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Pulp and Paper Newsprint Manufacturer SIC: 2621

ACCIDENT TYPE: Caught in Nip Point between drum and paper Reels DATE OF INCIDENT: 6/15/81

WORK LOCATION: Paper Machine TIME OF INCIDENT: 3:30 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Dry End Operator

DESCRIPTION OF INCIDENT:

The employee was "turning up"* paper on a paper machine with an air hose that had 90 psi (620.6 kPa) and a 30 inch (76.2 cm) wand to hit the paper with a blast of air and break it from the full reel and start it wrapping around an empty reel. There was no guardrail to prevent the employee from being pulled into the nip point between the drum reel and the paper reel. The nip point was guarded by a hydraulic arm except for the few minutes when an empty spool is started. The employee was drawn into the nip point and crushed between the drum reel and the paper reel. The platform was 48 inches (1.2 m) from the ingoing nip point.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(3) At the dry end of a paper machine employees were turning up paper on empty spools with an air hose, by standing on a small platform with no guardrail. They are exposed to the danger of ingoing nip points between the reel drum and paper reel during this operation.

American National Standard as adopted by 29 CFR 1910.261 (b)(3) safety requirements for floor and wall openings, railings and toe boards (Section 5.3, A12.1-1967).

* See Case No. 2 footnote, page 11.

CASE NUMBER: 14 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Cellulose SIC: 2611

ACCIDENT TYPE: Burned by Caustic Material (Chlorine Dioxide) DATE OF INCIDENT: 5/10/81

WORK LOCATION: Pulping Unit TIME OF INCIDENT: 5:35 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Production Manager
H	M	00	Instrument Specialist
H	M	00	Cost Manager
H	M	00	Pulp Unit Manager

DESCRIPTION OF INCIDENT:

A production manager was draining a tank filled with pulp saturated with the caustic material chlorine dioxide. There was a spill.

He apparently tripped and fell into the spilled material and was fatally injured, having sustained multiple burns. A self employed instrument specialist sustained burns to his legs from the spill. The cost manager for the pulping unit and the manager of the pulping unit sustain chemical burns of the chest as a result of the spill. All three were hospitalized.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 15 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Crushed between Two Metal Rollers DATE OF INCIDENT: 11/18/82

WORK LOCATION: Rollers of Paper Machine TIME OF INCIDENT: 10:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	44	Back Tender

DESCRIPTION OF INCIDENT:

Five employees were in the process of threading paper between the fourth dryer roll and the smaller roller. The paper had wrapped around the top breaker stack roll. Two men using wood sticks broke the 160 inches (4.1 m) wide paper into two pieces. The five men, on their knees, then grabbed onto the loosen paper end and pulled the paper while another employee jogged the breaker stack roll control.

The back tender, one of the five, was not kneeling and as the paper end that they had dropped into the basement made contact with the smaller roller, he was pulled between the rollers. He sustained fatal multiple fractures. The back operator had worked for the company for over seven years and had been a back operator for over three years.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.212 (a)(1)	When paper breaks at the breaker stack, employees inserted the scrap paper between the fourth dryer roll and the smaller paper roll that creates an ingoing nip point (inadequate operating procedures/guarding).

CASE NUMBER: 16 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Crushed between Felt and Roller DATE OF INCIDENT: 11/18/80

WORK LOCATION: Paper Machine, Overhead Felt TIME OF INCIDENT: 6:10 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Unknown

DESCRIPTION OF INCIDENT:

A worker noticed some wrinkles in the overhead felt that travels at 1250 F.P.M. (381.0 m/min.). He was facing the 16 foot (4.9 m) wide approaching felt with his back toward the in-running point.

It is surmised that as the worker pressed his palms to the felt to remove the wrinkles, he was either pulled backward by the momentum of the felt or he fell backward into the in-going nip point of the felt and roller which was 5 feet 5 inches (1.7 m) above the catwalk and about 1.5 feet (1.4 m) beyond the back rail of the catwalk. His body was pulled through the 4 inch (10.2 cm) space between the nip point barrier guard, then traveled through a 90 degree turn between the felt and roller, coming to rest underneath the catwalk on the basement floor. He had sustain fatal multiple fractures.

There were no witnesses. The worker had been employed by this company for 40 years. The worker was in the process of working a double shift and was in the fifteenth hour of work when the incident occurred.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 17 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Crushed when caught in Felt Nips DATE OF INCIDENT: 2/5/82

WORK LOCATION: Overhead Platform TIME OF INCIDENT: 11:40 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Machine Operator

DESCRIPTION OF INCIDENT:

An employee was on an overhead platform, 14 inches (0.35 m) wide, above the second press section of a paper machine. He was in a crouching position in the immediate vicinity of an in-running felt nip. He was using an air hose, that extended up from the floor level and which had a 32 inch (0.8 m) lance (wand), to blow out accumulated moisture from pans beneath the upper felt run.

The employee was caught in the felt nip and sustained fatal crushing injuries.

STANDARDS CITED RELATED TO THE INCIDENT:

Section 5 (a)(1)	Employees entered onto an overhead platform, 14 inches (0.35 m) wide, above the second press section of a paper machine and positioned themselves in the immediate vicinity of in-running felt nips when crouching to use an air hose, that extended up from floor level and which had a 32 inch (0.8 m) lance, to blow out accumulated moisture from the pans beneath the upper felt run, exposing themselves to the hazard of being caught in felt nips with a resulting crushing injury.

CASE NUMBER: 18 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture of Paperboard SIC: 2631

ACCIDENT TYPE: Overcome by Carbon Monoxide DATE OF INCIDENT: 11/4/81

WORK LOCATION: Inside Lime Kiln TIME OF INCIDENT: 1:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 2

Injury	Sex	Age	Job Description
F	M	44	Supervisor
F	M	36	Draftsman
NH	M	00	Engineer

DESCRIPTION OF INCIDENT:

A draftsman and a supervisor entered a lime kiln to check the thickness of the metal walls. The kiln was not blocked or blanked off from another kiln nor was the induced draft fan in operation. The fire shield was approximately six inches (15.2 cm) from the kiln.

When the employees were missed, coworkers put on air packs and entered the kiln. They found the two workers approximately 160 feet (48.8 m) from the opening used for egress and access. The rescue squad was called. The men were transported to the hospital where they were pronounced dead on arrival. The cause of death was due to carbon monoxide.

A third employee had entered the kiln and had walked approximately 20 feet (6.1 m) when he experienced dizziness. He walked out of the kiln. The plant nurse administered oxygen, and aspirin. Later that night the employee went to the doctor because of a headache.

Blood tests showed 9 percent carboxyhemoglobin in the deceased.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(4) Employer failed to block off with a blank flange or similar device, the flow of materials into equipment that was shut down and required entrance into for maintenance, inspection or servicing in that: Lime kiln #1 was not blocked or blanked off by a suitable means from the equipment interconnecting it to kiln #2, which permitted the flow of carbon monoxide gas from kiln #2 into kiln #1 while employees were inspecting the interior of kiln #1.

CASE NUMBER: 19 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Production SIC: 2621

ACCIDENT TYPE: Struck Beam or Post when Flipped by Motor Shaft DATE OF INCIDENT: 8/8/81

WORK LOCATION: Paper Machine TIME OF INCIDENT: 7:15 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Machine Operator

DESCRIPTION OF INCIDENT:

There was a power failure in the paper mill. A machine operator was in the process of manually turning the 150 h.p. d.c. (111.9 kw) drive motor shaft on the paper machine with a 48 inch (1.2 m) pipe wrench to prevent burning the paper. The machine had not been locked out.

The electrical power suddenly turned on. The operator was flipped and struck his head on either the floor, on the steel beams above the motor or on a post 14 feet (4.3 m) away. He was found by coworkers lying on his back 14 feet (4.3 m) from the motor. He was transported to the hospital where he died of heart collapse secondary to massive intercranial pressure.

There were no witnesses. The company has now installed 7.5 h.p. a.c. (5.6 kw) crawl motor to the generator in the power house thus negating the necessity of manually turning the shaft.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(4) A machine operator was manually turning the shaft of a 150 h.p. (111.9 kw) motor, which had not been locked out, with a 48 inch (1.2 m) pipe wrench during a power failure, exposing the employees to the hazards of suddenly rotating and moving parts, when the power was restored.

CASE NUMBER: 20 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture of Paper Products SIC: 2621

ACCIDENT TYPE: Caught between Steering Wheel of Clamp Truck and Wall of Loading Dock DATE OF INCIDENT: 6/6/80

WORK LOCATION: Driving Clamp Truck TIME OF INCIDENT: 11:40 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	38	Clamp Truck Operator

DESCRIPTION OF INCIDENT:

A clamp truck operator was loading a trailer without a tractor attached, parked at the loading dock. The wheels of the trailer were not chocked.

As the operator attempted to drive into the empty trailer, with a 3,400 pound (1542.0 kg) roll of paper on the clamp truck, the trailer drifted forward approximately 9 feet (2.7 m). The clamp truck fell backward pinning the operator between the steering wheel and the concrete wall of the loading dock. The overhead protective bar was previously pulled off the clamp truck. The helper called for assistance. The E.M.T. team administered cardio pulmonary resuscitation until the ambulance arrived. The operator was taken to the hospital, where he expired the following morning from anoxia.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.178 (k)(1)	The rear wheels of a trailer were not blocked to prevent movement while being loaded by a clamp truck.
1910.178 (k)(3)	Fixed jacks were not used to support a trailer not coupled with a tractor while being loaded.

CASE NUMBER: 21 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Caught in In-running Nip Point, Crushed by Rolls DATE OF INCIDENT: 5/20/81

WORK LOCATION: Catwalk on Press Section TIME OF INCIDENT: 3:50 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	51	Paper Machine Tender

DESCRIPTION OF INCIDENT:

The crew was threading the tail through the size press, when a fold over was found in the second press felt. The second press was shut down. Two employees and the machine tender went into the basement to attempt to get rid of the fold. They removed the fold but a wrinkle remained. The press section was rotating at 50 to 75 feet (15.3 to 22.9 m) per minute.

The machine tender apparently went up on the catwalk to smooth the wrinkle. The bottom of the felt roll is five feet (1.5 m) from the floor of the catwalk. The employee was 5 foot 10 inches (1.8 m) in height. Apparently the employee's right hand became caught in the rolls and he was pulled through to his chest. The two other employees saw blood on the floor coming from where he was pulled under the felt. The E.M.T. was called and arrived within two minutes. They found the employee had no pulse. Bolts were burned off to facilitate movement of the rolls, and removal of the employee's body. The machine tender was transported to the hospital where he was pronounced dead on arrival.

There were no witnesses.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(4)	The basement area of the suction felt press was not locked out while employees were exposed to hazards, such as in-running nip points when taking the fold and wrinkles out of the felt.

CASE NUMBER: 22 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2611

ACCIDENT TYPE: Run over by Backing Truck DATE OF INCIDENT: 4/21/80

WORK LOCATION: Vicinity of Pulpwood Truck TIME OF INCIDENT: 2:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Unknown

DESCRIPTION OF INCIDENT:

An employee was hooking cables for the crane to lift pulpwood from trucks in the plant wood yard.

As a truck was backing into position in order to lift the pulpwood off the truck, the employee was run over. He sustained fatal injuries.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 23 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture of Paper SIC: 2621

ACCIDENT TYPE: Drowned when Pinned Underwater by Front-End Loader DATE OF INCIDENT: 7/3/82

WORK LOCATION: Operating Front-end Loader TIME OF INCIDENT: 12:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	54	Front-end Loader Operator

DESCRIPTION OF INCIDENT:

A front-end loader operator was operating a front-end loader on a earthen road adjacent to the plant area known as the fly ash pit. The employee had been informed that the loaders brakes were non-operative.

The loader went left into the pit, turned over and pinned the operator under approximately 20 inches (50.8 cm) of water. The employee drowned.

The brakes had been defective for approximately two months, and this condition was known by at least seven employees. The loader did not have roll over protective bars.

STANDARDS CITED RELATED TO THE INCIDENT:

Section 5 (a)(1)	Employees operating the front-end loader in the area of the coal yard, ash pit, and sludge plant were exposed to the hazard of being thrown and crushed by this equipment when it was operated over rough and uneven terrain and it did not have operable brakes.
Section 5 (a)(1)	Employees operating the front-end loader in the area of the coal yard, ash pit, and sludge plant were exposed to the hazards of being thrown and crushed by this equipment when it was operated over rough and uneven terrain and it did not have rollover protection or seat belts. Guard railing along route ways and pit edges were not installed.

CASE NUMBER: 24 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture Paper Forms SIC: 2621

ACCIDENT TYPE: Struck Support Column with Load on Clamp Truck DATE OF INCIDENT: 9/14/82

WORK LOCATION: Operating Clamp Truck TIME OF INCIDENT: 7:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	60	Clamp Truck Operator

DESCRIPTION OF INCIDENT:

Employees were unloading bales of long fiber pulp from railcar to straw shed. The bales were stacked 6 bales high. Each bale was 33 inches by 33.5 inches by 15.3 inches (83.8 x 85.1 x 38.9 cm).

An employee operating a loaded clamp (lift) truck apparently miscalculated his travel route, his vision obstructed by the load, and struck a metal roof support column with 7 feet 8 inches (2.3 m) high stack of bales. His forward momentum caused his abdomen to strike the edge of the steering wheel. The E.M.T. responded within 5 minutes, and transported the operator to the hospital where he died due to laceration of the hepatic vein and blood loss.

The one foot square roof support columns were 16 feet 10 inches (5.1 m) apart north to south on the area which was the intended route. They were 49 inches (1.2 m) apart east to west. The operator had worked for the company for 37 years and was an operator for 10 years.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(6)	Clamp truck operators were transporting loads of fiber pulp bales, which were stacked at such height, approximately 7.5 feet (2.2 m), that forward view was obstructed during operations of clamp trucks in the straw shed of the yard department.
1910.176 (a)	Permanent aisles(s) for powered industrial truck operations were not marked at the loading/unloading dock and/or leading to adjacent work areas such as the hydropulper in straw shed of yard department.

CASE NUMBER: 25 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paperboard Manufacturer SIC: 2621

ACCIDENT TYPE: Crushed Beneath Falling Forklift DATE OF INCIDENT: 2/3/79

WORK LOCATION: Driving Forklift TIME OF INCIDENT: 6:15 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Laborer

DESCRIPTION OF INCIDENT:

A laborer, an extra man, was operating a forklift with the gross weight of 9,660 pounds (4.4 metric tons) and with a standard mast of 54 inches (1.4 m). He had just filled the gas tank with propane and was traveling up the truck dock ramp with the load (paper bales) down grade, so the wheels would not spin on the wet and slick concrete ramp. The ramp did have some rain grooves and a fellow employee had used 40 pounds (18.1 kg) of salt on the 58 foot (17.7 m) long ramp, to prevent ice and snow build-up.

At a point approximately 23 feet (7.0 m) from the bottom of the ramp, the forklift went off the side of the ramp for an unknown reason. The forklift fell on its left and crushed the operator under the over head guard. He sustained fatal injuries.

The slope of the ramp was in excess of 10 percent. The employee had crushed the three middle fingers of his right hand in an industrial incident at this company one year before while threading a rewinder.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (a)(3)(xv) Employees, moving bales of paper from the waste paper storage yard to the hydropulper, drove the forklift up the truck dock ramp with the load downgrade. The ramp measured 58 feet (17.7 m) in length and there was a 78 inch (2.0 m) drop over that total length. Section 604 (g)(1) of the Americans National Standards Institute, Safety Standard for Powered Industrial Trucks B56.1 1969 as adopted by 29 CFR 1910.261 (a)(3)(xv): When ascending or descending grades in excess of 10 percent, loaded trucks were not operated with the load upgrade.

Section 5 (a)(1)	Employees were operating forklift trucks on the waste paper truck dock unloading ramp, which was not protected by a substantial barricade from the hazard of driving over both edges of the ramp.
1910.261 (a)(3)(xv)	A safe distance from the edge of ramp(s) or elevated platform(s) with dock(s) was not maintained when operating powered industrial truck. (Section 603 (f) of the American National Standard Institute Safety Standard for Powered Industrial Trucks) B56.1 1969 as adopted by 29 CFR 1910.261 (a)(3)(xv): Employees were operating a forklift on the waste paper dock unloading ramp without maintaining a safe distance from the edge of the ramp.

CASE NUMBER: 26 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paperboard Manufacturer SIC: 2631

ACCIDENT TYPE: Caught and Crushed between Rotating Rolls on Rewinder DATE OF INCIDENT: 2/3/79

WORK LOCATION: Paper Machine Rewinder TIME OF INCIDENT: 5:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	22	Cutterman

DESCRIPTION OF INCIDENT:

A cutterman was in the process of inserting a piece of filler in the rewinder of a paper machine. The third hand had just started the machine and was increasing the speed to 1,400/1,500 feet per minute (426.7/457.2 m per minute). The guard gate was down.

According to two witnesses, the cutterman picked up a piece of filler, turned and seemed to slip into the rewinder. The rider roller jumped up a couple of times. The operator turned off the machine. The cutterman had been pulled through the rewinder. He sustained fatal injuries.

Investigation showed that the machine could be operated by pressing the thread and run buttons simultaneously while by-passing the safety. This fact was apparently known to management.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (l)(9)(i)	The barrier guard on the rewinder on the paper machine was not interlocked with the drive mechanism and employees were placing feeders into the ingoing rollers at thread and higher speeds without the guard in place.
1910.261 (l)(9)(ii)	The surface areas in front of the rewinders at the paper machines located in the machine finishing room were not non skid surfaces.
Section 5 (a)(1)	Management and employees working with and responsible for the rewinders were not adequately trained in the safe procedure for operating these machines with safety interlocks in place to prevent operating above jog speed without the guard in place.

CASE NUMBER: 27 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Crushed by Winder Rolls DATE OF INCIDENT: 3/27/81

WORK LOCATION: Paper Machine Winder Drum TIME OF INCIDENT: 9:30 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	41	Third Hand

DESCRIPTION OF INCIDENT:

Employees had finished making splice in roll of paper on machine running at 100/200 feet per minute (30.5/61.0 m per minute).

An employee went under the winder guard and winder drum to cut an overlap. He was pulled into the winder rolls and sustained fatal crushing injuries.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (l)(9)(i)	Employees were allowed to circumvent the barrier guard to cut overlap on paper rolls while machine was in the run mode. Employees were allowed to operate the machine in thread mode with the barrier guard raised.
1910.261 (l)(2)	The emergency stop devices were not tested by making use of them when stopping the machine.
1910.261 (b)(4)	Devices such as padlocks, blank flanges, or similar devices were not provided for locking out the source of power before any cleaning, maintenance, inspection, adjusting, etc. that required entrance into or close contact with machinery.

CASE NUMBER: 28 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Pulp and Paper Manufacture SIC: 2621

ACCIDENT TYPE: Pinned between Roll Table and Rewinder DATE OF INCIDENT: 2/25/84

WORK LOCATION: Salvage Rewinder TIME OF INCIDENT: 3:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	48	Salvage Rewinder Operator

DESCRIPTION OF INCIDENT:

The day of the incident was the first day of work change from an eight to twelve hour shift for the salvage rewinders. At the time the accident occurred, the regular eight-hour shift for day operators was just ending. The deceased, who had been off a day, had begun the shift at 7:00 am.

The salvage rewinder operator raised the roll table and dropped the core in the shaft by using the shaft loader. The machine will only operate when the up or down button is depressed.

The operator then placed a stick depressing the up button by mistake thinking it was the down button. This was done in an effort to save time. He left to check the core adjustment. While facing and adjusting the core, he was caught between the rewinder and the upward moving table. The operator had bypassed the safety device by inserting a stick in the up button.

His body was released from the rewinder and an ambulance called.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 29 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture of Paperboard SIC: 2631

ACCIDENT TYPE: Fell 15 Feet from Platform Striking Top of Forklift DATE OF INCIDENT: 9/26/79

WORK LOCATION: Raised Platform TIME OF INCIDENT: 10:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Electrician

DESCRIPTION OF INCIDENT:

Three electricians were in the process of locating an electrical problem in the crane of the number two paper machine. They were using a work tower constructed of metal piping that was twelve feet (3.7 m) high. The work platform was located at the nine foot (2.7 m) level, with the three feet (.9 m) above acting as a guardrail. A safety chain was used to enclose the access section. The platform was raised by a towmotor powered industrial truck. The bottom of the tower was provided with two metal channels for the lift's forks.

Two electricians were on the raised platform when they instructed the third electrician, operating the lift, to raise the tower. The safety chain was not in place. There was a slight jerk and one of the employees fell approximately 15 feet (4.6 m) from the platform. He struck the top of the forklift then rolled off and struck the floor in a sitting position. He then fell backward on to the floor. He was rushed to the hospital where he underwent surgery for internal bleeding. He was recovering when he went into heart failure. A pacemaker was inserted but to no avail and he died. He had a history of heart problems.

Neither electrician on the platform was wearing a safety belt.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.23 (c)(1)	All open sides of the work platform attached to towmotor powered industrial truck were not guarded by standard railings or equivalent, platform positioned 18 feet (5.5 m) above floor level.
19010.178 (o)(1)	The work platform was not firmly secured to the lifting carriage or forks on towmotor powered industrial truck when towmotor was used to lift employees on platform to elevated level.

CASE NUMBER: 30 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Burned when Employee Fell into Couch Pit Filled with Hot Water DATE OF INCIDENT: 9/1/83

WORK LOCATION: Couch Pit End of Paper Machine TIME OF INCIDENT: 4:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	25	Sixth Hand

DESCRIPTION OF INCIDENT:

Employees had just completed changing the wire, an endless plastic mesh belt, 220 inches (5.8 m) wide and 149 feet (45.4 m) long, located on the fourdrinier of a paper machine and above the couch and wire pits. The wire was installed with no problems. The wire is replaced every 45 days. The replacement requires the dismantling of one side of the machine, slipping the old wire off and slipping the new wire on. It takes 9 men to evenly pull together to slip the new wire on. Working together the crew can slip the wire on in 4 minutes. However, three men are required to climb out on free wheeling rollers which are above deep pits of hot paper stock.

When the sixth hand, who had worked on the number one return rolls, was exiting from the roll, he fell into the couch pit. The pit was 18 feet (5.5 m) deep containing stock pulp and water at 145-degree within 3 to 5 feet (1.5 m) of the top of the pit. Coworkers hearing his yells for assistance lowered a fire hose and rope. He apparently was unable to grasp them. His body was recovered by using a hook. He was severely burned. No safety belts and lanyards were used.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(2) Safety belts and lanyards were not worn by employees installing wire on the paper machine while exposed to falling into the couch or wire pit containing hot stock water.

CASE NUMBER: 31 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Fell through Trap Door of Pulper DATE OF INCIDENT: 6/26/82

WORK LOCATION: Pulper TIME OF INCIDENT: 10:30 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Head Beaterman

DESCRIPTION OF INCIDENT:

The head beaterman was removing the rag from the pulper. This "rag" was a tangled mass of wire and plastic that accumulates in the bottom of the pulper after fibers have been soaked out of used kraft cardboard. The wire is used for bailing the stock and is deliberately dumped into the pulper because it aids in trapping the plastic and other unwanted non-pulp fibers. The last rag removal had occurred 14 hours earlier. Another beaterman was operating the hoist. The head beaterman had pumped the pulp into a holding chest. He put the ladder down and climbed down into the pulper to attach a hook from the hoist to the rag. He hooked the rag and raised it by the hoist.

The head beaterman must have opened the trap door as he was putting the ladder away after climbing out of the pulper. He hooked onto the rag which was now out of the pulper to guide it as it was being let down to the platform. Suddenly he screamed as he fell through the trap door to the level below. A distance of 14 feet (4.3 m). The hook had come out of the rag as he was pulling it. This rag weighed 350 to 400 lbs (158.8 to 181.4 kg).

He was taken to the hospital. He remained semiconscious for several days and died one week later of a possible fractured skull.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(3)	Section 3.3, ANSI A12.1-1967, Safety Requirements for Floors and Wall Openings, Railings, and Toe Boards as adopted by 29 CFR 1910.261 (b)(3): when the rag was being removed, guardrails, belts and lanyards, or other devices were not provided.

CASE NUMBER: 32 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Crushed by Closing Diversion Gate DATE OF INCIDENT: 9/22/79

WORK LOCATION: Diversion Gate, Pulp Logs TIME OF INCIDENT: 11:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	19	Utility Man

DESCRIPTION OF INCIDENT:

A utility man was in the process of cleaning the diversion gates that control the flow of pulp logs to the two rotary drum debarkers. He used a wooden pole and a high pressure water hose to clean the gates. He was in voice contact with the second assistant who was in radio contact with the control room. The first gate was cleaned and was closed. The second gate was opened. The second assistant was told to go elsewhere to work and a utility man was his replacement.

The utility man, cleaning the second gate, was in the gate area when the controller saw the second assistant in the control room area and because of the lapsed amount of time, approximately 45 minutes, assumed that the second gate was cleaned. He closed the second gate. The utility man was crushed. The other utility man called via radio to the controller to open the gate but the utility man had sustained fatal injuries.

The control room has a permanently mounted TV camera on the gate area that apparently was not utilized by the controller.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(4)	Devices such as padlocks were not provided for locking out source of power of main disconnect switch before any maintenance, inspection, etc., or servicing of equipment that requires entrance into or close contact with machinery or equipment.

CASE NUMBER: 33 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Caught and Crushed under Falling Gate of Conveyer DATE OF INCIDENT: 7/4/80

WORK LOCATION: Conveyor in Grinder Room TIME OF INCIDENT: 10:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	32	Oiler

DESCRIPTION OF INCIDENT:

An oiler and his partner, during a scheduled maintenance operation, were in the process of greasing the gate of a conveyor in the grinder room. The workers usually blocked the hinged power operated conveyor gate, feeding the ring grinder, with a piece of pulpwood. This was not done or done improperly. A block of wood was in the area but was not used.

One oiler was working under the gate, when a preplanned power outage occurred, causing the gate to release. The oiler was caught under the fallen gate sustaining crushing injuries to his chest. Coworkers raised the gate by using a chain hoist. Mouth to mouth resuscitation was given until the ambulance arrived. The oiler was transported to the hospital where he died two weeks later.

The employees, except for supervisors, had not been notified of the planned power outage.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 34 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Manufacturer SIC: 2621

ACCIDENT TYPE: Caught between Backing Truck and Loading Dock DATE OF INCIDENT: 5/26/83

WORK LOCATION: Loading Dock Area TIME OF INCIDENT: 1:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	38	Millwright

DESCRIPTION OF INCIDENT:

A leadman and a millwright had removed the loading dock plate and transported it to the welding shop for welding repairs to be done. Other employees installed a temporary dock plate over the space created by the removal of the loading dock plate.

After being informed that the dock plate was ready to be reinstalled, the millwright walked to the loading dock area. A truck was backing to the loading dock. The driver stopped about 10 feet (3.8 m) short of the dock, got out and opened the trailer doors. He then resumed backing. The millwright was crushed between the trailer and loading dock. He sustained fatal injuries.

The millwright had been employed by this paper company for nine years and had been a millwright for 37 months.

STANDARDS CITED RELATED TO THE INCIDENT:

1926.21 (b)(2) Employees were not instructed to plan for and implement traffic controls at the loading dock during the performance of construction or repair work.

CASE NUMBER: 35 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paperboard Manufacturer SIC: 2631

ACCIDENT TYPE: Flash Fire of Vapors from Digester DATE OF INCIDENT: 8/1/83

WORK LOCATION: Manhole of Continuous Digester TIME OF INCIDENT: 1:20 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	41	Maintenance Man
H	M	00	Maintenance Man

DESCRIPTION OF INCIDENT:

Two maintenance men were in the process of opening the manhole covers on the fourth level of a continuous digester during a shut down maintenance period. They were using an impact wrench and a regular heavy duty hand held portable light which was hung a few feet above the outer cover. After removing the outer manhole cover, they obtained an air pack so they could enter the manhole to remove the inner cover.

One maintenance man was in the manhole removing the inner cover, the other man was reaching into the manhole, when a flash fire occurred. The employee on the inside dove out of the opening, his clothing aflame. The other man pulled the flaming boots and rain suit from his coworker. Both descended to the ground level by walking, and were transported to the hospital. The maintenance man who had been working inside the manhole was fatally burned. The other required hospitalization for burns to his hands and arm.

The light used possibly exploded when it came in contact with the released condensate and ignited the vapors from the digester.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(5)	An air test for oxygen deficiency or the presence of both toxic and explosive gases and vapors was not made prior to employees entry.
1910.307 (b)	The incandescent portable hand lamp was not intrinsically safe or approved for the hazardous location in which it was used, that is, the fourth level manhole interior space of a pulp mill digester.

CASE NUMBER: 36 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture Disposable Paper from Paper Stock SIC: 2621

ACCIDENT TYPE: Fell from Ladder, Exposure to Hydrogen Sulfide in Holding Tank DATE OF INCIDENT: 11/19/83

WORK LOCATION: Interior of Holding Chest TIME OF INCIDENT: 3:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	28	Laborer

DESCRIPTION OF INCIDENT:

A laborer, working as a hydropulper helper, entered a holding chest, approximately 18 feet (5.5 m) deep and 15 feet (4.6 m) in diameter, through a 2 foot by 2 foot (.6m x .6 m) square hole. He descended a fixed rung ladder for the purpose of cleaning the walls and ceiling by spraying them with water. No atmospheric test were conducted prior to entry.

When the employee reached the bottom of the tank, he apparently smelled something that caused him to climb back up the ladder very quickly. When he got to the ceiling, he fell off the ladder and landed on the chest floor. He sustained fatal injuries. The coroners report listed cause of death as head injuries and the fall from ladder due to fainting. Analysis of the employees blood showed no evidence of hydrogen sulfide or carbon monoxide.

An analysis of the air at the bottom of the chest taken six hours after the incident and after ventilation of area for 20 minutes, showed 15 to 20 ppm of hydrogen sulfide.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (b)(5) An employee entered a holding chest for the purpose of cleaning the walls and ceiling by spraying them with water. Prior to the employees entry, the atmosphere was not checked for the presence of toxic and explosive gases and vapors and oxygen deficiency. The employee was not wearing a safety harness with attached lifeline during his entry into the chest. Stand by personnel were not equipped with a self contained air supplied respirator or oxygen supply masks in the event that rescue of the person inside the holding chest became necessary during an emergency.

CASE NUMBER: 36 (cont'd)

1910.27 (b)(1)(ii)	The distance between rungs of the fixed ladder located inside the holding chest was 18 inches (45.8 cm) which exceeded the required maximum of 12 inches (30.5 cm).
1910.27 (c)(7)	There were protruding potential hazards within 24 inches (61 cm) of the centerline of rungs or cleats on the climbing side of the ladder located in the holding chest.
1910.27 (d)(1)(vi)	Ladder wells did not have a clear width of at least 15 inches (38.1 cm) measured each way from the centerline of the ladder.

CASE NUMBER: 37 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture Bleached Paper Products SIC: 2621

ACCIDENT TYPE: Electrocuted when Contacted 220 Volt Energized Conductor DATE OF INCIDENT: 9/6/80

WORK LOCATION: Salt Car Shaker Control Circuit Panel TIME OF INCIDENT: 10:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Electrician

DESCRIPTION OF INCIDENT:

An electrician, third rate, fourth rate being the highest, was in the process of determining the electrical problem with the salt car shaker control circuit panel. There was a pool of water, from a recent thunderstorm and salt water from the discharge pipe, located on the ground in front of the circuit panel. The electrician flipped a switch in the upper left hand corner inside the box, but this was not the main electric disconnect switch which is actually located in the motor control room 225 feet (68.6 m) away.

The electrician was found lying on his back in front of the circuit box. Cardiopulmonary resuscitation was administered and the electrician was transported via company ambulance to the hospital where he was pronounced dead on arrival. Cause of death was heart attack due to electrocution.

It was surmised that the electrician may have thought he had deenergized the conductors and then made contact with the C phase and received a shock of 220 volts while standing in the salt water puddle. He had worked for the company for 24 years and had worked in the electrical department for four years.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 38 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Tissue Paper Manufacturing SIC: 2621

ACCIDENT TYPE: Fire Fighters Struck by Falling Water Soaked Bales of Tissue Paper DATE OF INCIDENT: 3/24/80

WORK LOCATION: Bale Storage Building TIME OF INCIDENT: 3:30 pm

AFFECTED WORKER(S): NO. FATALITIES: 5

Injury	Sex	Age	Job Description
F	M	00	Fire Fighter (Captain)
F	M	00	Fire Fighter
F	M	00	Fire Fighter
F	M	00	Unknown
F	M	00	Unknown
H	M	00	Forklift Operator
H	M	00	Unknown
NH	M	00	Fire Fighter
NH	M	00	Unknown
NH	M	00	Unknown
NH	M	00	Unknown
NH	M	00	Unknown

DESCRIPTION OF INCIDENT:

Employees were using an abrasive wheel grinder to cut a 6 inch by 6 inch (15.2 cm x 15.2 cm) hole in the steel roof of a bale storage building. Welding, using an arc and oxygen acetylene torch, was also used in the work. A fire started in the 2 foot 10 inch (.9 m) high by 2 foot 4 inch (.7 m) thick by 4 foot (1.2 m) long compressed waste tissue paper bales weighing 500 to 700 pounds (226.8 to 317.5 kg) located in the building. The bales were stacked five high. The company's fire department was called and the 36 heads of the sprinkler system were activated. The community fire company also responded.

A fire fighter and the fire captain advanced into the fire area with a charged hose line. The added weight of the water caused the stacked bales to topple, trapping the two employees. Seven others entered the building in a rescue attempt. Three of these were also trapped by additional falling bales. Forklifts were used to remove the bales and two by fours lumber pieces were used to shore up other bales. Three fire fighters, including the captain died as did two other employees.

A forklift operator sustained a dislocated shoulder. He and another employee were hospitalized. Five other employees were injured but did not require hospitalization.

When it became apparent that the water was contributing to the bales instability the fire fighters used foam to fight the fire.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.176 (b)	Bales of broke paper weighing 500 to 700 pounds (226.8 to 317.5 kg) stored directly on the floor became unstable and collapsed slid into aisles, exposing employees to serious injuries and or death.
1910.252 (d)(2)(vii)	Bales of broke paper were not removed, covered or shielded during welding and cutting operations conducted on or near the north east corner of the roof.
1910.178 (c)(2)(ix)	Propane-powered lift trucks were not an approved truck to use in areas where easily ignitable fibers were stored or handled.

CASE NUMBER: 39 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Manufacture of Pulp and Paper Products SIC: 2621

ACCIDENT TYPE: Crushed between Rake and Rail Car DATE OF INCIDENT: 2/13/81

WORK LOCATION: Railroad Flat Car TIME OF INCIDENT: 2:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	43	Utility Man

DESCRIPTION OF INCIDENT:

Two utility men were in the process of unloading pulpwood logs from a railroad flat car into a rake. They had just completed emptying one railcar and one of the men was going to the empty railcar to retrieve his hook.

The rake operator started to back his equipment, which runs on rails, to the fuel area. The utility man was caught in the seven inch (17.8 cm) clearance between the rake chute and the flair on the flat car. He sustained crushing injuries to his chest. He was transported to the hospital where he was pronounced dead on arrival.

The utility man had been employed by this company for 6 months and had received on the job training.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 40 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Company SIC: 2621

ACCIDENT TYPE: Crushed by Press Roll
Falling from Forklift
DATE OF INCIDENT: 5/1/80

WORK LOCATION: Near Forklift TIME OF INCIDENT: 2:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	53	Unknown

DESCRIPTION OF INCIDENT:

Employees were in the process of unloading a press roll that weighed approximately nine tons (8.2 metric tons). The capacity of the forklift was rated at 10 tons (9.1 metric tons) with load centered at 24 inches (61.0 cm) from the back of the forks. Load capacity decreases as load moves out. At the time of the accident, the lift was attempted with the load about 4 inches (10.2 cm) from the back of the forks.

The press roll rolled off the forks of a forklift which had been company modified. An employee apparently attempted to jump out of the way but fell. The roll crushed his legs up to the hips.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (a)(3)(xv)	Section 605 (b) American National Standards Institute B56.1-1969 safety code for powered industrial trucks as adopted by 29 CFR 1910.261 (a)(3)(xv): Loads were handled beyond the rated capacity of the truck.
1910.261 (a)(3)(xv)	Section 503 (a) American National Standards Institute B56.1-1969 safety code for powered industrial trucks as adopted by 29 CFR 1910.261 (a)(3)(xv): Modifications and additions which affect the capacity and safe operations were performed by the customer user without the manufacturers prior written approval.
1910.261 (a)(3)(xv)	Section 605 (b) American National Standards Institute B56.1-1969 safety code for powered industrial trucks as adopted by 29 CFR 1910.261 (a)(3)(xv): Name plate and markings were not in place and maintained in a legible condition.

CASE NUMBER: 41 OPERATING PROCEDURE

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Caught in Nip Point of Paper Machine DATE OF INCIDENT: 10/8/80

WORK LOCATION: Spool Loading Platform TIME OF INCIDENT: 7:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	21	Fifth Hand

DESCRIPTION OF INCIDENT:

The fifth hand on a paper machine was standing on the reel spool loading platform trying to get the paper, which had broken, back onto the reel.

He apparently overbalanced and fell into the nip point of the reel which caused multiple, fatal injuries. He had been observed leaning out over the reel with an air hose in his hand. He was caught between the nip reel and the reel drum of the paper machine.

Employees had been instructed not to attempt to go onto the spool loading platform to get the paper back onto the reel. There was no sign of alcohol or drug use by the fifth hand.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

Equipment/Material/Facility Related

These incidents occurred when:

- Fire, explosions and steam were created when systems failed or were over-pressurized. (see cases 42 through 45)
- Machinery malfunctioned/components failed. (see cases 46 through 49)
- There was a malfunction or failure of equipment controls. (see cases 50 through 52)
- Failures of brackets, angle irons, bolts, etc., occurred. (see cases 53 through 55)
- Unstable bales, rolls, etc., fell or tumbled. (see cases 56 and 57)
- Supports (jacks, slings, etc.) failed allowing load to fall. (see cases 58 and 59)
- Hazardous chemicals leaked and combined with other chemicals to form toxic gases. (see case 60)
- Loose chain was caught in plank causing floor opening. (see case 61)
- Badly designed switch exposed worker to electrical current. (see case 62)

CASE NUMBER: 42 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Manufacturers Kraft Paper SIC: 2631

ACCIDENT TYPE: Steam Burns Caused by Water Leaking on Hot Materials DATE OF INCIDENT: 10/10/81

WORK LOCATION: Interior of Boiler TIME OF INCIDENT: 9:20 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	49	Maintenance Man

DESCRIPTION OF INCIDENT:

A bark fueled boiler was shut down to repair leaks to steam tubes. The boiler operates at a temperature of 700°F (371° C) and requires 8 to 9 hours to cool. The boiler was approved for entry and several tubes repaired. The superintendent directed that water be run through the unit to check for leaks. The fly ash hopper was not emptied as the unit was to be put back into operation as quickly as possible.

Two men entered the unit and one ascended a ladder. They became aware that some hot substance had entered the boiler. The man on the ground floor exited the boiler, but the other received 2nd and 3rd degree burns over 40% of his body even though he was wearing fire resistant coveralls. It is likely that the hot substance was steam created by water leaking and falling into the hopper. The hot material in the hopper caused steam to form and be carried through the ventilation system for the boiler.

First aid was applied after the man had descended the ladder and exited from the boiler. He was taken to a hospital where he died six days later.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 43 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Manufacturer of Paper and Bleached Kraft Paper SIC: 2621

ACCIDENT TYPE: Burned by Explosion and Fire in Boiler DATE OF INCIDENT: 11/5/83

WORK LOCATION: Boiler Room TIME OF INCIDENT: 6:30 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	22	Laborer

DESCRIPTION OF INCIDENT:

A laborer was working as a low pressure fireman, when a fire occurred in the boiler room on the breaching of the boiler. Workers were attempting to extinguish the fire when fire came out of the forced air fan.

The laborer sustained second and third degree burns to 80 to 85 percent of his body. He was transported to the hospital where he succumbed to his injuries five days later.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 44 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Pulp and Paper Mill SIC: 2621

ACCIDENT TYPE: Burned by Exploding Oxygen Tank DATE OF INCIDENT: 9/4/81

WORK LOCATION: Near Oxygen Tank TIME OF INCIDENT: 12:00 am

AFFECTED WORKER(S): NO. FATALITIES: 2

Injury	Sex	Age	Job Description
F	M	00	Superintendent
F	M	00	Laborer
H	M	00	Truck Driver

DESCRIPTION OF INCIDENT:

A driver of a tank truck which was to fill an outdoor oxygen tank parked his truck near the tank in order to investigate a hissing sound.

The top of the stationary oxygen tank blew off. The oxygen caused other material to be ignited and the resultant fire penetrated the nearby office building burning the two occupants to death.

The outdoor bulk oxygen system seemed to meet all standards. The container met the ASME Code requirements. Over-pressurization appears to be a causative factor. Other considerations were malfunctioning relief vents, or base metal tank defects.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 45 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Pulp and Paper Mill SIC: 2621

ACCIDENT TYPE: Struck by Panel Door during Explosion DATE OF INCIDENT: 7/20/82

WORK LOCATION: Industrial Oven TIME OF INCIDENT: 2:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	50	Oven Operator

DESCRIPTION OF INCIDENT:

The employee was operating the new industrial oven used to bake out the binder and leaving only fiberglass to be recycled. The employee had completed two cycles on this day and was in the process of the third. He was working alone.

An explosion occurred. The oven doors were blown off and the oven roof was lifted with the incinerator box hitting the ceiling. The operator was probably pushing the oven protecto-relay button at the time of the explosion. He was crushed between the control panel and its door by the force of the explosion which impacted these with the concrete pillar. He sustained fatal head injuries.

Inspection of the oven showed that the flame rod sensor and the associated electronics had failed, allowing high volumes of unburned gas to enter the oven. This condition, coupled with a spark from the ignition transformer, produced the explosion. The operator had worked solely with this oven for the two months it was in operation.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 46 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Crushed by Falling Roll of Paper DATE OF INCIDENT: 9/22/81

WORK LOCATION: Paper Machine, Discharge End TIME OF INCIDENT: 7:55 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	32	Third Hand

DESCRIPTION OF INCIDENT:

Employees were in the process of changing from production of tissue paper to hard roll towel paper. The machine was running at 2,600 fpm (792.5 m/min) the operator kicked out the roll of tissue paper by mechanically lowering the secondary transfer arm and the roll was moving along the rails to the drop table.

As the roll was descending the rails, the back end of the roll raised up and the roll was violently propelled toward the discharge end of the paper machine. The back end dropped to the floor and came to rest against the secondary arm cross shaft, crushing the third hand who was located in the well between the reel tracks. He sustained fatal crushing injuries. The roll weighed over 8,000 pounds (3.6 metric tons).

A post incident test indicated that the arms were functioning normally. The third hand had been employed for eleven years. He was in his ninth hour of work when the incident occurred.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 47 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Manufacture of Newsprint and Kraft Paper SIC: 2621

ACCIDENT TYPE: Crushed between Breast Roll and Machine Frame DATE OF INCIDENT: 11/24/79

WORK LOCATION: Paper Machine TIME OF INCIDENT: 12:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Machine Operator Tender

DESCRIPTION OF INCIDENT:

Employees were in the process of changing the wire plastic mesh on a paper machine. The stretch roll motor was inoperative and had been for 6 to 7 months. The employees were therefore using hot water on the wire and rolling the breast roller. The 13 ton (13.2 metric tons) breast roll was being pulled up by chains connected to screw jacks. The jacks were operated by a common shaft driven by an air motor.

A machine operator tender was feeling the tension on the wire, when the jack failed and the roll fell. The employees head was caught between the roll and machine frame. He sustained fatal head fractures.

STANDARDS CITED RELATED TO THE INCIDENT:

Section 5 (a)(1) Machine tenders were permitted to walk under the breast roll of the paper machine or to have parts of their body under the pivoting arms while the roll was being raised with wire under tension.

CASE NUMBER: 48 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF
ESTABLISHMENT: Manufacture Tissue Paper SIC: 2621

ACCIDENT TYPE: Crushed between Falling Roll and Machine Frame DATE OF INCIDENT: 12/15/82

WORK LOCATION: Press Roll Machine TIME OF INCIDENT: 2:30 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Machine Operator

DESCRIPTION OF INCIDENT:

An employee was assigned the task of cleaning the grooves in the bottom press roll while the machine was shut down. He was using a wire brush and was standing within the machine.

When the back cast iron arm that holds the top press roll broke the roll dropped. The employee attempted to leave his work station. He got as far as the machine frame when the cast iron arm on the front side also broke and the press roll pinned him to the machine frame. He sustained fatal crushing injuries to his chest area.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 49 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Business Paper Manufacturing SIC: 2621

ACCIDENT TYPE: Inhalation of Sulfur Dioxide, Died of Heart Attack DATE OF INCIDENT: 8/4/83

WORK LOCATION: Scaffold TIME OF INCIDENT: 11:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	46	Millwright

DESCRIPTION OF INCIDENT:

The millwright and another employee were on a scaffold repairing a pipe that goes from the cold acid tank to the rock towers. The digester cork blew and the seals ruptured on the cold acid tank and hot acid tank.

The exhaust fan quit allowing the sulfur dioxide gas to enter the work area. The millwright ran outside but the sulfur dioxide had seeped through the rock tower's man holes into the atmosphere. The air was contaminated with sulfur dioxide. The millwright suffered a heart attack two and one half weeks later and died one week after that.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 50 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Electrocution DATE OF INCIDENT: 9/8/82

WORK LOCATION: Near Circuit Breaker Box TIME OF INCIDENT: 10:50 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Electrician

DESCRIPTION OF INCIDENT:

The electrician was testing a 440 v three phase motor. When found, the electrician had a lead cable in his hand leading to a breaker.

It is speculated that the breaker box cover, came down and the disconnect handle fell into the off position, leaving the breaker in the on position. The electrician may have forgotten this and later seeing the handle in the off position, thought the leads were cold.

The witness immediately pulled the leads off the electricians hands. He observed at this time that the cover of the breaker was slightly open. The breaker was in the on position.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 51 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Manufacture Bleached Paper Products SIC: 2621

ACCIDENT TYPE: Struck Pipe Bridge while Elevating in Aerial Lift DATE OF INCIDENT: 12/11/81

WORK LOCATION: Aerial Lift TIME OF INCIDENT: 12:40 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Painter

DESCRIPTION OF INCIDENT:

A painter was using an aerial lift to reach a pipe bridge which he intended to paint. The aerial lift controls in the basket had been replaced backwards so that what was the up position was now down and vice versa. There were no markings on the controls.

It is assumed that the painter either misjudged his distance from the cable tray bottom of the pipe bridge or perhaps a control did not operate as he had expected, in any event he struck his head and shoulder and died almost immediately.

The painter had been employed by the pulp and paper company for twenty-nine years and had worked as a painter for 19 years.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.67 (c)(2)(ix)	The lower controls and the upper controls on the aerial lift were not marked.
1910.67 (c)(2)(ix)	The lower controls on the aerial lift were not operable.

CASE NUMBER: 52 EQUIPMENT/MATERIAL/FACILITY RELATED

TYPE OF ESTABLISHMENT: Paper Bag Manufacture SIC: 2621

ACCIDENT TYPE: Electrocution DATE OF INCIDENT: 10/17/81

WORK LOCATION: Tubing Machine TIME OF INCIDENT: 2:40 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	24	Shafter

DESCRIPTION OF INCIDENT:

The employee was cleaning the tubing machine with steam and water. The water was one half inch (1.3 cm) deep on the floor. The cleaning had been completed and the employee was coating the rollers with oil. He was holding a jogging cord in his hand with which he could rotate the machine at a slow pace. The push button switch sends out a warning signal when first depressed and then rotates the machine.

The warning buzzer sounded but the machine did not move. The employee fell with the cord laying across him. When a witness tried to remove the cord, he received an electrical shock. The electrocuted employee was wearing rubber soled work shoes.

The cord showed no external wear, cuts or breaks. It is designed to carry 250 volts, and was carrying 220 volts at the time of the incident. It is used only when the machine is being cleaned.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 53 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Pulp and Paper Mill SIC: 2621

ACCIDENT TYPE: Fall of 60 (18.3 m) Feet from Catwalk to Concrete Slab Yard DATE OF INCIDENT: 6/29/81

WORK LOCATION: Catwalk on Chip Tank TIME OF INCIDENT: 7:45 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	48	Foreman

DESCRIPTION OF INCIDENT:

A temporary woodyard foreman was walking on the catwalk on a chip tank to visually check the level of chips. The catwalk system and stairway approach was to have been replaced, but the job was only partially completed, in that a 6 foot (1.8 m) long by 3 foot (.9 m) wide section replacement catwalk was built next to and attached to the rusty angle iron on the south east corner of the existing catwalk.

As the foreman, who weighed approximately 250 pounds (113.4 kg) was making his visual check, the rusty angle iron failed and the catwalk collapsed. The foreman fell to the concrete slab yard 60 feet (18.3 m) below. He died from multiple skull fractures.

Inspection of the catwalk also showed wood dust and chips had accumulated on the boards of the walkway.

STANDARDS CITED RELATED TO THE INCIDENT:

1910.37 (k)(1) The southeast corner section of the chip tank catwalk, approximately six foot (1.8 m) long and approximately 60 feet (18.3 m) above the yard was rusted and deteriorated, exposing employees to a fall hazard.

CASE NUMBER: 54 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Burned by Hot Digester Pump DATE OF INCIDENT: 5/26/81

WORK LOCATION: On Platform Near Digester Pump TIME OF INCIDENT: 1:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	39	Mechanic

DESCRIPTION OF INCIDENT:

A mechanic was working on a platform near a pump in a digestive piping system operating at 150 psi (1,034.2 kPa) at this point.

The pump flange, through which the motor shaft passes, separated and the mechanic sustained third degree burns over 90 percent of his body when covered by the 235°F (132°C) degree digester liquor. The mechanic was transported to the hospital where he died later the same day.

Inspection of the failed flange showed that the four bolts that failed, had undergone brittle fracture due to an instantaneous surge in pressure applied to the bolts.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 55 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Struck by Falling Doctor Blade Holder DATE OF INCIDENT: 5/26/81

WORK LOCATION: Calendar Paper Machine TIME OF INCIDENT: 10:55 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Millwright

DESCRIPTION OF INCIDENT:

Four Millwrights were preparing to perform maintenance work on a calendar paper machine. As a roll was being removed, the millwrights noted that a bracket supporting a doctor blade holder was cracked. The holder is 18 feet (5.5 m) long and made of a metal cylinder approximately 6 inches (15.2 cm) in diameter. The doctor blade holder was not in use and had not been in use for several years.

As one millwright was setting down a brace between the two calendar machines, the bracket failed and the holder fell about 6 feet (1.8 m) before striking the millwright on the head. The millwright sustained fatal head injuries.

The millwright was wearing a hard hat which was crushed. Inspection of the bracket showed that the partial break was long standing as rust and oil was noted on the interior of the crack.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 56 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Paperboard Mill SIC: 2631

ACCIDENT TYPE: Roll of Paper Fell off Elevator Injuring Helper DATE OF INCIDENT: 8/9/83

WORK LOCATION: Near Hydraulic Elevator TIME OF INCIDENT: 8:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	38	Machine Operator Helper

DESCRIPTION OF INCIDENT:

A re-winder and slitter machine operator helper was near a lowrater (hydraulic elevator) on which was located a 2,000 pound (.9 metric ton) roll of paper. The paper was elevated about 2.5 feet (.8 m) above the floor.

Several workers heard a thud as one end of the paper roll fell on the floor. No one saw the actual incident, but the machine operator helper was discovered unconscious on the floor. He died of a lacerated aorta.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 57 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Paper Mill SIC: 2621

ACCIDENT TYPE: Crushed by Falling Pulp Bale DATE OF INCIDENT: 3/25/84

WORK LOCATION: Pulp Storage Area TIME OF INCIDENT: 3:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	51	Beaterman

DESCRIPTION OF INCIDENT:

The responsibilities of a beaterman include adding a block of pulp to the beater every fifteen or twenty minutes. Between these times, the beaterman also cleans the pulp storage area. Pulp is stored in bales comprised of two columns of eight half blocks held together with a strap and are stacked two bales high.

At the time of the incident the top bale was not stable. The beaterman was found lying on his back with the top bale of pulp laying across his right leg. The bale weighing 3,445 lbs (1.6 metric tons) caused multiple contusions, abrasions and fractures to various body parts.

It is uncertain what actually triggered the bale to fall. The beaterman was either cleaning or attempting to pick up his next load of half blocks. Moisture possibly expanded the bale causing it to become unbalanced.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 58 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Paper board Mill SIC: 2631

ACCIDENT TYPE: Struck and Crushed by Falling Rewinder Table DATE OF INCIDENT: 9/4/80

WORK LOCATION: Rewinder Table, Overhead Crane TIME OF INCIDENT: 3:30 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Fourth Hand

DESCRIPTION OF INCIDENT:

The fourth hand of the paper machine crew was in the process of lifting the rewinder table with an overhead crane rated at 5 tons, (4.5 metric tons) using a five-eighth inch (1.6 cm) sling cable. The table weighted 3,200 pounds (1.5 metric tons) and the paper roll, 8,400 pounds (4.3 metric tons). The usual method of lifting, a pneumatic lifting system, was at the time inoperable.

The sling cable broke and the rewinder table fell, crushing the fourth hand located beneath the raised table. The table was raised by a crane, and coworkers administered CPR until the rescue squad arrived. The employee was pronounced dead on arrival at the hospital.

There were no eye witnesses to the incident. The foreman authorized the use of one sling instead of the two required as per published instructions.

STANDARDS CITED RELATED TO THE INCIDENT:

Section 5 (a)(1)	The temporary lifting system was approved and utilized without engineering considerations, when used to lift the rewinder end of the number one paper machine.
Section 5 (a)(1)	The employer failed to train employees in the safe use of overhead cranes and wire rope slings.
Section 5 (a)(1)	The written instructions for temporarily lifting the rewinder table were not followed in that one sling was used for the lift rather than two slings as depicted in the written instructions.
1910.184 (c)(7)	The sling used to lift the rewinder table was not protected from the sharp edges of the structural member to which it was attached.

CASE NUMBER: 58 (cont'd)

1910.184 (c)(9)	On the rewinder end of paper machine an employee was not kept clear of a load being lifted with a sling.

CASE NUMBER: 59 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Manufacturer of Paper Products SIC: 2621

ACCIDENT TYPE: Crushed by Reels on Paper Machine DATE OF INCIDENT: 5/4/82

WORK LOCATION: Near Paper Machine TIME OF INCIDENT: 11:35 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	F	00	Machine Tender

DESCRIPTION OF INCIDENT:

The paper broke on a paper machine. The employees were attempting to rethread it by taking a sheet of paper back across the reels when the ropes used for the feeding broke at the transfer table.

Somehow one employee became entangled in the ropes and was carried through the reels. Upon release from the reels she was thrown against the dryer hood and fell out onto the transfer table. The incident caused multiple internal injuries which resulted in her death.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 60 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Manufacture Newsprint and Stock for Milk Carton SIC: 2621

ACCIDENT TYPE: Overcome by Hydrogen Sulfide DATE OF INCIDENT: 12/21/81

WORK LOCATION: Near Sodium Hydro Sulfide Tank TIME OF INCIDENT: 3:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 2

Injury	Sex	Age	Job Description
F	M	48	Foreman
F	M	22	Laborer
H	F	00	Nurse
H	M	00	Kiln Operator
H	M	00	Electrician
H	M	00	Helper
NH	0	00	Kiln Operator
NH	0	00	Unknown
NH	0	00	Unknown
NH	0	00	Unknown
NH	0	00	Unknown
NH	0	00	Unknown
NH	0	00	Unknown
NH	0	00	Unknown

DESCRIPTION OF INCIDENT:

The caustic and line kiln operator was attempting to thaw a three inch line to the sodium hydrosulfide tank by putting 60 psi (413.6 kPa) of steam into the line. The second shift operator came on and went to check out the operation. He found a ruptured gasket in the flange in the line under the tank.

The kiln operator and laborer went back to the tank after obtaining a wrench to turn off the valve, and the laborer collapsed from hydrogen sulfide gas. The operator attempted to pull the laborer to a clear area but was unable to do so. The operator left the area and told the foreman of the man down. The foreman went to the laborer and attempted to pull him to clear area but the foreman was also overcome. Additional personnel came to the area to assist. The laborer and foreman died from exposure to hydrogen sulfide gas. The company nurse, kiln operator, electrician and helper were hospitalized. Eight other employees including the second shift kiln operator were treated and released.

It was determined that the leaking sodium hydrosulfide entered the sewer where it mixed with sulfuric acid being dumped into the sewer from another operation. This caused the hydrogen sulfide gas to be generated.

CASE NUMBER: 60 (cont'd)

STANDARDS CITED RELATED TO THE INCIDENT:

1910.261 (g)(21) The mainline at the bottom of the sodium hydrosulfide storage tank was not blanked off to prevent an accidental release of sodium hydrosulfide into the sewer, where it could mix with other effluents such as acids and free toxic gases, i.e., hydrogen sulfide, into the air.

CASE NUMBER: 61 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Manufacturer of Paper Products SIC: 2621

ACCIDENT TYPE: Fell 40 Feet (12.2 m) from Second Floor Work Area into Trash Dumpster DATE OF INCIDENT: 3/28/82

WORK LOCATION: Second Floor Trap Door of Bleach Plant TIME OF INCIDENT: 7:05 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Millwright

DESCRIPTION OF INCIDENT:

Two millwrights were on the second floor of the bleach plant and were preparing to lower a rotating assembly through a trap door to the ground. One millwright hooked up the assembly to the power hoists hook and the other millwright took up the slack. There was a loose chain hanging from the hoist equipment. The millwright, giving the hoisting signals, was standing on a section of flooring consisting of planks with up to one inch space between the planks.

As the hoist was raised, the loose chain was caught in one of the one inch (2.54 cm) spaces and the flooring planks were lifted enough to cause the millwright to lose his balance and fall 40 feet (12.2 m) landing in a trash dumpster. He sustained fatal head injuries.

Both millwrights had been employed by this company for 30 years and had preformed this operation many times.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 62 EQUIPMENT/MATERIAL/FACILITY/RELATED

TYPE OF ESTABLISHMENT: Tissue Paper Products Manufacturing SIC: 2621

ACCIDENT TYPE: Electrocuted when Contacted 550 Volt A.C. DATE OF INCIDENT: 1/24/79

WORK LOCATION: Refrigerator Unit on a Wrapper Machine TIME OF INCIDENT: 4:20 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Instrument Specialist

DESCRIPTION OF INCIDENT:

An instrument man was inspecting the pressure controls on a refrigerator unit on a wrapper machine. He had to remove the protective cover of the pressure switch thus exposing himself to 550 volts a.c.

When his helper returned with a new pressure switch, the helper discovered the instrument man's right hand against the pressure switch with smoke coming from his hand. The operator turned off the machine. Coworkers removed the instrument man from the machine and initiated cardiopulmonary resuscitation until the nurse and ambulance arrived. The instrument man died at the hospital. The probable cause of death was electrocution.

According to the coroner, the employee had a history of chest pain for which he was receiving treatment.

STANDARDS CITED RELATED TO THE INCIDENT:

Section 5 (a)(1) An employee had to remove the protective cover from a pressure switch to adjust the pressures on a refrigerator unit subjecting himself to 550 volts a.c. The pressure switch shall be so located as to enable accessibility to the adjustment screws and visibility to view window so that it is not necessary to remove the protective cover for adjustments.

Other

These incidents occurred when:

- The worker apparently died from cardiac arrest. (see cases 63 and 64)
- The worker fell for unknown reasons. (see case 65)

CASE NUMBER: 63 OTHER

TYPE OF ESTABLISHMENT: Manufacture of Paper for Cigarettes SIC: 2621

ACCIDENT TYPE: Heart Attack DATE OF INCIDENT: 9/15/79

WORK LOCATION: Vicinity of Forklift TIME OF INCIDENT: 12:00 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	49	Forklift Operator

DESCRIPTION OF INCIDENT:

A forklift operator collapsed during a coffee break. He was found on the floor by a co-worker, who administered cardiopulmonary resuscitation, but failed to obtain a response. The forklift operator was taken to the hospital where he was pronounced dead on arrival. Cause of death was listed as acute visceral congestion due to acute cardiac failure and arteriosclerosis.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 64 OTHER

TYPE OF ESTABLISHMENT: Pulp and Paper Manufacture SIC: 2621

ACCIDENT TYPE: Heart Attack DATE OF INCIDENT: 2/1/84

WORK LOCATION: In Vicinity of Digester TIME OF INCIDENT: 3:00 pm

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	00	Unknown

DESCRIPTION OF INCIDENT:

An employee was on the third floor when he noticed smoke coming from the area between the brake and the digester. In a very short period of time, orange colored flames shot up approximately two feet (.6 m). The fire company was called and the employee exited the building.

The employee experienced chest pain after his descent. He was walked slowly by a co-worker to the nurses station where his vital signs were checked and found to be stable. Oxygen was administered. Later, the employee died from cardiac arrest.

The coroners report stated the employees carbon monoxide level was 6 percent and that he had severe coronary artery disease. He was a cigar smoker.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

CASE NUMBER: 65 OTHER

TYPE OF ESTABLISHMENT: Manufacture of Paper from Pulpwood SIC: 2621

ACCIDENT TYPE: Fall of 60 Feet (18.3 m) from Work Area to Ground DATE OF INCIDENT: 5/11/81

WORK LOCATION: Work Surface on Chip Silo TIME OF INCIDENT: 8:05 am

AFFECTED WORKER(S): NO. FATALITIES: 1

Injury	Sex	Age	Job Description
F	M	31	Pulp Mill Laborer

DESCRIPTION OF INCIDENT:

A laborer working alone was repairing a chip silo door which had corroded. The work area, approximately 60 feet (18.3 m) above ground level was level, of solid construction and guarded by railings, 3 inch (7.6 cm) outside diameter steel pipe, 42 inches (1.1 m) high with main and midrails. The weather was fair and cool.

For an unknown reason, the laborer fell from his work area to the ground 60 feet (18.3 m) below. The door on which he was working also fell. Coworkers on the ground summoned the nurse and paramedics on site who administered cardiopulmonary resuscitation. The laborer was transported via ambulance to the hospital where he was pronounced dead on arrival.

There were no witnesses. The laborer had been employed by this company for nine years.

STANDARDS CITED RELATED TO THE INCIDENT:

No citations were issued.

See Appendix A (Table I) for a summary of cases by incident classification. Forty-one of the 65 incidents, or 63% were operating procedural problems in which employees used improper, risky and unsafe work procedures, machine guarding was inadequate or lacking, fall protection was not provided and other failures resulting in fatal incidents. Twenty-one or 32% were related to equipment/material/facility factors. These included malfunctioning of equipment and equipment controls, explosions and fires, failure of brackets angle irons and bolts, and other events. The remaining 5% were classified as other. There were no incidents related to environmental conditions.

The 65 incidents resulted in 72 fatalities. See Table A on page 84 for a cross tabulations of accident type by type of incident and a summary table of accident types found in Table V, Appendix A, page A-5.

The employee died from the results of being caught between rotating rolls, other nip points formed by rotating rolls and surfaces such as felt, being caught in components of machinery or machinery and other surfaces in 28% (20 of 72) of the total fatalities. This was followed by deaths from workers being struck by falling, tumbling rolls or bales and other objects such as falling or moving parts of machinery accounting for 18% (13 of 72) of the seventy-two fatalities. These two types of accidents, caught-in or between and struck-by, accounted for almost one half of the accidents. Other types of accidents included: thermal and chemical burns, 12% (9 of 72); asphyxiation and poisonings, 10% (7 of 72); fatal injuries involving vehicles, 7% (5 of 72); falls from elevations, 7% (5 of 72); electrocutions, 6% (4 of 72); health related, 6% (4 of 72); struck-against objects, 4% (3 of 72) and drownings, 3% (2 of 72).

B. Employee Activity at the Time of Injury

Table B on page 85 indicates that 83% (60 of 72) of the workers were performing normal job activities such as threading or re-threading rolls, repairing/maintaining equipment, injamming equipment, and moving, loading/unloading materials among other activities. Five or 7% of the workers were doing something other than normal work activities. These included extinguishing a fire, attempted a rescue, on break etc. The remaining seven or 10% were unknown or not clear. See Table C on page 86 for employee location at time of the incident.

C. Standards Cited

There were no incident related citations in 28 of the 65 cases. Section 5(a)(1) of the OSH Act was cited eleven times in a total of 70 citations. See Appendix B (Table I) for a listing of standards cited.

NOTE: Percents may not add up to 100% because of rounding.

TABLE A

PULP, PAPER, and PAPERBOARD MILLS

TYPE OF ACCIDENT
BY INCIDENT TYPE

Type of Accident	Operating Procedure	Equipment Material Facility	Other	Number of Fatalities
Caught in or between rotating rolls, nip points, etc.....	11	1	0	12
Struck by falling, tumbling rolls, bales.....	5	4	0	9
Thermal burns.....	3	4	0	7
Asphyxiation/poisoning by hazardous chemicals.....	3	3	0	6
Falls from elevations.....	2	2	1	5
Caught between components of equipment/surfaces.....	3	1	0	4
Electrocutions.....	1	3	0	4
Caught between moving vehicles or vehicle and a surface.....	3	0	0	3
Struck against objects.....	2	1	0	3
Struck/crushed by falling, moving equipment/parts of.....	1	2	0	3
Struck-by, crushed by vehicles.....	2	0	0	2
Drownings.....	2	0	0	2
Crushed between felt and roller/felt nips.....	2	0	0	2
Chemical burns.....	1	1	0	2
Heart attack.....	0	0	2	2
Caught and battered by rotating shaft.....	1	0	0	1
Caught in, crushed by conveyors.....	1	0	0	1
Suffocated in wood chips.....	1	0	0	1
Ruptured intestine pushing roll.....	1	0	0	1
Heat exhaustion.....	1	0	0	1
Struck by objects during explosion.....	0	1	0	1
*** Total ***	46	23	3	72

TABLE B

PULP, PAPER, and PAPERBOARD MILLS

EMPLOYEE ACTIVITY AT TIME OF INCIDENT
BY INCIDENT TYPE

Employee Activity	Operating Procedure	Equipment Material Facility	Other	Number of Fatalities
** Normal Job Activity				
Repairing, maintaining, installing, adjusting equipment.....	4	5	1	10
Checking, testing, inspecting equipment/material.....	5	4	0	9
Threading/rethreading paper rolls, splicing, rewinding.....	7	1	0	8
Cleaning equipment, removing ashes, waste, etc., unjamming..	5	2	0	7
Operating mobile equipment: front-end loader, forklift, etc.	4	1	0	5
Extinguishing fire (fire fighter).....	3	0	0	3
Moving equipment, loading/unloading equipment.....	1	2	0	3
Moving, loading, unloading rolls, pulpwood, etc.....	2	0	0	2
Draining tanks, chests.....	2	0	0	2
Moving from one work location to another.....	2	0	0	2
Removing wrinkles from felt paper.....	2	0	0	2
"Turning up" paper.....	2	0	0	2
Slitting paper into rolls.....	1	0	0	1
Removing "rag" from pulper.....	1	0	0	1
Punching chips.....	1	0	0	1
Operating industrial oven.....	0	1	0	1
Changing product type, e.g., tissue to towel paper.....	0	1	0	1
** Subtotal **	42	17	1	60
** Other Than Normal Job Activity				
Return to rail car to retrieve hook.....	1	0	0	1
Manually turning electric motor drive shaft (power failure).	1	0	0	1
Attempted rescue.....	0	1	0	1
Attempting to extinguish fire (not a fire fighter).....	0	1	0	1
Collapsed during coffee break.....	0	0	1	1
** Subtotal **	2	2	1	5
** Unknown Activity or Not Clear				
Can't be determined.....	2	3	0	5
Not reported.....	0	1	1	2
** Subtotal **	2	4	1	7
*** Total ***	46	23	3	72

TABLE C

PULP, PAPER, and PAPERBOARD MILLS

WORK LOCATION
BY INCIDENT TYPE

Work Location	Operating Procedure	Equipment Material Facility	Other	Number of Incidents
Paper machine--felt, press rollers, embossers, etc.....	13	5	0	18
Platforms, elevated work surfaces.....	4	4	1	9
Operating vehicles, mobile equipment, or in vicinity of them.	6	0	1	7
Rewinders, slitters.....	2	1	0	3
In/near boilers, boiler room.....	1	2	0	3
Near electrical control panels, breakers, power lines.....	1	2	0	3
Pulper, pulper platform, pulping unit.....	2	0	0	2
Near/in chests.....	2	0	0	2
Vicinity of conveyors.....	2	0	0	2
In/near manhole, trap doors.....	1	1	0	2
Vicinity of chemical tanks.....	0	2	0	2
Vicinity of chip bins.....	1	0	0	1
Loading, unloading dock area.....	1	0	0	1
Basement of machine room.....	1	0	0	1
Railway cars.....	1	0	0	1
In/near storage areas.....	1	0	0	1
Diversion gate (control flow of pulp logs).....	1	0	0	1
In lime kiln.....	1	0	0	1
Pulp storage area.....	0	1	0	1
Tubing machine.....	0	1	0	1
Near ovens.....	0	1	0	1
Near elevator/hoist.....	0	1	0	1
Near digester/pump/piping system.....	0	0	1	1
*** Total ***	41	21	3	65

Section 5(a)(1) of the OSH Act (General Duty Clause) which states that "Each employer shall furnish to each of his employees employment and a place of employment which is free from recognized hazards that are likely to cause death or serious harm to his employees" was cited for the following reasons.

- There was no guard provided to protect employees entering reel stack from the nip point created when both reels were nearly full. Nor was there a safe operating procedure that was strictly enforced.

- Employees entered an overhead platform and positioned themselves in the immediate vicinity of in-running felt nips to use air hose exposing themselves to the hazards of being caught in felt nips with a resulting crushing injury.

- Employees operating the front-end loader were exposed to the hazard of being thrown and crushed by the equipment when it was operated over rough and uneven terrain and it did not have operable brakes.

- Employees operating the front-end loader in the area of the coal yard ash pit and sludge plant were exposed to the hazard of being thrown and crushed by this equipment when it was operated over rough and uneven terrain and it did not have roll over protection or seat belt. Guard railings along route ways and pit edges were not installed.

- Employees were operating forklift trucks on the waste paper truck dock unloading ramp which was not protected from the hazard of trucks being driven over the edges by a substantial barricade on both edges of the ramp.

- Management and employees working with and responsible for the rewinders were not adequately trained in the safe procedure for operating these machines with safety interlocks in place to prevent operating above jug speed without the guard in place.

- Machine tenders were permitted to walk under the breast roll of the paper machine or to have parts of their body under the pivoting arm while the roll was being raised with wire under tension.

- The temporary lifting system was approved and utilized without engineering considerations, when used.

- The employer failed to train employees in the safe use of overhead cranes and wire rope slings.

- The written instructions for temporarily lifting the rewinder table were not followed in that one sling was used for the lift rather then two slings as depicted in the written instructions.

- An employee had to remove the protection cover from a pressure switch in order to adjust the pressure on a refrigerator unit subjecting himself to 550 volts a.c. The pressure switch shall be located to enable accessibility to adjustment screws and visibility through view window without the necessity of removing protective cover for adjustments.

IV. CONCLUSION

A. Problem Areas

Pulp, paper and paperboard mills industries (as currently covered by CFR Standard 1910.261) have been grouped together in this study as a continuous process from pulp wood to the finished products; paper and paperboard. In many incidents, the pulping process was part of the paper or paperboard making establishment and was included in those SIC's.

Some problem areas that suggest further need for standards development, modification and enforcement are indicated in the following statements:

- There was a failure to take adequate precautions around rotating rolls and ingoing nip points. The lack of or ineffective guarding was a factor in many cases. Also dangerous short cuts were taken by employees when existing guarding was circumvented or by-passed.

- Falling rolls and bales of material, components of equipment, and other objects resulting in struck-by and crushing injuries indicate a need for improved work and safety procedures in this area.

- Fatal thermal burns and chemical burns require appropriate measures for their prevention.

- There was a failure to guard against falls from elevated platforms, catwalks, through openings, and other work surfaces.

- Asphyxiation and poisoning occurred when confined spaces and enclosed areas were not checked for hazardous materials and chemicals resulting in multiple deaths, one of which was a rescue attempt.

B. Secondary Factors

In the narratives of the case reports, factors are mentioned that contribute to the accident and cut across all accidents in the pulp, paper and paperboard industries. They can be considered secondary and should be taken into account in any effort to reduce serious accidents. These include:

- Health problems of workers. (see cases 7 and 62)
- Lack of adequate training; new to job. (see cases 3 and 9)
- Overtime work may have created fatigue and affected judgement. (see cases 12 and 14)
- Failure of protective equipment. (see case 42)
- Communication problems. (see case 33)

C. Preventive Measures

A review of the types of incidents and secondary factors illustrate that fatal occupational incidents are complex events. Multiple points of attack are needed to address human, machine, and environmental interactions resulting in fatal incidents. These preventive measures include:

- Establishment and strict enforcement of safety procedures through standards modification and development in the areas of machine guarding, hazardous chemical/materials and fall protection.
- Increased efforts in training and education for work and safety, procedures to reduce risky and dangerous short cuts and other unsafe work practices such as circumventing or by-passing guards.
- Improved supervision at all levels and specifically for the new worker and workers new to a job.
- Provide more information to employers through consultation programs.

In summary, two categories of accidents accounted for nearly one half of the 72 pulp, paper and paperboard fatalities. These were; caught in or between rotating rolls, equipment etc. (28%) and struck-by falling, tumbling objects and equipment parts (18%).

D. Data Source

The OSHA Compliance Officer's case files resulting from accident investigations provide more detailed descriptions of how occupational fatalities occur than any other data currently available to OSHA. This data source continues to be useful for studying the occurrence and nature of work fatalities when cases are aggregated by specific topics, e.g., by industry (oil/gas well drilling and services), by work activity (welding), by equipment used (ladders, scaffolds, etc.), by work location (confined work spaces) and so on. The information can then be analyzed further by various classification systems. Since the data are in-house, access is relatively easy. On the other hand, the uniformity, consistency and quality of the case file data used vary from narrative to narrative. The OSHA fatality/catastrophe codes in present use are generally too broad and insufficiently defined to facilitate accurate and efficient compilation of information for purposes of study.

REFERENCES

National Institute for Occupational Safety and Health, Pulp and Paper Mills, U.S. Department of Health and Human Services, July 1981, NTIS PB 83-115766

Occupational Safety and Health Administration, General Industry, OSHA Safety and Health Standards, (29 CFR 1910), U.S. Department of Labor, March 1983

Occupational Safety and Health Administration, Construction Industry, OSHA Safety and Health Standards, (29 CFR 1926), U.S. Department of Labor, 1983

APPENDICES

APPENDIX A
Classification of Variables Tables

TABLE I

PULP, PAPER, AND PAPERBOARD MILLS

TYPE OF INCIDENT

Type of Incident	Number of Incidents
** Operating Procedure	
Used improper/risky/unsafe work procedures	8
Adequate machine guarding not provided/exposed nip points	5
Used dangerous body position in work performance	4
Failed to follow lock-out procedures, immobilizing equipment	4
Unsafe operation of vehicles or use of unsafe vehicle	4
Bypassed/circumvented safety devices/guards	3
Adequate fall protection not provided	3
Lack of communication--audio or visual	3
Failure to test atmosphere--toxic, O2 deficiency & explosive	2
Activated wrong switch	1
Proper safety precautions not taken around flammables	1
Unsafe operation of mobile equipment	1
Unsafe loading/unloading practices	1
Failed to follow instructions	1
** Operating Procedure	41
** Equipment/Material/Facility Related	
Explosions from over-pressurizing/fires/steam/chemicals	4
Malfunction of machinery/failure of components	4
Malfunction or failure of equipment controls	3
Failure of brackets, angle irons, bolts	3
Rolling, falling paper rolls, pulp bales	2
Failure of slings, cables, ropes, supports, etc	2
Hazardous chemicals leaked; combined with other chemicals	1
Loose chain caught in planks	1
Badly designed/located electrical switch	1
** Equipment/Material/Facility Related	21
** Other	
Heart attack	2
Worker fell for unknown reason	1
** Other	3
*** Total ***	65

TABLE II

PULP, PAPER, AND PAPERBOARD MILLS

ACCIDENT TYPE

Type of Accident	Number of Fatalities
Caught in or between rotating rolls, nip points, etc.	12
Struck by falling, tumbling rolls, bales	9
Thermal burns	7
Asphyxiation/poisoning by hazardous chemicals	6
Falls from elevations	5
Electrocutions	4
Caught between components of equipment/surfaces	4
Struck/crushed by falling, moving equipment/parts of	3
Caught between moving vehicles or vehicle and a surface	3
Struck against objects	3
Chemical burns	2
Struck-by, crushed by vehicles	2
Drownings	2
Heart attack	2
Crushed between felt and roller/felt nips	2
Caught and battered by rotating shaft	1
Caught in, crushed by conveyors	1
Struck by objects during explosion	1
Suffocated in wood chips	1
Ruptured intestine pushing roll	1
Heat exhaustion	1
*** Total ***	72

TABLE III

PULP, PAPER, AND PAPERBOARD MILLS

WORK ACTIVITY

Work Activity	Number of Fatalities
** Normal Job Activity	
Repairing, maintaining, installing, adjusting equipment.....	10
Checking, testing, inspecting equipment/material.....	9
Threading/rethreading paper rolls, splicing, rewinding.....	8
Cleaning equipment, removing ashes, waste, etc., unjamming..	7
Operating mobile equipment: front-end loader, forklift, etc.	5
Moving equipment, loading/unloading equipment.....	3
Extinguishing fire (fire fighters)	3
Moving, loading, unloading rolls, pulpwood, etc.....	2
Draining tanks, chests.....	2
Moving from one work location to another.....	2
Removing wrinkles from felt paper.....	2
"Turning up" paper.....	2
Slitting paper into rolls.....	1
Operating industrial oven.....	1
Removing "rag" from pulper.....	1
Punching chips.....	1
Changing product type, e.g., tissue to towel paper.....	1
** Normal Job Activity	60
** Other Than Normal Job Activity	
Attempted rescue.....	1
Attempting to extinguish fire (not a fireman).....	1
Return to rail car to retrieve hook.....	1
Collapsed during coffee break.....	1
Manually turning electric motor drive shaft (power failure).	1
** Other Than Normal Job Activity	5
** Unknown Activity or Not Clear	
Can't be determined.....	5
Not reported.....	2
** Unknown Activity or Not Clear	7
*** Total ***	72

TABLE IV

PULP, PAPER, AND PAPERBOARD MILLS

WORK LOCATION

Work Location	Number of Incidents
Paper machine--felt, press rollers, embossers, etc.....	18
Platforms, elevated work surfaces.....	9
Operating vehicles, mobile equipment, or in vicinity of them	7
Rewinders, slitters.....	3
In/near boilers, boiler room.....	3
Near electrical control panels, breakers, power lines.....	3
Pulper, pulper platform, pulping unit.....	2
Vicinity of chemical tanks.....	2
Near/in chests.....	2
Vicinity of conveyors.....	2
In/near manhole, trap doors.....	2
Pulp storage area.....	1
Vicinity of chip bins.....	1
Loading, unloading dock area.....	1
Basement of machine room.....	1
Railway cars.....	1
In/near storage areas.....	1
Diversion gate (control flow of pulp logs).....	1
Near digester/pump/piping system.....	1
Tubing machine.....	1
Near ovens.....	1
In lime kiln.....	1
Near elevator/hoist.....	1
*** Total ***	65

TABLE V

PULP, PAPER AND PAPERBOARD MILLS
SUMMARY OF FATALITIES BY TYPES OF ACCIDENTS

ACCIDENT TYPE	NUMBER OF FATALITIES
Caught in Nip Points/Rotating Rolls, Equipment (28%)	
Caught in or between Rotating Rolls, Nip Points	12
Caught between Components of Equipment/Surfaces	4
Crushed between Felt and Roller, Felt Nips	2
Caught and Battered on Rotating Shaft	1
Caught in, Crushed by Conveyors	1
TOTAL	20
Struck-by Falling/Tumbling Objects (18%)	
Struck-by Falling, Tumbling Rolls, Bales	9
Struck, Crushed by Falling/Moving Equipment	3
Struck-by Objects during Explosion	1
TOTAL	13
Thermal and Chemical Burns (12%)	
Thermal Burns	7
Chemical Burns	2
TOTAL	9
Asphyxiation and Poisoning (10%)	
Asphyxiation/Poisoning by Hazardous Chemicals	6
Suffocation in Wood Chips	1
TOTAL	7
Injuries Involving Vehicles (7%)	
Caught between Moving Vehicles or Moving Vehicles and a surface	3
Struck-by, Crushed by Vehicles	2
TOTAL	5
Falls from Elevations (7%)	
Falls from Platforms, Catwalks, through Floor Openings, etc.	5
TOTAL	5
Electrocutions (6%)	
Electrocutions from Contact with energized Sources while Standing in Water, Removal of guards, Exposing Sources of Current, etc.	4
TOTAL	4
Health Related (6%)	
Heart Attacks	2
Heat Exhaustion	1
Ruptured Intestine	1
TOTAL	4

TABLE V (cont'd)

PULP, PAPER AND PAPERBOARD MILLS
SUMMARY OF FATALITIES BY TYPES OF ACCIDENTS

ACCIDENT TYPE	NUMBER OF FATALITIES
Struck against Objects (4%)	
Struck Head, Other Parts of Body against Objects	3
TOTAL	3
Drownings (3%)	
Fell into White Water Pit and drowned, Caught under Water by Overturned Equipment, etc.	2
TOTAL	2
TOTAL Fatalities (100%)	72

TABLE VI

NUMBER OF FATALITIES FROM SELECTED
OSHA CASE FILES RELATED TO PULP, PAPER
AND PAPERBOARD MILLS
BY OCCUPATION

OCCUPATION	NUMBER OF Fatalities
Laborer	8
Unknown	6
Millwright	4
Fire Fighters or Brigademen	3
Forman	3
Electrician	3
Back Tender	3
Maintenance Man	3
Fourth Hand	3
Machine Operator	2
Clamplift Truck Operator	2
Paper Machine Tender	2
Third Hand	2
Utility Man	2
Dry End Operator	1
Machine Operator Tender	1
Instrument Specialist	1
Forklift Operator	1
Fifth Hand	1
Shift Supervisor	1
Reel Handler	1
Spareman	1
Manager	1
Supervisor	1
Draftsman	1
Front-end Loader Operator	1
Cutterman	1
Salvage Rewinder Operator	1
Sixth Hand	1
Head Beaterman	1
Oiler	1
Paper Machine Hand	1
Superintendant	1
Oven Operator	1
Painter	1
Shafter	1
Mechanic	1
Machine Operator Helper	1
Beaterman	1
Pulp Mill Laborer	1
TOTAL	72

APPENDIX B
STANDARDS CITED

TABLE I

PULP PAPER AND PAPERBOARD MILLS
FREQUENCY OF STANDARDS CITED

Standards Cited Related to Incident	Description	Number of Times Cited
1910.23 (c)(1)	Guarding of open-sided floors, platforms and runways.	1
1910.27 (b)(1)(ii)	Specified distance between rungs of fixed ladders.	1
1910.27 (c)(7)	Safety specifications for counter weighted hatch covers.	1
1910.27 (d)(1)(vi)	Width of ladder wells.	1
1910.37 (k)(1)	Maintenance and workmanship of components of means of egress.	1
1910.67 (c)(2)(ix)	Upper and lower controls arrangement on aerial lifts.	2
1910.134 (e)(3)	Written procedures for use of available respirators and employee familiarity with them.	1
1910.134 (e)(4)	Frequent random inspection of respirators.	1
1910.134 (e)(5)	Instruction in the selection, use and maintenance of respirators by competent persons.	1
1910.134 (f)(2)(ii)	Inspection of self-contained breathing apparatus.	1
1910.134 (f)(2)(iv)	Respirators maintained for emergency use did not have current records of inspection date and findings.	1
1910.176 (a)	Safe clearance and marking of aisles and passageways.	1
1910.176 (b)	Storage of material shall not create a hazard of sliding or collapse.	1
1910.178 (c)(2)(ix)	Approved industrial trucks for use in easily ignitable fiber area.	1

TABLE I

PULP, PAPER AND PAPERBOARD MILLS
FREQUENCY OF STANDARDS CITED (cont'd)

Standards Cited Related to Incident	Description	Number of Times Cited
1910.178 (k)(1)	Blocking of trailer wheels to prevent movement while being loaded by industrial truck.	1
1910.178 (k)(3)	Use of fixed jacks to support trailer not coupled with tractor.	1
1910.178 (o)(1)	Only stable or safety arranged loads shall be handled.	1
1910.184 (c)(7)	Slings shall be padded/protected from sharp edges of load.	1
1910.184 (c)(9)	Employees kept clear of load being lifted with sling.	1
1910.212 (a)(1)	Machine guarding at point of operation, ingoing nip points, etc.	4
1910.252 (d)(2)(vii)	Relocation of combustibles during welding and cutting operations.	1
1910.261 (a)(3)(v)	ANSI Safety Code for portable metal ladders A14.2-1956.	2
1910.261 (a)(3)(x)	ANSI Safety Code for conveyors cableways and related equipment.	2
1910.261 (a)(3)(xv)	ANSI Safety Code for powered industrial trucks B56.1-1969.	5
1910.261 (b)(2)	Personal protective clothing and equipment.	2
1910.261 (b)(3)	Maintenance of floors, platforms and work surfaces.	2
1910.261 (b)(4)	Power source lockout of equipment.	5
1910.261 (b)(5)	Safety percautions for entering vessels, tanks, chip bins, etc.	3
1910.261 (b)(6)	Industrial power truck operations shall conform to ANSI Standard B56.1-1969.	1

TABLE I

PULP, PAPER AND PAPERBOARD MILLS
FREQUENCY OF STANDARDS CITED (cont'd)

Standards Cited Related to Incident	Description	Number of Times Cited
1910.261 (g)(21)	Pipes leading to tanks shall be blocked off or valved during inspection/repair.	1
1910.261 (k)(1)	Emergency stops for paper machines.	1
1910.261 (k)(2)(iii)	Guarding of ends of rotating shafts.	1
1910.261 (k)(5)	Guarding of flush floor opening in the bottom of wire pit.	1
1910.261 (k)(26)(i)	Guarding of nipping points of drum winders and rewinders on operation side.	1
1910.261 (k)(31)	Nonskid surface provided in front vicinity of winder area.	1
1910.261 (l)(2)	Emergency stopping devices shall be provided on machines and tested.	1
1910.261 (l)(9)(i)	Guarding of nipping points on winders and rewinders.	2
1910.261 (l)(9)(ii)	Nonskid surface provided in front of the rewinder.	1
1910.307 (b)	Safe electrical equipment, wiring methods and safe installation of equipment in hazardous locations.	1
1926.21 (b)(2)	Employees shall be instructed in recognition and avoidence of unsafe conditions.	1
Section 5 (a)(1)	General Duty Clause OSH Act	11
TOTAL VIOLATIONS		70

(No relevant standards were cited in 28 of the 65 incidents)

APPENDIX C
Definitions

I. DEFINITIONS AND PROCESS DESCRIPTIONS OF PULP, PAPER AND PAPERBOARD INDUSTRIES[1] BY PROCESS ORDER

Woodyard Operations: Pulpwood is delivered to the pulp mill where it undergoes slashing, barking, chipping, screening and storage for the digesters and refiners. Some of these steps may be performed at the forest site such as slashing, barking and chipping.

Slasher Table: Where logs are cut into prescribed lengths by several circular saws.

Debarker: A machine for removing bark from a log by the abradant actions of logs in contact with metal knives, cutterheads, etc. "Barking" or "debarking" may be accomplished by jets of high-pressure water (hydraulic barker).

Chipper: A machine containing large rotating discs that contain knives radiating from the hub of the disc like spokes on a wheel. Logs are fed through a spout and emerge as word slivers, oversize chips, fines and chips.

Screening System: A system of vibrating or gyrating trays and rotary drum shakers to separate acceptable chips from other material such as fines, slivers, oversize chips, etc. The accepted chips are stored in chip piles, chip bins or silos.

Pulping Operations: The separation of cellulose fibers in cellulosic material from other components present permitting the fibers to bind together into a web that may be formed into paper. Mechanical pulping, chemical pulping and other operations involving both chemicals and mechanical pulping are used for this purpose.

Mechanical Pulping: Process involving the physical disintegration of pulpwood by grinding debarked logs in water (stone ground pulp), separation of the fibers of untreated wood chips and treatment of sawdust in a refiner (refiner mechanical pulp) or softening of wood pulp chips by heating, followed by mechanical refining (thermomechanical pulp).

Chemical Pulping: These processes dissolve and hydrolyze lignin which holds cellulose fibers of wood in a rigid matrix. The pulp is cooked and the lignin is digested by components may be recovered for reuse. The major alkaline process is the sulfate (kraft) process and the major acid process is the sulfite process.

[1] Adapted from Appendix A, Description of Pulp and Paper Mill Operations, of the publication, Pulp and Paper Mills, NIOSH, U.S. Department of Health and Human Services, July 1981. NTIS PB 83-11576.

Combination Pulping: Chemi-mechanical and semi-chemical pulping methods are similar in that wood or wood chips are exposed to a relatively mild chemical pretreatment before mechanical refining.

Bleaching Operations: This is an operation used to increase the whiteness of the pulp. Peroxide is primarily used in oxidative bleaching of mechanical pulp. Chlorine is used in the bleaching process for chemical pulps. Other chemicals are used in place of and in addition to for these processes.

Chemical Recovery Operations: Although not technically necessary to produce chemical pulp, the chemical recovery operations are an integral part of the chemical pulping process and are an economic and environmental necessity.

White Liquor: A liquor consisting mainly of sodium hydroxide and sodium sulfide used to digest lignin in wood chips or sawdust in the kraft pulping process; cooking liquor.

Black Liquor: The spent cooking liquor in the kraft process from which tall oil and inorganic chemicals are recovered for commercial use and reuse in reconstituting white liquor.

Green Liquor: Sodium salts that have been withdrawn from the spent cooking liquor and dissolved in water from which sodium hydroxide is obtained and stored as white liquor.

Red Liquor: The spent cooking liquor of the sulfite process of pulping from which several by products may be obtained in the recovery operation including vanillin, ethyl alcohol and lignosulfonates used as dispersants and in the manufacture of ceramics.

Tall Oil: A product of black liquor from which fatty acids may be used for the production of soap and resin acids used for the sizing of paper.

Stock Preparation Operations: Pulps are delivered from the pulp mill in an aqueous slush or slurry form, as wet or dry sheets (laps), as dry bales, shredded material etc., and must be reconstituted into a slurry form and blended with other components before use in paper making.

Beating and Refining: Pulp and various additives are mixed in a water suspension which crushes and abrades the fibers causing them to separate, swell and increase in surface area.

Application of Additives: Various chemical agents are used to further prepare fibers for the papermaking machine, to impart various characteristics to paper products, and to facilitate papermaking operations by controlling residue formation and microorganisms. Some may be added to beaters or refiners, others are added during the papermaking process.

Blending and Proportioning: The final steps before the refined pulp is made ready for delivery to the papermaking machine. Different pulps are separated, refined and mixed together in appropriate proportions with amounts of alum, clay, sizing and other additives in a mixing chest. The blended stock is delivered to a machine chest where it is diluted with water.

Furnish: The refined pulp to which various additives have been incorporated.

Stuff Box: A head box where the blended pulp stock is received from the machine chest for monitoring and regulating before delivery to the fan pump and through a series of centrifugal cleaners and screens. The furnish is then passed through a vacuum system for removal of air bubbles and then to a fan pump and pressure screen for delivery to the papermaking machine head box.

Papermaking Machine Head Box: The head box on the papermaking machine where the final furnish is received for delivery to the papermaking operation.

Papermaking Operations: Two basic types of papermaking machines are used to form paper, paperboard or building board from pulp; the fourdrinier and cylinder machines. The sections that form the paper or paperboard sheet are different on fourdrinier and cylinder machines. However, the pressing, drying and calendering sections are similar. Papermaking machine operations are automated but require modification by operators and monitoring. Various surface treatments such as sizing, coating and coloring, can be applied to paper or paperboard at several points in the papermaking process.

Machine Tender: The operator who has responsibility for operations that lead to sheet formation.

Backtender: The operator, with the assistance of the third, fourth and fifth hands, who is responsible for operations that control the properties of the formed sheet after it has been dried.

Fourdrinier Paper Machine: The machine's basic component is a long, endless plastic or bronze alloy wire screen belt (the fourdrinier wire), which moves the sheet of pulp through various presses and operations. The mesh count of the wire is different for different paper products. The fourdrinier wire is mounted over the breast and couch rolls and is supported in the middle by table rolls driven by the wire. Pulp remains on the screen while water drains through as the flow of material progresses. Water removal is facilitated by the action of table rolls, foils and suction boxes under the sheet. The paper sheet is smoothed and foam or air bubbles are removed as it passes under the dandy roll located along the suction box section. After the paper leaves the fourdrinier wire at the couch roll, it is transferred to a

felt blanket which carries the sheet through the wet press section containing a series of press rolls and felt blankets that remove more water. The paper is then passed through a series of hollow, steam-heated rolls where it is held tightly against the drying rolls by cotton or felt drying blankets. Sizing may be sprayed onto the paper sheet during the drying operation. After drying, the sheet passes through calendar rolls to import a surface finish to the paper by a combination of compression and friction. From the calendar stack, the sheet of paper or paperboard is surface-wound on a reel.

Cylinder Paper Machine: These machines are used for the manufacture of corrugated container board, heavy construction paper, or multi-ply building board. The sheet-forming section consists of four to seven separate vats, each with its own cylinder mold and smaller couch roll. Formation of a fibrous web occurs on the mesh covering the cylinder mold when stock suspension is forced through the wire mesh. The fibrous web on the cylinder mold is couched or pressed from the cylinder by means of a couch roll that transfers the paperboard web to a pick-up felt. The pick-up felt carries the material to other vats where new webs forming a multi-ply sheet on the pick-up felt. After leaving the last cylinder, additional water is removed from the sheet by suction press rolls. The sheet is carried on felt blankets to the primary and main press sections. Drying and calendering processes for fourdrinier and cylinder machines are essentially similar.

Coating Operations: Coatings are applied to paper to improve the opacity or surface characteristics of the base stock. These may be applied on the paper machine system or uncoated jumbo rolls may be removed and coated on a coating machine prior to supercalendering and finishing operations.

Supercalendering: Calender stacks are used off the machine to import a smoother finish to the paper. They have their own wind and unwind stands.

Finishing Operations: These operations begin after the last operation on the papermaking machine and end at a point where the product leaves the mill. Included are supercalendering, rewinding and slitting, cutting, sheeting, trimming, packaging and shipping.

Rewinding and Slitting: Rewinding is done in the finishing room as part of the process or to eliminate defects. The machine-width sheet is slit into specific smaller widths according to customer needs by the use of slitting devices. Also, the process provides for tightly wound rolls for use in high-speed printing presses.

Cutting and Sheeting: Rolls of paper from the rewinder are mounted on reel stands and as the paper is unwound it is cut into sheets of specific lengths by a revolving knife at each revolution.

Trimming, Packaging and Shipping: The paper is trimmed, packaged and prepared for shipping.

II. TYPES OF INCIDENTS

Operating Procedure

These are incidents that resulted from the employee or employer not following designated work and safety procedures or there were no procedures available. These include safe guarding the work area, the use of appropriate personal protective equipment and all work activities under the control of the employer and worker.

Equipment/Material/Facility Related

These are incidents that resulted from malfunctioning of equipment, failure of component parts, collapse of structures, etc., and interaction of such physical conditions in the work location with human activities.

Environmental Conditions

Environmental conditions relate to extreme weather conditions which played a primary part in triggering the incident such as freezing temperature, excessive moisture, etc.

Other

These are incidents that do not meet the proceeding definitions, and cannot be specifically assigned to operating procedures, equipment/material/facility related or environmental conditions.

III. FACTORS RELATED TO FATAL INCIDENT

Human Related Factors

These are factors that can be directly associated with what the worker was involved in or what other worker(s) or the employer did or failed to do that caused the incident. For example, improper or dangerous work procedures were used, safety procedures were not followed or personal protective equipment was not worn when required. Included is any work activity or procedure for such under the direct control of the worker, fellow worker(s) and employer.

Equipment/Material/Facility Related Factors

These factors deal with the physical aspects, e.g., collapse of structures, failure of equipment, etc., of the workplace and the interaction between these and the worker's activities.

Environmental Factors

These factors relate to extreme or unplanned environmental conditions in the workplace which strongly and adversely affect the working conditions. Strong winds, icy surfaces, etc., are examples.

Other Factors

These are factors that cannot be assigned to the other three categories.

APPENDIX D
Forms

Fatality/Catastrophe Report

U.S. Department of Labor
Occupational Safety and Health Administration

MOD Date	1. Reporting ID	2. Previous Activity? If Yes, enter Type: ☐ Yes ☐ No Number:	3. Event Number (Identifies this Report) ▶

4. a. ☐ Change? b. Establishment Name	5. Employer ID (State's option)

6. a. ☐ Change? b. Site Address (Street, City, State, ZIP)	7. City Code	8. County Code

9. Event Address (If different) (Street, City, State, ZIP)

Industry & Ownership

10. Type of Business	11. Primary SIC	12. No. of Employees

13. Ownership (Mark "X" in one box)
a. ☐ Private Sector b. ☐ Local Government c. ☐ State Government d. ☐ Federal Agency/Code

Receipt Information

14. Reported By	15. Date	16. Time AM PM
17. Job Title	18. Telephone Number	

Employee Representation

19. Group Name(s)

Site Contact

20. Name and Location	
21. Job Title	22. Telephone Number

Classification

23. (Mark "X" in one box)
a. ☐ Fatality b ☐ Catastrophe

Event Description

24. Event Date	25. Event Time AM PM	26. Number of Fatalities	27. Number of Hospitalized Injuries	28. Number of Nonhospitalized Injuries	29. Number Unaccounted for

30. Type of Event (e.g., Fall from scaffold)

31. Preliminary Description

Action

32. Inspection Planned? ☐ Yes ☐ No If No. Reason:	33. Supervisor(s) Assigned a. b.	34. CSHO(s) Assigned a. b.

35. Optional Information

Type	ID	Value	Type	ID	Value

36. Total Entries

37. Comments:

OSHA-36(F) (Rev 1/84)

CASE FILE COPY

Investigation Summary

U.S. Department of Labor
Occupational Safety and Health Administration

MOD Date	1. Reporting ID	2. Summary Number (Identifies This Summary) ▶ 14263941

3. Related Inspection Numbers	3.1 Type	Number	3.2 Type	Number	3.3 Type	Number	3.4 Type	Number	4. Total Entries

Name Line Number	5. Injured/Deceased (Name)	6. Inspection Number (3 1, 3 2 etc.)	7. Sex	8. Age	9. Injury a. Fatality	9. Injury b. Hospitalized	9. Injury c. Nonhospitalized	10. Nature of Injury	11. Part of Body	12. Source of Injury	13. Event Type	14. Environmental Factor	15. Human Factor	16. Task a. Reg Assigned	16. Task b. Not Reg Assigned	17. Substance Code	18. Occupation Code
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19. Type of Event

20. Abstract

Abstract Line Number	
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Case File Page / of

OSHA-170 (1/84)

CASE FILE COPY

OSHA Instruction ADM 1-1. 12A
April 1, 1984
Office of Management Data Systems

INVESTIGATION SUMMARY CODES

NATURE OF INJURY CODES

01 Amputation
02 Asphyxia
03 Bruise/Contusion/Abrasion
04 Burn (Chemical)
05 Burn/Scald (Heat)
06 Concussion
07 Cut/Laceration
08 Dermatitis
09 Dislocation
10 Electric Shock
11 Foreign Body in Eye
12 Fracture
13 Freezing Frost/Bite
14 Hearing Loss
15 Heat Exhaustion
16 Hernia
17 Poisoning (Systemic)
18 Puncture
19 Radiation Effects
20 Strain/Sprain
21 Other
22 Cancer

OSHA Instruction ADM 1-1. 12A
April 1, 1984
Office of Management Data Systems

PART OF BODY CODES

01 Abdomen
02 Arm(s) Multiple
03 Back
04 Body System
05 Chest
06 Ear(s)
07 Elbow(s)
08 Eye(s)
09 Face
10 Finger(s)
11 Foot/Feet/Toe(s)Ankle(s)
12 Hand(s)
13 Head
14 Hip(s)
15 Knee(s)
16 Leg(s)
17 Lower Arm(s)
18 Lower Leg(s)
19 Multiple
20 Neck
21 Shoulder
22 Upper Arm(s)
23 Upper Leg(s)
24 Wrist(s)
25 Blood
26 Kidney
27 Liver
28 Lung
29 Nervous System
30 Reproductive System
31 Other Body System

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SOURCE OF INJURY CODES

01 Aircraft
02 Air Pressure
03 Animal/Insect/Bird/ Reptile/Fish
04 Boat
05 Bodily Motion
06 Boiler/Pressure
07 Boxes/Barrels, etc.
08 Buildings/Structures
09 Chemical Liquids/Vapors
10 Cleaning Compound
11 Cold (Environmental/ Mechanical
12 Dirt/Sand/Stone
13 Drugs/Alcohol
14 Dust/Particles/Chips
15 Electrical Apparatus/ Wiring
16 Fire/Smoke
17 Food
18 Furniture/Furnishings
19 Gases
20 Glass
21 Hand Tool (Powered)
22 Hand Tool (Manual)
23 Heat (Environmental) Mechanical)
24 Hoisting Apparatus
25 Ladder
26 Machine
27 Materials Handling Equipment
28 Metal Products
29 Motor Vehicle (Highway)
30 Motor Vehicle (Industrial)
31 Motorcyle
32 Windstorm/Lighting, etc.
33 Firearm
34 Person
35 Petroleum Products
36 Pump/Prime Mower
37 Radiation
38 Train/Railroad Equipment
39 Vegetation
40 Waste Products
41 Water
42 Working Surface
43 Other
44 Fume
45 Mists
46 Vibration
47 Noise
48 Biological Agent

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EVENT TYPE CODES

01 Struck By
02 Caught In or Between
03 Bite/Sting/Scratch
04 Fall (Same Level)
05 Fall (From Elevation)
06 Struck Against
07 Rubbed/Abraded
08 Inhalation
09 Ingestion
10 Absorption
11 Repeated Motion/Pressure
12 Cardio-Vascular/Respiratory System Failure
13 Shock
14 Other

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ENVIRONMENTAL FACTOR CODES

01 Pinch Point Action
02 Catch Point/Puncture Action
03 Shear Point Action
04 Squeeze Point Action
05 Flying Object Action
06 Overhead Moving and/or Falling Object Action
07 Gas/Vapor/Mist/Fume/Smoke/Dust Condition
08 Materials Handling Equipment/Method
09 Chemical Action/Reaction Exposure
10 Flammable Liquid/Solid Exposure
11 Temperature Above or Below Tolerance Level
12 Radiation Condition
13 Working Surface/Facility Layout Condition
14 Illumination
15 Overpressure/Underpressure Condition
16 Sound Level
17 Weather/Earthquake, etc. Condition
18 Other

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HUMAN FACTOR CODES

01 Misjudgement of Hazardous Situation
04 Malfunction of Procedure for Securing Operation or Warning of Hazardous Situation
05 Distracting Actions by Others
06 Equipment in Use Not Appropriate for Operation or Process
07 Malfunction of Neuro-Muscular System
08 Malfunction of Perception System with Respect to Task Environment
09 Safety Devices Removed or Inoperative
10 Operational Position Not Appropriate for Task
11 Procedure for Handling Materials Not Appropriate for Task
12 Defective Equipment: Knowingly Used
13 Malfunction of Procedure for Lock-Out or Tag-Out
14 Other
15 Insufficient or Lack of Housekeeping Program
16 Insufficient or Lack of Exposure or Biological Monitoring
17 Insufficient or Lack of Engineering Controls
18 Insufficient or Lack of Written Work Practices Program
19 Insufficient or Lack of Respiratory Protection
20 Insufficient or Lack of Protection Work Clothing and Equipment

APPENDIX E
Available Studies in the Occupational Fatality Series

OSHA PUBLICATIONS OF STUDIES OF OCCUPATIONAL FATALITIES

The following publications by the Occupational Safety and Health Administration, U.S. Department of Labor have been placed in the National Technical Information Service (NTIS) and are available. The publications number and cost per copy* are noted:

Occupational Fatalities Related to Fixed Machinery as Found in Reports of OSHA Fatality/Catastrophe Investigations, May 1978. PB 80-181035, $13.95

Occupational Fatalities Related to Scaffolds as Found in Reports of OSHA Fatality/Catastrophe Investigations, May 1979. PB 80-182009, $13.95

Occupational Fatalities Related to Ladders as Found in Reports of OSHA Fatality/Catastrophe Investitations, November 1979. PB 80-153471, $13.95

Occupational Fatalities Related to Roofs, Ceilings, and Floors as Found in Reports of OSHA Fatality/Catastrophe Investigations, November 1979. PB 80-161136, $18.95

Selected Occupational Fatalities Related to Oil/Gas Well Drilling Rigs as Found in Reports of OSHA Fatality/Catastrophe Investigations, June 1980. PB 80-226939, $13.95

Occupational Fatalities Related to Miscellaneous Working Surfaces as Found in Reports of OSHA Fatality/Catastrophe Investigations, April 1982. PB 83-125732, $18.95

Selected Occupational Fatalities Related to Fire and/or Explosion in Confined Work Spaces as Found in Reports of OSHA Fatality/Catastrophe Investigations, April 1982. PB 82-237314, $18.95

Selected Occupational Fatalities Related to Lockout/Tagout Problems as Found in Reports of OSHA Fatality/Catastrophe Investigations, August 1982. PB 83-125724, $18.95

Selected Occupational Fatalities Related to Grain Handling as Found in Reports of OSHA Fatality/Catastrophe Investigation, January 1983. PB 83-170795, $18.95

Selected Occupational Fatalities Related to Powered, Two-Point Suspension Scaffolds/Powered Platforms as Found in Reports of OSHA Fatality/Catastrophe Investigations, March 1983. PB 83-194050, $11.95

Selected Occupational Fatalities Related to Oil/Gas Well Drilling and Servicing as Found in Reports of OSHA Fatality/Catastrophe Investigations, December 1983. PB 84-154095, $30.95 ($6.50 per microfiche copy)

Selected Occupational Fatalities Related to Toxic and Asphyxiating Atomspheres in Confined Work Spaces as Found in Reports of OSHA Fatality/Catastrophe Investigations, July 1985. PB 86-144920/AS, $24.95 ($6.95 per microfiche copy)

Selected Occupational Fatalities Related to Trenching and Excavation as Found in Reports of OSHA Fatality/Catastrophe Investigations, July 1985. PB 86-155041/AS, $18.95 ($6.50 per microfiche copy)

Selected Occupational Fatalities Related to Welding and Cutting as Found in Reports of OSHA Fatality/Catastrophe Investigations, August 1988. PB 89-117527/AS, $28.95 ($6.95 per microfiche copy)

Selected Occupational Fatalities Related to Logging as Found in Reports of OSHA Fatality/Catastrophe Investigations, December 1988. PB 89-142954/AS, $21.95 ($6.95 per microfiche copy)

Selected Occupational Fatalities Related to Ship Building and Repairing as Found in Reports of OSHA Fatality/Catastrophe Investigations, January 1990. PB 90-163205, $31.00 ($8.00 per microfiche copy)

Selected Occupational Fatalities Related to Vehicle-Mounted Elevating and Rotating Work Platforms as Found in Reports of OSHA Fatality/Catastrophe Investigations, July 1991. PB 91-231613, $17.00

Selected Occupational Fatalities Related to Marine Cargo Handling as Found in Reports of OSHA Fatality/Catastrophe Investigations, August 1992. PB 92-220540, $35.00 ($17.00 per microfiche copy)

Copies of these publications may be obtained from the following address:

National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

Telephone Information: (703) 487-4600
Telephone Sales Desk: (703) 487-4650

* Prices subject to change without notice. Please contact NTIS to verify cost.