

PLAINTIFF'S
EXHIBIT
DUP-2677

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THE UNIVERSITY OF CHICAGO

... ..

1990

Abstract

CATION

1. The first part of the document is a list of references. The references are listed in a standard format, with the author's name, the title of the work, and the publisher's name. The references are as follows:

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STOLFEAR

At the time of the 1990 census, the population of the United States was 248,600,000. The population of the United States in 1990 was 248,600,000.

SECTIONALIZATION

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TO: LOUVIERS TECHNICAL LIBRARY MANUAL NO. 23

Instructions for Retention and Utilization
CONSTRUCTION DIVISION
SAFETY OPERATIONAL METHODS MANUAL

This manual has been prepared for use in the Construction Division only. It is numbered and specifically assigned to the individual to whom it is addressed.

All Project Managers, Assistant Project Managers and Safety Supervisors have had copies of this manual assigned to them. They are the property of the Du Pont Company Construction Division, are copyright registered, and will be surrendered and accounted for to the Division Safety Office should the addressee no longer occupy his present status.

No other position at any site has been assigned this manual. The Safety Supervisor, however, has been issued more than one (1) copy in most instances, for the express purpose of CONTROLLED rotation of the copies among other principal supervision of the site.

This manual has been edited toward TWO MAJOR OBJECTIVES. All parts beginning inside the front cover through section "C" are Managerial and Administrative guidance material only. The Sections from "D" through the remainder of the manual have been, for the most part, written and edited to permit direct reproduction in quantity as JOB PROCEDURES, as and when needed.

All supervisors on the organization chart of any site in the Division are expected to have reviewed this manual upon assuming a supervisory position and periodically thereafter. The manual will be revised and supplemented from time to time.

The Division management SERIOUSLY intends to improve ANNUALLY all previous accident records. Obviously, since the safety ground to be covered by all supervision at all times under such goals is so extraordinary - EVERYONE MUST know what to do, how to do it, and why it must be done.

NOTE: The issuance of this manual does not inhibit any site, at any time, from providing any procedure necessary or advisable if the subject is not covered in the manual as presently constituted. Such supplementation should be forwarded to the Division Safety Engineer's office for incorporation in the manual if it has application to problems which are division-wide.

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MANAGEMENT
LEADS AND SUPPORTS

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FOREWORD

The evolutionary growth of our times is making mandatory the progressive strengthening and broadening of many managerial and supervisory responsibilities.

The nature, scope and quality of du Pont Industrial Management has always been a model of such functions in American industry. However, and despite this fact, a close current examination of specific areas of possible further improvement and mutual benefit points toward Safety. Safety is an admissible contemporary consideration for the following reasons:

1. An expanding recognition of the moral responsibilities of all echelons of business management.
2. Civil standards and business competition with extended goals and objectives are requiring more perfectionism and effectiveness.
3. There exists a pyramiding economic liability risk.

Accordingly, you are requested to read and apply thoughtfully the contents of the Operational Manual—which has been compiled with consideration for the—

MORAL, ECONOMIC, AND PRACTICAL ASPECTS
OF SAFETY, IN A COMPETITIVE BUSINESS.

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INTRODUCTION

That "Time Marches On" is too obvious a fact for explanation. It may be less obvious to a few that with the passage of time, there have come innumerable benefits to humankind. Industrial enterprise has probably been the greatest beneficiary of improvement over the old. This is because of the "organized" nature of functions and objectives in business where many individuals are subjected to or caused to collaborate with many others to compound changes. These improvements, for the most part, have been referred to as industrial revolutions or periods of vast technological change.

The mounting gross product of civilized effort in material things has fortunately carried in its avalanche a number of beneficent changes favoring the comfort, value, and security of human individuals as such. This we call occupational safety.

THE SAFETY OF HUMANS IN OR OUT OF OCCUPATIONAL STATUS IS CONTINGENT ON TWO PRIMARY INFLUENCING FACTORS.
ONE FACTOR IS PHYSICAL, AND THE OTHER FACTOR INVOLVES THE INDIVIDUAL'S OWN STATE OF MIND.

BOTH FACTORS ARE AS EXTENSIVE AS THE WHOLE WORLD PHYSICALLY, AND AS INVOLVED AS ALL THE VARYING STATES OF MIND OF ALL HUMANS IN THEIR LIFE SPAN.

This manual has been compiled after a quarter century of integrating BOTH factors in every objective, every paragraph of every policy, procedure or regulation. For practical reasons, this manual slants and limits its information and guidance to the requirements of largely one industrial occupation—our occupation—Safe Operational Methods, for the Art of Massive Construction.

Humans are NOT expendable
... even by fractions

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**ENGINEERING DEPARTMENT
CONSTRUCTION DIVISION
OPERATION METHODS - SAFETY**

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**GRAPHIC
SAFETY ENGINEERING**
(Sequence of Functions Defined)

ADMINISTRATION

Safety Director - is expected to:

- | | |
|------------------------------------|---|
| Supt. or
Supvr. &
Assistants | <ol style="list-style-type: none"> 1. Have considerable initiative and productiveness. 2. Understand the chronology of his work in detail. 3. Make effective impressions on all contacts. 4. Be able to make good talks and speeches. 5. Teach and support his own men. 6. Have a progressive and insistent attitude. |
|------------------------------------|---|

Secretary - is expected to:

- | | |
|--------------------|---|
| or
Stenographer | <ol style="list-style-type: none"> 1. Be good at shorthand and typing. To set up work in unusual forms which is very frequently necessary due to the nature of safety work. 2. Keep current and informative files. 3. Be alert and interested in the work. 4. The quantity of output and keeping records up to date is important and necessary. |
|--------------------|---|

- | | |
|--------------|--|
| Statistician | <ol style="list-style-type: none"> 1. Should have the ability to know how to do much with figures on subjects which will effect the field performance, and to give Management interpretive and timely information based on facts and observed trends. |
|--------------|--|

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| Report
Writer | <ol style="list-style-type: none"> 1. Reports should be brief and prompt. 2. Language of reports should be truthful and not exaggerated or misleading. 3. Files of reports should be strictly up to date and complete. 4. Auxiliary files of cards, compensation payment records and restricted work records should be complete, adequately informative and strictly up to date. |
|------------------|--|

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|-----------------------|--|
| Chart Maker
Artist | <ol style="list-style-type: none"> 1. Charts, illustrations and educational materials shall be laid out, used, reproduced and circulated—with timeliness—in the highest possible quality and with the most effective and economic advantage possible. 2. Knowledge of methods of reproduction, advertising technique and ability to adapt appeals, posters, pictures, etc., most effectively to the safety subject is necessary. |
|-----------------------|--|

- | | |
|--|---|
| Plant, Shops
or Field
Inspectors | <ol style="list-style-type: none"> 1. Be of sufficient number, experience, age and of sufficient mental caliber for the job. 2. Be thorough, alert and of good personality for influence and for adaptability to field personalities and co-supervisors of other departments. 3. Give evidence of effective attention to the many details expected of them in their work in the field. |
|--|---|

- | | |
|---|--|
| Specialists-
Consultants
(Occasional)
& Temporary
Help) | <ol style="list-style-type: none"> 1. Help is to be expected from consultants resident on the project, as well as from those members of supervision with much technical knowledge, maturity and experience. |
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NOTE: On small operations the functions under the heading of Administration can be combined

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CONTROL

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| Records | 1. This reference has to do with the extent of subject matter on which information is kept and the condition of such records relative to up-to-dateness, thoroughness, neatness and quick and positive reference. It has to do with all classifications of injury reports, Workmen's Compensation Charts, statistics, reports, recommendations, communications, letters, correspondence and follow-up records. |
| Records-
Departmental | |
| Records-
Safety &
Medical | 1. This has to do with data recorded both by the Safety Department and Medical Department. Most of this comes through close liaison and joint attention to the same cases. These records have to do largely with lost-time accident cases, restricted work, minor injuries and special benefit plans. |
| Finance | 1. The most satisfactory accident prevention results are those which are adequate and yet costing the least. Therefore, expenditures for supplies, equipment, space and time shall always be held at absolute minimum, consistent with achieving satisfactory results. |
| Cost of
Safety
(Prevention) | |
| Cost of
Medical
(Cure) | 1. These costs are usually not available in detail; however, they are broken down into Workmen's Compensation and consultation cases. Cost of medical equipment, supplies and dispensary work for first aid, including salaries of attendants, is usually handled by the Medical Section. |
| Cost of
Insurance
(Bond) | 1. Knowledge shall be had of the nature of the kinds of insurance covering the project; that is, Workmen's Compensation, Public Liability - whether "self-insured" or "outside insured" or of any special arrangements.

In any and all cases, the economy of close scrutiny of claims paid, the economy of clerical handling and the timeliness and validity of all adjustments must be watched and followed very strictly. |
| Coordination | 1. In this item we look for the efficiency of the clerical personnel and their knowledge and understanding of their work. |
| Central
Safety
Office-
Clerical | 2. The practical effectiveness with which they are given their assignments by their supervisors is important.

3. The judgment used in the timely allocation of various types of non-field work should be evaluated. |
| Inter-
departmental | 1. The effort, frequency, effectiveness and judgment used in coordinating inter-departmentally such items as permits or are usable by two or more crafts or departments mutually is observed.

2. The cooperation between any two departments resulting from central safety's attempts at coordination as well as spontaneous cooperation else must be observed and evaluated. |
| Inter-craft
Shop or
Sections | 1. Requirements and observations here are based on the same considerations as the preceding paragraph. |

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Associated
Service
Depts.

1. The advisability of frequent and close collaborative attitude in matters of policy as well as the execution of details is highly important between the safety organization and the service departments, such as Medical Section, Patrol Section and the like.

Other Plants,
Projects or
Subsidiaries

1. Frequently, items of business, improved methods, new developments and other progressive activities are, or should be, exchanged between organizations for the mutual benefit.

METHODS

Enthusiasm
(Appreciation)
(Interest)

Investigation

1. The amount and quality of enthusiasm or "build-up" needed should be noted at the beginning of a project. Periodically, with adequately affecting revival methods, action should be taken in each instance as needed.

Incentives

1. Incentives are one of the principal means of creating enthusiasm. They should be carefully selected as to suitability, practicability, timeliness and effectiveness.

Stimulation

1. Stimulation to arouse lagging interest in safety is produced in many ways. To carefully review an organization to discover where, when, and what kind of stimuli are best suited is no small task. Speeches, talks, mass meetings, exhibitions, supervisory conferences, contests, social events, etc., are, for the most part, forms of stimulation to better safety appreciation, cooperation and participation.

Follow-up

1. Follow-up for safety compliance and safety consciousness should be considered the duty of all sectional heads and not solely the duty of the Safety Department as is too often the assumption.
2. Follow-up will be more effectively accomplished when the Safety Director has much zeal for efficiency, ability to make good interpretations of needs of the moment, and when he has sufficient experience and knowledge of this work, as well as the best possible knowledge and acquaintance of the personalities of individuals, especially departmental and group leaders.

Re-analyze

1. It must not be assumed that survey of needs, as originally analyzed, may not need reconsideration as time progresses. It is, therefore, expected that "re-analysis" of the whole scope of problems or any sectionalized part be executed at frequent intervals in the interest of changing needs.

Education

Verbal

1. Verbal education is looked upon not only as that information given working forces at formal mass meetings, foremen's meetings and weekly "gang" meetings, but

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Education Verbal	also that infusion which accumulates as education from all daily personal contacts on safety, the safety inspector's daily and hourly contacts as well as the required and frequent S.T.A. by the gang foreman, S.T.A. (safety instruction with every task assignment), orientation, use of public address system, staff meetings, etc., also go to make up verbal safety education when planned topics are presented clearly.
Written	1. Educational media in written form has its principal outlet in painted signs, paper signs, colored pasters, weekly project safety foremen's forecasts, and indirectly in many of the other printed, typed or duplicated material. The quality, attractiveness, timeliness and thorough distribution of this material are the conditions which determine its effectiveness.
Visual	1. Motion pictures, painted signs, hazards marked by colored cloth, paint, striped boards, handrails, buffers, gates, barricades, slogans, and the like are items contributing to visual education and are adjudged adequate according to the same general conditions as those we look for in written educational media: that is, quality, attractiveness, timeliness, distribution or proper placement and sufficiency in numbers or quantity. Many other conditions and many other items contribute to visual education in an indirect manner. Some of these are the wholesale use of safety shoes, hard hats, goggles, the "Blue Book," and certain behaviorism controls.
Engineering Personal Protective Equipment (Technical Considerations)	1. The major considerations involved in the subject of personal protective equipment have to do with kinds of equipment to procure, quantity of each kind, cost of each kind, speed of procurement of any kind, and the last, but not least consideration, the breakdown into sizes, capacities, limitations of service, manufacturer's integrity and dependability. 2. The control of equipment throughout its life of usage on the plant or project for inventory, repair, and prevention of theft or loss is extremely important to set up at the start.
Jigs, Fixtures, Guards, Equipment Drawings, Plans and Designs	1. The mechanical guarding of tools, equipment and machines compared to the more intangible aspects of safety work are expected to be cared for with little or no insistence from any quarter. 2. Concerning drawings, plans and designs, the Safety Department is expected to ferret out by field inspection unusual types of construction and question where doubt exists as to adequacy for safety. Review of drawings and plans prior to field work should be insisted on by the Safety Department on all unusual work. 3. The Safety Department is expected to originate drawings and designs of jigs, fixtures, guards, and incidental apparatus in the furtherance of safety needs of the plant or project.

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Inspection
Tasks
Job Analysis

1. A broad analysis of each project or job should be made to determine the nature of the work and the scope of the work contemplated.
2. Such an analysis is then expected to divulge safety equipment needs, organizational needs, geographical subdivisions for control, and peculiarities existing in any part or in any group.
3. Daily or hourly inspection of areas, shops, crafts or other centers of activities will divulge needs occasioned by changing conditions as well as to inform on the extent of personal participation of foremen, supervisors, and superintendents.
4. Frequently, highway and traffic safety come into consideration by analysis - also the need for safety, sanitation and fire control in plant villages, camps, trailer camps and barracks.

APPLICATION

Timeliness

1. To take needed action in any situation is the expected course of events, but unless the required action is taken in time, the effect of the action may be void or only partially helpful to the problem.
2. The Safety Director has as his problem the frequent need for considering by anticipation the timeliness of large and small actions, campaigns, incentives, programs, inspections, etc., with respect to the whole plant, certain specific or all areas, certain departments or crafts. Some considerations involving the decision of "when is the right time" may encompass the year, the month, the week, the day, the night or the next hour. The best preventative of accidents is timely anticipation of reminders concerning guards, procedures, programs, incentives, inspections and other fundamental safety functions.

Scope

1. The same thinking and the same considerations given under "timeliness" of actions can, and should, be given under the "sufficient scope" for actions. Scope, penetration, and inculcation are to be desired about various subjects at various times in terms of the whole plant or project, or for one or several areas, or for one or several departments, or for one or several special groups.
2. The consideration of scope in terms of plant geography is important in itself.
3. Scope as a word is applicable in safety preparation and follow-up. It should be thought of in terms of education penetration, inspection coverage, extent of presentation for education on any particular subject or procedure or scope of responsibility for any individual group head or plant head.

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| Section-
alization | <ol style="list-style-type: none"> 1. The extent, nature, timeliness and scope of safety activity are better and more successfully accomplished when plans include sectionalizing (on a job analysis basis) for: <ol style="list-style-type: none"> (a) Type of work (b) Materials (c) Manual work (d) Non-manual work (e) Unusual or special conditions |
| Participation | <ol style="list-style-type: none"> 1. Unless active "personally executed duties" are performed by each level of management starting from the top, there will be little or no success with the safety program. There must be frequent enough participation by: The President, Manager, intermediate management group supervisors or foremen, workmen or workwomen themselves. 2. The nature of the participation varies with the position of each participant. |
| Compliance | <ol style="list-style-type: none"> 1. The will and interest to do that which is proper, that which is agreed upon and that which we are instructed to do reasonably, defines "compliance". Compliance refers to the following in safety work: <ol style="list-style-type: none"> (a) To duly accepted and approved policies (b) To safety regulations—local or institutional (c) To safety rules of the Company, plant or department (d) To procedures or laws of City, County, State or Federal Laws |

FACILITIES

- | | |
|---------------------------------|--|
| Safety Office | <ol style="list-style-type: none"> 1. Should be located with or near the offices of other management personnel. 2. Should have an interior arrangement suitable and equipment adequate for the prosecution of safety work: <ol style="list-style-type: none"> (a) Stenographic or duplicating space for educational paper work and communications (b) Should contain equipment for minor chart and drawing work |
| New Employee's Orientation Room | <ol style="list-style-type: none"> 1. A typical, quietly located conference room or lecture room equipped for blackboard talks; seats, table and projection equipment is recommended. 2. Seating, ventilation, heat, light and smoking facilities all lend their benefit to the successful orientation. |
| Foremen's Meeting Hall | <ol style="list-style-type: none"> 1. Those appointments described for a good orientation room apply equally for the weekly meeting place for foremen. The size of the operation controlling the number of foremen will dictate whether the orientation room can be used for foremen's weekly safety meetings or whether a larger space will be needed. |

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Tool room or
Storeroom

1. Adequate, clean and convenient space should be provided in the tool room or storeroom for the completely segregated and organized storage of safety implements and supplies.
2. The service of quick disbursement on demand, frequent inventory, cleaning, sterilizing and repairing is made more practical by having a separate storage space for safety equipment.

Patrol
Department

1. This organization is naturally related to safety and should cooperate on a high frequency of daily contacts with the safety department. Safety men or safety conditions as met in the sphere or influence of the patrol section is desirable and useful toward the plant's overall safety production objectives.
2. Educate every patrolman to act as a duly authorized safety inspector and on-the-spot "safety fixer".

Medical
Services,
Controls,
Records &
Liaison

1. The relations between the plant safety engineer and the Medical section must at all times be pleasant, frequent, and one in which respect for the other's work, authority, objectives and purposes must at all times be mutual.
2. Early and specific understanding shall be had as to what minimum forms, reports and information are wanted from the other and at what time. Then both departments should abide closely by the procedure agreed upon.
3. Whether a small medical unit or a large medical personnel is necessary will be determined by these best equipped by experience to decide the matter. However, the Safety Director should be in a position to assist in formulating requirements; if not, he is most certainly in a position to help the smooth operation of whatever organization and procedures are set up.

Legal Dept.
Liaison-
Contested
claims,
Insurance
Contracts,
Licenses

1. The adequately accredited Safety Director, or supervisor will do well to equip himself to discuss with the Legal Department any and all details relating to the subjects in the marginal title to this paragraph.

County,
State and
Federal
Considerations

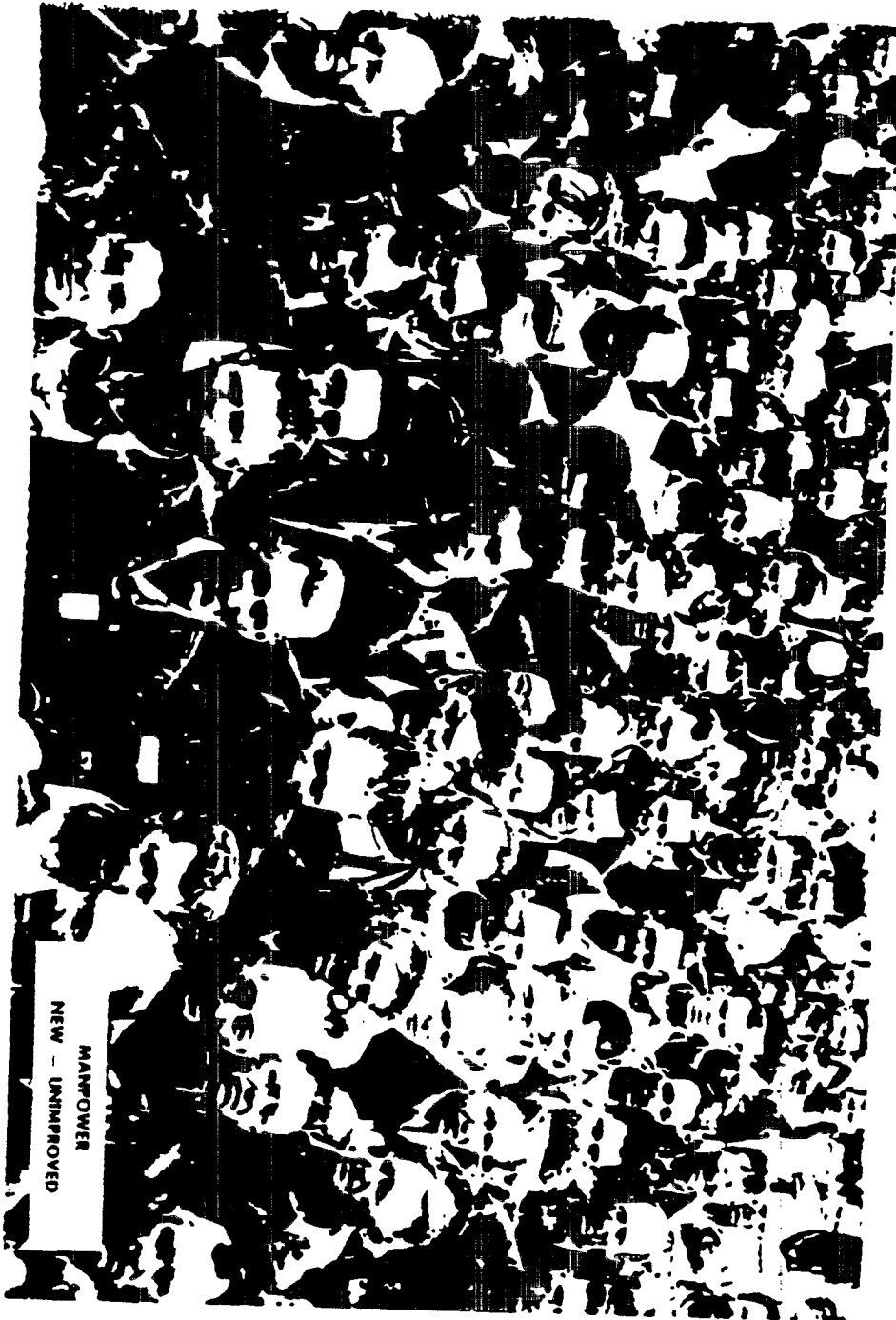
1. A series of meetings with plant doctor, legal advisor, insurance claim adjuster, state compensation board representative and a careful review of the state compensation and Federal Labor Laws will do much toward anticipating, and therefore avoiding, costly and embarrassing future possibilities growing out of industrial accidents.

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ENGINEERING DEPT. - CONSTRUCTION DIV. SAFETY TECHNIQUES

DAILY	WEEKLY	MONTHLY	ANNUALITY
- Referral & Screening - Gun Orientation - Craft Orientation - Safety Inspections - Written Plans - SIA (R - SIA) - P.P.E. - Mass Carriage - Tools - Hand - Misc. - Inj. - Log - Permit to Fire, Shut Down, etc. - Blue Book Compl. - Procedure Compl. - Order & Arrangements - Fire Prevention - Personal protective equipment	- Safety Objective - Tool Box Meetings - Physical Insp. V.P.B. - Foreman - Meeting - Shop Meeting - Visual Aids	M. E. Inspection - Office Safety - Inspection Prog. 6 - 16 Weeks - Safety Steering - Project Meetings	- Div. Program - Q Mass Meetings
GENERAL			
	- Competition - Control - Equipment - Procurement - Control	- Medical, Surgical & Orientation Control - Annual Divisional & Co. Incentives Control - Administration - Application - Methods - Facilities	- Standards Methods, & Suggestions - Participation - Records System - Publicity & Industrial Relations - Participation



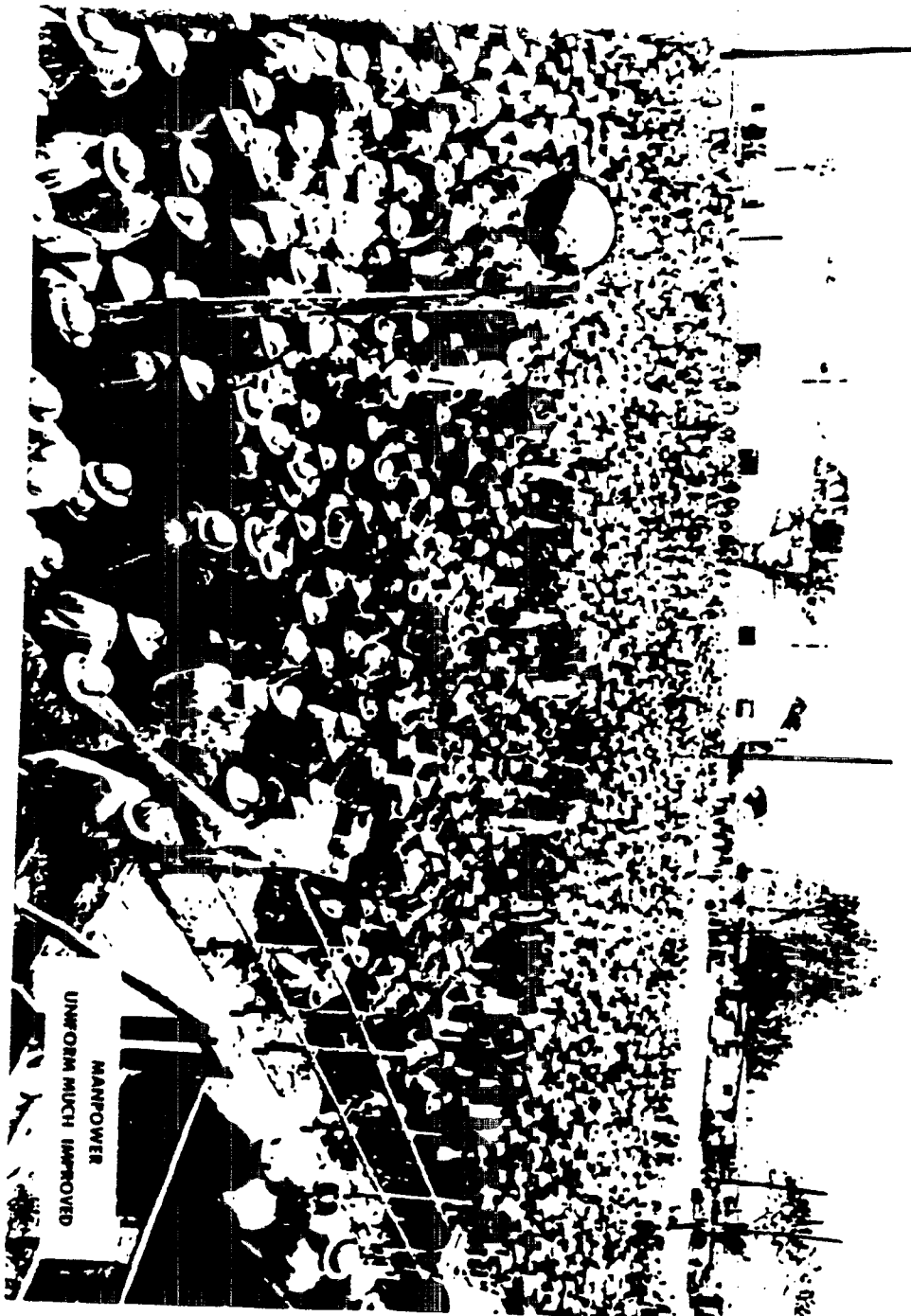
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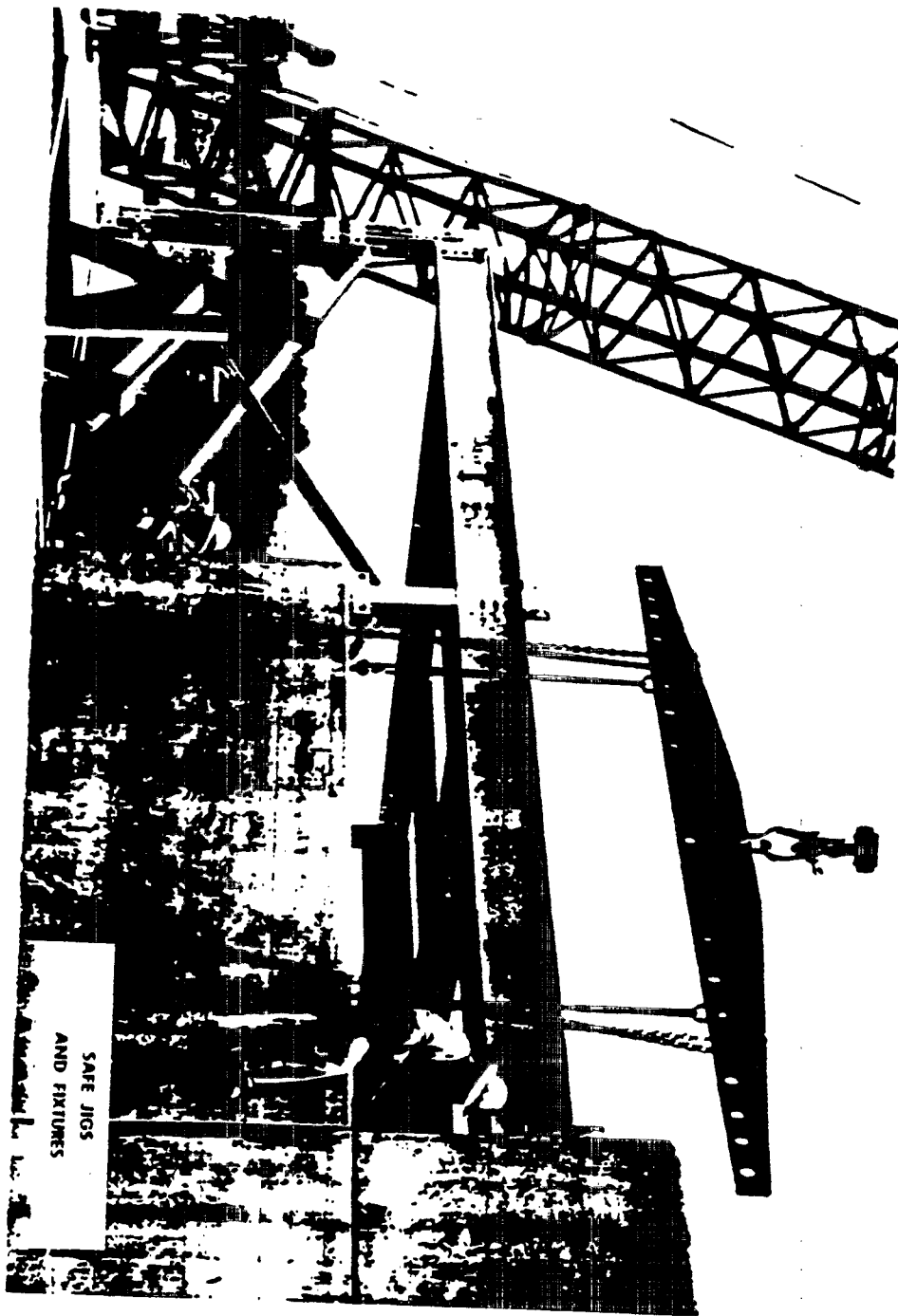
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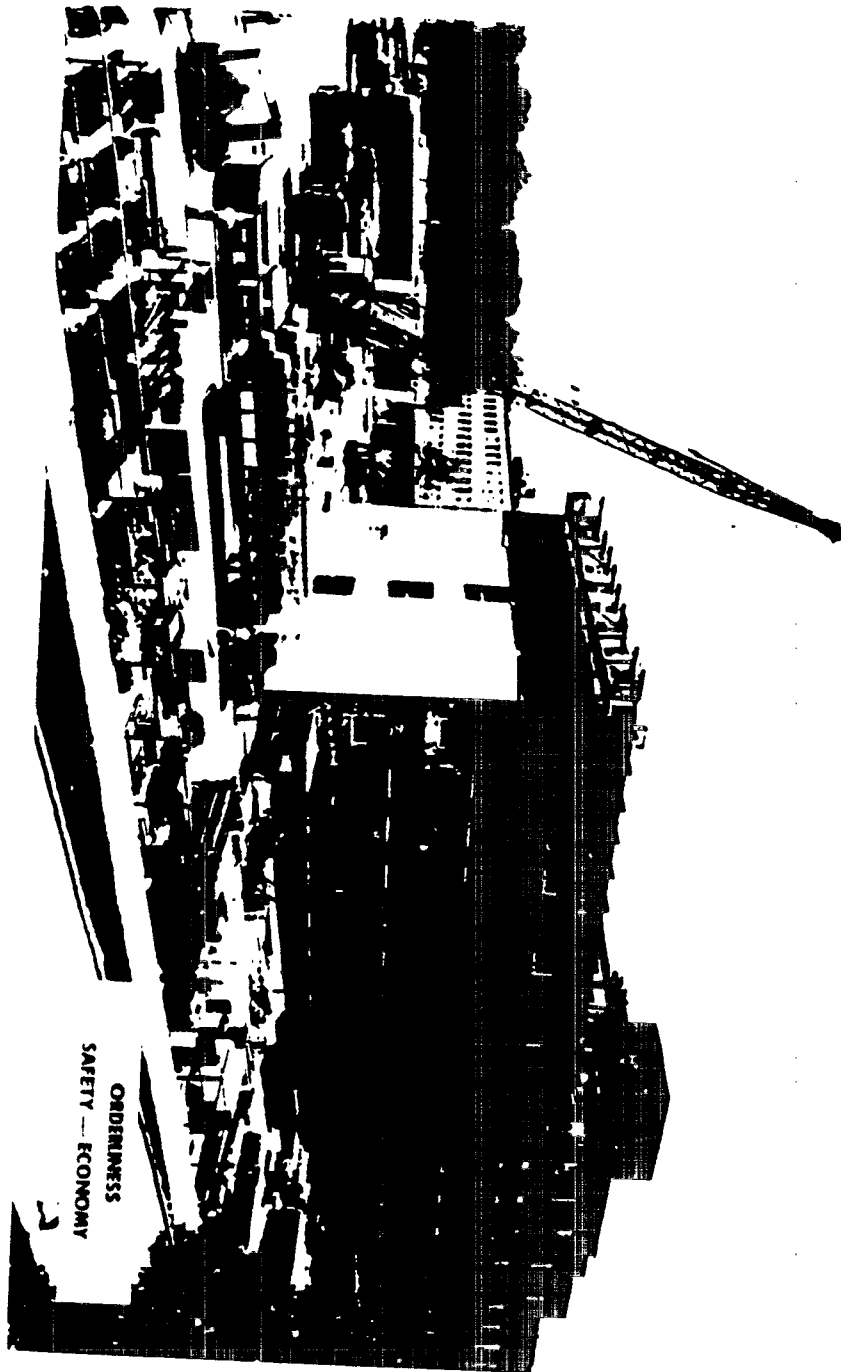
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SAFETY AND FIRE PROTECTION DIRECTION AND MANAGEMENT

A. THE SAFETY AND FIRE PROTECTION SUPERVISOR

The person assigned the responsibilities of direction and management of safety and fire protection on a construction site should be a college graduate possessing such personal characteristics as aggressiveness, foresight, leadership, and the ability to speak well and convincingly.

Safety is primarily a management function; therefore, the Safety Supervisor should be responsible to the highest local management authority. This is necessary to achieve prompt understanding and compliance to details evolving from policies authorized by management, especially on the part of other department heads and intermediate management groups.

Since the majority of safety activity is in the field, the Safety Supervisor should seek action on field matters directly through the Field Superintendent, or equivalent, on a daily basis.

B. DEPARTMENTAL ORGANIZATION

1. *Personnel* — By rule of thumb, when a job exceeds 500 people the addition of a Safety Inspector should be considered. Other help to service fire extinguishers, place posters, etc. may be provided from appropriate craft personnel.
2. *Leadership* — The type of leadership required of Safety Department personnel is considered to be divided into three headings —
 - (a) *Management* — The Safety Supervisor must inspire confidence if he is to gain the assistance of management in obtaining approval for suggestions and recommendations; he must be prompt with the correct answers in staff and group meetings; and be able to communicate with all echelons. He must anticipate all needs for equipment, material, and procedures.

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- (b) *Departmental* - The Safety Department must be organized in such a manner that all duties, field and office, are carried out accurately and on time. The Safety Supervisor must be satisfied that he is teaching, assisting, or motivating all personnel with whom he comes into contact.
 - (c) *Field* - The Safety Supervisor, as well as any other member of the Safety Department, will receive cooperation from the field personnel to the same extent that respect is gained through tactful and convincing discussions. He must consider the needs, desires and feelings of ALL personnel and assure that his approach will evolve the greatest response.
3. *Equipment* - The Safety Supervisor will initiate the procurement of all personal protective equipment for the project in accordance with established policies.
- Coordination between the Safety Office and the author of the requisitions is necessary to avoid duplications, improper type, or inadequate quantity of safety equipment.
- All equipment must be requisitioned far enough in advance to allow delivery prior to actual need.
- Physical facilities should include office space and an orientation room commensurate with the size and duration of the job.
- Safety costs are to be kept at a realistic minimum without sacrificing the effectiveness of the over-all program.

C. RESPONSIBILITIES

The Safety Supervisor is responsible for interpretation of project safety policies; development and execution of an accident prevention system, adapted to the individual project; and for the development of safety-consciousness in the individual employee.

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1. *Safety Education* – Promote accident prevention by teaching safety through meetings, demonstrations, and publicity – using visual, oral, and written aids.
2. *Participation* – Organize functional groups required for optimum project safety performance.
3. *Equipment and Tools* – Participate in the selection of equipment and tools, with attention to quality and intended use. Observe the use and maintenance of equipment and tools, and take action necessary to correct unsafe practices.
4. *Inspection System* – Establish regular inspection of tools and equipment by qualified personnel and require adequate records. These should be supplemented by frequent personal inspection and with daily inspection by the person using the tool.
5. *Fire Protection* – Provide adequate fire fighting equipment and train personnel in its use. Arrange regular inspections and periodic drills.
6. *Orderliness* – Stress removal of scrap, trash, and unused material from work areas. Insist upon safe, orderly storage of material and equipment throughout the project on a daily basis.
7. *Contractor's Safety* – Coordinate DuPont and contractor's accident prevention programs, as stipulated by contractual agreement.
8. *Special Problems and Studies* – Review unusual and/or special procedures, dealing with legal, medical or related compensation problems, with the Division Safety Engineer, Construction Division, Wilmington.
9. *Workmen's Compensation* –
 - (a) *Personal Injuries* – Become familiar with all Du Pont Company, Insurance Company, and State requirements in connection with Workmen's Compensation. Conduct thorough investigations of all injuries and accidents and prepare accurate and detailed reports, as required by "Safety Bulletin No. 422".

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(b) *Contested Cases* — All communications, notices, petitions for compensation, etc., should be forwarded to the Construction Division Safety Office for further processing.

10. *Follow-up* — One of the most important phases of safety is "follow-up". It cannot be assumed that a procedure will automatically be followed merely because it has been authorized and publicized. Check frequently into every phase of the work to determine how effectively the safety function is being fulfilled.

11. *Interest* — Interest is maintained by using signs, posters, contests, and mass meetings. To develop specific interest at the proper time requires originality, imagination, and planning.

Conducting the Safety program is essentially a "TEACHING JOB". What to say, how to say it, when to say it, and to whom to say it is a decision best made by the individual and often has more to do with getting results than any other technique.

Be sure to anticipate that some employees may have "steam to blow off" from time to time. Provide a relief valve.

D. WORK RAMIFICATION

Following are a few important phases of accident prevention work which call for the planning, management, and initiative of the Safety Supervisor.

1. Safety rules and procedures for all field tasks
2. Safety rules and procedures for all office workers
3. Safety guidelines for "off the job"
4. Highway safety on project roads and parking lots
5. Safety from the Sanitary Engineer's viewpoint on the over-all project

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6. Insurance requirements and potential legal liability
7. Co-occupancy of construction workers in the Operating areas or buildings during start-up, shutdown, or D&R
8. Safety program and activities outside our own company

E. REPORTING

1. The Safety Supervisor of any project should report directly to the Project Management.
2. The Division Safety Office is accountable to Wilmington Management – that office being used for consultation, advice, records, and the coordination of Division Safety activity.

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SAFETY RECORDS AND REPORTS

A. RECORDS

A complete record of all medical and first aid treatment will be maintained at each Construction site in the manner and on the forms described below. Copies of all correspondence, state, or federal reports will be included in the file.

B. REPORTS

1. General

All reports for other than minor injury will be forwarded to the Division Safety Office for review prior to submission to the Safety and Fire Protection Division. A letter of transmittal to the latter should accompany the reports.

2. Forms Required

- (a) Du Pont employee injuries will be reported on the appropriate injury report forms outlined in Bulletin 422, i.e. G-111 for Sub-Major, G-105 for Tab, Non-Tab, and FAO major injury. They will bear "PI" numbers in chronological order by date of occurrence (or allegation in case of Non-Tab) for majors and "S" numbers for Sub-Majors.
- (b) CPPC contractor employee injuries will be reported by copy of the First Report of Injury forms that are submitted to their insurance carrier. "PL" numbers will be assigned chronologically regardless of injury classification. (Classification is not shown on S&F copies.)
- (c) Non-Du Pont employee injuries other than CPPC contractor employees will be reported on form G-245-PL. PL numbers will be assigned chronologically in the same series used for CPPC contractor injuries.
- (d) Samples of Company, State, and Federal forms may be found in Section N.

3. State Reports

State laws vary in reporting requirements; however, a "First Report of Injury" is generally required within 7-14 days if lost time is involved. Each site should ascertain reporting requirements and obtain the necessary forms.

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4. Federal Reports

- (a) Fatality of one (1) or more or hospitalization of five (5) or more employees requires notification to the nearest office of the Area Director of OSHA within 48 hours.
- (b) Injuries falling in categories listed below will be logged on a separate OSHA form 100 for Du Pont and individual contractors. It is not necessary to start a new sheet each month. If no injuries are experienced during a month, the word "None" is entered on the next line.
 - (1) Fatality
 - (2) Lost time cases
 - (3) Restricted or reassigned work cases
 - (4) Cases requiring medical treatment beyond First Aid
 - (5) Loss of consciousness
 - (6) Diagnosed occupational illness or disease
- (c) Supplementary records shall be kept containing information on OSHA form 101. State or Company reports containing similar information are acceptable (Table in Section N shows alterations required on State forms.)
- (d) Annual summaries of injuries must be prepared on OSHA 102 and posted in a conspicuous place within one (1) month of year-end.

5. Safety & Fire Data Log

This report gives basic statistical information, and one copy is to be submitted to the Construction Division Safety Office by the 5th of each month. Forms are available from the Division Safety Office. The formula for calculating total exposure hours for "off-the-job" statistics (line 15b) is:

Number of employees x 312 hours

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DISTRIBUTION OF SAFETY REPORTS *			
Form No. or Type	No. of Copies of Each (Total)	To Whom Addressed (By Point)	When Due
G-113 Minor Injuries	1	File locally (keep "Daily Log" sheet for Medical)	Daily as they occur
G-111 Sub-Major Injuries	3	1 - S&F Div. 1 - Div. Saf. Off. 1 - Local File	Made only as soon as factual medical diagnosis is known and all investigative facts are known.
G-105 Major Injury Report	4	2 - S&F Div. 1 - Div. Saf. Off. 1 - Local File	Within 1 week
G-106 Physician's Report	3	1 - S&F Div. 1 - Div. Saf. Off. 1 - Local File	Within 1 week
G-107 Medical Progress	3	1 - S&F Div. 1 - Div. Saf. Off. 1 - Local File	End of each month
G-108 Final Major Report	4	2 - S&F Div. 1 - Div. Saf. Off. 1 - Local File	At case conclusion
G-636 Medical Evaluation of Sub-Major	3	1 - S&F Div. 1 - Div. Saf. Off. 1 - Local File	Tri-monthly and/or case conclusion
G-245-PL Public Liability	4	2 - S&F Div. 1 - Div. Saf. Off. 1 - Local File	Within 1 week
G-110 ** Monthly Safety Record Summary	2	1 - S&F Div. 1 - Local File	5th of each month
Safety & Fire Data Log	2	1 - Div. Saf. Off. 1 - Local File	5th of each month
Employer's First Report of Injury	7	2 - Insurer 2 - S&F Div. 1 - Div. Saf. Off. 1 - Cont. Home Off. 1 - Local File	Within 1 week

*See Section N for Sample Report Forms

**Chambers, Savannah River, and Wilmington Shops only.

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SAFETY RESPONSIBILITIES OF THE DU PONT ENGINEER

The application of the Engineering concept to Safety has made DuPont a leader in accident prevention in the Construction Industry. From this we derive obvious economic benefits through the conservation of human resources and the elimination of property damage. With no yardstick for comparison, physical conservation is often overlooked as a part of successful Safety Engineering. When analyzed, however, one cannot dismiss the extreme importance and immeasurable consequences of physical damage that accompany imprudent planning, inadequate fire prevention, or insufficient knowledge of inherent process hazards — three principal safety responsibilities of the DuPont Engineer.

Specifically, an Engineer must observe and question every phase of his planned work to a degree of personal concern. He must anticipate that his communications, written or verbal, are often misunderstood and, thus, constantly follow up to ensure compliance therewith. He must —

1. Exhibit a strong "proprietary interest".
2. Prepare a *Master Safety Plan* for all new work that will include:
 - a. Scope of work
 - b. Permit restrictions
 - c. Evacuation procedure
 - d. Process hazards
 - e. Smoking restrictions
 - f. Fire prevention and protection
 - g. Shutdown Permit instructions
 - h. Emergency telephone numbers
 - i. Work Area arrangement
 - j. Access
 - k. Trash and other receptacles
 - l. Ladder and barricade racks
 - m. Stretchers
 - n. Drinking water
 - o. Toilet facilities
 - p. Signs

and other pertinent safety data. In order to effect this requirement, the Plant Process, with its inherent hazards, must be studied and understood.

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3. Provide *Job Plans* with detailed instructions to reflect the physical hazards of:
 - a. Major equipment
 - b. Rigging
 - c. Material handling
 - d. Stability
 - e. Access to work/storage areas
 - f. Overhead work/barricades
 - g. Plant co-occupancy exposuresSpecific weight must be shown for all equipment lifts.
4. *Inspect* each new job immediately after start of work to ensure adherence to instructions listed in job plan. A Job Plan compliance inspection should be made daily thereafter.
5. Conduct *pre-job planning* meetings with respective Contractor's Supervision for work involving shutdown and/or critical rigging.
6. Author all *permits* and maintain a record of same. When work is of a delicate nature, personally review and discuss methods with affected Operating Department supervision.
7. Review necessary restrictions and safety/fire requirements with *contractor* (L.S.) supervisor. *Inspect* daily to ensure compliance therewith. Prior to start of work by contractor (L.S.), have all equipment inspected to meet acceptable standards.
8. Conduct periodic *safety meetings* with personnel in his area of responsibility.
9. Develop programs for *publicity* and/or incentives within his area of responsibility.
10. Consider Safety an integral part of all manpower *scheduling*.
11. Request or conduct *Safety inspections* in his area as he feels necessary, in addition to those conducted weekly projectwide.

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SAFETY RESPONSIBILITIES OF THE CONTRACTOR'S SUPERINTENDENT

The Contractor's Superintendent is responsible for the over-all training, control and conduct of all personnel under his supervision. Specifically, the Contractor Superintendent's safety responsibilities include:

1. *Personal Protective Equipment* - Assure that protective equipment of a type recommended for his craft is available and used by all personnel when required.
2. *Orderliness* - Insist on a high level of orderliness in all work areas at all times.
3. *Man Placement* - Know all personnel and assign to jobs for which they are physically and emotionally qualified.
4. *Compliance* - Tour all areas regularly and make corrections as necessary.
5. *Training* - Conduct regular meetings with his general foremen and foremen to assure that they understand and implement all facets of the Safety Program, such as: STA, man placement, orderliness, stability, etc.
6. *Orientation* - Meet with all new employees to explain the basic safety rules that apply within their craft, and *make it clear that he insists on safety performance.*
7. *Injuries and Incidents* - Participate in and/or conduct a thorough investigation of all injuries and serious incidents that occur within his craft.
8. *Participation* - Encourage a high degree of safety morale and participation by his employees.
9. *Policies and Procedures* - Review applicable procedures when issued and periodically thereafter as a reminder.
10. *Tools and Equipment* - Assure that tools and equipment meet all safety requirements and are used in a safe manner.

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**PLANNING SAFETY REQUIREMENTS
FOR A CONSTRUCTION JOB**

A. Safety Supervisor discuss the following with Site Management:

1. Location

Determine -

- (a) The type, background, quantity, and nature of job supervisory personnel
- (b) The anticipated equipment and materials to be used
- (c) The type of labor to be trained and the proposed method to guide their activity

2. Nature of Construction

Determine -

- (a) The kinds of hazards which are anticipated
- (b) The type of protective equipment which must be purchased
- (c) The method of preparing and distributing safety procedures

3. Size and Kinds of Crafts Involved

Determine -

- (a) Craft Safety rules
- (b) Area Safety rules
- (c) Equipment inspection routines and forms
- (d) Traffic controls, signs, and correctives
- (e) Safety meeting materials

4. Types of Construction Equipment to be Used

Determine -

- (a) Pressure vessel inspection obligations
- (b) Operating safety rules for cranes, bulldozers, pile drivers, etc.

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- (c) Motor vehicle equipment, inspection, repair, and control (including drivers)
- (d) Extraordinary or unusual equipment or special applications of standard equipment

5. Insurance Liaison — Medical and Legal

- (a) Establish a meeting between the Safety Supervisor (Du Pont Coordinator), insurance representatives, and contractor representatives early in the job to outline our philosophy and discuss claims disposition procedures outlined in D-13.

8. Write requisitions for personal protective equipment in accordance with above conditions early enough for delivery prior to the start of employment.

To aid in the preparation of your first order, the following check list of safety equipment should be considered. Quantities should be based on job size and duration. See Section M for specifications and supply source.

- 1. Safety Shoes
- 2. O-D Gloves
- 3. Hard Hats
- 4. Sideshield Spectacles
- 5. Hearing Protection — Plugs and Muffs
- 6. Cover-all Goggles
- 7. Construction Safety Handbooks
- 8. Office Safety Manuals
- 9. Contractors' Safety Manuals
- 10. "What to Say About Abstracts at a Safety Meeting" Books
- 11. "Daily Safety How Functions and Techniques" Books
- 12. "Some Day" File Forms
- 13. Construction Division Safety Flags
- 14. Kickback Aprons
- 15. Dust Respirators and replacement filters
- 16. Paint spray respirators and replacement filters
- 17. Red Cloth for Hazard Marking
- 18. Electric Lineman's Gloves, 13,000 volt minimum with leather protectors and canvas carrying bags

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19. Rubber Blankets — Dielectric
20. Rubber Coated Gloves, long gauntlet
21. Rubber Boots
22. Safety Foot Guards
23. Barricade Posts, Stands, and Tape
24. Burning Goggles — Density No. 5 and 8
25. Welders' Hoods — Density 10 and 12
26. Knee Pads
27. Danger Tags
28. Safety Belts
29. Safety Signs
30. Stretchers and Blankets
31. Goggle Cleaning Stations
32. Full Face Shields
33. Clean Rag Cans
34. Oily Rag Cans
35. Flammable Liquids Cans
36. Report Forms
37. State Workmen's Compensation Reports
38. Ladder Shoes for all ladders except stepladders
39. W.M.E. Inspection Cards and Plastic Holders
40. Inspection Tape
41. Defective Tags
42. Stickers to Identify Containers (Trash, Scrap Metal, etc.)

The above Safety Equipment-First Order List is not all-inclusive to meet the requirements of forecasted project exposure. Various other items of safety equipment may not be needed at inception of work; however, consideration should be given securing of such equipment as work progresses.

1. Acid Protection
2. Safety Bulletin Boards
3. Calcium Chloride
4. Carbon Monoxide Indicator
5. Railroad Derailers

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6. Explosimeter
7. Exhaust Systems or Blowers
8. Fuse Pullers
9. Dust Sampling Equipment
10. Life Jackets
11. Perks Washers
12. Respiratory Equipment
13. Sandblast Helmets
14. Skin Cream
15. Sweat Bands
16. Switch Box - Lockout Devices
17. Tool Holders (Impact Tools)
18. Trash Barrels
19. Welding Curtains
20. Welding Shields
21. Welding Spark Collectors
22. Publications
 - (a) National Safety Council Safety News
 - (b) Occupational Hazards
23. Reference Manuals
 - (a) Construction Division Safety Manual
 - (b) Accident Facts
 - (c) Chemical Safety Data Sheets -
Manufacturing Chemists' Association
 - (d) Dangerous Properties of Industrial Chemicals - Sax
 - (e) Handbook of Fire Prevention -
National Fire Prevention Association

- C. Requisitions must also be prepared for fire protection equipment to meet existing conditions. Coordinate with Operating Dept. for transfer to them at close of job.
1. First aid fire extinguisher A, B, and C class exposure
 2. TC fire protection - hose reels, hydrants, large-wheeled units, etc.
 3. Alarm system, exit lights, etc.

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- D. Analyze Job — by areas and type of construction
 - 1. Overhead work
 - 2. Underground work
 - 3. Special or unusually hazardous materials handling, like steel erection, stack construction, deep excavation.
 - 4. Service Facilities and Equipment — availability thereof
 - 5. Unusual personnel occupancy — access and egress
This analysis should be made only after thorough physical inspection. From this we develop appropriate procedures.
- E. Prepare written and visual educational papers, posters, signs, procedures, pamphlets, letters, and reference material. All of the above should —
 - 1. Fit the scope of operations
 - 2. Be timed for full effect
 - 3. Be applicable to, and written for, specific groups, where possible.
- F. Conduct daily physical inspections to evaluate the adequacy of all aspects of the safety program. This daily inspection is to examine compliance as well as to further educate.
- G. All of the preceding must be re-evaluated periodically and adjusted to meet changing conditions.
Allocate time between office and field so that it yields the best results.

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MEDICAL SERVICE

This is the procedure for providing medical services to Du Pont and CPPC contractor jobs. It applies to all site situations, whether a Plant doctor or contractor doctor is used. Selecting appropriate medical assistance and establishing rapport is extremely important. Control and disposition of injury cases must be consistent on self-insured and insurance company risks.

A. MEDICAL FACILITIES

All sites will arrange for medical service immediately upon arrival. This may consist of trained* attendants, a Construction medical facility, or Plant facilities depending on the size and duration of the job. In any event first aid supplies must be approved by the consulting physician.

B. SERVICES REQUIRED

1. Physical examinations for Du Pont personnel
2. Minor injury treatment
3. Serious injury handling to assure
 - (a) Prompt treatment where obvious trauma exists
 - (b) Proper control or refusal of treatment (where complaints are subjective, questionable in origin, or late-reported)

C. MEDICAL ATTENDANT

1. Employer — One CPPC contractor will be requested to employ a medical attendant and render service to all others. The need for Agreements of Indemnification should be determined by the contractor providing the service through contact with his insurance carrier.
2. Duties
 - (a) Treat minor injuries in accordance with accepted medical practice.
 - (b) Refer severe injuries to a doctor.
 - (c) Record all injuries treated.
 - (d) Set appointment for retreatment.
 - (e) Record discharge from further treatment.
 - (f) Maintain OSHA reports.

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* Bureau of Mines, American Red Cross, or equivalent training

D. WORKING RELATIONSHIPS

Proper communication regarding both classification and cost of an injury requires an early meeting of the Du Pont coordinator, contractor representatives, and insurance company representatives to select doctors and to discuss claims philosophy. Key points:

1. A "specific diagnosis" on the first visit whenever possible
2. All serious cases will be followed by the Du Pont coordinator through the contractor or insurance representatives.
3. Treatment should not be rendered solely for subjective complaints, however, no doctor is expected to jeopardize the welfare of an injured employee.
4. An independent doctor may be retained to examine cases of prior real injury when disability is implied by the employee at the time of his termination.
5. Permission for the injured to return on "guided work" may be granted on circumstances, such as - duration of treatment, cause of injury, size of project and craft.

E. REFERRAL SYSTEM

1. Authorization - If severity warrants, injured will be referred for medical treatment by a mutually agreed upon doctor.
 - (a) Injured will be given an "Order for Medical Treatment" form (72-CD1) with required information completed. An envelope addressed to the Du Pont Coordinator by name will be enclosed.
 - (b) Doctor (or nurse) will give sealed envelope containing completed form to the injured for return to Du Pont Coordinator.
 - (c) Du Pont Coordinator will make distribution of various copies as required and request injured's supervisor to complete fourth copy (Details of Incident) for file.

F. OTHER CONTRACTORS

Routine medical service will not be provided to Lump Sum contractor personnel. Extreme emergency cases will be handled on a first aid basis and the injured cared for until attended by the contractor's doctor.

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REPORTING OF INJURIES

- A. All severe injuries (sub-major potential or worse) are to be reported to the Division Safety Office and/or Construction Manager as soon as sufficient information is available to make a meaningful preliminary report. This does not require the results of a complete investigation but does require minimum information as to injured's name, age, employer, craft, incident, preliminary diagnosis, and current status of injured.

There are no exceptions to this regardless of employer or time of occurrence. This early notification affords the Division Safety Office the opportunity to assist in selecting possible avenues to be explored during subsequent investigations and their potential effect on classification and/or costs.

- B. It is a contractual obligation that Du Pont is advised of all injuries sustained by contractor personnel. Failure to enforce this severely hampers the defense of potential 3rd party suits through lack of prompt investigation. (Refer C-13 "Contractor Claims Disposition")

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LEGAL SERVICES

Local attorneys will generally be retained to assist Construction sites with legal problems.

- A. Requests for legal assistance may concern either Workmen's Compensation or Third Party Liability.
 - 1. Requests for Workmen's Compensation assistance shall be made to -
Legal Department
Chief Counsel - Labor Law Division
 - 2. Requests for assistance and/or notification of Third Party exposure should be made to -
Legal Department
Senior Attorney for Engineering Department
General Legal Division

In both cases, copies should be sent to Division Safety Office.

- B. Coordination - The Division Safety Office will coordinate final disposition of any claims under Workmen's Compensation and Third Party Liability and must be contacted PRIOR to any decisions regarding settlement.

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"SOME DAY" FILE

The "Some Day" form was prepared with the assistance of the Legal Department to make certain information available for the defense against alleged or exaggerated claims. These forms are designed to contain accumulative data in any case where there is an allegation of injury not supported by evidence and must become a part of every personal injury file. The form should be kept current as the case develops and should be supplemented with a chronological narrative in diary form for particularly complicated cases. This should note all contacts made concerning the case and record direct statements of individuals involved wherever possible. Information contained in the "Some Day" file should be kept confidential.

A sample of the "Some Day" form appears in Section N of this Manual. Copies are obtainable from the Division Safety Office.

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REPORTING OF "QUESTIONABLE ACCIDENTS"

Classification rules, compensation procedure, claim settlement, and safety records are all influenced by language and facts, or lack of facts, beginning with the original investigation, and ending with the accident report forms.

1. We should be careful to distinguish between an *incident* and an *accident*. It is preferable to use the word "accident" only if there has been an admitted injury; otherwise, if no ultimate damage was done, the occurrence should be labeled an "incident".
2. When incidents, accidents, and allegations are properly differentiated, one can properly classify a case. Alleged cases should never include statements that imply that something actually happened.
3. Consideration for classification involves recognition of facts, such as:
 - a. Was there a factual incident?
 - b. Was there disability or damage produced — then and ultimately? How much?
 - c. Is the damage or disability confirmed as existing in fact, and supported by the evidence of medical statement or testimony?
 - d. Lost time enters into both the considerations of classification as well as the extent or degree of compensation liability, therefore:
 1. Was the lost time really necessary and legitimate, in accordance with the facts of the investigation, the medical treatment required, or the specific medical diagnosis rendered? A specific diagnosis is a statement naming the injury, and if possible, the extent of the injury based on objective findings.

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4. Except for specific medical treatment done on traumatic cases, all other treatment should be referred to merely as follows:

"John Doe was seen by Dr. Jones or Nurse Smith on such and such a date."

This does not affect the doctor's treatment nor what the doctor's records reflect. This is a protective measure which becomes important when a plaintiff wishes to infer that the treatment was questionable in nature or that by such treatment we assume responsibility.

When the nature of treatment is required, the information can be subpoenaed or voluntarily supplied from the medical records.

5. Great care should be exercised in settling all claims, whether they are alleged or real, and particularly if they are to be brought into the compromise settlement category for any purpose or from any source.

6. Accidents cannot be "classified" by general rules but only by consideration of each individual set of circumstances and final results — case by case.

7. All of the above has absolutely no relation to real "accidents" where traumatic injury exists and is obvious to anyone.

When an "alleged" claim comes to the attention of the local management as a *formal* claim for Workmen's Compensation or other settlement, the appropriate "PI" or "PL" report shall be made as soon as possible and forwarded in accordance with Section C, Part 2.

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LOANING OF CONSTRUCTION DIVISION PERSONNEL

When Construction Division personnel are loaned to another department within the Company and working under the direct supervision of the borrowing department, the borrowing department must accept the responsibility for the safety of the loaned employee. This also applies to personnel loaned to other divisions or site locations of the Engineering Department.

It would be desirable to notify the borrowing department or division of the above and so document the notification.

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OUTLINE FOR SAFETY ORIENTATION

This outline contains minimum information to be covered in orientation meetings.

- A. *1st Session* — Conducted by Contractor's Superintendent, with Safety Supervisor in attendance
 - 1. Explain site safety policy, emphasizing personal participation.
 - 2. Blue Book
 - (a) Assure that blue pages have been read before starting, and discuss them first.
 - (b) Use the Blue Book as an outline to conduct the orientation, highlighting all pertinent information.
 - 3. Process Hazards — Outline problems inherent in the local operation — not to alarm but to alert the new employee.
 - 4. Personal requirements of the Superintendent in regard to absolute adherence to rules, regulations, and policies, including personal deportment.
 - 5. Check personnel for possession of basic protective equipment.
- B. *2nd Session* — Conducted by the Foreman
 - 1. Blue Book
 - (a) Basic safety precautions from the Blue Book pertaining to specific craft of the new employee and other craft knowledge which may pertain.
 - 2. Safety Task Assignment (STA)
 - (a) Examples of good STA pertaining to the particular craft of the new employee.
 - 3. Personal and Company Tools
 - (a) Care
 - (b) Use
 - (c) Inspection and Maintenance

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CONTRACTOR CLAIMS DISPOSITION

A. GENERAL

The following procedure will be used in processing claims under the CPPC insurance program. It is imperative that these procedures be uniformly applied by all contractors at the same location and throughout an individual contractor's organization except as restricted by state laws. (Specific exceptions are Ohio, South Carolina, and West Virginia.)

B. RESPONSIBILITIES

1. The insurance program is for the contractors, to be administered by the contractors, with coordination by Du Pont to maintain consistency in claims disposition, particularly where several contractors are involved at a site or the contractor representative lacks experience in handling insurance matters, particularly Workmen's Compensation.
2. Du Pont will act as coordinator between local contractor representative and the local insurance representative.
3. Reports will be prepared by contractor representative and given to Du Pont representative for typing. Contractor will then sign and forward as described below.

C. REPORTS - CONTRACTOR'S FIRST REPORT OF INJURY

1. Four (4) copies prepared and distributed*.

Original and one copy- Insurer

One - Du Pont local file

One - Contractor's home office

(Contractor may also maintain local file)

* For sub-major and major (TAS, NT and FAO) injuries, three (3) copies will be sent to the Division Safety Office.

2. Insurer will forward one (1) copy to state, except
New Jersey - Contractor sends all reports directly to state.
Texas - Contractor sends reports directly to state, but only if time is lost in excess of one (1) day.
3. Location code numbers are composed of a combination of a two-digit site number and a three-digit contractor's number (see pages 6 and 7 of this procedure for list). This number shall be placed in the upper right corner of the report form.

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4. Notify Insurer by telephone on serious cases and confirm with first report; send reports by mail on routine injury or alleged cases.

D. INVESTIGATIONS

1. Real injuries will be investigated by the contractor, with Du Pont in attendance. If severity warrants, Insurer will attend and conduct the investigation. In no case should this be later than the day following injury. Format will parallel Section D, Part 7 of Brown Book.

Contractors will not participate at Northern New Jersey; Insurer to conduct all investigations.

2. Alleged injuries will be investigated by contractor with Du Pont attending. Insurer will be informed of potential claim by one of the following means:

- (a) "Precautionary" report submitted to Insurer and "Someday" file prepared. Further investigation will be conducted at Insurer's discretion, but no report sent to state until formal claim is filed. Applies in —
Delaware Kansas New York
Iowa Kentucky Tennessee

- (b) Verbal report to Insurer and a complete "Someday" file created at site. Report will be submitted and file turned over to Insurer when claim is filed.
Applies in —
North Carolina Virginia

- (c) Claimant sent out for diagnosis, and report made to Insurer, who may notify claimant in writing that claim is denied if diagnosis is purely subjective. Applies in —
New Jersey

- (d) Report filed with Insurer if claim is substantiated; no report made if claim is unsubstantiated or not properly reported. Contractor advises claimant of denial. Applies in —
Texas

*Sample of the form is in Section N of this manual. It should be executed and supplemented as case develops, with a chronological diary of all events, contacts, and statements of individuals concerning the case.

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E. SECURING MEDICAL TREATMENT

1. Authorization — If severity warrants, injured will be referred for medical treatment by a mutually agreed upon doctor.
 - (a) Injured will be given an "Order for Medical Treatment" form (72-CD1) with required information completed. An envelope addressed to the Du Pont Coordinator by name will be enclosed.
 - (b) Doctor (or nurse) will give sealed envelope containing completed form to the injured for return to Du Pont Coordinator.
 - (c) Du Pont Coordinator will make distribution of various copies as required and request injured's supervisor to complete fourth copy (Details of Incident) for file.
2. Transportation
 - (a) Severe injury — Injured will be transported to nearest competent medical facility by whatever means available, i.e., Du Pont vehicle, ambulance, etc.
 - (b) Routine injury, allegation, retreatments — One of following means of transportation should be used in this order —
 - (1) Man's personal auto, if he is able to drive
Reimburse for mileage if requested
 - (2) Taxi or other public conveyance
 - (3) Du Pont vehicle
3. Wages — Injured receives wages for full shift on day of injury for regularly-scheduled hours only. Wages will also be paid for time spent on visits for further medical treatment rendered during regularly-scheduled shift.
4. Reports — If supplementary doctor's reports are prepared, the Insurer will send a copy to the local site on all folder cases and on "Medical Only" cases upon request.

F. SETTLEMENTS

1. Real injury and/or scheduled loss will be paid without question.
2. In compromise, Insurer will give both contractor and Du Pont the opportunity to advise and consent prior to any offer of settlement being made—with the exception of Texas (see Para. 3).

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3. Texas cases — Alleged or Contested

- (a) Insurer must be able to act as a free agent when appearing at pre-hearing conferences.
- (b) Insurer will confer with the Du Pont Coordinator to discuss strategy involved in individual cases.
- (c) Consensus should be reached prior to pre-hearing conference as to the dollar range that the case is worth. This should be a figure which Insurer is prepared to defend.
- (d) Rarely will settlement be attempted prior to pre-hearing conference.
- (e) No settlement in excess of IAB award will be contemplated without notifying IAB of this action.

G. *SELECTION OF EMPLOYEES*

- 1. Contractors will make every effort to learn of and record previous injuries, compensation settlements, obvious physical deficiencies, and similar information which may be useful in seeking relief from the State Second Injury Fund.
- 2. Refusal of employment or termination subsequent to employment for any of the above will be entirely the responsibility of and at the discretion of the Contractor.

H. *THIRD PARTY*

Third Party liability claims against Du Pont may be ascertained when:

- 1. A contractor employee sustains injury while on Du Pont property or using Du Pont tools or equipment, or
- 2. Contractor employee inflicts injury on another person or causes damage to another's property.
 - (a) Insurer will accept the contractor's injury report as notice of potential liability on routine cases.
 - (b) Du Pont will file a liability form (EA 2151-3 1-69) with Insurer if:
 - (1) There are obvious overtones of Du Pont negligence.
 - (2) A claim is made directly against Du Pont by the injured.

USE CODE 99999 FOR THESE LIABILITY CLAIMS AGAINST DU PONT

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Section C
Part 13
Page 5 of 7

I. **COSTS**

Certain costs incurred in connection with contractor employee injuries will be paid by Du Pont without being submitted to Insurer. These would include, but not be limited to, transportation, emergency room fees, and similar items which are not purely medical, hospital, surgical, or compensation.

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J. CONSTRUCTION SITE LOCATION CODES

Beaumont	10
Brevard	11
Cape Fear	12
Clinton	13
Corpus Christi	14
Fayetteville	15
Grasselli	16
Houston	17
Johnsonville	18
Kinston	19
Louisville	20
Memphis	21
Old Hickory	22
Pontchartrain	23
Potomac River	24
Sabine (Field)	25
Sabine (Shop)	26
Seaford	27
Spruance	28
Tecumseh	29
Victoria	30
Washington Works	31
Wilmington Area	32
May	33
Florence	34
East Chicago	35
Albany Shops	36

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K. CPFC CONTRACTORS

Asbestos & Insulating Company	100
B&B Insulation, Inc.	101
Blount Brothers Corporation	102
Brown & Root, Inc.	103
Caudle-Hyatt, Inc.	104
Curry Electric Company	105
Daniel Construction Company	106
Davis Electrical Constructors, Inc.	107
H. B. Deal Construction Company	108
Delaware Insulation Company	109
Dougherty-Liddell Construction Co.	110
Edenfield Electric, Inc.	111
General Welding Company	112
I. D. Griffith, Inc.	113
Hatzel & Buehler, Inc.	114
Healy-DiSabatino Joint Venture	115
Henderson Electric Co., Inc.	116
Hullinghorst Industries, Inc.	117
The Johansen Co.	118
E. L. Jones Painters, Inc.	119
Laburnum Construction Corporation	120
Lambert Electric Company, Inc.	121
Natkin & Company	122
North Brothers Company	123
Northside Electric Company	124
Peters Electric Company	125
Porter-Hayden Company	126
Benjamin F. Shaw Company	127
S.I.P., Inc.	128
Standard Electric Company, Inc.	129
Young Insulation Company	130
John Wile Construction Company	131
A-H Mechanical Contractors	132
Schoonover Electric	133
H. B. Zachry Company	134
McAuliffe Mechanical Contractors	135
Sargent Electric Company	136

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CONTRACT ADMINISTRATION

A. *CONTRACT DOCUMENTS*

All contracts (Lump Sum, Unit Price, or Cost-Plus-Percentage-of-Cost) include the appropriate General Conditions Form. The "Safety and Health" provisions of the General Conditions establish the guide lines under which the contractor must work. Special safety provisions may be incorporated in the contract as necessary. This should be done when the bid documents are prepared; and to this end, each bid form should be reviewed by the site Safety Supervisor while it is in preparation.

B. *CONTRACT AWARD*

It is customary to meet with the contractor's site supervisor on his initial visit to the site after award of the contract. Among other items discussed in this orientation meeting should be the subject of safety as stipulated in the contract documents. This should include, but not be limited to, inspection of equipment, orientation and safety education of contractor's employees, use of Du Pont tools and equipment. Complete understanding should be reached as to all aspects of the contractor's work which involve safety prior to the beginning of work. Safety Supervisor should review each contract in preparation for such meeting, since provisions may vary to suit specific situations.

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INSPECTION TECHNIQUE

- A. A committee will be appointed weekly to make a complete project inspection. The committee is generally made up of the Safety Supervisor as a permanent member, with an Engineer and a Contractor's Superintendent as rotating members.
- B. The inspection committees should look for physical things that are contradictory to the Blue Book and the Brown Book, as well as investigate such things as STA — frequency and quality; orderliness; man-job placement; supervisory coverage, in relation to work being performed; job plan compliance; provisions in the event of an emergency (access and egress, lighting, and communication systems); fire prevention; and co-occupancy.
- C. Results of the inspection will not be given general distribution. Corrections of wrong conditions will be made on an individual basis. Trends will be observed and discussed in staff and/or scheduling meetings.

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VISITORS' SAFETY

The following outlines the responsibility for admittance, escort and conduct of visitors. These rules apply equally to employees of other Construction Division locations, other Engineering Department Divisions, other DuPont Departments, and all non-DuPont personnel.

A. Admittance

1. Visitors will be allowed to enter and leave only through the main Construction entrance.
2. Visitors must register at the Receptionist's desk by completing the information required on the visitor's register (Form G-139), including the time in and out.
3. The employee whom the visitor wishes to see will be contacted by the Receptionist to obtain authorization for entry. Visitors will not be admitted until this contact has been made.
4. The Receptionist will supply safety equipment to each visitor before admitting him to the Construction area. This will consist of hard hat and eye protection.
5. All visitors will be issued and required to wear badges if they go to the field. A visitor's badge register will be maintained by the Receptionist.
6. Visitors will be admitted to the field only by authorization of Project Management or the immediate staff.

B. Escort

1. It is the responsibility of the employee visited to maintain control of his visitor. Visitors shall be properly escorted at all times when they are in the field.
2. The visitor must be informed of site emergency procedures, such as:
 - (a) Fire alarm
 - (b) Evacuation alarm
 - (c) Escape routes
 - (d) Assembly areas

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C. Conduct

All visitors, DuPont or non-DuPont, will be governed by all applicable site procedures, such as: personal protective equipment, danger tag & lock-out, electrical "hot" work, tank entry etc.

Visitors should not ordinarily be permitted to operate any controls or equipment, perform any manual labor, or direct the activities of any craftsmen. Any variance from this procedure must have the approval of the Field Project Manager or his Assistant.

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DU 029589

MOTOR SCOOTERS - CONTROL & USE

The Construction Division has experienced injuries to personnel as a result of the instability of the three-wheeled type scooters used to transport personnel. Both the battery powered electric and the gasoline powered scooters, made by various manufacturers, are being used. Overturning of this equipment is the primary cause of injury.

Electrically powered scooters must be restricted to a turning radius of 6 feet, and the gasoline powered equipment restricted to a turning radius of 9 feet. A simple adjustment may be made on the front wheel steering to control the degree of turning radius.

When purchasing new scooters, consideration should be given to four-wheeled vehicles to provide the degree of stability necessary without additional adjustment.

Operators of these scooters must be instructed prior to using them and a record of AUTHORIZED OPERATORS maintained in a central location.

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MATERIALS HANDLING

Material Handling is one of the major causes of construction accidents and occupies the majority of the craftsman's time. It is essential that all aspects of this problem are taken into consideration.

A. *Manual Handling*

1. Proper lifting techniques — legs not back
2. Proper gloves
3. Accurate appraisal of size and shape of load
4. Consider alternatives that are available
5. Assure stability of man (proper footing)
6. Assure stability of material (chocked, tied, etc.)

B. *Non-Power Equipment Handling*

1. *Types*
 - (a) Stevedore trucks
 - (b) Platform trucks
 - (c) Wagon trucks
 - (d) "Johnson" bars
 - (e) Floor cranes
 - (f) Pallet trucks
 - (g) Hand-operated fork lifts
2. *Safety Considerations*
 - (a) Capacity
 - (b) Limitations
 - (c) Suitability for job
 - (d) Stability
 - (e) Knowledge of proper use
 - (f) Adequate guards
 - (g) Proper use of rollers, dollies and skids

C. *Power Equipment Handling*

1. *Types*
 - (a) Cranes
 - (b) Fork lifts
 - (c) Trucks
 - (d) End loaders
 - (e) Material Hoists

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DU 029591

2. *Safety Considerations*

- (a) Qualified operator
- (b) Qualified user (other than actual operation)
- (c) Proper signals
- (d) Capacity
- (e) Application
- (f) Stability
- (g) Adequate guards
- (h) Adequate safeguards (check valves, outriggers, barricade)
- (i) Access to cab
- (j) Operator visibility
- (k) Preventive maintenance

D. *Rigging*

- 1. Weight of load
- 2. Capacity of equipment
- 3. Knowledge of signals
- 4. Familiarity with proper installation of chokers, hooks, shackles
- 5. Familiarity with capacity of chokers, hooks, shackles
- 6. Investigate environment
(proximity of electric, process, or service lines)
- 7. Weather conditions
- 8. TRAINED craft riggers

The above is an outline which should be analyzed by the appropriate supervisor prior to proceeding with a material handling job. All crafts handle materials, many of them in a manner with which they are unfamiliar. Since materials must be handled, then we must make the craftsmen familiar with the method of operation through timely training.

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DU 029592

DEVELOPMENT - TOOLS, METHODS, EQUIPMENT

Our continuous efforts to economize and streamline our construction techniques require analysis, testing, and evaluation of new tools, equipment, and techniques almost on a daily basis. This evaluation may take place as a Divisionwide study or a local site development. In either case, it is imperative that good communications exist between the Safety Department and those involved in development activity to assure proper safety considerations PRIOR to instituting the tool or method.

The Division Safety Office will assist whenever possible and should be consulted; however, since it is impossible to keep abreast of all developments, the Site Safety Office should participate in ALL cases.

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DU 029593

CONTAMINATED EQUIPMENT

Instances have occurred in the past where employees of a vendor sustained injuries because of contamination (corrosive, toxic, or radioactive substance) of a piece of equipment sent to their shops for modification from one of our field sites.

All supervision responsible for shipment of any process equipment to an off-the-site location are to be instructed that the equipment must be completely decontaminated, prior to shipment, so as not to expose any person, carrier or vendor to possible injury.

Decontamination may involve steaming, sand blasting, water wash, or neutralizing chemicals.

The Operating Department should be consulted as to the best way to accomplish the decontamination.

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DU 029594

SAFETY REPORTS - SECURITY & DISTRIBUTION

When projects are subjected to litigation from injuries occurring on their premises, the courts will frequently subpoena all records and reports written pertaining to the specific incident involved. Therefore, it becomes necessary for the Construction Division to be certain that these reports do not contain information that will legally jeopardize our position.

All reports of this nature (Company injury reports, State injury reports, close call, or serious incident reports, etc.) are to be submitted to the Division Safety Office for review prior to distribution.

Project management will administer the necessary controls to assure that any reports written by operating departments or other Engineering Department Divisions that may be involved in the incident are also reviewed before distribution is made. Serious Potential Incident reports, originated by the Operating Department which involve Construction, should be reviewed at the site prior to distribution to assure that no inaccurate implications are included.

The Division Safety Office should be kept advised of incidents of this nature.

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DU 029595

SUBSTATION TESTING & INSPECTION

Testing and inspection of substations must be carefully controlled to assure that only qualified personnel perform this function.

A. TRAINING OF PERSONNEL

1. The testing and inspection of unit substations through 15 kv is handled by Construction. (Test sets used shall not exceed 50,000 v. D.C.) Anything above this requires the services of an E.S.D. representative.
2. The Engineering Service Division qualifies personnel in the use of high voltage equipment for testing and inspection of substations. Only those people who have successfully completed the E.S.D. training program, conducted by T. L. Bourbonnais and W. G. Morrison, are authorized to operate the high voltage instruments, not including the meggers (above 500 v.) used in this work.
3. It is mandatory that this responsibility is not delegated; and in the event it is necessary to train additional people to conduct this work, the training of those people shall be done by the E.S.D. representatives. It is the responsibility of the people qualified by this training to be sure anyone using high voltage meggers (above 500 v.) has been properly instructed and checked out in their safe use.
4. A list of qualified personnel is kept current by E.S.D. and the Construction Division Safety Office.

B. ASSIGNMENT OF PERSONNEL

In the event it becomes necessary for this work to be performed at your site and you do not have qualified personnel, your Construction Manager should be contacted so that arrangements can be made to get the necessary qualified personnel to perform this test and inspection.

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O-D GLOVES

Each site must develop the atmosphere necessary to obtain 100% O-D glove usage from those men performing jobs where these gloves might prevent injury.

Although every such circumstance cannot be defined, O-D gloves should be worn when there is danger of finger injury from impact if struck by or caught between the material or equipment being handled or the tool being used.

O D gloves will be maintained in stock on the site and issued to personnel when needed the same as safety belts, respirators, and other safety equipment.

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DU 029597

DISASTER RESPONSIBILITIES

A. SCOPE

This procedure gives guidelines for preparation of a disaster procedure to cope with calamities (fire, explosion, toxic fumes) which endanger personnel or property. Specifics as to signals, communications, evacuation routes, and assembly points must be developed locally and coordinated with the operating department.

B. PERTINENT INFORMATION

Certain items must be disseminated to all project personnel by whatever educational means seem most effective. This may include wallet cards, signs, orientation, safety meetings.

1. Signals

Types and frequency of alarm.

2. Evacuation Route

- (a) Identify path to be followed from operating buildings.
- (b) Identify exits in Construction facilities.

3. Assembly Points

Assure that assembly point for each area is designated.

4. Alarm

Instruct employees in proper way to turn in alarm.

C. SPECIFIC FUNCTION - Sample Organization

1. Field Project Manager or Assistant Field Project Manager
Designated as Disaster Coordinator using his office as headquarters. He will establish contact with plant.
2. Field Superintendent
Accounts for all field personnel using his office to receive reports.
3. Craft Superintendents
Report to their respective shops to receive reports accounting for personnel.
4. Division and Area Engineers
 - (a) Assure that all work permits are cancelled.
 - (b) Assure that all open flames are extinguished.
 - (c) Return to their office.
5. Control Superintendent
Accounts for visitors.

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DU 029598

- 6. Medical Personnel
Stand by at First Aid Station to assist as required.
- 7. Staff Personnel (Unassigned)
Report to Disaster Coordinator.
- 8. Runners
Should be assigned to Disaster Coordinator and to each shop to relay messages.

D. GENERAL CONSIDERATIONS

- 1. No effort should be made to locate missing persons by reentering disaster area until the "ALL CLEAR" is sounded.
- 2. All information given outside the Company will be by the Operating Department.
- 3. Telephone calls must be kept to a minimum to keep lines open.
- 4. Alternate facilities for Disaster Coordination must be provided in the event that Construction facilities are directly involved in the disaster.

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OSHA COMPLIANCE INSPECTIONS

A. *SCOPE*

This procedure outlines the steps necessary if a Compliance officer wishes to conduct a routine inspection or responds to a complaint.

B. *PRELIMINARY REQUIREMENTS*

Conduct Compliance officer to Field Project Manager's office to determine:

1. Compliance officer has proper credentials.
2. Type of inspection to be conducted. Get copy of complaint, if applicable.
3. Who will be inspected - (Du Pont, General Contractor, sub-contractor, or any combination thereof)?
4. Establish relationship of Du Pont as owner on contract jobs and our proprietary interest in the inspection.
5. Who will accompany the Compliance officer as:
 - (a) Owner's representative
 - (b) Employer's representative
 - (c) Employee's representative.

C. *SELECTION OF REPRESENTATIVES*

1. Routine Inspections

- (a) Owner's representative - This will generally be the FPM or highest Du Pont supervisor on site. He should limit his comments during the inspection to items involving Du Pont's interests. The Du Pont Safety Supervisor should also go along in his role as consultant to FPM or his designate.
- (b) Employer's representative - This should be the superintendent or highest site supervisor of the contractor being inspected. He should be the spokesman in answering questions that relate to unsafe acts or conditions that may exist on his work. If several contractors are involved, this representative may change during various portions of the inspection.
- (c) Employee's representative - Should be selected from the rolls of the contractor who is being inspected. The Compliance officer may choose to question several individuals rather than have an employee accompany him.

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2. Complaint Inspections

- (a) Owner's representative - Highest Du Pont supervisor on site and Safety Supervisor.
- (b) Employer's representative - Contractor's superintendent or highest site supervisor.
- (c) Employee's representative - Only if requested by Compliance officer.

D. AFTER INSPECTION

- 1 Exit meeting with FPM to discuss any citations.
 - (a) What are they?
 - (b) When will they be issued?
 - (c) Proposed penalties.
 - (d) Period allowed for abatement.

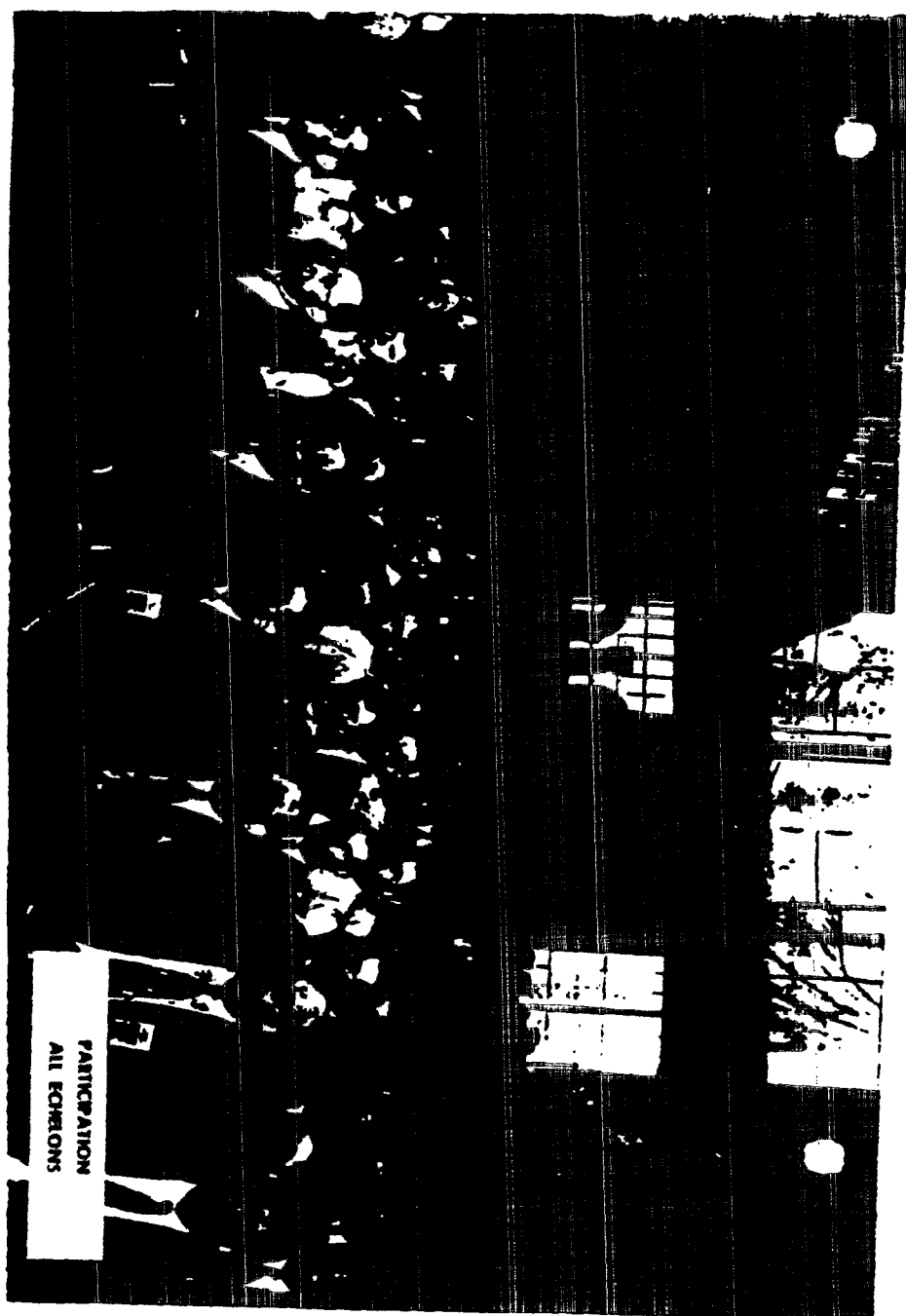
E. GENERAL CONSIDERATIONS

- 1. Compliance officers should be treated courteously and given information that they request, including, but not limited to, noise surveys, medical reports, dust sample results. Information should not generally be volunteered. If information of proprietary nature is requested, the inspector should be told that Management approval is required and he should return at a later date. Avoid outright refusal of information.
- 2. All subcontractors must be notified of the inspection prior to entering their work area.
- 3. If the Compliance officer chooses to inspect contractors beyond those agreed to in item B-3, additional employer's representatives must be lined up prior to proceeding.
- 4. Division Management should be notified of inspection as soon as practicable.

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Section D
Part 1
Page 1 of 1

SAFETY RESPONSIBILITY

The safety and well being of all employees on this Project will receive first consideration throughout all phases of the work. It is necessary that all employees be fully aware of the scope of responsibility that they must accept and carry out in order to achieve accident-free work in their area of responsibility.

Safety must start at the planning stage. No work has ever been accomplished without some degree of planning; the more thorough the planning, the better the result. Thus the Contractor's Superintendents, the Engineers, the Department Heads, and other supervision who are responsible for planning will secure a degree of accident prevention commensurate with the thoroughness with which they fulfill this obligation. The safety accomplishment of any group will hinge on and be measured by the supervisor's insistence on safe work.

The Safety Department will coordinate all safety activity. They will assist all Departments and Contractors in every manner possible toward a mutual goal of safe work. They cannot, however, relieve any supervisor of his line responsibility for direction of the work under his supervision.

We ask each employee to cooperate to the fullest extent in complying with the safety regulations outlined in the Blue Book and other safety fundamentals.

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DU 029603

PERSONAL PROTECTIVE EQUIPMENT

The following outlines policy pertaining to the issue or sale of certain items of personal protective equipment:

A. **SAFETY SHOES**

Safety shoes will be made readily available through stock, shoe mobile, or special order at cost to all employees. All shoes are to conform to ANSI Class 75.

B. **HARD HATS**

The entire project is a hard hat area. All employees will be required to wear hard hats at all times while at work in the field and shops. This includes office employees and visitors when they go to the field and shops. Hard hats will be maintained for loan to all employees. Use of metal hats should be discouraged.

C. **GLOVES**

All field employees will be expected to possess and use good gloves, appropriate to their work.

1. Standard work gloves will be available for resale.
2. O.D. gloves will be issued for jobs requiring them.

D. **EYE PROTECTION**

1. All field employees or others going to the field will be issued safety glasses w/semi-sideshields at the time of employment prior to going to the field.

2. Special types of eye protection will be maintained for issue to certain employees performing specialized work.

3. Prescription glasses will be available for resale at cost.

E. **HEARING PROTECTION**

1. Hearing protection in the form of ear plugs or ear muffs will be issued to those employees requiring it.

F. **OTHER PERSONAL PROTECTIVE EQUIPMENT**

Such items as safety belts, respirators, etc., will be maintained for issue when required.

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DU 029604

PRESCRIPTION SAFETY GLASSES

The following is required to obtain prescription safety glasses for employees requesting them:

1. Obtain a completed prescription blank from employee.
2. Compute price of glasses from current price list.
3. Obtain payroll deduction or arrange payment by cash or check prior to ordering glasses.
4. Arrange delivery either directly to the employee or to the doctor who filled out the prescription blank.

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DU 029605

3. **RESALE ITEMS**

All items stocked for resale may be purchased by Du Pont and CPPC Contractors either by cash or payroll deduction.

- **CLEANING**

All equipment that is used, such as hats, boots, ear plugs, respirators, must be sterilized prior to re-issue. "Zephiran Chloride" and "Cidex" are two cold solutions available. After sterilizing by immersion or spray, the equipment must be placed in a plastic bag or other suitable protection.

The Division Safety Office will select and/or approve all Safety and Fire Equipment. The sites may initiate inquiry at any time with the Division Safety Office concerning desired changes in or additions to equipment lists.

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DU 029606

METAL SCAFFOLDS

A. SCOPE

This procedure provides information concerning the types, component parts, and accessories of ferrous metal scaffolds. More detail is available in Maintenance & Construction Procedures PV 3, 3.1, 3.2, 3.3 & 3.4.

B. PURCHASE AND RENTAL

1. Specifications covering the purchase and rental of ferrous metal scaffolds are given in Standard SIOF and should be strictly adhered to.

C. TYPES

1. Manufacturer's frames, bracing, connecting pins, and other accessories shall not be interchanged.
2. Sectional frame-lock scaffolds are made up of the basic pre-fabricated end frames, cross bracing, and frame-lock devices to hold the parts firmly in place.
3. Tube and coupler scaffolds are made of various lengths of tubing clamped together by special patented couplers to support practically any desired shape of working platform. This type of scaffold is desirable when working on round, curved, or other irregular-shaped objects.

D. ERECTION

1. Scaffolds exceeding 50 feet in height above the baseplates must be approved by Project Management. The maximum allowable load per walk-through frame is 2500 lb. uniformly distributed, or 600 lb. concentrated center-point loading.
2. Examine footing and set scaffold legs on baseplates placed on foundations or mud sills adequate to support the maximum intended load.
3. When erecting a rolling scaffold, set legs on lumber, if necessary, to keep from digging into ground or pavement.
4. Adjusting screws shall be installed only between baseplate and vertical frame section. They shall never be used together with casters. Adjusting screws shall not be extended more than 12 inches.

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5. Scaffolds shall be properly braced by cross bracing or diagonal braces (or both) when necessary for securing vertical members together laterally; and the cross braces shall be of such a length that will automatically square and align vertical members so that the erected scaffold is always plumb, square, and rigid. All brace connections must be secure.
6. When scaffold height exceeds 3 times the smallest base dimension, it must be secured to the building or structure at the 2nd lift and every other lift thereafter. Running scaffold is to be anchored every 30 feet horizontally at the heights established in the preceding sentence.
"Out riggers" or guys may be used where it is impractical to secure scaffold to building or structure.
7. All scaffold working platforms, beginning with the first lift or frame, shall be equipped with a standard 42-in. high rigidly secured (not wired) handrail, a mid rail, and be completely decked with safety plank or manufactured scaffold decking (See Engineering Standard S7F) and provided with rigidly secured toe boards. The manufactured scaffold decking produced by Werner, Safway, and Waco Companies has a maximum allowable loading per plank of 800 lb. uniformly distributed, or 400 lb. concentrated center-point loading.
8. Access to working platform shall be by ladder, either built into frame or attached separately.
9. All casters used with scaffolding shall be rubber tired and provided with a positive locking device to hold the scaffold in position. The 8-in. caster has a rated load capacity of 500 lbs. When casters are used, this capacity should be the load-limiting factor.
10. Casters of rolling scaffold shall be locked at all times while the scaffold is being erected or in use. Scaffolds shall not be moved while personnel remain on the scaffold. Tools or materials should either be removed from the platform or secured so they cannot fall or roll off when the scaffold is being moved.
11. A tag shall be placed on the scaffold indicating complete or incomplete, special requirements, date of erection, and signature of Foreman supervising erection.

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DU 029608

E. INSPECTION

1. Before erecting and during dismantling, inspect all scaffold components. Those found with defects must be discarded immediately.
2. Handrails, midrails, cross bracing, and steel tubing shall be inspected for cracks, especially near center span and indications where a welding arc has been struck.
3. Scaffold components shall be straight and free from bends, kinks, dents, and severe rusting.
4. Scaffold frame weld zones shall be inspected for cracks, and ends of tubing for splitting or cracking.
5. Manufactured decking shall be inspected for loose bolt or rivet connections and bent, kinked, or dented frame.
Plywood surface should be checked for softening due to rot or wear, and peeling of laminated layers at edges. The surface should have an abrasive nonskid cover applied.
Safety plank should be checked for rot, cracks, cuts, and other external damage. Also, inspect tie rod or bolt and angle iron to be sure that it operates properly.
6. Each quick-connecting device, whether cam, spring, threaded connection or toggle pin arrangement, should be inspected to see that it operates properly.
7. Casters, if used, should be inspected for smooth rolling surface, free turning, free acting swivel, and to be sure that the locking mechanism is in good working order.

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**TARPAULINS & WELDING CURTAINS
FIRE RETARDANT PROPERTIES**

- A. All materials that will be used for protecting materials or equipment, welding curtains, drop cloths, and similar uses must be checked for fire-resistant properties.
- B. Persons requisitioning the material should stipulate fire-resistant material. The Purchasing Department should accept basic responsibility for procuring acceptable material.
- C. Where polyethylene or similar plastics of relatively low fire resistance are used, they must be restricted to areas where ignition potential is minimal.
- D. Section M, Part 1 lists recommended material.

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DU 029610

REPORTING OF MINOR INJURIES

- A. When an employee receives any minor injury, he must report immediately to First Aid. If the foreman or supervisor is present, he should be notified by the injured before going to First Aid. If the foreman or supervisor is not present, the injured should leave word with one of his fellow-workmen concerning his whereabouts.
- B. After treatment, the medical attendant may instruct the employee to return if another treatment is required. This will be arranged through the employee's supervision.
- C. Following the treatment of each individual, the injury will be entered in the daily medical log. It should also be entered on OSHA Form 100, if warranted.
- D. The department supervision will be responsible for seeing that the accident is thoroughly investigated and the appropriate First Report of Injury executed if required.
- E. All questions on the Injury Report should be filled out with complete accuracy. It is very important that the description of the accident permits the reader to clearly visualize the accident. If doubt exists as to the accuracy of the claimant's description, this should be noted.
- F. Injury reports must be completed within 48 hours. In the event that reports are inaccurate or fail to reflect sufficient investigation, they will be returned to supervision.

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ACCIDENT INVESTIGATION

The purpose of this procedure is to establish a method of investigating Tabularable Major Injuries, Sub-Major Injuries and Serious, Unusual or Alleged incidents where the potential of costly damage to equipment or serious injury to personnel was extremely high, whether or not these actually resulted.

A. PURPOSE OF INVESTIGATION

1. To establish the exact, factual cause of the accident. Keep in mind that we are basically investigating incidents and not injuries.
2. To determine what steps must be taken to prevent recurrence of the same type of incidents and to define exactly who is to initiate these preventive measures.

B. INVESTIGATING COMMITTEE

The investigating committee will be composed of the following members:

1. The Field Project Manager, who will be chairman of the committee.
2. The Safety Supervisor, who will be the recording secretary.
3. The Contractor's Superintendent of the craft involved in the incident.
4. The Foreman and General Foreman in charge.
5. The Division and Area Engineer of the area or building in which the incident occurred.
6. Witnesses to the occurrence.
7. Other personnel, as deemed advisable by the Field Project Manager.

C. TIMELINESS OF INVESTIGATION

1. Only in rare cases will it be necessary to hold an investigation on any day other than the day of occurrence. Important evidence may be lost during delay.

D. INVESTIGATIVE PROCEDURE

1. When the committee convenes and after the Field Project Manager has stated the purpose of the meeting, the foreman

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- of the crew or crews involved will be asked to describe in detail —
- a. The nature of the work being performed prior to and at the time of the incident.
 - b. The exact instructions given to the crew or crews and especially the employees directly involved.
2. The Contractor's Superintendent over the work involved is then to be asked to verify and/or supplement the information given in #1 above.
 3. The Area Engineer and Division Engineer will then be asked for a detailed account of how the work was planned and any specific safety instructions that were in the Job Plan. This information may be obtained in a separate meeting.)
 4. If personal injuries or death result from an incident, the eyewitnesses should be asked to relate whatever part they played in rescue operations. They should be asked such questions as whether or not the victim was conscious or unconscious, whether his eyes were open or closed, whether his skin color was normal, gray, dark, or otherwise abnormal. They should particularly be asked whether the accident victim uttered any sounds after the incident. The eyewitnesses should limit themselves to what they saw and should not be asked to make a judgment as to negligence.
 5. During the establishment of facts as outlined above, bring out such factors as age of employee, length of experience in the type of work he was doing, service on the project, his injury record, and all other pertinent information which will serve in formulating plans for the prevention of similar occurrences.
 6. Photographs should be taken whenever possible. Assure that time and conditions are noted and how these conditions differ from those at the time of the incident. The photographer should be careful not to take pictures which may distort the view by unusual camera angle.
 7. Statements from witnesses should be tape recorded if possible. They should be told that their statements are to be recorded, after being given an opportunity to object. If this procedure is questioned, explain that statements are being obtained from many people; and it is desirable to be able to play the tapes over again later, if necessary, to help keep separate the facts observed by different people.

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After the recording is made, offer to play it back to the witness. The tapes should be sent to counsel in the Legal Department. Do not transcribe the recordings. Your representative in the Legal Department should be contacted as soon as possible for further guidance.

8. Requests to take pictures, received from authorities who are legally empowered to investigate accidents (state, county, city, etc.), should be granted; however, someone should be assigned to accompany them to observe and protest anything unusual about their conduct. Any other request for pictures should be referred to the Wilmington Office before request is granted.
9. Based on the complete assembly of facts, steps to prevent recurrence should be formulated.

E. WRITTEN REPORTS REQUIRED

1. It will be the responsibility of the Safety Supervisor to prepare a detailed summary of the complete investigation and forward a copy of this summary to reach the Field Project Manager's office not later than forty-eight (48) hours following the accident. One copy to be forwarded to the Division Safety Office.
2. Reports required by the Company or other organizations off the site are listed and described in Safety and Fire Protection Division Bulletin #422.
(See also Section C, Part 2, of this manual.)
3. "Some Day"
Your execution of the "Some Day" file forms in all alleged or suspected false claim cases is an important detailed responsibility necessary to successful defense in future litigation.
(Refer to Section C, Part 9, of Brown Book.)

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RESTRICTED WORK CASES

The following outlines the procedure for control of Restricted Work Cases. When examination by the Du Pont Medical Staff indicates that any workman on the Du Pont payroll has received an occupational injury which is not generally incapacitating, the following procedure will apply.

- A. After the Medical Department has compiled the necessary records and notified the Safety Department, the injured employee shall be instructed to report to his superintendent.
- B. The Contractor's Superintendent will talk with the employee regarding cause of injury and explain that the course of action being taken is for the employee's welfare.
- C. The Contractor's Superintendent and Safety Supervisor will share responsibility for assigning the employee to a job where a regular craftsman is now being utilized to do similar work. A daily check shall be made to make sure that the employee is able to perform effectively.
- D. The Medical Department will be responsible to see that the injured follows his re-treatment schedule by notifying the employee's superintendent as to any delinquencies in return for scheduled medical treatment. The Medical Department will discharge the patient for regular work at the earliest possible moment.
Malingering and chronic cases are not to be interpreted as "Restricted Work" cases and will be classified for benefits, as provided by the Workmen's Compensation Law. No employee is to be retained on the site if he is incapable of performing tasks in line with his classification or fails to respond to treatment in a reasonable period.
- E. The Safety Department will record all "Restricted Work" cases as to employee's name, number, date of origin, progress, unusual incidents about the case, and date of discharge.
- F. This procedure does not in any way conflict with the standard Du Pont Company classifications for injuries outlined in Bulletin No. 422.
- G. Tabulatable major injuries generally involve lost time; therefore the injured goes on compensation because of extent of disability. Other injury cases will be decided on the basis of work available, type of injury, cause of injury, and similar considerations.

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CONSTRUCTION EQUIPMENT - CONTROL & INSPECTION

A. SCOPE

1. Construction equipment for purposes of this procedure shall include all power-driven equipment or manually-operated equipment which, because of its size, the nature of its work, or its method of operation, excludes it from the hand tool category. For example: cranes, trucks, fork lifts, ironworkers, power benders, scooters.
2. Operators, regardless of other inspections, must make a daily check of brakes, horn, lights, clutch, steering, and other devices required for safe operation.

B. RESPONSIBILITIES

1. Procurement - the representative of Construction management in charge of the purchase or rental of equipment is responsible for establishing with the vendor minimum standards with which the equipment must comply.
(Wilmington Contracts Office and/or Field)
2. Inspection - Maintenance - each Contractor's Superintendent shall be made fully responsible for: (a) inspection of equipment prior to putting in service, (b) regular monthly inspection and repair of all equipment in his craft. Written records will be kept by the inspecting crafts covering the inspections of each equipment piece. This function will be coordinated by the Field Superintendent. All power mechanical equipment will have evidence of what parts were inspected, who inspected them, and when they were inspected.
3. Contractor's equipment must be checked for compliance with safety standards by a competent person before the equipment is placed in service.

C. CONTROL

Control of equipment includes fire protection, repair work, and proper use of the equipment on every task. The suitability of the operator for the equipment is vital. His reliability, experience, and receipt of complete instructions cannot be over-emphasized. Following is a list of important details applicable to the safe use and operation of equipment - both Du Pont and Contractor.

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1. (a) Need for a signal man.
(b) Truck driver must leave truck cab while truck is being loaded by means of power equipment.
(c) Evidence of complete and periodic inspection must be submitted as requested, usually monthly.
(d) Live boom equipment is not approved for use under any conditions.
(e) Lights, horn, mirrors, windshields, brakes, and similar devices must be kept clean and in good condition.
(f) Capacity of cranes, method for charging crane booms, leveling of cranes, must be carefully considered.
(g) Refueling and lubrication locations and procedures must be established.
2. Items to be inspected and at what frequency shall be listed on WME inspection cards. These cards will be placed on the equipment in a plastic envelope for protection. The inspector will signify inspection by initialing and dating the appropriate column.

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MOBILE CRANES - OPERATION & CONTROL

A. RESPONSIBILITY

Establishing safe methods for the operation and control of cranes is the responsibility of the Contractor's Superintendent in charge, with consultation from the Safety Department.

B. OPERATOR QUALIFICATION

1. The operator may possess no physical impairment or otherwise limiting characteristics.
2. The operator must be tested verbally and physically demonstrate his ability to operate the equipment to which he is assigned - both initially and periodically thereafter.
3. Records that show the equipment for which an operator is qualified must be kept by the Contractor's Supervision conducting qualification tests.

C. CRANE SELECTION & OPERATION

1. The crane must be of sufficient capacity and proper type (crawler or transit, mechanical or hydraulic) to fulfill all requirements of the work without endangering personnel or equipment.
2. Crane operation will be only at the direction of ONE qualified Signaller.
3. Outriggers on all transit cranes will be set and the crane leveled for all lifts. (Exception to this must be approved by Project Management.)
4. "Walking" of suspended loads should be avoided. Where necessary to do so, the following applies:
 - (a) Investigate route to be followed for solid and level footing.
 - (b) Tie load to the frame of the crane.
 - (c) Personnel will not touch the load for any reason. Tag lines must be used if control in addition to Item 2 is required.
5. Weight of the load must be positively established prior to handling. Check brakes and machine stability when load is still only inches above ground.
6. The operator must not attempt any lift for which he feels conditions are inadequate.

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7. A procedure for changing the crane boom will be developed and include a check list to be used and signed by the foreman supervising the work.
8. When leaving the control station of a machine, the following precautions should be observed:
 - a) Disengage the master clutch or shut off the engine.
 - b) Lower bucket or crane load to ground.
 - c) Set safety pawls on all drums where these are manually operated.
 - d) Set the swing lock or swing brake and both traction brakes and/or locks to prevent machine movement.
9. Avoid sudden stops and starts.
10. The hoist line must be vertical before starting the lift.
11. Crane loads and booms may not swing over personnel.
12. No one is permitted to ride the hook or load.
13. The boom hoist drum pawl should be engaged at all times except when lowering the boom.
14. Do not get on or off a machine when it is in motion. No adjustment, repair or lubrication permitted on moving machinery.
15. Work within 15' of electric lines requires special procedure see Brown Book - Section D, Part 13).
16. A tagline is required on all loads.
17. No tool boxes, oil cans, choker racks, water coolers, or similar additions may be placed in the radius of the swing of the counterweight where a person could conceivably be crushed.

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CRANE WORK NEAR OVERHEAD ELECTRIC SERVICE LINES

- A. If any part of a crane or similar equipment must be moved within fifteen (15) feet or less of any electric service line, the following must be done before proceeding:
 - 1. The Contractor's Superintendent in charge of the equipment, the Contractor's Superintendent in charge of work, the Electrical Contractor's Superintendent, the Division Engineer, and the Safety Supervisor are to be contacted.
 - 2. These individuals will decide whether: (a) the power is to be cut off, (b) the crane is to be grounded, (c) if an Electrical Department standby man is necessary, and (d) if protective equipment* must be worn.
 - 3. Written approval to proceed with the work will be given by the committee outlined above, after all precautions specified on the permit have been enacted.
- B. No crane shall be operated under these conditions unless:
 - 1. A signal man is present whose sole function shall be to assure that clearances are maintained.
 - 2. Signs and barricades are posted around the crane, warning personnel to stay clear.
 - 3. The crane operator is the only person on the rig.
- C. Cranes or other equipment having booms should not be parked over night or over a week-end directly under any high tension line. Booms must be lowered or tied off, using load line.
- D. Precautions noted in this procedure apply to all electric service lines. Similar considerations should be given to piping systems which contain potentially hazardous materials.
- E. Correct identification of all overhead electric service lines is vital, since there is considerable resemblance between some high voltage lines and "telephone" lines.

All crane operators will be instructed to stay on the rig in case of contact with any electrical line.

*Men handling tag lines or attaching or disconnecting loads must wear tested Lineman's gloves, of adequate voltage rating, with protectors and rubber footwear.

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MAST CRANE OPERATING PROCEDURE

It is the intent of this procedure to explain the safe operation of Mast Type Cranes. Certain portions, particularly the daily check list, must be adapted to the specific crane being used.

A. GENERAL

1. A special safety belt will be provided for personnel climbing to the crane cab, and no one will be permitted to climb the mast crane ladder without wearing this belt except in extreme emergency.
2. Generally, only one person will be permitted in the cab of the tower crane. Exceptions must have the approval of the Contractor's Superintendent or his designate.
3. All loads must be moved gradually by the operator. Accelerate and decelerate all motions gently.
4. Loads must be lifted with load line only. Do Not "boom up" for initial lift of loads.
5. Do not hoist loads at an angle.
6. Do not swing any load over any personnel at any time.
7. Communications from the people using the crane to the operator will be accomplished by two means:
 - (a) *Visual* — where standard crane signals will be employed. Signalmen should wear "Da Glo" gloves for better visibility.
 - (b) *Oral* communication — is provided through a closed circuit telephone system. Picking up any one of the receivers gives instant communication with the operator. It is intended that a responsible member of the gang using the crane will be on the telephones while the crane is in use. These phones will also allow for the operation of the crane in areas not visible to the operator. To make full and safe use of this arrangement, signals should be transmitted to the operator through a combination of visual and oral communication.
8. The attached sketch shows the load capacity of this crane which gives the safe working load at the appropriate radii. These safe loads will not be exceeded. (Insert sketch appropriate for crane being used.)

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9. When wind velocity reaches 30 MPH, as measured by an Anemometer mounted on the mast crane, crane operator will shut down crane.
10. Provision must be made to remove the crane operator from the cab in case of an emergency.

8. **OPERATOR—PHYSICAL FITNESS**

The Contractor's Superintendent or his designate will be responsible to assign an operator to this piece of equipment who can pass necessary requirements and is qualified to operate a crane of this nature and capacity.

In addition to this basic requirement, the Safety Department will arrange for the selected operator to take the following additional physical examination:

All available medical records, including all physical examinations, all laboratory, X-ray, and other special examinations, all first aid records, and all disability wage records, will be examined.

1. Vision must be 20/20 in both eyes with glasses. Depth perception must reach 70% stereopsis by Keystone visual test. Peripheral vision must be as near normal as can be detected by rough eye motion tests.
2. Hearing must be good enough to detect normal spoken voice at 6 feet in one or both ears. There must be no evidence of ear disease or balance center disease.
3. Medical history and examination may not include any evidence of cardiac, vascular, metabolic disease, or other conditions which might cause sudden loss of consciousness, loss of coordination, or impairment of judgment.
4. Physical examination should not reveal any limitations of ability to move the head, neck, torso, or extremities, nor should there be any apparent loss of coordination or gross slowing of reflexes.
5. There should be no history of nervous or mental disorders. Specific reactions of the employee indicating unstable temperament, mental immaturity, excitability, irresponsibility, or lack of adaptability must rest with supervision, as they are not usually observable during short medical contacts.
6. There must be no history of uncorrected conditions, or physical evidence of such conditions, as will be irritated or aggravated by long periods of watchful attention, prolonged sitting, or intensive concentration.

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The results of this examination are to be made a part of his medical record history card.

C. *CRANE OPERATION* — Daily Procedure

Note: The same steps will be followed after any maintenance work has been performed on the crane, requiring a shutdown of the unit.

Prior to mounting cab:

1. Make visual inspection of:
 - (a) All tower and boom bolts in position.
 - (b) All pins and lock pins in position.
 - (c) Check trail cable to determine amount of twist. Twist should not exceed one lap.
2. When conditions of 1-a, b and c are satisfactory, turn on power at main switch.
3. Climb aboard revolving frame. Be alert for any rotation of tower and counter-weight (revolving frame) due to wind.
4. After aboard, make visual inspection of machinery.
 - (a) No foreign objects on cover or cable drums.
 - (b) That cables are coiled properly in drum grooves.
 - (c) That boom ratchet and pawl are free of ice, snow, or foreign objects.
5. Close circuit breakers on the A.C. cabinet (stenciled "AC Cabinet"). Four switches involved.
6. Turn swing brake hand crank all the way out (counter-clockwise to set swing brake). (Brake is off at night to permit weather vaning). Use care not to shear stop pin.
7. Check condition of rungs on tower ladder.
8. Fasten safety belt and cautiously climb tower.
9. At top of tower, fasten cab safety belt prior to disconnecting crane safety belt.
10. Proceed into cab and close door. Remove cab safety belt and secure.
11. Determine that all control levers are in neutral. Depress in order:
 - (a) Load limit reset.
 - (b) Start button — this will start motor generator set.

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12. Check all limit switches:

- (a) Cautiously hoist load line hook to maximum height so as to contact limit switch on boom. Hoisting motion should stop.
- (b) Check boom hoist drum locking pawl.
- (c) Cautiously raise boom to maximum angle. Motion should stop at approximately 68 degrees. (where applicable)
- (d) Cautiously lower boom to minimum angle. Lower motion should stop at approximately 15 degrees. (where applicable)
- (e) Make one full turn (making sure everything is clear) in each direction.
- (f) When all above are complete, sound horn to check horn and signal crane ready for operation.
- (g) Position hook over standard test block and attempt to lift. If load limit switch does not function, shut down all operations.

When leaving crane for any reason:

Do following in order:

- 1. Lower boom to lowest working position.
- 2. Raise hook as high as possible.
- 3. Rotate crane 360 degrees (one full turn to make sure all obstructions are clear). Return to original position. This means return in reverse rotation to prevent lapping cable.
- 4. Depress stop button. Put all operating controls in neutral position.
- 5. Close cab windows. Fasten cab safety belt.
- 6. Go out the door and fasten crane safety belt. Remove cab safety belt.
- 7. Close door and descend cautiously.
- 8. Turn off power.
- 9. Release swing brake, allow machine to weather vane.
- 10. Check cable for twist. Cable should not have any twist at night or when unit is shut down.
- 11. Descend from crane swing platform.
- 12. Lock out main switch.

A "pre-flight" check list for crane use is shown in Section N, Part 12.

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Daily, the PEO foreman and operator will go through this check list and initial each item as being satisfactory for operation. This list will also be used at any time crane is started after a shutdown.
The PEO foreman and Contractor's Superintendent will sign this report and forward daily to the Safety Supervisor.

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RADIATION HAZARD CONTROL FOR X-RAY AND RADIOISOTOPES

SCOPE This procedure covers the controls to be followed for any X-raying or radiographic work performed for or by Construction at this site.

A. RESPONSIBILITY

The Construction Engineer will be responsible for all radiographic work performed for or by Construction. The Radiation Protection Officer of the Operating Department will be fully advised in advance of all proposed radiographic work. The approval of the Field Project Manager or the Assistant Field Project Manager will be required prior to the initiation of any new phase of this work.

B. CONTRACTORS

Any proposed Contractor for this type work must furnish the following information when bidding on any radiographic work at this site:

1. Contractor's State Department of Health license number
2. Type of radioactive source to be used
3. Size of radioactive source to be used
4. That he will be fully responsible for the badging and protection of personnel and that maximum radiation received in any period will be in accordance with Federal and State Government requirements
5. The type camera or source handling facilities to be used
6. References on work performed for others

- C. COMMUNICATIONS

At least two (2) days prior to the starting of radiographic work, the Construction Engineer will furnish the Plant Radiation Protection Officer the following information in writing:

1. Contractor's name
2. The type and size of source to be used
3. The exact location of the work
4. The date and time of starting and stopping work
5. The location of the barricade to be erected
6. Any Construction personnel that will enter barricade during radiographic work

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At the same time the above information will be transmitted to all key members of Construction Supervision.

In the event there is any change in any of the above information at any time, the Plant Radiation Office and Construction Supervision will be notified in writing.

Under no condition will any radioactive source to be used by or for Construction be brought on the site without prior approval of the Field Project Manager, or in his absence the Assistant Field Project Manager.

D. TRANSPORTATION

1. Transportation of Radioisotopes

(a) The contractor is responsible for all handling of radioisotopes within the project boundaries. This will include:

- (1) Proper shielding of carrying containers
- (2) All vehicles used to transport radioisotopes on the project shall carry "Danger Radiation" signs and danger flags or reflectors to be used in case of breakdown.
- (3) No radioisotope sources shall be left unattended except in transportation vehicles or designated storage areas.

(b) All Contractor personnel transporting radioisotopes will be provided with film badges by the Contractor.

E. STORAGE

There will be no storage of any radioactive source on the site without prior approval of the Field Project Manager or in his absence the Assistant Field Project Manager and the Plant Radiation Protection Officer. At time of approval for storage of any radioactive source, provisions for approved storage area will be made.

F. BARRICADE AND SIGNS

The Construction Supervision will determine the area to be barricaded in view of the size of source to be used and will erect a barricade of sufficient size so that the estimated radiation doses will not exceed 3.0 MR/hr. above background at any point of

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its perimeter, (see Exhibit I for method of calculation), prior to removing the radioactive source from its shielding container. Approved "Radiation Area" signs will be placed on the barricade at conspicuous places and at all probable entrance points.

The wording and symbols on these signs will be in magenta or purple on a yellow background. A red blinker light will be placed on four (4) sides of the barricade, at all probable entrance points to the barricaded area and one as near as possible to the radioactive source. Immediately after the barricade, signs, and lights have been erected and prior to the unshielding of the radioactive source, the Construction Supervisor or his designate will make a check to assure that no unbadged Construction Personnel are within the barricaded area.

The radioactive source will then be unshielded and a radiation survey made by the Contractor to assure himself that all portions of the barricade are outside the 3.0 MR/hr. above background. At the time of the initial set-up for radiographic activities, the Plant Radiation Protection Officer, or his designate, will make radiation survey of the limits of the barricade with the radioactive source fully exposed to assure that the radiation level is 3.0 MR/hr. above background or less at all points. After full approval of the barricade is given by Plant Radiation Protection Officer or his designate, radioactive work by the Contractor may begin. In the event the radioactive source is such a size that barricading to 3.0 MR/hr. above background limits is not possible, or badging of Construction personnel is required, a special procedure will be written by the Construction Supervisor and approved by the Field Project Manager, or in his absence the Assistant Field Project Manager, prior to beginning any radiographic work. During subsequent days' work, providing the same radioactive source is used in the same location within the same barricade, the Contractor may start the radiographic work after his radiation survey and prior to the radiation survey by the Plant Radiation Protection Officer or his designate. However, the barricade radiation survey to spot check radiation readings will be made early in each day's work by the Plant Radiation Protection Officer or his designate. These readings along with the barricade, sign and blinker light locations will be placed on the daily log.

If the barricade is in such a location that it can be left in place after the day's radiographic work is complete, the signs and lights

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will be removed. If the barricade will interfere with any work to be performed between periods of radiographic work, the barricade will be removed.

G. **RECORDS AND REPORTS**

A sketch of the barricade will be drawn and all survey readings recorded. Also to be shown on this sketch will be approximate locations of radiation warning signs and blinker lights.

Prior to completion of each day's radiographic work, the Daily Radiographic Log will be made out. (See Section N) This log will be signed by the Supervising Engineer and the Contractor performing the work. The Daily Radiographic Log along with the Barricade Diagram will be distributed daily by the Construction Engineer as follows:

One (1) copy to the Field Superintendent's file.

One (1) copy to the Contract Engineer

One (1) copy to the Safety Department

One (1) copy to the Plant Radiation Protection Officer

In the event of any unusual incident or activity in any way related to the radiographic work by the Contractor performing the radiographic work, any Plant Personnel or Construction Personnel, the Construction Supervisor, and the Plant Radiation Protection Officer or his designate will be notified immediately. The Construction Supervisor will immediately notify the Field Project Manager or his Assistant. Any incident will be detailed fully in the Daily Radiographic Log.

Any time the radiation level reaches or exceeds 2.0 MR/hr. at the perimeter of the barricade, the Contractor's employees performing the work will enter on the Radiographic Daily Log the total time of such exposure.

H. **FOLLOW-UP**

During normal Construction working hours, a continuous patrol by the Construction Supervisor or his designate will be maintained outside the barricade. After working hours this patrol will be made periodically during the radiographing.

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EXHIBIT I

The radiation dose rate from an unshielded radioactive source depends on the type and strength of the source and on the distance from the source. The restricted area requiring a barricade around its perimeter is any point where the dose rate will be greater than 3.0 MR/hr. Since the dose rate is inversely proportioned to the square of the distance then

$$\frac{R}{R_0} = \frac{(d_0)^2}{(d)^2}$$

Where R_0 = the dose rate at distance d_0
 R = the dose rate at distance d

The product of $R_0 d_0^2$ is constant for any given source and gives the dose rate at unit distance. The $R_0 d_0^2$ (MR/hr. per curie at 1 foot) for the more common sources are as follows:

SOURCE	$R_0 d_0^2$ (MR/Hr. per curie at 1 foot)
Radium 226	9.040
Cobalt 60	14.080
Cesium 137	3.440
Iridium 192	5.920

Therefore the overall basic formula for a particular source would be

$$R = \frac{R_0 d_0^2}{d^2} \times C \text{ where } R = \text{dose rate}$$

d = distance in feet

C = Number of curies in source

$R_0 d_0^2$ = Constant for source

Therefore distance to barricade for a particular source is

$$d = \sqrt{\frac{R_0 d_0^2 \times C}{R}}$$

EXAMPLE

At what distance is the dose rate from a 1 curie Iridium 192 source equal to 5 MR/hr?

$$R_0 d_0^2 = 5.910$$

$$C = 1 \text{ curie}$$

$$R = 5 \text{ MR/hr.}$$

$$R = \frac{R_0 d_0^2}{d^2} \times C \text{ or } d = \sqrt{\frac{R_0 d_0^2 \times C}{R}}$$

$$d = \sqrt{\frac{5.910 \times 1}{5}} = \sqrt{1.182} = 34.4 \text{ feet}$$

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TRANSPORTING PERSONNEL, MATERIAL, AND EQUIPMENT

The following practices are to be enforced:

A. TRANSPORTING PERSONNEL AND MATERIAL

1. If it is necessary for employees to ride in the back of a loaded vehicle, Contractor's Superintendents will give approval and assume responsibility for their safety. Personal inspection of the loaded vehicle, to determine the possibility of load's rolling or shifting, is required and may be delegated to the foreman.
2. If employees must ride in the back of a dump truck, the bed must be secured to the frame of the truck. Running boards may not be ridden.
3. Employees must be seated, with arms and legs within the confines of the truck. Vehicles regularly used to transporting personnel must be equipped with seats and a safe means of mounting or dismounting from beds. Employees may mount or dismount vehicles only when fully stopped.
4. Power equipment "personnel platforms" must have access steps, hand rails (chain), and a secureable gate.
5. Personnel are to vacate all vehicles being loaded by a crane, backhoe, shovel, etc. Exceptions to this will be made by the Field Superintendent or higher authority.
6. Loads extending beyond the bed of a truck or wagon are to be flagged or marked at night with red lanterns or clearance lights. Loads are to be secured to prevent any movement.
7. Only three (3) people may ride in the cab of a truck. Seat belts must be used.
8. Drivers are responsible for their vehicle and passengers. Drivers must be familiar with and comply with state and project traffic regulations.

B. EQUIPMENT REQUIREMENTS

1. All vehicles used off Plant will be equipped in accordance with Engineering Standard S9G.
 - (a) A non-glare rear view mirror.
 - (b) Left-hand outside rear view mirror.
 - (c) Seat belts to accommodate all passengers.
 - (d) Turn signals
 - (e) In the absence of built-in flashers, flares must be provided for emergency use. Flares should be placed 300' behind and 100' in front of disabled vehicles.

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- 8) Two windshield wipers.
- 9) Back up lights, if used at night.
- 10) First Aid Kit (DuPont Medical Division approved)
- 11) Snow tires or chains, where conditions warrant.
- 12) All equipment and devices required by State Law.

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PARKING LOT SAFETY

Parking lots are provided for the convenience of employees. The following rules of conduct are recommended to minimize inconvenience in their use. Varying Plant conditions and locations will require different layouts. Standard C7R should be used as a basic pattern.

A. PEDESTRIANS

1. Parking lot problems are generally the result of a breach of rules and regulations and not the physical layout of the lot. Therefore pedestrians should use designated walkways.
2. Always walk — NEVER RUN.
3. Keep alert for moving vehicles at all times.
4. Load or unload vehicle only in DESIGNATED areas.

B. DRIVERS

1. Always enter and leave the parking lot along prescribed routes.
2. Follow posted speed limits and be alert for pedestrians — pedestrians have the right of way.
3. Pick up passengers only at designated points.
4. Be courteous. Avoid cutting in front of vehicles and causing loose gravel or shell to fly.
5. Always look before you back your vehicle.
6. Clear windows and tail lights of obstruction before using vehicle.

C. LIABILITY

1. Du Pont will not accept responsibility for injury, property damage, theft, or any other loss incurred in parking lots.

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WORK PERMITS AND FLAME PERMITS

POLICY

The objectives of this procedure are to safeguard personnel:

- I. In areas where operating equipment may contain hazardous materials.
- II. Where construction work creates a hazard for Operating personnel.
- III. Where activity must be coordinated and/or controlled because of the complexity of either operation.
- IV. In radiation areas.
- V. During the performance of any work where operating conditions require special safety precautions or fire prevention measures unfamiliar to construction personnel.

A. TIME AND SCOPE OF APPLICATION

1. This procedure will be placed in effect upon mutual agreement between the Construction Engineer and the Operating Supervisor of the area. The date selected should anticipate the actual necessity of construction personnel having to obtain work permits because of one of the five objectives above.
2. Areas where the procedure applies will also be determined jointly by the Construction Engineer and the Operating Supervisor of the area. These areas must be clearly defined.

B. WORK PERMITS

1. The work permit (see Section N) is to be initiated by the Construction Engineer in charge of the work and must be approved by the Operating Supervisor or his delegate in the building or area in which the work is to be performed.
2. The Construction Engineer will fill out the work permit form down through "Description of Work". Sufficient detail should be given in the description to define the scope of the work and the most hazardous phases. The remainder of the permit will be filled out and signed by the Operating Supervisor or his delegate. The Construction Engineer will then sign the permit as final authorization to begin work.
3. Sufficient copies of the work permit form are to be properly completed and signed so that one copy may be retained by the

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Operating Supervisor, one by the Construction Engineer, and one posted in the area.

4. The Construction Engineer is to retain his expired permits until all work is completed in the "permit" area.
5. The work permit form provides a space for the Operating Supervisor to note any special precautions necessary before or during the work. It will be the joint responsibility of the Construction Engineer and the supervision of the craft (s) involved to include these special safety precautions in daily instructions to all employees involved in the work before the work begins.
6. In the event that certain tests or checks for contamination or other health hazards are necessary, the Technical Section of the Operating Department will provide such service, or adequate parallel arrangements are to be made.
7. All crafts must check out their work area prior to starting and satisfy themselves that all precautionary measures have been taken.

C. *PROCESS AND PIPING*

1. No construction mechanic may open any process or service pipe line or piece of equipment until the line or equipment has been cleared by the Operating Supervisor of the building or area involved. Clearance by Operating Supervision includes decontamination of the systems. The first joint in the line or equipment will be opened by Operating personnel to demonstrate completion of this phase of work.
2. In clearing work for construction, the Operating Department will tag and lock all valves and switches concerned in accordance with their procedure for locking and tagging, after which Construction personnel will attach their tags and locks, in accordance with the Construction Danger Tag Procedure. When the work is completed, Construction locks and tags will be removed, after which the Operating Department may remove their locks and tags.

D. *POWER-DRIVEN EQUIPMENT*

1. On dismantling or shutdown of electrically-operated equipment, the Operating Department will open switches. After Construction

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has ascertained that fuses or heating elements are removed and has placed its locks and tags, the effectiveness of the lock-out should be checked by attempting to start the equipment. A thorough check is required to ascertain that all interlocks or dual feeds are de-energized.

2. On work involving equipment driven by steam or compressed air, two valves between the pressure sources and the equipment must be closed, locked, and tagged, or the lines disconnected by the Operating Department before work is begun.

E. **FLAME PERMITS**

1. The Construction Engineer must ascertain whether there are any restrictions or hazards involved should welding, burning, cutting, or any other flame or spark-producing operation be necessary. Smoking and match carrying should also be checked.
2. If certain fire prevention equipment or measures, such as extinguishers, air samples, or water hose, are required, these shall be noted by the Operating Supervisor on the bottom portion of the work permit under "flame permit".
3. If checks are necessary for explosive air mixtures, they should be made by the Technical Section of the Operating Department or a qualified service agency. The Construction Safety Office should be contacted for advice on special information such as toxicity and flammability.

F. **RADIATION CLEARANCE**

1. Construction personnel may not work in or enter any posted radioactive area without the prior approval of the Field Project Manager.
2. The Construction Engineer is to ascertain if there is any radioactive source within his work area.
3. In the event Construction personnel are to perform work on any equipment or in areas containing radioactive sources, the Operating Department will remove or shield the source to reduce radiation to background level, remove or cover the radiation signs, monitor the area, and sign the radiation portion of the work permit before Construction personnel enter the area.
4. Brown Book, Section G, Part 8 outlines procedure to be followed for setting up and controlling radioactive sources.

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DANGER TAG, LOCK AND TRY PROCEDURE

POLICY

Danger tags and locks shall be used only to prohibit operation of a valve, switch or piece of equipment when injury or property damage could result from the operation. No work is to be done on any operable equipment until operation of same is prevented by use of this procedure.

A. GENERAL

1. Only the standard Construction Division danger tag will be used.
2. All tags will be dated, signed, payroll number shown, and attached securely.
3. Tags are never to be re-used, but destroyed immediately on removal. No alterations are permitted.
4. No device shall be operated with tag or lock attached regardless of circumstances.
5. No person shall remove another's tag or lock unless the owner is off the site, then the Field Superintendent may remove the tag or authorize its removal.
6. It is Division Engineer's and Contractor Supervision's responsibility that no work is performed beyond the protection of locks and tags installed.
7. Locks and tags are not a substitute for Industrial Department's responsibility for breaking flanges, placing blanks, draining and otherwise decontaminating equipment or systems.
8. Electricians will place "multi-lock" devices if other crafts are involved in the shutdown.
9. Lines containing acid, volatile liquids, high pressure steam, and all electrical services require LOCK as well as tag.
10. Tags required beyond one shift must be replaced by the oncoming shift or by the Contractor's Superintendent* or Division Engineer if no work is scheduled and the system remains shut down. In no case will tags be permitted to remain for more than 30 days.
11. On complex lockouts where many mechanics are involved, the Contractor's Superintendent* and Division Engineer may, with the approval of Project Management, jointly place tags and locks in behalf of all involved; unlocking must also be done jointly.

*One General Foreman in each craft may be designated by the Contractor's Superintendent and approved by the Field Project Manager to act in this capacity.

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B. CONSTRUCTION EQUIPMENT OR FACILITIES

1. Electrically Operated Systems

- (a) Electrician opens switch, pulls fuses, places lock and tag, then tries to operate equipment.
- (b) Other mechanics place tags on electrician's lockout device.
- (c) Upon completion of work, mechanics remove their tags.
- (d) The electrician is the last to remove his lock and tag; and after assuring that everyone is clear, he will re-energize the system.

2. Other Systems

- (a) Appropriate person de-energizes, tags, locks, and "tries" the system.
- (b) Mechanics performing work, place their tags.
- (c) Mechanics remove tags as work is completed and system is re-energized.

C. OPERATING FACILITIES AND EQUIPMENT

1. Electrically Operated Systems

- (a) Plant electrician de-energizes system, demonstrating accuracy to Construction electrician.
- (b) Construction electrician ascertains that fuses have been removed; tags, locks, and tries the system.
- (c) Other mechanics place tags.
- (d) Upon completion of work, Construction electrician is last to remove his lock and tag.
- (e) Plant electrician clears system and re-energizes.

2. Other Systems

- (a) Plant operator de-energizes system and places locks and tags.
- (b) Plant mechanics make first break of flanges, place blanks, and demonstrate that system is empty and decontaminated.
- (c) Construction coordinator (Division Engineer or appropriate Contractor's personnel) verifies that system is de-energized and places his tag and lock.
- (d) Other mechanics place tags, perform work, and remove tags when complete.
- (e) Construction coordinator assures that system is clear, then removes lock and tag.
- (f) Plant operator re-energizes system.

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D. *SHOP EQUIPMENT*

1. The qualified operator of Construction Shop equipment may lock out his equipment to change tools, chucks, blades, and perform similar tasks.
2. A power disconnect switch must be provided for this purpose at or near the equipment, unless the equipment can be unplugged.
3. Pushbutton or butterfly controls may not be used for purposes of lockout.
4. A lock without tag may be used for this purpose.
5. The above does not apply to any maintenance or repair work that is done by other than the authorized operator.

E. *LOCKS*

1. Only individually keyed locks will be used; the key will remain in possession of the person placing the locks.
2. A master series of locks to be used specifically for lockout may be provided to each craft that requires them. Master keys for the craft will remain in the possession of the Contractor's Superintendent; grand master keys will remain in the possession of the Field Superintendent and/or project management.

F. *WARNING*

Any person who operates a valve switch or device to which "Danger" tags are attached or removes a tag without authorization will be subject to immediate dismissal.

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WORK ON OR NEAR ENERGIZED ELECTRICAL SERVICES

This procedure establishes the minimum requirements when work is to be performed which falls in the following categories:

- A. *WORKING ELECTRICAL SERVICES WHICH ARE ENERGIZED (HOT WORK)*
- B. *WORKING WITHIN CLOSE PROXIMITY OF ENERGIZED ELECTRICAL SYSTEMS*
- C. *USE OF SWITCH (HOT) STICKS*

A. "HOT WORK" DEFINED

The term "hot work" is defined as: Any work in which any exposed (uninsulated) part of any energized circuit must be touched with hands and/or tools or equipment.

Generally, no work is to be performed on any electrical facility which would fall in the category of "hot work", regardless of the voltage involved. There may be isolated instances, however, when because of Operating Plant considerations and requirements, it may be proposed or required by them that certain items of "hot work" be performed. Before work of this nature is begun, the following steps must be taken by Construction Supervision, *unconditionally*:

1. Work on Energized Circuits

- (a) The Division Engineer in charge of the affected area is to review and question the actual necessity of the proposed "hot work" with the *responsible Operating Supervision*. If electrical service interruption is not possible and the electrical work must be performed "hot", the Division Engineer will advise Project Management.
- (b) If the work is still deemed necessary following a thorough review by the Field Project Manager, a specific pre-plan will be developed jointly by the Division Engineer and Electrical Contractor's Superintendent covering all aspects of the proposed work. Preparation of the plan should include review of the proposed work at the work site, thorough analysis of the specific hazards involved, determination of the types of protection (blankets, line hose, mica, etc.), and establishment of personal protective equipment necessary.

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- c) The pre-plan will be reviewed and approved by the Safety Supervisor, Field Superintendent, and Field Project Manager or Assistant. Prior to the beginning of work, the FPM or AFPM will obtain the approval of his Construction Manager and agreement to the plan by the Operating Department.
 - d) All supervision and mechanics in the Electrical Department who are involved in the work will be thoroughly instructed in each step of the pre-plan to avoid the slightest misunderstanding and to insure the safe completion of the work. This is the responsibility of the Electrical Contractor's Superintendent.
2. Exceptions — (Items falling under "hot work" definition but excepted from "hot work" requirements)
- a) Testing — (440 volts maximum) — The use of standard testing instruments (approved by the Electrical Contractor's Superintendent) on energized circuits to determine voltage, amperage, wattage, etc. All persons engaged in such activities will wear di-electric gloves of proper voltage rating, safety glasses, and long-sleeved shirts. Furthermore, no rings, watches, key chains, metallic hats, or other conductive materials will be worn, used, or carried.
 - b) Gang Operated Switches — Opening and closing of such switches)
 - c) Miscellaneous — Work on welding circuits not exceeding 100 volts DC or 80 volts AC, automotive ignition circuits, wet cell batteries, instruments operated by dry cell batteries such as explosimeters, flashlights, etc.
9. **WORK IN CLOSE PROXIMITY OF ENERGIZED ELECTRICAL SYSTEMS**

Due to the nature of electrical work, it sometimes becomes necessary to work within close proximity of energized electrical systems. For the purpose of this procedure, close proximity is defined as: *Any work which must be performed within five (5) feet of an uninsulated energized electrical system; work performed over such systems, regardless of distance, where tools or materials could be dropped and cause short circuits; or work which involves handling of long material which could come into contact with such systems.*

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Examples of this type work would include electrical racks, substations, switch gear, high lines, etc.

1. Any work that meets the definition of close proximity, as defined above, will require the following preliminary steps:

- (a) The Division Engineer will write a "close proximity" job plan after consulting with the Electrical Contractor's Superintendent as to the method and safety precautions necessary to accomplish the work.
- (b) After the plan has been approved by the signature of the Field Superintendent, Division Engineer, and Safety Supervisor, the FPM or AFPM will obtain approval from his Construction Manager for work to start.
- (c) The FPM's signature will authorize the Division Engineer and Electrical Contractor's Superintendent to proceed.
- (d) The Electrical Contractor's Superintendent, after thoroughly reviewing the written plan of work, the hazards involved, and giving adequate STA to the Foreman, will give a copy of the plan to the Foreman. This will be the Foreman's approval to start the work.
- (e) All craftsmen involved must be instructed in all details of the job plan described above.

2. Plans will include a schedule showing the length of time required to complete the work, but in no case should permission extend for a period longer than one (1) week.

3. Since close proximity work, as defined by this procedure, requires the Construction Manager's approval, the "close proximity" job plan should be written at least five (5) days prior to the start of work.

C. SWITCH (HOT) STICKS

1. General -

- (a) Only fiberglass switch sticks are acceptable.
- (b) Switch sticks are to be stored in smooth, interior type storage cannisters. Cannisters are to be water tight, or otherwise protected from the weather.
- (c) Fiberglass sticks should be tested every five (5) years.
- (d) Generally, sticks are not to be used during rain, heavy fog, or snow. Should the need arise, a special protectant should be applied to the sticks to break up the moisture continuity (Ex: Dow Corning grease No. DC4 or DC5).

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2. Use —

- (a) Before use, inspect for contamination. Remove contamination with Triclene[®] or equivalent. Wipe the stick with a dry cloth.
- (b) Use of dielectric gloves is optional, depending upon the experience and judgment of the user.

Minimum lengths of fiberglass sticks are:

<u>System Voltage</u>	<u>Minimum Stick Length</u>
Up to 5 KV	6'
5 to 15 KV	8'
15 to 45 KV	10'
45 KV UP	12'

Specification for rubber protective is as follows:

	<u>ASTM</u>	<u>ANSI</u>
Insulating gloves	D120-63	J6.6-1964
Matting	D178-24	J6.7-R1962
Insulating Blankets	D1048-59	J6.4-R1962
Insulating Hoods	D1049-59	J6.2-R1962
Insulating Line Hose	D1050-59	J6.1-R1962
Insulating Sleeves	D1051-59	J6.5-1962

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PRESSURE VESSEL TESTING

A. GENERAL

1. Pressure vessels, for purposes of this procedure, will include both TC and permanent equipment installations.
2. Testing falls in categories of hydrostatic and pneumatic. IN NO CASE WILL THE FIELD UNDERTAKE STRUCTURAL TESTING. ALL TESTS WILL BE PERFORMED ONLY TO PROVE THE INTEGRITY OF A SYSTEM FOR LEAKS.
3. Additional information may be found in Engineering Spec. SP1B.
4. Definitions (see SP1B for details)
 - (a) Operating (working pressure) refers to the maximum pressure to be developed in the system during operation. This is determined by such things as pump shutoff pressure, relief valves, rupture discs, etc.
 - (b) Design pressure refers to the design limitations of the specification (SP-U or P code). This may be considerably higher than operating pressure.
 - (c) Maximum allowable test pressure should not exceed 150% of design pressure.

B. TC INSTALLATIONS

1. Air Receivers

- (a) Receivers on all portable and stationary compressors will receive hydrostatic tests to 150% of design pressure prior to being placed in service.
- (b) Test will be performed by the vendor, or by Construction if site-fabricated.
- (c) Subsequent tests will be at the discretion of the Field Project Manager.

2. Relief Valves

- (a) Valves will be calibrated and tested prior to installation and annually thereafter.
- (b) The Pipe or Instrument Department will be responsible for scheduling of tests and maintaining records.

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- (c) Relief valves must be set to operate at the pressure which is stamped on them.
- (d) Relief valves must be sized so that their relieving capacity permits no more than a 10% rise above the system operating pressure. Consult with Design Division for specific details.

C. PERMANENT INSTALLATIONS

1. Vessels

- (a) Inspection and testing is generally performed at the vendor's shop and witnessed by the Inspection Section. A copy of their report is sent to the field site.
- (b) Field tests should be restricted to design information and pressures previously determined and certified by the vendor and/or ASME codes.

2. Piping Systems

- (a) Incremental tests may be performed hydrostatically by shop doing the fabrication.
- (b) System tests may be performed hydrostatically or pneumatically after an entire system is installed.

D. HYDROSTATIC TESTS

- 1. These tests may be performed to twice the design pressure (not to exceed maximum allowable test pressure) without prior approval.
- 2. Tests which will exceed twice the design pressure require approval from the Division Safety Office or Construction Manager.

E. PNEUMATIC TESTS

PERMISSION FROM THE DIVISION SAFETY OFFICE AND/OR CONSTRUCTION MANAGER IS REQUIRED FOR ALL PNEUMATIC TESTS CONDUCTED ABOVE THE OPERATING PRESSURE OF THE SYSTEM.

1. Procedure

- (a) Use the form provided in Section N of the "Brown Book" at the site level. The engineer should complete this in its entirety and submit it to the site safety office. After

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review, a teletype should be prepared including all information and be signed by the submitting engineer.

- b) The request should also include:
 - 1) Whether system is a new or revised installation
 - 2) Whether equipment is included
 - 3) The results of any prior tests, if equipment is included (vendor's shop or local site.)
 - 4) Project number
- c) On new systems, the pipe specification should be the Standard Engineering Specific Use Specification (SPU series) rather than project specifications or "P" codes. If the SPU specification is not available, the maximum operating pressure and maximum allowable test pressure must be given in the request.
- d) On existing systems which have been altered, the allowable test pressure will generally be lower than when originally designed; therefore, the field must contact the Design Division to ascertain the rating for the revised system.

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OPENINGS – FLOOR, WALL, AND ROOF EDGE

Protection is required to prevent personnel or material from falling through floor openings, wall openings, or from roof edges, stairways, elevator shafts, and the like. The protection may be guardrails, hole covers, or a combination of the two.

- A. **FLOOR OPENINGS** – shall be protected in one of the following ways:
 - 1. Rigid guardrail and midrail of 2" x 4" lumber, 2" x 2" x 3/8" angle, or 1 1/2" pipe, supported by posts on 8 ft. centers with toeboard at least 4" high.
 - 2. Cable guardrail and midrail of 1/2" cable with toeboards.
 - 3. Hole cover shall conform to the following:
 - (a) Minimum of 3/4" plywood if one dimension is 18" or less.
 - (b) Two-inch material if both dimensions exceed 18".
 - (c) Secured to prevent displacement
 - (d) Clearly marked with "Hole Cover" sign.
- B. **WALL OPENINGS** – shall be protected as outlined in A above, if the bottom of the opening is less than 3 feet from the working surface.
- C. **ROOF AND ELEVATED FLOOR EDGES** – shall be protected in one of the following ways:
 - 1. Perimeter guardrail, as described in A above.
 - 2. Temporary, non-rigid barricade set back from edge at least 6 feet.

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EXCAVATION AND CONCRETE BREAKING

A. SCOPE

1. This procedure applies to all excavations in the immediate vicinity of existing underground services, where there is the possibility of contact with energized lines because their exact location has not been determined.
2. This procedure also applies when breaking concrete floors or walls in the immediate vicinity of service lines.

B. EXCAVATION WORK

1. Prior to excavation as outlined, the Construction Engineer is responsible for having the line and grade of the proposed excavation checked with all maps of underground facilities to determine the type and location of underground interferences.
2. The Construction Engineer will have the location and depth of these lines marked by stakes, indicating type of service.
3. After all underground services have been checked and marked, the Construction Engineer will issue a written permit to the foreman supervising the work, retaining one (1) copy.

C. CONCRETE BREAKING

1. Prior to chipping, drilling, or removing concrete from floors or other locations where service lines may be embedded, the Construction Engineer will check all maps and prints for the location of existing lines.
2. The location and depth of such lines will be marked for the guidance of the craft performing the work.
3. The Construction Engineer will issue a written permit to the foreman supervising the work, retaining one (1) copy.
4. Proper liaison with affected operating departments must be established prior to start of work.

D. GENERAL

It will be the Construction Engineer's responsibility to determine whether or not electrical lines can be de-energized during the excavating or concrete breaking work.

If not, the following must be included as specific instructions in the permit:

1. Grounding of tools
2. Insulating operator
3. Hand excavation to uncover interferences.

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LADDERS AND STAGES CONTROL AND INSPECTION

A. CONTROL OF LADDERS

Information for the safe use of ladders may be found in the "Blue Book". From an administrative standpoint, the following controls are required:

1. Straight and extension ladders require a 6-foot length of $\frac{1}{2}$ " rope (manila or synthetic fiber) spliced to the top rung.
2. Straight and extension ladders require non-skid safety feet.
3. Wooden ladders should be treated with a wood preservative at regular intervals (at least annually) to prevent weathering — DO NOT PAINT.
4. Purchase and use only Company-approved ladders. See Engineering Standard S3C. Wooden, aluminum, or fiber glass ladders are acceptable, depending upon application, but must meet specifications set forth in the above Standard.

B. INSPECTION OF LADDERS AND STAGES

A periodic inspection of ladders and stages is to be performed by the appropriate craft. Records of the inspections will be maintained. Each ladder and stage will be marked with the date when the inspection expires.

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NEW EQUIPMENT PRECAUTIONS

The words "New Equipment", as used in this procedure, apply to the *initial* arrival of all types of tools and equipment on the Construction site.

No equipment is to be received and placed in use until it has been thoroughly inspected and the necessary guards installed to ensure safe operation. The craft or department receiving the equipment will be responsible for complying with this requirement.

IN NO EVENT is any piece of equipment to be placed in use because it is "urgently needed" until it has been thoroughly inspected and the proper guards installed.

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VENDOR'S TRUCKS - LOADING AND UNLOADING

Loading and unloading of vendor's trucks must be done either entirely by the vendor's employees or entirely by Construction personnel.

Construction personnel should not attempt to unload any vendor's truck until the vendor's employee has opened and secured the truck doors or tail gates.

If it is the vendor's responsibility to load or unload, Construction personnel should remain clear so as not to be exposed to injury, in the event of an incident. If it is Construction's responsibility to load or unload, the vendor's employees should be instructed to remain clear.

The department or craft involved will be responsible for carrying out this procedure without deviation.

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GRINDERS - PEDESTAL, BENCH AND PORTABLE

A. GENERAL

1. Each employee is responsible for inspection of the grinder he is using to determine current inspection, proper wheel rpm rating, proper washers, properly spaced work rest, and guards.
2. The following types of wheel construction are listed in order of preference:
 - a) Resinoid (organic bond) reinforced
 - b) Resinoid bond
 - c) Vitreous (inorganic) bond
3. Wheel rating must exceed the maximum potential rpm of the grinder on which it is mounted.
Reduction of air pressure or volume to the grinder is not an acceptable substitute for a wheel of required rating. All grinding and cutting wheels must have rpm identification affixed by the manufacturer.
4. No special adapters, arbores, or other improvisations are permitted, nor may more than one wheel be mounted between a single set of flanges.
5. Perk's washers shall be used on all vitreous (inorganic) bonded wheels. These are not required on Resinoid reinforced wheels. Paper washers must be removed prior to installing Perk's washers. Grinding wheels have an affinity for water, which can throw them out of balance; therefore a wet wheel should not be used unless it is designed for that purpose.
6. All abrasive wheels shall be mounted between flanges which are at least 1.3 the diameter of the wheel. For exceptions refer to ANSI B7.1.
7. On all portable tools, the control switch shall be instant pressure controlled without locking pin.
8. Wheels should be stored in a dry place with constant temperature above freezing and protected from physical damage which could cause cracking.
9. Guards must be installed and maintained, per ANSI B7.1 and Engineering Standard S2M.

B. PEDESTAL AND BENCH GRINDERS

1. A designated craft will perform initial inspection and subsequent

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maintenance of all grinders. Installation must conform to Engineering Standard S2M. Inspections will be made on an established schedule and records maintained by the inspecting craft.

2. The inspecting craft will be responsible for installing all wheels and determining that they are designed for the speed of the grinder.
3. The using craft is responsible for maintaining the proper distance between the work rest and the wheel — 1/8 inch. The work rest shall remain 90 degrees to the tangent of the wheel at the point of contact.
4. Grinding is not to be performed on the side of the wheel.

C. **PORTABLE GRINDERS**

1. Grinders must be inspected prior to initial use and periodically thereafter.
2. Crafts using portable grinders will change wheels when necessary. Only wheels of rpm rating above that of the grinders are to be used. (It is preferred that all wheels be rated above the maximum rpm of the highest speed grinder on the project.)
3. The using craft shall assure that grinders are inspected when required. The inspecting craft will maintain a record of inspections.

D. **PERSONAL REQUIREMENTS**

Wearing of gloves will be the choice of the individual using the grinder. Generally it is best not to use gloves within 4" of the wheel. Material holders should be utilized in such cases.

E. **ABRASIVE DISCS AND CUT-OFF DISCS**

1. Grinding is to be performed on the rim face only of abrasive disc.
2. Check cut-off disc for chips — DO NOT USE IF CHIPPED.
3. Consider fire potential from sparks.
4. For bench applications, anchor material securely by mechanical means — DO NOT HOLD BY HAND.
5. For applications where portable disc is applied to work or work is hand fed into disc, avoid binding through misalignment.
6. Consider need for respiratory protection or ventilation system.

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Additional information may be found in Engineering Standard S2M and ANSI B7.1-1964.

TANK ENTRY

SCOPE

The word "tank" or "closed vessel" means all pieces of equipment which must be entered through a manhole or other constricted opening, such as, vaults, pipelines, tunnels, confined passageways, and pits. It also includes any area in which air movement is not possible or where respiration may be endangered by oxygen deficiency, fire, flood, explosion, or panic.

MINIMUM REQUIREMENTS

1. Prior to entering any tank, a permit must be properly executed by the Contractor's Supt. or Division Engineer outlining specific requirements as shown on sample in Section N and amplified below.
2. Disconnect or blank off (or otherwise render inoperative) and lock and tag out all pipelines, electrical lines, agitators, and any other services leading to a tank before entering.
3. Review the tank and its previous contents to ascertain that the necessary ventilation, protective clothing, respiratory equipment, emergency standby equipment, and fire prevention precautions have been specified and provided.
The Construction Safety Supervisor shall be consulted where any question as to adequacy of protective measures exists, or where toxicity and explosive information is required.
4. A means of quick, safe tank entry and exit shall be available and in place at all times during tank occupancy.
5. All persons entering a tank shall wear safety belts continuously from tank entrance to tank exit. The safety belt* shall be attached to a lifeline leading out of the tank exit.
6. A standby man, properly instructed in emergency procedures, shall be posted at the tank entrance at all times that someone is inside. (The standby should be of greater size and strength than the man entering the tank.)
7. If lighting and power requirements cannot be met by the use of battery lights and pneumatic equipment, reduced voltage (12 volts or less) must be used to minimize electrocution hazard.

*Where entrance is so restricted as to prevent removal of a man equipped with a waist type safety belt, a shoulder type safety harness shall be used.

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Higher voltages may be used only in conjunction with the Rucker Safety Sentry described in Engg. Std. E 1.2P, Fig. 4.

8. Burning should be kept to a minimum and then done only with cylinders outside and hose connections checked for leakage prior to tank entry. The possibility of flammable or explosive materials being absorbed in the shell material must also be considered prior to burning or welding.

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SCRAP RECEPTACLES - TYPE, LOCATION, AND USE

SCOPE This procedure outlines type, location, and use of containers for trash, scrap metal, and similar materials.

A. TYPE

1. All receptacles shall be constructed of metal or other suitable nonflammable materials.
2. Paper or pasteboard cartons, wooden boxes or crates, and similar type containers shall not be used for collection of combustible trash.
3. Receptacles intended as a receptacle for waste and rags saturated with oil, grease, turpentine, or other flammables subject to spontaneous ignition, shall be of the self-closing lid type approved for this purpose.

B. LOCATION

1. Planning must include the location of receptacles at field work sites. Consider potential points of trash accumulations: change rooms, cup dispensers, etc.
2. Receptacles located inside buildings shall be kept at least 18 inches away from combustible walls and partitions.
3. Receptacles, located outside of buildings, for combustible trash shall be placed at least 15 feet from the building or combustible materials.

C. USE

1. Employees shall be instructed to use trash barrels for the disposal of paper, lunch remnants, and all small scrap of a combustible nature.
2. Cigarette and cigar butts, matches, etc., should never be thrown in trash receptacles. Ash trays should never be emptied in waste baskets or other combustible trash receptacles.
3. Glass (broken, empty jars, etc.), scrap metal, and similar material should never be placed in trash containers.

D. IDENTIFICATION

All receptacles used for collection of scrap or trash shall be labeled with their intended purpose by use of preprinted stickers. Painting of the entire container is not necessary.

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SAFETY BELTS - USE AND INSPECTION

A. *USE OF SAFETY BELTS*

1. Safety belts are required under the following circumstances:
 - (a) On all stages, floats, or other types of suspended scaffolding
 - (b) On scaffolds with incomplete decking or handrails
 - (c) On sloping roofs
 - (d) On flat roofs or elevated floors within 4 feet of the edge
 - (e) On ladders near edge of roofs and floor openings
 - (f) Other elevated work which is not protected against falls.
2. Safety belts must be worn in the following manner:
 - (a) "D" ring at wearer's back
 - (b) Tied to immovable object overhead or to independent life line on suspended scaffolds
 - (c) Maintain a minimum of slack - no more than 3-foot potential fall.
 - (d) Use proper knot, either bowline or stopper hitch.

B. *INSPECTION OF BELTS*

1. Quarterly visual inspection by qualified inspector who will check:
 - (a) Stitching
 - (b) Rivets
 - (c) Buckle
 - (d) Lanyard
 - (e) Cuts or abrasions
 - (f) Acid damage
 - (g) Burns
 - (h) Dry rot
- 2. Visual inspection of general appearance prior to each use by the wearer.
3. Static or drop load testing is not permitted for safety belts and lanyards.

C. *MAINTENANCE AND IDENTIFICATION*

1. Belts will be identified with month and year of purchase, either by the vendor or the site.

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- 2 Records will be maintained so that belts are destroyed after 5 years, regardless of condition, earlier if condition warrants.
3. Lanyards must be of $\frac{1}{2}$ " nylon or Dacron[®] line no more than 8 feet long. No metallic lanyards are permitted.

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EXPLOSIVE TOOLS
(Stud Guns)

Regardless of the make, type, or size, all explosive tools can be hazardous. However, they can be used safely and to an advantage provided certain precautions are followed during their use. The following regulations will govern the use and storage of such tools:

A. GENERAL PRECAUTIONS (APPLICABLE TO ALL TYPES OF POWDER-ACTUATED STUD GUNS)

1. The Contractor's Superintendent of the craft using the tool will issue a written permit authorizing the use of the tool for each specific job.
2. The explosive power-actuated tool and ammunition must be kept in a locked box at all times (other than when being used) to prevent unauthorized use.
3. Storage of the tool, ammunition and studs should be controlled to the point that only AUTHORIZED, TRAINED* personnel can withdraw them for use.
4. Manufacturer's recommendations should be followed as to inspection, maintenance, replacement parts and ammunition.
5. The tools should not be used where the stud is to be driven into surface-hardened steel, cast iron, glazed brick or tile, marble, granite, live rock or similar brittle materials.
6. Tools must not be used in any location where explosives, flammable gases, vapors or dusts are present.
7. Existing and applicable local laws governing the use of explosive tools should be followed.
8. The tool operator and any nearby workers must wear eye protection when the tool is being used. Ear protection is available and should be used where the position of the work exposes the operator's ears to excessive concussion (Example: Shooting overhead in a tightly enclosed closet or corner with head and gun elevations approximated).

The utmost care must be exercised to insure that ammunition studs, nails, etc., are of the proper specification. The tool operator is to be instructed and must be positive that the tool is at all times equipped with the proper ricochet or spill guard.

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3. *HIGH VELOCITY GUNS*

1. Only the "captive stud" type gun should be used. Guns capable of firing a stud into free flight at high velocity are prohibited.
2. No stud is to be driven closer than three inches to the edge of brick, concrete or masonry surfaces because of their tendency to split or crack. Exception to this rule may be made where steel safety shields are placed on the sides of the surfaces as in the case of concrete curbs to prevent flying spawls.
3. In case of misfire, the tool should be kept in operating position for one full minute and then placed in a vertical position muzzled down while the charge is removed.
4. The tool should never be pointed at anyone. The line of fire, whether up, down or across, must be cleared of personnel. Don't assume the stud can't be shot all the way through anything.
5. Studs should never be driven through pre-drilled or pre-punched holes in fixtures or material without a special guard designed for this type operation.

C. *LOW VELOCITY HIGH INERTIA GUNS (STUD OR FASTENER VELOCITY NOT TO EXCEED 300 FPS AT 6.5 FEET FROM MUZZLE)***

This type gun employs the principle of a powder-actuated captive piston (high mass) driving a free stud at low velocity. Stud-driving energy is derived from piston inertia. Once free of the piston, stud alone has insufficient inertia to produce free flight, ricochets, penetration, etc. This type gun is recommended from both safety and productivity standpoints.

Adherence to A above will afford adequate use precautions.

*Manufacturer of the type stud gun to be used should train, qualify and license site employees in use and maintenance of the gun

**See Powder-Actuated Tool Manufacturers' Institute, Inc. code.

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ELECTRICAL EQUIPMENT - USE AND INSPECTION

A. GENERAL

The Electrical Department will maintain a record of all electrical equipment on the project. Requisitions for electrical tools and equipment should originate with, or be checked by, the Electrical Department before purchases are made. This equipment must be inspected prior to initial field use and must be re-inspected periodically as established below.

B. INSPECTION

1. Portable hand tools and equipment - Quarterly
2. Permanently-wired equipment - Semi-annually
3. Office equipment - Annually

C. INSTALLATION OR PREPARATION FOR USE

1. Permanent equipment and electrical service

Upon installation of any electrical power service to any apparatus or device, GROUNDING CIRCUITS WILL BE RUN AND PROVED OUT BY MAGNITO - MEGGER READINGS PRIOR TO ENERGIZING THE CIRCUIT WITH POWER. WHETHER THE PURPOSE FOR ENERGIZING IS FOR TEMPORARY TEST OR PERMANENT RUN-IN.

This provides protection PRIOR to intentional or accidental energizing of ANY electric service.

2. Portable tools and extension cords

- (a) Trigger locks must be removed prior to use.
- (b) Proper 3-wire cord and cord cap must be affixed.
- (c) Initial inspection for ground integrity and proper polarity performed.

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CHAIN FALLS AND MECHANICAL LIFTERS USE AND INSPECTION

A. *INSPECTION*

1. Chain falls and similar devices will be inspected quarterly by a qualified inspector.
2. Chain falls will be visually inspected for:
 - (a) Pull chains
 - (b) Load chains
 - (c) Load hooks
 - (d) Becketts
 - (e) Guards
 - (f) Casing
 - (g) General appearance
 - (h) Running condition
 - (i) Lubrication

B. *USE*

1. Note the capacity stamped on the case. This can rarely be exceeded if only one man operates the load chain.
2. A load must never be hooked on the end of the hook, and all hooks equipped with safety latch.
3. The load chain must not be used in place of a choker by wrapping the chain around the load and hooking above.
4. When there is more than one part required in the hook, the parts should be put in a shackle and the shackle on the hook.
5. Keep all workers clear of possible whipping chains, cables, and "lost" loads.

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EXCAVATIONS INSPECTION, BARRICADING, SHORING AND SLOPING

Following is a partial check list to use for inspecting excavations for safety considerations. All supervision should keep this list in mind and check excavations during their daily routine. Conditions of a questionable nature must be referred to both the Foreman of the men in the excavation and to the Field Superintendent immediately.

A. INSPECTION

1. Observe loose rocks or disturbed spoil on sides, slopes, and near top edges of trench.
2. Provide a ladder or stairway within 25 feet of each work area.
3. Review number and location of foot bridges.
4. Toe of spoil dirt pile should be at least four feet back from edge of excavation.
5. All materials should be placed as far back from edge of excavation as practical.
6. Motorized and heavy equipment should be routed as far away from edges of excavations as possible to keep loads off sides of excavations. "Crane Mats" may be required to spread load when equipment is required near edge for digging, handling pipe, hauling spoil, etc. Bumper logs shall be installed to limit travel of equipment near edge of excavation or a signalman will be used.
7. Carefully lower materials into an excavation; keep men away from the load, never under the load.
8. Check changing conditions, such as (1) a crack developing in the walls or at the top, (2) a small slide or slough-off, (3) water seepage.
9. Recognize the effect of heavy or persistent rain, or the effect of blasting on the excavation.
10. Check evidence of traffic up and down sloped banks.
11. Provide sufficient signs and barricades for daylight and darkness.

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12. Keep minimum practical number of men in excavation — don't overcrowd the space allowable for safe work.

B. SHORING AND SLOPING

1. Banks more than 4 feet high shall be shored or sloped to the angle of repose. This will vary with soil conditions, the size of the excavation, and may exceed a 1 to 1 ratio. The type of shoring will also vary with soil conditions and size of excavations but will generally be wooden bands, using trench jacks or continuous wooden frame.

C. BARRICADES

1. Types

- (a) Warning — These call attention to the hazard but offer no physical protection, therefore should be at least 4 feet from edge. Generally erected with yellow tape on stands.
- (b) Protective — Provide physical protection. Generally made from solid rails on posts set in ground.

2. Placement

- (a) Shall be erected prior to excavating or immediately thereafter to avoid leaving an unprotected hazard.
- (b) Shall be marked with lights at night if they are in walkways or roadways.
- (c) One barricade will suffice as protection for several small excavations in an area.

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BLASTING AND HANDLING OF EXPLOSIVES

POLICY — Blasting shall be conducted under the supervision of the Construction Engineer in keeping with Du Pont Standards and governmental regulations. The Du Pont Blaster's Handbook is a valuable reference.

A. **BLASTING**

1. Determine location and extent that blasting is necessary.
2. Be sure that the blaster places and detonates the charge in accordance with his instructions regarding size, location, and time of detonation.
3. Inspect blast area to assure that all charges fired, and arrange for clearance in case of misfire or partial discharge.
4. Blasting should be done when there are a minimum of personnel in the area involved, preferably before or after regular shift.
5. The posting of signalmen, equipped with red flags to warn personnel, is required. Keep lookout men and others at least 300 feet away from blast site.
6. Blasters shall be fully qualified to handle explosives in compliance with Governmental regulations.
7. Blasting mats shall always be used.
8. Special precautions shall be used when blasting near buildings, overhead lines, or similar facilities subject to damage.
9. Mobile radio equipment is not permitted within 1000 feet of blast area unless it is de-energized and locked out.

B. **STORAGE AND HANDLING**

1. Explosives shall be transported in approved magazines or original container.
2. Blasting caps shall not be transported in the same vehicle with explosives.
3. No smoking, carrying matches, or other spark-producing device is permitted on vehicle.
4. Vehicles shall be identified on all four (4) sides with sign "EXPLOSIVES" in red 4" letters on white background.
5. Vehicle must carry a fire extinguisher carrying a minimum UL rating of 10 BC.
6. Explosives shall be accounted for at all times and an inventory and use record kept. Appropriate authorities must be notified of loss and/or theft of explosives.

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7. The storage of explosives shall be in a magazine separated from blasting caps and primers, and no smoking or open flame will be permitted within 50 feet.

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LIGHTING OF WORK AREAS

A. POLICY

Lighting of work areas shall be established to conform with the following table BEFORE men are assigned. This may be accomplished by permanent lights, temporary lights, or a combination thereof.

Appropriate supervision should be supplied with an inexpensive portable light meter for use in administering this procedure.

TABLE

Area	Foot Candles in Service
Shops	
General	30
Benches	50
Storage	10
Machine Tools	100
Field	
General	10
Specific Areas — Includes Operations such as threading, grinding, rigging, etc.	30
Precision Work	50
Storage	10
Office	
General	70
Sketching	125

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METAL WELDING, CUTTING, BURNING, HEATING, OR MELTING

Gases for Oxy-fuel gas cutting and burning will be restricted to natural gas and/or propane unless specific permission is granted by the Construction Manager.

Metal working with such tools as gas or electric torches, blow torches, and similar devices using flames are major fire hazards. Such work can be done safely if the following rules are strictly followed:

- A. Keep flame, sparks, molten slag, and hot metal from coming in contact with combustible materials.
- B. Each employee engaged in this type work is to have a 10B:C rated or greater dry chemical extinguisher within immediate reach. It is his responsibility to know that his extinguisher is in proper working condition.
- C. When such work is done inside buildings, near buildings or combustible materials, the following precautions must be observed:
 - 1. No work is to be started in any operating plant building until work and flame permits are obtained.
 - 2. Be certain that floor or area around the work is free of combustible debris or airborne combustible gases.
 - 3. Be sure that no flammable liquids are in the vicinity of the work.
 - 4. Have all combustible materials within the area of proposed work moved to a safe distance. If because of excessive weight or bulk the material cannot be moved, it should be protected with a fire resistant material.
 - 5. Use metal catch pans or other suitable means to catch sparks or hot slag when burning, etc. overhead on grating or other openings.
 - 6. Assure that there are no chlorinated solvents within 200 feet.
- D. Check Safety Department before any welding, cutting, or heating is done on a metal drum, barrel, or tank.
- E. The use of heating tips or "Rosebuds" on Oxy-fuel torches, for the purpose of heating metals to produce hot bends, creates a potentially hazardous condition.

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EYE PROTECTION

This procedure outlines the minimum types of eye and face protection required for an all-CPPC construction site.

A. SAFETY GLASSES WITH SIDESHIELDS* ARE REQUIRED

1. In all Construction Shops.
2. In fabrication areas adjacent to certain shops.
3. In plant areas to the extent required by the Operating Department.
4. By project supervision at all times.
5. For drilling, chipping, pouring concrete, steel on steel, driving nails, power sawing, and similar jobs.

B. FACE SHIELDS

Required for:

1. Grinding.
2. Pouring lead, vitrabond, etc.
3. Cadwelding.

C. COVER-ALL GOGGLES AND ACID GOGGLES

Required for:

1. Handling corrosive liquids or solvents (acid goggles).
2. Power chipping or breaking (cover-all).

D. PRESCRIPTION GLASSES

If employees with prescription glasses desire to purchase safety glasses, we will purchase on a reimbursable basis; otherwise, visitors' goggles will be provided for those employees where eye protection is required.

E.- CONSTRUCTION AREAS

Safety glasses will be required in construction areas as outlined above. The entire project may be designated 100% eye protection at the discretion of the project management.

F. VISITORS' EYE PROTECTION

The Field Project Manager should assure that visitors are properly equipped and escorted while on a field tour. Depending upon proximity to work, eye protection may not be required.

*Sideshields for prescription glasses may be of the clip-on type. clip-on type is acceptable for visitors' use only.

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G. *BOUNDARIES*

Areas requiring 100% eye protection shall be designated by appropriate signs along the boundary.

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RAILROADS

A. *SCOPE*

1. This procedure outlines basic precautions for work in or around railroad tracks, spurs, or cars.

B. *TRACK WORK*

1. Track work shall be coordinated with railroad and/or operating department to ascertain that section involved may be shut down.
2. "Blue ball" signs clamped to rail shall be placed on both sides of work location as far away as possible but never less than 100 feet or the nearest switch. Signs must be removed promptly when work is complete.

C. *RAILROAD CAR LOADING AND UNLOADING*

1. Operating Department and/or railroad shall be notified of work in progress.
2. Cars shall be protected by "blue ball" signs attached to the car or placed on track at both sides of car spot.
Lighting should be placed on signs for work after dark.
3. Brakes shall be set or cars chocked (see Engg. Standard S4C).
4. Access to car shall be provided for personnel and materials handling equipment.

D. *RAILROAD CAR MOVING*

1. Assign one man to act as "brakeman"; nobody else permitted on car.
2. Only cars on level track may be moved and then only at walking speed.
3. Vehicle pulling car must stay clear of tracks.
4. Place chocks only after car has stopped completely.

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PROTECTIVE COATINGS SAFE APPLICATION

A. GENERAL

The application of protective coatings involves the following hazard considerations:

1. **Flammability of Materials and Explosion of Air-Vapor Mixtures.**
Virtually all solvent solution coatings are highly flammable in liquid form. Vapors released in the process of application will be explosive if concentrated in sufficient volume in closed or restricted areas.
2. **Toxicity of Materials.**
Solvents, as well as other components (lead, cyanides, resins, etc.) of many solution coatings, are toxic. Intoxication may come about through excessive breathing of vapors or particulate matter, skin contact (dermatitis, allergy, etc.), skin absorption into the system, and oral ingestion.

B. PRECAUTIONARY MEASURES AGAINST:

1. Explosive Vapors, Wet Coat Surface Fires and Flammable Liquids:

- (a) Provide application area with adequate explosion-proof ventilation.
Adequate ventilation is considered to be that which will prevent the accumulation of explosive vapors above 10 per cent of the Lower Explosive Limit (LEL) of the solvents being employed.
- (b) Provide air sampling sufficient to prove adequacy of ventilation (explosimeter or similar device).
- (c) Protect mix and storage areas, application area, and "wet" walls from all ignition sources.
- (d) Handle low flash point (under 200°) solvents in safety cans or equivalent drum dispensers.

2. Toxic Materials:

Inhalation Protection

- (a) Provide ventilation sufficient to satisfy Threshold Limit Value (TLV). See Page 2 for toxicity ventilation calculations.

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- (b) Inhalation toxicity protection can also be afforded by breathing air equipment.
If excessive airborne particulate concentrations exist, breathing apparatus may be mandatory.

Skin Contact, Skin Absorption, and Oral Ingestion Protection

- (a) Long-sleeved shirts, gloves, skin cream, and washing of hands and face before eating and smoking will generally afford adequate protection for solvent solution enamels, lacquers, varnishes, petroleum products, water-based paints, etc.

CAUTION: Special coatings containing leads, chlorinated hydrocarbons, epoxies, resins, polyamines, cyanides, styrene monomers, highly reactive catalysts, and coatings which involve chemical reactions require special development of safety precautions.

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SAMPLE CALCULATION
PROTECTIVE COATINGS
(VENTILATION)

An entire room is to be given one coat of paint. Developed information indicates:

1. Xylene makes up 48% by volume of paint mixture as it leaves the factory.
2. Site painters will add an additional pint of xylene per gallon. End result: mixture which is 53% xylene by volume.
3. Paint additionally contains solids, pigments, etc., which are not toxic or flammable.
4. Application rate will be two gallons per hour for eight hours.
5. Assume: all xylene immediately evaporates from applied paint; mixes completely with air in room; and vapors do not escape room.

Minimum ventilation required:

- A. Xylene evaporated per shift = 2 gallons paint mixture per hour x 8 hours x 53% xylene by volume = 8.48 gallons xylene.
- B. Vapor volume of xylene (1 gallon evaporated) = 27 cubic feet.
- C. Total volume of xylene vapor available = 27 cubic feet x 8.48 gallons = 229 cubic feet.
- D. TLV for xylene = 200 PPM or 0.02% by volume in air.
LEL for xylene = 10,000 PPM or 1% by volume in air.
TLV is therefore the controlling limit.
- E. Total volume of air required to dilute total xylene applied to a TLV of 200 PPM =
$$\frac{\text{total volume of solvent vapor} \times 10^6}{\text{TLV}} \quad \text{or} \quad \frac{229 \times 10^6}{200 \text{ PPM}} =$$

1,145,000 cubic feet per 8-hour shift or 2385 CFM air change.

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ACIDS — STORAGE, HANDLING AND APPLICATION

I. SCOPE

This procedure outlines basic safety requirements concerning the receiving, storing, and handling of nitric, muriatic, acetic, chromic, hydrofluoric, oxalic and other acids used for such processes as pipe pickling, acid etching of wall surfaces, etc. Supervision of the craft requisitioning and using any of the acids will be responsible for seeing that these precautions are followed at all times.

II. STORAGE OF ACIDS

1. All acid carboys and drums are to be stored in a location where they will be protected from the direct rays of the sun, inclement weather, and sources of artificial heat.
2. Carboy and drum storage must be isolated from working areas or main buildings and unless empty, shall be stored "one high".
3. All new shipments of acids, on arrival must have containers opened to release any internal pressure.
4. Acid carboys and drums are to be inspected at least once each week for evidence of leakage. At the same time, they are to be opened to release any internal pressure. Note that weekly venting is particularly important on drums.
5. Where it is necessary to store acids in a storage building, the various types shall be segregated; carboys are to be placed on wooden skids.
6. Adequate ventilation must be provided in the storage areas, and a water supply should be located in the vicinity so that accidental acid spills or leakage may be washed away.
7. Barrels and drums are to be stored on metal or wooden racks equipped with chocks to prevent rolling.

III. HANDLING CARBOYS, DRUMS, BOTTLES

1. When diluting acid, always remember to add acid to water cautiously; never add water to acid.
2. In obtaining acid from a carboy, use a safe carboy inclinometer, siphon or pump.
3. Do not move carboys of acid unless the stoppers are securely tied and the hood is in place.
4. In the absence of a safety shower, keep a supply of water near at hand for emergency purposes. (An ordinary 3/4" garden hose, connected to good pressure will suffice.)
5. A substantial wood cradle or pallet shall be used under the acid container when lifting and transporting by mechanical means.

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IV. PROTECTIVE CLOTHING AND EQUIPMENT

1. Acid type goggles, rubber gloves, coats and aprons are the minimum protection to be worn by employees when they are handling and dispensing acids.
2. Where employees may be exposed to the possibility of acid gas and organic vapors, suitable respiratory equipment must be worn.
3. Particular attention is again directed to the venting of acid containers, both on arrival and periodically—proper eye protection, rubber gloves and aprons must be worn.

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When using this type of tip, a single fuel cylinder may not supply sufficient volume of gas to support a flame of the size that the heating tip or "Rosebud" produces. As a result, the flame will tend to "flash back" into the torch body creating a serious hazard from explosion.

It is therefore recommended to manifold at least two fuel cylinders by use of a small "pigtail" when performing this operation. This increases the volume of gas and eliminates or greatly reduces the potential hazard.

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TAR KETTLES

SCOPE This procedure outlines requirements for set-up and use of tar kettles to minimize the hazards of fire and burns.

A. LOCATION OF EQUIPMENT

1. Tar kettles or similar devices using pressurized fuel burners must be located at least 30 feet from any structure, building, or material and equipment of a combustible nature.
2. Materials used in the heating operation should not be stored closer than 10 feet from the kettle. The immediate work area shall be kept free of stumbling and tripping hazards.
3. Necessity for flame permits should be checked if the work is to be performed in a plant operating area.
4. If kettle is located on a roof, it shall be placed in a non-combustible enclosure or pan large enough to hold the entire contents of the kettle.

B. PRECAUTIONS DURING USE

1. Employee performing this work must wear eye and face protection when loading kettle. Gloves shall be worn and sleeves rolled down.
2. A fire extinguisher of minimum 20 B:C rating is required near the kettle.
3. Fuel tanks are to be separated from kettle frame; examine all hoses, fittings, clamps, etc., from pressure fuel chamber to burner on a daily basis.
4. Maintain careful control of temperature of molten tar inside kettle to prevent accidental ignition.
5. If the contents ignite, close the kettle lid, close the burner valve, and remove burner from kettle. The fire will usually smother in a short time. The fire extinguisher should be used on stubborn cases. Stand back from the kettle when the lid is raised (use long-handled shovel, etc.), as the sudden inrush of fresh air may result in re-ignition.
6. All equipment, including buckets or carrying containers, should be free of all moisture to prevent splattering of the hot liquid.

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MATERIAL HOISTS

A. OPERATION OF HOIST

1. Hoist to handle materials only — No person is permitted to ride the hoist platform.
2. Dual platform hoist towers — At no time will the two platforms be operated simultaneously.
3. Hoist platform load capacity should be determined prior to use and posted at each level.
4. Enclose either the hoist tower or the hoist platform with chicken wire to a minimum height of 7 feet to prevent the free fall of material from perimeter of tower. Toeboards are required around perimeter of platform.
5. Material and equipment should be kept off ramps to hoist tower at the various elevations until hoist platform has been spotted and gate opened.
6. Hoist tower must be level, plumb, and securely guyed at intervals of at least 25 feet.
7. The operator must have overhead protection of at least 2" lumber, supported to develop full strength.

B. CONTROLS

1. Signal System
 - (a) A battery powered telephone system is recommended to transmit instructions between hoist operator and elevated landing level, particularly on multi-level hoists.
 - (b) Standard bell signals may be applied where hoist is used with only one elevated landing. Regulations and signal instructions are to be posted at both levels of operation and at the hoist engine or motor location.
2. Gates
 - (a) The gates to the hoist tower at each landing level shall be constructed to prevent any part of the body from protruding into hoist tower when gate is closed and hoist is in use.
 - (b) All gates to the hoist tower should be equipped with an electrical interlock system so that no gate may be opened

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unless hoist platform is positioned at that level. A green light, indicating that all gates are closed, and a red light, indicating that a gate is open, must be clearly visible to the operator.

- c) If there is any indication to the hoist operator that a gate to the tower is open, the hoist should be made inoperable and shall remain so as long as the gate remains open.

3 Brakes

- a) Hoist brakes must be capable of stopping 150% of maximum allowable load.
- b) The hoist engine cable drum should be equipped with ratchet and pawl to hold the load.
- c) The hoist platform should be equipped with brakes that will hold the tower rails if hoist cable fails.
- d) Brakes in both 2 and 3 above must set automatically ("dead man control")

C. INSPECTION

1. Mechanical

- a) The appropriate Contractor's Supervision shall be responsible for the regular inspection of the mechanical phases of the hoist.

2. Electrical

- a) The appropriate Contractor's Supervision shall be responsible for the inspection daily, before use of the electrical interlock system and telephones.

DUP 0912150

12-71

DU 029681

INSPECTION OF PORTABLE TOOLS AND EQUIPMENT

A. GENERAL

The following outlines the procedure for method and frequency of inspection of all tools and equipment. The Contractor's Superintendent or designate charged with the inspection will keep adequate records of inspection and repair. Over-all coordination of this activity is the responsibility of the Field Superintendent.

B. RESPONSIBILITY

It is the responsibility of the craft using or possessing tools and equipment to have such equipment inspection completed by the end of each inspection period. The responsible craft will arrange to get tools and equipment to the proper inspection stations or arrange for the inspecting craft to visit them.

C. INSPECTION MARKINGS

All inspected tools and equipment will be identified by color code, using tape printed with the expiration date and of the colors designated below, or other suitable means.

MARCH	-	YELLOW
JUNE	-	ORANGE
SEPTEMBER	-	WHITE
DECEMBER	-	RED

THE CRAFT USING EQUIPMENT IS RESPONSIBLE FOR SEEING THAT IDENTIFICATION MARKINGS ARE KEPT LEGIBLE THROUGHOUT THE CURRENT PERIOD. New tools and equipment must be inspected before being sent for use in the field and must have identification, showing the inspection expiration date.

D. RESTRICTIONS

At any time that tools or equipment are found to be in need of inspection or repair, they must be tagged "Defective" and sent to the responsible department for the inspection and repair.

Under no circumstances may defective tools or equipment remain in service.

DUP 0912151

DU 029682

<u>Monthly Inspection</u>	<u>Check For</u>
<u>Major Equipment</u> (excludes shop equipment and trailers)	Condition of entire piece of equipment, as outlined on WME card.
<u>Quarterly Inspection</u>	
<u>Burning Equipment</u>	Broken gauges, leaking hoses and connections.
<u>Chain Falls</u>	Damaged load links, conditions of gears, hooks, brakes.
<u>Come Alongs</u>	Damaged chains, hooks, handle
<u>Grinders</u>	Guards, vibration, balance, etc. Millwright changes all wheels on stationary units during month, as required
<u>Ladders</u>	Flughty, rot, cracks, rope, proper hardware, splinters, steps and rungs
<u>Lug Alis</u>	Cable, handle, latch, hooks
<u>Portable Electric Hand Tools</u>	Proper ground, polarity, breaks, damaged connectors, switches
<u>Safety Belts</u>	Visual defects
<u>Shop Equipment</u>	Electrical and mechanical condition, as indicated on WME card
<u>Stages</u>	Loose slats, bad hand rails, damaged rungs.
<u>Trailers</u>	Entire condition, per WME card

<u>Annual Inspection</u>	<u>Check For</u>
<u>Office Equipment</u>	Proper ground, polarity, breaks, damaged connectors, switches.

<u>Items Inspected</u>	<u>On Continuing Basis</u>
<u>Electric Welding Cables</u>	Not inspected on a scheduled basis. Repaired when noted by Electricians. Electrical Contractor's Superintendent or his designate, or when they are informed of poor condition
<u>Scaffold Planks and Scaffold Materials</u>	Upon erection and dismantling

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DU 029683

FIRE INSPECTION - AFTER HOURS

In order to decrease the potential of fire, inspections will be made following the close of each shift.

Inspection teams will tour the entire construction area, inspecting all construction buildings and work sites to ascertain that no open fires, smoldering sparks, and potential fire hazards exist. If fire hazards are discovered, the team will take whatever action is necessary to control them.

Offices, change houses, warehouses, and areas where welding or burning were conducted are particularly vulnerable to fire.

The number of people assigned to fire inspections will vary with the size of the job; however, it should be sufficient to cover all areas within one-half hour after quitting time.

A check list may be used to summarize the results of after-hour fire inspections.

DUP 0912153

12-71

DU 029684

COMPRESSED GAS CYLINDERS

A. IDENTIFICATION

1. All compressed gas cylinders shall be identified as to content by having the proper manufacturer's label attached or placed on each cylinder.
2. The receiving department may not accept compressed gas cylinders from any vendor unless the cylinder is clearly identified, as outlined in "1".
3. See Engineering Standard F1J for additional information on use, storage, and marking of cylinders.

B. HANDLING

1. Metal valve cap must be in place at all times when the cylinder is not connected for use.
2. Cylinders should be moved or transported in special racks or cradles to prevent them from being dropped or falling over.
3. Lifting of cylinders from one level to another is never to be done by means of attaching rope or chain slings. Only enclosed cages or carrying cradles designed for this purpose are to be used.

C. STORAGE

1. Store and use in upright position; secure (tie, etc.) each cylinder to positively prevent it from falling or being pulled over.
2. Cylinders of oxygen or other oxidizing gases shall be stored separately from other gas cylinders.
3. Where conditions warrant, storage may be provided to afford weather protection for cylinders.
4. Smoking is not to be permitted within 20 feet of any cylinder storage area containing cylinders of flammable gas.
5. All storage compartments shall be identified as to contents.
6. Storage building should be minimum of 50 feet from adjacent buildings.

DUP 0912154

12-71

DU 029685

SOLVENTS, FLAMMABLE, AND COMBUSTIBLE LIQUIDS -- STORAGE, CONTROL, AND HANDLING

This procedure establishes the requirements for storage, handling, and use of solvents and other flammable liquids. ALL SOLVENTS MUST BE APPROVED BY SAFETY DEPARTMENT PRIOR TO PURCHASE.

A. GENERAL

Solvents involve the following major hazard considerations:

1. Toxicity

Solvents as a group are toxic to varying degrees and in varying ways. Toxic effects may come through breathing of vapors, skin contact (dermatitis, allergy, etc.), skin absorption into system, and oral ingestion.

2. Flammability

Virtually all solvents are flammable. The degree of flammability varies with individual solvents. Vapors released by these solvents will be explosive if concentrated in sufficient volume in closed or restricted areas without adequate ventilation.

B. PRECAUTIONARY MEASURES TO BE TAKEN AGAINST --

1. Flammability

- (a) Provide adequate ventilation. Adequate ventilation is considered that which will prevent the accumulation of explosive vapors above 10% of the lower explosive limits of the solvent used.
- (b) Provide explosimeter sampling to assure adequacy of ventilation at beginning of use and as needed during use.
- (c) Control spark-producing devices.
- (d) Handle solvents in safety cans.
- (e) Ground against static in accordance with Engineering Standard E3P.

2. Toxicity

Inhalation Protection

- (a) Provide adequate ventilation to maintain concentration of vapors below the Threshold Limit Value (TLV).
- (b) Where flammability is not of concern, breathing air equipment will afford protection against inhalation toxicity.

DUP 0912155

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Skin Contact, Skin Absorption, Oral Ingestion Protection

- a) Long-sleeved shirts, rubber gloves, skin cream, and washing of hands and face before eating or smoking will generally afford adequate protection for solvents.

C. CONTROL OF FLAMMABLE AND COMBUSTIBLE LIQUIDS
(under 200° flash point)

1. Bulk Storage

- a) All tanks for bulk storage of flammables are to be installed underground in accordance with the specification shown in Engineering Standard F11G. Special attention is directed to installation of proper flame arresters on both fill and vent piping.
- b) Smoking is prohibited within a distance of 50 ft. from any installation as described in Part B.1. above or within 50 ft. of pumps, fill, or vent piping.
- c) Large containers (55 gal. drums) of lubricating oil, linseed oil, turpentine, paints, kerosene, and similar type oils or solvents, must be stored outside building. See Engineering Standard F9G for details concerning fire protection when solvents are dispensed from building enclosures. See Engineering Standard E3P for static protection for flammable liquid containers.

2. Small Quantity Handling

- a) An approved safety can must be used to transport, handle, or dispense small quantities of flammable and combustible liquids (gasoline, kerosene, turpentine, solvents, etc.)
- b) Contents of all safety cans must be identified, using labels or stencil.
- c) Lubricating, linseed, and motor oils need not be stored in safety cans. However, these oils should never be stored in open containers (such as pans or buckets); and the can should be labeled or stenciled as to content.

D. REFUELING VEHICLES AND EQUIPMENT

- 1. All motor vehicles or equipment operating on this project (which are powered by or operating in connection with an internal combustion engine using gasoline, diesel fuel, LP gas, or similar fuels) shall not be refueled with the engine running or operating.
- 2. All ignition switches shall be in "off" position during refueling operations.

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DU 029687

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APR 3 1973
TECHNICAL SERVICES
NOISE CONTROL

Section D
Part 48
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A. SCOPE

This procedure covers control of noise levels, minimum requirements for the protection of hearing, and typical exposures that exist on Construction sites.

B. LIMITS OF EXPOSURE

Maximum permissible "A" scale exposure is 90 decibels for 8 hours. The time/noise factor, however, allows higher exposures up to 115dBA for brief periods, as outlined below:

dBA	Duration (hrs.) per Day
90	8
92	6
95	4
97	3
100	2
102	1-1/2
105	1
110	1/2
115	1/4 or less

It should be noted that noise levels drop rapidly as distance from the source increases; therefore, remote location of noisy equipment is desirable.

C. ENGINEERING CONTROLS

1. Promacut saws (steel blade friction types) should be shrouded per design by ESD. Without shrouding, the operator and people in adjacent areas will require hearing protection.
2. Lapse time meters can be installed on any shop machine which has questionable noise levels. These will provide economical evidence of time exposure. (Be sure the meter is wired directly into the service which causes the noise, not to an auxiliary motor or blower.

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3. Time and distance affect the permissible exposure. Machines, such as compressors and gasoline driven welders, should be remotely located to reduce exposure to those times when it is necessary to stop, start, or otherwise adjust the machine. This normally does not present the potential of exceeding permissible limits as measured by a dosimeter and octave band survey.
4. Operators of cranes, cherry pickers, front end loaders, etc., require hearing protection unless cabs are insulated to minimize exhaust sounds; changing of mufflers will reduce exposure to personnel working around the equipment.
5. Portable disc grinders (air or electric) produce unacceptable noises when used on large pipe and steel plate. Operator protection is required. Employees in the area may require protection, depending on the distance from source. (15 to 20 feet approx.)
6. The general background noises of construction are within acceptable levels. Most shop tools produce noise within acceptable levels. Those which do not usually are used intermittently, and the length of exposure minimizes concern.
7. Noise surveys should be conducted of any questionable areas or machines.
8. Future W.M.E. purchases (cranes, fork lifts, etc.) will include specifications restricting noise to acceptable levels.
9. Procurement and installation of future shop equipment shall include considerations for noise abatement or elimination.
10. Areas exceeding permissible 8-hour exposure shall be clearly identified.

D. OPERATIONS AREAS

Construction personnel will follow Plant hearing protection requirements.

E. HEARING PROTECTION

1. All personnel will be instructed regarding availability and proper use of hearing protection.

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2. Ear plugs will be issued to personnel requiring protection on an intermittent basis. Plugs must fit the individual; therefore, they must be issued by a person (Nurse, First Aid attendant) who has been trained in fitting them by a physician.
 3. Ear muffs should be provided for personnel requiring full time protection where engineering controls are not possible, such as equipment operators.
- F Typical exposures are shown on the following page as a guide to setting up a hearing protection program.
- G. For additional information, see Engineering Standard J2B.

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TYPICAL EXPOSURES

<u>Equipment</u>	<u>Maximum Exposure Without Protection</u>
Promacut with Shroud	Operator - 4
Promacut Saws	Operator - 0
Portable Grinder, (air & electric)	4 hours
Buffalo Iron Worker	1 hour
Beaver Cut-Off Saw	2 hours
Media Abrasive Cut Off Saw	8 hours
Leonard 1-1/2 d Bender	8 hours
Shot Blast Machine	8 hours
De Walt Saw (Small Size)	5 hours
De Walt Saw (Large Size)	2 hours
Table Saw	3 hours
Planer	6 hours
Air Compressors	Protection required ad- jacent to compressor; however, 25 feet away no protection is re- quired.
Gasoline Welding Machines	Protection required ad- jacent to machine; how- ever, 25 feet away no protection is required.
-	
Air Chipping Guns, Breakers, and Impact Tools	0
WME - Cranes, cherry pickers, front end loaders, and similar equipment	Operator - 0 unless cab and muffler have been modified.

DUP 0912160

1-73

DU 029691

OFF-THE-JOB SAFETY PROGRAM NON-MANUAL SALARIED EMPLOYEES

In view of the Construction Division's sustained On-The-Job Safety Performance, it is desired to bring about more Safety for our employees at ALL TIMES*. After consideration of the high frequency rate of off-the-job injuries everywhere, compared to on-the-job injuries, the Construction Division, during 1958, will enter into a specific program directed toward eliminating off-the-job injuries.

During 1958, we will pursue at all locations a five-element program as follows:

- I. SPECIFIC MONTHLY MEETINGS
- II. EDUCATION
- III. TIMELY REMINDERS
- IV. DIVISION-WIDE MONTHLY BULLETIN
- V. COMPETITION

The operation or implementation of these elements of the program will be as follows:

I. SPECIFIC MONTHLY MEETING

There will be a monthly meeting of a minimum of 20-minutes duration to be held by appropriate supervision at each location specifically directed at off-the-job injuries. Adequate preparation for effective presentation will be required.

II. EDUCATION

Each location will devise means to carry out a program of education of all the people to acquaint them with off-the-job hazards, frequency, current examples, and the requirements for prevention. (Bulletin boards, displays, plant news periodicals—for example; also, see element IV below.)

III. TIMELY REMINDERS

Suitable reminderism will be prepared by each location with due consideration for timing and need, in order to effectively keep foremost in the attention of our people the need for action and self-control regarding off-the-job injuries. Due consideration will be given to your geographic location, seasons of the year, special hazards, vacations and continuing emphasis on travel safety. The Division Safety Superintendent will furnish some ideas on reminderism material which can be reproduced alternately on cards and ditto-sheets for weekly and/or monthly "hand outs."

IV. DIVISION-WIDE MONTHLY BULLETIN

DU 0912161

The Division Safety Superintendent's Office will prepare and issue a monthly bulletin beginning February 25, 1958, to all locations to "educate and inform" in off-the-job accident prevention, and to promote

*ALL TIMES — After 4 30 p.m. - Weekends - Holidays and Vacations.

Section E
Part 1.G
Page 2 of 2

action in "all-time self-safety." This bulletin will also provide data and facts for utilization at meetings and for personal use to recipients at home for their families.

V. COMPETITION

Each location will publicize performance between their groups and encourage a competitive spirit to improve. The Division Safety Superintendent's Office will publicize performance between locations.

Report your statistics as above on the back of the Division Monthly Log Sheet.

Classification and tabulation of categories should be in the manner and the order used on the Company Monthly Safety Performance Bulletins. Use 312 hours per month per employee for exposure hours in frequency calculations.

DUP 0912162

DU 029693

CONSTRUCTION DIVISION SAFETY PROGRAM — 1962

CAUTION: Proper understanding of this issue is contingent on having implemented prior annual programs of this Division.

For a number of years it has been pointed out that we have enough "tools" for Safety, but that which is lacking is maximum performance WITH these tools! Some of our basic tools are: The Brown Book, the two Blue Books, the Abstract Book, the Daily How Book, the S.T.A. Book, various kinds of inspection, Stability, Screening, Job Placement, Training, "Operation Must," Orderliness, among others of previous Annual Programs.

During the past two years in addition to the prior existence of the above "tools" for Safety, we particularized in 1960 in "Progressive Foreman Training" and in 1961 in "Administering Safety by Engineers and Craft Superintendents."

This year (1962) we find it advisable to require improved performance ("Safety-Tool" Performance Quality) with our existing "Tools" with particular emphasis on the following selected functions.

Assistant Project Managers, Field Superintendents, Engineers, Craft Superintendents, and Gang Foremen are called upon (for a selected group of normal functions) to show quality performance in these functions, echelon by echelon.

The assignment of responsibility to carry out the functions of the Assistant P.P.M. and Field Superintendent on projects where both positions do not exist, will be as follows:

On projects where one or the other is assigned, the one assigned will carry out the functions of both positions.

On projects where neither position is filled, the P.P.M. will be responsible for carrying out the functions of this program.

"Unusual" projects (either organizationally or by nature of work) must be discussed by the responsible head with the Division Safety Office prior to the beginning of work at the site.

The use of all previously issued ("Tools") - regulations, policies, rules, procedures, programs, and techniques, is anticipated whenever and wherever they apply. (Review them now, then quarterly), determine where each should be woven into the pattern of this program as written, new and throughout the year.

1962 — 12 MONTHS
(300)•

A. ASSISTANT PROJECT MANAGER

1. Forecast (in writing, commensurate with your position) a WEEKLY job-wide "hazard analysis" of work in progress in both abstract and physical considerations, such as:

*Reference Numbers for Communication, Telephone, etc.

DUP 0912163

(301) *

(a) Physical

Advise on hazardous (tricky) work elevations and locations—

Advise on moving or placing big, unwieldy, or unusual—forms, pours, piling, equipment, material handling, access, orderliness, etc., and

(302) *

(b) Abstract

State what to do about "co-occupancy" control, as it occurs, building by building, area by area

Recommend what to do about "green" men on a current basis

Question specific individual gang foremen's experience relative to "high risk" type work in A-1 (a) above, as assigned

Look for inter-craft work "jurisdiction" hazards and then you specify

Check and re-check S.T.A. quality as related to each (specific) foreman

Gauge—then act on—individual and "specific group" morale on a current basis (monthly minimum)

Observe then reduce time spent by foremen "away" from their men to absolute minimum

Screen: any echelon, any roll—for job placement or replacement on a current basis

(AT YOUR SITE DURING ANY WEEK—ENTER UNDER PHYSICAL AND/OR ABSTRACT ANY SUBJECTS CURRENTLY REFLECTING RISK LIKE THE EXAMPLES ABOVE.)

(303) *

(c) Review this weekly analysis at your staff meetings—weekly

(304) *

(d) Work at corrections (safeguards) of A-1 (a) and A-1 (b) with the Safety Engineer or his alternate prior to exposures each week

(305) *

(e) Send carbon copy of this "Forecast" to the Division Safety Office on a one week later schedule, showing briefly the action taken for each item you listed under A-1 (a) and A-1 (b), for the week prior.
(Hand written copies acceptable)

(306) *

2. Learn (from your Safety Engineer), and the ("Alleged and Exaggerated Claim" Book) and Division Safety Office discussion, how to handle in-
*Reference Numbers for Communication, Telephone, etc.

DUP 0912164

DU 029695

mediate the delicate aspects of medical "conditions" in cases which need not come under the tabular classification. Read, then study—Company Bulletin 422 in conjunction with the above booklet—the classification rules for injuries.

(It is too late to get this education when there is an urgent case in hand; wrong chronology, a few minutes, a few hours can make an irrevocable difference.)

(307)*

3. Take administrative and advisory action with the Project Manager in B, C, D, and E, following, on a current basis.

B. FIELD SUPERINTENDENT

(308)*

1. Personally provide evidence (your own way) each month, of thorough coverage of All "equipment and tool" inspections for the entire project. (Mark, sign, and file these regularly.) Advise management as to repairs or needs superseding your authority. This should be in addition to the Inspection Cards required fastened to only major equipment as requested in Division letter (1/1/60).

(309)*

2. Regulate without fail, on all shifts, the presence of competent supervision above foremen, at all major rigging operations and other major operations beginning immediately and hereafter.
(The history of near misses in the Division in recent years is replete with evidence of this need.)

(310)*

3. Take action with the Division and/or Area Engineer promptly after a "near miss" to assess responsibility, then do something about "failure"-of-responsibility.

(311)*

4. Do active, practical, current screening of personnel with craft superintendents in D below.

C. DIVISION AND AREA ENGINEERS

(312)*

1. Preplan hazardous jobs by analysis according to and in concert with (A-1) to the satisfaction of your supervisor and the Safety Engineer.

(313)*

2. Do the above (C-1) at least within the scope of the "Operational Methods Manual" relative to policy and procedure.

(314)*

3. Maintain evidence of your special instructions on items of "wide variance" in start-up jobs, shutdown jobs, week-end work, and work for new crews

*Reference Numbers for Communication, Telephone, etc.

DUP 0912165

DU 029696

or new work for old crews as in "Productionizing", "Development" and the like. Relate this activity to A-1 above.

(315)*

4. Do active practical job placement and screening of personnel with craft superintendents on a current basis.

†(By the "General Conditions" in our contracts this should include contractors mechanics, and their supervision.)

D. CRAFT SUPERINTENDENTS AND ASSISTANTS

(316)*

1. Keep on a current basis "job placement and screening" ("Operation Must" 1957-1961) as required by previous Programs from your gang foremen.

(317)*

2. Personally build more function and reliability into your craft's gang proctors. Meet with them personally with a program of assistance at regular intervals.

(318)*

3. Analyze (at least monthly) with your gang foremen the "attitude" of their crew members, concerning, good or bad morale status, and "loyalty" man for man.

(You find the "claim conscious" and claim potential aside from E-3, then discuss with the management.)

E. GANG FOREMEN

(319)*

1. Give "S.T.A." AS DEFINED, regularly, adequately, forcefully with each task. This is still only partially effective after 20 years. (Review "Operation Must"—1957 - 1961)

(320)*

2. Follow up on all individual crew members intermittently but continuously to be sure that the S.T.A. given is carried out as given

(321)*

3. Make "current" examinations of each crew member's good or bad attitude (state of mind, apparent distractions, apparent health, and apparent tension) which would make him accident prone.

FOLLOW UP - ACCELERATORS

W. ASSISTANT PROJECT MANAGER

(400)*

1. On April 1, 1962, (or 3 months after inception of this Program anywhere) begin review meetings to be held by the Safety Engineer (or his qualified alternate) to examine, evaluate, and correct weaknesses persistent in this entire Program—A through E.

*Reference Numbers for Communication, Telephone, etc.

DUP 0912166

DU 029697

(401)*

2. Safety Engineer—Differentiate (seasonal)—publicity, signs, promotion and advertising between (January through March, (April through June) and (July through September), (October through December).

X. FIELD SUPERINTENDENT

(402)*

1. Beginning April 1, 1962, (or 3 months after inception of this Program anywhere) hold a monthly meeting personally with all field personnel whose record of performance is unsatisfactory from the standpoint of (A Formula), (S.T.A. quality), (Practitioner weakness), (V.P.R.), (Minor injury record), or like problems.

Y. DIVISION AND AREA ENGINEERS

(403)*

1. Beginning April 1, 1962, (or 3 months after inception of this Program anywhere) Engineers re-read the 3 red booklets, "What to Say About Abstracts," "Daily Safety How," and "How to Control Alleged and Exaggerated Claims in Compensation." (One book per month, pay special attention to Introduction and Foreword pages.)

(404)*

- (a) The Assistant Project Manager will prepare a ten-question true or false quiz as examination test for and after the study of each book. (There are philosophies, principles, and policies in each of these books which are indispensable to safety management at our level of progress for any member of our management.) File locally all quizzes and answer papers for review by the Division Safety personnel on visits.

Z. CRAFT SUPERINTENDENTS AND ASSISTANTS

(405)*

1. Concentrate on eliminating any employees who (after a fair period) persist in showing adverse or objectionable characteristics or attitudes as are included in one or all of D-1, 2, 3, under Craft Superintendents. Assistant Field Project Manager should be prepared to answer for—

- (a) The success of this activity, or
- (b) The failure of this activity.

NOTES.

1. Local incentive plans may be proposed, when needed, for approval of the Division Safety Office.
2. Although most Field Project Managers have (by intention) no assignment in this Program (1962), their over-all guidance is anticipated.

*Reference Numbers for Communication, Telephone, etc.

DUP 0912167

DU 029698

**CONSTRUCTION DIVISION
SAFETY PROGRAM — 1961
(AN ANNUAL SUPPLEMENT)**

CAUTION: Proper understanding of this issue is contingent on having implemented prior annual programs of this Division.
The use of techniques of previous years is expected. Be diligent in recognizing the need, the adaptability and the effort required.

* * *

Employees usually reflect the convictions (views, beliefs, attitudes, and temperament) of their immediate supervision. Employees (people), by nature, think, do or respond according to the degree and manner in which they are instructed and according to the example set for them. It is therefore imperative that all supervision first, have an understanding and appreciation for the "confirmed principles of Accident Prevention and the two divisions of safety we simultaneously practice—the "environmental" (tangible) and the "State of Mind" (abstract), second, personally acquire, portray and administer vigorous, consistent, effective safety applications at all times in all work.

**BROAD OBJECTIVE STATEMENT - THIS PROGRAM
INDOCTRINATE FOR IMPROVED SAFETY ADMINISTRATION
UPGRADE "ADMINISTRATIVE" PRACTICES OF
ENGINEERS AND CRAFT SUPERINTENDENTS**

This means re-instruct and re-explain at frequent intervals (monthly-minimum) to Engineers and Craft Superintendents the objectives and the DEGREE of what is wanted in "first and second" above.

Show specifically HOW to ADMINISTER safety responsibilities to the degree envisaged by our Division objectives—at least in the following items:

* * *

PART I

- Conduct a series of meetings for all Engineers and Craft Superintendents TELLING, SHOWING, AND CHECKING the HOW of their efforts, doing of this and the succeeding parts.

1. (a) Pre-Employment and (b) Post-Employment

- a. of new applicants;
- b. of previously enrolled craftsmen;
- c. of prospective foremen.

CHECK EACH individual Engineer and Section Foreman after one or more of these meetings. DO NOT CONCLUDE improvement or waste by groups.

1. Review YOUR personnel 2-3 times each month strictly for the purpose of uncovering faults.

- a. Remember—checking is for improvement, raising.
- b. coaching, improving as well as disciplining. If you can't or
- c. won't coach, you are NOT leading, administering or both.

DUP 0912168

DU 029699

2. Improved Communication Effect

- Improve (impart) orientation of new employees.
- Improve conduct of all meetings (foreman's meetings, crew meetings, craft and crew meetings).
- Improve (through progressive information) conduct of policy, procedures, and details involved in each situation.
- Apply, regularly, appropriate visual publicity and other forms of communication to emphasize all "standard" requirements.

2. Think—then talk—then do you talk.

- Orientations must inform, identify your authority and insure obedience to rules and regulations. (How far can you get for oriented the first—then do YOU make men dependable?)
- Any meeting, large or small, is bound to be ineffective if it isn't planned.
- Learn, learn, learn more constantly all that any one possesses knows. Learn the broader aspects of policies that you think you know.
- Think of ways to instruct, publicize, mark, and reward YOUR crew or groups about those things which YOU find them not doing, comprehensible on, or ignorant about. Ask the Safety Supervisor to help get what you need based on what YOU discuss.

PART H

Improve "Engineering of People" (Effective Leadership, Successful Guidance)—Focuses Through Safety Management.

- Make better use, man for man, of the "A" Formula Factors. (These are an effective requirement of supervisory actions on the supervisor's crew members in 7 vital areas.)
- Revised man "observed responses" through proper location and job placement.
- Stop supervision more generous and maintain a comparative scale until it is retained in the correction of every last man in craft or crew by his hourly performance.
- Make the effects of inspection "exaggerated" over weeks and months by better expressions of discipline to those responsible for imperfections observed and recorded.

You can't know "through" safety, unless, you yourself have—learned, analyzed, and applied to discipline offenders the EXISTING rules, methods and tools of safety such as a plan to be MANAGED to fit a situation that is specific and NOT general.

1. The "A" Formula is useless—unless you

- Know the man being rated.
- What each factor really means.

2. Proctor, over the years, have only been used to 25% of their potential effectiveness. YOU know what a proctor is for (by my definition—Gino Scotti then have him do something—which you arranged for, to get 4 hours of proctoring from each proctor every day. Get the proctor into the "shelter" too.

2. A man who rarely considers pride in his work, or who does not show interest in your responsibility, or who is in any way unconcerned with understanding your job. He is your burden. In six weeks he should "come-out" or be replaced.

4. There is no point in inspecting—then correcting for offenders. Find your own way to have offenders answer for violations personally. This means you'll have to get personal. If this is distasteful or embarrassing to you, then YOU suffer the consequences. The trend of our affairs is such that there will be consequences as this matter as business progress will not be stopped for the week. "This is the history of the world."

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PART III

Improve Environment (Tangible)—All Ordinances.

Tangible Considerations

- | | |
|---|---|
| 1. Keep and MAINTAIN orderliness | 1. "No man puts down what is not put in THE box plan"—this is the basis of ORDERLINESS. |
| 2. Reduce V.P.R. | 2. Violations prove dangerous for YOUR authority. |
| 3. Require analytical safety planning. | 3. If you think you have planned in the past or been analytical in the past—multiply by 3 for the future. |
| 4. Provide (lost by loss) stability of men and machines. | 4. There can be no engineering without respect for the laws of gravitation, materials or machines. |
| 5. Provide protective devices off/for tools, machinery and equipment. | 5. This should be your second, most obvious safety job. |
| 6. Maintain fire protection and protection. | 6. A clean orderly place is its own fire protection. |

GANG FOREMEN - TRAINING

Continues as in 1960 but the Craft Superintendents assume the primary initiative in the training.

PART IV — OPERATION MUST (Repeat)

(a) By Foremen

1. Daily Individual Men Inspection
2. Daily Specific Men Placement
3. Daily Specific Man-Task — S.T.A.

The requirement, IV (a) above, is Fundamental. (We in the Division Safety Office believe an accident is virtually impossible if the above three steps are faithfully executed at the proper time and with adequate quality.)

The Illustration for this requirement specifically dictates that every foreman and supervisor must—every day in the first half-hour of the day:

First (1) Look carefully at each man in his gang to see if he looks fit and ready to work — and then,

- Second (2) Specifically fit the gang member to a task which physically and from the experience or reliability factor matches the man to the task and the task to the man as practically as may be possible — and then,

Third (3) Specific adequate S.T.A. must be given for each task — with confirmation from each man that he understands all of his instruction.

It is imperative and essential to the success of this three-step sequence that all supervision—particularly foremen, arrange their supervisory time such that they are with and are personally supervising and observing their gangs, or groups, as much of each working hour as is practically possible. It is believed, that through proper analysis and planning this can be done to a greater degree than at any time in the past.

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This year and from now on—the exact execution of the three steps must be done and must be confirmed frequently about every foreman—with the same sense of reliability and integrity as when any of them sign checks, or give their word of honor in having fulfilled an expected mission reflective on their honor.

(Foreman: Check on the True "Why" of Absenteeism first thing in the morning on the day of Employee's Return.)

(b) By Safety Engineer

"Square pegs in round holes," has been a legitimate criticism for misplaced manpower since before our time in Business and Industry.

We have trained and reminded frequently beyond the normal for Industry, that we must:

SEE TO IT THAT OUR FOREMEN FACTUALLY PLACE EACH MAN ON EACH TASK—ON THE BASIS OF WHAT HE KNOWS ABOUT THAT MAN—particularly:

(1) Basic physical matching of men to task as well as—

(2) Aptitude and attitude coordination of the man to the task.

This function will be investigated by the Safety Office personnel "at least" once each week—foremen by foremen—and the results reported to management.

(c) By Management

The least Management will select a person or persons of known experience and capability to physically inspect the working areas for the primary purpose of observing and analyzing:

1. The nature and current state of orderliness related to any working environment.

2. The daily personal working habits of mechanics as related to Absenteeism.

This requirement should not be confused with the "Weekly Inspection Committee" or other organized unit as found on page 28 of the "Site Book".

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**CONSTRUCTION DIVISION
SAFETY PROGRAM — 1960**

CAUTION: Proper understanding of this issue is contingent on having implemented prior annual programs of this Division.

The use of techniques of previous years is expected. Be diligent in recognizing the need, the feasibility and the effort required.

Former fully described techniques:

1957 Program

- I. PHYSICAL ORDERLINESS
- II. THE CONTROL OF ABSTRACT DEFICIENCIES* (Mental Distractions)
- III. "OPERATION MUST"—by Foreman, Safety Engineer and Management
- IV. FOREMEN TOOL BOX MEETING IMPROVEMENT, FORECAST HAZARDS, CONTRACTORS AND V.F.R.

1958 Program

- I. DAILY MAN-JOB PLACEMENT
- II. PHYSICAL ORDERLINESS (as in No. 1, 1957)
- III. UNIFORMITY
- IV. STABILITY
- V. ABSTRACTS (as in No. II, 1957)*
- VI. T.F.R.—(Worthy of more conscientious review, understanding and staff discussion)

1959 Program

- I. OPERATION—"SPECIFIC"
- II. PRINCIPLES—"RIGHT VS. WRONG" (Supporting V.F.R. and Blue Book Use)
- III. ORDERLINESS, UNIFORMITY, JOB PLACEMENT, STABILITY AND ABSTRACTS (of 1957 and 1958*)
- IV. REFERENCE TO PARTS AND SEGMENTS OF FORMER METHODS AND TECHNIQUES, "BROWN BOOK" AND "BLUE BOOK"

**THE 1960 PROGRAM WILL CONCERN ITSELF ESPECIALLY
WITH GANG FOREMEN**

Part I. OPERATION—"SPECIFIC"—Engineering-Foreman Relationship
(see 1959 Program)

**Part II. FOREMEN'S TRAINING FOR MORE COMPETENT AND EFFECTIVE
SAFETY.** (This means teach foremen to understand what is wanted,
to see more and to act more.)

*The Division Safety Office will provide, in part, new material for the
"Absorber" publicity as in 1959.

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"SUBJECTS"

- A. Foreman's improved conduct of each safety meeting
- B. Foreman's improved S.T.A., consistent S.T.A. and individual-task S.T.A.
- C. Foreman's improved prector assistance—"daily"
- D. Foreman's improved—daily Man-Job Placement
- E. Foreman's improved—rigging, scaffolding, special tools, material handling, co-occupancy (construction forces with others), stability, fire, toxicity and Blue Book conformity
- F. Foreman's improved knowledge of meet policy and procedure data in "Brown Book"—(Operational Methods Manual)

PART II. PROGRAM AND CONDUCT FORCEFUL FOREMAN'S MEETINGS

Program and conduct a meeting for every foreman each month in accordance with the following schedule. Each subject will be covered four (4) times during the year. **ADVANCE AND EXPAND THE SUBJECT COVERAGE WITH EACH SUCCEEDING SERIES OF MEETINGS.**

The duration of each specified meeting is left to the discretion of local management. Since all foremen cannot be spared from the field at the same time, repeat meetings are contemplated during any month for most sites.

ALL SITES ARE REQUESTED TO SEND CARBON COPIES OF THEIR MEETING OUTLINES TO THE DIVISION SAFETY OFFICE PROMPTLY AS PREPARED. SHOW ON EACH OUTLINE THE NAME, POSITION AND LENGTH OF SERVICE OF THE PERSONS OR PERSON WHO MAY ASSIST THE SAFETY ENGINEER WITH THE INSTRUCTION.

DO NOT WEAKEN THIS PROGRAM BY INTERCHANGING SESSION SUBJECTS OR PARTS OF "SUBJECTS." (See bottom of preceding page.)

The following courses (training classes) should include established foremen and those men who are most likely to be detailed as foremen. (Anticipate—over on probability.)

ACCENT THE INTANGIBLE (Meetings for A&B)

A. (SUBJECT)—IMPROVED CONDUCT OF SAFETY MEETINGS

1. Teach and show how to conduct an informative weekly tool box meeting.
 - a. Preparation of material—(Review of previous work and presentation of approaching experiences, problems and work, anticipating specific hazards).
 - b. Presentation of material (in foreman's language).
2. **USE** supervisor's meeting ratings of the previous week for constructive improvement, foreman by foreman.

Foremen must have thorough understanding and show staunch support of the material themselves, before they can effectively present it to the men.

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B. (SUBJECT)—IMPROVED CONSISTENT, INDIVIDUAL TASK (S.T.A.)

1. Tell what we mean by consistent, individual-task (S.T.A.).
2. Show how to analyze each task for hazards, (1 man or 10 men).
3. Show how to present effective S.T.A. (Tell, show, question.)
4. Follow-up to visualize need for more S.T.A. as work progresses in the original task.

ACCENT THE TANGIBLE (Meetings for C&D)

C. (SUBJECT)—PROCTOR ASSISTANCE—(DAILY CONTRIBUTION)

1. Demonstrate the foreman's daily contact with the proctor to improve the proctor's participation. Concentrate on the proctor's work analysis, observation, aggressiveness, and initiative, thereby improving proctor effectiveness.
2. Demonstrate example of assistance by the proctor on daily observations, and preparation of material presented by the proctor at his gang foreman's safety meeting.

D. (SUBJECT)—DAILY MAN-JOB PLACEMENT

1. Explain what is meant by "knowing your men" and how to effectively observe and place men to adaptable work with the least possible risk involved.
2. Explain the kinds of things to look for and the advantage in knowing (every day) what suggests a sick man, a worried man, a distracted man, an angry man, an inexperienced man, a man of poor morale or the non-cooperative type. This is within the capability of a good foreman.

ACCENT BOTH THE TANGIBLE AND INTANGIBLE (Meetings for E&F)

E. (SUBJECT)—FUNCTION AND JURISDICTION

Since there has been a variation of craft function and jurisdiction in different areas in recent years, you are expected to clarify the who and how of: the foreman's authority and responsibility in rigging, scaffolding, special tools, material handling, co-occupancy, stability, fire and toxicity and Blue Book conformity.

F. (SUBJECT)—KNOWLEDGE OF POLICY AND PROCEDURES IN THE "BROWN BOOK"

Review and interpret, as applicable to gang foremen, policies and procedures covered in "Brown Book" so that a common understanding and interpretation is had by all.

The above meetings are to be formalized to whatever extent they will cause positive and lasting improvement of all foremen. They are to be conducted by the Safety Engineer with the assistance of whatever qualified supervision is necessary or helpful. CRAFT SUPERINTENDENTS AND ENGINEERS ARE TO KNOW AND UNDERSTAND WHAT IS TRANSPIRING AT THESE MEETINGS AND WHY.

FIRE PROTECTION

Review, inspect, protect, cover, organize for fire prevention so that all risk is controlled on a current basis.

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CONSTRUCTION DIVISION SAFETY PROGRAM — 1959

CAUTION: Proper understanding of this issue is contingent on having implemented prior annual programs of this Division.

Part I OPERATION—Specific

Part II PRINCIPLE—Right vs. Wrong

Part III CONTINUING—Physical Orderliness, Uniformity, Job Placement, Stability and Abstract Deficiencies

Part IV ALL APPLICABLE PARTS AND SEGMENTS of Former Methods, The Operational Methods Manual and Employees' Handbooks

During the past three years, there has been increasing conviction on the part of management, including the Field, that our Division has and has had, available for application, extremely advanced Safety "HOW". This includes a decided sufficiency of methods, procedures and policies. This condition has led, therefore, to the logical conclusion that our immediate need is not for new procedures or new methods but for intensive and critical application of those previously introduced. This position is further strengthened by analysis of current and past incidents wherein the fault lay not in the absence of anticipated controlling factors but in the absence of human application to that which was already known and in existence.

This is to say that the annual programs from 1953 through 1958 are our 1959 Safety Program material with the addition of Job Placement, Uniformity, Orderliness, Stability, Abstracts, and the Overall Project Effectiveness Measurement explained in the 1958 program.

Accordingly then, the 1959 Division Safety Program will contain new material only to the extent of delineating more expensive thinking on Gang Foreman.

The intent and purpose of our 1959 Program is to emphasize and obtain "CONTROLLED application" of the functions made available over recent years in a manner consistent with objective zero from EVERY echelon of supervision particularly Gang Foreman.

1. OPERATION—"Specific"

The Construction Division has achieved an outstanding position in the field of safety—experiencing only one lost time injury for every 100 occurring in the industry. This has not been accomplished overnight; it has taken many years of developing techniques and training supervisory people in the fine requirements for accomplishment at this level.

The GANG FOREMAN is our first line of supervision and consequently bears a large share of the responsibility for making our safety function successful. However, a large proportion of our gang foremen are of short-service and we have the problem of immediately improving their safety supervisory ability 100 fold, because an accident can happen in the first week of his foremanship. It also quite frequently happens that all of the new foremen's men are new to our techniques for safety.

It is not reasonable to expect that he can make this transition without assistance when our other supervision has taken years to gain the understanding required by our system. In the light of these facts and since

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our objective is no injuries we will, in 1959 direct more attention to the training and DAILY FOLLOW-UP on the performance of each gang foreman.

The GANG FOREMEN are the direct responsibility of the craft superintendent—for safety as well as other functions—but it is recognized that as measured as their work is in many instances, additional specific action will have to be taken if we are to achieve our critical objective.

The DIVISION ENGINEER is charged with responsibility for safety, quality, cost and schedules for his division; therefore, as a principal part of our 1959 Safety Program HE WILL BE REQUIRED, with the assistance of his Area Engineers to—

- determine day by day that all the gang foremen working in his division, are receiving adequate training and instruction and are carrying out the objectives of our Safety Program and that corrective measures are taken as required to meet this end.

More specifically, the Division Engineer will be responsible for determining day by day that—

- 1) Proper S.T.A. is being given as required.
- 2) The Division requirements of DAILY ORDERLINESS are being met "at each task site".
- 3) The gang foremen are RECEIVING COMPLIANCE with their safety instructions.
- 4) Corrective action in each case is taken as promptly as required.

This does not in any way RELIEVE the Craft Superintendent or General Foremen of their safety responsibilities. Moreover, the specific emphasis on the above with the added collaboration of the engineer should aid the craft heads in a more thorough coverage of these critical items.

II. PRINCIPLE—"Right vs. Wrong"

The attainment of an annual "0" frequency rate ("zero" major injuries) is an idealistic goal, is ultimate in desire, but, above all, it is possible. The "stumbling block" continues to be (as it always has been): "People"—craftsmen, supervision and management. The primary problem is, to a degree, lack of knowledge of the techniques of our program or failure to "understand" or to "recognize" as well as a condition of unwillingness (consciously or unconsciously) to adequately evaluate for corrective action.

One major barrier (primarily psychological) to adequate quality performance consists of self-adapted "limits" of consideration—limits of interpretation of "Rules", "Violations", and "Hazards". If "it" doesn't break a rule—"disregard it", if "it" isn't a violation (by flexible interpretation)—"it" is "relatively unimportant", if "it" isn't a major hazard—"correct it later". For example, Violation Frequency Rate (V.F.R.) has been a part of our construction safety system since 1948. While useful as a current indicator or measurement of safety performance, it has one primary weakness; the resultant V.F.R. because of limiting "ground rules" is rarely reflective of actual conditions at any site. It has been subject to: (1) limitation to Blue Book rules only; (2) varying committee opinion as to whether or not "it" (the unsafe situation or act) constitutes a violation, and (3) a tendency to minimize violations through the use of other nomenclature.

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It is desired in 1959 to remove these "weakening" barriers by adopting and applying the basic principle of "Right or Wrong" to the administration and evaluation of all safety functions, techniques, programs, or parts thereof. Thus, any condition, work method, phase of work, procedure or act of any person(s) is to be viewed as: (1) needing no correction, alteration or change of any kind—therefore, RIGHT; or (2) needing any degree of correction, change, rearrangement, reassignment or alteration—any of which means "something" was wrong, (therefore, WRONG). For example, all inspection committees are to function as heretofore in frequency and scope. However, no limitation of any kind is to be continued or established which will prevent anything "WRONG" from being "counted" in the V.F.R. for the site on any future inspections.

All other functions as previously stated, should be reviewed and analyzed frequently—with all phases of each being subjected to the "acid" test: Is it Right or Wrong? Does it fill our requirement? Does it follow exactly what is written in the procedure or other authorized formal project or Division issue?

Obviously, the benefit to be derived from the application of this principle lies not only in the ability of people to recognize what is "Right or Wrong", but also in their willingness to promptly transpose honest recognition into adequate corrective action.

III. CONTINUING—Physical Orderliness, Uniformity, Job Placement, Stability, and Abstract Deficiencies (Mental Distraction)

As in the past years when a broadly applicable procedure or technique was issued and proved successful—continuation of that technique has always been carefully considered by Management.

As often as possible, a less effective technique or procedure is eliminated to prevent burdensome and less effective accumulation.

Accordingly, "Operation Must" (1956, 1957), Physical Orderliness (1957, 1958), Uniformity (1958), Job Placement (1956, 1958), Stability (1958), Abstract Personal Deficiencies (1956, 1957, 1958), and other important delineations of the past, are all expected to be used exactly as published, where, when, and as they apply.

The techniques are effective in proportion to their "planned" and executed use, carefully tailored to specific (and some general) operational conditions.

IV. ALL APPLICABLE FORMER "METHODS"

Procedure methods as found in the "Operational Methods Manual", the Blue Book, Office Safety Manual, S.T.A., V.F.R. and T.F.R., are to be continued as existing or as recently amended under II., Principle—"Right vs. Wrong".

The Construction Division philosophies of frequent reminderism, competitive groupings for 6 to 16 weeks, the "as required" physical placement of visual aid publicity on a rotating basis of calendar and subject matter, and special purpose inspection, are all expected to be employed on the recognition of their need.

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CONSTRUCTION DIVISION SAFETY PROGRAM — 1958

"Controlled application of functions
featuring overall Project-Effectiveness Measurement."

- Part I. JOB PLACEMENT
- Part II. PHYSICAL ORDERLINESS
- Part III. UNIFORMITY (Maximum Possible)
- Part IV. STABILITY
- Part V. ABSTRACT DEFICIENCIES . . . (Mental Distraction)
- Part VI. OVERALL PROJECT EFFECTIVENESS MEASUREMENT . . . (T.P.R.)

During the past three years, there has been increasing conviction on the part of management, including Field, that our Division has and has had, available for application, extremely advanced Safety "HOW". This includes a decided sufficiency of methods, procedures and policies. This condition has led, therefore, to the logical conclusion that our immediate need is not for new procedures or new methods but for intensive and critical application of those previously introduced. This position is further strengthened by analysis of current and past incidents wherein the fault lay not in the absence of anticipated controlling factors but in the absence of human application to that which was already known and in existence.

Accordingly then, the 1958 Division Safety Program will contain new material only to the extent of delineating more expansive thinking on previously issued "HOW".

This is to say that the annual programs from 1952 through 1957 are our 1958 Safety Program material with the addition of upgraded clarification of Job Placement, Uniformity, Orderliness, Stability, Abstracts and the introduction of what for the first time will be a new Overall Project Effectiveness Measurement to be explained in this program.

The intent and purpose of our 1958 Program is to emphasize and obtain "CONTROLLED application" of the functions made available over recent years in a manner consistent with objective zero from EVERY echelon of supervision.

I. JOB PLACEMENT

When the function of "man-placement" was originally introduced, it was intended as a practical "matching" of individual abilities to work assignments. Every employee, du Pont or contractor, of any craft or position, was to be assigned work consistent with his experience, and current physical capabilities. Such assignments were also to include consideration of the employee's dependability, understanding, and other personal abstract factors.

It was not unreasonable then, nor is it now, to expect that each gang foreman should know, within a few days, each of the workmen assigned

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to his particular gang. The adequacy of this requirement must be increased over the level of past years. This necessitates continuous insistence and control of the application of Job Placement. This involves not only gang foremen, but also all other echelons of management and supervision.

Job Placement as intended, when introduced, is no differently intended at this time. It simply means that the Project Manager and, therefore, the whole staff, will see to it that supervision assigning people to tasks will take the little extra time needed, task after task, day after day, to properly "Job Place". By so doing, a maximum amount of the potential for accident possibility will be taken out of each "man-task" combination. There should be evidence that each foreman has assigned his men for the day with due consideration, which will eliminate having any one individual assigned to what he can't do properly.

It is realized that humans are not infallible and that there will not always be available, the most ideal men for the task. The foreman or supervisor must, however, live in good conscience that every day, he has done his level best with "Job Placement".

II. PHYSICAL ORDERLINESS

The script which immediately follows this introductory paragraph has been taken verbatim from the 1957 Safety Program and needs no alteration. At the end of this quoted section, you will find additional ideas and clarification for better understanding of the purpose, the requirements and benefits of physical orderliness.

"In the du Pont Construction Division, by concept, definition and experience, this phrase means specifically: That at any moment, hour or day ALL and EVERY piece of equipment, tool, material, facility or apparatus shall be stored, stacked, located, placed, temporarily erected, temporarily spotted, or set up for manipulation in such a manner as will render accidents highly improbable AND give the direct and obvious impression of a clean and orderly work place. This applies to the interior of bins, cabinets, and rooms; outside as well as whole floors, buildings, yards, and areas. This requirement by necessity means that all facilities at all times will be erected, placed, or stored PARALLEL to or at RIGHT ANGLES with some base line. Like an interior wall, an exterior wall, a building line, fence line or similar point of reference.

- The benefits of this apparently unusual or "extreme" requirement have become obvious in "Material Handling", work accessibility, fire prevention, and ACCIDENT PREVENTION".

The primary purpose for introducing both uniformity and orderliness, as has been stated previously, is to create an abstract psychological effect on "people" in their work environment. Each should be applied to such extent that they will go a long way in keeping "people" aware of the propriety of their environments. Therefore, as has already been proven in the past, they will be more alert than would normally be customary in both little and big situations.

An equally important advantage of physical orderliness (involving all facilities and all material at all times) is the elimination of duplicate effort.

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If every pair of hands shall, in every instance, put down in the proper place what those hands picked up originally, then material handling duplication will be eliminated. This will be true whether the material is a bolt, a load of bricks, a bale of insulation, or box of nails. It should unquestionably result into enhanced efficiency, more work accessibility, assist in schedule maintenance, provide additional fire safety and more "men" safety.

Workers who litter their work areas or who indiscriminately allow waste, debris, or incoming materials to impede their work, prove in so doing that they are probably not the best mechanics. The best mechanics, either in experience or attitude, include their own contributions systematically through "craftsmanship" toward effectiveness in their tasks as they work along hour after hour. If we haven't gotten the degree of orderliness desirable or had it sustained, it is the fault of supervisors who either doesn't care, doesn't understand or doesn't agree with or appreciate what has been stated in the foregoing. Like most all other things, orderliness can be had by "orders" that are adequate—orders that are respected.

III. UNIFORMITY

The Construction Division has a long history of efficient operation. However, search for continual improvement has brought into focus certain areas of operation, function, development, and individual decisions, which are unquestionably subject to improvement. It has been found that certain functions, facilities, equipment and apparatus are more favorable to our overall endeavors than indiscriminate substitutes. There are advantages to the Division in uniformity from the standpoint of added economy in mass procurement, in distribution, in transfer and in re-use. Above all, the primary intent of the application of uniformity for safety, is to apply psychology to the unit worker in his visual environment. This is to help obtain from each employee a more positive self-behavior, consistent with an obviously regulated environment.

For safety reasons and in the above abstract sense, uniformity is a brother to orderliness. Uniformity between sites is of interest to and is largely the responsibility of the home office management, and will be pursued to an even greater extent in the future. It is anticipated that each site will apply uniformity to all the functions, apparatus and facilities on its own site as will be practicably possible. A few examples: Why shouldn't all gang boxes be the same in color, or shape or size? Why shouldn't all barricades be of the same size, shape, design and color? Why shouldn't 1/2" electrical drill motors be the same make? Why should we have welding goggles, six of one make, 18 of another and 23 of another?

Almost without exception, in all facilities, tools, equipment and methods, at any given time, there is one best suited to our needs. Why shouldn't we find it, and use the best? Indiscriminate variety is at direct cross purpose with cost reduction and breeds accidents.

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IV. STABILITY

In the third quarter of 1957, a brochure on stability was issued to all supervision in the Division. That brochure was issued primarily to show

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where stability fitted into our major Safety functions. It also showed which of four levels of supervision had specific responsibilities in this consideration by the nature of their positions, and the nature of construction activity generally. It should be understood by all concerned that we intentionally avoided delineating stability in terms of maturity or of conditions of mind. We limited discussion of stability to encompass only the probabilities of falls of persons or objects. Seeing to it that a man's place of work will not permit him to fall is his supervisor's responsibility. That equipment and materials shall be used or installed in such a manner that they cannot fall, or be displaced, is a responsibility both of the mechanic handling and the supervisor directing. It is our intention in causing a thorough awareness of stability (with regard to men, machines and materials) to assure in every possible instance a condition referred to as 'fall-proof' or 'fall-safe'. Certain recognizable conditions involved in achieving stability include in part the following: platforms, trenches, frameworks—steel, panel forms, piles of materials, wind pressure, overload, imbalance, footing-failures, slipperiness, insecure picks, inadequate nails, uncovered holes, rain-drenched earth, ice and snow, unaided ladders, grease frost, surface stones, blind corners, no safety belt, loose decking, improper rigging, etc. None of the foregoing list is at all unusual in its occurrence on normal construction. They have all, however, been the cause of many past accidents. Therefore, it is not illogical to require supervision—all supervision—we do what is necessary to be done in the presence of these conditions at all times.

It should go without saying, of course, that when supervision finds its own way to get the spontaneous assistance of each worker in these matters, the problems of the supervisor are reduced, and more importantly, the probability of injuries becomes materially reduced.

Despite the great potential listing of normally unstable conditions possible, they are all controllable—if each man is taught and required to handle his own, one at a time, as they appear one at a time.

V. ABSTRACT DEFICIENCIES — (Mental Distraction)

In 1935, we entered a new phase of Safety work—"Abstract Deficiencies"—most contrasted with the past when we dealt largely with tangible elements only. This was inaugurated by a sound slide presentation called "The New Road" which was intended to give the proper understanding of our desire to include henceforth, a new function dealing with abstract conditions. Since that time, we have had the benefit of 24 months of specific abstract delineation, at least in the form of monthly "Big Word" cards. Many people in our supervisory ranks, through only this much introduction to the implementation of abstracts, found ways and means to initiate some expansions of their own on this subject.

At this time, it is the purpose and the intention of this leg of the 1938 program to call attention to the fact that many of the old standard functions (see cover) are deeply ingrained with both the necessity and the opportunity to embellish and improve with the philosophy of the abstract.

For example:

1. When orientation talks are given, we have often spoken of the direct

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necessity of making a very serious impression on the new listeners. Now we are saying that unless the person giving the orientation, Safety Office or Craft, is conscious of abstract philosophy, he cannot and will not make the best orientation talk possible. It is likely that all the orientations of the past could have been greatly improved, had we had this awareness previously.

2. Our instructions on STA given by the foreman, have been done in one way or another thousands of times; and yet, unless a given foreman has some ability to imagine and explain those parts which are abstract in his task assignments, STA cannot be the best STA.
3. We have given in this program and in other writings the reasons for uniformity and orderliness. We have said that basically the purpose for both is to make environment sufficiently obvious as to effect personal conduct. Therefore, we believe that if every worker had this explained to him quite frankly, then the effect we seek should come sooner and in greater depth than we have had in the past.
4. The old safety philosophy of "setting the example" has always had in it the abstraction of influencing other persons.

Following are some phrases which, when examined in the light of their observed influence, should give the reader an opportunity to effect improvement:

- (1) radiating confidence in work discussion;
- (2) talking down superstition as related to Safety;
- (3) application of the "pat on the back" technique;
- (4) conviction and voice tone when issuing any audible directive, request or recommendation; and
- (5) how well we do our individual duty as supervisors toward overall morale maintenance.

VI. OVER-ALL PROJECT EFFECTIVENESS MEASUREMENT

Heretofore, the primary determining factor of whether or not Safety has been administered successfully at any given site has been the Tabulatable Injury Frequency and Severity rates. This measure, while standard for all industry, as well as intra-company comparison, is not truly indicative of the actual total experience at any given site. For example, it is quite possible for a variety of incidents to occur, any one of which even though formerly not included in the Frequency Rate, may be more costly overall than a tabulatable Major Injury.

Therefore, beginning January 1, 1958, we are adopting within the Construction Division, a new "yardstick" of measurement wherein all incidents, as hereinafter defined, will be included in a special rating to be known as "TPR"—Trouble Frequency Rate. It will be the responsibility of each Field Project Manager to see that all incidents, as defined below, are reported to the Division Safety Office as they occur or become known. (Formula for computing TPR will be the same as that used for Frequency Rate.) Each project is also to list any "Incidents" occurring during the month on the reverse side of the Monthly Safety & Fire Data Log Sheet.

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The "TPR" of each project will be shown on the monthly "Black Sheet" from the Division Safety Office in a column separate from the Frequency Rate.

accidents to be included in "TPR" are:

- (1) Non-reparable Major Injuries, including all Sub-Contractor's injuries.
- (2) Sub-Major Injuries.
- (3) fire resulting in property loss or damage necessitating Insurance Reserve Reports.
- (4) accidents involving property damage requiring Insurance Reserve Reports.
- (5) claims against the project for public liability.
- (6) motor vehicle accidents on or off project involving du Pont equipment.
- (7) compensation claims involving litigation or services of an attorney, and
- (8) any Workmen's Compensation payment except where only the payment of outside medical (professional) services is involved.

Note: There is the obvious possibility of overlapping in the examples cited above. In instances where the same case falls in more than one category, it will be counted as one.

Reasons for "TPR"

When unfavorable situations arise on a project, they are unfortunately explainable only from the viewpoint that: that which happened, could have been avoided "IF"—somebody or some group, would have:

1. Anticipated by some extreme ability of "crystal ball" gazing—which is ridiculous and impractical, or,
2. Applied adequately, existing "HOW" which was designed basically to forestall or limit trouble—such as:
 - a. thorough "Employment Screening"
 - b. factual men—"Job Placement"
 - c. appropriate STA
 - d. follow through on "Operation Must" or
 - e. as in the case of fires, proper prior inspection.

Therefore:

Trouble—must be concluded to come from failure to apply given procedures thoroughly enough in any given situation.

IN FINAL SUMMARY:

HENCEFORTH, WE ARE LOOKING FOR "CONTROLLED APPLICATIONS" BY ALL SUPERVISION WITH FAR LESS EXCEPTION AND COMPROMISE.

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DU 029714

CONSTRUCTION DIVISION SAFETY PROGRAM—1957

Part I. PHYSICAL ORDERLINESS

Part II. THE CONTROL OF ABSTRACT DEFICIENCIES (MENTAL DISTRACTIONS)

- (a) "Big Word" Cards—Extended
- (b) Mechanics—(Monthly)—for Dramatizing "Big Words"

Part III. OPERATION MUST

- (a) By Foreman
- (b) By Safety Engineer
- (c) By Management

Part IV. REAPPLICATION OF FORMER TECHNIQUES

I. PHYSICAL ORDERLINESS

In the du Pont Construction Division, by concept, definition and experience, this phrase means specifically: that at any moment, hour or day ALL and EVERY piece of equipment, tools, material, facility or apparatus shall be stored, stacked, located, placed, temporarily erected, temporarily spotted, or set up for manipulation in such a manner as will render accident highly improbable AND give the direct and obvious impression of a clean and orderly work place. This applies to the interior of bins, cabinets, and rooms; cubicles as well as whole floors, buildings, yards, and areas.

This requirement by necessity means that all facilities at all times will be erected, placed, or stored PARALLEL to or at RIGHT ANGLES with some base line; an interior wall, an exterior wall, a building line, fence line or similar point of reference.

The benefits of this apparently unusual or "extreme" requirement have become obvious in "Material Handling", work accessibility, fire prevention, and ACCIDENT PREVENTION!

(All concerned are hereby advised that the above requirement shall now and in the future be construed as permanent policy and not a part of a current annual program.)

II. THE CONTROL OF ABSTRACT DEFICIENCIES

(a) "Big Word" Cards

During 1957, the Division Safety Office will continue to delineate examples of mental distractions through the medium of "Big Word" pamphlets, supplied to all projects on a monthly basis. Local project dissemination is to be identical in method to that used during 1956.

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The "Words" as processed in 1956 are always applicable and should be re-applied wherever new employees are involved or where the original application bears repetition. These words are:

COMPLACENT	UNDEPENDABLE
INDIFFERENT	IRRESPONSIBLE
NEGLECTED	INATTENTIVE
WORRIED	TEMPERAMENT
HURRIED	PREOCCUPIED
CONFUSED	INEXPERIENCED

(b) Mechanics—(Monthly)—for Dramatizing "Big Word"

The Division Safety Office will issue each month a very brief, yet specific program for the purpose of generating job wide attention and interest on an "Abstract Deficiency".

Each issue will contain all necessary information and details and will be provided in time to allow for a full month's application.

III. OPERATION MUST

(a) By Foreman

1. Daily Individual Man Inspection
2. Daily Specific Man Placement
3. Daily Specific Man-Task—S.T.A.

The requirement, above is Fundamental. (We in the Division Safety Office believe an accident is virtually impossible if the above three steps are factually executed at the proper time and with adequate quality.)

The illustration for this requirement specifically dictates that every foreman and supervisor must—every day in the first half-hour of the day:

- First (1) Look carefully at each man in his gang to see if he looks fit and ready to work—and then,
- Second (2) Specifically fit the gang member to a task which physically and from the experience or reliability factor matches the man to the task and the task to the man as precisely as may be possible—and then,
- Third (3) Specific adequate S.T.A. must be given for each task—with confirmation from each man that he understands all of his instructions.

It is imperative and essential to the success of this three-step sequence that all supervision—particularly foremen, arrange their supervisory time such that they are with and are personally supervising and observing their gangs, or groups, as much of each working hour as is practically possible. It is believed, that through proper analysis and planning this can be done to a greater degree than at any time in the past.

This year and from now on—the exact execution of the three steps must be done and must be confirmed frequently about every foreman—with the same sense of reliability and integrity as when any of them sign checks, or give their word of honor in having fulfilled an expected mission reflective on their honor.

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(b) BY SAFETY ENGINEER

"Square pegs in round holes." has been a legitimate criticism for misplaced manpower since before our time in Business and Industry. We have trained and reminded frequently beyond the normal for Industry, that we must:

SEE TO IT THAT OUR FOREMEN FACTUALLY PLACE EACH MAN ON EACH TASK—ON THE BASIS OF WHAT HE KNOWS ABOUT THAT MAN— particularly:

- (1) Basic physical matching of men to task as well as—
- (2) Aptitude and attitude coordination of the men to the task.

This function will be investigated by the Safety Office personnel "at least" once each week—foremen by foremen—and the results reported to management.

(c) BY MANAGEMENT

The local Management will select a person or persons of known experience and capability to physically inspect the working areas for the primary purpose of observing and analyzing:

1. The nature and current state of orderliness related to any working environment as described in, (1), this program.
2. The daily personal working habits of mechanics as related to Abstracts, (11-a), in this program.

This requirement should not be confused with the "Weekly Inspection Committee" or other organized unit as found on Page 28 of the "Blue Book".

A competitive posting, tabulation, and review should be made, (by crafts), at the regular Friday Staff Meetings where the best craft should be recognized by a rotating award to be provided locally. (It would be advisable to be more original in the nature of the award than the time-worn flag, plaque, or cup.)

SAFETY . . . has to do with everything, EVERYBODY, ALL THE TIME, under every conceivable circumstance.

IV. FORMER TECHNIQUES APPLICATION

- You are expected to make timely use of ALL former techniques as may be applicable. Some are listed below:

- (a) Program Training for foremen for better utilization of the Monday morning Tool Box Meeting time. Help them with "Attention", "Interest", "Desire", and "Action"—The basic principles of "Setting".
- (b) The every-task, S.T.A. requirement.
- (c) Field, Mechanical Equipment and Tool Inspection in scheduled periods.
- (d) Weekly meetings and Safety Meeting Guides. (Show more FORECASTED MAJOR HAZARDS.)

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- (e) Continuous attention to contractor safety performance (du Pont "safetyness").
- (f) Rigid adherence to principles of employment screening already established.
- (g) Factual and all-inclusive VPR tabulations.

DONT NEGLECT FUNDAMENTALS

See For Review:

- (a) Programs of 1956, '53, '54, '53
- (b) Graphic Safety Chart
- (c) "Blue Book" — Rigidly Revitalize
- (d) Material supplied in "Start Up Kit" and that material issued by you for local application.
- (e) Program all possible Traffic Safety.

TO THE SAFETY ENGINEER:

Constantly review the above fundamentals. Are you expecting others to do that which you may not be fully conversant with yourself?

Note especially: You are directly responsible for the administration of Safety Engineering in accordance with the Graphic Safety Engineering Sequence of Functions Chart.

Special note on Fire Prevention:

Review, inspect, protect, cover, organize for fire prevention so that all risk is controlled on a current basis.

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CONSTRUCTION DIVISION
SAFETY PROGRAM - 1956

MENTAL DISTRACTION
"Abstract Deficiencies"

Confused	Complacent
Temperament	Forgetful
Pre-occupied	Indifferent
Angered	Neglected
Worried	Undependable
Hurried	Irresponsible
Inexperienced	Inattentive

Divisional and Field management have agreed that the road of further progress in our accident prevention activities lies in the field of Abstraction for the most part, and secondly, a recognition and agreement that we pursue past basic techniques with more thoroughness, completeness, and unfaltering consistency, day by day and task after task to the "100,000th" task!

- Part I * Interpretation of ABSTRACT DEFICIENCIES/"MENTAL DISTRACTION".
- Part II PLACEMENT—Employment "Screening" with realistic "Job Placement".
- Part III OPERATION "MUST"—A three-step requirement for every foreman, every day. "Must" means for 20 years—when an accident has been experienced—a foreman invariably failed to do this completely, thoroughly, and reliably.
- Part IV FOLLOW-UP on 1, 2, and 3 above. (Convince us and yourself!)

* THE CONTROL OF ABSTRACT DEFICIENCIES
(A Prologue)

We have discussed, illustrated, and demonstrated many times during the past several years that in the du Pont Construction Organization, concrete safety, that is, guards, signs, personal protective equipment coverage and the like have been provided in time and quantity to produce 99.6% of our desired annual goals of no accidents.

Beginning in 1956 as practicable as we know how, and as agreed at the Project Manager's Conference in July, 1955, further progress depends on our concerted successful effort in the field of controlling abstractions in people's abstracts producing deficiencies contrary to desired safe personal conduct.

Because in new fields, it is advisable to crawl before you attempt to walk—we are approaching "Abstract Deficiency Control" through a partial consideration of that subject which we will name "Mental Distraction"—for better field and general comprehension.

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In the sense then, that a cluttered mind is a distracted mind—we recommend and request the operation of Part 1 (following) with daily thoroughness on the part of EVERY supervisor, foreman, superintendent, and engineer on the project to and on EVERY single individual on the job site continuously and completely as indicated.

(This prologue has been briefed in the knowledge that the basic philosophy and psychology of abstract human deficiencies have been discussed in our organization in many ways and many times during the past two years.)

I. ABSTRACTS

- A. Beginning with January 1956, and continuing monthly thereafter, the Division Safety Office will select and delineate to all sites, one example of mental distractions taken from those on the front cover of this program.

Each example will be illustrated and will be sufficiently explained to assist in obtaining uniform understanding and application at all projects. This, in printed form, will be supplied in sufficient quantity to permit distribution to all supervision by the following method:

- B. Beginning with the Field Project Manager and continuing through line organization, personal delineation at each site is to be made on an individual basis wherein each supervisor discusses the example separately with each member of his next line of supervision until all (including foremen) are covered. It is recommended that delineation of the example to Supervision be completed during the first 3 weeks of any month and that the example be used as the weekly safety "objective" during the 4th week.
- C. Each project will be advised one month in advance of each selection or example of mental distractions to be utilized. Thus each site will have time to prepare appropriate and adequate publicity to further aid in delineation of the example.
- D. Be prepared to explain upon request how and when by local initiative you were able to improve on the requirements in "B" without sacrificing the primary plan and intent in "B".

II. PLACEMENT—Employment Screening (Selection)

A specific and uniform policy has been framed by the District Superintendents and the Service Superintendent resulting from analysis of divisional needs as well as local conditions so as to get the maximum in general employee effectiveness. This you will obtain from the Division Service Superintendent's Office.

No one should expect management to assume liabilities under the present compensation law obligations without some attempt to avoid liabilities often traceable to other previous employers or previous circumstances or conditions.

No workmen should be permitted to assume the hazards of construction work who might injure himself critically or lose his life in so doing.

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Selection should, therefore, embrace two important considerations:

- (a) Basic physical objection and risks, and secondly,
- (b) Aptitude and attitude risks.

Job placement will be the daily responsibility of each foreman and craft superintendent, with assistance by area and division engineer, at employment and thereafter.

III. OPERATION "MUST"

Steps to Safe Operation:

1. Daily Individual Man Inspection
2. Daily Specific Man Placement
3. Daily Specific Man-Test—S.T.A.

The requirement above is fundamental. [We in the Division Safety Office believe an accident is virtually impossible if the above three steps are factually executed at the proper time and with adequate quality.]

This requirement specifically dictates that every foreman and supervisor must—every day in the first half-hour of the day:

- First (1) Look carefully at each man in his gang, to see if he looks fit and ready to work—and then,
- Second (2) Specifically fit the gang member to a task which physically and from the experience or reliability factor matches the man to the task and the task to the man as practically as may be possible—and then,
- Third (3) Specific adequate S.T.A. must be given for each task—with confirmation from each man that he understands all of his instructions.

It is imperative and essential to the success of this three-step sequence that all supervision—particularly foremen, arrange their supervisory time such that they are with and are personally supervising and observing their gangs, or groups, as much of each working hour as is practically possible. It is believed, that through proper analysis and planning this can be done to a greater degree than at any time in the past.

This year and from now on—the exact execution of the three steps must be done and must be confirmed frequently about every foreman—with the same sense of reliability and integrity as when any of them sign checks, or give their word of honor in having fulfilled an expected mission reflective on their honor.

(Foremen: Check on the True "Why" of Absenteeism first thing in the morning on the day of Employee's Return.)

IV. FOLLOW-UP

Unlike the system in recent years wherein the Division Safety Office rated the performance of the various units relative to the Division Annual Program, in 1956 there will be no such monthly ratings, but:

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1. You will determine your own degree of compliance and execution for each part of this program.
2. The Division Safety Office will make ratings on personal visitation at irregular intervals, at which time the program will be judged to be completely functioning or not.
3. Plans are being considered by the District Superintendents to continue in a manner to be announced later the intra-district competition in Safety Performance by each site.

DON'T NEGLECT FUNDAMENTALS

See for Review:

- (a) Programs of 1955, 1954, 1953, 1952
- (b) Graphic Safety Chart
- (c) Blue Book
- (d) One Page Craft Procedures Supplied in Start-Up Kit and written by you for Local Application.

FORMER TECHNIQUES — APPLICATION

We will continue to make active use of all of the techniques developed in the past, but special reference is made to the following:

- (a) Violation Frequency Rate (daily count recommended).
- (b) The every task, S.T.A. requirement.
- (c) Field, Mechanical Equipment and Tool Inspection in scheduled periods.
- (d) Weekly meetings and Safety Meeting Guides.
- (e) Continuous "Orderliness" throughout.
- (f) Advice adequately all NEW people, to maintain uniform state of current understanding at maximum.

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CONSTRUCTION DIVISION SAFETY PROGRAM - 1955

Divisional and Field management have stated their opinion that our Annual Program for 1955 should emphasize and require improvement in the use of our primary and secondary techniques. Everyone is, or should be, aware of the fact that we have never discarded any of our techniques and that it has always been in the province of responsibility and opportunity for all sites to operate the methods at maximum productivity.

For the sake of review, our primary techniques operate under the following broader headings:

- I. **PLACEMENT**—Employment "Screening" with realistic "Job Placement".
- II. **TRAINING**—Effectual divisional and job site extended employee orientation.
- III. **GROUP INSTRUCTION**—Monday morning "Tool Box" Meetings by foremen (with factual Proctor System assistance.)
- IV. **ORGANIZATION AND PERSONAL INSTRUCTION**—Consistent line organization—S.T.A. practice and V.F.R. control.
- V. **FOLLOW-UP**—Daily and weekly "Job Inspection" (including V.F.R. tabulation and control).

The Division Safety Office is herewith delineating specific ways and means of improving fundamentals for detailed application in 1955. Such delineations in effect are to be construed as the "new phase" of the program rather than any other new applications, such as were used in recent years, like the "Personal Contact" requirement, the "This I Did" cards requirement, and the most recent "Individual File Folder" requirement.

Following in the order of the above listed basic techniques, we indicate how each activity may be improved on more specific, more factual, more thorough, and more consistent application at all sites alike. Supervision is expected to delineate further under each subject, by its own extended analysis, as each set of conditions at each site may require.

I. **PLACEMENT**—Employment Screening (Selection)

A specific and uniform policy has been framed which will emanate from the District Superintendents and the Service Superintendent resulting from analysis of divisional needs as well as local conditions so as to get the maximum in potential employee effectiveness. This you will obtain from the Division Service Superintendent's Office.

No one should expect management to assume liabilities under the present compensation law obligations without some attempt to avoid liabilities often traceable to other previous employers or previous circumstances or conditions.

No workmen should be permitted to assume the hazards of construction

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work who might injure himself critically or lose his life in so doing. Selection should, therefore, embrace two important considerations:

- (a) Basic physical objections and risks, and secondly,
- (b) Aptitude and attitude risks.

Job placement will be the daily responsibility of each foreman, craft superintendent, with assistance by area and division engineer, at employment and thereafter.

II. TRAINING—Employee Orientation

Each new or re-employed employee shall be required to attend 3 one-half hour orientation classes, at intervals as follows:

Session A—with Safety Engineer—1st day of work

Session B—with Craft Superintendent—7th, 8th or 9th working day

Session C—with Safety Engineer—14th, 17th, or 18th working day

Subject (Session A)—in this meeting it is the Safety Engineer's responsibility to explain safety policy on the site, in the Division and in the Company. Such regulations as medical and First Aid, personal protective equipment and a good sampling of the Blue Book's contents shall be developed and discussed. In any event the new-comer shall be impressed to sufficient dependability.

Subject (Session B)—in this meeting the Craft Superintendent is to make perfectly clear where he stands on Safety and where his craft employees stand, man for man. The craft superintendent must impress on the new employee in strong, clear terms, as to what is wanted, who the worker is responsible to and for exactly what. Sincerity, clarity and straight-from-the-shoulder talk is required here at the craft performance level. After a craft superintendent has personally and forcefully made known his stand on safety with his own men "individually," he should later invite other craft superintendents to talk to his craft as a group for a show of solidarity in the supervisory ranks.

Subject (Session C)—in the second meeting with the Safety Department, the principal objective is to get clearer explanations of how techniques are applied to maximum effectiveness in relation to individual workers. What techniques, what old human habits or what short range hazards or remedies are discussed, are left to the good judgment of the Safety Engineer and his supervision and will be subject to local specific work and conditions.

III. GROUP INSTRUCTION—Tool Box Meeting (Footed Proctor Assistance)

- (a) These have too often given evidence of need for more thorough preparation on the part of the foreman presiding. The Planning Committee, the Steering Committee and the Safety Office will be more thoroughly critical in the constructive, progressive improvement which we must get from each foreman in every meeting.

The aforementioned committees shall assist more positively in the guidance of each foreman for better quality and practical application of tool box meeting time as it affects the work on hand at the time, craft for craft and gang for gang.

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- (b) The established Foremen's Forecast should contain, in the future, more of the major hazards anticipated. To obtain the maximum benefit from this weekly Forecast, it shall be completed for Thursday issue, applicable to the week beginning the following Monday. Planning committees are, therefore, required to sit on Tuesday of each week, so that by mutual discussion of projected work for the sites, the material for the Thursday forecast may be adequately covered on time.
- (c) Foremen are to be selected for more critically in the future as indicated in the "Blue Book". They should be rotated not more often than 10-30 days and their performance should be checked by the Safety Office at least twice each week. They shall be identified by the new divisional proctor "Insignia-Badge" and "matching hat band". (These are supplied by the Division Safety Office.)

IV. ORGANIZATION AND PERSONAL INSTRUCTION — Consistent Line Organization—S.T.A. Practice

The principal improvements of this technique, based on our experience with it over the past twelve years, are as follows:

- (a) Proper S.T.A. must be given in every case with each new task assigned (according to the "Blue Book") and it will not be satisfactory to give S.T.A. on some tasks and not on others.
 - (b) The context of the S.T.A. for any given task is to be specifically the result of good "eye-to-mind" analysis of every task and never a hazy generality or repetitive memory for only token compliance with the S.T.A. obligation. On written blocks of more hazardous work, S.T.A. should be written (10 words or 1,000 as may be required by the risk in the task).
 - (c) Top supervision, from Project Manager through Field Superintendent, all Field Engineers, Craft Superintendents and other Supervisors must realize that they, themselves, must give adequate, timely and exemplary S.T.A. creditable to their person and position.
- Note: Only S.T.A. that results in no accident is "adequate" S.T.A.

V. FOLLOW-UP—Daily and Weekly "Job Inspection"

- (a) In the past many designated inspection committees did an effective job of the standard tour of activities. On occasion, practice has been for one or two committee members to do most of the observing and note-taking. In the future each committee will present notes so divided that each inspection committeemen will have evidence of his own findings and recommendations.
- (b) All committees shall be briefed prior to starting out as to what they are to look for, how thoroughly they are to look and that faults are to be recorded and corrected no matter what group they pertain to.
- (c) Inspection teams should be trained to look for things that may develop rather than only that which is obviously and physically before them at the moment of inspection. When possible, as in the past, all objectionable conditions should be ordered corrected on the spot at the time of inspection and reported accordingly for the V.F.S. Tabulation.

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CONSTRUCTION DIVISION SAFETY PROGRAM - 1954

FINGERS FALLS FUNCTIONS

Follow-up	Faithful	Finish
Failures	Familiarity	Fortitude
Foremen	Forsightedness	Firmness
Failure	Fast	First
Field Supervision	Function	Fitness
Frequency	Faultfinding	Forecast
Frustration	Foolishness	Friendliness
Factual	Forgetfulness	

The above words, as you will recognize, have much to do with Safety at one time or another. We are requesting that these words be used as a title for Foreman's Forecast editorial page in weeks to come. This, as you might surmise, is recommended in order to help accentuate the theme of H-F.

During the last several years, 85% of our major tabeatable injuries resulted from injuries to fingers, and from the falls of persons. Because of this, and out of consideration of the above, weeks and months of study have led us to conclude that the Safety Program for 1954 must, logically, include and be built around great emphasis on FINGERS and FALLS.

1. FINGERS AND FALLS*

Advertise, post, proclaim and broadly publicize a concerted action having to do with the prevention of FINGERS and FALLS accidents through a sectionized program of "H-STA." This is to mean that over and above all general and basic function for safety, major emphasis is to be placed on S.T.A. having to do with FINGERS and FALLS, and that all S.T.A. must include "H-STA" irrespective of other S.T.A. requirements.

- (a) "H-STA" signs and placards especially designed for the purpose (note style symbols) are to be adequately posted all over each project. These are to be maintained throughout the entire 12 months of the year.
- (b) The sites are requested to adopt whatever phrases for verbal or poster use which may be practicable to get and maintain emphasis on FINGERS and FALLS. (Catch phrases, discrete slogans, time card imprints, banners, loud speaker work and forms of personal greetings, stationary and print markings are the better known of the publicizing media for job saturation in any given subject by past experience.)
- (c) "H" must be discussed at every tool box meeting, every staff meeting, every planning meeting and every mass meeting throughout the entire year.

*See pages 6 and 8 of the "Blue Book".

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2. FUNCTIONS

(See "Graphic Safety Engineering" Chart, for the number and types of functions and considerations required.)

It is recognized and can rightfully be claimed that more safety work is done by the moment-to-moment word of mouth and other opportunities for oral expression than through written means. It is, nevertheless, a file folder that proves the most in the safety engineer's responsibility of follow-up investigation. There is no better proof of "doing" than the "record."

Therefore, each person on the organization chart down to, but not including, gang foremen, is to set up and keep a personal folder in his files. This folder shall contain copies of any and all communications originating in 1954 with and from that supervisory individual in behalf of safety. This folder will be called for from any individual at any time through the local Field Project Manager by the Division Safety Office and must be received within 72 hours of local receipt of request. Folders not received in the Division Safety Office within the 72 hour period will be returned unopened. Folders meeting the time and contents requirements will be analyzed and commented on constructively and immediately returned. The local safety supervisor should likewise interest himself in these folders. The purpose of folder inspection is to observe planning, anticipation, initiative, scope of coverage, and frequency of the types of safety consideration by the individual concerned, in his position, and for the amount of time lapse in the year.

3. TECHNIQUES—APPLICATION

We will continue to make active use of all of the techniques developed in the past, but special reference is made to the following:

- (a) Graphic Safety Functions Chart and Booklet.
- (b) Violation Frequency Rate (daily count recommended).
- (c) The every task, (S.T.A.) requirement.
- (d) "THIS I DID" (as amended for 1954 following) —the "THIS I DID" program of 1953 will be discontinued despite the great benefit achieved therefrom; except, that in order to permit non-election winners to continue to have an opportunity to win a gold plumb bob, the new rules will be as follows: The Division Safety Office will accept during the first week of any month (and only at that time) any contribution which is complete and valuable enough for division application and adoption. Such contributions in 1954 will have to be worth 100 points when first submitted. It need not be submitted on the conventional "This I Did" card. The earning of points by accumulation will not prevail in 1954, and points won in 1953 will not be counted.

A "THIS I DID" Club will be formed early in 1954 which will include the posting of election winners' names at all sites on a standard display plaque.

4. CONFERENCE

A Construction Division Safety Conference will be held for all principal safety personnel early in 1954 at a location to be announced.

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CONSTRUCTION DIVISION SAFETY PROGRAM - 1953

PHASE ONE (Major Techniques)

The techniques proven valuable in past years such as:

- (A) S.T.A.
- (B) V.F.R.
- (C) "A" Formula (by areas)
- (D) Screening (as in 1952 Program)

will be continued in application with increased effectiveness applied and anticipated.

One or two paragraphs written on the back side of the monthly log sheet with calculations where they apply, will suffice for reporting each of (A), (B), (C), and (D).

There are to be no citation flags applying in 1953; however, any project experiencing a V.F.R. greater than one (1) will be investigated promptly.

PHASE TWO (Initiatives)

Effective January 1, 1952, each person whose name appears on the project's formal organization chart will be required to make a statement on a card provided by the Division Safety Office. (Gang foremen optional.)

This statement may be as long or short as the individual sees fit, and shall be entered immediately below the printed heading on the card—"This I Did." The statement must indicate, describe, convince, and relate anything done on the individual's own initiative which is a valid, practical, successful contribution toward the factual accomplishment of "no accidents". That which will be credited highest are those actions taken, out of personal initiative, which in proven application go far in influencing to as lasting a degree as may be evident, the safety consciousness of any group, large or small, and in any important way. (Do not turn in philosophy or suggestions—just—"This I Did".)

Mechanics of application of cards

The local safety office will place these cards in a rack monthly on the first day of each month just outside the safety office door. The cards must be picked up by the addressee within five days. They must be turned in locally by the 25th of the same month. No general notices will be routed regarding due dates. In order to elicit quality, each project may select those cards deemed effective and of highest quality up to 20% of the total. As recognition, the best 20% (this is a leveling factor) may be submitted to the Division Safety Superintendent's Office by the third working day of the following month. Of the 20% submitted, the Division Safety Office will in the best instances award a gold plumb bob and oak leaf cluster in lapel size with a letter from appropriate Wilmington management, with copies to personnel file. Should individuals who have already been awarded the gold plumb bob deserve recog-

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nition on subsequent occasions, it should be made known that further reward for such individuals has been planned and will be acted upon as merited.

PHASE THREE (Fundamental "HOW")

Each project safety engineer will be loaned a graphic safety engineering chart, along with an explanatory booklet for proper and complete use of the chart.

The data on the chart is our total safety program in Du Pont Construction and represents in broad form the administrative, control, method, application, and facilities, requirements on every one of our jobs, large or small. The objective in 1953 is to make absolutely certain that each of the sixty segments under the five principal headings are in effect at maximum efficiency, according to the needs of every project. All projects may expect at any time or from time-to-time a review by the Division Safety Office of the degree and quality of compliance to all segments of this chart. The chart will hereafter serve as a check instrument by the Division Safety Office during personal visits. Unsatisfactory performance under any segment will be pinpointed with explanations prior to the visitor's departure from the site in the interest of effective program coverage.

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**CONSTRUCTION DIVISION
SAFETY PROGRAM - 1952**

- I. The effective systems of accident prevention of recent years will be continued as described in prior annual programs. The major items are:

S.T.A. — (Safety Task Assignment)

All foremen are to be repeatedly instructed to teach their men to O-S-E-Y orders as given.

V.F.R. — (Violations Frequency Rate)

100% — (Personal Equipment Coverage)

Non-written all level "Personal Contact"

- a. Competition between projects on V.F.R. will continue on the following basis only:

Violations are defined as conditions or acts **CONTRARY** to anything referred to or mentioned in the "Blue Book" **ONLY**. **THIS IS FOR UNIFORMITY.**

The project with the lowest V.F.R. rating (and complying with sub-major and major injury regulations) will be recognized with a pennant award, except that when in the opinion of Division Management circumstances warrant the award may be made to other than the lowest V.F.R. in the interest of over-all safety achievement.

Projects winning V.F.R. Pennants will award individual wallet cards in silver coloring for first time winning, and gold finished wallet cards for individual recognition for second consecutive winners. These cards will be supplied by Wilmington and will be suitably endorsed. (Disqualifications will be by 1950 rules regarding major and sub-major cases.)

- II. All blocks of work shall have adequate detailed safety **INTRODUCED** INTO the written plan for the work. All such plans must reach and be understood by the Gang Foreman.

This requirement shall be carried out in such a manner that planning papers or forms, whichever are used, indicate clearly that **ALL WORK** is paralleled by a sufficient safety plan. A file of these plans shall be maintained for periodical review.

- III. There shall prevail, in a manner superior and more critical than heretofore, a **PRE-EMPLOYMENT SCREENING OF PROSPECTIVE** employees for **CRAFT QUALIFICATIONS** by those having to do with employment including medical. Notes must be kept by these persons as to the number of interviews, number of rejects and number of rejects influenced by this program and cause.

- a. There shall be placed in effect a dependable post employment requirement of Gang Foremen and Craft Superintendents to daily exercise better **EMPLOYEE SELECTION FOR JOB PLACEMENT AND TASK ASSIGNMENT** in the interest of effectiveness and personal safety.

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Factual evidence in note form must be kept by the Safety Engineer in a folder to substantiate compliance to this item.

- b. The Medical Supervisor at all sites shall interest himself daily with Items III and III-a to ASSIST DIRECTLY IN EFFECTING the results that are SOUGHT. The Medical Supervisor shall ATTEND staff meetings involving safety for the purpose of advising in detail on a current basis on items III and III-a.

The Medical Supervisor shall TALK to all Gang Foremen AT GANG FOREMEN'S MEETINGS approximately ONCE EACH MONTH to aid in better selection and placement of men based on both PHYSICAL ABILITY and MENTAL ALERTNESS. He must keep notes on all talks and efforts relative to III-b.

- IV. BEFORE ANY CONTRACTOR IS PERMITTED TO START WORK, a factual delineation of safety requirements, beginning with COMPLIANCE to the SAFETY CLAUSE IN THE CONTRACT, shall be given.

This is to be done BY THE CONTRACT ENGINEER or other responsible person along with the Safety Engineer and Field Superintendent or Assistant Project Manager. Notes are to be kept in a folder by the Contract Engineer of all such discussions.

A current follow-up of these requirements will be made by the responsible parties.

- a. The Safety Record of du Pont and Contractors' employees on each site will be CRITICALLY SCRUTINIZED by Wilmington during 1952.

- V. The use of the "ACCOMPLISHMENT FORMULA" will be continued and will be applicable to supervision down to and including FOREMEN during 1952. The result obtained through the application of this formula EVERY 60 DAYS shall be explained to the rated individual on the basis of both PERFECT PERFORMANCE and THE AVERAGE for this type of group at that site. This item is the responsibility of the Safety Engineer.

Items II, III, III-a, III-b and IV are the direct responsibilities of the department heads, supervisors or engineers whose work at the project site is directly or most nearly related to the responsibilities outlined. This does not allow these people to pass these responsibilities on to lesser levels of supervision. This will mean that each of these persons, except Craft Superintendents, will maintain a folder containing written notations of effort expended, action taken or specific accomplishments in the interest of compliance to their assigned responsibility set forth within this program. These folders, along with all written notations, will be called for on irregular sequence during the year. The Project Safety Engineer's responsibility in this connection will be to secure the folders from all parties and forward same to the Division Safety Office as requested, along with his personal comments on each folder presented.

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AC VERSUS DC WELDING EQUIPMENT AND REVERSE POLARITY WELDING

A. AC AND DC WELDING EQUIPMENT COMPARISON

A safety comparison of AC versus DC welding equipment requires the establishment of certain fundamentals:

1. "Open-circuit voltage" is the voltage indicated when a volt meter is attached to a welding machine, with one meter lead connected to the electrode holder and the other to the work return lead (no arc struck).
2. In general, the open-circuit voltage of most DC welders ranges from 35 to 100 volts and depends primarily upon the manual adjustment of the machine by the operator.
3. The open-circuit voltage of most AC machines will be in the range of 70 to 85 volts.
4. The open-circuit voltage of a single DC welding machine (100 volts, DC) is generally regarded as the maximum DC voltage which humans can withstand, hand to hand or foot. If the electrode should touch the central region of the body (near the heart) and break the skin, there is a possibility of a fatality. Two DC welding machines, connected for opposite polarity, develop up to 200 volts, which is possibly fatal.
5. The open-circuit voltage of essentially all AC welding machines exceeds the voltage which can prove fatal to humans under the most unfavorable conditions of wet hands and feet and a firm grip on the electrode. This condition is possible under field welding conditions. (This voltage is 37.5 volts AC, hand to hand or foot.) There is no uniform relation between human sensitivity to AC voltage as compared to DC voltage.

All AC welding machines must have "open-circuit" automatic voltage reducers provided on them at time of purchase. This is a "vendor's optional offering" at extra cost.

Torch mounted thumb switches or foot switches to control welding power should be installed on TIG welding torches and/or welding machines used with AC welding power or alternately on AC and DC welding power.

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B. LOW-VOLTAGE CONTROLS

Experience indicates that low voltage "open-circuit" controls are practical in all cases where reasonably clean material is being used. Rusted or otherwise coated materials require cleaning before arcs can be struck in a satisfactory manner. The reduction of open-circuit voltage by the use of this device is to about 7 volts.

C. PHASING

On multiple installations of AC welding machines, there is a possibility (between the electrodes of different machines) of having voltages of zero, one, square root of three, or two times the voltage of any one unit.

The best procedure, where these conditions may exist, is to take the precaution of requiring an electrician to make the set-up and check with a voltmeter, to make sure that the lowest possible voltages exist between adjacent machines that can be arranged without overloading one or two phases of the circuit.

D. HIGH FREQUENCY MACHINES

Special purpose AC machines that operate at high frequencies are now being built and their use is becoming more prevalent. One of the characteristics of high frequency current flow in conductors is that the flow of electrons tends to take place along the outside surface of the conductors and does not penetrate to the center. This tendency becomes greater as the frequency increases. This tendency is also present in current flow through the human body; and consequently there is less chance of a current flow through vital parts of the body at the higher frequencies than at lower frequencies.

E. REVERSE POLARITY (DC) WELDING

There are certain hazards incumbent in electric welding particularly concerning reversed and/or dual polarity welding. It is recognized that an electric welding machine can cause an individual to receive an electrical shock, whether it is a motor generator set or rectifier or transformer type equipment. Therefore, assuming that the welding machines are properly installed (guarded, insulated, grounded), this procedure is primarily concerned with an individual's electrical shock potential created at the electrode when performing reversed* and/or straight polarity welding.

*Straight Polarity is defined as "electrode negative, work positive"
"Reverse Polarity" is "electrode positive, work negative".

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The intensity of electrical shock a person receives from one electrode is dependent upon how well he is insulated at the moment and at what voltage the machine is set to produce what can vary from very low voltage to as much as 80-100 volts, provided the person is grounded and he touches the bare electrode. If a person touches an electrode of a machine operating with straight polarity setting and then comes in contact with an electrode of another machine operating with reverse polarity, he will receive a shock equal to the additive voltages of the two machines, which could be fatal. If the two machines are of the same polarity, then the shock created between electrodes is equal to the difference between the two voltages of the respective machines.

**IN VIEW OF THESE INHERENT HAZARDS,
CONSIDER THE FOLLOWING.**

1. All leads from multi-operator power sources shall operate on the same polarity. In shops where both polarities, or separate AC and DC power sources are provided, not more than one electrode holder or torch lead shall be at a work station at the same time.
2. Care should be taken to prevent two leads from coming into contact between booths or work positions at points of open partition. Fabricated metal parts — strap iron, miscellaneous rods, etc. — should not be allowed to accidentally become part of any circuit regardless of polarity.
3. EACH SITE SHALL COORDINATE THE RESPONSIBILITY FOR SAFETY FROM ELECTRICAL HAZARDS IN CONNECTION WITH WELDING EQUIPMENT WITH THE CONTRACTOR'S ELECTRICAL SUPERINTENDENT, OR ONE QUALIFIED PERSON AND NOT SEVERAL PERSONS.

All personnel should be made aware of the inherent hazard existing when coming in contact with any live electrode. Welders (despite experience) should also be educated to recognize the potential hazards existing when performing welding work.

Note: For additional information, see Engg. Std. E1. 3P and ANSI Z49.1

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RADIOACTIVE AND X-RAY SOURCES

As a general statement, all phases of industrial radiography, both X-ray and gamma ray, should be restricted to radiographers and assistant radiographers who have specific training in radiographic handling and safety, and who receive regular medical checkups, and whose exposure is measured by dosimeters and is regularly recorded. Assistant radiographers are defined as all those people working for a radiographer within a restricted radiographic area.

All industrial radiography, using artificial isotopes as sources, comes under the regulations of the Atomic Energy Commission, except in the states of Arkansas, California, Florida, Kansas, Kentucky, Mississippi, New York, North Carolina, Oregon, Tennessee, and Texas. These states have taken over the licensing function and follow practically the same regulations as set up by the AEC. In other than these states, it is necessary to obtain a license from the Commission before a source can be purchased and used. This license makes the licensee responsible for the maintaining and using of the source in a safe manner and includes requirements concerning the training and supervision of the radiographers and assistant radiographers who may use the source. The safety procedures required are outlined in AEC Regulations.

Industrial radiography, using X-rays and Radium as an energy source, does not come under the requirements of the Atomic Energy Commission, therefore, radiographers using these sources may not be as specifically trained in radiographic safety.

The Du Pont Company has a specific procedure for procuring and handling Du Pont radioactive sources. This procedure, No. 1036, copies are available from the Inspection Section, was prepared by the Engineering, Legal, and Purchasing Departments.

An important provision of this procedure, and one which is also an AEC requirement, is that all plants for which a radioactive source is purchased, usually for instrumentation, must designate and train a PLANT RADIATION PROTECTION OFFICER. All Du Pont plants now have RADIATION PROTECTION OFFICERS and their assistance on radiographic safety problems would, of course, be of great value.

At the present time, the two widely used isotopes for industrial radiography are Iridium 192 and Cobalt 60. Cesium 137 and Radium may also be used in industrial radiography.

It is recommended that all radiographic work using isotope sources be restricted to Iridium 192 or Cobalt 60. The reason for this is that these

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two elements are supplied as solid metal cylinders encapsulated in stainless steel. Cesium is supplied as Cesium Chloride encapsulated in stainless steel. Radium which disintegrates into a radioactive gas — Radon — is usually encapsulated in a double capsule. With the latter two elements, it is essential that the capsules remain absolutely tight and they must be tested regularly for leakage. Capsule leakage has occurred and is an unnecessary hazard which can be eliminated by restricting the source to Iridium or Cobalt for radiographic work.

Cesium and Radium are rarely used for radiographic inspection today; however, they are used in instruments such as level gauges. In addition to checking these sources for leakage, it is extremely important that these instruments be turned to the "off" position before personnel does any work where they would be in the direct rays of the source such as inside a vessel which had a radioactive level gauge attached to the outside of the vessel. When the instrument is in the off position, the radioactive source is shielded.

The amount of shielding required for storage or using a radiographic source is not a specific figure. The dosage of the radiation varies with the type of source, the size of the source, the time of the exposure, and with all sources inversely proportional to the square of the distance from the source. Our Inspection Procedure No. 1036, approved by E.S.D. and Design, limits the field intensity of the surface of permanent storage housings, or on the surface of the shipping box, if not in a permanent housing, to 5 milliroentgens per hour, as measured with a suitable counter.

Dosage outputs for radioactive sources:

	Output MRH/CURIE
Gamma Ray Sources	
Radium 226	9040
Cesium 137	4190
Cobalt 60	14500
Iridium 192	5910

MRH = milliroentgens/hour at 1 foot from the source

Dosage output for a typical industrial X-ray generator:

Power	Output MRH/MA
120 KVP	438960
150 KVP	794040
250 KVP	2788980

MRH = milliroentgens/hour at 1 foot from the source

MA = milliamps

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Each X-ray generator has its own characteristics. This example of a typical X-ray generator is merely to illustrate the large output that it is possible to obtain from an X-ray generator.

It should be noted that unlike radioisotopes which emit radiation continuously, X-ray generators can be energized or turned off at will; however, during operation the radiation output from an X-ray machine is many times greater than that of industrial isotopes. It is, therefore, very important that personnel never expose any part of their body to the direct beam from an X-ray machine. Both radioisotope cameras and X-ray machines may be so constructed that the beam can be directed in a specific pattern and/or it may be adjusted to radiate in a 360° pattern.

Permitted dosage:

Radiation Workers	Average
Total dose in any 13 consecutive weeks, 3 rem	0.3 rem/Wk.
Total dose in any one year, 12 rem	
Total dose accumulated at age N 5 (N-18) rem	5.0 rem/Yr.

where N is the person's age and greater than 18

Non-occupational Personnel

Individuals should not receive doses in excess of 1/10 those permitted for radiation workers 0.5 rem/Yr.

For exposure to X-ray and gamma ray 1 rem = 1 roentgen; therefore a radiation worker can accept an exposure of .3 roentgens per week, which is 300 milliroentgens per week, and a nonradiation worker 1/10th as much, or 30 milliroentgens per week.

It is apparent that the measurement of radiation dosage and the method for maintaining total dosage records is quite involved, and it has been said that the best attitude relative to radiation exposure of nonoccupational personnel is that any unnecessary exposure is too much.

The range in feet required for safe occupancy of workers, other than the radiographers, is again dependent upon the type of source, size of source, and the exposure time, plus the amount of secondary radiation which might be emitted by objects other than the source. In order to determine the exact radiation level at a specific point, it is necessary to use some sort of a counter.

On the basis that non-occupational personnel should not receive more than 1/10th the permitted dosage of a radiographer, it can be computed that non-occupational personnel should receive not more than 30

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milliroentgens per week. The safe distance for this non-occupational worker on a basis of 40 hours per week exposure would, therefore, be determined on the type and size of the radiographic source, assuming that he was exposed directly to the rays.

As an example, the safe working distance for a non-occupational worker can be computed as follows:

$$\text{Distance in feet} = \sqrt{\frac{C \times H \times N}{R}}$$

Where C = Constant dosage in milliroentgens per hour from source at 1 foot.

H = Total hours exposed

N = Number of curies in source

R = Dose rate

Therefore, for exposure to one curie of Cobalt 60 for 40 hours in one week -

$$14,500 \times 40 \text{ hrs.} = 580,000 \text{ mr at 1 foot}$$

$$R = 30 \text{ mr}$$

$$\text{Distance} = \sqrt{\frac{580,000}{30}} = 139 \text{ feet}$$

At 139 feet from the Cobalt 60 source the radiation level is 30 milliroentgens in 40 hours plus any secondary radiation which might be present. Secondary or scattered radiation is radiation emitted from objects being irradiated by the primary radiation beam which includes the object being radiographed plus the floor, wall, columns, pipes, etc. exposed to the radiographic source. Since secondary radiation roughly amounts to only 1/10th of one per cent of the incident dose at 3 feet from the scatterer, it would be negligible in the above problem. Secondary radiation is an important consideration, however, with high intensity radiation where the scatter may be reflected around a barrier to the radiographer.

Once a permitted radiation level line has been established a barrier should be erected and the area should be considered a restricted area with access limited to the radiographers, and so posted.

From the above it is apparent that specific safety consideration must be given to every radiographic application.

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CRANE SHEAVES

A. SPECIFICATIONS

All crane sheaves must meet the following specifications. Material to be cast steel, cast iron, or forged steel, as recommended by the crane manufacturer.

1. Cast Steel

- (a) Material shall meet ASTM Specification A148-60, Grade 90-60, or ASTM A27-58, Grade 70-36.
- (b) Radiographic inspection of each sheave will be required and a certification report shall show that sheave meets requirements of ASTM Specification E71-52, Table I, Class 3, or better, for all parts of the sheave.

2. Cast Iron

- (a) Material shall meet ASTM Specification A126-61T, Class C.
- (b) Radiographic inspection of each sheave will be required and a certification report shall show that sheave meets requirements of ASTM Specification E71-52, Table I, Class 2, or better, for all parts of the sheave.

3. Forged

- (a) 1035 Steel, ASTM 235, Class E, normalized
- (b) Dye check

Approval by Inspection Section at vendor's plant shall be required in all of the above.

B. INSPECTION

- 1. Results of inspection shall be entered on Major Equipment Inspection form.
- 2. Subsequent inspections shall be made annually as follows:
 - (a) Visual inspection for obvious signs of wear or damage.
 - (b) Dye check or X-ray if (a) shows suspicious area.

C. RECORDS

- 1. Record of initial certification or X-rays shall become a part of WME folder.

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RESPIRATORY PROTECTION

FILTER TYPE MASKS VERSUS DEMAND AIR MASKS

A. Background Information

The prime consideration when specifying or issuing respiratory safety devices to employees is:

"That the individual must be assured oxygen sufficiency in the atmosphere in the cubicle or in the confined area where he is expected to work. Filter type respirators and canister respirators are not always adequate under the above referred types of uses."

It is, therefore, imperative that in a case of doubt, and of course in cases where the chemistry involved is properly analyzed by ourselves to indicate oxygen deficiency, the apparatus used should be of the "demand air type". Demand air is obtainable from plant air lines, compressed air bottles and compressors. Air bottles, particularly those worn on the person, are not always desirable subject to the stricture presented in the small openings on virtually all tanks. Air drawn from compressors sometimes presents the risk of carbon monoxide from heated oil in the receiver tank.

All in all then, demand air, with sufficient lengths of conducting hose, is most safely derived from hand or electrically operated blower air pump, plant air or external compressed air cylinders. In all cases of demand air use, the pressure at the face mask must be closely regulated, and the air should be filtered. In some commercial devices, both the filtering mechanism and the pressure regulator are inherent parts of the device. In the use of compressors and/or commercial compressed air bottles, the filter and the pressure regulator must be provided. This frequently includes "plant" air.

Note - when plant air is used as a source for breathing air it is required that an auxiliary source of supply be provided and readily available for use in the event there is a disruption to the plant air supply. Auxiliary reserve should be 20-30 minutes minimum air supply.

For illustrations of demand air equipment, we give as one source, the current Mine Safety Appliances Company catalog. If upon the termination of field work in the Construction Division, the air respiration source for any particular job is not absolutely clear to you, contact the Division Safety Office before the exposure.

B. Use of Breathing Masks

1. Purpose

- a. It is intended in this section to supply only basic safety precautions for breathing air masks, when used in confined work areas such as pressure vessels, cubicles, or containers where there may be a deficiency of oxygen, where a hazardous gas is being used for testing, or where gases of an offensive nature are given off during burning or welding.
- b. When there is any possibility of an explosive hazard, this procedure alone is not adequate.

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2. Hazard

- a. The first thought shall be given to the removal of the hazard (frequently possible).
- b. Proper planning, such as work sequence, increased ventilation, and a change of test gases (if work is testing) can often remove the potential danger.
- c. The most common and severe hazard is insufficient respiration oxygen. The reaction to this dangerous condition is much more rapid than is generally recognized. One deep breath of an atmosphere containing no oxygen can cause immediate unconsciousness.
- d. The displacement of air by other gases, particularly inert gases, hydrocarbon cleaning agents, is a common hazardous occurrence. Refer to Standard Engineering Specification PZ-1 for acceptable cleaning agents. The ventilation must be rapid and positive if a cleaning agent with a high evaporation rate is used.
- e. The potential of tripping and falling is increased while wearing a mask. Whenever possible, all tripping hazards are to be removed, and guard rails installed before entering the "unit".

3. Testing Mask Equipment

- a. Determine how long the equipment has been in use since the last inspection by an authorized person. Do not use equipment that is obviously in disrepair.
- b. Examine the air hose carefully. Badly worn hose or hose that has been contaminated with oil, dirt, or any other foreign material shall be replaced. Do not use any hose that has an odor from a previous combustible gas service.
- c. Put on the masks, adjust the air properly, and use it for at least five minutes before entering the "unit".

4. Heat and Vapor

- a. A combination of high temperature (90°F. and above) and high humidity (90% and above) are to be avoided. These conditions may exist in vessels that have been heated by the sun. Never enter a container or confinement where such conditions may exist.
- b. Remember, steam also displaces air. Steam containers must not only be cooled, but they must be well aerated before entry.

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PROTECTIVE COATINGS SAFE APPLICATION

This procedure primarily applies to paints; however, its principles apply to all coating operations including insulation coatings, waterproofing, and surface adhesives.

I. GENERAL

The application of protective coatings involves the following major hazard considerations:

- A. **Flammability of materials and explosion of air-vapor mixtures:**
Virtually all solvent solution coatings are highly flammable in liquid form. Vapors released in the process of application will be explosive if concentrated in sufficient volume in closed or restricted areas. Even vapors from ordinary enamels and oil paints may be accumulated in sufficient density to produce an explosive mixture. After application, "wet" or uncured coating surfaces constitute a significant fire hazard.
- B. **Toxicity of Materials:**
Solvents, as well as other components (lead, cyanides, resins, etc.) of many solution coatings are toxic to varying degrees and in varying ways. Intoxication may come about through excessive breathing of vapors or particulate matter, skin contact (dermatitis, allergy, etc.), skin absorption into the system and oral ingestion (lead on hands; hands to mouth; lead in mouth; lead swallowed).

II. PRECAUTIONARY MEASURES AGAINST:

A. Explosive Vapors, Wet Coat Surface Fires, Flammable Liquids

1. Provide application area with adequate explosion-proof* ventilation.

*Non-explosion-proof fans may be used with specific approval by the responsible Field Project Manager. In such cases, fans should be started before the beginning of coating application and run continuously until job is complete and coating essentially dry. In case of inadvertent fan shut-down, fans should not be re-started until an explosivesmeter check has been made.

Adequate ventilation is considered to be that which will prevent the accumulation of explosive vapors above 20% of the Lower Explosive Limit (LEL) of the solvents being employed. If explosivesmeter tests show concentrations above 20% of LEL, coating application must be stopped and ventilation must be increased.

Fumes and vapors from coating operations must be exhausted away from air intakes, work areas, ignition sources, etc. (See attachment No. 1 for sample ventilation calculation.)

2. Provide explosivesmeter sampling at beginning of application and periodically thereafter to prove adequacy of ventilation.

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3. Protect mix and storage areas, application area, and "wet" walls from all ignition producing sources.
4. Handle low flash point solvents in Safety cans or equivalent drum dispensers.

8 Toxic Materials:
Inhalation Protection

Maximum Allowable Concentrations (MAC) for toxicity control of most solvent vapors in air, or for other non-explosive toxic ingredients, are generally many times (possibly several orders of magnitude) lower than the LEL. Hence, if ventilation satisfies MAC, it generally will more than satisfy the ventilation required to prevent an explosive mixture. However, make sure ventilation does satisfy both LEL and MAC. (See attachment No. 1 for toxicity ventilation calculations.)

2. Where explosive mixtures are of no concern, inhalation toxicity protection can also be afforded by breathing air equipment. If excessive air borne particulate concentrations exist (such as in a confined spraying operation), breathing air or filter apparatus may be mandatory.

Skin Contact, Skin Absorption, Oral Ingestion Protection

1. Long-sleeved shirts, gloves, skin cream and washing of hands and face before eating and smoking will generally afford adequate protection for solvent solution enamels, lacquers, varnishes, petroleum products, water based paints, etc.

CAUTION: Special coatings containing leads, chlorinated hydrocarbons, epoxies, resins, polyamines, cyanides, styrene monomers, highly reactive catalysts, and coatings which involve chemical reactions during mixing and application require special development of safety precautions - UTILIZE MANUFACTURER'S SPECIALISTS, Division Safety Office and Company toxicology lab (Haskell Laboratory) for such items.

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**PROTECTIVE COATINGS
(VENTILATION)**

An entire room 20' x 40' x 15' is to be given one coat of paint. Contact with the vendor and site paint supervision indicates the following:

1. Xylene makes up 48% by volume of paint mixture as it leaves the factory.
2. Site painters will add an additional pint of xylene per gallon of mixture for thinning purposes. End result: mixture which is 53% xylene by volume when applied.
3. Paint additionally contains solids, pigments, etc., which are not toxic or flammable under conditions to be encountered during normal application (confirm this with vendor and from chemical references).
4. Maximum application rate will be two gallons per hour - one shift, eight hours per shift.
5. Assume that: all xylene immediately evaporates from applied paint; mixes completely with air in room; and vapors do not escape room (no ventilation).

Calculation of minimum ventilation required:

- A. Volume of room = 20' x 40' x 15' = 12,000 cubic feet.
- B. Xylene evaporated per shift = 2 gallons paint mixture per hour x 8 hours x 53% xylene by volume = 8.48 gallons xylene.
- *C. Vapor volume of xylene (1 gallon evaporated) = 27 cubic feet.
- D. Total volume of xylene vapor available = 27 cubic feet x 8.48 gallons = 229 cubic feet.
- *E. MAC for xylene = 200 PPM or 0.02% by volume in air.
LEL for xylene = 10,000 PPM or 1% by volume in air.
MAC is therefore the controlling limit.
- F. Total volume of air required to dilute total xylene applied to a MAC of 200 PPM =

$$\frac{\text{total volume of solvent vapor} \times 10^6}{\text{MAC}} \quad \text{or} \quad \frac{229 \times 10^6}{200 \text{ PPM}} =$$

1,145,000 cubic feet per 8 hour shift or 2385 CFM air change.

*See attachment No. 2 or similar standard references for this type information.

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Part 5
Attachment No. 2 Page 2

TABLE OF SOLVENT PROPERTIES

Name and Synonyms	Boiling Point C	Flash Point F	Flu- orinated Group	Explosive Limit (% LEL UEL)	Evaporation Rate (Ethex=1)	Sp. G.	Viscosity (Cp, 70°F)	MAC		
5. Amyl Alcohol CH ₃ (CH ₂) ₄ OH	96	203	70	4	2.5	1.8	0.81	48	5	
6. Amyl Alcohol CH ₃ (CH ₂) ₄ OH (Benzene OH)	148	298	84	1	1.1	1.1	0.879	22	100	
7. Amyl Alcohol C ₁₁ H ₂₄ O	138	280	91	2	1.2	1.2	0.81	20	100	
8. Benzene C ₆ H ₆	80	176	12	4	1.4	7.1	2.0	0.80	37	35

COMMENTS

Contact with skin causes burns. Fluorinated alcohols are highly toxic. Eye effects may be serious. Dangerous fire hazard.

Noticeable throat irritation may occur before throat irritation. Burning occurs in this fluid is reached. Other effects: odor or about 7 ppm. High concentrations may cause narcosis. Guide value based on irritation.

Slight throat irritation occurs at the guide value, and eye and nose irritation indicates concentrations above the guide value. Odor detectable at about 60 ppm. Evaporative exposure causes narcosis.

No appreciable irritation or discomfort at guide value. Evaporative exposure below the blood will produce effects of the body reacting to irritants. Other body systems may also be affected. Benzene is implicated as a precursor of leukemia, a blood cancer. Actual symptoms may be limited until the effect on the body has progressed to the point where serious and even fatal poisoning results. Brief high exposures may cause narcosis. Benzene handling should be closely supervised.

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TABLE OF SOLVENT PROPERTIES

Section G
Part 5
Attachment No 2 Page 1

Name and Synonyms	Boiling Point C	Boiling Point F	Flash Point (°)	Free Base Group	Explosive Limit (% LEL UEL	Evaporation Rate (100mm Hg)	Sp. G.	Vapor Volume (cc, 76°)	MAC	COMMENTS	
1 Acetaldehyde CH ₃ CHO	21	70	-36° Closed Cup	4	4.1	55	3	.782	58	200	Eye irritation is first noticeable symptom. Others will follow quite when, lowest irritation of grade value, above grade value long irritation occurs. Reported excessive exposure may cause throat irritation and possible liver damage. Severe exposure may result in an immediate fatality due to emphysema, or delayed, due to pulmonary edema. Odor usually detectable at less than 1 p.p.m. Dangers are listed.
2 Acetic Acid CH ₃ COOH	118	245	104° Closed Cup	2	5.6	—	11.0	1.05	57	10	The concentrated ("glacial") acid is also known for its irritating action of vapor and noted in eyes, then in upper respiratory tract and even in adequate warning. Odor detectable at about 3 p.p.m.
3 Acetone CH ₃ COCH ₃	56	133	0° Closed Cup	4	3.0	11	1.9	.791	44	1000	Causes slight eye, nose and throat irritation but has no chronic systemic effect. The principal hazard is from fire and explosion. Odor usually detectable at about 3 p.p.m. Evaporating emissions of acetone, with lowered oxidant pressure, occurs at grade value.
4 Acetic anhydride CH ₃ CO	102	180	42° Closed Cup	4	3	17	5.2	.783	62	20	May be absorbed through skin as well as respiratory tract. Toxic effects due to its cytotoxicity. Acetone odor Dangers are listed.

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Name and Synonym	Boiling Point C	Boiling Point F	Flash Point (F)	The Hazard Group	Explosive Limits (V/L) UCL	Explosive Limits (V/L) LCL	Evaporation Rate (Gm/100 ml/hr)	Sp. G.	Vapor Volume (Gm, ft.)	MAC	COMMENTS
9 Carbon Disulfide CS ₂	46	115	-22	4	1.25	4.4	1.6	1.26	34	20	Effect on central nervous system en- dorsed by benzodioxane, and may progress at the way to pyrolysis. Benzodioxane is caused by high concentration. Death may occur from respiratory failure. Sh- apable odor at 1 ppm or less. Fire and explosion hazard is severe. Carbon disulfide handling should be clearly supervised.
10. Carbon Tetrachloride CCl ₄	77	171	None	0	—	—	2.6	1.595	34	25	A single nerve exposure seems enough to cause nervous and unconsciousness may reach to death. On repeated ex- posure, even moderately above the guide value, toxic symptoms may occur. Chronic effects center in the liver and kidneys. Guide values should not be exceeded. Excessive exposure to low nervous or other vital energy.
11. Chloroform CHCl ₃	133	275	104	2	1.6	15.7	10.1	.931	34	100	Excessive exposure causes eye and nose irritation. Toxic effects center in the red blood cells and central nervous system. The odor is detectable at about the guide value. Appreciable odor.
12. Chloroform CHCl ₃	136	273	124	2	1.71	—	22.4	.973	24	100	Toxic effects similar to those of chlo- roform, but more pronounced. Odor detectable at about guide value. Pronounced odor.
13. Chlorobenzene C ₆ H ₅ Cl	132	270	85	2	7.1	1.3	0.3	1.11	32	75	Causes slight irritation, headache and dizziness when inhaled in sensitive resonance. Adverse central nervous system, causes narcosis.

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Names and Synonyms	Bulfinch Refs	Publ Refs	The Standard Group	Explosive Limits (5.1) (10.1)	Freezing Point (10.1)	Sp. G.	Boiling Point (10.1)	Viscosity (10.1)	MAC	COMMENTS		
14. Chloroform	61	142	None	0	—	1.48	61.2	1.50	41	100	Test solvent under the heat of carbon tetrachloride with principal effect on the liver. High concentration may cause necrosis. Odor detectable about the boiling point. May release decomposed products.	
15. Cresol CH ₃ OH, CH ₃	192	370	178	1	1.4	—	—	1.05	37	5	30% absorption is a fairly powerful irritant. Odor detectable at less than 1 ppm. Chloroform is from the and synthesis. Acts primarily as an irritant. The irritant caused small concentrations are especially about the boiling point, on high exposure. Odor of chloroform.	
16. Cyclohexene	13	35	230	4	—	—	—	—	703	41	Concentrations of 100 ppm and above irritate the eyes, nose and throat. Irritation of the skin, especially on high exposure. Odor is detectable at about the boiling point. Pleasant aromatic odor.	
17. Cyclohexane	81	176	1	4	1.3	0	3.6	—	779	20	100	Irritation to eyes, nose and throat at twice the boiling point. Slightly irritating to high concentrations. Odor is mild and pleasant. Detectable at about twice the boiling point.
18. Cyclohexanol CH ₃ (CH ₂) ₅ OH	162	322	154	1	—	—	150	—	903	31	100	Irritation to eyes, nose and throat at twice the boiling point. Slightly irritating to high concentrations. Odor is mild and pleasant. Detectable at about twice the boiling point.
19. Diethylene Glycol ICH ₂ (CH ₂ OH) ₂ COCH ₃	164	370	136	2	—	—	60	—	931	26	50	Irritation to eyes, nose and throat at twice the boiling point. Slightly irritating to high concentrations. Odor is mild and pleasant. Detectable at about twice the boiling point.

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Name and Synonyms	Boiling Point °F	Boiling Point °C	Flash Point (°F)	Flash Point (°C)	Flammable Limits (Vol %)	Explosive Limits (Vol %)	Evaporation Rate (Other = 1)	Sp. G.	Vapor Volume (cc, m.)	MAC	COMMENTS
30 p-Dioxane OCN CH ₂ OCH ₂ CH ₂	101	316	54	4	2.0	22	5.8	1.04	39	100	Slit absorption is a factor. Ev. rate and vapor inhibition error only at concentrations above the guide value and does not provide a means of warning. Causes liver and kidney damage. Odor detection limit is given at about 200 ppm. p-Dioxane forms an explosive mixture on distilling to dryness. Odor is faint and pleasant.
21 Dodecane CH ₃ (CH ₂) ₁₀ CH ₃	216	421	165	—	0.0	—	—	—	—	—	
22 Ethyl Acetate CH ₃ COOC ₂ H ₅	77	171	24	4	2.5	9	2.7	0.90	33	400	Causes eye, nose and throat irritation at guide level. May also cause skin irritation, but does not produce respiratory effects and is one of the least toxic of the organic esters. Odor detectable at about 100 ppm. Agreeable odor.
23 Ethyl Alcohol C ₂ H ₅ OH	78	173	55	4	4.3	19	7	0.79	56	1800	Inhibition of vapor is somewhat but not high. Some eye irritation at slightly above guide value. Pleasant odor of ingestion or inhalation of high vapor concentration is narcotic. Odor pleasant and detectable at about 2 ppm.
34 Ethyl Benzene C ₆ H ₅ C ₂ H ₅	126	277	59	4	1.0	—	9.4	0.87	27	790	Inhibition to eyes reported at the guide level. Narcosis can occur below the guide value.
35 Ethyl Chloride CH ₃ CH ₂ Cl	13	54	-39	4	3.6	14.0	1	0.910	46	1000	Produces narcosis on exposure to high concentrations. Decomposition product.

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Name and Synonyms	Boiling Point		Flash Point (F)	Flash Point (C)	Fire Hazard Group	Explosive Limits (Vol %)		Evaporation Rate (Relative to Water = 1)	Sp. G.	Vapor Volume (CC, M.)	MAC	COMMENTS
	F	C				LEL	UEL					
26 Ethylene Dichloride (CH ₂ Cl-CH ₂ Cl)	84	103	55	4	4	6.7	15.9	3.3	1.26	42	100	Irritation of upper respiratory tract and mucous to high concentrations. Chronic poisoning affects the liver. Little odor if noted at the guide value. Little hazard probably because of low volatility. Some flow and random low level system damage results from high flow.
27 Ethylene Chloride (HCHOH-CH ₂ OH)	197	387	223	1	2	2	2	—	1.12	59	—	Long irritation and headache of about 1000 ppm. The sensory response up to 800 ppm. Distress at 2000 to 3000 ppm.
28 Ethyl Ether (C ₂ H ₅ O)	35	95	—	4	4	1.9	43	1.0	0.710	31	400	Acute irritation noted at half the guide level. 3 1/2 % is air required to produce narcosis in 30 minutes. Long irritation may follow. Dangers are lower.
29 Gasoline	38-704	100-399	—50	4	1.3	6.0	2.5	7.5	14.32	500	—	Long irritation and headache of about 1000 ppm. The sensory response up to 800 ppm. Distress at 2000 to 3000 ppm.
30 Isopropyl Alcohol	82	181	53	4	2.0	11	7.7	7.5	0.5	43	400	Irritation to mucous membranes of guide value. Odor detectable below guide value.
31 Methylated CH ₃ OH	65	148	56	4	2.3	26	5.2	7.02	0.8	300	—	Irritation to mucous membranes. (Methylated). Irritation response may follow eyes causing lacrimation. Odor detectable at about 400 ppm.

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Name and Synonyms	Boiling Point ° F	Boiling Point ° C	Flash Point (° F)	The Hazard Group	Explosive Limits (% LEL - UEL)	Evaporation Rate (Index - 1)	Sp. G.	Vapor Volume (cc./lb.)	MAC	COMMENTS
32. Methyl Chloride CH ₃ CHOHOM	124	355	107	2	2.5 17.8	21.1	.966	41	35	Irritant especially above guide limit. Excessive exposure may damage central nervous system and blood. High ex- posure produces sneezing and damage to lungs. Other detectable at about twice the guide limit. Mild odor.
33. Methyl Chloride CH ₃ Cl	74	165	None	0	—	2.7	1.32	32	500	Beginning sneezing at about twice the guide value. Weak odor detectable at about the guide value. Discom- fort products possible.
34. Methylene Chloride CH ₂ Cl ₂	40	104	None	0	—	1.8	1.34	51	500	Irritation of highly sensitive con- ditions may cause sneezing, itching centering in the nose. Odor detectable at about twice the threshold value. Dangerous to the eyes. Decomposition products possible.
35. Methyl Ethyl Ketone CH ₃ COCH ₂ CH ₃	80	176	30	4	1.8 11.5	2.7	0.85	36	250	Irritation of throat and eyes at less than guide value. Harsh at twice the value. High exposure cause sneez- ing. Odor detectable at guide value.
36. Naphtha (Coal Tar)	138- 215	300- 408	100- 110	2	—	39	.85	37	100	Irritant properties of guide value. Har- sh at higher concentrations. May in- clude benzene. Odor detectable at guide value.
37. Naphtha High Flash Petroleum Solvent Solvent	150- 204	302- 399	100- 110	2	1.8 6.8	4.4	.800	20	500	Similar to kerosene in irritating more irritating. Detectable irritating harshness at high exposures. Odor de- tectable at guide limit.

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Name and Synonyms	Boiling Point C	Flash Point F	The Hazard Group	Explosive Limit (%) LEL UEL	Evaporation Rate (Other=1)	Sp. G.	Vapor Volume (C ₁₀ , ft.)	MAC	COMMENTS		
38. Naphthalene (VH & P)	100- 160	212- 320	30	4	.92 6.0	7.1	.790	70	500	Similar to gasoline in toxic properties. Dissolves the lacquer. Odor driv- able at guide level.	
39. Toluene C ₆ H ₅ CH ₃	111	237	40	4	1.4 6.7	4.5	.866	51	300	Initiation of vapors, measurement of irritant the guide value. Fodges & Harwood possible even at guide value. High exposures cause lacquer. Odor driv- able at less than 1 ppm usually. No specific toxicity data.	
40. Triethyl Phosphate (CH ₃ CH ₂ CH ₂ O) ₃ P	293	560	295 Open Cup	1	—	—	1.00	9.73	12	—	Very dangerous possible on sensitive ex- posures. Small odor. Decomposition products possible.
41. Dibutyltin Dichloride CH ₃ (CH ₂) ₃ SnCl ₂	114	237	Non- Flammable	0	—	—	12.6	1.44	35	—	Headache, nausea, and dizziness may occur at less than threshold level. High exposures cause lacquer. Odor usually detectable at less than guide level. Decomposition products possible. Un- labeled dibutyltin compounds can be in- tensely dangerous by inhalation route.
42. Triethyl- amine CH ₃ (CH ₂) ₃ N	87	189	Non- Flammable	0	—	—	3.1	1.46	36	300	Initiating to nose and throat below the guide value. Odor detectable at guide level.
43. Terephthalic acid C ₆ H ₄ (COOH) ₂	153	307	93	3	0	—	375	.897	18	100	Initiating to eyes, nose and throat at guide value. Nausea occurs on ex- posure to concentrations above guide level. Odor detectable at less than 1 ppm usually.
44. Ethyl acetate CH ₃ COOCH ₂ CH ₃	175	347	—	—	—	—	—	—	—	—	Initiating to eyes, nose and throat at guide value. Nausea occurs on ex- posure to concentrations above guide level. Odor detectable at less than 1 ppm usually.

EXPLANATION OF TABLE ABBREVIATIONS:

1. LEL: Lower Explosive Limit
2. UEL: Upper Explosive Limit
3. Cu, ft: Cubic Feet
4. PPM: Parts Per Million

ASBESTOS DUST - CONTROL AND MEASUREMENT

A. SCOPE

This procedure gives general guidelines for the control and measurement of asbestos dust to minimize personnel exposure and thus reduce the hazards of asbestosis.

B. ASBESTOS DUST - MAJOR SOURCES

1. Opening of boxes and removal of insulation.
2. Cutting of insulation by hand or power.
3. Shaping insulation with rasps or sanders.
4. Mixing asbestos to form cement.
5. Spraying insulation or fireproofing.
6. Cutting asbestos siding or roofing (Transite, etc.).
7. Removing old insulation from lines and vessels.

C. PERMISSIBLE EXPOSURE

Asbestos dust concentrations may not exceed an 8-hour time weighted average (TWA) of 5 fibers longer than 5 microns per ml. At no time may the concentration exceed 10 fibers/ml. After July 1, 1976, the TWA is reduced to 2 fibers.

D. ASBESTOS DUST CONTROL

Engineering methods, such as isolation, exhaust ventilation and dust collection, shall be used to meet the TWA.

1. Vacuum newly-opened cartons of insulation prior to removal for fabrication or bin storage.
2. Consider block insulation with glaze coating.
3. Equip hand-operated and power-operated tools, which may produce asbestos dust in excess of TWA shown in Para. C, with local exhaust ventilation.
4. The machine work area shall have a vacuum clean-up system. This can be a system of hoses connected to the main collection system. All parts of the room must have daily vacuum clean-up of all ledges, shelves, floors, and machines. Caps or dampers should be provided in each intake hose and machine connection to maintain capacity of the system.
5. Asbestos must be worked in the wet state unless the usefulness of the product is thereby reduced.

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6. Asbestos cement, mortar, grout, plaster or similar material may not be removed from shipping bags or container without being wetted, enclosed or ventilated.
7. Scrap and waste insulation shall be collected in sealed impermeable bags and disposed of according to local plant or government regulations.
8. Substitute materials for asbestos should be used whenever possible.
9. Change rooms with two separate lockers for each employee must be provided at fixed places of employment that are exposed to asbestos dust concentrations in excess of the TWA shown in Para. C.
10. Food, gum, tobacco, or other material placed in the mouth should not be kept or consumed in work areas.

E. RESPIRATORY PROTECTION

1. Restrictions

- (a) Respiratory protection may not be used to comply with the TWA in Para. C except as follows:
 - (1) During period necessary to institute engineering controls
 - (2) Jobs where engineering methods are not feasible.
 - (3) Emergencies.
- (b) Employees who cannot function properly or whose safety or health may be impaired, based on their most recent physical examinations, shall not be assigned to tasks requiring respiratory protection.

2. Use - Respiratory protection shall be provided for all personnel in areas where the TWA may be exceeded.

- (a) General Use - Respirators meeting Bureau of Mines Schedule 21B may be used where ambient oxygen does not fall below 18%.
- (b) Dismantling - Supplied air, powered air, or self-contained breathing apparatus meeting Bureau of Mines 19B.
- (c) Spraying - Supplied air, powered air, or self-contained breathing apparatus meeting Bureau of Mines 19B.

3. Care and Maintenance

- (a) Each employee shall be instructed in testing respiratory devices for proper fit and will be required to make this test prior to each use.
- (b) Respiratory equipment must be cleaned and sterilized prior to re-issue.

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F. EXHAUST SYSTEMS

1. Systems for local exhaust ventilation shall be designed for each application in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems; ANSI Z9.2-1971. Caps or dampers should be provided at each intake.
2. Exhaust systems shall discharge into bag filters which meet the following criteria:
 - (a) Cotton bag filter having air flow permeability not exceeding 20 cfm/ft².
 - (b) No bypass devices.
 - (c) No leakage of unfiltered air.
 - (d) Ability to empty hoppers without creating visible emissions of particle matter.
 - (e) No torn or ruptured bags.
 - (f) No worn or threadbare bags.
 - (g) No improperly positioned bags.

G. WARNING SIGNS

Warning signs conforming with OSHA 1910.93a shall be posted at all approaches to areas where asbestos concentrations may be above the limits in Para. C at a sufficient distance to permit an employee to read the signs and take necessary precautions before entering the area.

H. MEDICAL EXAMINATIONS

Medical examinations relative to asbestos exposure shall be made available to all employees exposed to airborne concentrations of asbestos as follows:

1. Employment - Within 30 days after first being assigned to work exposing the employee to asbestos dusts.
2. Annual - After initial employment.
3. Termination - Within 30 days before or after date of termination.
4. Recent Exam - No new exam is necessary if records show that the employee has been examined within the past year.

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5. Records - Shall be made of all examinations and retained for 20 years. Contents of these records will be made available to:
- (a) Authorized physicians and medical consultants of OSHA and NIOSH
 - (b) the employee's physician
 - (c) the employer.
6. Responsibility - On CPSC sites, responsibility to provide these examinations will rest with the contractor.

SAMPLING

Frequency and Location

- (a) General - Samples conducted should give a reliable cross section of exposure to employees performing typical operations with typical materials, i.e., dismantling, cutting, fabricating, spraying.
- (b) Initial samples of 8-hour duration must be taken to monitor places where asbestos is released and determine employee exposure to asbestos fibers.
- (c) Follow-up Samples - Subsequent samples of shorter duration must be taken of such frequency and pattern to represent employee's exposure levels.

2. Procedure

- (a) Connect filter to pump, using hose provided.
- (b) Clip filter holder to lapel or shirt pocket as close as possible to the person's breathing zone.
- (c) Remove top section of the filter to expose the full filter face.
- (d) Turn on pump and set at two (2) lpm rate. Check rate periodically. When finished sampling, turn off pump and record elapsed time. Sampling record forms (EN 2731) are available from Stationery.
- (e) Replace filter top after sample is collected and seal with tape prior to shipment.

3. Analysis - Place completed samples (exposed filters) in a mailing tube, seal, and send with two copies of the sampling record to:

G. W. Hiddemen
Marshall Laboratory
3500 Grays Ferry Avenue
Philadelphia, Pennsylvania 19146

4. Record Keeping - Records of personnel and environmental monitoring shall be maintained for three (3) years and made available upon the request of authorized representatives of OSHA and NIOSH (National Institute of Safety and Health).

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ELECTRICAL STORMS — ON THE JOB

THERE IS CONSIDERABLE RISK TO WORKING MEN AND CERTAIN MECHANICAL EQUIPMENT DURING THE APPROACH AND THE EXISTENCE OF ELECTRICAL AND WIND STORMS which are usually accompanied by heavy rains. It should be noted that in some areas of the country, storms have been occurring at a frequency of one or more every day.

We realize it is a very difficult subject on which to establish exact sets of rules to follow as precautionary measures. It is reasonable, however, to establish some general rules for protection against lightning. These follow:

IF OUT IN OPEN

1. Find a "dry" ditch, culvert, or low spot, crouch to keep from being the highest point within a 30+ foot radius.
2. Do not take shelter under trees.
3. Do not lean against or hold anything touching the ground, particularly metallic objects.

IF NEAR BUILDINGS OR STRUCTURES

1. Get into, but avoid physical contact with, metal building or structure, automobile sedan, metal-enclosed truck, or inner portion of a large wooden building.
2. Get away from isolated trees, power poles, flagpoles, elevated crane booms or anything attached to them, chimneys, fireplaces, lightning rods, electric and telephone wiring or even the outside of buildings. If you are touching or close to any of these objects and standing on the ground, you may become an auxiliary ground ("shunt") to that structure and part of the bolt may pass through you.
3. Get away from pipe lines, railroad tracks, fresh concrete, or metal fences, as these may carry dangerous branch currents along the ground from more distant lightning bolts.

IMPORTANT

Install grounding cables on buildings or building steel as early in T.C. and permanent building schedule as possible. For lightning, ground rods are usually more important than long cables to remote water lines intended for regular electrical lightning and power installations.

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DISASTER CONTROL WINDSTORM AND FLOOD PROTECTION

Protection Bulletin No. 15
E. I. Du Pont de Nemours & Co.
Safety and Fire Protection Division

Destructive windstorms and floods have proven to be a part of the regular weather pattern throughout the country in recent years. Experience by Company plants and other industrial facilities has demonstrated that protection measures against the hazards of these storms warrant special attention in each unit's disaster control program. In 1953, storms and floods accounted for 16% (\$138,768) of the Company's property losses. The largest single loss in the Company in 1954 was \$104,358 caused by Hurricane Hazel. Total storm and flood loss in 1954 was \$435,000.

Outside insurance studies reflect that whenever and wherever heavy windstorms strike, greater losses usually occur in those locations where simple protection measures have not been taken in advance. Incidents created by storms at plants both in the Company and out have shown that protective precautions taken before, during, and after storms do minimize the possibility of personal injuries and do reduce property losses.

PURPOSE

The purpose of this bulletin is (1) to present a brief outline of information concerning storm hazards and (2) to provide a list of precautionary measures to assist Company units in determining whether additional protection measures should be included as a part of the disaster control program. These Company locations which have developed storm control procedures may find this material helpful as a check list in re-evaluating their plans.

THE HAZARDS

Personal injuries and damage to property and operations can result from various types of storms and accompanying hazards. These storms include:

Hurricanes—Rotating storms with winds of 75 miles per hour or higher and having a diameter extending over several hundred miles.

Whole Gale—May be similar to a hurricane but with winds from 55 to 75 miles per hour.

Gale—May have winds from 32 to 55 miles per hour.

"Fresh" Windstorms—Some rainstorms may be accompanied by winds of severe intensity having considerable destructive force and resembling "twisters".

Thunderstorms—Accompanied by lightning, possibly hail, and sometimes winds from 20 to 80 miles per hour.

Floods—"Flash floods" may be caused by sudden and severe torrential rains, such as those which sometimes accompany hurricanes and other

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storms. Other floods may occur as a result of prolonged rain or melting snows.

Tornadoes—Rotary storms of small diameter. These are the most destructive storms of all with winds as great as 500 miles per hour in some cases.

Primary attention in this bulletin is given to the effects of hurricanes since measures that protect against hurricane damage will protect against most other windstorms as well. However, tornadoes have peculiar characteristics, are the most violent of all storms and, therefore, they will be discussed separately in this bulletin.

The worst months for hurricanes are August, September, and October; but winds of hurricane intensity have occurred during the other months of the year.

The types of destruction caused by hurricanes may include the following: building or wall collapse; roof and stack damage; glass breakage; damage by falling trees and limbs; flying debris damage; water damage and flood inundation; fires caused by damage to electrical systems, unexpected release of combustible liquids or gases, and lightning; loss of normal fire protection facilities due to breakage or water mains, loss of power, damage to fire protection systems and equipment; fallen power lines, etc.

Measures to protect against personal injuries and to eliminate or reduce damage of these types are discussed in the following sections:

PROTECTION MEASURES BEFORE THE STORM — LONG RANGE

Wind-Resistant Building Maintenance

In existing buildings the adoption of additional features which would help minimize wind damage may not always be practicable, but careful maintenance of all buildings is an important part of windstorm protection planning. Items to be considered in evaluating buildings for windstorm protection include the following:

Roof Anchoring—Outside insurance reports indicate that roof anchoring is the most important protection to be taken to prevent serious windstorm damage. Roofs may be anchored with metal straps bolted to side walls and corner columns.

Roof Surface—High winds can pry up and rip off sections of roof surfacing. Periodical inspections for cracks, blisters, buckling, worn spots, and other defects should be conducted and necessary repairs made.

Skylights—Ascertain if windows and frames fit securely. Consider protecting skylights with heavy wire mesh or have other protective material available which can be anchored prior to the arrival of an oncoming storm.

Stacks and Signs—Determine whether anchor bolts are tight and secure. Inspect for corroded sections and adequate guy wires.

Windows—Inspect windows for missing or cracked panes of glass and replace where loose or broken.

Drainage Facilities—Inspect gutters and leaders to keep them clear and in repair. Alleyway drains should be clear. DUF 0912228

Determine the need for drainage ditches around the outside of low-lying buildings which might be flooded under adverse conditions.

Consider the use of sandbags to deflect drainage water away from other buildings.

Consider equipping floor drains with flap valves at the discharge end and linings for pressure plugs at the inlet.

Check the need for earth, concrete, or brick dams to block off the lowest areas from flood water and provide a base for sandbags if required.

Wind-Resistant Building Construction

Helpful information concerning wind-resistant building construction can be obtained from recognized, comprehensive building codes, such as the "National Building Code", which specify special construction details, the use of suitable materials, and the design of foundations. The "National Building Code" has a special appendix dealing with "Windstorm Resistant Construction". Copies of this code can be obtained from the National Board of Fire Underwriters, 85 John Street, New York 38, New York.

Arrangements For Receiving Storm Warnings

The United States Weather Bureau hurricane warning system operates with co-operation of the Navy, Air Force, and Coast Guard, and periodic messages are prepared whenever a storm has been located. Arrangements in advance for receiving storm warnings may be made by industrial units with some local weather stations. If liaison with official weather stations is not feasible because of distance or other reasons, arrangements should be made with other reliable, available sources.

The Company's Engineering Department has a Severe Weather Warning Service Group which presently has arrangements with about 25 Company installations, primarily along the East Coast, to furnish these units with storm warnings and other pertinent weather information. The Group is set up to obtain all official U. S. Weather Bureau messages including warnings of impending hurricanes, high winds, high tides, flood data, snow storms, and tornado information. Inquiries about the Group's service, including charges involved, can be made to Engineering Service Division, Engineering Department, Louviers Building.

Other possible sources for receiving storm warnings may include local Air Force bases, law enforcement agencies, fire departments, civil defense units, radio stations, etc.

In addition it is advisable to have a battery operated radio receiving set for use should normal communication facilities break down when a storm hits.

Training and Informing Employees

Extend disaster control training and drills of protection organization to cover special problems in storms and floods. Well-trained organizations have proven to be one of the best safeguards in any emergency.

Inform all employees through safety meetings, plant publications, bulletin board notices, etc., concerning storm protection measures and plant safety precautions to be followed.

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Evacuation Plans

Consider evacuating personnel from areas where water and other hazards are a possibility in a severe storm. Select safer shelter locations.

Determine whether employees who are not needed for emergency duty should be sent home before travel conditions become unsafe.

Emergency Equipment and Supplies

Consider adequacy of emergency lighting equipment and inspect it periodically to insure it is in good working order.

Determine necessity for sandbags, sand, rope, and similar emergency supplies.

Determine need for supply of plywood, lumber, plastic sheets, tarpaulins, and other material to be used in making emergency repairs during and after a storm.

Consider need for battens to protect basement windows and other low-lying windows and doors which might be affected by flood waters.

Determine methods of emergency communications. Wire communications often suffer heavy damage and break down in severe storms. Suggestions for emergency communications are set out in Protection Bulletin #10, "Communications in Disaster Control", issued by this Division on October 28, 1953.

Check emergency generators and fuel supply to assure operation under adverse conditions.

Evaluate source of emergency power should normal public utility supplies be cut off as frequently occurs in storms.

Records Protection

Determine if important records are stored in an area protected from hazards of flood or other storm damage.

Mutual Aid Plans

Consider mutual aid plans with neighboring industries and local protection agencies, but recognize that the effects of a widespread storm may limit outside help or eliminate it altogether.

PROTECTION MEASURES BEFORE THE STORM — SHORT RANGE

Loose Material and Movable Objects

Determine whether all materials and equipment in open areas which are not permanently anchored and which could be hazardous in high winds or flood should be temporarily secured in position or moved to a protected area.

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Window and Door Protection

Consider boarding up windows in seriously threatened areas, particularly

on sides normally exposed to the most violent winds. When boards are used, they should be firmly attached to the building so as not to blow loose and possibly create additional hazards.

Determine the feasibility of bracing unusually large panes of glass by means of struts or trusses if boarding windows is not practical. Struts and trusses can protect windows against extreme bending and can cushion vibrations caused by the wind, but of course, will not protect against breakage by flying debris.

Check all doors, particularly large garage doors and the like to make sure they are secure and to prevent movement by storm winds.

Personnel Welfare

Consider the need for extra supplies of emergency drinking water, food, and cooking facilities which may be needed if storm is prolonged and disaster control work is drawn out. The contamination of drinking water sources often occurs under flood conditions, and may necessitate the boiling of water for drinking purposes. There may be a need for hip boots, dry clothes, blankets, and cots for members of the disaster control organization.

Medical Supplies

Check availability of first aid supplies in various areas of the plant in the event the main medical facilities are cut off by the storm.

Additional Precautions When Floods Threaten

Consider need and availability of boats for emergency use.

Consider need for building auxiliary dikes of sandbags or dirt around key areas, buildings, or equipment.

Protect inside of building by closing low-lying windows, ventilators, pipe trenches, drains, and other openings.

Prepare emergency pumps, including fire pumps for quick use.

Obtain suction hose to handle seepage past barriers.

Remove valuable equipment and supplies which are in low-lying areas to higher or safer locations. Give special attention to electrical meters, movable panels to save relays, instruments, etc. If electrical equipment cannot be moved, consider the feasibility of coating machine surfaces with grease or other protective compounds.

Consider timing for shutting down operating equipment and to permit electrical equipment, boilers and furnaces to cool off before being hit by water.

Consider timing for shutting off gas mains and electrical power in areas where flood waters approach.

Where possible move tank cars to higher ground and anchor to prevent their floating.

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Move portable containers, particularly those containing flammable liquids and other hazardous materials, to a higher or safer area.

Determine need for emergency sanitation facilities including disinfectants. Guard against floors buckling or rising from water seepage under dikes.

Consider stationing repair crews and other members of the Disaster Control Organization in those areas where emergency service would be needed most quickly.

If travel between buildings becomes essential, determine advisability of installing strong guide ropes between the buildings for safety purposes. Check the fire alarm system, sprinkler system, and emergency equipment at regular intervals to determine if they are in working condition and make emergency repairs as promptly as possible. If repairs cannot be completed immediately, consider the assignment of "fire watchers" to guard the affected areas and have fire first aid equipment readily available.

Wind Pressure Problems

Tests of the United States Bureau of Standards have shown that as wind blows against a building, a positive pressure is produced on all or part of the windward side while a negative or suction pressure is formed on the leeward side (the side sheltered from the wind). The same effect would be produced on roofs having a slope of more than 30°. A common occurrence in windstorms, particularly hurricanes, is for the wind to break a window or blow open a door on the windward side and then build up inside the building a positive pressure under the roof or on the inside of the leeward walls. This pressure in combination with the external suction pressure may lift off the roof or force out a leeward wall. The National Board of Fire Underwriters, Research Division, has suggested the following protection measures to prevent any such damage:

In buildings with large doors or each end, fasten each door partly open to help equalize internal and external pressure.

In buildings generally, one or more windows should be kept open on the leeward side to equalize internal and external pressure. Only small openings on the leeward side are advisable as long as the windward side remains intact but as soon as windows are broken or other openings occur on the windward side, additional openings should be provided on the leeward side to help equalize the pressure.

As a hurricane passes, the wind direction will shift and if the hurricane center passes directly overhead, the wind will completely reverse after a period of calm. Therefore, plans should be made to close windows or doors held open in the early part of the storm and open others as may be necessary.

PROTECTION MEASURES AFTER THE STORM

Although the windstorm may have passed, the state of emergency may still exist because of water damage or other hazardous conditions. Therefore, some of the measures mentioned under previous sections of this bulletin may still be applicable, such as emergency fire protection precautions. Additional items for attention include:

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Safety and Fire Protection Inspections

Inspect fire alarm and sprinkler system again.

Check water supply systems and all utilities.

Complete prompt and thorough patrol of entire plant premises. Watch out for fallen power lines which may dangerously charge metal fences, telephone wires, etc., which they touch.

Traffic Control

Provide for clearance of debris from roads to permit passage of emergency vehicles to and from the plant.

Determine need for assembling bulldozers, scrapers, etc., from construction contractors, farmers, etc., to clear plant entrance and inside roads.

If necessary, contact local law enforcement agency to prevent automobiles and curiosity seekers from blocking roads to and from the plant.

Spectator Control

Keep the number of persons in the area affected to the minimum necessary to carry out the objectives of the disaster control program. Further precautions regarding spectator control are set out in the Division's Protection Bulletin No. 14, dated January 16, 1954, captioned "Spectator Control During Emergencies".

Precautions for Flooded Building

Determine need for disconnecting main electrical switch to prevent short circuits. Then make thorough inspection of electrical system for damage. Consider need to shut off gas valve until inspection has been completed.

Decide if necessary to remove chemicals that might start a fire if hit by water.

Be certain wet meters and electrical apparatus become thoroughly dry before returning to service.

When a previously wet circuit is restored, be sure all sections of building are patrolled to watch for any short circuits.

Caution employees handling electrical equipment in wet areas to avoid any possibility of electrical shock.

Determine need for decontamination of area. Inoculation of emergency workers may be considered advisable by medical unit.

Repairs

Activate previously trained repair crews as needed to safeguard personnel and restore operations. Repair or isolate broken electric lines, damaged sections of pipe lines and other critical utilities or services.

Determine need for demolition of unsafe structures and clearing away of debris.

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DU 029764

TOENADOES

Where and When Tornadoes Can Occur

Tornadoes may occur any place in the United States.

Tornadoes happen most frequently in the midwestern, southern, and central states from March through September. They can happen at any time of the year, usually on hot, sticky days.

How Often Do They Occur

Records indicate that tornadoes occur on approximately 12 days per year in parts of the midwest to less than one per year in the northeastern and far western states. The national average is 153 tornadoes a year.

How A Tornado Can Be Recognized

A tornado usually appears as a funnel-shaped cloud, spinning rapidly, and extending toward the earth from the base of a thundercloud.

Familiar thunderstorm clouds are present. Usually, an hour or more before a tornado, cloud formations appear to be bulging down instead of up. The clouds often have a greenish-black color.

Direction of Travel

In most instances tornadoes move from a westerly direction, usually from the southwest.

Length of Path

Tornadoes usually move from 10 to 40 miles (the average length is 16 miles), but they may move forward for 300 miles.

Width of Path

The average width is about 400 yards, but they have cut swaths over a mile in width.

Speed of Travel

The average speed is 25 to 40 miles per hour, but they have varied from 5 to 139 miles per hour.

Wind Velocity

Estimated as high as 500 MPH within the tornado.

DUP 0912234

Protective Measures

The U. S. Weather Bureau advises that there is no universal protection for personnel against tornadoes except caves or underground excavations. The Bureau suggests the following precautions:

On receiving a tornado warning, a lookout should be posted to keep safety officials advised of the tornado's approach.

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Advance preparations should be made for shutting off electrical circuits and fuel lines if the tornado approaches the plant.

Move personnel to sections of the plant offering the greatest protection. A steel framed or re-enforced concrete building of substantial construction may be a relatively safe shelter. The first floor is usually considered safer than upper floors. Additional protection may be afforded by lying under sturdy tables, desks, work benches, etc.

Instruct personnel to stay away from windows and adjacent areas.

According to outside insurance studies, normal wind-resistant building construction cannot assure protection against damage from tornadoes. However, insurance reports indicate that buildings which are well constructed and incorporate good maintenance practices for windstorm resistance may withstand to some extent the forces of some tornadoes which otherwise would demolish them.

CONCLUSION

Experience has proven that planning in advance for disaster control is the most effective way to protect personnel and property and to minimize the hazards and possible damage of storms. Many phases of a disaster control program, as discussed in this Department's pamphlet, "Plan of Organization for Protection of Company Units" and in previous Protection Bulletins, may be involved in an emergency caused by storms. It is recognized that in a severe storm situation, the entire disaster control organization may be activated before, during and after the storm. In addition to the items mentioned in this bulletin, services such as rescue, accounting for personnel, public relations, medical, security, emergency transportation, and the control center, may be needed. The basic principle of disaster control is applicable regardless of the cause of the emergency. Practical planning now can pay big dividends should a disaster strike.

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THE CORRECTION OF ABSTRACT DEFICIENCIES
(ESSENTIALLY — "MENTAL DISTRACTIONS")

1. Safety performances of recent years by our Construction Division permit us to celebrate the accomplishment of an effect on people. "People", despite all our national progress in technological improvement and in production, development, invention, and the enjoyment of new material things, from television to penicillin—are still the most ineffective and undependable parts of our efforts toward progress in the efficient accomplishment of little jobs or big projects.
2. We people are undependable because we are unstable; we are unstable as compared to any machine because we are humans.
3. Humans are all different and constantly variable, by reason of earlier conditions of both heredity and environment. This instability even in mature humans is more readily understood when we look at children—you and I have children and we have appraised and criticized children. You all know what is meant by a "problem child". Human beings are problem children at one time or another, or most of the time about some subjects, even when they "grow up". Actually, all of us who consider ourselves normal are about one thing or another, at some time or another, what the majority would call temperamental, bull-headed, reactionary, obstinate or do things in such a manner which may not be considered the proper or the rational manner by a majority of others.
4. Almost all of our kind of safety effort is directed by ways and means which go to control people. That is—we try to get interest, reason, morale, purpose, understanding, individual spirit and esprit de corps, to keep most of the people as nearly as we can to a maximum of rational behavior for as much of a day, or a week, or a month, or a year as possible. This means doing things in such a manner as leadership or supervision considers right—doing work right, the first time—this is accident prevention.
5. People have accidents more because of imprudent inclination or imprudent judgment than because of faulty material or lack of natural safeguards. To put it in other words, accidents are on account of people, not on account of things.
6. To go back to our philosophy on the various and never ending difference in people—the unpredictable nature of people—what we have readily said and sadly explain—people have not truly learned how to live. When we will have prevented all accidents, then we will have learned how to "live".
7. It naturally makes us quite proud that through our leadership and our seriously thought-out methods, we have come upon many means of the control of the behavior of people, to the great advantage of those people. In this you know that we refer to our safety system, the depth of this system, the manner of its application, the scope, the timeliness of the applications, the incessant and insistent nature of the system, and last but not least, the final factual, now many times repeated, wonderful effect and results of this effort, a healthy, whole individual

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GOLD PLUMB-BOB AND SILVER TRIANGLE AWARDS

A. PLUMB-BOB

1. Nominee must have made significant contributions to the Safety program.
2. He may not have experienced a tabulatable major or sub-major injury in his area of responsibility to Du Pont or CPPC during the last 5 years.
3. The nomination should be in writing to the Division Safety Office and enumerate nominee's contributions.

B. SILVER TRIANGLE

1. The nominee must have held the Gold Plumb-Bob for at least 5 years.
2. During this period, he must have continued to make significant contribution to Safety participation and administration commensurate with his area of responsibility.
3. One of the following criteria must be met:
 - (a) No tabulatable major injury to Du Pont or CPPC personnel in his area of responsibility during the past five years, or
 - (b) Accumulate 3 million consecutive hours without a tabulatable major injury to Du Pont or CPPC personnel in his area of responsibility.

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"AWARDS FOR NO-INJURY RECORDS"

Safety Bulletin No. 408 (A) - October 1, 1969
E. I. du Pont de Nemours & Co.
Safety & Fire Protection Division

A. PLAN

The "Awards for No-Accident Records" plan, replacing the original "President's Prize Plan" of April 1, 1923, was adopted January 1, 1928. Three awards were established: General Manager's Award, President's Award, and Board of Directors' Award, each based on a schedule of injury-free calendar day goals related to hours worked. The President's and Board of Directors' Awards required one and a half and two and a half times respectively the calendar days required to earn the General Manager's Award. In January, 1931, the plan was revised to include plant salary roll employees in the exposure hours.

During December, 1942, a supplement was issued extending the "Goals (Classification of Plants and Time Requirements)" because of the adoption of the plan by plants employing abnormally large numbers of war workers. The 1931 revision was not otherwise changed. The addition merely provided comparable requirements for plants much larger than those considered at that time.

In September, 1951, the recommended minimum cost values of individual awards were increased to \$3.00 for the General Manager's Award, \$4.00 for the President's Award and \$5.00 for the Board of Directors' Award.

Effective January 1, 1956, the plan was extended to include sales, warehouse, office and all other miscellaneous employees. Effective the same date, the name of the plan was changed from "Awards for No-Accident Records" to "Awards for No-Injury Records".

The word "unit" as used in this bulletin shall mean a plant, laboratory, construction project, or in the case of a miscellaneous group, all those employees in a department whose exposure hours are now included under the headings "Miscellaneous" and "Sales" on the Safety Performance chart.

This new plan, which includes only one award, extends the time required for award eligibility, except for small units, and increases the expenditure per award, is as follows:

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DATE EFFECTIVE

The plan is effective October 1, 1969.

TRANSITION PROCEDURE

The "Awards for No-Injury Records" plan, while effective October 1, 1969, is retroactive in the sense that each unit will start its "no-injury record" as of the date of its last tabulatable major injury (or Board of Directors' Award). A unit will be credited through September 30, 1969, with the percentage of goal accomplished under the prior plan and go on to fulfill the remaining percentage under the goals of the new plan. A unit working for a General Manager's Award, for instance, had accomplished 84.07% of that goal by October 1, 1969. It could become eligible for the Board of Directors' Award by working injury-free through 15.93% of the newly established goal.

Example

A unit working continuously in Class "D", had a major injury April 30, 1969.

May 1, 1969 through September 30, 1969 is 153 calendar days:
 $153/182 = 84.07\%$ accomplished.

Since 15.93% of 273 (new goal, Class 9) is 43 (rounded to nearest whole number), eligibility is accomplished by working through November 12, 1969.

AWARDS

One award is made available and is known as the "Board of Directors' Award".

UNIT CLASSES AND TIME REQUIREMENTS

New units, either recently started or recognized as independent units for safety purposes, will start the first no-injury record period as of the date of start up or the date of recognition.

The Miscellaneous unit of a department will start its first no-injury period on January 1, 1966; thereafter from the date following the last tabulatable major injury.

The eligibility goals on which the award is based are determined by a unit's operating a definite length of time, as established in the table below, without a tabulatable major injury. The classes are determined by the number of exposure hours (combined wage and salary rolls) per month, and each class requirement is the operation of a certain

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number of calendar days in order to become eligible for the award. Units which change from one classification to another will be credited with the proper proportion of the record achieved in each class.

The following table shows the classes and requirements in calendar days:

Exposure Hours** Per Month	Class	Calendar-Day Goals
to 25,000	1	912
25,001 to 50,000	2	861
50,001 to 75,000	3	809
75,001 to 100,000	4	756
100,001 to 130,000	5	699
130,001 to 160,000	6	477
160,001 to 200,000	7	386
200,001 to 250,000	8	321
250,001 to 300,000	9	273
300,001 to 350,000	10	249
350,001 to 400,000	11	237
400,001 to 500,000	12	225
500,001 to 750,000	13	219
750,001 to 1,000,000	14	213
1,000,001 to 1,500,000	15	201
1,500,001 to 2,000,000	16	189
2,000,001 to 2,500,000	17	177
2,500,001 to 3,000,000	18	165
3,000,001 to 3,500,000	19	153
3,500,001 to 4,000,000	20	141
4,000,001 and up	21	129

*Calendar day = midnight to midnight

**Total wage and salary rate

COMPUTING NO-INJURY RECORDS

The following is an example of the method of calculating the date on which a unit will become eligible for the Board of Directors' Award:

Last disabling injury occurred June 3, 1970

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		Exposure Hours (Total worked all employees)	Class Calendar Days		
			12	11	10
1970	June 27 30 x 403 835 =	363,452	27		
	July	365,130		31	
	August	308,499			31
	September	485,342	30		
	October	370,960		31	
	November	384,297		30	
	December	397,483		31	
		2,653,163	57	123	31
Class	Days Required		Days Accomplished		%
12	225		57		25.33
11	237		123		51.90
10	240		31		12.45
					89.68%

Uncompleted percentage - 10.32, class of last complete month - 11
 $1032 \times 237 = 24,4584$ (24 when rounded)
 Will become eligible midnight of January 24, 1971.

NO-INJURY RECORDS

No-injury record periods start as of the calendar day immediately following the date of the last tabulatable major injury.

The no-injury record required to win an award is based on consecutive calendar days, except that units which are completely shut down for more than seven consecutive days will have the shut-down period deducted from their records.

Awards may be won consecutively if the time period is not terminated by a tabulatable major injury. Otherwise, the eligibility period for another award will begin from the date of the last tabulatable major injury.

As a unit accomplishes the goal for an award, its medical records should be examined to determine the likelihood of any non-disabling injuries requiring reclassification to disabling injuries at a later date due to delayed loss of time of some degree of permanent-partial disability. If an

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injury has to be so reclassified at a later date to a tabulatable major injury, any previously accepted award based on the assumption that this injury would remain non-disabling will be stricken from the Company records. Any such awards will have to be re-earned (without the unit's distributing individual awards) before establishing eligibility for another award.

For example, a unit working continuously in Class 10 had a disabling injury on January 10, 1970. After this, it continued injury-free and won an award by working 249 calendar days through September 16, 1970. The Company physician reported that there were no pending cases which were expected to result in loss of time or permanent disability. The unit continued working expecting to obtain another award on May 23, 1971. However, early in January, 1971, the Company physician reported that a finger injury case that had occurred June 20, 1970, now contrary to expectations, had residual partial loss of function. The case was reclassified to tabulatable major, and the award of September 16, 1970, was deleted from the Company records.

It thus became necessary for the unit to re-earn the award of September 16, 1970. To accomplish this it worked free of disabling injury and achieved the goal on February 24, 1971 (249 days following the last disabling injury on June 20, 1970). No individual awards were distributed again. The next award was achieved with injury-free performance on October 31, 1971.

Chronologically, the sequence is shown as follows:

January 10, 1970	• Disabling injury occurred.
September 16, 1970	• Board of Directors' Award won by working 249 calendar days from January 10, 1970.
January 4, 1971	• Physician reported permanent partial disability in finger case which occurred June 20, 1970.
June 21, 1970	• New starting date for injury-free period. Award must be re-earned from this date (249 days).
February 24, 1971	• Award re-earned. No awards distributed.
October 31, 1971	• Award won. Awards distributed.

FINANCING

The cost of the awards will be borne by the departments involved.

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Recommended MINIMUM AVERAGE EXPENDITURE per employee for awards is \$7.50 and the MAXIMUM EXPENDITURE should be held as near as practicable to this amount with \$8.00 being a limiting maximum. Increase in the expenditure for awards because of repeated winning is not approved, nor is pyramiding of awards.

TYPE OF AWARDS

The selection of awards is left to the decision of units winning the awards. The awards should be such as to promote the safety activity and the safety image of the unit. Usually the awards take the form of individual items of merchandise to the employee, preferably an item which has recall value.

Awards should not be in forms such as cash, trading stamps and gift certificates.

The Safety and Fire Protection Division, with concurrence of Department Heads, will act as judge on any question under controversy.

B. PARTICIPATION

Du Pont personnel from all fully-contracted sites will compete as one unit (Construction Field Staff) under the Company's "Awards for No-Injury Plan". Chambers Works, Savannah River, and Wilmington Shops will continue to operate as separate units.

C. STATISTICS

1. Statistical information will be compiled from monthly reports (Monthly Safety & Fire Data Log) by the Division Safety Office and forwarded to the S&F Division on a single Monthly Safety Record Summary (G-110). Sites will no longer complete the latter.
2. (a) Sites which compete individually must keep records of per cent of award requirements achieved each month.
(b) Calculations should be sent to S&F Division for their verification two (2) months prior to eligibility.
(c) A statement from the Company physician must be sent to S&F upon eligibility, stating that medical records contain no cases pending which could result in a tabulatable major

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GOLD PLUMB BOB CITATION AWARD ON QUALIFICATION

The Division Safety Office, in the mid '40's obtained approval for the procurement and the presentation of a gold oak leaf and plumb bob insignia for extremely meritorious safety contributed by any echelon of supervision. This citation was and is to be looked upon as an incentive medium, and it is under no circumstances to be awarded without specific reference to requirements which we list below:

1. The recipient must have been in some echelon of supervision during no less than the last 5 years.
2. He must have contributed during all of this period and continuing the very best of our kind of safety participation and function at his echelon level successfully. He must not have experienced major or sub-major injury during the last 5 years.
3. His consistent contributions must be evaluated on paper at the time his nomination is presented to this office.
4. On extremely rare occasions if an employee has contributed in a truly extraordinary fashion in one or more methods, the five year requirement in terms of service will be waived. The injury experience will not be waived.
5. Contractors' supervision may be considered, but you are warned that their contributions must be extraordinary.

Generally speaking, we anticipate no more than 5 or 6 such citations per site during this year. We suggest that your nominations be forwarded on the scale of approximately one every two weeks so that staff meeting presentation, which we anticipate, will have its psychological effect.

Positively, as in the case of prior awards of this insignia, no lost insignia will be replaced. No member in the Division previously cited will be eligible on this or subsequent occasions.

Please take great care in making your nominations to avoid rejection. For your review, a hard hat decal depicting the emblem and a personal letter from this office go with the award at the time of presentation.

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CONSTRUCTION DIVISION SAFETY
"ABSTRACT" INCENTIVE PLAN
(Sample)

PURPOSE

Arouse and maintain interest
Create and maintain participation
Sustain awareness and foster understanding
Solicit assistance in current Abstract indoctrination campaign

ELIGIBILITY (Craftsmen and Helpers only)

All Du Pont and Fixed Fee contractor employees at all field sites are eligible with the exception of all supervision. (Gang Foremen are also excluded.)

PLAN

1. Each eligible employee as outlined above may voluntarily submit one entry per month which is to consist of the completion, in 10 words or less, of the sentence "Abstract" Says: _____
2. Entries must be submitted on an official entry blank available at all construction entrances. (Entry blanks will be supplied by the Division Safety Office.)
3. At the end of each month, all entries will be judged locally by a 3 man committee appointed by the Field Project Manager. The committee will select the five best entries at their site and forward these 5 to the Division Safety Office to arrive strictly prior to the 5th working day of the succeeding month.
4. The Division Safety Office will group the entries according to their respective Districts and will select in each District which, in their opinion, is the best entry. A Portable Transistor Radio will be awarded to the winner in each District each month.
- 5-A. "Ab Street" hard-hat "stickers" will be supplied each site for controlled use in conjunction with this incentive. All members of supervision, including foremen, are requested to place one of these "stickers" on their hard hats as soon as possible after the "stickers" are received at the site. (Place on left front of crown.)
- 5-B. One "sticker" only will be given to each eligible employee following their first submission of an official entry in this plan. The "sticker" is to be placed on the hard hat as in 5-A.
Special note: "Stickers" are not to be given for entries subsequent to the initial entry.
Note: Entries received at Louviers Building after the 5th working day of the succeeding month will be ineligible for final judging.

RULES FOR THIS INCENTIVE PLAN:

1. Each employee may submit only one entry per month. Each entry is to be stamped with date received by the Safety Office.

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2. All entries must be received by the last working day in each month to be eligible for judging. No entry will be carried over into the next month.
3. Originality, earnestness of thought, uniqueness, adaptability to the principles of Abstract Advertising and value of the completed "saying" to the current Abstract Advertising Program will be the primary factors used in selecting the winners. Spelling and legibility will not be a factor in the judging.
4. All entries become the property of the Construction Division and may be used in future accident prevention activities at the discretion of the Division Safety Office.
5. In the event exact duplicate entries are submitted at the same site, only one bearing the earliest "date received" will be entered in the judging.
6. In the event a specific entry is not considered worthy enough to forward to the Division Safety Office and another site forwards an identical entry which wins, only the entry judged by the Division Safety Office will receive a prize. The decisions of the project (committee) judges and the Division Safety Office are final and binding.

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TWO STAGE SAFETY INCENTIVE PLAN

(Designed to augment and supplement the 1960 Field Safety Program)
Calendar for this plan will be March 1, through December 31, 1960

I. STAGE ONE—Shall consist of an objective wherein monthly required standing (explained below) in

- (1) Violation Frequency (V.F.R.)
- (2) Trouble Frequency (T.F.R.) and
- (3) Foreman Training Quality, will qualify any site to participate in Stage Two.

II. STAGE TWO—Permits to qualifying project sites the opportunity to nominate their top foreman of the month for a distinguished award. Each month the 2 highest ranking foremen in each district will be presented with the award.

A committee of 5 at the home office will make the final awards and their decisions will rule and be final.

• • • • •

I. RATING METHOD FOR STAGE ONE (SITE QUALIFICATION):

- (1) Each month's V.F.R. standing at each site will be subtracted from a factor of ten (10), the difference will apply as credit points toward monthly site qualification.
For example: V.F.R. = 2.73
(10 - 2.73 = 7.27 credits)

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NOTE: This system is a method for true V.F.R. and T.F.R. reduction, not an opportunity to select and report a favorable statistic.

- (2) Each month's T.F.R. standing at each site will be subtracted from a factor of ten (10), the difference will apply as credit points toward monthly site qualification and added toward credits earned in (1) the V.F.R. standing — plus —.
- (3) Each month each site will submit outlines for Foreman Training Class material as required in Part II (Developed) of the 1960 Program. These papers will be scored on the scale of (10) with 10 credits representing highly satisfactory or perfect meeting preparation outline papers. These papers must contain (x) evidence that the specific objective to be accomplished is strongly identifiable for each session. There must be (y) evidence of treatment in the Tangible and Intangible where required. The (x) material must be complete, organized, sequenced and receive letter treatment from quarter to quarter.

The grades on these papers (0 to 10) will be added to the credits for V.F.R. and T.F.R. for that month. The sum of the credits earned in (1), (2), and (3) above shall be the project eligibility score for the month. 22 credit points or more qualify a "site."

All data for site qualification and foreman nomination data as above specified, will be due in the Division Safety Office monthly at the

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time the Monthly Data Log sheets are received. A sufficient quantity of reporting data sheets for the duration of the incentive plan is supplied. (See enclosure.)

Site Ineligibility will occur on a monthly basis subject to:

- (a) Less than 22 credits accumulated in the preceding factors (1), (2), and (3), and/or
- (b) Major injury experience (Du Pont) or (Contractor) personnel.

Both eligibility and ineligibility of a project site will be considered on a monthly basis only.

The project site, irrespective of District, with the greatest accumulation of monthly credit points under (1), (2), and (3), will be suitably honored by authority and consideration of the Division Management at the end of the ten month term.

II. RATING METHOD FOR STAGE TWO (FOREMAN NOMINATION QUALIFICATION)

- (1-a) The foreman nominated by each eligible site shall be named without the nominee's knowledge and only final winners will ever know of their selection. This does not inhibit in any way the necessary incentive publicity of this plan before the fact.

"Top Foreman" as nominated by a site shall have accompanying his nomination to the Division Safety Office the following specific, convincing, personal "facts."

- (1) That he conducts usually and currently the highest caliber safety meetings. (State average of last 4 ratings.)

and (2) That he usually and currently has the lowest gang V.F.R. (State it.)

and (3) That he is free for the previous 12 months of sub-major or major injuries. (Give last date, if any.)

and (4) That he is performing currently the most effective "job placement." (Give examples.)

and (5) That he is the one demonstrating the highest safety interest as analyzed by Engineers and Safety Supervision under Operation "Specific" for that month. (State how—important.)

- (b) Unless a contractor's foreman has worked on one or more of our sites for at least one year (accumulated experience), he will not have eligibility, regardless of site eligibility.

(c) "Top Foreman" in each District will be selected by Wilmington Management based on information forwarded by the field. (1 through 5 above)

(d) A foreman may be nominated more than once but no longer after winning this award.

DUP 0912248

(2) Award

- (a) The award to a District winning Top Foreman will be a commemorative 12" circular Gernhem silver tray engraved as a citation.

DU 029779

- (b) Lost awards cannot be and will not be duplicated.
- (c) Foremen candidates for awards are not to be advised of their nomination. In this manner, unsuccessful candidates will have no dis-appointments and it will be sufficient for any and all foremen to know (after confirmation) who was recipient and at what sites. Sites will be advised by teletype. Sample citation awards will be unavailable except through large photographs which will be forwarded.
- (d) Presentation to winning Top Foreman shall be at Staff Meetings or specially called meetings in the presence of the Staff.

Notification and Publicity (Local)

Instructions:

1. Publicity:

After being supplied with 8 1/2 x 11" glossy photographs of the award, the sites will use their own methods to publicize "Top Foreman" of the month as per this plan.

2. Write the following letter to each foreman, but address it to his home address so his family will see it:

.

February 22, 1960

Dear _____:

Each month in 1960, beginning with March, we plan to award a 12" engraved "Gerhem" silver tray to the "Top Foreman" of the month. This is to be engraved as a citation to the winner. You will be eligible to participate for nomination under the rules which will be explained on the job.

This incentive plan is part of our 1960 Safety Program.

Kindest regards,
CONSTRUCTION DIVISION
Field Project Manager

DUP 0912249

DU 029780

**INCENTIVE PLAN DESIGNED TO STIMULATE
AND MORE THOROUGHLY IMPLEMENT THE EMPHASIZED
"ADMINISTRATIVE FUNCTION"
OF STAFF SUPERVISION BY SITES — 1961 SAFETY PROGRAM**

(Staff Supervision here means any Field Division Engineer, Area Engineer, Craft Superintendent, Assistant Craft Superintendent and any General Foreman functioning as Craft Superintendent or Assistant.) (SRP Inc. Gen. Craft Supts.)

Division Engineers and Area Engineers will alternate monthly for the monthly recognition award; and Craft Superintendents and Assistant Craft Superintendents will alternate monthly for the monthly recognition award as shown below.

January — Division Engineers — Craft Superintendents
February — Area Engineers — Asst. Craft Superintendents
March — Division Engineers — Craft Superintendents
April — Area Engineers — Asst. Craft Superintendents
May — Division Engineers — Craft Superintendents
June — Area Engineers — Asst. Craft Superintendents
(2nd half will follow same schedule.)

Each individual in the two groupings shown above will always be scored each month but recognition eligibility by "certificate" award will be each alternate month accumulatively for high men in that month as follows:

STEP I. Assign and post credits in individual "passbooks" equal to the number of men having worked under the participant's supervision each month as determined at the end of the month. (Passbooks supplied by the Division Safety Office.)

STEP II. Assign and post debits in the individual "passbooks" equal to the number of infractions witnessed by an audit (inspection) committee for 4 weekly inspections per month. Post monthly accumulations of "debts and credits" in passbooks. Infractions for purposes of this plan are limited to the Table of 5 Subjects and their Debits. (attached)

7UP 0912250

STEP III. A participant's monthly standing will be based on the "percentage" remaining of his original credits. Credits and debits will be carried accumulatively from month-to-month. "Percent standing" at any time will be based on all accumulated debits divided by all accumulated credits.

If it should occur that a would be participant has no competition, no award will be permissible during such a period.

Ties or claimed inequities between 2 or more individuals will be settled locally by—(high score on a 25 question True or False quiz available from the Division Safety Office, if and when needed.)

STEP IV The participant at a site with the highest percentage of remaining credits in the months he is eligible will be awarded a certificate entitling him to compete for a valuable District prize in July or December valued at approximately \$100.00.

*Site certificates are good only for the 1/2 year in which they are won. District prizes (should they occur) will be settled as in Step III.

All bookkeeping monthly is the responsibility of the Safety Engineer. Site accumulative inspection tally forms to be provided by Division Safety Office for convenience and uniformity as per sample attached. Passbooks are transferable on confirmation for transferees.

To give spirit animation and human interest to this plan, actual simulated bank passbooks will be issued for each participant at each site. During the application of this incentive procedure throughout the 12 months of 1961, the percent change of credits (deposits) made for the month versus penalty points (withdrawals) will be shown. Inasmuch as there are 5 subjects on which penalties can be earned, both the rate of penalty points (withdrawals), as well as the category for which they were withdrawn gives current indication to management as to each individual's shortcomings for "weekly" attention.

This makes obvious where the individual needs "HELP." Following is a mathematical sample of a typical site for two months. We have selected two months so as to show the carryover of percentage standing from one month to the next month. (These are actual experience figures at a medium size site.)

"Auditors" — Safety Engineer and 2 rotating experienced appointees.
(NOT regular inspection committee.)

Passbooks must not be carried about, as they may be lost or mislaid. Keep them in "transparent" racks where they may be accessible to all concerned in the main office in or near the Safety Office or the conference Room.

Repeat winners will not receive another certificate but their highest score during each half year will be their competing score.

DUP 0912251

DU 029782

SILVER TRIANGLE GOLD LEAF PLUMB-BOB CITATION AWARD

The Division Safety Office, since the mid 1940's has presented a Gold Oak Leaf and Plumb-Bob insignia for extremely meritorious Safety contributions by any echelon of supervision. We wish to introduce as added recognition the Gold Oak Leaf and Plumb-Bob mounted on a sterling silver triangle to be awarded to members of the Construction Division who meet the following qualifications:

- 1 The recipient must have been previously presented the Gold Oak Leaf and Plumb-Bob insignia.
- 2 He must have been in some echelon of supervision during no less than five years since receiving the Gold Oak Leaf and Plumb-Bob insignia.
- 3 During this period, he must have continued to contribute the very best of our kind of Safety participation and administration at his echelon level successfully. He must not have experienced in his area of responsibility a major injury during the last five years.

Nominations for this insignia award will originate with the Division Safety Office. The insignia accompanied by a personal letter from Division Management will be forwarded for staff meeting presentation.

As in the case of prior awards of the Plumb-Bob insignia, no lost insignia will be replaced.

DUP 0912252

DU 029783

FIRE PREVENTION AND FIRE PROTECTION DURING CONSTRUCTION

The possibility of loss by fire during the construction period is seldom appreciated. Practically every class of construction work, however, requires the use of flammable materials in conjunction with substances, processes, devices or equipment which introduce fire hazard.

PART I.

Storage of Raw Materials and Temporary Construction Buildings

One of the first problems confronting the construction engineer is the storage of raw materials, the provision of storage sheds, construction sheds, offices and other buildings necessary for handling the different classes of work.

The raw materials can be divided into two general classes: viz., those which can be stored unprotected against weather in the open, such as structural steel, pipe, lumber, brick, gravel, etc., and those which, due to value or susceptibility to water damage, must be protected in store houses. This latter class includes tools, fittings, copper, cement, lime and similar materials.

In selecting sites, both for outside storage, sheds or other buildings, the need of having them accessible to the work, and at the same time so located or separated that they do not unduly expose the construction work, or each other, should be kept in mind.

Storage of Lumber

It should be at a detached location. The lumber piles should have several feet space between them and the rows of piles should be separated by at least 10 feet of clear space, and preferably 20 feet. Where space will permit, not over 1,000,000 board feet should be stored at one location. In arranging large storages in separate fire areas, care should be taken not to have all lumber of one dimension in an area. The destruction of one area under these conditions might seriously handicap the work.

The ground between the piles should be kept free of combustible materials, such as dry vegetation, bark, chips, paper, etc., to prevent fire spreading from one pile to another through this medium. This also reduces the ember hazard. Unless absolutely necessary, the piles should not be higher than 10 feet above the ground. For fire protection see caption "Fire Protection".

Storage Sheds

DUP 0912253

These should be located at a point where they will be convenient to operations, but will not form a serious exposure to the buildings under construction. They should be built in small units with good separation, rather than combined in one or two large buildings. Where necessary to construct large buildings, or where large values are present, automatic sprinklers should be installed, provided, of course, water supply is available.

Construction Shops

Construction shops should not be combined with storage buildings as most of the shop work introduces fire hazard, and if so arranged, large values may be involved in fire. Frequently shop buildings can be made a part of the completed plant, warranting better design and construction than if of a temporary nature.

Where destruction of the shops would seriously delay or stop work until rebuilt, this class of buildings, though temporary, is sometimes protected with automatic sprinklers.

Storage of Oils and Paints

Oils and paints should not be kept in store houses or construction shops, due to the fire hazard which they introduce. Even with small amounts, a separate detached oil and paint house should be provided.

On large projects, where considerable gasoline is to be used, standard gasoline equipment consisting of properly protected underground storage tank, should be installed. On smaller projects the gasoline should be kept in metal drums where it will not expose buildings or work under construction.

Local supplies of lubricating oil should be kept in substantial metal cans.

Only a day's supply of oil and paint should be taken on to the work at one time. Surplus remaining at closing time, or when work is completed, should be removed to oil and paint house.

Oil is subject to spontaneous combustion. The main supply should be kept in a detached, unimportant storage shed and should be kept dry. The local supplies should be kept in substantial metal cans having tight-fitting metal covers.

HAZARDOUS MATERIALS AND DEVICES

Gasoline Torches, Lamps and Soldering Iron Pots

These devices introduce acute fire hazard, not only due to the unprotected flame, but also because of the gasoline hazard. They should be filled, stored, and, if possible, lighted outside of buildings under construction. They should be examined before being used. Defective torches should be immediately repaired or disposed of.

If necessary to have a small supply of gasoline available on the work, due to location and constant use of these devices, it should be kept in approved type metal safety can, but wherever practical the torch should be filled outside of the building.

Only safety matches should be used.

DUP 0912254

Tar Pots

Tar pots used in roofing, water-proofing, road building, etc., introduce hazard. The most effective way to extinguish fire in a tar pot is smother it. Frequently tight-fitting metal covers with handles are provided and kept nearby for this purpose. These covers are also of value in protecting hot tar against rain and

water from other sources. Water coming in contact with hot tar will sometimes cause it to foam over; the tar then being ignited by fire underneath.

Fires have occurred in cloth or rope mops used for applying tar on roofs. Such fires, though the causes are not definitely known, may have been due to spontaneous combustion. Mops should be removed to a safe location when not in use. Inspect the pressure system of the tar pot before each day's use.

Oxy-Hydrogen and Oxy-Acetylene Cutting and Welding (and Similar Cutting, Welding and Brazing Processes).

Fires have been caused by hot metal or sparks developed during the process of welding or cutting with oxy-hydrogen or oxy-acetylene flames. Where necessary to use them, combustible materials nearby should be removed or protected.

Clothing used during this work should be examined for sparks or smoldering fires before being placed in lockers or left in building.

Cylinders containing acetylene, hydrogen, oxygen and any compressed gases should be stored in detached buildings where not likely to be subjected to fire. There are cases on record where such cylinders have exploded during fire, doing considerable damage.

Blacksmith Forges and Blast Furnaces

These should be so located and safeguarded that hot coals and sparks cannot come in contact with combustible materials. Hot rivets frequently cause fire by falling into flammables. This hazard should be guarded against.

LIGHTING

Oil Lamps and Torches

One of the most common methods for temporary or emergency warning lighting is the use of oil torches.

In using oil (kerosene) flare torches, care should be taken to see that flame cannot come close to combustible material. Frequently these torches overflow and burning oil drops to floor or ground underneath. They should not be placed directly against wooden walls or partitions.

Oil supply should be kept in main oil or paint house recommended above, and as far as possible the torches and lanterns should be filled outside of buildings. Where local supplies are necessary, substantial metal safety cans should be used.

Lamps or torches should never be filled when lighted. A man should be delegated to clean and fill torches and keep them adjusted and in repair. Only safety matches should be used.

Temporary Electrical Installations

DUP 0912255

Although of a temporary nature, these should conform in all essential details to the requirements of the National Electrical Code, published by the National Board of Fire Underwriters. Particular attention should be given to the question of support, insulation and fusing of wires and apparatus. Life hazard, as well as fire hazard, is brought about by defective electrical equipment.

POWER

Boilers

If boilers are enclosed as protection against weather or cold, the following precautions should be observed, unless, of course, the structure is of non-combustible or fire-resistive construction. Proper clearance should be provided between building wall or roof and boiler breeching. Where a smoke stack passes through a wooden roof, the opening should be at least 12 inches greater in diameter for small stacks, and 18 inches to 3 feet greater in diameter for large stacks.

Water protection consisting of a thimble and umbrella should be provided in the roof.

Ashes should not be thrown on or against combustible material or construction.

Proper clearance should be maintained between steam pipes and woodwork or combustibles.

Steam Pipes and Radiators

All steam piping even of the low pressure type, should be clear from all woodwork and guarded to prevent burns to persons.

Where secured to woodwork they should be supported on standard metal hook plates.

Throwing Frozen Building Materials

It is frequently necessary during cold weather to thaw sand, gravel, slag and similar materials before they can be used. This is usually done by building an open wood fire directly on the pile, or by use of steam coils. Wherever possible steam should be used. Before using open fires make sure that sparks or embers cannot reach combustible material or construction.

Orderliness

It has been estimated that at least fifty per cent of the fires which occur throughout the country are due to disorderly work areas. The construction engineer should recognize the importance of maintaining orderly conditions compatible with the progress of his work.

DUP 0912256

Yard Orderliness

Yard should be kept free of wood, refuse and other combustible materials. Such accumulations might result in fire spreading from one building to another. Furthermore, they provide footholds for flying embers and sparks, resulting in many small fires which expose the buildings under construction, and also disorganize the fighting of fire, as well as involving the possibility of overtaxing the water supplies, unless of a very substantial nature.

On large projects an incinerator is sometimes constructed for burning the wood refuse and other waste materials.

Burning grounds should be located a safe distance away and wire screened.

Construction Building—Orderliness

All dirty and oily waste should be kept in substantial metal oily waste cans which are emptied frequently.

The workmen should be required to keep their clothing and other items hung up in an orderly manner. This will facilitate ventilation and will tend to retard spontaneous combustion.

Matches and Smoking

The use of matches should be restricted and only those of the safest type (that is, which must be struck on prepared surface on side of box) should be used.

The safety match, having margined stick, is considered the safest match available.

A great many fires have been caused by smoking. Where large amounts of combustible materials are used in construction, it is well to prohibit, or at least restrict, smoking.

Safeguarding Records

The need of protecting records is self-evident. Frequently it is found that tracings and blue prints, as well as specifications for the project, are stored in the construction engineer's office, or at some point on the work where a small local fire would destroy them. This might result in a most serious delay, holding up construction work until the plans and specifications were again developed.

Where warranted fire-resistive vaults should be constructed.

Temporary Structures

During construction work it is often necessary to erect temporary wooden sheds, offices, enclosures or hoardings, platforms, etc. Before this work is done examination should be made to see if such structures form connecting links between important buildings, or if they introduce conflagration hazard.

Completion of Fire Stops

Instead of waiting until a building is completed before installing fire doors on interior walls or wired glass windows or shutters, which protect against external or inter-exposure, these should be installed at the earliest possible moment when they will not be likely to be injured by future construction.

FIRE PROTECTION DUP 0912257 Outside Aid

Where the construction work is located within city or town hydrant protection, locate the nearest fire alarm box, or arrange to summon aid by telephone or other means.

If hydrants are available and water pressure is adequate, a supply of standard 2 1/2-inch Dearen-jacketed neoprene fire hose should be provided. It should

be kept on hose reels, or otherwise arranged so that it can be gotten into action without delay. By stamming one line together good streams can be obtained even with moderate pressures.

When outside of city or town limits, arrangements can sometimes be reached with the nearest municipality to send motor driven pumps or chemical trucks in event of fire.

Aid can sometimes be obtained from nearby manufacturing plants.

Investigation by the engineer in charge may uncover other channels from which help can be obtained. This work should be done before the construction work is under way so that, should fire occur, the channels from which assistance can be obtained and the method of giving alarm will be known. This will enable the construction engineer to summon help with utmost dispatch.

General Notes

An important phase of construction work which is frequently overlooked or neglected is the question of getting at least part of the fire protection system in, during the early stages.

The completion of water supplies and installation of fire mains, hydrants and equipment should precede, if possible, the actual building construction. If automatic sprinklers, inside hose equipment and other motor extinguishing apparatus are to be provided, the installation should be made as soon as possible.

Lumber Yard Protection

For the protection of outside lumber yards and other places which will not be included in the permanent fire system, and where temporary protection consisting of mains and hydrants is not warranted, a liberal supply of barrels and pails should be installed. For this, fifty-gallon oil drums can be used. The exterior of these drums should be painted red and they should be lettered in white "For Fire Only". Pails can be hung inside or placed on brackets attached to outside of cask. The drums should be covered.

Anti-Freezing Solutions for Water Casks and Pails

Water pails and casks installed at locations where they may freeze can be filled with a solution of calcium chloride.

For ordinary temperatures to -20° F. at least 4 pounds per gallon should be used.

Accessibility

For quick action at time of fire, the fire equipment must be kept accessible. This means that hydrants and hose houses must be kept free from obstruction. Well defined paths or roadways should be maintained. The same is true with interior building equipment.

Exits

DUP 0912258

Proper exit facilities in large or high buildings are not only necessary to allow escape of workmen, but they also provide means for the firemen to enter building.

Fire Inspection, Guards and Watchmen Service

The extent of this supervisory service depends largely upon the size of the project.

Where the construction work is part of the development of a plant already in operation, the plant inspection and watchmen service can usually be extended to include the new work. On small projects the fire inspections, guards and watchmen service are often combined.

Some supervision of this nature is needed, especially at night and when construction ceases. The men on duty should be instructed regarding fire hazards, location of fire extinguishing equipment and how to summon aid. They should, furthermore, be instructed to give alarm immediately upon discovery of fire, and then do everything possible to extinguish it.

Approved Installation, Inspection and Test of Fire Equipment Inspection of Cut-offs

The importance of carefully checking the construction of fire walls and fire stops is frequently not appreciated. Improper construction or assembling of materials may result in voids, unsubstantial walls, exposed reinforcing member and many other defects which might cause failure of these of fire.

This applies not only to vertical cut-offs, but also to horizontal cut-offs, formed by floors in fire-resistive buildings.

There is one case on record where spread of fire into a reinforced concrete building, which resulted in many thousand dollars loss, was due to a 2-inch opening through a floor, this opening at one time having contained a pipe. In the installation of fire doors, wired-glass windows, shutters, etc., as well as the proper construction of walls and floors, good workmanship plays a very important part in relation to their proper functioning and future maintenance. Most of the defects which develop in automatically operated devices are due to installation defects.

Tests

DUP 0912259

When the fire protection system, that is, water supply mains, hydrants, automatic sprinklers, etc., is fully completed, it should be carefully inspected and tested.

The following are some of the points to be checked:—

- a. Tanks and reservoirs should be filled and checked for leakage.
- b. Pressure test should be made on mains, automatic sprinkler and standpipe systems, as specified above.
- c. After pressure test, static pressure should be placed on entire system to determine if it is leaking excessively.
- d. Shut-off tests should be made on all valves, and direction of operation given on wheel, cap or nut should be checked. All valves should be uniform in operation, preferably right hand, or those closing counter-clockwise, unless greatly in the majority, should be changed to operate right hand, so that the valves in the entire system become uniform in operation. If all but a few of the valves are left hand, that is, close by turning valve wheel or wrench to the left, or counter-

clockwise, the right hand valves should be changed so that all valves in the fire protection system are uniform in operation, and signs should be posted to the effect that they operate in opposite direction to the ordinary valve.

- e. Hydrants should be operated to make sure that they are in operative condition and free from obstruction.
- f. Flowing tests should then be made, using all hydrants, drains on sprinkler risers, standpipes, etc., in order to ascertain if mains and connections are free from obstruction.
- g. Fire pumps should be run at full capacity, both as regards volume and speed.

In other words the inspection and tests should uncover any deficiencies in installation. The system should be left ready for use.

DUP 0912260

DU 029791

FIRE EXTINGUISHERS - BASIC REQUIREMENTS

This procedure establishes basic considerations in establishing first aid fire protection for T.C. facilities and facilities under construction:

I. FIELD FIRE PROTECTION RECOMMENDATIONS - CONSTRUCTION FACILITIES

- A. T. C. Office
- B. Stores & Receiving
- C. Mechanical Shops (Carpenter, Pipe, Millwright, Sheetmetal, etc.)
- D. Gasoline Dispensing Pumps
- E. Automotive Garage
- F. Paint Shop & Garage
- G. Field Change Houses (or the like as may prove)
- H. Lumber Storage
- I. Any Exterior Volume-Storage of Flammables
- J. High Density Frame Structures on Aeration Towers and High Density Form Work and Frame Work.

II. MINIMUM PROTECTIVE EQUIPMENT - EACH CATEGORY:

- A.
 - 1. One 2 1/2 gallon water extinguisher just inside main "end" entrances.
 - 2. CO₂ or dry chemical at the stenographic reproduction station one in or near the Medical First Aid Unit, and one at the main electrical switch or indoor transformer station.
- B. 2 1/2 gallon water extinguishers just inside entrances to Stores and Receiving structures.
- C. Dry chemical extinguisher just inside the entrance to each Mechanical Shop.
- D. Dry chemical extinguisher at each end and 20 feet "out" of the gasoline service "station".
- E. Dry chemical extinguisher on each side of the double door entrances to automotive garages whether they be storage garages or repair and storage garages.
- F. One 2 1/2 gallon water extinguisher in warehouses for each 2,000 sq. ft. of floor space or part thereof. (Freeze-proof, if required)
- G. Provide one 50 gallon (freeze-proof in season) water barrel for each 10,000 board feet of lumber storage, and two 4 1/2 buckets (round bottom).

III. FIRE PROTECTION RECOMMENDATIONS FOR HEAVY PORTABLE OR TRAVELING EQUIPMENT

- A. Air Compressors (Portable or Stationary)
 - 1. Gasoline - one dry chemical
 - 2. Diesel - none

DUP 0912261

- B. Automobiles - none
- Trucks (Pick-up) - none*
- Trucks (Flat-bed) - none*
- Trucks (Dump) - none*
- Trucks (Other) - none*
- *Unless C.C. regulations require extinguisher or unless truck is transporting flammables in quantity (such as a gasoline refueling truck).
- C. Cranes (all types) - one dry chemical
- D. Welding Machines (gasoline) - one dry chemical
- E. Welding Machines (electric) - none
- F. Dozers - none
- G. Graders - none
- H. Loaders - none
- Tractors - none
- I. Fork Lift (gasoline) - none
- J. Farm Tractors - none
- L. Stretcher Carriers - none
- M. Mortar & Cement Mixers - none
- N. Trenchers - none
- O. Hoists - none
- P. Pumps (gasoline powered) - one dry chemical extinguisher (because of where often located)
- Q. Melting Kettles (lead or pitch)
 - 1. Dry chemical for lead pots
 - 2. Dry chemical for pitch.
- R. Grass or Hay Mowers - none
- S. Nelson Heaters (or similar types) - one dry chemical extinguisher.

Note 1. Refueling any internal-combustion or heating equipment while said equipment is overheated or under ignition is strictly prohibited.

Note 2. Unusual situations or conditions should be reviewed with the Division Safety Office.

IV. FIELD LOCATIONS

- A. It will be the responsibility of each Engineer to plan his work area to provide in any area, space, floor, building or part of any of these, adequate fire extinguishers within immediate reach of any work which could precipitate fire.
- This means for example, one 5 lb. powder extinguisher could do for 1 or 3 or 4 welders working in a radius of 25-30 feet. If one reofer or one welder works alone, he alone is sufficient reason for one adequate extinguisher due to his involvement with flame or flammables.
- B. In addition to the above, early consideration should be given to installation of permanent sprinkler and/or standpipe systems so construction may benefit.

DUP 0912262

FIRE RETARDANT PAINT

On somewhat frequent occasion it becomes desirable or necessary to make the application of fire retardant paint on interior walls of T.C. Facilities.

Following is a laboratory and field tested formula for a fire retardant paint suitable for our purposes with a proven savings of about 60% (per purchased gallon) over the formerly purchased commercial fire retardant paint.

INGREDIENTS:

Du Pont #865 Sealer Coater (Vinyl Emulsion Paint)

Ansul Dry Chemical Powder (98% Bicarbonate Soda, 2% Water Repellent Chemical)

Water tint coloring may be added for desired color.

MIXING INSTRUCTIONS:

To one gallon Sealer Coater Paint, add two pounds of Ansul Dry Chemical powder.

Mix either by hand or electric agitator until all lumps are dissolved.

APPLICATION:

Paint may be applied by brush, roller, and some spray guns.

Can be applied to all types of wall boards, wood, and plywood.

Drying time: 4-6 hours.

OTHER FEATURES:

Odorless

1 gallon of paint will cover approximately 300-500 square feet of surface.

Brushes and equipment can be easily cleaned with warm water and soap.

DUP 0912263

DU 029794

COOLING TOWERS - TREATED & UNTREATED

In the interest of safety and fire protection, all such towers are to be constructed under the following requisite conditions irrespective of whether the labor shall be du Pont or Contractor.

1. Smoking shall be totally prohibited in the area, structure and for distances up to 50 feet away.
2. Sources of ignition such as matches, welding torches, (gas or electric), circuits, overloaded fuses and the like, shall be dealt with and guarded against continuously and to the highest possible degree throughout the construction period.
3. Tarpaulins, oily rags, wood shavings, cans of combustible material including high reflecting objects such as glass, high gloss metal surfaces and the like, should never be permitted to accumulate or stand in direct sunlight in any portion of such structures.
4. Lightning grounding, when it finally becomes installed as part of permanent design, should be installed on stand-off insulators and never be attached directly to combustible material even though the ground lead may carry an insulative skin.
5. First Aid fire equipment of reasonable capacity shall also be at the work places of mechanics working on wooden parts such as decks, cubicles, etc. Plant fire hydrant service should be looked into in advance and liaison with the Fire Department should also be had in advance.
6. DURING CONSTRUCTION, BEGINNING WITH THE INSTALLATION OF ANY PART OF THE FRAMEWORK AND ESPECIALLY ANY PART OR ALL OF THE "FILLER"—STRUCTURE SHALL BE WET-DOWN AT LEAST TWICE EVERY 24 HOURS, BEING CAREFUL TO WET ALL AREAS OF THE STRUCTURE INCLUDING UPPER CORNERS AND AREAS UNDER AND ON DECKS AS THEY MAY PREVAIL. ORDINARY LAWN SPRINKLERS PROPERLY PLACED WILL GO FAR IN DOING A WET-DOWN JOB BETWEEN ASSIGNMENTS OF LABOR TO THE WORK.

DUP 0912264

DU 029795

GAS & OIL FIRED SYSTEMS - INSTALLATION & USE

(With consideration for Air Content)

This procedure is to be used as a guideline in selecting, installing, and maintaining all types of heating equipment and manifold systems used for various purposes in construction.

Electric or steam heat is the most desirable from the standpoint of safety and should be utilized wherever possible. In the absence of these energy sources, it becomes necessary to use oil, natural gas or LP gas (bottled).

Installation & Use - Stationary - Refer also to appropriate NFPA pamphlets.

A. Oil Stoves & Heaters

1. Appliances must be carefully leveled in accordance with manufacturer's instructions and attached to floor or otherwise secured in position.
2. When a gravity tank or portable pump is used, a cut-off valve must be installed in the piping close to the tank or pump discharge. Fuel tank must be outside of building or enclosure.
3. PFI pipes and cut-off valves shall be readily accessible.
4. Vent pipes shall be installed so that draft will proceed upwards constantly during heater operation.
5. NFPA pamphlet No. 31 - Standards for Installation of Oil Burning Equipment - contains more complete information.

B. Natural or LP Gas

1. Install regulator with automatic shut-off valve between gas source and appliance.
2. Tanks or bottles must be outside of building or enclosure and installed in accordance with Engineering Standards F8J and F9J.
3. Gas piping must enter building or enclosure at point nearest appliance - not through wall and run across floor for several feet.
4. Appliances must be properly vented per local codes.

II. Installation & Use - Portable

1. Forced air heaters of oil or gas fired type should be used.
2. Burner should be placed outside of building or enclosure, exposed to outside atmosphere and heat supplied through duct to desired area.
3. Installation must include consideration for venting, air content (fumes and/or adequacy of oxygen), purpose of installation (heating of load, tar, etc.), use of internal combustion engine and proximity of combustible materials.

DUP 0912265

DU 029796

III. Salamanders

A. Use

1. These are to be used only where no other appliance is applicable and then only for purposes of curing concrete or masonry work - NEVER to heat buildings or personnel.

B. Installation

1. Place no closer than 4 feet from wall, woodwork, or other combustible unless asbestos shielding of $\frac{3}{8}$ " minimum thickness is installed and then a minimum of 9" clearance is required.
2. Salamanders shall be secured in place to prevent tipping. When used on combustible floor or frozen ground, they shall be in appropriate base of fire resistant material, (sandbox 3" extending 18" past sides of salamander).
3. Specific persons will be designated and trained to install and service salamanders.
4. Salamanders will be attended during operation and must NOT BE REFUELED or LIGHTED while hot.

IV. General

In the use of any of the above appliances for space heating, burning, welding, heating of materials, etc., the following must be carefully observed:

- A. Presence of sufficient oxygen.
- B. Presence of toxic and/or explosive fumes or vapors.
- C. All installations must be in accordance with applicable Engineering Standards, National Fire Codes and State or Local regulations.

DUP 0912266

DU 029797

TEMPORARY PARTITIONS - FIRE CONSIDERATIONS

When requested by the operating department to erect temporary partitions for the purpose of isolating construction work area from the operating department manufacturing or production areas, the materials used in the construction of these partitions shall be:

1. Sprinklered Locations - ordinary untreated wood framing with asbestos cement board, gypsum board, plywood or equivalent wall material may be used for walls. It will not be necessary to fire retard this material in these areas. NOTE: Compressed paper material boards such as Nomosote or asphalt treated materials should not be used in temporary partitions. Any material used in the construction of TC partitions or walls should have a flame spread rating not to exceed 76.
2. Unsprinklered Locations (including TC shops, offices and warehouses) In such unprotected areas, the partitions or walls should either be constructed of fire retardant materials or the material be protected by painting with fire retardant paints. When erecting partitions consisting of wood framing and wall board on one side, both sides of the wall including the wood framing should be fire retarded. When erecting wall board on both sides of wood frame, the area of exposure or the faces of the two walls should be fire retarded. An approved inexpensive retarding paint may be found in Section J, Part 3 of "Brown Book".
3. Outdoors Weather Protection
The Safety and Fire Protection Division has approved the use of pressure treated fire retardant lumber or untreated lumber painted with a fire retardant material for framing and polyethylene as wall material.

DUP 0912267

DU 029798

TYPE, LOCATION AND USE OF TRASH RECEPTACLES

1. Type

- A. All trash receptacles used on this project are to be constructed of metal or other suitable nonflammable materials. (Usually, painted commercial steel drums are acceptable.)
- B. Paper or pasteboard cartons, wooden boxes or crates and similar type containers are not to be used for collection of combustible trash.
- C. Receptacles intended as a temporary depository for waste and rags saturated with oil, grease, turpentine or other flammables subject to spontaneous ignition are to be of the self-closing lid type approved for this purpose.

2. Location

- A. Adequate planning and forethought must be given to location of trash receptacles at field work sites. Consider potential points of trash accumulations: change rooms, paper water cup dispensers, etc.
- B. Large size receptacles (like 55 gal. drums) located inside buildings are to be kept at least 18 inches away from combustible walls and partitions. Drums are also to be provided with close fitting metal covers.
- C. Drums, barrels, luggers and other large containers located outside of buildings as receptacles for combustible trash are to be placed at least 15 feet from the building or combustible materials.

3. Use

- A. Employees are to be forcefully instructed to use trash barrels for the disposal of paper, lunch remnants and all small scrap of a combustible nature.
- B. Cigarette and cigar butts, matches, etc., should never be thrown in trash receptacles. Ash trays should never be emptied in waste baskets or other combustible trash receptacles.
- C. Glass, (broken, empty jars, etc.) scrap-metal and similar material, should never be placed in trash containers.

4. General

All drums used for collection of combustible scrap and trash are to be painted yellow and the word "TRASH" is to be stenciled in black on the outside of each drum.

DUF 0912268

DU 029799

INSTALLATION AND CONTROL OF OIL BURNING STOVES AND HEATERS

1. Installation:

- (a) Appliances shall be securely attached to floor or otherwise secured in position.
- (b) Appliances shall be carefully leveled in accordance with manufacturers instructions.
- (c) Where heater is supplied with a gravity tank or portable pump a cut-off valve shall be installed in the piping close to the discharge from supply tank or pump.
- (d) Appliances shall be installed so that integral tanks are readily accessible for filling and so that cut-off valve on supply tank is, also, readily accessible.
- (e) Vent pipes from heaters shall be installed so that draft will proceed upwards allowing smoke and flame to rise constantly while heater is in operation.
- (f) Oil burning stoves with supply tanks of more than two gallon capacity should have proper flue connection which will insure safe operation of the heater. Dampers are to be such that they cannot close off more than 80% of the internal cross sectional area of the vent pipe.

2. Fuel Storage for Oil Burners:

- (a) All fuel storage tanks or drums used for the purpose of supplying fuel to oil burning heaters or stoves are to be stored outside of buildings.

3. Table of Clearances for Oil Burning Heater Systems:

DUP 0912269

	A	B	C	D	E
	Top	Front	Vent Pipe	Back	Side
	Inches				
(a) Domestic Warm Air Furnace with connected burners	18	48	18	18	18
(b) Mechanical Warm Air Furnaces with temperature limit control	6	48	18	6	6
(c) Domestic Furnace Units (Furnace & Burner)	18	48	18	18	18
(d) Domestic Hot Water and Steam Boilers with conversion burners	6	48	18	6	6
(e) Domestic Boiler Units	6	48	18	6	6
(f) Water Heater Unit	6	48	18	6	6
(g) Domestic Ranges	36	48	18	12	24
(h) Space Heaters (Circulating Type)	36	48	18	12	12
(i) Heating Stoves (Radiating Type)	36	48	18	36	36
(j) Ceiling Type Direct Unit Heaters	18	18	18	18	18

SAFETY CONSIDERATION FOR THE USE OF SALAMANDERS

The following procedure providing for the types, installation, use and maintenance of salamanders shall be strictly adhered to:

1. Types

- (a) Portable, oil fired, manually operated.
- (b) Portable, automatic, oil fired, electrically operated.

2. Installation

A selected individual from one designated craft will be responsible for the correct installation of all salamanders and shall observe the following regulations:

- (a) No salamander is to be placed nearer than 4 feet to any wall, woodwork, or other combustible material, unless an asbestos shield not less than 3/8 inch in thickness is provided and then there shall be at least a 9 inch clearance provided between any wall, woodwork, or combustible material.
- (b) Salamanders shall be secured in place so as to prevent tipping or slipping. When used on combustible floors or frozen ground salamanders shall be supported by a substantial base of fire resistive materials (sand box 3 inches in depth) extending at least 18 inches from salamander on all sides.

3. Use

- (a) Salamanders as designated in heading No. 1—Types, paragraph (a) shall be used for the purpose of curing concrete only and under no circumstances will they be used as a heating unit in buildings, shacks, warming stations, etc., occupied by personnel, du Pont or sub-contractors, on this project.
- (b) Salamanders as designed in heading No. 1—Types, paragraph (a) shall be used only in outlying areas where electricity is not available and for quick placement in areas of freshly poured concrete in cases of sudden drop in temperature. They shall not be used in closed buildings or in structures with temporary coverings.
- (c) Always consider the possibility and consequences of "high winds" and "poisonous gas" accumulation.

4. Maintenance

- (a) Salamanders shall be attended during all periods of operation by a competent and responsible person.
- (b) Salamanders as designated in heading No. 1—Types, paragraph (a) shall never be refueled or lighted while hot.

5. General

The use of coke fired salamanders must be cleared with the Division Safety office if the need for using them arises.

DUP 0912270

OPERATION OF HOT TAR KETTLES

The potential hazard of fire and serious burns should be an ever present consideration when equipment for heating tar is used. It is essential that very specific instructions be given to employees performing this work, that the equipment be thoroughly inspected mechanically prior to each new job application, and that the following precautions are observed.

A. Location of Equipment

1. All tar kettles or heating devices employing pressurized fuel burners are to be located at least 30 feet from any structure, building or material and equipment of a combustible nature.
2. Materials of any nature including those incidental to the heating operation should be stored not closer than 10 feet to the heating kettle. It is imperative that the immediate work area be free of stumbling and tripping hazards.
3. Necessity for flame permits should be checked if the work is to be performed in a plant operating area.

B. Precautions During Use

1. Employees performing this work must wear eye and face protection when loading kettle. Gloves are to be worn and sleeves should be rolled down.
2. Locate a CO² or dry powder fire extinguisher near the kettle.
3. Examine all hoses, fittings, clamps, etc., from pressure fuel chamber to burner on a daily basis.
4. Maintain careful control of temperature of molten tar inside kettle so as to prevent accidental ignition.
5. Should the molten contents ignite, close the kettle lid tight, close the burner valve and remove burner from kettle. The fire will usually "smother" out in a short time. The CO² or dry powder extinguisher should be used on "stubborn" cases. Be certain to stand well back from the kettle when the lid is next raised (use long handled shovel, etc.) as the sudden inrush of fresh air may result in re-ignition.
6. All equipment, including buckets or carrying containers, should be free of all moisture to prevent "splattering" of the hot liquid.

DUP 0912271

DU 029802

URETHANE INSULATION & ADHESIVE

The adhesive used in the application of this insulation, specifically Tuff-Bond Quick-Set, is a very highly flammable solvent. Therefore, no open flame should be used within a 25 ft. radius of any application of this adhesive.

Smoking should be prohibited within the above given distance and arrangements should be made for the control of smoking or any other conditions where ignition from any source could cause trouble. This material is also sufficiently toxic to warrant adequate ventilation during application.

Please call this to the attention of both your supervision and the applicators. If substitutes for this adhesive are required or used, the same regulations should apply upon analysis of what volatiles may become involved.

PREFERRED ALTERNATE FOR URETHANE FOAM AND GLASS FIBER INSULATION ADHERING AGENT

- (A) Foster's Safetec Duct-Fast #81-99 marketed by Benjamin Foster Company, Philadelphia, Pennsylvania.
- (B) The material is a quick-setting, non-flammable, fire resistant adhesive for thermal insulation.
- (C) The manufacturer's label includes instructions to avoid prolonged breathing of fumes and to provide adequate ventilation. This is due to the cumulative effect of the non-flammable, chlorinated solvent contained in the material.

This material is being widely used throughout the Division for adhering Urethane, foam and glass fiber type insulations, and is replacing those volatile cements covered under Thermal Insulation Specification Codes SN-817 and 318.

DUP 0912272

DU 029803

FIRE RETARDANT PAINT

On somewhat frequent occasion it becomes desirable or necessary to make the application of fire retardant paint on interior walls of T.C. Facilities.

Following is a laboratory and field tested formula for a fire retardant paint suitable for our purposes with a proven savings of about 60% (per purchased gallon) over the formerly purchased commercial fire retardant paint.

INGREDIENTS:

Du Pont #865 Sealer Coater (Vinyl Emulsion Paint)

Ansul Dry Chemical Powder (98% Bicarbonate Soda, 2% Water Repellent Chemical)

Water tint coloring may be added for desired color.

MIXING INSTRUCTIONS:

To one gallon Sealer Coater Paint, add two pounds of Ansul Dry Chemical powder.

Mix either by hand or electric agitator until all lumps are dissolved.

APPLICATION:

Paint may be applied by brush, roller, and some spray guns.

Can be applied to all types of wall boards, wood, and plywood.

Drying time: 4-6 hours.

OTHER FEATURES:

Odorless

1 gallon of paint will cover approximately 300-500 square feet of surface.

Brushes and equipment can be easily cleaned with warm water and soap.

DUP 0912273

DU 029804

AERATED WATER COOLING TOWERS TREATED AND UNTREATED

In the interest of safety and fire protection, all such towers are to be constructed under the following requisite conditions irrespective of whether the tower shall be the Port or Contractor.

1. Smoking shall be totally prohibited in the area, structure and for distances up to 50 feet away.
2. Sources of ignition such as matches, welding torches, (gas or electric), circuits, overloaded fuses and the like, shall be dealt with and guarded against continuously and to the highest possible degree throughout the construction period.
3. Tarpaulins, oily rags, wood shavings, cans of combustible material including high reflecting objects such as glass, high glass metal surfaces and the like, should never be permitted to accumulate or stand in direct sunlight in any portion of such structures.
4. Lightning grounding, when it finally becomes installed as part of permanent design, should be installed on stand-off insulators and never be attached directly to combustible material even though the ground rod may carry an insulative skin.
5. First Aid fire equipment of reasonable capacity shall also be at the work places of mechanics working on wooden parts such as decks, cupolas, etc. Plant fire hydrant service should be looked into in advance and liaison with the Fire Department should also be had in advance.
6. DURING CONSTRUCTION, BEGINNING WITH THE INSTALLATION OF ANY PART OF THE FRAMEWORK AND ESPECIALLY ANY PART OR ALL OF THE "FILLER" —STRUCTURE SHALL BE WET-DOWN AT LEAST TWICE EVERY 24 HOURS, BEING CAREFUL TO WET ALL AREAS OF THE STRUCTURE INCLUDING UPPER CORNERS AND AREAS UNDER AND ON DECKS AS THEY MAY PREVAIL. ORDINARY LAWN SPRINKLERS PROPERLY PLACED WILL GO FAR IN DOING A WET-DOWN JOB BETWEEN ASSIGNMENTS OF LABOR TO THE WORK.

DUP 0912274

DU 029805

CONSTRUCTION SITES
ANNUAL SAFETY PERFORMANCE

Year	Du Pont Roll Hours	Tabulatable Injuries	Frequency Rate	Severity Rate
1945	5,584,865	19	3.40	
1946	9,014,720	13	1.44	053
1947	10,499,170	10	.95	59
1948	9,600,572	5	.54	03
1949	6,600,274	4	.66	02
1950	9,288,871	8	.86	31
1951	10,986,689	4	.36	55
1952	12,120,421	12	.99	52
1953	13,900,799	10	.64	02
1954	9,112,704	4	.43	03
1955	7,590,948	5	.65	*804 0
1956	7,843,553	2	.25	26.5
1957	10,154,604	1	.09	1.77
1958	11,506,375	8	.70	1118 3
1959	7,066,776	5	.71	1180 5
1960	8,826,577	9	1.02	739 5
1961	8,437,443	1	.12	3
1962	10,009,836	8	.79	656
1963	13,846,914	8	.57	49
1964	10,997,347	3	.27	13
1965	10,308,522	2	.19	39
1966	15,145,149	5	.33	18.2
1967	12,607,200	6	.48	316
1968	8,986,203	6	.67	91
1969	8,721,627	7	.80	765

*Beginning of new national method of calculation

DUP 0912275

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DU 029806

CONSTRUCTION SITES
TABULATABLE INJURIES BY MONTH OF OCCURRENCE

Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
'945	3	3	1	3	0	0	0	0	1	2	0	0	13
'946	0	0	0	2	1	1	2	1	1	1	4	0	13
'947	2	2	0	1	0	0	1	0	0	1	1	3	10
'948	0	1	0	1	0	0	0	1	0	2	0	0	5
'949	2	0	0	0	0	0	0	0	0	0	1	1	4
'950	0	2	1	2	1	1	0	0	0	0	0	1	8
'951	0	0	0	0	0	0	0	0	0	3	0	0	4
'952	2	0	0	0	0	2	0	1	1	3	0	2	12
'953	1	0	1	0	0	1	2	0	3	1	0	1	10
'954	1	1	1	1	0	0	0	0	0	0	0	0	4
'955	0	0	0	0	1	0	0	1	1	1	0	0	5
'956	0	1	0	0	0	1	0	0	0	0	0	0	2
'957	0	0	0	0	0	0	1	0	0	0	0	0	1
'958	0	1	1	2	0	0	1	0	2	0	0	1	8
'959	1	0	0	0	1	1	1	0	1	0	0	0	5
'960	0	0	1	0	3	1	0	2	1	1	0	0	9
'961	0	0	0	0	0	0	0	0	0	0	1	0	1
'962	2	1	1	0	0	1	0	1	1	1	0	0	8
'963	2	1	0	0	2	1	1	0	1	0	0	0	8
'964	0	0	1	0	0	2	0	0	0	0	0	0	3
'965	1	0	0	0	0	1	0	0	0	0	0	0	2
'966	0	0	0	1	0	0	1	0	2	1	0	0	5
'967	2	0	0	2	0	0	1	0	0	0	0	1	6
'968	0	1	0	2	0	0	1	0	1	1	0	0	5
'969	0	0	2	1	0	2	2	0	0	0	0	0	7

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DU 029807

CONSTRUCTION SITES
CONTRACTORS' SAFETY PERFORMANCE

Year	Exposure Hours	Major Injuries	Frequency Rate
1960	5,299,843	5	94 (F.F.)
	531,241	5	9.4 (L.S.)
	5,831,084	10	1.71 (Combined)
1961	5,404,211	0	0.0 (F.F.)
	357,113	1	2.8 (L.S.)
	5,761,324	1	17 (Combined)
1962	6,273,376	6	.95 (F.F.)
	365,919	4	10.9 (L.S.)
	6,639,295	10	1.5 (Combined)
1963	9,724,422	7	.72 (F.F.)
	601,628	1	1.6 (L.S.)
	10,326,050	8	.77 (Combined)
1964	9,819,887	3	.31 (F.F.)
	410,853	0	0.0 (L.S.)
	10,230,740	3	.29 (Combined)
1965	7,575,363	5	.66 (F.F.)
	463,718	4	10.8 (L.S.)
	8,039,081	9	1.11 (Combined)
1966	11,278,531	6	.53 (CPPC)
	863,969	3	3.47 (L.S.)
	12,142,500	9	.74 (Combined)
1967	10,769,870	5	.46 (CPPC)
	829,459	5	6.03 (L.S.)
	11,599,329	10	.86 (Combined)
1968	8,720,317	8	.91 (CPPC)
	869,817	1	1.15 (L.S.)
	9,590,134	9	.93 (Combined)
1969	7,411,878	4	.54 (CPPC)
	1,098,350	1	.91 (L.S.)
	8,510,228	5	.59 (Combined)

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DU 029808

CONSTRUCTION SITES
COMPANY SAFETY AWARDS SINCE 1926

	Chief Engineer's	President's	Board of Directors
Antioch	5/26/66		
Baton Rouge	10/20/41		
Beaumont	11/17/61 12/10/68	3 6/63	1/23/66
Belle	3/31/45 9/16/50 2/10/60	7 11/47 8 26/51 3 11/61	6/14/48 11/22/57
Brevard	8/29/68		
Cape Fear			8/17/70
Chambers Works	10/12/35 9/ 8/51 10/17/61	11 5/27 10/21/41 6/ 9/52 2/19/65	1 8/50 2/ 6/54 6/ 2/55 5 22/58 1 22/58 6 11/56 8 15/67 11/11/69
Chattanooga	4/30/48 9/25/55 9/ 9/65	7 9/49 9/12/66	5 20/51
Chestnut Run (Wilmington Area)	10/28/57	12/16/58	5 22/61 11/ 2/63 3/ 6/66 2/11/68
Circleville	10/15/65		8/15/70
Clinton	6/17/65		
Edge Moor	2/12/49 1/22/56	6/ 8/57	
Experimental Station	7/ 2/49 10/ 9/56	2/20/50 11/24/57	

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	Chief Engineer's	President's	Board of Directors
Houston	11/19/50	5/22/52	
Johnsonville	12/23/51		
Kinston	7.17/62		1/16/70
Louisville	11/22/42	8/ 6/44	
	10/ 3/62	1/19/64	
Martinsville	1/21/59	5/ 1/66	1/16/69
	3/31/65		
May	11/24/50	8/ 1 51	9/25/68
	8/21/66	3/21 67	
Memphis	8/20/59	11/18/60	12/26/63
			12/ 8/66
			1/12/70
Montague	11/19/64		
Morgantown	6/24/41	7/31/43	
Newport	9/18/55	3/28/57	
Niagara Falls	11/19/49		
	12/25/60		
	4/ 2/65		
Old Hickory	2/ 1/63	9/10/63	7 10/64
			7 28.65
			5.10.66
			1/26/67
			11/ 6/68
Olin	1/27/57		
Parlin	5/ 4/60	6/ 1/61	8/19/64
	(Equiv.)	(Equiv.)	(Equiv.)
			10/12/67
			(Equiv.)
Pensacola	3/28/53	6/11/53	
Pineah Forest	8/25/51		
Pontchartrain	6/ 3/64		
Repauno	4/11/52	5/ 2 53	

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Part 4
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	Chief Engineer's	President's	Board of Directors
Sabine River	5/6/46 2/24/64	8/10/46 11/22/66	4/13/58 5/14/60 12/7/68
Guadalupe River	10/14/66		1/31/70
Seaford	12/29/39 4/2/53 11/2/61	4/2/54 11/4/62	2/17/64 4/4/66
Seaside	2/19/58	3/6/59	6/12/61 2/17/63 10/5/64
Seaside	8/2/58		
Victoria	5/12/53 2/29/60	12/3/54 5/1/61	4/23/64 9/5/66 12/27/67
Washington Works	12/1/47 6/1/56	5/24/61	2/5/64 8/8/66 10/31/68
Waukesboro	5/6/47 1/14/58 4/18/69	11/26/47	
Wilmington Shoals	1/18/39 6/7/51 9/24/54 7/13/64	12/19/45 11/30/51 7/17/57 9/13/65	4/19/48 11/21/49 10/16/52 7/12/53 4/17/59 4/6/61 3/29/67 2/14/69

DUP 0912280

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CONSTRUCTION DIVISION
WORLD RECORD ACCOMPLISHMENTS

Date	Site	Hours
11/5/40	Memphis	3,000,000
3/20/48	Belle	4,425,638
11/21/50	Wilmington Shoos (Machine Shop)	5,004,700
4/20/52	Savannah River	6,275,072
6/5/56	Chambers Works	6,277,000
1/22/59	Chambers Works	8,099,629
10/24/67	Old Hickory	8,099,629
11/30/70 (continuing)	Old Hickory	9,033,697

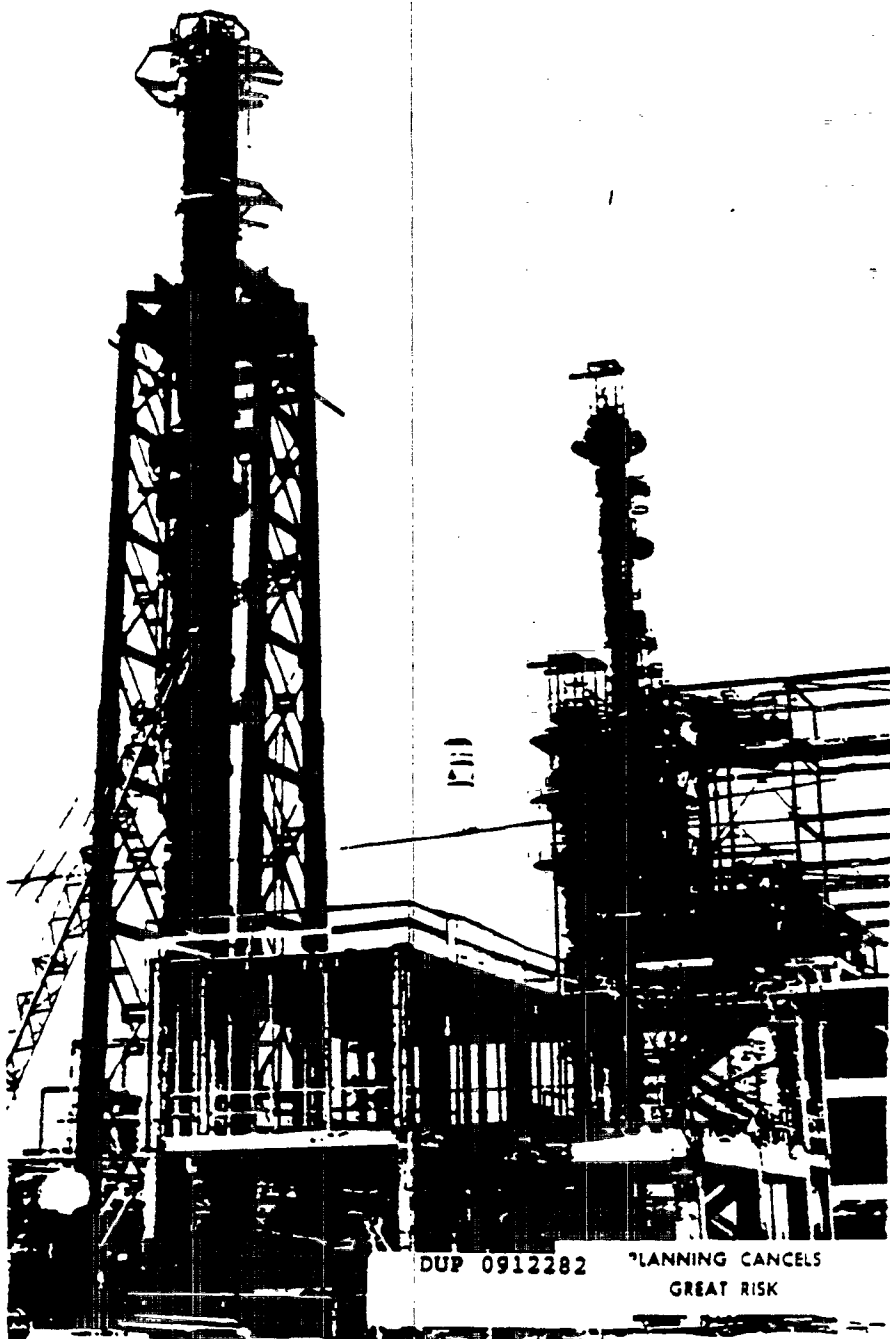
CONSTRUCTION DIVISION
(12 months or more
(without lost-time injury)
(Du Pont Roll)

5/5/55	7,447,218
6/14/57	8,000,000
10/7/61	9,135,238

DUP 0912281

12-70

DU 029812



DUP 091228Z

PLANNING CANCELS
GREAT RISK

DU 029813

INTEGRATING SAFETY WITH THE WORK

G. M. READ, CHIEF ENGINEER

E. I. du Pont de Nemours & Company

Construction Section — National Safety Congress

Chicago, Illinois, October 17, 1950

You and I are brought together here today to exchange knowledge on a vitally important management function—accident prevention, which is predicated on economic and moral benefits to all. Deeds carry convictions. We have concrete evidence to prove that safety pays off in two definite ways: First, through the conservation of human life, and second, through lower operating cost. Accidents cost money—more money than the cost of a well-run safety program. Top management is charged with the responsibility of operating a business efficiently. This means that all elements of cost should be analyzed to determine if the best possible job is being done. Such an analysis for safety reveals that the direct cost is some \$750 for the average disabling accident; and the indirect costs, such as work stoppage, spoiled work, equipment damage, manpower replacement, legal expense, etc., are calculated to be four times the direct cost. By doing a small amount of research on this subject, the average manager in industry would find that less than 1% of his payroll spent for safety (providing the program was well managed) would reduce accidents to less than .6 disabling injuries per million exposure hours. This compares with the current figures of 12 disabling injuries, or 20 times better than actual known performance existing at this time. In construction work specifically, a program costing only 1% of payrolls when used effectively has yielded performance 40 times better than the average for that industry. A word to top management—why not look at the actual record? The cost sheets reveal that for each \$1.00 spent for safety you save \$4.00. These figures should create sufficient interest for forward-looking management to determine if their safety program squares up with these facts. It is my firm belief that the success of any safety program rests squarely on the shoulders of top management. Management is responsible for putting up the money to conduct a well-rounded safety program. This simply means first-class personnel and adequate facilities, and above all, management's encouragement, interest, patience, co-operation and willingness to lend a helping hand at all levels of organization. Such action as this by management shows that management means business; it means it is ready to provide the best in safety; and that it is wholeheartedly supporting safety. This policy then permeates down into all levels of the organization and has a stimulating and lasting effect on safety performance.

To point out the wisdom of preventing loss of manpower, preventing financial losses due to unnecessarily high insurance rates and compensation costs, and preventing losses due to interrupted schedules and damaged goods and equipment, seems elementary. However, even to those of you who are thoroughly indoctrinated in safety work, it would be of value to you to make a critical review of your system to determine if it is modernized in all respects. Remember, new horizons are being continually opened up.

It seems to me a brief comment is in order on the basic reasons for the lack of interest in safety in some organizations. It simply boils down to top

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management's failure in not taking sufficient time to evaluate this very important function.

You as safety-minded men can do a great deal in selling your top management safety by presenting selected statistical data which will show the potential economies and human benefits derived from a well-run safety program.

Many years ago our Company foresaw the value of all-out accident prevention, and it established procedures, programs, and policies which covered this important operating function. Our Company's safety policies have proven to be more than reasonably successful. We do not claim that this is the best and only approach to this very important subject. However, we are always glad to share our safety information with anyone who has the same sincere interest.

I have been exposed for many years to reports pertaining to accident prevention and safety performance. This experience indicates to me that companies, organizations and groups who suffer large or abnormal losses in men and money have only themselves to blame. To me it indicates the lack of sound organization and, furthermore, the lack of understanding of the problem. Again it should be pointed out that safety programs will yield satisfactory results when top management takes the time to evaluate the benefits to be achieved, places the right men in the work, and spends enough money to carry out the program. There are still some engineering and construction firms who do not believe that safety can be made to pay its own way. Until this condition is rectified, we shall retain the present unfortunate status quo; namely, being wasteful of manpower, money and human resources. To improve this condition, I recommend that management immediately initiate policies which will lead to sound safety practices, thereby reducing the present tragic toll of 2,000,000 injuries a year in all industry. The prime responsibility for reducing accidents is a job first for management and second for workers. Why subject men and women to unnecessary suffering through accidents when you can and should do something about it?

I bring to your attention a very unfortunate and almost universal habit of handling safety as something separate and apart from the regular function of industry, the plant or the project. Safety is not something separate to be handled by somebody in an isolated department called the Safety Department. You know a lot of people who still believe that it is up to the Safety Department to make everybody safety-minded. A lot of people in industry still believe that guards and safeguards are to be called for by the Safety Department. They also believe that all safety meetings are to be held by the Safety Department. Some of our schools and colleges, when they teach anything on safety, have it as a separate and distinct course, and it is not integrated into other courses as it should be. Safety at all levels of organization must be integrated with the work. Alertness to safety should be everybody's responsibility every hour of every day regardless of the type of operation involved.

To be effective, safety must be integrated with each step of the job, both in the administrative strata of our commercial and industrial life as well as on the production floor or on the construction site. Safety must be part of the work!

The work can be thought of as tasks being performed by the field workers on a specific day or shift, by a whole craft or an individual.

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Integrating safety with the work, like all other safety considerations must, should, and will, wherever you find it, now, or in the future, originate at the top. Safety starts from the top down, not from the bottom upward.

Now, let us look at some phases of safety as integrated into works management, and later as to what we mean by integration of the safety with the field work.

These are examples of safety integration at the top management level on construction work:

1. Provide a simple, practical, enforceable safety clause in contracts and sub-contracts.
2. Include with the contract a letter on safety policies to be followed by the contractors.
3. Carefully screen and assign a capable safety engineer to the project as soon as construction starts.
4. Provide brief practical printed instructions from owners to contractor's field supervision at new sites as soon as job starts.
5. Design safety into new production facilities. Train your design engineers to think safety.
6. Provide for the public welfare and public safety around job sites.
7. Insist on performance rating analysis from the insurance company for insurance cost reduction as soon as you merit it.
8. Allow one-half to one per cent of labor dollars for a safety program in the job estimate. This will save both the contractor and owner money.
9. Make provision through Company policy for periodical review, inspection and reports of progress and results for top management on a regular schedule at monthly intervals.
10. Clarify, in the light of safety, policy provisions by management covering pre-employment physical examinations, welfare plans and similar indications of management's sincerity and desire to accomplish a humanitarian goal.

These are examples of safety integration at the field performance level:

1. Employ a safety engineer, safety supervisor, or inspector full time or part time as the job requires.
2. A job safety planning committee should meet once each week and distribute in writing to all foremen for practical use, specific advice on the anticipated hazards, one week in advance of the work to be performed.
3. Provide safety orientation talks for all new employees, at employment, and do it with firmness.
4. The policies to be followed by the contract engineer and his inspection Department should be well defined.

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5. Require daily S.T.A.* by all supervision and foremen.
*S.T.A. means "safety instruction for every job or task by the foreman at the site to the men or men who perform the work."
6. Discuss and control safety as part of all work and not something apart from the work.
7. Require weekly orderliness inspections of all areas, monthly inspections of all equipment and the provision of time and material to shore up, barricade, handrail and plan the placement of all materials and equipment for safe environmental conditions. These must be controlled from day to day on a practical basis.
8. The execution of any and every block of work should be planned specifically with safety in mind. For example, if part of the general project is the construction of a pumping station or a power house, then the plans for the erection or construction of each stack should be considered a "block" of work to be planned with safe operation as a major object of the planning.
9. Planning must be carried down to the gang foreman's level so that even small chores like opening flanges of pipe lines that had carried acids or corrosives are also planned. Accidents happen at task performance level; therefore, to prescribe planning for tasks is not outside the realm of practicality.

It is not too difficult to get agreement on these prescribed principles of accident prevention.

The big trouble with safety is to get these things done day in and day out on a matter-of-fact basis with thoroughness and with regularity.

Another big part of the problem after establishment and acceptance of a safety policy is that some in supervision have eyes and use them; others look and do not see, and some too often have no imagination. Supervision in many cases is unable to see "wrong things". Almost as surely as the sun rises each morning, so surely can it be said that, when a job or task is being improperly done, there is apt to be a personal injury or damage to the work in process. When a man or a machine has been hurt or damaged, that is proof that the job or hand was being done wrong. Except for the rare commission of so "out of God" classification, if we'll be honest, we'll admit an accident is proof that the job or some part of it was being done incorrectly. Doing it wrong can stem from lack of "know-how", ignorance, laziness, unwillingness to cooperate, or following poor, wrong, or incomplete instructions.

If we will follow through with these really old principles which I am merely reviewing for you here today, we come to the conclusion I started out to demonstrate, and that is—you cannot separate "accident-free quality work," and safety; they have to be part of each other.

Unfortunately, years ago, when safety got its first and somewhat reluctant admission into our industrial plants, safety came in as a separate function, a separate department, a subject handled, if it was handled at all, strictly as a side issue, and that method, while not entirely useless, has proven itself highly inefficient so far as complete accident prevention is concerned.

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My personal experience of thirty-five years covers a wide and diversified field in the chemical industry and has proven out the value of many of these fundamental principles which I have discussed with you today.

In closing, I would like to emphasize that safety has made great progress in the past years and on a broad front, but I draw sharply to your attention that there are still new horizons to be pushed back.

1. Safety is humanitarian. It follows the laws of God and man.
2. Safety can be applied on a profitable basis.
3. Safety works from the top down and not from the bottom upward.
4. Safety should be integrated into the work for maximum effectiveness.

Finally I say to you —

5. Safety is everybody's business every day, but only through hard work will its performance be worthwhile.

In closing —

I quote for you the words of Canon Ferrer, who said —

"I am only one,
But I am one.
I cannot do everything,
But I can do something.
What I can do
I ought to do;
What I ought to do
By the Grace of God I will do."

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HOW MUCH JOB ANALYSIS?

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E. I. du Pont de Nemours & Company
National Safety Congress — 1951

am personally not aware of the scope of responsibility regarding the duties of analysis on the whole gamut of construction work on any individual project by job analysis engineers. However, in the realm of safety, or better, in the job of providing safety on any given site for any short or protracted period, considerable analysis must be made by the safety engineer principally, and by any others in the management function whose assistance, cooperation, or helpful intervention can be anticipated.

Job analysis, insofar as safety is concerned, immediately poses the problem of short-range and detail analysis, as well as long-range and broad analysis, of the following basic functions in safety engineering:

1. Administration
2. Control
3. Methods
4. Application
5. Facilities

Taking these one at a time and in the order given above makes for considerable opportunity in the field of planning as a result of being "prior analytical." For example:

1. Administration

- (a) In the analysis of administration of safety, and specifically the safety program at any characteristic site, those making the analysis should consider, among other things, the qualifications, experience and personality of those having leadership responsibility in the safety program. This analysis should consider both the Safety Department as well as the leadership in all other departments.
- (b) Prior analysis for administrative purposes should include a review of personnel assigned for safety work in terms of numbers, such as the number of people in the Safety Department, as well as the number of people part-time or full-time individually and collectively, among those making up the various safety committees for the project as a whole, as well as for the separate crafts.
- (c) Typical, also, of the analyses to be made with respect to administration are such considerations as the safety personnel's ability and experience in dealing with and handling business contacts within, as well as outside the company, on matters pertaining to formal reports, Workmen's Compensation, legal and lawyer contacts, problems related to medical services, medical and non-medical licenses, permits, building codes, etc.

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2. Control

- (a) In safety work, activities, expressions, and functions having to do with control again reflect themselves in small and temporary controls, as well as long-range and mass controls. In either case, controls, when properly analyzed, reflect a necessity for having proper, effective, and dependable records, both of a statistical nature, as well as those having to do with safety operation, compensation claims, insurance considerations, and legal considerations.
- (b) A proper analysis of controls quite obviously should include the consideration for ways and means to control the cost of the accident prevention activities, the cost of the medical service, and the cost of insurance coverage. The controls of finance vary in importance and influence all the way from buying optical equipment at 35% less than normal, up to finding ways and means to protect the job's interests when a workman's real or alleged compensation suit of \$3,000 or \$250,000 comes along.
- (c) One analyzing even by elementary job analysis principles would have to include the all important feature of coordination of policies, regulations, inter-department and inter-plant relationships, as well as these coordinative functions necessary between associated service departments on the same job, or with other plants and other projects.

3. Methods

- (a) Perhaps more obviously than would arise under the foregoing, the job analyst would be first to inquire about the specific methods of accomplishing a given job. In safety work, the broad methods are broken down into three major headings. They are:
 - (1) The examination and analysis which indicate that interest, enthusiasm, and appreciation are to be sought for and produced, where lacking. These are influenced by the application of psychological principles and actions of a nature indicated by the prior analysis of the personnel, of the entire force, of the project and its characteristics. We must analyze the environment of the force and the plant as related not only to geographical location, but also to the type of town and the nature of the people in the area. How they compare as being fit subjects for our indoctrination, based on their prior development, standard of living, attitudes, and many other influences affecting people differently from one territory to the next, must also be examined.
 - (2) Job analysis in safety work has long since recognized the obvious necessity for the application of suitable education in verbal, written, and visual forms covering all of the functions of safety engineering and to a degree compatible with the nature of the force, the nature of the operation, and the duration of the operation.
 - (3) Engineering in safety is perhaps the easiest to come to the attention of the job analyst, because, unlike the difficulty of managing and controlling people toward effectiveness, the management and the control of equipment and concrete things

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almost always take the bent of and make use of obvious engineering laws and principles.

4. Unlike the considerations given above under administration, control, and methods, the consideration of application of all of the foregoing too often escapes those who analyze the safety job. Very frequently that which accounts most for the factual accomplishment of safety where accidents would prevail is:
 - (a) The timeliness with which an action shall be taken.
 - (b) The scope desired to be covered by that action.
 - (c) Frequently the broad scope must be broken down into specific sectionalization for effective scope coverage, particularly where the existence of a kind of hazard is for a short term.
 - (d) Participation, which is all-important on the part of not only supervision, but of all individuals as well, is very closely related to application, since, to participate effectively, one must have to know not only what to apply, but how to apply it.
 - (e) In further analysis of the major functions of application comes the consideration of compliance. Plants, projects, and individuals must at all times comply with any requirements. Unto each, then, the job analyst should see the necessity for having carried out compliance to policies, rules, regulations, procedures, or laws.
5. It stands to reason that if the safety job requires a department of one, or five, or a hundred people, to head up that job, both the Safety Department, as well as the whole project, will need certain facilities or tools with which to accomplish the work. Facilities are generally of two different characters, and they are:
 - (a) Physical facilities, such as Safety Office, typewriter, orientation room, foremen's meeting hall, tool room space for equipment, etc.
 - (b) Facilities are not always concrete. The job analyst, making reasonably refined study of safety functions, can readily see the abstract, yet important, existing facility of such groups and allied functions as Service Departments, Control Departments, Fire and Patrol Departments, Medical, Compensation and Legal Departments, as well as County, State, and Federal Departments, services, and considerations.

All of the above, with detail obviously deleted, is first and foremost the job analysis function of the safety engineer about his own work. However, it seems reasonable to believe and to state, that when job analysts for a plant or a project at large understand better some or all of the basic analysis done for and about safety by the safety engineer, then he, the job analyst, can contribute to safety in great measure by reflecting this knowledge in the plans, discussions, and functions which he influences to all the other jobs or activities on the same project where safety is to be integrated.

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CONSIDERATIONS FOR THE SAFE USE OF TOOLS & EQUIPMENT IN GAINFUL EMPLOYMENT

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E. I. du Pont de Nemours & Company

Technical Advisors' Group — President's Conference — 11/1/48

The indicated scope of this subject necessitates that the discussion be restricted to applicable principles only. The principles involved and hereunder described are to be interpreted as encompassing any gainful employment irrespective of the organization size, place, or time of exposure.

The definition of tools and equipment in this report is as follows: A tool or tool equipment is an implement used in the working, moving, or transforming material by manual operation and powered by manpower, air, electricity, steam, or explosive force.

There are five principles, the timely consideration of which will allow for the safe use of tools universally. The conditions are—

1. Procurement

For purposes of this report, procurement means the act of selecting, obtaining, or making available at the place of need the tool which has been requisitioned. The purchaser, the requisition author, sectional supervisors of the operation, and safety supervision each should be coordinated into agreement obtained through a "purchase-for-safety-procedure".

- (a) The acquisition of tools or equipment must include the consideration of specific fitness for the task by design, size, and proper craft or task category. Procurement in many cases should receive the joint consideration and approvals of craft supervision, the safety supervision, and any necessary sanction of the engineer.
- (b) Procurement also involves the consideration of sufficient quantities of the right tools for the elimination of substitution.
- (c) Procurement should involve the acquisition of the most recent, improved models of the tool to have the advantage of the very latest technological improvements in the tool.

2. Distribution

Once acquired, the tool (one or many), the same kind or many different kinds, should be distributed to users in a manner reflecting an orderly process for—

- (a) Issuing the right tool for the right purpose
- (b) Issuing a tool that is in proper condition
- (c) Issuing a tool in such a manner that it will be returned where and when necessary to facilitate its redistribution for timely and maximum use

3. Control

A control of the use of tools provides for the following considerations:

- a) Having the tools where and when needed
- b) To permit inventory
- c) To permit issuing tools to authorized users
- d) To permit inspection for maintenance
- e) To prevent losses in breakage and pilferage

4. Maintenance

- a) All tools to remain safe tools and usable tools must be attended to periodically. This includes the extreme degrees of maintenance from mere coatings of oil or grease to prevent corrosion to the actual replacement of vital parts.
- b) Many tools require routine sharpening, edging, or other corrections for the purpose of maintaining their effectiveness as well as their safe operation. The considerations for maintenance include the process of testing for deficiencies or defective parts of the tool, as well as conditioning or the replacement of parts.

5. Application

- (a) Many common tools can be used with relatively little or no prior instruction to the user. On the other hand, many tools of early origin and particularly many of the modern tools, complicated and simple, require instruction for safe use at many levels of application.

CONCLUSION

Personal injuries and accidents arise out of faulty procurement, mishaps and distribution, imperfect controls, or inadequate maintenance. Hence, the conscientious and thorough management of these activities prevents personal injuries and accidents.

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COSTS AND RELATIVE CONSTANTS

AS HAVE TO DO WITH AND AS WERE EXPERIENCED
IN THE MORE BUSINESS-LIKE TYPE OF SAFETY ENGINEERING
OVER APPROXIMATELY TWO DECADES

By

J. A. DE LUCA
Construction Division Safety Supr.
E. I. du Pont de Nemours & Company

The Construction Division of the du Pont Company has pursued the integration of safety into all its field construction and administrative work to the highest known degree for over twenty years.

The work has been heavy construction of new plants for duPont's own commercial interests, as well as very great projects built in the interests of the government.

All in all, the facts to follow have been ascertained during the construction experience on over thirty-two commercial projects and over thirty small, medium, and very great projects for the government. The correlation commercial projects with regard to size means variously—6 months to 8 months to 36 months' construction duration with forces varying from 100 to 700 to 2,000 men.

Government projects have varied in size from 300 men to 2,000 men to 45,000 men. It is necessary to note that irrespective of the size or scope of the project, financially or in manpower, and irrespective of the end products on either commercial or government work, all safety engineering was done in the same way, using the same techniques with a relatively constant favorable result.

The major difference in the application of du Pont Construction Division's safety techniques project-for-project has been a matter of proportion only. One general objective from the economic standpoint has been to create understanding and appreciation of methods and techniques so that insurance carriers and insurance brokers would be influenced to insure the du Pont activities on a progressively improved "Performance Rating". The average workmen's compensation insurance rate for twelve to fifteen different construction crafts in heavy construction over an average of twenty states in the United States has during the period of 1940 through 1950 approximated \$5.25 per \$100 of payroll based on the "Manual of Rates". The du Pont Construction Division, based on performance rating discussion, prior to the conclusion of insurance contracts, has consistently procured insurance coverage where self-insurance was not permitted at \$2.00 per \$100 of payroll. This represents 2% insurance cost. In almost every case no insurance was procured from outside carriers or brokerage groups without the provision for further rate reduction below 2% when further performance was had on the same project, and further, that all insurance contracts provide retrospective considerations after service charges. We cite below two examples of the effect on insurance of proper safety management:

A project in Texas, which was a commercial project, and not self-insured by du Pont because of the laws in Texas, had a well-known carrier, who after

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considering du Pont's insistence for a performance rating, condescended to a rate of \$4.80 per \$100, which is to say that this rate represented the maximum understanding of that insurance carrier's interpretation of the possible effect of the safety engineering traditionally done by the du Pont Construction Division. When after a year and some months, the carrier, by his own experience with du Pont Construction safety engineering has been in a position to examine and understand what du Pont construction "cells" accident prevention technique, that insurance carrier volunteered a 43¢ rate in place of the \$4.80 rate.

Another example not on a commercial project but on the largest government project ever built and having to do with dates as late as January, 1952, was, in the same way as the example above, experienced a rate reduction from an original performance rating of \$2.00 per \$100 payroll to 76¢ per \$100 of payroll with an abundance of reserves held, which to our knowledge after the reserves are held sufficiently to cover limitation of the law, the rate will actually be 22¢ per \$100 of payroll.

Workmen's compensation insurance rates vary by crafts from less than \$1.00 to over \$4.00 per \$100 of payroll, that is, representing maximum and minimum under any and all conditions. Here it is practical to think about rates in terms of what the average contractor spends for insurance, with or without safety, so that averaging the rates and the contractors would probably limit the scope to \$2.50 to \$6.50 in the general construction business currently.

All of the foregoing is to imply that if accident and loss prevention should be followed as it can be, then many other contractors have the possibility of reducing that segment of their overhead cost, headed, "Insurance", anywhere below 6% to less than 1% or 2%. This particular consideration does refer to a majority of the 15,000 contractors in the United States at this time.

With all of the foregoing as historical background, as well as factual experience, and during which time in the overall several millions of dollars worth of insurance was saved, the following data therefore are provided for the information of those who should be interested.

Cost of a Reasonably Adequate Program: 1/2 of 1% of Payroll Dollars

Example #1

- (a) In 1947 one project executed 16,199,413 hours of work
- (b) At an average rate of \$1.75 per hour
- (c) The cost of a fully adequate safety program was \$164,490.

$$\begin{array}{rcl} \text{Calculation} & - (16,199,413) (\$1.75) & = \$28,348,972 \\ & \underline{164,490} & \\ & 28,348,972 & = .0058 = 1/2 \text{ of } 1\% \text{ payroll dollars} \end{array}$$

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Example #2

- (a) In 1951 one project executed 13,515,688 hours of work
- (b) At an average rate of \$2.10 per hour
- (c) The cost of a fully adequate program was \$179,363.

Calculation—(15,515,688) (\$2.10) = \$32,582,944

$\frac{179,563}{32,582,944} = .0055 = 1/2 \text{ of } 1\% \text{ payroll dollars}$

Examples (1 c) and (2 c) are solely and only but rightly made up of the following charges:

15% Safety Personnel Salaries

5% Safety Equipment (Less Employee Purchases of Shoes, Hats, and Gloves)

80% Remindern and Education Meetings—Time

It is to be noted also that 1/2 of 1% came about by supplying required Safety—not by limiting the cost first.

BASIC CALCULATION—INSURANCE COSTS—\$7,000,000 JOBS

A. Payroll Labor = \$3,500,000

Normal Insurance Cost = \$4.50 per \$100.00 Payroll (conservative)

Calculation—(35,000) x (\$4.50) = \$157,500.00

B. If safety is rigidly controlled, it is possible to earn a performance rating of \$2.00* per \$100.00 payroll.

Calculation—(35,000) x (\$2.00) = \$70,000.00

This provides a saving of \$87,500.00 over normal cost.

C. Performance ratings have been known to result in a rate of \$.40** per \$100.00 payroll.

Calculation—(35,000) x (\$.40) = \$14,000.00

This provides a saving of \$143,500.00 over normal cost.

*Based on Frequency Rate of Less Than 4.

**Based on Frequency Rate of Less Than 1.

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Cost of Injury to John Doe—Employee 7-904—Dept. K.

	Direct	Indirect
Workmen's Compensation (Award)		
Loss Right Index Finger	\$300.00	
Medical Costs	150.00	
Damage to Work in Process		\$ 865.00
Damage to Cam & Shaft, Press #17		451.97
Loss of Time of his Foreman Spent on Reports & Case Follow-up		26.73
Cost of Replacement of Operator		259.00

	Direct	Indirect
Time lost by Neighboring Workmen Between 3.45 and 4.30 on day of injury, (4 men x 3/4 hr. x \$1.20 per hour)		3.60
Loss of Production due Temporary Stoppage of four other Presses		37.68
	\$450.00	\$1,643.98

$$\frac{\$1,643.98}{\$450.00} = \$3.65 \text{ (roughly the 4 to 1)}$$

Accident Costs Per \$1,000,000.00 Construction Work

Total Cost of Project—\$1,000,000

Of Which Labor Amounts To—\$500,000

Which @ \$2.50 Hourly Rate Equals—200,000 man hours

*Accidents Normal to Construction—45/1,000,000 exp. hrs.

Accidents Normal to 200,000 Exposure Hours—9

*Source: U. S. Bureau of Labor Statistics

$$\begin{aligned} \text{Direct Cost of Each Major Injury} &= \$500.00 \text{ Medical} \\ &+ 250.00 \text{ Compensation**} \\ &= \$750.00 \end{aligned}$$

$$\text{Direct Cost of 9 Major Injuries} = 9 (\$750) = \$6,750.00$$

$$\text{Indirect Cost***} = 4 \times (\text{Direct Costs}) = 4 (\$6,750) = \$27,000.00$$

$$\text{Direct and Indirect} = \$33,750.00****$$

$$\text{Cost of Accidents Per } \$1,000,000 \text{ Construction Work} = \$33,750.00$$

**Expenditure of an organization having good safety.
(Industry average could more appropriately be used.)
Industry Average—128 days.
 $\frac{128}{7} = 18 \text{ weeks @ } \$30.00 \text{ weekly} = \$540.00$

***Source: M. S. C. and experience of the author.

****Excluded cost of injuries involving lesser severity than "lost time cases".

SOME SAFETY ENGINEERING CONSTANTS

1. An "Adequate" program 1/2 of 1% of payroll
Time, Lab. equipment, (what they will buy)
2. Direct and Indirect Losses in accident cases \$1 Direct to \$4 Indirect

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3. Savings from a proper program \$4 saved if \$1 spent (min.)
4. Personnel Requirements for directing safety 1 for every 500 employees
5. Breakdown of the unit dollar for safety cost 15% safety salaries, 5% equipment, 80 % time for educational meetings.
6. Satisfactory minor injury performance 2% per week (7) days.
Zero minor injuries for too long a time should be a matter of suspicion implying—(non-reporting).

BASIC SAFETY ENGINEERING TOOLS AND TECHNIQUES

1. $F.R. = \frac{No. L.T.A. \times 1,000,000}{exp. \text{ hours}}$
2. $S.R. = \frac{No. \text{ last days} \times 1,000,000}{exp. \text{ hours}}$
3. Frequency of reminderism Tool Box meetings (weekly)
Supervisory meetings (monthly)
Periodical (yearly)
(quarterly)
(on-the-spot)

Personal—Protective

4. Equipment coverage 98% in 90 days
(Shoes, Hats, Gloves, and Goggles)
5. Violation* Frequency Rates $V.F.R. = \frac{No. V \times 100}{force}$

Violation of plant rules as viewed on one inspection—Violation per 100 men during one "viewing"

Safety should be run like any good business should be run, in that we should know at all times—cost, performance, schedules, planning, and results.

* Violations of rules, regulations, or procedures—when followed up by looking for them during any inspection rounds or periods.

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HOW TO BREED DOLLAR BILLS WITH ADEQUATE SAFETY ENGINEERING

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E. I. du Pont de Nemours & Company

National Safety Congress — 1930

The fundamental notion of legitimately making money almost immediately presumes going into some kind of business to make the money. Safety in years gone by and somewhat to this day is rarely thought of, and best not spoken of, as a money-making activity, at least insofar as end-of-the-line workers are concerned. Safety and "making money", as will be included in this paper, will be treated on the basis of safety preventing a loss of money.

For all practical purposes, since safety is somewhat of an indirect object to the principal goal of manufacturing a product or constructing buildings or tunnels, preventing loss is the same as making money. It stands to reason that the push cart vendor who has the street side of his cart run into and broken frequently cannot make satisfactory net profit on the sale of his apples if the money he nets has to go far repairing a left wheel on his cart time-after-time. I hope we can agree, therefore, that making money as a principal objective, and preventing a loss of money, insofar as the subject of safety is concerned, really both add up to the same thing. The prior considerations and the planning which goes through the mind of any enterpriser contemplating a project, or the running of a business, always includes some very basic considerations for monetary outlay.

Running the business of safety in any organization should be looked upon in exactly the same manner as running the primary business, or any other important function of that business. Every department head has the responsibility of operating in such an economic manner as will add to the overall income, rather than to detract from it. When Safety Departments are by prior intent, run on good business principles, large economies, and therefore, large savings can accrue. This is the same as saying that safety is helping to produce a greater net result in the enterprise, which is the same as saying helping to make money.

Let us look at a number of items which if considered in their proper chronology, can lead to very important economies. These result in safety being at least a loss preventive venture, rather than a burden of cost.

1. A properly run safety organization, having been put on notice that a project is to be started or any venture is to be entered into where men, equipment, and materials are to be involved, should immediately survey their side of the problem with reference to the procurement of safety equipment, safety facilities, and safety personnel.

Economies can be effected by prior liaison with at least safety equipment manufacturers regarding type, quantity, price, and delivery of orders of equipment, such as hard hats, shoes, gloves, eye protection, and many of the items which are procured in lesser quantity. Volume discounts can be requested and frequently had, particularly if the project is unusual in size, or if there are any circumstances which will allow the safety engineer

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to be a salesman himself and influence the vendor to give his purchases whatever legitimate considerations are possible and plausible in the interest of lower costs and timely delivery.

2. Early and prompt delivery can indirectly effect costs and prevent losses by the elementary fact that the equipment will have been in use and thereby contribute its share to the basic objective of prevention of accident loss.
3. Consider the matter of the procurement of safety personnel who are to operate with the safety engineer. Too frequently, aside from the fact that many unqualified persons are selected, the rate at which these people are hired is often false economy in that sooner or later, if results are had, they will come out of the fact that qualified personnel was later substituted. Qualified personnel does not work for low wages, therefore, money can be saved by paying higher rates to qualified people in the first instance, then we not only avoid paying two sets of help, but moreover find that a few qualified people can do more and better work than a larger number of unqualified inspectors or helpers.
4. Money can be saved in terms of the general effectiveness of all "meetings" and all "time" used for meetings, if these meetings are planned regularly to hit a mark and get a result, rather than to hold them in the light of hopeful contribution to the overall atmosphere of safety.
5. Perhaps the most highly contributing item to the total of savings in properly administered safety engineering, is the detailed advance analysis, discussion, and implementation of the insurance contract beginning with such allied factors as:
 - a. insistence on performance rating.
 - b. insistence on retrospective condition clauses in the insurance contract.
 - c. insistence on the provision for scalar reduction of the premium rate on performance, on the same project, even prior to the culmination of the usual "calendar year".
 - d. Similar screening of subcontractors' insurance should be made so that "qualification" by subcontractors will in part be on their deserving consideration because of their low cost insurance. The enterpriser always pays for the insurance, no matter what kind of a subcontract may be involved in the overall agreements.
6. Even after the more economical and equitable types of insurance agreements are implemented, the Safety Department has more opportunity than has been realized in the past, to keep losses, adjustments, and compromise settlements to a minimum, with fairness and justice by the application of:
 - a. A predetermined policy and agreement with the insurance carriers of assuming a "stiff upper lip" about compromise settlements.
 - b. By requiring doctors within the organization or outside, to make "specific diagnoses" as well as "specific declarations" of other associated medical involvements.
 - c. By working closely with the Legal Department on real cases to corroborate the medical data, the absolute facts, the Legal Proxies, if any, and the whole "ball of wax" so that awards or compromise settlements, when they are not totally avoidable, are paid on the

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basis of real equity, specific conditions, specific culpability, and specific damage.

Real or alleged cases should not be settled or compromised out of convenience to the insurance company, to the Legal Department, to the doctor or some medical consultant, or even out of following the general trend of our times attributable to the present day social consciousness, or socialism, whichever exists today, to the point where equity and justice are out of balance, whether in favor of one side or the other.

- 7 The obvious savings item we have left for last because it naturally is more responsible than any other factor for savings or losses. That item is the number of accidents which accrue or could accrue versus those which we prevent or could prevent.

The foregoing paragraph infers, of course, that in the specific matter of accidents or no accidents, there is the basic problem of effectively and factually preventing the accidents.

If the frequency rate of the industry that you happen to be in is 10 or 40, then obviously you may not be judged as doing any kind of a job unless your frequency rate industry-for-industry would be something along the lines, respectively, of 2 or 5. In the writer's particular industry the frequency rate is 45. We have corrected this unhealthy condition in our company to the point where the frequency rate is less than 1 and has been held so by the application of all the philosophies in this paper and including many more.

It should go without saying that whether we be interested in safety work and its "proper results", manufacturing and some superlative result, or some superlative accomplishment in the field of finance, he or they, who achieve the most or who get the best results, will achieve new pinnacles of performance, will always work hardest, explore more, invent new techniques, and constantly maintain a philosophy and practicality of applied zeal, zeal, energy, insistence, and an attitude that the best is never good enough.

When one who is in charge of safety has basic business ability enough to separate and follow the above subjects and segments of this paper and their sustaining details in an accounting method, and with dollars to the forefront, arithmetical figures accrue which lend themselves to the simple procedures of mathematics, namely addition, subtraction, multiplication, and division.

If the safety engineer knows ordinary business methods, and if he applies these to the activity that he is representing, which is the same as saying, "if he knows safety engineering", then he can, as some of us have been able to do, produce businesslike reports of the kind that top management will lend eye and ear to. When management has this satisfaction, it will bestow the Safety Department more authority in the future, more responsibility, more budget, and possibly even more personal remuneration than may now be the case.

It stands to reason, like any other function in business, every decision or decision, every procedure, every part of a program, every purchase, every expenditure, every charge code, have in them depending on how they are handled the possibility of fruitful savings. This, of course, implies that practically every move will be made with the prior conviction that it shall be effective. If it is effective, it will very likely be efficient. When you have efficiency,

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you have profits, or least if there are no profits as such, there is very definitely a prevention of loss. In this we mean:

The lesser loss because of lesser accidents means the basic elimination of compensation cases.

2. Prevention of loss means the savings that accrue from thoroughly searched and equitably concluded compromise settlements.
3. Savings come from advanced discussion and prior agreement on justifiable reasons for performance rates on insurance premium costs.
4. Savings come from efficiently running the safety office and its personnel.
5. Savings come from the proper and sensible economic procurement of personal protective equipment and other safety equipment.
6. There are savings that can accrue due to the inspection system on plant equipment, which out of adequate safety managing alone, can be so effective as to eliminate the normal maintenance program. Savings can accrue out of the prevention of "direct costs" which are considerable, and as but not least, savings can accrue through the use of only sensible procedures, practical rules, and by a general philosophy that "people should be safety engineered" rather than only things, such as aisle markers, gear and belt guards, and the purchase of stop gap equipment. It is wrong to substitute only these, for what should be expected in the proper behaviour in people instead.

Accidents are an account of people—not an account of things. Therefore if your Safety Engineering controls the behaviour of people, singly and in groups, your losses will be less, and your "pure bred" savings dollars will be more.

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THE OTHER FIFTY PERCENT

J. A. DE LUCA, DIVISION SAFETY SUPERINTENDENT

E. I. du Pont de Nemours & Company

Annual Cost Reduction Conference — 1952

If you were to be asked why you have been brought here today, you could answer short, or you could answer long. Chances are you would answer short. Now what do I mean by answering short? In answering short I simply mean that you would very likely answer, without any improper intention—cost reduction!

If this should be your answer, no one could say you were wrong. On the other hand, let's look at what might be in my mind about a "long answer." You were brought in here to be influenced toward looking more squarely and more frequently at change. There are, and there have been, changes taking place around us during each one of our busy days, in recent years, so rapidly that it takes more than normal powers of observation to keep abreast.

At this point, some, or all of you, are probably saying to yourselves—"If he means those new Westinghouse low arc switch blades, or if he means those new Corone proof insulators"—No, I do not mean to infer that you have not kept up with the change in much technological improvement in the materials or the equipment of your trade or craft. These things have been only a small part of the overall changes.

Most of us in this room today do not remember, or were not even here to experience, all of what has transpired during each of the past fifty years. Nevertheless, if we would, as we should, review only the past fifty years, even in a general manner, we would, in doing so, have developed before us the enormity of the changes which have taken place in such a short period of time in relation to history. In only the last fifty years—as a matter of fact, in just the last twenty years—we have seen our American industrial, civic, and social life totally transformed from what was always, good or bad, a society of classes such as has always prevailed in more extremes in Europe and other countries, to a virtually classless society in the United States. In 1952, in twenty short years, a condition, good or bad, that has prevailed in the world among its peoples for centuries, has been greatly changed by virtue of the introduction of a number of tremendously forceful material, economic, and social readjustments.

I need not take up your time in this meeting to try to impress you further with the fact that since these national and international, and inter-class changes have taken place, then certainly current business methods have been influenced proportionately, which is also to say that construction engineering and management have, perhaps more than we recognize, been changed before our very eyes, without our having made a sufficient appraisal of even this change.

Since this is a 1952 meeting for the consideration of the reduction of the cost of doing work, it is hardly illogical to presume that we ought to take a good look at the things which cause the need for reducing cost. To get down to cases now how many of you have honestly made study or calculation of the many things which go to make higher costs in these days? For example,

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What is the attitude of today's electrician or electrical craftsman or electrical foreman, as compared with the same person five years ago, fifteen years ago, and thirty years ago? Is there the same self-imposed spirit of accomplishment in personal craftsmanship now, as there was then? And does this figure into the cost? If so, how much? The electrician or electrical craftsman of thirty years ago, like other tradesmen, probably walked to work or used the streetcar. Today he rides in a Plymouth or a Chrysler; his work is farther away from his home than it used to be thirty years ago. The reason it is farther away is that American industrial communications and transport are virtually all on wheels now, as compared to thirty years ago. The average worker commutes with less hardship than in former days; he has the comforts of a better home; he has television and magazines as good as anybody else can have. This you all know, but I pose the question: What effect has better living and better conditions done to attitudes that used to be referred to as "frugal", "careful", "interested", "proud workmanship"—all these things have to do with the present higher cost of work in progress as well as estimates for projected work.

Whereas your speaker realizes that none of you, or all of us together in this room, cannot change very much all of the foregoing, it is, nevertheless, my strong conviction that unless we, in our present positions, learn better to cope with the attitudes, the abilities, and the subconscious mind of all of our co-working craftsmen, we will not successfully manage effectiveness in work to its maximum degree, which would, of course, be "cost reduction".

I have no doubt that any or all of us can, with renewed vigor, as we have already seen displayed in the past, produce practical work-a-day cost reduction having to do with handling of our craft material and equipment. Some people in supervision in other steps of manufacture, like yourselves, had the problem of getting cost reduction on their equipment and material that comes under your hand finally. You, in turn, aside from handling that material again, in an economical and time-saving manner, still have the problem of influencing every hand during every hour of every electrical tradesman or craftsman that you supervise, and so does your gang foreman. Your speaker realizes that it is not a natural attitude of tradesmen or supervision in crafts to suddenly become expert human analysts and psychological experts. Nevertheless, each leadership spot in the electrical crafts must recognize this responsibility in the face of all the economic and sociological changes in the past twenty years. He has more problems than phasing out circuits or stringing our transmission.

In summary, I desire, as one of your speakers at this meeting, to leave you with a crystal clear understanding that your cost reduction opportunities are only 50% on the material and equipment side of your work-a-day life, and that it is almost the extreme of fecklessness not to recognize, or not even to attempt to analyze and apply some of your own proper influence toward the human side of cost reduction possibilities.

Some, if not all of you, may at this juncture wonder why I haven't said one single word about "safety", since I am the Safety Superintendent. I have purposely deleted the word "safety" to this point, in that if we see, do, and get effective human behavior like I have been talking about for the past several minutes, safety will be there, whether you think of it as such or not—because you always get safety when you get true effectiveness.

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SOME NEW ECONOMIC ADVANTAGES TO PROPERLY MANAGED SAFETY ENGINEERING

J. A. DE LUCA, DIVISION SAFETY SUPERINTENDENT
E. I. du Pont de Nemours & Company
Petroleum and Railroad Sections—National Safety Congress
Chicago, Illinois, October 19, 1953

Mr. Chairman and delegates to the 1953 National Safety Congress.

This makes over 200 presentations on various phases of industrial safety at these Congress meetings and at other places throughout the country in the last twelve years by me. As you might surmise, this has become very abominous. I am nevertheless, happy to have still another occasion in which the benefits of our experiences can be reviewed for the benefit of others interested. You can tell from your program that I am not going to speak about safety equipment, participation, the hazards of contact dermatitis, statistics concerned with minor injuries, or any other of the "X" number of possible subjects at a Safety Congress. I am going to try to stick to the chosen subject, and that is, the function of operating major techniques having to do with money. Large sums of money can, or have been wasted by omission or failure to sufficiently regard the possibilities of methods which will provide more monetary savings than many of us have heretofore conceived or factually acted upon to produce. I am assuming, and I hope correctly, that the lofty elevation from which we approach discussion of "New Economic Advantages" allows us here to take for granted that a well established, sensible and sufficient safety program does exist, where you are concerned, to allow for the improvement here about to be recommended and described.

Subject #1 — Financial Subsidizing of Safety Equipment for Volume Coverage of Employees is Not Necessary and, Therefore, not Subscribed to by me.

Such personal protective equipment as safety shoes, hard hats, and gloves, in particular, need never be subsidized since ways and means have been found in the process of indoctrination of new employees to cause them willingly to spend, each on his own, approximately \$16.00 for this equipment. Your speaker has, in the past decade, seen the acceptance of this procurement system to the extent of 3 million dollars worth of safety shoes, 2-1/2 million dollars worth of hard hats, and in the neighborhood of \$1,800,000 worth of gloves. That which is needed to support the policy of non-subsidy is, briefly, as follows:

- A. The equipment in question must be of the highest quality; it must be selected for technical characteristics suitable to the trade, craft or operation; it must be conveniently on hand at the time when operation begins, and thereafter.
- B. It must be sold at cost with the only additives being probable state taxes, freight in, or both. There must be Company policy, rules and regulations, the nature of which will automatically, and subtly call for the requirement of this equipment. Last, but not least, there

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must be an intelligent understanding by supervision of their responsibility in persuading, selling, or in whatever diplomatic manner possible, make it their responsibility to not only get, but keep, the coverage to the maximum at all times. The workmen, themselves, are to be caused to appreciate the advantage of sanitation in private ownership and the wholesomeness of individual proprietary interest. How to buy this equipment, when to buy it, from whom to buy it, how to keep inventory, the establishment of order points, are all important; but at the same time are no greater a burden, nor are these requirements unlike the proper "in-industry" control of any stocks of stores' materials. The only possible exception of non-subsidy on personal protective equipment is the condition where, because of the manufacturing process, a particular item of personal equipment is consumed rapidly, unduly or in extremely short periods of time by corrosives to which employees are exposed, and for which condition they cannot be held responsible. In construction operations, such is not the problem. In manufacturing plants, this could be a problem, except that even in some operating plants which have come to my attention, subsidizing the cost of personal protective equipment has been done more because it is the easy way out for the safety engineer and supervision, rather than because of the nature of the manufacturing process or other conditions. We'll take our leave now of subject "Subsidy" and take up compensation.

Subject #2 — The "Suff Upper Up" Policy as Regards Compensation in Compensation Settlements.

I am happily associated with a Company of long and honorable standing whose integrity is well known. Therefore, like the old cry of our colonial ancestors, "no taxes without representation", we operate by the policy that when an injured workman has *se* due him, we will spend \$1,000, if necessary, to see that he gets it. On the other hand, we would spend \$10,000 to make sure that a false claim is not honored. This policy, as you might surmise, has, and does, sooner or later, irritate or complicate the former mode of operandi of a number of parties involved. Your insurance adjuster will become involved, yours and the attorneys for the petitioner will be involved; medical men can be involved; and the State Compensation Commission or Commissioner, may be involved. It has been my observation that in too many companies, insufficient attention has been paid by too few groups as to how this part of the employers' or the stockholders' money is spent; and what is more, the tendency seems to be growing rapidly in the wrong direction. Am I wrong in asking you, the audience, these questions?

- A. Has every claim you have ever heard of, or personally dealt with, been handled strictly on what you would call an equitable basis?
- B. Have you ever heard of a charge of "gross negligence" where, in fact, there was none on the part of the employer?
- C. Have you ever experienced or known about any form of indifference or inaction implying inconvenience to would-be or could-be legal representatives for the defendant employer or for the other side?
- D. Have you ever known of cases which, after sufficient investigation, and I wish to emphasize the word "sufficient", have shown settlement cases to have been entirely out of line in one direction or another?

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"This I know, and this I propose—I propose that you review whose money the insurance carrier uses when the carrier adjusts a claim. If you conclude as you should, that he has been using the insured's money, then it is reasonable that the insured should have more voice than has been experienced in the past as to how those monies are used, case for case. I do not wish to give the impression that carriers of Workmen's Liability Compensation do not know their business; nor do I wish to give the impression that they are without a sense of responsibility in the equitable handling of the funds set aside for compensation indemnity. What I do take issue with, in reference to any employer's representative, as well as some segments of his insurance carrier's representatives, is that on too frequent occasion, compromise in settlements evolve which are admittedly entered into as a matter of convenience or on the assumed hypothesis that "if we don't compromise, the ultimate cost will be greater unconditionally." I wish, therefore, to state that if a few more cases are contested with a few more dollars and a few more briefs preceded with a few more intensive investigations of the cases to back this up, and should this be done early in the establishment of a new site, the word will get around to selfish interests that this outfit can't be "taken." A considerable amount of discouragement is properly enacted which very definitely, even in these times, cuts down dishonest, irregular or inflated claims consciousness and false claims opportunity.

In summarizing this point, I wish to reiterate that these comments have nothing whatsoever to do with valid payments for valid employment incurred injuries where strict honesty and energy prevail on both sides of the question. Exit compensation—enter insurance.

Subject #3 — Retrospective, Comprehensive, Performance-Rated Insurance Operation.

Observation and experience has it that, even in this enlightened age, too many industrial employers do not pay sufficient and timely attention to the nature of the insurance coverage agreements, and that which it may vs. what it could cost them if more timely attention were paid to details and fluctuating circumstances. In order to save some time with this point, it may be sufficient to make the following statements:

- A. Retrospective insurance rate agreements can be had but must be sought after and, in many cases, must be pressed for even to the point of changing carriers, if necessary or advisable.
- B. Performance-rating can be had, and sooner than has been the experience of many in the past, if you have the performance and if you ask for it and not wait for it to be volunteered.
- C. Comprehensive unit classification rates can be had in more cases than may be generally known if they are insisted upon.

In this subject, the condition naturally holds that an employer is in no position to insure or demand considerations from his carrier in any of these phases of insurance unless he has led the pure, clean and progressive safety life of a progressive employer whose safety policy, conscience, and results are obviously matters of clear cut record and outstanding quality. So much for insurance.

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Subject #4 — Spending Money for Safety — Determinable Limits.

Twelve years of experience on no less than 75 small, average size, and multi-million dollar projects, universally indicate that one can afford to spend for safety an amount equal to the reduction in insurance rate due to good performance experience. After that, safety expenditure can increase in direct proportion to the continuing reduction in insurance premium cost; for example, if the normal cost of insurance for a going operation was, at one time, 4% of payroll dollars, and should conscientious accident prevention functions allow for a 1% reduction in insurance premium rate, then that 1% can be budgeted and should be budgeted in the allowable expenditures for accident prevention. It is illogical not to anticipate the next immediate question, and that, of course, would be, what funds are required to initiate this progression of affairs in order to make one's organization eligible for performance rating. This question can be answered as follows: In no case, during the 12 years experience above-referred to, was it ever necessary to spend more than one-half of 1% of payroll dollars to get very reasonable accident prevention performance started. In summarizing this subject, your speaker takes the stand that it is practically possible to convert 25% to 50% of the now existing insurance expenditures to accident prevention expenditures with adequate and timely management of the functions described in the insurance section of this paper as effecting the conditions determining the limits or allowances for the maximum safety budget. Now let us look at one aspect of "supply".

Subject #5 — Centralization of Equipment Procurement, Educational Material Procurement and their Dispersment.

It seems into, at this point, to advocate for safety work the advantages of centralization and coordination in a multi-plant operation. The benefits of centralization are well known considerations in the management of large companies. Centralization of the above-named functions, and so far as safety work generally is concerned, leads considerably to economy in purchases, control of specifications, reduced operating inventory, standardization of equipment and methods, and provides a source of directive control which is absolutely indispensable where unified common objectives calling for a maximum effectiveness are assumed or required. De-centralization has its place in many management activities, even in some safety functions; but it is not advisable in the subject which this paragraph concludes. Now I will take up—

Subject #6 — Economy in the use of Safety Personnel—Direct and Indirect Effect.

In days gone by, where full-fledged safety had been placed in operation, particularly on larger plants and larger construction operations, it was not uncommon to have a head of safety and four, six, eight, ten or more safety inspectors, or otherwise miscellaneous employees, in a safety department. This form of use of personnel and organization has been found highly inefficient from the standpoint of both direct cost as well as the more important consideration of influencing a result. The change we have made is, first of all, to have eliminated both the title and the office of inspector. The title "inspector" in safety work is psychologically objectionable. In the second place, and perhaps of greater consequence than the eradication of "inspector", is the primary use of all levels of supervision in the place of inspectors. This, as one can easily

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ree, is the way safety should have always been set up, since safety is supervision's job, and we have always been wrong when we hire extra people to do part of supervision's job for them, with consequent lessened effectiveness. The establishment and placement of one or more inspectors is the easy road for management and the safety director. The hard, but better road is the road that should have always existed, and that is, to get safety integrated into the work through, and by, each echelon of supervisory level at the time and at the place where the work and the exposure to accidents may take place.

SUMMARY

It would not surprise me very much if the subjects so limitedly covered in this presentation are, in a number of details, not clear to some of our listeners. If this is so, two things are indicated which were anticipated before setting down this material. One is, that some of the listeners may not be associated with, as yet, what are considered the better, the more complete and the more thorough, safety policies and programs. The only other possible excuse for misunderstanding is that your speaker failed to make these relatively intricate subjects clear. If the latter is true, we will proceed by inviting you to ask questions from the floor so that we may have the opportunity to further clarify these subjects and satisfy you.

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MENTAL DISTRACTIONS

R. K. Mason, District Superintendent
E. J. du Pont de Nemours & Co.
Du Pont Section, National Safety Congress

OCTOBER 21, 1957

Back in July, 1955, a milestone was reached in the Safety Program of the Construction Division of the Engineering Department. At the Project Manager's Conference that month a decision was reached which I believe, in time, will have far-reaching effects in the entire field of safety.

This decision was to set in motion a comprehensive attack on the hazards created by the occasional mental and emotional disturbances of workers.

The plan was a trouble-shooting operation in the field of human relations applied to safety. In essence, it was an attempt to get foremen and supervisors to keep their eyes peeled and their ears to the ground for such potential accident makers as developing illness, hangovers, family rows, financial trouble and plain and fancy jitter of all kinds.

Up to that time, mental distraction was an intangible factor sometimes revealed in accident investigations, but more often overlooked. While an employee's pre-occupation with vexing personal dilemmas was recognized as the cause of some accidents, it received no formalized attention.

The decision to take a positive approach to these problems grew out of a realization at the conference that if continued progress was to be made toward perfection, the neglected and little-understood field of mental deficiencies would have to be studied. What was needed, it was agreed, was some light on the problem of how these changing mental attitudes of employees affected their day-to-day safety awareness and general efficiency.

It was agreed that we had much to learn in this field, but that it held out the best prospects for safety performance improvement.

Our Safety Department undertook careful analysis of this many-sided problem and in January, 1956, they inaugurated the Mental Distractions Program, the operation of which I shall do my best to describe.

First, a list of one-word descriptions of typical mental distractions was made up. The words in this list—which became known as the "Big Words"—were made the subjects for discussions through the line organization each month. They portrayed the distracted employee, pre-occupied by anger, worry, lack of confidence, sickness and the many other personal troubles that from time to time plague us all.

These "Big Words" became terminal points from which both discussion and practical applications could spring. They covered what was considered the most fruitful avenues for safety improvements. A few of the words chosen were: confused, temperament, pre-occupied, angered, worried, hurried and inattentive. You will notice that each describes an employee who has his mind on something other than his job.

In practice, this phase of the program worked like this: each month the Division Safety Office took one of these words, explored its various applications

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in the field of mental deficiencies, and printed this material on cards. These cards were then distributed to all sites in sufficient quantities to permit distribution to all supervision.

Then, beginning with the Field Project Manager and continuing through the line organization to all foremen, and from them to the men, discussions on the subject matter of these cards were held. Thus, everyone from the top down became familiar with the "Big Word" of the month and its possible application to himself or his fellow workers.

Believe me—moul-searching became the order of the day!

The second phase of the program urged foremen to exercise good judgment in the placement of employees in tasks which were in keeping with their mental attitude of the moment. This was direct application of the "Big Word" to individual cases.

Based on the assumption that each man's state of mind is not the same every day, it reminded the foremen and supervisors that events occur or situations arise off the job which often profoundly disturb even the most well-balanced member of his crew. And it pointed out that a man in a mentally-disturbed condition (no matter what its cause) is a hazard to himself and to those with whom he works.

The program pointed out to the foremen that violent emotional disturbances impair any man's ability to concentrate, and often cause him to be careless or even reckless. But at the same time it emphasized that many less-serious troubles are enough to disturb the emotional equilibrium of some people. It was in this realm that the foremen were called upon to exercise special vigilance.

This part of the program embraced the physical aspects as well as the mental. For instance, a man who has just returned to work after hospitalization usually is not up to par physically, and it is common sense to assign him to light duty until his strength returns.

But this example should have been obvious to any foreman or supervisor. It was the more subtle type mental or physical deficiency which the program aimed to uncover. And during the course of the program's brief existence, I am happy to say many such deficiencies were spotted and direct remedial action taken.

So, to summarize—This second phase of the program concerned itself with seeking out the man with a problem on his mind, finding out what that problem was, and helping the man find a solution if possible; then, pending this solution, to assign him to a type of work in which he would be less likely to injure himself or others.

The third phase of the program, appropriately called "Operation Must", took the philosophy behind the screening and placement phases, fused it with existing safety procedures and gave it day-to-day urgency.

It specified that every foreman and supervisor should carefully look over each man in his gang each morning to see if he looks fit and ready for work. Then it directed the foreman to fit the gang member to the task which physically, mentally, and emotionally matched the man. Past experience and record of reliability were also to be taken into account.

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And, finally, it specified that each man should be given specific and adequate safety instructions for each task in accordance with existing procedures.

The program suggested to the foreman and supervisors that one method for discovering the man with a special mental or physical condition consisted in checking with the man to discover the "true" reason for absenteeism first thing in the morning on the day of the employee's return from absence.

Now to give you a better idea of how the program operates, I am going to read to you verbatim, some typical reports turned in by foremen at various sites.

"My best job placement function this week," this foreman reports, "was with one employee who was assigned to work with another employee in a building. The first employee's wife had had an operation before he started work here. He said that she would never be well again. He has five children, for whom he has to cook breakfast and prepare for school before he comes to work. And, he has to take care of them and do the housework at night. He also has to take care of his wife, because he cannot afford to hire help. He said he didn't know how he will ever get his medical bills paid." "I assigned him," the foreman continues, "to work with another employee who also has a large family because I felt he would be better able to understand the first employee's problem and would take more interest in trying to help him. The first employee is working hard and seems more cheerful than he was."

Here's another:

"My best job placement function this week was with one employee who was assigned to hauling backfill to the new parking lot. I noticed he was driving his truck too fast and was not stopping at stop signs. I stopped him and talked to him about it. A short time later I noticed he failed to stop at the stop sign before driving on the highway. When I tried to talk to him about it he said not to bother him, that nobody cared about him. Realizing that something was wrong, I explained that I was only trying to help him and if something was worrying him, I would like to know about it, and that the company would also be interested because they would like to help him too. He told me his wife had TB and had just had one lung removed and was given a 50-50 chance to live. He said they have three children, and that he washes and irons and works when he got home at night. He showed me a letter from an attorney for the hospital which was after him for the \$1,200 hospital bill. He said he had explained his financial condition to the hospital but it didn't do any good. The man was so upset, I immediately reported it to the craft superintendent and safety engineer. They called him in and discussed his problem with him and helped him to get his problem straightened out. He called me at home twice afterwards and told me how much he appreciated our help."

The Field Project Manager sent a note along with this one, explaining that the man was encouraged to talk to an attorney—a friend of the family—and ask the attorney to explain the situation to the hospital and help make arrangements for the bill to be paid in a manner satisfactory to all parties.

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Here's another:

"This involved a man who was assigned to light duty because his foreman was aware of the fact that he had participated in rescue work the night be-

fore when a tornado had struck his home town. He had reported to work the morning following the big storm and was tired, nervous and emotionally upset. The foreman moved him from his regular duty (on nightline work) until he had calmed down and was able to give his full attention to his regular job. This action undoubtedly saved the man from injuring or even killing himself."

There's another case in which a craftsman was hired to perform work on still columns. When the man reported for work, his foreman noticed that he seemed sick and distracted. He assigned him to work in the shop where he would not be exposed to the hazards of high work and where he could be kept under close scrutiny. A few days later, this man collapsed while working from the shop, suffering bruises and cuts about the head. Had the foreman in this case been less perceptive, this man's black-out undoubtedly would have had fatal results.

I think the foreman in each of these cases learned one thing, if nothing else — that kindness and consideration are like a rubber ball. They always bounce back to you. And I would say the program had succeeded if it did nothing but make us all realize that every man has his problems, and that sometimes problems are serious enough to warrant our extending a helping hand and a sympathetic ear.

What has been our experience with the program? Does it work? Before I answer these questions, let me say that in any preventative program like this, it takes time for experience to accumulate, but I feel that sufficient time has now elapsed to evaluate it in terms of accomplishments to date and expectations for the future.

The program has given us all an awareness of the symptoms of mental distractions and we have made a good start on the problem of how best to handle them.

It has given us dramatic proof that accidents are caused by people and that the study of people is the key to improved safety.

It has demonstrated to us that management vitally interested in protecting human life, in avoiding human suffering and in saving money, must consider each man as an individual if anything approaching perfection in safety performance is to be realized. And I think this program has brought home to us that there is a continuing need for day-by-day scrutiny of each man and how he fits his job assignment.

Statistically, we can detect a definite trend to the better side of the curve. Taking all factors into account, already we can see improvement which we can attribute to this program. As a matter of fact, I believe this program has finally achieved a real breakthrough of the safety performance improvement barrier.

A recent innovation in the over-all program is the circulation throughout the Division of reports of "near-miss" accidents occurring on the sites, immediately after they happen. These reports contain a description of the "accident", pertinent discoveries, and recommendations. They have been serving a very real purpose in making all of us aware of accident possibilities through vivid pictures of actual experience.

The physical side of our safety program has been with us a long time. We have had a lot of time to develop it to its present state of high effectiveness. It

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and will remain to be the basis for our basic safety effort. But we realized that in this alone, we were approaching the point of diminishing returns. We could no longer expect sweeping performance improvements by the mass action characteristic of the physical program alone.

Our realization that further improvement in safety performance must stem from consideration of each and every man and woman in the organization as an individual, with individual problems was the key to the door of safety perfection.

We are learning that we had only to turn the key in the lock to get that door open. As I see it, we now have one foot in the door, and from here on it will be mainly a matter of pushing hard to open this door to opportunity—the opportunity to completely eliminate accidents from all of our activities.

To enable this program to reach its ultimate goals, I believe we must do a number of things.

First, I believe, it should be extended into all divisions of the Company.

Secondly, I believe, those of us who have had pioneering experience with the program should exert ourselves a little harder.

How? By setting an example for others by being genuinely interested in the welfare of our people, both on the job and off.

By having the kind of positive attitude that "rubs off" on others.

By seizing on these opportunities to demonstrate our faith in the program and its objectives.

This means taking time to help others when help is needed.

This means curbing our own tendencies to be "pre-occupied" with our own problems.

This means realizing that the other fellow's troubles—which may seem small to us—are large to him.

This means understanding that comparison of our own problems with those of a man further down the ladder is no consolation to the man in trouble.

Then, I believe, foremen and supervisors must be encouraged to be more interested in and sympathetic to their men's troubles. This does not mean that they should keep on hand a large supply of crying towels. What it does mean is that they should interest themselves enough in their men to know their backgrounds, know their attitudes, prejudices, hopes, fears and aspirations. By knowing their men they will be able to spot unusual spots of nervousness, absent-mindedness, grouchiness or other indications that spell trouble. And, I believe, foremen and supervisors must be encouraged to use their natural insight and intuition. They must be continually alerted to the fact that some men are slow, others fast, still others fargerfu, others woolgatherers and daydreamers, still others warriors. They must be educated to the fact that it isn't only limited intelligence, personal tragedy, youthful exuberance, or financial worries that can lower a man's defense against accidents. It can also be a physical condition, such as failing eyesight, poor hearing, or even the run-down feeling which accompanies a bad cold.

We must all see that Johnny Jones, the carpenter, who is able, alert and reliable, sometimes has spells of absent-mindedness. We must remember else he is a husband and a father of three of the cutest kids you ever saw.

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and—if one of the children is ill—he is not "himself" on the job. He seems to be uncooperative, grouchy, and pre-occupied. This is the Johnny with whom we must work and live and make human allowances for.

Now I think we must all come to the realization that what we are calling on our foremen to do is a large order for most of them. I know it would be for me. So we must be ready always to assist them with a difficult situation, to see our minds and hearts open, and to approach each problem as unique in itself, requiring a unique solution.

Finally, the men themselves must be encouraged to look on their supervisor or foreman as a friend, a man to whom they can talk. They must be made to feel that we are all genuinely interested in their welfare and the welfare of their families.

To sum up, I believe, our experience with the mental distraction program shows that the road to safety is a two-way street. The street is still under construction, but in time, traffic will flow smoothly in both directions.

When each employee with a personal problem knows he can get sympathetic understanding of his troubles from his foreman or supervisor, we shall have cleared away one of the major obstacles on the road to safety perfection. I most heartily recommend the extension of the program to all Divisions of the Company.

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SAFETY IN PLANT CONSTRUCTION

J. A. De Luca, Division Safety Superintendent
E. I. de Pont de Nemours & Co., Inc.
Safety Symposium, American Chemical Society
Chicago, Ill., September 8, 1958

NOTE: All figures, statistics, costs, percentages, factual statements, and philosophical or abstract statements are precisely and intentionally reflective of experience involving the Construction of 180 major projects, 2,000,000 man in 38 states and 650,000,000 exposure hours.

Safety, from definitions, connotes a state of being, wherein no significant distasteful conditions abound or, where no surprise physical pain is induced, or secondarily, where no disadvantageous or regrettable property loss is experienced. (Here "property" includes—facilities, assets, and money.)

Plant means land, structures, equipment, power, apparatus, tools and raw products for conversion, including apparatus and vehicles for movement and transportation of same.

Construction means to assemble, cut, fit, join, excavate, erect, place, cover, test, pour, paint and polish what a man said "it would take to produce, for a consumer market, 40,000 tons annually".

Obviously, if there is to be construction, there must be a constructor. This constructor, is not just "a contractor". It is plus or minus 500 men (fragile human beings) screened into 15 grades or classes of craft experience or tradesmanship. Each man ranges in attitude, age, health, stability and ability in almost daily variation according to that which is defined as "human nature".

Now—mix what was defined above as "plant" into what was defined as "construction", pour in random volumes of what was defined as the "fragile human beings", add various measurements of weather conditions, dilute this compound lightly with "geographic eccentricities" according to the segment of the nation where you want this plant, then stir or agitate the whole mass for twelve to eighteen months.

When you are through, you will very likely have one or two possible results. They are:

1. An \$8,000,000 plant "fairly close" to specification, except for: (a) 2% to 28% overrun on the cost; as many as 30 accidents per million hours of construction, (500 men in a year and a half would work 1,500,000 hours) or 45 compensable accidents which (at \$1,300 each) = \$58,500 direct loss;
(b) one fatality for each two million exposure hours;
(c) broken or damaged enterprisers' equipment and/or contractors' equipment averaging \$6,000 in this example;
(d) Several months delay in schedule; always a companion ailment to general inefficiency on any construction bearing the telltale pocket marks of accidents. These are invariably the costly product of "little discipline" and "no morale".

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2. Or on the other hand, you may have \$8,000,000 of quality construction with no men hurt, no equipment losses and a 1/2% to 2% underrun—with operation to start one to two months ahead of schedule. This in turn puts capital investment to work actually or potentially to make an extra 60 day profit.

The conditions recited above are not at all hypothetical either where the outcome was favorable or where it was unfavorable. The big issue, still too rarely understood, is that; where we have "adequate" coordinative construction leadership we have order, discipline and consequent morale. Where we have discipline and morale, we have the only "soil" in which a sincere and practical safety program (so-called) can flourish fruitfully. The bracketed (so-called) is inserted above and is thereby emphasized out of the author's dismay-disgust with the glib reference to "programs" made in industry no matter how infantile or ridiculous or insufficient they may be.

Once the "fertile soil" has been provided, then a chronological order of functions officially and seriously assigned to supervision should be set in motion. This begins any good safety program. There is no safety program without official assignment of specific functions to supervision. These must be executed on time by supervision.

One must not be misled by the apparent time required, or involvement of the above specified conditions and functions in that; 30-to-60 days is the proven shape-up time for all safety on a construction job. What follows the 30-60 day start-up or "blast-off" then becomes a matter of maintaining momentum and building quality and solidarity in the face of mounting forces, mounting heights, mounting structures and expanding areas.

If recognition of the salient managerial factors and conditions in the foregoing is had then one can approach accident prevention down into the rank by:

- (a) "progressive delineation" of functional requirements down the echelon of the organization, and
- (b) maintain a system of "high frequency reminderism" (manufactured safety consciousness) on individual crafts and all individual persons.

Some examples of "progressive delineation" of required functions beginning at the weekly construction management staff meetings are:

1. Weekly field safety inspection for on-the-spot hazard correction.
2. Notification to all involved forces that new electrical service lines and substations are to be energized, or tagged out, subject to the nature of the anticipated exposures.
3. Declarations of satisfaction or dissatisfaction with arrangement, orderliness of materials, fire hazards, excavations to be opened and barricaded and the like.
4. Integration of specific area or building or process safety requirements in the written job plans and schedules.
5. Sound monthly preventative-maintenance type construction equipment inspections.
6. Etc.

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Some examples of maintaining a "high frequency of practical reminderism" on the individual include:

1. Daily "S.T.A."—a field contraction for (Safety Task Assignment), a policy requiring each foreman to give to each man or crew—the specific safety rules, requirements, caution, or admonition relative to that man's or that crew's currently assigned task. Foremen must be held to this requirement rigidly to the sufferance of some disciplinary action or it (S.T.A.) will not prevail dependably. S.T.A. may take one minute, 10 minutes or an hour, subject to the nature of the task and the size of the crew.
2. Weekly (15 minutes) Gang Meetings—(Mondays, after weekends, and not any other day for psychological reasons) where the foremen talk to their men on preplanned topics partially programmed by the Safety Engineer.
3. Personal protective equipment coverage, i.e. (safety shoes, hard hats and gloves.) After providing them on the site, they are dispersed by individual self-acquisition prompted regularly by immediate supervision.
4. Posting of job signs, warning devices and the installation of fail-safe fixtures.
5. Etc.

A well run construction operation will have about 10 to 50 formal safety policy procedures of a repetitive nature, two to three rotating committees, weekly "Gang Meetings", quarterly Mass Meetings, incentive programs, (Covering interim periods of six to sixteen weeks) making performance competition between crafts or areas, or both.

A highly efficient safety engineer in any construction organization will interest himself adequately with insurance, Medical and Legal considerations. All of these have an important bearing on "severity", claim-cost reduction and rehabilitation of the injured. He must have good knowledge of the other professions to have the background with which to elley or contest alleged injuries, fabrications, exaggerations, and wild settlement compromises initiated by either a workman or (as occurs too often) the adjuster of the Insurance Agency. Remember the Insurance Agency uses the entrepreneur's money—there is no other source.

Construction safety performance of a type which injures none, or only one or two in 500, over an 18-month period requires that—all of supervision participate daily at his echelon level. Inclusive, they are in order:

Construction Superintendents, Asst. Construction Superintendents,
Field Superintendents, Division Engineers, Area Engineers,
Craft Superintendents and Gang Foremen.

No self-respecting construction organization will do safety work solely out of fear of legislation, dictatorial groups, or outside agencies.

Safety is a management function and should not be usurped by other groups for the sake of assuming authority, feather-bedding or any other like reason. Management has a clear cut moral and economic obligation to do work "right the first time"—that's primarily what accident prevention comes from.

Accidents, whether to equipment or to persons, are always proof that the work involved was not being done right. This is a direct reflection on super-

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Part 9
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vision or management in that, either way, we had or permitted, the wrong method to be used or assigned the wrong men. Both of these conditions are the responsibility of management to control through progressive desire to improve the capacity at each echelon of supervision, and that supervision in turn must be taught and required to select and reselect able dependable craftsmen.

Of course, none of the foregoing is easy to do. Of course, it can't be done over night. Of course, it cannot be done without opposition. Of course, the enterpriser doesn't care—he should; if he did—if just he did—his cost of construction would be at least 1% to 5% less than it is today, not to mention the 2,000 widows or the 4,000 orphans we enroll each year on account of construction accidents nationally.

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**GENERAL SAFETY EQUIPMENT
PURCHASING INFORMATION**

A. FIRE EXTINGUISHERS

1. 2½ gallon water — pressurized
2. 5 lb. dry chemical — pressurized
3. 10 lb. dry chemical — pressurized
4. 20 lb. CO₂

NOTE: Check operating plant requirement; order identical types, sizes, and make, for possible transfer later. Must bear U.L. label. Kidde and American LaFrance generally most economical.

B. TARPAULINS

Use 10 oz. vinyl laminated material called "Herculite" obtained from Webb Manufacturing Company, Fourth & Cambria Streets, Philadelphia, Pennsylvania, or "Vynal" — laminated nylon, 10 oz., 21 denier.

C. DROP CLOTHS

Use 31 oz. neoprene coated fiber glass.
Available: Aquador Plastics, Inc., Lyndhurst, N.J.

D. DANGER TAGS

Standard "Construction Division" tag complete with tie string.
Available: M&M Displays, Philadelphia, Pa.

E. DEFECTIVE TAGS

Available: M&M Displays, Philadelphia, Pa.

F. BARRICADES

Warning barricades for Construction Division use will be yellow polypropylene tape with red stripes.
Available: Southern Weaving Co., Greenville, S.C.

G. SAFETY SIGNS

General information:

1. All signs will be in keeping with Federal Regulations.

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2. All standard safety signs will be fiber glass. All signs will have holes on corners and top and bottom at vertical center, with 1" increments between centers of holes. All corners will be rounded.
3. Signs with *standard wording should be used to minimize cost of specials.*
4. Standard signs may be procured from M&M Displays, Inc., 3301 Maiden Lane, Philadelphia, Pennsylvania, at prices for which there has been an arrangement with the Construction Division based on Division quantity.

Specifications

Following is a brief description of those signs maintained in stock by M&M Displays, Inc., for the Construction Division:

No.		
C-104	10" x 14"	Wear Goggles When Operating This Machine
D-105	14" x 20"	Overhead Work
D-106	14" x 20"	Do Not Walk Under The Load
D-107	10" x 14"	Hole Cover
		No Unauthorized Removal
D-108	10" x 14"	No Smoking
B-109	9" x 20"	Asbestos Workers
B-110	9" x 20"	Boilermakers
B-111	9" x 20"	Bricklayers
B-112	9" x 20"	S.I.W.
B-113	9" x 20"	R.I.W.
B-114	9" x 20"	P.E.O.
B-115	9" x 20"	Sheet Metal
B-116	9" x 20"	Painters
B-117	9" x 20"	Millwrights
B-118	9" x 20"	Carpenters
B-119	9" x 20"	Pipe
B-120	9" x 20"	Electricians
B-123	9" x 20"	Laborers
B-124	9" x 20"	Cement Masons
N-127	7" x 10"	Full Oxygen
D-128	5" x 7"	HOT
N-129	10" x 14"	This Machine To Be Operated Only By
N-130	7" x 10"	Empty Oxygen
C-131	14" x 20"	Do Not Enter Without Eye Protection

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C 132	10" x 14"	Hearing Protection Required
D 140	14" x 20"	No Smoking Beyond This Point
V 141	7" x 10"	Empty Fuel Gas
V 142	7" x 10"	Full Fuel Gas
V 143	7" x 10"	Empty Inert Gas
V 144	7" x 10"	Full Inert Gas
C 145	7" x 10"	Safety Belts Required
C 146	14" x 20"	Construction Area - Hard Hats Required
C 147	10" x 14"	Watch Your Step (double sign with handle)
C 148	10" x 14"	Incomplete Scaffold - Do Not Use
C 157	10" x 14"	Buried Cable
C 161	14" x 20"	No Smoking On Roof
C 164	14" x 20"	DETOUR (arrow left)
C 165	14" x 20"	DETOUR (arrow right)
C 172	14" x 20"	Danger High Voltage

H TRASH, SCRAP, AND MISCELLANEOUS CONTAINERS

1. Use any appropriate receptacle and identify with labels available from M&M Displays, Inc., Philadelphia, Pa., in the following legends:

Stock No.	Lettering Size	Lettering Color	Background Color	Message
210	6"	Black	Yellow	Trash
211	5"	White	Gray	Scrap Metal
212	2"	White	Gray	Oily Rags
213	2"	White	Gray	Clean Rags
214	2"	White	Red	Gasoline
215	2"	White	Red	Thinner
216	2"	White	Red	Flammable
	1"			Solvent
217	2"	Black	Yellow	Non-Flammable
	1"			Solvent
218	2"	Black	Yellow	Kerosene
219	2"	Black	Yellow	Trash
220	2"	White	Red	Cigarette Ends
221	2"	Black	Yellow	Oil
	1"			☐ Cutting ☐ Motor
	1"			☐ Transformer ☐

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Part 1
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INSPECTION TAPE

Inspection tape may be procured from M&M Displays, 3301 Maiden Lane, Philadelphia, Pennsylvania. The tape comes in rolls of 100 feet, 1/2" wide. It will be printed in four (4) different colors with expiration date and month (see Section D, Part 43 for colors)

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PERSONAL PROTECTIVE EQUIPMENT PURCHASING INFORMATION

All purchases of personal protective equipment are to be in conformance with the following standards:

A. HEAD PROTECTION

1. Bullard Catalog #70-502 DC, Fiber Glass "Hard Boiled" cap with Dihedral suspension. Available from any Bullard distributor.
2. Apex PG-2, Belmar Safety Equipment, Inc., Barrington, New Jersey. Packed 12 to carton, F.O.B. site for 108 hats or more.

B. SAFETY SHOES

Stock, use Shoemobile, or order directly.

Select vendor on basis of quality, flexibility, and willingness to accept returned shoes at close of job without restocking charge. All shoes should be 75 rating per ANSI Z41.1.

C. SAFETY BELTS

1. General use - Latex impregnated Dacron® or nylon (type 707 filament) depending on exposure; fitted with single Dee ring and 5000# tested, drop forged hardware; dry tanned chrome leather lining; tongue type buckle. Lanyard of nylon or Dacron® rope, 1/2" diameter, maximum 8' long (6' maximum if snap is used). Miller 123N (nylon) or 123D (Dacron®) or equivalent. Size order - 25% small (32" to 40"); 50% medium (36" to 44"); 25% large (40" to 48").
2. Special purpose - Same basic specifications as above but with double Dee ring (#124N or 124D), Dee ring in front for vertical work (#6390) or harness type for tank work #102D or N.

D. GLOVES

1. O-D style RICO 444c or A/O 5X462 (short gauntlet) and RICO 555C or A/O 5X463 (long gauntlet).
2. Leather "driver" style glove - RICO #276 or equivalent.

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E. EYE PROTECTION

1. Spectacle (plano) - Style WO 60 - no sideshields
Style WO 61 - flatfold sideshield
Style WO 62 - plastic cup sideshield
Style WO 63 - wirecup sideshield
All 6.00 C - "Fitsall" bridge
46 mm eye w/4-1/2" spatula or 6-1/2" cable temple
48 mm eye w/4-3/4" spatula or 6-3/4" cable temple
Available: Wilkie Optical, Barrington, N.J.
Order in multiples of 10 pair and w/standard eye/temple ratio
and specify flesh or smoke frame.
2. Cover-all Goggle
Will-flex #1003 (Baffle vent)
Available: Wilkie Optical
3. Spectacles (prescription) - from American Optical (Use laboratory nearest to site), or Wilkie Optical.
4. Visitors' Spectacles -
Wilkie GW 69 - specify with or without sideshields.

F. HEARING PROTECTION

1. Ear Plugs
"Com-Fit" - available from Wilkie Optical.
2. Ear Muffs
Delaware Valley Safeguards
David Clark Model E-305 or equivalent.

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(Typical Form)
EMPLOYER'S FIRST REPORT OF INJURY
INDUSTRIAL ACCIDENT BOARD

STATE BLANK FOR CLIP

Location 1000

EMPLOYER'S FIRST REPORT OF INJURY
INDUSTRIAL ACCIDENT BOARD
This report is to be filed with the Industrial Accident Board within 10 days of the date of the accident. It should be filled out by the employer or the person in charge of the establishment. It should be filled out in duplicate. One copy should be filed with the Industrial Accident Board and the other copy should be kept by the employer. The report should be filled out in duplicate. One copy should be filed with the Industrial Accident Board and the other copy should be kept by the employer. The report should be filled out in duplicate. One copy should be filed with the Industrial Accident Board and the other copy should be kept by the employer.

1. Name of injured person: _____
2. Address: _____
3. Date of injury: _____
4. Time of injury: _____
5. Place of injury: _____
6. Nature of injury: _____
7. Cause of injury: _____
8. Name of employer: _____
9. Address of employer: _____
10. Date of report: _____
11. Name of person reporting: _____
12. Signature of person reporting: _____
13. Title of person reporting: _____
14. Name of witness: _____
15. Address of witness: _____
16. Date of report: _____
17. Name of person reporting: _____
18. Signature of person reporting: _____
19. Title of person reporting: _____
20. Name of witness: _____
21. Address of witness: _____
22. Date of report: _____
23. Name of person reporting: _____
24. Signature of person reporting: _____
25. Title of person reporting: _____
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27. Address of witness: _____
28. Date of report: _____
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31. Title of person reporting: _____
32. Name of witness: _____
33. Address of witness: _____
34. Date of report: _____
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93. Address of witness: _____
94. Date of report: _____
95. Name of person reporting: _____
96. Signature of person reporting: _____
97. Title of person reporting: _____
98. Name of witness: _____
99. Address of witness: _____
100. Date of report: _____

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Section N
Part 2
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MINOR INJURY REPORT

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SUB-MAJOR INJURY REPORT

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1. The first section of the report, titled "Introduction", provides a brief overview of the project and its objectives. It also mentions the scope of the study and the limitations of the data.

2. The second section, "Methodology", describes the research methods used in the study. This includes a detailed explanation of the data collection process, the sample size, and the statistical techniques employed for data analysis.

3. The third section, "Results", presents the findings of the study. It includes a series of tables and graphs that illustrate the data trends and patterns. The text accompanying these visual aids provides a detailed interpretation of the results.

4. The fourth section, "Discussion", discusses the implications of the findings and compares them with previous research. It also addresses the limitations of the study and suggests areas for future research.

5. The final section, "Conclusion", summarizes the key findings of the study and provides a final statement on the overall results.

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DU 029859

Section N
Part 4
Page 1 of 2



MAJOR INJURY REPORT

DATE OF INJURY		TIME OF INJURY		DAY OF WEEK		MONTH	
YEAR		HOUR		MINUTE		SECOND	
LOCATION OF INJURY							
NATURE OF INJURY							
CAUSE OF INJURY							
PERSONS INVOLVED							
INVESTIGATION							
REMARKS							

DUP 0912329

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DU 029860

Section N
Part 4
Page 2 of 2

1. NAME OF THE PARTY	
2. ADDRESS OF THE PARTY	
3. CITY AND STATE OF THE PARTY	
4. ZIP CODE OF THE PARTY	
5. PHONE NUMBER OF THE PARTY	
6. FAX NUMBER OF THE PARTY	
7. E-MAIL ADDRESS OF THE PARTY	
8. WEBSITE ADDRESS OF THE PARTY	
9. SOCIAL MEDIA ADDRESSES OF THE PARTY	
10. OTHER CONTACT INFORMATION OF THE PARTY	
11. DATE OF BIRTH OF THE PARTY	
12. DATE OF DEATH OF THE PARTY	
13. DATE OF MARRIAGE OF THE PARTY	
14. DATE OF DIVORCE OF THE PARTY	
15. DATE OF REENTRY OF THE PARTY	
16. DATE OF EXIT OF THE PARTY	
17. DATE OF ENTRY OF THE PARTY	
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Q-10 discharged by automatic process _____

Q-11 discharged due to error in work _____

Q-12 discharged due to work not done _____

Q-13 discharged disciplinary reason? ☐ yes ☐ no _____

If yes, specify and attach - _____

If _____, specify cause and attach the _____
See (11), (12) or (13) Cause - or reference of letter Number - 001

If _____, specify cause and attach the _____
See (14), (15) or (16) Cause - or reference of letter Number - 002

Other _____

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DU 029862

Section N
Part 6
Page 1 of 1

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FORM NO. 87 (REVISED 1-6-60)		OCCUPATIONAL HISTORY AND STATUS			
1. NAME (Last, first, middle initial) 2. DATE OF BIRTH (Month, day, year) 3. SEX (M, F) 4. RACE (A, O, N, E, I, H, J, K, L, M, P, Q, R, S, T, U, V, W, X, Y, Z) 5. SOCIAL SECURITY NUMBER (9-9-99-9999-9999) 6. GRADE (1-12) 7. SCHOOL (Name) 8. CITY (Name) 9. STATE (Name) 10. ZIP CODE (5 digits) 11. HOME PHONE (Area code and number) 12. BUSINESS PHONE (Area code and number) 13. MAILING ADDRESS (Name, street, city, state, zip) 14. MAILING PHONE (Area code and number) 15. DATE OF DEATH (Month, day, year) 16. DATE OF INTERVIEW (Month, day, year) 17. NAME OF INTERVIEWER (Last, first, middle initial) 18. TITLE OF INTERVIEWER (Name and title) 19. ORGANIZATION (Name) 20. ADDRESS (Name, street, city, state, zip) 21. PHONE (Area code and number) 22. FAX (Area code and number) 23. E-MAIL (Name and address) 24. WEBSITE (Name and address) 25. OTHER (Name and address) 26. OTHER (Name and address) 27. OTHER (Name and address) 28. OTHER (Name and address) 29. OTHER (Name and address) 30. 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DU 029863

ENGINEERING DEPARTMENT - CONSTRUCTION DIVISION
MONTHLY SAFETY & FIRE DATA LOG

Due in Division Safety Office by 5th of Month:

	MONTH & YEAR		
	DU PONT	OPPC CONTAS	OTHER CONTRC
1. TOTAL EMPLOYEES FOR MONTH	_____	_____	_____
2. DAYS WORKED THIS MONTH	_____	_____	_____
3. DAYS WORKED THIS YEAR	_____	_____	_____
4. DAYS SINCE LAST TAB INJ	_____	_____	_____
5. AVERAGE DAYS SINCE LAST TAB INJ	_____	_____	_____
6. MAJOR INJURIES THIS MONTH	_____	_____	_____
7. MAJOR INJURIES THIS YEAR	_____	_____	_____
8. DAYS LOST (TAB INJ) THIS MONTH	_____	_____	_____
9. DAYS LOST (TAB INJ) THIS YEAR	_____	_____	_____
10. SUB MAJOR INJURIES THIS MONTH	_____	_____	_____
11. SUB MAJOR INJURIES THIS YEAR	_____	_____	_____
12. F.A.C. IN RECLASS THIS MONTH	_____	_____	_____
13. MINOR INJURIES FROM OSHA 1001	_____	_____	_____
14. NON TAB INJURIES THIS MONTH	_____	_____	_____
15. NON TAB INJURIES THIS YEAR	_____	_____	_____
16. UNSTR FIRE LOSS THIS MONTH	NO _____	\$ _____	_____
17. UNSTR FIRE LOSS THIS YEAR	NO _____	\$ _____	_____
18. OSHA NCL REPORTABLE MOTOR VEH MO	NO _____	\$ _____	_____
19. OSHA NCL REPORTABLE MOTOR VEH YR	NO _____	\$ _____	_____
20. OFF THE JOB SAFETY (DU PONT ONLY)	MONTH _____	_____	_____
21. NUMBER OF EMPLOYEES	_____	_____	_____
22. TOTAL EXPOSURE HOURS	_____	_____	_____
23. NUMBER OF INCIDENTS	_____	_____	_____
24. DAYS LOST	_____	_____	_____

DATE

SAFETY SUPERVISOR

(EXPLANATIONS OVER)

DUP 0912333

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Section N
Part 7
Page 2 of 2

1. Contractor's Name Sub Major E & C Du Pont, GPC and Other Contractors
Contract Number 100-100000

Contractor's Address Employer City

2. Contractor's Name Sub Major E & C Du Pont, GPC and Other Contractors
Contract Number 100-100000

Contractor's Address Employer City

3. Contractor's Name Sub Major E & C Du Pont, GPC and Other Contractors
Contract Number 100-100000

Contractor's Address Employer City

DUP 0912334

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ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED DATE 06-18-2009 BY 60322 UCBAW/BJS

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ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED
DATE 08-09-2001 BY SP-6 BTJ/bjs

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2025 RELEASE UNDER E.O. 14176
 2025 RELEASE UNDER E.O. 14176

197 MAR 28 1972 FBI - NEW YORK

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U.S.G.P.O. FORM NO. 10-70 PREVIOUS EDITIONS ARE OBSOLETE

~~ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE~~

To : Mr. Tolson _____ **By : [Redacted]** _____

DU 029866

Section N
 Part 9
 Page 1 of 2

"SOME DAY"

Interpretation Data
 Du Post Construction

Form 810

PERSONAL DATA

No. 288 Social Security 1-100-100000
 Address Dept. of Civil ASD
 City Washington
 State D.C. ZIP 20540
 Period of Service 1958 to 1977
 Present Home Address

CLAIM OR ALLEGED INCIDENT DATA (Accession to Employee)

Incident (Date, Time, Place, or Address)
 Title of Incident Title of Day Location
 Date of Incident Date of Day
 Character of Incident Material Involved
 Character of Injury
 General Summary of Claim (Accession)

A claimant should be provided with the above information in order to be able to file a claim.

MEDICAL DATA

Immediately after occurrence a thorough medical examination of the party or related individuals should be made and the examination should be signed by both parties and the party doctor "Blue Card" or equivalent.

Date Not Done

All Data Relating to Medical

Completed Made by

The following information is to be provided to the party or related individuals in order to be able to file a claim. This information is to be provided to the party or related individuals in order to be able to file a claim.

INSTRUCTIONS OVER

DUP 0912336

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DU 029867

Person to Speculate or Consult: Name _____ Address _____

State or jurisdiction where requested, method of obtaining copy of all consultation reports as well as summary of all medical records, X-ray and laboratory tests.

Is employee hospitalized? _____ (When) _____ By Whom? _____

Name _____ (Why) _____

Is there a place of residence? _____

OTHER FOR IDENT DATA

Name _____ Address _____

At present, dependent on employee's present or future even if even not yet obtained:

Name _____ Address _____

Name _____ Address _____

Name _____ Address _____

Name _____ Address _____

Check and write: signed statements from each witness and co-worker present even though separate a know-as
or else make these useful by previous questions.

Is there any other source of information or other source of information from which the name and address of the person who is the subject of the investigation can be obtained?

Has Employee sought legal counsel? _____ Attorney's Name and Address _____

Attach original or copy of all correspondence early as it is developed.

Attach a running summary of all cumulative investigation findings made positive in the course of the investigation.

Show ALL dates on which present investigation was not
from the first day of completion to present date.

From _____ To _____

Signed _____

DUP 0912337



Section N
Part 10
Page 1 of 1

MEDICAL EVALUATION OF SUB-MAJOR INJURY

Employing Unit _____
Name Plant, Lab., Warehouse, Const., Etc.

Sub-Major Injury No. _____

Injured Employee _____

Date of Injury _____

Nature of Injury _____

For Intermediate Reports (Submitted at intervals of three months)
At the present time there is still some loss of function, or limitation of
duties, as follows:

We can expect maximum recovery by _____
Date

For Final Report (Submitted when maximum recovery achieved)

Case was dismissed from treatment and observation _____
Date

Status at Dismissal (Check one):

_____ No degree of permanent disability

_____ Cosmetic disfigurement only

_____ Some loss of use or function of injured part: _____ %

_____ Other: Specifically _____

(Signature of Company Physician) M.D.

Date _____

DUP 0912338

*Or physician authorized or recognized by the company to treat the case.

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Section N
Part 11
Page 1 of 1

CONSTRUCTION DIVISION
WORK PERMIT

INDUSTRY _____ DATE OF PERMIT _____
FACILITY NAME _____
DATE WHEN PERMIT IS ISSUED _____ TIME _____
LOCATION OF WORK TO BE DONE _____
TYPE OF WORK _____
BY WHOM _____
THE HOLDER OF THIS WORK PERMIT CERTIFIES AND IS OBLIGED TO MAINTAIN THAT THE WORK DESCRIBED ABOVE
WILL BE DONE IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE DIVISION.

FLAME PERMIT

(Certify that it is used only for welding, brazing, or other flame or heat producing work.)
DESCRIPTION OF WORK: _____
SPECIAL PRECAUTIONS TO BE TAKEN: _____
DATE WHEN PERMIT IS ISSUED _____
TIME _____
LOCATION OF WORK TO BE DONE _____

RADIATION PERMIT

(Certify that it is used only for work that is necessary and is in accordance with the rules and regulations of the Division.)
INDUSTRY WHERE PERMITTED: _____
LOCATION WHERE PERMITTED: _____
SPECIAL PRECAUTIONS TO BE TAKEN: _____
DATE WHEN PERMIT IS ISSUED _____
TIME _____
LOCATION OF WORK TO BE DONE _____

EMERGENCY INFORMATION

THE NAME, LOCATION, AND PHONE NUMBER OF THE PERSON TO BE NOTIFIED IN THE EVENT OF AN EMERGENCY: _____
FACILITY NAME, TYPE OF WORK, AND PHONE NUMBER: _____
SPECIAL PRECAUTIONS TO BE TAKEN: _____
DATE WHEN PERMIT IS ISSUED _____
TIME _____
LOCATION OF WORK TO BE DONE _____

DUP 0912339

17-70

DU 029870

MAST CRANE DAILY OPERATING CHECK OUT REPORT (Typical)

TO: SAFETY SUPERVISOR	DATE	INSPECTOR	SIGNATURE
1. PRIOR TO MOUNTING TOWER			
1. Cast off boom point		Operator	
2. Check tower tower bolts		Operator	
3. Check tower pins and lock pins		Operator	
4. Check trail cable		Operator	
5. Engage Main Switch		Operator	
6. Swing brake-hand crank		Operator	
7. Cable drums free and clear		Operator	
8. FROM CAB LEVEL			
1. M. G. set on		Operator	
2. Release boom pawl		Operator	
3. Load travel limit switch		Operator	
4. Lower boom angle stop		Operator	
5. Clearance rotation		Operator	
6. Horn		Operator	
7. Test black lead check		Operator	
CONTRACTOR SIGNATURE		CONTRACTOR SUFF. SIGNATURE	

Section N
Part 12
Page 1 of 1

DUP 0912340

DU 029871

TO: _____ (Contractor's Supt.) APPROVED: _____ PPM, APPM
FROM: _____ (Emgr.) _____ SAFETY SUPERV.

New Revised

Test

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AT _____ p31.

THE SOURCE TO SYSTEM:

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ACCEPTED MANUSCRIPT

ALL SYSTEMS MUST BE RELIEVED BEFORE LEAKS ARE REPAIRED.

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DU 029872

TANK ENTRY PERMIT

DATE ISSUED _____
EXPIRES _____ (Const. Engr. or Contractor's Sign.)
LOCATION: _____
NATURE OF WORK _____

PROTECTIVE EQUIPMENT REQUIRED

1. Safety Belt
2. Fresh Air Mask
3. Rubber Boots & Gloves
4. Chemical Goggles
5. Fire Extinguisher
6. Copious Blower or Lamb Air Mover
7. Other _____

YES

NO

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

PRECAUTIONS:

1. Lines to vessel blanked or disconnected
2. Vessel emptied & cleaned
3. Low-Volt light
4. Explosimeter Test
5. Oxygen Test
6. Switches & Valves Locked & Tagged out
7. Standby Man Outside

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

SIGNED:

STANDBY MAN: _____

MEN ENTERING VESSEL: _____

PLANT RADIATION OFFICER: _____

DUP 0912342

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DU 029873

11/11/2014 10:11 AM

12.71

DU 029874

Section N
Part 5
Page 1 of 1

CC. Safety Office
CC. Contract Engineer
CC. Plant Radiation Protection Officer

RADIOGRAPHIC REPORT

DATE _____
CONTRACTOR _____
ORDER NO _____
DB NO _____

FORCE _____
TOTAL SHOTS TAKEN _____
SOURCE USED _____
TIME IN PLANT _____
TIME OUT PLANT _____
LOCATION _____
SIZE BARRICADE _____
RADIATION CHECK BY _____
AMOUNT OF RADIATION _____
DU PONT PERSONNEL EXPOSED _____
SCHEDULED WORK COMPLETED _____
TOTAL TIME DURING WHICH RADIATION LEVEL WAS 20 MR HR OR ABOVE
AT BARRICADE _____
PERIMETER _____
NOTES _____

DUP 0912344 _____

Contractor Inspector

DU 029875

41 2104

REFERENCE FILE

LOG OF OCCUPATIONAL INJURIES AND ILLNESSES

This is the record of occupational injury and occupational illness that occurred in a log of cases (OSHA Form No. 100) which is the official record of occupational injury and occupational illness. It is a record of occupational injury and occupational illness that occurred in a log of cases (OSHA Form No. 100) which is the official record of occupational injury and occupational illness.

It is a record of occupational injury and occupational illness that occurred in a log of cases (OSHA Form No. 100) which is the official record of occupational injury and occupational illness. It is a record of occupational injury and occupational illness that occurred in a log of cases (OSHA Form No. 100) which is the official record of occupational injury and occupational illness.

It is a record of occupational injury and occupational illness that occurred in a log of cases (OSHA Form No. 100) which is the official record of occupational injury and occupational illness.

INSTRUCTIONS FOR COMPLETING LOG OF OCCUPATIONAL INJURIES AND ILLNESS (OSHA Form No. 100)

Column 1: CASE OR FILE NUMBER
The number may be entered which will facilitate recognition and recordkeeping records.

Column 2: DATE OF INJURY OR ILLNESS
The occupational incident must be the date of the work accident which occurred in injury. If occupational illness occur the date of initial diagnosis of illness, or if illness occurred while working, the first day of the absence in connection with which the case was diagnosed.

Column 3: EMPLOYEE'S NAME
Column 4: OCCUPATION
Enter the occupational title of the job to which the employee was assigned at the time of injury or illness. In the absence of a formal occupational title, enter a brief description of the duties of the employee.

Column 5: DEPARTMENT
Enter the name of the department to which employee was assigned at the time of injury or illness, whether or not employee was actually working in the department at the time. In the absence of formal department title, enter a brief description of general workplace to which employee is assigned.

Column 6: NATURE OF INJURY OR ILLNESS AND PART(S) OF BODY AFFECTED
Enter a brief description of the injury or illness and indicate by part or parts of body affected. Where parts body is affected the word "body" may be used.

Column 7: INJURY OR ILLNESS CODE
Enter the code which most accurately describes the nature of injury or illness. A list of injury codes of the extent of injury. A more complete description of injury and illness and illness codes below is "definition."

Column 8: FATALITIES
If the occupational injury or illness resulted in death, enter date of death.

Column 9: LOST WORKDAYS

Enter the number of days the employee would have worked but could not because of occupational injury or illness. The number of lost workdays should not include the day of injury. The number of days includes all days consecutive or not to each other, because of the injury or illness.

1) The employee would have worked but could not, or
2) The employee was assigned to a temporary job, or
3) The employee worked at a permanent job but was laid off, or
4) The employee worked at a permanently assigned job but could not perform all duties normally assigned to it.
For employees not having a regularly scheduled shift, or when work days are consecutive, enter the number of lost workdays. For employees not having a regularly scheduled shift, or when work days are not consecutive, enter the number of lost workdays. Estimate of lost workdays shall be based on work history of the employee and days worked by employees, not on calendar, working in the workplace and/or duration of the illness or injury.

Column 10: PERMANENT TRANSFER TO ANOTHER JOB OR TERMINATION OF EMPLOYMENT AFTER LOST WORKDAYS

Indicate here if the employee did not return to his previous employment after lost workdays.

Column 11: NONFATAL CASES WITHOUT LOST WORKDAYS

Enter a check in Column 11 for all cases of occupational injury or illness, whether or not employee lost workdays but did result in:

-Transfer to another job or termination of employment or medical treatment, other than first aid, or
-Diagnosis of occupational illness, or
-Loss of consciousness, or
-Restriction of work or motion, enter a check in Column 11.

Column 12: TRANSFER TO ANOTHER JOB OR TERMINATION OF EMPLOYMENT WITHOUT LOST WORKDAYS

If the check in Column 11 represented a transfer to another job or termination of employment, enter a check in Column 12.

INITIALING REQUIREMENT

Each line entry reporting an occupational injury or illness MUST BE INITIALED in the right hand column by the person responsible for the content of the entry. Changes in an entry also must be initialed in the affected column.

CHANGES IN EXTENT OF OR OUTCOME OF INJURY OR ILLNESS

If there is a change in an occupational injury or illness case which affects entries in Columns 6, 7, 8, 9, or 10, the first entry should be hand out and a new entry made. For example, if an injured employee at first required only medical treatment but later lost workdays, the check in Column 11 should be hand out and the number of lost workdays entered in Column 9.

In another example, if an employee with an occupational illness lost workdays, returned to work, and then one of the illness, the workdays entered in Column 9 should be hand out and the date of death entered in Column 8.
In every case a hand out if later found to be a non-occupational injury or illness.

Occupational Safety & Health Reporter

DUP 0912345

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DU 029876

REGISTRATION REQUIREMENTS
 Regulations issued under the Occupational Safety and Health Act of 1970 require all employers to submit to the OSHA the maintenance records of recordable occupational injuries and illnesses occurring on or after July 1, 1971. Such records must consist of: (1) a written chronological injury and illness log; (2) a separate record of each occupational injury and illness; and (3) an annual summary of occupational injuries and illnesses.

maintaining requirements under the Occupancy Policy and Health & Safety from your site a number of information requirements. Please note no information contained in this form is to be used as a site safety management file or record and is not

INTERNATIONAL INJURY is any injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from exposure to the work environment.

OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with his employment. It includes acute and chronic diseases or disorders which may be caused by inhalation, absorption, ingestion, or direct contact, and which can be diagnosed in the employee listed below.

The following listing gives the categories of economic literature and disorders that will be utilized for the purpose of classifying recordable illnesses. The numbering codes are those to be used in Column 7 of the log. For purposes of information, examples of each category are given. These are typical examples, however, and are not to be considered to be the complete listing of the types of illnesses and disorders that are to be recorded under each category.

- 221) **Intermediate New Species or Quasies**
 Ecological, taxonomic, evolutionary, or both caused by previous changes and changes in previous plants or other forms were partial basis of classification, etc.
- 222) **Old (before of the Leningrad Period)**
 Plants - species, sections, and other taxonomic categories, variations, variations, and other interrelationships.
- 223) **Intermediate - before the Leningrad Period**
 Ecological, taxonomic, evolutionary, or both caused by previous changes and changes in previous plants or other forms were partial basis of classification, etc.
- 224) **Intermediate - before the Leningrad Period**
 Ecological, taxonomic, evolutionary, or both caused by previous changes and changes in previous plants or other forms were partial basis of classification, etc.

1940s, 1950s and 1960s, etc.

261. Disorders Due to Physical Agents Other Than Toxic Materials:
Exposure: Heatstroke sunburn, heat exhaustion and
other effects of environmental heat; frostbite, frostnip, burns and
effects of exposure to low temperatures; electric
injury; effects of vibrating radiation ultrasound, infrared,
radio; effects of hypoxia altitude; working under
extreme pressure, hypertension, decompression, etc.
262. Disorders Due to Repeated Trauma
Exposure: Repetitive trauma leading to: strain, sprain,
contusion, and burns Repetitive trauma; phosphenia; and
other conditions due to repeated trauma, exhaustion or
fatigue
263. Other Environmental Illness
Exposure: allergic, infectious, allergic bronchitis,
asthma and other allergic and infectious respiratory illness;
allergic rhinitis and conjunctivitis, etc.

ILLNESS are any occupational injuries or illnesses which result in:

- 1- **FATALITIES** regardless of the time between the injury and death, or the words of the statute, or
- 2- **LOST WORKDAYS CASES**, either those fatalities that result in loss of earnings, or
- 3- **NONFATAL CASES WITHOUT LOST WORKDAYS**, where there is a permanent and substantial impairment of the injured employee, or a permanent loss of earnings, or a permanent loss of substantial enjoyment of work or leisure. This category also includes any diagnosed occupational illnesses which are required to be compensated but are not classified as fatalities or lost workdays cases.

Medical Treatment includes treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does NOT include first and subsequent line-of-care observation and subsequent observation of minor conditions, such as lacerations, and as such, shall not be voluntarily reported without such care being provided by a physician or registered professional personnel.

ESTABLISHMENT A single physical location where business is conducted or where services or administrative functions are performed. For example, a company, mail, work, bank, restaurant, movie theater, lawn, ranch, hotel, sales office, warehouse, or general administrative office. Where community centers are not performed at a single physical location, such as computer communications services obtained from the same physical location as a business entity, such services shall be treated as a virtual establishment.

For those engaged in activities such as agriculture, construction, transportation, communication, and health, get the latest news, which may be obtained through records that are maintained at a place in which employees must each day.

Records for personnel who do not presently report or work at a single establishment, such as traveling salesman, warehouse, temporary, etc. shall be maintained at the nearest town where they are paid or the base from which personnel would be called on their personnel.

WORK ENVIRONMENT is composed of the physical location, atmosphere, materials processed or used, and the tasks or assignments performed by an employee in the performance of his work, whether on or off the employer's premises.

FEDERAL OPERATIONAL SAFETY AND HEALTH ACT FORM NO. 101 (7-71)									
State Rep- resentative Name Address City State Zip	Social Ser- vice Num- ber	Age	Department	In Position	Have Detailed Description of Incident or Subject of Subpoena	Have Detailed Description of Injury and Illness, If Any	Have and When and Where Incident Occurred	13-15	16
Alabama									
Alaska									
Arizona									
Arkansas									
California									
Colorado									
Connecticut									
Delaware									
District of Columbia									
Florida									
Georgia									
Hawaii									
Idaho									
Illinois									
Indiana									
Iowa									
Kansas									
Kentucky									
Louisiana									
Maine									
Maryland									
Massachusetts									
Michigan									
Minnesota									
Mississippi									
Missouri									
Montana									
Nebraska									
Nevada									
New Hampshire									
New Jersey									
New Mexico									
New York									
North Carolina									
North Dakota									
Ohio									
Oklahoma									
Oregon									
Pennsylvania									
Rhode Island									
South Carolina									
South Dakota									
Tennessee									
Texas									
Utah									
Vermont									
Virginia									
Washington									
West Virginia									
Wisconsin									
Wyoming									

2 - Bureau of Workers' Compensation Files Report of Injury Form that used to be called
used to report accident or occupational injury, illness, or death. It is now called
and is known as the Federal Occupational Safety and Health Act Form 101.
Previous Editions - 7-1-71

DUP 0912347

12-71

DU 029878

RECORDING AND REPORTING

41 21

OSHA No. 131

Form approved
OMB No. 4481-453

Supplementary Record of Occupational Injuries and Illnesses

1. NAME

Name

First name

Last name

Address

2. SOCIAL SECURITY NUMBER

Number

First name

Last name

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

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Address

City

State

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Occupation

Employer

THE ACCIDENT OR EXPOSURE TO OCCUPATIONAL ILLNESS

1. Place of accident or exposure

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

State

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Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS

1. Describe the injury or illness in detail and indicate the part of body affected.

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

Address

City

State

Zip

Occupation

Employer

DUP 0912348

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DU 029879

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REFERENCE FILE

**SUPPLEMENTARY RECORD OF
OCCUPATIONAL INJURIES
AND ILLNESSES**

To supplement the Log of Occupational Injuries and Illnesses (OSHA No. 100), each establishment must maintain a record of each recordable occupational injury or illness. Workmen's compensation, insurance, or other reports are acceptable as records if they contain all facts listed below or are supplemented to do so. If no suitable report is made for other purposes, this form (OSHA No. 101) may be used or the necessary facts can be listed on separate plain sheet of paper. These records must also be available in the establishment without delay and at reasonable times for examination by representatives of the Department of Labor and the Department of Health, Education and Welfare, and States exercising jurisdiction under the Act. The records must be maintained for a period of more than two years following the end of the calendar year in which they occur.

Each entry must contain at least the following facts:

- 1) *Name the employer*—name, mail address, and location if different from mail address.
- 2) *Name the injured or ill employee*—name, social security number, home address, age, sex, occupation, and department.
- 3) *About the accident or exposure to occupational illness*—place of accident or exposure, whether it was on employer's premises, what the employee was doing when injured, and how the accident occurred.
- 4) *About the occupational injury or illness*—description of the injury or illness, including part of body affected, name of the object or substance which directly injured the employee; and date of injury or diagnosis of illness.
- 5) *Other*—name and address of physician; if hospitalized, name and address of hospital, date of report, and name and position of person preparing the report.

SEE DEFINITIONS ON THE BACK OF OSHA FORM 100.

DUP 0912349

12-71

DU 029880

RECORDING AND REPORTING

41 2108

OSHA No. 32

Form Approved
CNS No. 442 1453

Summary

Occupational Injuries and Illnesses

Establishment Name and Address

Case 1	Category 2	Frequency 3	Lost Workdays 4		Lost Workdays 5		Lost Workdays 6	
			Number of Cases 7	Number of Days Lost 8	Number of Cases 9	Number of Days Lost 10	Number of Cases 11	Number of Days Lost 12
13	Occupational Injuries							
14	Occupational Illnesses							
15	Occupational Skin Diseases or Disorders							
16	Heat stress of the lungs (pneumoconiosis)							
17	Respiratory conditions due to toxic agents							
18	Poisoning (toxic effects of toxic materials)							
19	Disorders due to physical agents (other than toxic materials)							
20	Disorders due to repeated trauma							
21	All other occupational illnesses							
22	Total—occupational illnesses (21-20)							
23	Total—occupational injuries and illnesses							

* Lost Workdays—Cases resulting in: Medical attention beyond first aid, diagnosis of occupational illness, loss of consciousness, restriction of work or motion, or transfer to another job (within the establishment).

DUP 0912350

12-71

DU 029881

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REFERENCE FILE

Summary
Occupational Injuries and Illnesses

Every employer is required to prepare a summary of the occupational injury and illness experience of the employees in each of his establishments at the end of each year within one month following the end of that year. The summary must be posted in a place accessible to the employees. The form on the reverse of this sheet is to be used.

Before preparing the summary, review the log to be sure that entries are correct and each case is included in only one of the ratings described by columns 8, 9, and 11. If an employee's loss of work days is continuing at the time the summary is being made, estimate the number of future work days he will lose and add that estimate to the work days he has already lost and include this total in the summary. No further entries need be made with respect to such cases in the next summary.

Occupational injuries and the seven categories of occupational illness are to be summarized separately. Identify each case by the code in column 7 of the log of occupational injuries and illnesses.

The summary from this log is made as follows: For occupational injuries, code 10—follow the same procedure for each of the illness categories:

Fatalities. For cases with code 10 in column 7, count the number of entries (date of death) in column 8.

Lost Workday Cases. Number of Cases. For cases with code 10 in column 7, count the number of entries in column 9.

Number of Cases Involving Transfer or Termination. For cases with code 10 in column 7, count the number of check marks in column 10.

Number of Lost Workdays. For cases with code 10 in column 7, add the entries (lost workdays) in column 9.

Transfered Cases Without Lost Workdays. Number of Cases. For cases with code 10 in column 7, count the checkmarks in column 11.

Number of Cases Involving Transfer or Termination. For cases with code 10 in column 7, count the checkmarks in column 12.

Total each column for occupational illnesses and then, on the last line for occupational injuries and illnesses combined.

Compare the sum of entries in the total line for columns 3, 6, and 7 with the total number of cases on the log. If the summary has been made correctly, they will match.

DUP 0912351

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DU 029882

Section N
Part 20
Page 1 of 3

SECTION - TELESCOPIC BOOM HYDRAULIC CRANE

EQUIPMENT NAME _____ NUMBER _____

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	REMARKS
1	Crane	1	EA	
2	Hydraulic Pump	1	EA	
3	Hydraulic Motor	1	EA	
4	Hydraulic Hose	100	FT	
5	Hydraulic Line	100	FT	
6	Hydraulic Valve	1	EA	
7	Hydraulic Filter	1	EA	
8	Hydraulic Accumulator	1	EA	
9	Hydraulic Cylinder	1	EA	
10	Hydraulic Piston	1	EA	
11	Hydraulic Rod	1	EA	
12	Hydraulic Seal	1	EA	
13	Hydraulic Gasket	1	EA	
14	Hydraulic Bolt	1	EA	
15	Hydraulic Nut	1	EA	
16	Hydraulic Washer	1	EA	
17	Hydraulic Seal Kit	1	EA	
18	Hydraulic Hose Clamp	1	EA	
19	Hydraulic Line Clamp	1	EA	
20	Hydraulic Valve Assembly	1	EA	
21	Hydraulic Filter Assembly	1	EA	
22	Hydraulic Accumulator Assembly	1	EA	
23	Hydraulic Cylinder Assembly	1	EA	
24	Hydraulic Piston Assembly	1	EA	
25	Hydraulic Rod Assembly	1	EA	
26	Hydraulic Seal Assembly	1	EA	
27	Hydraulic Gasket Assembly	1	EA	
28	Hydraulic Bolt Assembly	1	EA	
29	Hydraulic Nut Assembly	1	EA	
30	Hydraulic Washer Assembly	1	EA	
31	Hydraulic Seal Kit Assembly	1	EA	
32	Hydraulic Hose Clamp Assembly	1	EA	
33	Hydraulic Line Clamp Assembly	1	EA	
34	Hydraulic Valve Assembly	1	EA	
35	Hydraulic Filter Assembly	1	EA	
36	Hydraulic Accumulator Assembly	1	EA	
37	Hydraulic Cylinder Assembly	1	EA	
38	Hydraulic Piston Assembly	1	EA	
39	Hydraulic Rod Assembly	1	EA	
40	Hydraulic Seal Assembly	1	EA	
41	Hydraulic Gasket Assembly	1	EA	
42	Hydraulic Bolt Assembly	1	EA	
43	Hydraulic Nut Assembly	1	EA	
44	Hydraulic Washer Assembly	1	EA	
45	Hydraulic Seal Kit Assembly	1	EA	
46	Hydraulic Hose Clamp Assembly	1	EA	
47	Hydraulic Line Clamp Assembly	1	EA	
48	Hydraulic Valve Assembly	1	EA	
49	Hydraulic Filter Assembly	1	EA	
50	Hydraulic Accumulator Assembly	1	EA	
51	Hydraulic Cylinder Assembly	1	EA	
52	Hydraulic Piston Assembly	1	EA	
53	Hydraulic Rod Assembly	1	EA	
54	Hydraulic Seal Assembly	1	EA	
55	Hydraulic Gasket Assembly	1	EA	
56	Hydraulic Bolt Assembly	1	EA	
57	Hydraulic Nut Assembly	1	EA	
58	Hydraulic Washer Assembly	1	EA	
59	Hydraulic Seal Kit Assembly	1	EA	
60	Hydraulic Hose Clamp Assembly	1	EA	
61	Hydraulic Line Clamp Assembly	1	EA	
62	Hydraulic Valve Assembly	1	EA	
63	Hydraulic Filter Assembly	1	EA	
64	Hydraulic Accumulator Assembly	1	EA	
65	Hydraulic Cylinder Assembly	1	EA	
66	Hydraulic Piston Assembly	1	EA	
67	Hydraulic Rod Assembly	1	EA	
68	Hydraulic Seal Assembly	1	EA	
69	Hydraulic Gasket Assembly	1	EA	
70	Hydraulic Bolt Assembly	1	EA	
71	Hydraulic Nut Assembly	1	EA	
72	Hydraulic Washer Assembly	1	EA	
73	Hydraulic Seal Kit Assembly	1	EA	
74	Hydraulic Hose Clamp Assembly	1	EA	
75	Hydraulic Line Clamp Assembly	1	EA	
76	Hydraulic Valve Assembly	1	EA	
77	Hydraulic Filter Assembly	1	EA	
78	Hydraulic Accumulator Assembly	1	EA	
79	Hydraulic Cylinder Assembly	1	EA	
80	Hydraulic Piston Assembly	1	EA	
81	Hydraulic Rod Assembly	1	EA	
82	Hydraulic Seal Assembly	1	EA	
83	Hydraulic Gasket Assembly	1	EA	
84	Hydraulic Bolt Assembly	1	EA	
85	Hydraulic Nut Assembly	1	EA	
86	Hydraulic Washer Assembly	1	EA	
87	Hydraulic Seal Kit Assembly	1	EA	
88	Hydraulic Hose Clamp Assembly	1	EA	
89	Hydraulic Line Clamp Assembly	1	EA	
90	Hydraulic Valve Assembly	1	EA	
91	Hydraulic Filter Assembly	1	EA	
92	Hydraulic Accumulator Assembly	1	EA	
93	Hydraulic Cylinder Assembly	1	EA	
94	Hydraulic Piston Assembly	1	EA	
95	Hydraulic Rod Assembly	1	EA	
96	Hydraulic Seal Assembly	1	EA	
97	Hydraulic Gasket Assembly	1	EA	
98	Hydraulic Bolt Assembly	1	EA	
99	Hydraulic Nut Assembly	1	EA	
100	Hydraulic Washer Assembly	1	EA	

DUP 0912352

EN-3530

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DU 029883

INSPECTION - MECHANICAL CABLE CRANES

EQUIPMENT NAME		PLANT NO.	
NO.	DESCRIPTION	NO.	DESCRIPTION
1	1. Main Cable		
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100	100. Main Cable		

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INSPECTION - CONSTRUCTION EQUIPMENT

DATE: _____ TIME: _____

LOCATION: _____

EQUIPMENT		CONDITION	
ITEM	REMARKS	ITEM	REMARKS
1	Engine	1	Engine
2	Transmission	2	Transmission
3	Drive Shaft	3	Drive Shaft
4	Clutch	4	Clutch
5	Brakes	5	Brakes
6	Steering	6	Steering
7	Lighting	7	Lighting
8	Exhaust	8	Exhaust
9	Fluids	9	Fluids
10	Structural	10	Structural
11	Controls	11	Controls
12	Wheels/Tyres	12	Wheels/Tyres
13	Safety	13	Safety
14	Identification	14	Identification
15	General	15	General
16	Engine	16	Engine
17	Transmission	17	Transmission
18	Drive Shaft	18	Drive Shaft
19	Clutch	19	Clutch
20	Brakes	20	Brakes
21	Steering	21	Steering
22	Lighting	22	Lighting
23	Exhaust	23	Exhaust
24	Fluids	24	Fluids
25	Structural	25	Structural
26	Controls	26	Controls
27	Wheels/Tyres	27	Wheels/Tyres
28	Safety	28	Safety
29	Identification	29	Identification
30	General	30	General

Inspector: _____

Reviewed: _____

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