Approval	Vogtle Electric Generating Plant	Procedure No.
S Bacholdt	NUCLEAR OPERATIONS	00261-C
Date 8/30/89	Unit COMMON — Georgia Power	Revision No. 5
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FUEL OIL HANDLING AND SAFETY

1.0 PURPOSE

This procedure describes the process for receipt, sampling and accountability of fuel oil and provides handling safety precautions when transferring fuel oil from a tank truck to permanent tanks.

2.0 DEFINITIONS

NONE

3.0 RESPONSIBILITIES

3.1 MANAGER MAINTENANCE

The Manager Maintenance will ensure Maintenance personnel handling fuel oils for any purpose have been briefed in the Safety Precautions outlined in Section 4.0 of this procedure.

3.2 MANAGER OPERATIONS

The Manager Operations will ensure:

3.2.1 Operators handling fuel oil are briefed in the Safety Precautions outlined in Section 4.2 of this procedure.

3.2.2 Procedure 94001-C, "Spill Prevention, Control, Countermeasures (SPCC) And Reportability" is implemented in case of a spill.

3.2.3 Operators follow applicable operating procedures when off-loading fuel oil.

3.2.4 The Fuel Oil Monthly Inventory is performed for Auxiliary Boiler and Diesel Generator fuel, hour meter readings are recorded for the Diesel Generators, Diesel Fire Pumps, and the Security Diesel, and the report (Figure 2) properly completed.

3.2.5 The Auxiliary Boiler fuel oil consumption is limited to 4 million gallons of No. 2 fuel oil per year.

3.3 QUALITY CONTROL SUPERINTENDENT

The Quality Control (QC) Superintendent will ensure the receipt inspection of fuel oil planned for use in the emergency diesel generators.

3.4 MANAGER HEALTH PHYSICS/CHEMISTRY

The Manager Health Physics/Chemistry will ensure the following:

3.4.1 Laboratory personnel obtain samples of diesel fuel oil for analysis per Procedure 30080-C, "Diesel Fuel Chemistry Control".

3.4.2 Technical Specifications for emergency diesel generator fuel oil are met or fuel oil is rejected for this use.

3.5 NUCLEAR SECURITY MANAGER

If the fuel oil delivery is inside the Protected Area (PA) the Nuclear Security Manager will ensure the following:

3.5.1 The driver of the delivery vehicle is promptly inprocessed at the Plant Entry Security Building (PESB) in accordance with Procedure 90001-C, "Personnel Access/Search" (Safeguards) and Procedure 90005-C, "Security Badge Identification Program" (Safeguards).

3.5.2 The delivery vehicle is searched prior to entry into the Protected Area (PA) in accordance with Procedure 90015-C, "Vehicle Access" (Safeguards).

3.5.3 A Nuclear Security Officer (NSO) will escort the vehicle to the unloading point inside the PA and will observe the unloading process in accordance with Procedure 90019-C, "Warehouse Materials Access Controls" (Safeguards).

4.0 INSTRUCTIONS

4.1 RECEIPT AND SAMPLING

4.1.1 Upon arrival of the tank truck, the driver will report to the receipt warehouse.

4.1.1.1 Warehouse personnel will contact the QC Receipt Inspector and the On-Shift Operations Supervisor (OSOS) or the Shift Supervisor (SS) to determine the destination of the tank truck. If the delivery point will be inside the PA, the Supervisor Nuclear Security-Captain (SNS-CPT) will be notified.

4.1.1.2 If the tank truck destination is the auxiliary boiler, construction, security diesel, or diesel fire pumps, Warehouse personnel will release the tank truck for transfer operations.

4.1.1.3 If the tank truck destination is the emergency diesel generator's fuel oil storage tanks, the fuel oil will be sampled in accordance with subsection 4.1.2.

4.1.1.4 Security personnel will escort the tank truck to its destination. The OSOS or SS will notify the Security-Visitor Access Representative (VAR) as to who will be assigned as escort for the driver. The assigned escort will meet with the driver at the PESB. Fuel oil will be unloaded in accordance with section 4.3

4.1.2 Emergency Diesel Generator Fuel Oil

4.1.2.1 When oil for the emergency generators arrives on-site, Laboratory personnel will sample and analyze the tank truck fuel oil per Procedure 30080-C.

NOTE

Avoid sampling during rain storms unless absolutely necessary. Do not sample during electrical storms or high winds unless so ordered by the OSOS.

4.1.2.2 Warehouse personnel and the QC Receipt Inspector will initiate the Material Inspection Report (MIR) per Procedure 00850-C, "Materials Receiving and Inspection". A QC hold tag is not required.

4.1.2.3 Laboratory personnel will promptly analyze an aliquot of the sample on site as specified in Procedure 30080-C.

4.1.2.4 Laboratory personnel will promptly send the remaining sample off site for evaluation as required by purchasing and/or licensing documents.

4.1.2.5 Laboratory personnel will recommend refusal of the fuel oil if the on site analysis results are unsatisfactory, and promptly Notify QC receiving upon making accept/reject determination.

4.1.2.6 QC will release the fuel oil for delivery and use if the on-site analysis results are satisfactory. The MIR will be forwarded to the Procurement Review Group for review and completion per Procedure 00850-C. No MIR Status Report will be issued. Multiple deliveries received against the same release number may be received under one MIR. The MIR will be noted with each Fuel Oil shipment number.

4.1.2.7 The HP/Chemistry Department will track the return of the off-site results in accordance with procedure 30080-C. Off-site results must be received within 30 days.

4.1.2.8 Results from the offsite analysis will be reviewed by the HP/Chemistry Department. Distribution of the results will be made per Procedure 30080-C.

4.2 SAFETY PRECAUTIONS

4.2.1 Fuel oil storage areas will be posted with caution signs which read such as "DANGER-FLAMMABLE MATERIAL NO SMOKING, SPARKS, OR OPEN FLAME WITHIN 25 FEET".

4.2.2 Fuel oil transfer will be accomplished only by individuals wearing a full face shield, goggles, or safety glasses and rubber gloves.

WARNING

PROLONGED CONTACT WITH SKIN
MAY CAUSE OPEN SORES OR BURNS
TO APPEAR ON THE SKIN.

4.2.3 If fuel oil contacts skin or clothing the affected area must be washed immediately with soap and water.

4.2.4 If an individual ingests fuel oil, Safety Department personnel should be immediately contacted for assistance.

4.2.5 A container to catch drips, or suitable absorbent materials should be placed under all hose connections.

4.2.6 Prior to connecting the fuel oil transfer hose, a grounding strap will be connected between the tank truck and a suitable ground; or a wire covered hose may be used.

4.2.7 Fuel oil will not be transferred from tank trucks in any manner during electrical storms, high winds (greater than 50 mph), tornado warnings, hail storms, or rain storms unless deemed necessary by the OSOS.

4.2.8 At least two 20 pound dry chemical fire extinguishers will be available at the transfer site at all times during the fuel transfer from the tank truck, hook up, and tear down.

4.2.9 Any spillage of fuel oil will be immediately reported to the SS.

4.2.10 The SS will assess the spillage to determine if the applicable sections of Procedure 94001-C, "Spill Prevention Control, Countermeasures (SPCC) And Reportability" should be initiated.

4.2.11 All hose connections should be visually verified to be clean before connections are made.

4.3 TRANSFER OF FUEL OIL

In addition to the requirements of the applicable Operations procedures for off-loading fuel oil, the following steps will be completed as well.

4.3.1 At the delivery site, prior to unloading fuel oil, Operations personnel will check the delivery agent's delivery ticket to verify that the ticket has the following information:

a. Date

b. Supplier

c. Delivery Agent

d. Total Gallons to be Delivered

e. Name of Driver

f. Truck Number

4.3.2 The Fuel Oil Receiving Checklist (Figure 1) will be completed and forwarded to the SS. A copy of the driver delivery ticket will be forwarded as well. All unloading of fuel oil inside the Protected Area (PA) must take place in the presence of an NSO.

4.3.3 The SS will ensure that any difference (indicated on line 9 of the Fuel Oil Receiving Checklist, Figure 1) greater than 100 gallons, is documented.

4.3.4 After fuel is unloaded the original of the delivery ticket and a copy of the Fuel Oil Receiving Checklist will be forwarded to material receiving for processing.

4.3.5 The completed Fuel Oil Receiving Checklist will be forwarded to Financial Services.

4.4 FUEL OIL INVENTORY

4.4.1 At the end of each month record the amount of fuel on hand for the Auxiliary Boiler and the Diesel Generators, and record hour meter readings for the Diesel Fire Pumps and the Security Diesel.

4.4.2 Report the status of fuel to Financial Services using the Fuel Oil Monthly Inventory form (Figure 2).

4.4.2.1 The Plant Technical Data Book will be used to convert percent tank level to gallons.

4.4.2.2 Figure 2 will be completed the 1st day of the month (for the previous month) on the night shift.

4.4.2.3 The completed Figure 2 will be reviewed by the Support Shift Supervisor and then delivered promptly to Financial Services.

4.4.2.4 Financial Services will determine miscellaneous usage for fire pumps and security diesel based on current and previous hour meter readings and fuel consumption rate.

4.4.3 Maintain total fuel used for the year. The Auxiliary Boiler annual fuel usage is not to exceed four million gallons per year.

5.0 REFERENCES

5.1 Standard First Aid And Personal Safety, American Red Cross, Second Edition, 1979.

5.2 GEN-11101, "Oil, Natural Gas and Gasoline Manual"

5.3 "Tank Volume Curves", Plant Technical Data Book Tab 4.

5.4 PROCEDURES

5.4.1 00150-C, "Deficiency Control"

5.4.2 00850-C, "Materials Receiving And Inspection"

5.4.3 13145-1, "Diesel Generator Fuel Oil Transfer System"

5.4.4 13760-C, "Auxiliary Steam Boiler System"

5.4.5 30080-C, "Diesel Fuel Chemistry Control"

5.4.6 90001-C, "Personnel Access/Search"

5.4.7 90005-C, "Security Badge Identification Program"

5.4.8 90015-C, "Vehicle Access"

5.4.9 90019-C, "Warehouse Materials Access Controls"

5.4.10 94001-C, "Spill Prevention, Control, Countermeasures (SPCC) And Reportability"

END OF PROCEDURE TEXT

FUEL OIL RECEIVING CHECKLIST

1. Date: ____/____/____ Time(CST) _____

2. Delivery Ticket No. _____ Release No. _____

3. Plant Tank No. _____ Load No. _____

4. Quantity Ordered (from Shift Supervisor): _____ gal.

5. Oil Storage Tank Level (Prior to Filling): ____ % _____ gal.
   (From Tank Volume Curve, Plant Technical Data Book)

6. Oil Storage Tank Level (After Filling): ____ % _____ gal.
   (From Tank Volume Curve, Plant Technical Data Book)

7. Difference between Lines 6 and 5 Received
   _____ gal.

8. Gallon Loaded (From Delivery Ticket) _____ gal.

9. Difference between Lines 8 and 7 Over/Short _____ gal.

Person Receiving Fuel Oil _____
Signature

Shift Supervisor _____
Signature

FIGURE 1
(Example)

OPERATIONS FUEL OIL REPORT FOR THE MONTH OF _____

INSTRUCTIONS:

A. OPERATIONS: Complete items 1 thru 5 below and promptly deliver to Financial Services before 0900 on the first day of each month.

1. Record Unit 1 D/G FOST, D/G Day Tank and Aux. Boiler Storage Tank levels; convert to gallons and determine total gallons on hand.

2. Record Unit 2 D/G FOST and D/G Day Tank levels, convert to gallons and determine total gallons on hand.

3. Record hour meter readings for Unit 1 D/G's and accumulative run time for the Aux. Boiler (from Aux. Boiler Operating Log).

4. Record hour meter readings for Unit 2 D/G's.

5. Record hour meter readings for Diesel Fire Pumps and the Security Diesel.

B. FINANCIAL SERVICES: Complete item 1 and 2 below.

1. Using data recorded in Item A.3 for this month and the previous month, determine total fuel oil used on Unit 1.

2. Using data recorded in Item A.4 for this month and the previous month, determine total fuel oil used on Unit 2.

C. DATA

1. TOTAL FUEL OIL ON HAND, UNIT 1:

	% LEVEL	GALLONS
D/G "A" STORAGE TK, 1-2403-T4-001	_____	_____
D/G "A" DAY TK, 1-2403-T4-003	_____	_____
D/G "B" STORAGE TK, 1-2403-T4-002	_____	_____
D/G "B" DAY TK, 1-2403-T4-004	_____	_____
AUX BOILER STORAGE TK, A-1322-T4-001	_____	_____
TOTAL GALLONS FUEL OIL ON HAND, UNIT 1		_____

FIGURE 4 (CONT'D.)

2. TOTAL FUEL OIL ON HAND, UNIT 2:

D/G "A" STORAGE TK, 2-2403-T4-001	_____	_____
D/G "A" DAY TK, 2-2403-T4-003	_____	_____
D/G "B" STORAGE TK, 2-2403-T4-002	_____	_____
D/G "B" DAY TK, 2-2403-T4-004	_____	_____
TOTAL GALLONS FUEL OIL ON HAND, UNIT 2		_____

3. DIESEL GENERATOR AND AUXILIARY BOILER RUN TIMES, UNIT 1:

D/G "A" HOUR METER READING	_____ HRS
D/G "B" HOUR METER READING	_____ HRS
AUXILIARY BOILER TOTAL RUN TIME	_____ HRS

4. DIESEL GENERATOR RUN TIMES, UNIT 2:

D/G "A" HOUR METER READING	_____ HRS
D/G "B" HOUR METER READING	_____ HRS

5. MISCELLANEOUS USAGE:

DIESEL FIRE PUMP 1, C-2301-P4-005
HOUR METER READING _____ (22 GAL/HR)

DIESEL FIRE PUMP 2, C-2301-P4-003
HOUR METER READING _____ (22 GAL/HR)

SECURITY DIESEL
HOUR METER READING _____ (55 GAL/HR)

FIGURE 4 (CONT'D.)

6. TOTAL FUEL OIL USED, UNIT 1:

D/G "A" HOUR METER READING
THIS MONTH =
PREVIOUS MONTH = _____
HRS(480 GAL/HR)= _____ GAL

D/G "B" HOUR METER READING
THIS MONTH =
PREVIOUS MONTH = _____
HRS(480 GAL/HR)= _____ GAL

TOTAL RUN TIME
AUXILIARY BOILER _____ HRS(1500 GAL/HR)= _____ GAL

TOTAL GALLONS FUEL OIL USED, UNIT 1 _____ GAL

7. TOTAL FUEL OIL USED, UNIT 2:

D/G "A" HOUR METER READING
THIS MONTH =
PREVIOUS MONTH = _____
HRS(480 GAL/HR)= _____ GAL

D/G "B" HOUR METER READING
THIS MONTH =
PREVIOUS MONTH = _____
HRS(480 GAL/HR)= _____ GAL

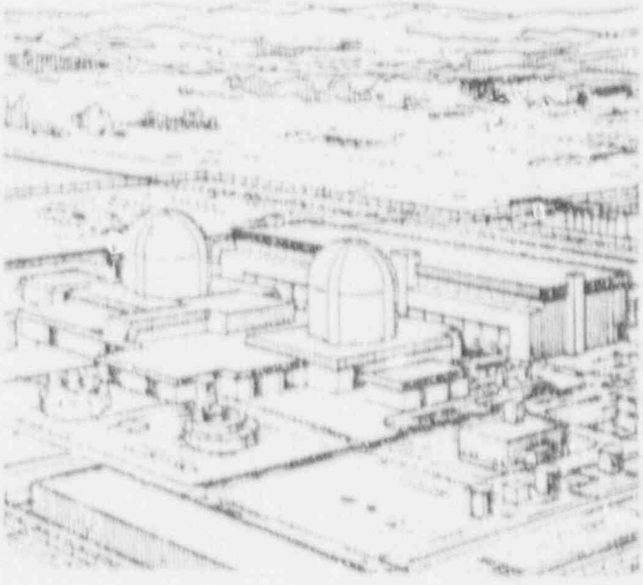
TOTAL RUN TIME
AUXILIARY BOILER _____ HRS(1500 GAL/HR)= _____ GAL

TOTAL GALLONS FUEL OIL USED, UNIT 2 _____ GAL

FIGURE 4 (CONT'D.)

The Alvin W. Vogtle Electric Generating Plant

SAFETY STANDARDS



Georgia Power

First Edition, September, 1987.

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00257-C Radiography Control (Quality Control)
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70303-C Noise Control Program
70304-C Electrical Safety Guidelines
94001-C Spill Prevention, Control, Countermeasures (SPCC) and Reportability

MAINTENANCE DEPARTMENT

23250-C General Rigging and Lifting

HP/CHEM DEPARTMENT

43006-C Containment Entry

"Section 'O' Safety," Georgia Power Co., Seventh Edition, Revised—January 14, 1971.

GPC OPERATIONS DEPARTMENT (GENERAL OFFICE)

GPC Operations Department Electrical System Operating Procedure, 1980, "Red Book," Georgia Power Co.

Georgia Power Company
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912-537-9444

Georgia Power

Edwin I. Hatch Nuclear Plant

PREFACE

The management of this plant is dedicated to your safety. We have an obligation to our family, to ourselves and the Georgia Power Company to perform each job in the safest possible method. Safety demands the total commitment of each employee.

We are our brother's keeper and we have a duty to protect our fellow workers by never allowing them to perform unsafe acts.

Make safety a commitment for life. To your safety we dedicate this booklet.

General Manager
Nuclear Operations
Plant Vogtle

GENERAL INFORMATION

100 - INTRODUCTION

The safety rules in this booklet are for your protection and each employee shall be thoroughly familiar with them. The basic responsibility for safety is up to you. **It is in your hands.**

Your life and the lives of others near you depend on your ability to make safe decisions on the job. To do this you must know and observe accident prevention rules. You must follow them at all times, for you know that the habit of working safely, and good safety attitude, produces the type of behavior that is your best ally on the job.

This habit of safety includes recognizing unsafe conditions connected with your work and those around you as well as the unsafe acts of people in your area. You must be able to anticipate and prevent possible accidents by recognizing potentially unsafe situations, thereby saving yourself, other employees, and the public from being exposed to danger.

If a problem exists that makes your job or that of others unsafe, **correct the problem,** then proceed. **NEVER** by pass or short cut safety so that you or others are in danger. The only way is the safe way.

Safety works when I make it work.

101 - POLICY

It is the policy of GPC and this Plant to protect the life and health of employees and the public and to prevent damage to property, material, and equipment. In carrying out this policy, safety is of primary importance in design, purchasing, construction, maintenance, and operating activities related to structures, facilities, equipment, and programs.

102 - EMPLOYEE RIGHTS

As a GPC employee you are authorized official time to participate in safety and health activities.

You or your employee representative can request assistance or advisement from the Safety and Health Advisors and report unsafe acts or conditions to them that have gone unresolved for an unreasonable period.

You have the right to review a copy of the Occupational Safety and Health Program documents (the OSHA Act of 1970; Title 29 CFR 1910 and 1926) and details of the Georgia Power Company Safety and Health Program.

You or your employee representatives also have the right to review the Plant annual summaries of injuries/illnesses. However, you may review only that portion of the occupational injury/illness log that pertains directly to you. Employee representatives must obtain written permission from the employee in order to review log entry.

An employee representative (and an alternate) will be appointed from each department to the occupational safety & health committee. Official time will be afforded the representative to make monthly walkdown inspections and attend committee meetings.

The employee representative may bring to the attention of the Safety and Health Advisors any pertinent information regarding conditions in the workplace.

103 - EMPLOYEE RESPONSIBILITIES

As an employee you are responsible for performing work in a safe and efficient manner. Compliance with plant procedures, instructions, guidelines, and applicable requirements of the plant safety program is mandatory, and you will be accountable for compliance.

In addition to the job planning performed by your supervisor/foreman, you are responsible to make a thorough evaluation of the work to be performed in order to establish necessary safe work procedures. You shall obtain necessary safety equipment, protective devices, barriers, and any other necessary equipment and verify clearances. If you have any questions concerning the job planning, you should ask your supervisor/foreman.

You have the responsibility to look out for hazards in the plant. If you locate a hazard, correct it if you can. If you cannot correct the hazard, report it to your supervisor/foreman for correction.

104 DISCIPLINARY ACTION

You are expected to voluntarily observe and follow safe work practices. However, anyone willfully violating an established safety rule will be subject to disciplinary action. This can range from a warning to suspension or termination, depending on the seriousness of the offense.

105 ADDITIONAL INFORMATION CONCERNING PLANT SAFETY POLICY

It is not the purpose of this handbook to provide comprehensive and complete details of all safe work rules and practices that you would need to do your assigned work. As can be noted, this hand-

book is general in nature. To provide additional information a system of standard practices, instructions, and guidelines are available for reference.

SECTION II

GENERAL SAFE WORK REQUIREMENTS

200 SAFE WORK RULES AND EMPLOYEE CONDUCT

a. The possession or consumption of intoxicants or other controlled substances while on plant property is strictly prohibited.
b. Fighting, scuffling, running, and horseplay are not allowed.
c. Abuse, misuse, or unauthorized alteration of tools and equipment is prohibited.
d. The careless handling or throwing of matches and lighted cigarettes, the uncontained spitting of tobacco juices, and the flagrant littering of plant work areas are prohibited.
e. Acts that jeopardize your own safety or the safety of others are prohibited.
f. Unauthorized removal of safety or fire equipment from designated locations except in case of an emergency is prohibited.
g. If you have medical restrictions or limitations you are prohibited from knowingly exceeding the imposed restriction or limitation.
h. Whenever you are uncertain about proper work procedures, you are to ask your immediate supervisor for instructions rather than take chances.
i. If you feel that you cannot continue to work safely because of fatigue, illness, or some other reason you are to promptly report the condition to your immediate supervisor.
j. Proper lifting techniques shall be used when manually handling materials.
k. Off-duty employees at the plant shall comply with all plant safety rules and regulations.
l. You shall wear clothing suitable for your type of work. Jewelry, including rings, should not be worn. Shirts shall be worn at all times (except in approved change areas).
m. You must secure long hair which could be caught in moving machinery.
n. You are responsible for knowing the plant emergency telephone number (4444) for reporting fires or other emergencies.
o. Only those employees who have been designated to respond to the scene shall do so in the event of a fire or medical emergency.
p. All warning signs and barriers shall be strictly observed. If you create physical hazards, such as floor openings, during

your work assignments, you shall properly barricade and placard the hazard.

q. Signs prohibiting smoking and open flames shall be strictly complied with.

r. You shall use the personal protective equipment specified for each job.

s. Unauthorized possession of firearms, explosives, and fireworks while on GPC property is forbidden.

201 HOUSEKEEPING

Good housekeeping is an important part of accident and fire prevention. You are responsible to keep your work area clean and orderly.

202 JOB PLANNING

Before beginning any work assignment, the supervisor and affected employees must plan the job so that it can be done safely. If you are uncertain about any aspect of the job plan, ask your supervisor before beginning the work.

203 FIRES AND EMERGENCIES

You are responsible for knowing the emergency telephone number for reporting a fire or other emergency at your work location. To report a fire, dial the Control Room (4444). Identify yourself, give the location of the fire and the meterial or equipment involved, and stay on the line until you are released by the person receiving your call. Fight the fire if you can.

204 RADIOLOGICAL HAZARDS

In addition to the common industrial hazards, nuclear power plants produce another type of hazard to your health and safety-ionizing radiation. Ionizing radiation cannot be seen, felt, heard, or smelled so it is important that you are constantly aware of signs, barricades, and postings warning you of its presence. Exposure to radiation, no matter how small the amount, affects the cells. The lower you keep your exposure, the lower the risk to your health now and in years to come. Exposure limits have been established by law for your protection, at which little or no adverse health effects have been observed. These exposure limits are strictly adhered to.

Nuclear Plant

Those areas in the plant which pose radiological hazards are contained within a controlled zone called the radiation area. You are responsible for knowing and strictly observing plant rules and regulations regarding your conduct and activities within the radiation area. The Health Physics department is responsible through the Plant Manager for the Radiation health and safety program at
As part of this program they will provide you with training in radiological health and safety practices. Also, Health Physics will survey and post the radiological hazard areas of the plant, provide you with protective equipment, special or radiation work permits, and answer any questions you may have concerning the radiological conditions of the plant.

By your adherence to the rules and regulations concerning radiological health and safety you will be able to perform your job while keeping your exposure to radiation as low as reasonably achievable (A.L.A.R.A.)

205 ACCIDENT AND INJURY REPORTING

If you are injured on the job, or if you develop an occupational illness, established procedures for reporting the illness or injury contained in "You are Georgia Power" handbook must be followed. All injuries, no matter how slight, should be reported to your supervisor. Your responsibilities are as follows:

a. If you report to First Aid for treatment of a job related injury or illness, you should notify your supervisor during the same shift if possible. However it must be reported within 48 hours of the occurrence of the injury or illness.

b. For injuries involving First Aid only complete form 907 "First Aid Report" available from the Safety and Health Department.

c. When a doctor's attention is required initiate form 701338E (Ga. form WC 1) "Employer's First Report of Injury." Your Safety and Health Advisor has these forms and will assist you in completing this form.

d. If a situation arises and you need medical care for a work-related medical problem during your off-duty hours, tell your supervisor and Safety and Health Advisor, so that arrangements can be made for you to see the Company designated doctor. You should not visit your personal doctor for treating a work-related off-duty or illness unless that treatment is approved in advance by your Safety and Health Advisor.

SECTION III

CLEARANCES

300 CLEARANCE PROCEDURE

a. Work shall be performed on electrical equipment or circuits, mechanical and hydraulic equipment, pressure systems, and other similar devices under a clearance procedure where required.

b. Protective tags used in a clearance shall not be applied, altered or removed except under established procedures.

c. Only authorized employees shall issue and hold clearances.

d. When working on equipment or systems that are involved in a clearance, you must observe the boundaries established by protective tags and the conditions imposed by the tags.

301 GROUNDING

a. Only authorized employees shall place and remove safety grounds and identification tags.

b. Only approved safety grounding devices shall be used.

c. Ground switches must not be used for safety grounds.

d. Additional information on clearances and grounding can be found in plant procedures.

SECTION IV

PERSONAL PROTECTIVE EQUIPMENT

400 EYE AND FACE PROTECTION

Safety glasses and other eye and face protection are required in many areas of our plant, and for specific work activities. There are also specific requirements if you wear contacts or have vision in only one eye.

BASIS EYE PROTECTION

1. Goggles - Flexible fitting, regular ventilation
2. Goggles - Flexible fitting, hooded ventilation
3. Goggles - Cushioned fitting, rigid body
4. Spectacles - metal frame with sideshields
5. Spectacles - plastic frame with sideshields
6. Spectacles - metal-plastic frame with sideshields
7. Welding Goggles - eyecup type, tinted lenses (illustrated)
7A. Chipping Goggles - eyecup type, clear safety lenses (not illustrated)
8. Welding Goggles - coverspec type, tinted lenses (illustrated)
8A. Chiping Goggles - coverspec type, clear safety lenses (not illustrated)
9. Welding Goggles - coverspec type, tinted plate lens
10. Face Shield - (available with plastic or mesh window)
11. Welding Helmets

EYE PROTECTION IS **REQUIRED** FOR ANY OF THE JOB OPERATIONS LISTED BELOW OR WHEN WORKING NEARBY.

APPLICATIONS	
OPERATION	**RECOMMENDED PROTECTORS**
1. Pipe threading machines	1,3,4,5,6,10
2. Concrete	1,2,3,4,5,6
*3. Sandblasting	1,3,4,5,8,10
4. Acetylene — burning 7,8,9 Acetylene — cutting 7,8,9 Acetylene — welding 7,8,9	
**5. Chemical handling	2, 10 (for severe exposure, add 3,3 over 2)
**6. Chipping, wire brushing	1,3,4,5,6,7A,8A
7. Electric (arc) welding	11 (11 in combination with 4,5,6 with tinted lenses available)
8. Furnace operations	7,8,9 (for severe exposure, add 10
**9. Grinding — light	1,3,4,5,6,10
**10. Grinding — heavy	1,3,7A,8A (for severe exposure, add 10)
11. Laboratory	2 (10 when in combination with 4,5,6)
12. Drilling or machining	1,3,4,5,6,10
13. Molten metals	7,8 (10 in combination with 4,5,6 in tinted lenses)
14. Spot welding	1,3,4,5,6,10
15. Anytime metal is striking against metal, use any of the above.	

* Fresh air breathing apparatus.
** Basic eye protection with face shields or welding hood **required**.

SAVE YOUR EYES!

401 HEAD PROTECTION

a. Hard hats are required in all plant work areas except the control room, chem. lab, computer room, specified warehouse areas, areas with tile ceilings, and offices.

b. Contamination zones and refueling areas may be exempt from hardhat requirements. Signs may be posted or the supervisor/foreman will determine the need dependent upon potential hazards.

c. Hardhat suspensions must not be removed or the hat altered in any way. Only paint that will not adversely affect the properties of the material shall be used.

d. If your hardhat becomes defective, it must be immediatley returned to materials for replacement.

e. Only hardhats that meet the ANSI Z89.1 1981 CLASS "B" requirements are approved for head protection on this site.

402 HAND PROTECTION

a. Whenever you are performing work activities such as welding and cutting, handling hazardous chemicals, handling hot and cold objects, or activities that may produce hand injuries, approved hand protection for the type of exposure is required.

b. Gloves used for work on energized electrical conductors or equipment require special tests and approvals as specified in plant instruction.

c. Gloves shall not be worn when working with rotating equipment that might create a hazard.

403 FOOT PROTECTION

a. You are required to wear appropriate footwear for the type of work to be performed. Safety-toe shoes are recommended for normal work activities.

b. Some special work activities may require the use of special foot protection such as non-conductive soles, rubber boots, etc. In performing these work activities, you will be furnished and must use the required footwear.

c. Shoes or boots made of leather or an equivalent substitute are to be worn at all times in plant areas. Tennis-type (athletic) shoes of either canvas, suede, or leather; sandals; or shoes with platform soles are not considered to be adequate footwear in the plant areas and are not permitted. All shoes must have a defined heel.

404 HEARING PROTECTION

a. Approved hearing protection (ear plugs or ear muffs) are provided and shall be worn in designated high noise level areas or temporary high noise level work situations.

b. Ear plugs are available through Materials, Tool Rooms and wall dispensers (for disposable plugs).

c. It is your responsibility to keep hearing protectors in a clean condition.

405 BODY BELTS, HARNESSES, LANYARDS AND LIFELINES

a. Body belts or harnesses with drop lines and/or lanyards shall be worn under the following conditions:
   1. Working on surfaces 10 feet or more off the ground that do not have guardrails where there is a fall potential.
   2. Working from floats, boatswain chairs, painter's stage, or other types of suspended scaffolds 10 feet or more off the ground.
   3. Working in hoppers, bins or loose materials where the employee may be buried in the material.
   4. When entering confined spaces that contain environments that are immediately hazardous to life.
   5. Working from a pole, steel structure, or an aerial lift bucket.

b. Drop lines, harnesses, body belts, and lanyards shall be removed from service and destroyed if they have been used to arrest a fall.

c. Drop lines, harnesses, body belts, and lanyards shall be removed from service and destroyed if they have been used to arrest a fall.

d. Lanyards shall have as little slack as possible and limit any fall to 6 feet or less.

e. Body belts and harnesses must provide a snug fit. D-rings must be positioned at the center of the wearer's back.

f. Lanyards or drop lines shall not pass over sharp, cutting edges or corners and their method of attachment shall be equal to the strength of the rope.

g. Body belts, harnesses, lanyards, and lifelines shall be inspected before each job.

h. Defective belts, harnesses, lanyards, safety straps, or lifelines shall be removed from service and have a defective equipment tag attached to the units until they are repaired or replaced.

i. Protective equipment must be kept clean.

406 LADDER CLIMBING SAFETY DEVICES

You are required to use an approved ladder climbing device whenever climbing fixed ladders so equipped.

407 RESPIRATORY PROTECTION

a. Respiratory protection devices must be worn whenever you are exposed to harmful concentrations of toxic vapors, gases, dusts, or oxygen deficient environments.

b. If you must wear respiratory protective devices as part of your regular work activity or during emergency operations, hair must be worn in a manner that does not interfere with these devices providing you the needed protection.

408 RADIOLOGICAL HAZARDS

Health Physics will provide you with the following equipment to protect you from radiological hazards:

a. Contamination zone clothing (c-zone) - This clothing must be worn when your are in areas where loose radioactive material is present on accessible surfaces or in the air. This clothing when properly worn, prevents the loose material from getting on your body causing your skin to become contaminated; however, c-zone clothing does not prevent your exposure to radiation while in a radiation or high radiation area.
b. Respirators - These devices protect you from inhaling airborne radioactive contamination.
c. Personnel dosimetry devices - These devices monitor your cumulative exposure to ionizing radiation, providing a means to document your exposure and keep you from exceeding the established exposure limits.

It is your responsibility to use this equipment properly and according to the instructions of health physics.

SECTION V

TOOLS AND EQUIPMENT

500 HANDTOOLS

a. Use the proper tools for each job.
b. Do not use defective handtools or use them in a manner other than their designed purpose.
c. Do not throw tools from one worker to another.
d. Do not leave tools on the floor, in walkways or near edges of elevated work surfaces.

501 COMPRESSED AIR AND PNEUMATIC TOOLS

a. Eye protection and other necessary personal protective equipment shall be worn when using compressed air equipment.
b. Air hose and pneumatic tools shall be visually inspected before each use.
c. All hose connections shall be secured in accordance with manufacturer's recommendations. Twist-type "chicago" fittings must have securing wire on each side of the fitting.
d. Connections on hose greater than 1-inch inside diameter must have a safety chain to prevent the sections from coming apart under pressure.
e. Compressed air shall not be directed at any part of the body or at any other person. Horseplay or cleaning clothing with compressed air is forbidden.
f. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi. If a three-foot air lance is used, air pressures above 30 psi are permitted.
g. The air flow shall not be stopped by kinking the hose. Air flow must be controlled by valves.
h. Prior to disconnecting hose or making adjustments on air tools, the supply air valve must be shut off and the air pressure must be bled off.

502 PORTABLE ELECTRIC HAND TOOLS AND EXTENSION CORDS

a. All portable electric tools must be grounded (except Underwriters Laboratory approved, double-insulated tools).
b. All damaged cords, plugs, or switches etc. must be immediately returned to the tool room for repair.
c. All electrical cords and cables must be covered or elevated to protect them from damage and to eliminate tripping hazards.

503 SHOP EQUIPMENT

A. Shop equipment shall be used only for its designed purpose and only by authorized employees.
b. Assure that shop machinery and equipment are in safe operating condition before using.
c. Assure that equipment is in a safe mechanical and/or electrical condition before maintenance or lubrication.

504 PORTABLE LADDERS

a. Ladders shall be used only for their designed purpose.
b. Only one person shall be on a ladder at a time.
c. Use both hands and face the ladder when ascending or descending. Do not carry items in hands while climbing.
d. Do not overreach when working from a ladder, move the ladder.
e. Metal ladders shall not be used for general purpose use.
f. Fabrication or use of job-built ladders shall be coordinated with the plant safety section.
g. When using a portable ladder, the ladder shall be securely held, tied, or otherwise made secure to prevent the ladder from falling.
h. Extension ladders of 36 feet in length or less shall have a minimum overlap of three feet at section connection.
i. Sections of extension ladders shall not be separated and used as straight ladders without safety feet.
j. The top step of ladders shall not be used.

505 SCAFFOLDS

Scaffolds shall be constructed and erected in accordance with OSHA Safety and Health Standards (29 CFR 1926.451).

Supervisors or foremen shall inspect all scaffolds, on which employees are to work, prior to their use. Any defects found shall be repaired immediatley.

The footing or anchorage of scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement.

Guardrails and toe boards shall be installed on all open sides and ends of platforms ten feet above the ground or floor. Standard guardrail material shall be 2 x 4 inches or equivalent approximately 42 inches high with a 1 x 4 midrail and a 4 inch high toe board. If a standard guardrail cannot be installed, employees working on the scaffold shall wear a safety belt and lanyard. The lanyard should be attached to a secure lifeline or overhead support.

SECTION VI

HAZARDOUS MATERIALS

600 HAZARDOUS CHEMICALS

a. Always know the chemical you are using and be familiar with the hazards and special precautions to be taken.
b. When handling acids, caustics, or other hazardous chemical, suitable protective equipment must be worn. Your foreman/supervisor and the safety section should be consulted for instructions regarding personal protective equipment.
c. Do not begin cutting or welding operations on any piping or vessel that has contained chemicals until the proper clearance has been obtained and safe work procedures established by your foreman/supervisor.
d. Check emergency showers and eyewash fountains in the area for proper operation before you handle chemicals or perform maintenance on equipment involving chemicals. If you get chemicals in your eyes or on your skin flush them thoroughly with water.

601 FLAMMABLE AND COMBUSTIBLE LIQUIDS AND AEROSOLS

a. Each employee shall know the hazards of the flammable liquids used in his job.
b. Do not store materials other than flammable liquids in flammable liquid storage cabinets.
c. Store aerosol cans in flammable liquid cabinets or in an area away from all sources of heat or direct rays from the sun.
d. Never use gasoline for starting fires or for cleaning purposes. Do not dispense gasoline for any purpose unless safety can or tank designed for that purpose is used.
e. Do not pressurize drums to transfer the contents.
f. Do not place working quantities of flammables or combustible liquids near open flames, welding operations, or other sources of ignition.
g. Shut off all portable and mobile equipment, gasoline, or diesel engines when refueling.
h. Be sure all equipment (such as tank trucks, portable containers, etc.) used for handling or storage of flammable liquids is bonded and grounded during transfer of the flammable liquid. Also a metal-to-metal bond should be made between the dispensing and receiving containers.

i. Store flammable or combustible liquids in approved storage cabinets or rooms. Each area where flammable liquids are stored or dispensed shall be marked with signs reading "Danger - No smoking or open flames."

602 CLEANING SOLVENTS

a. Only cleaning solvents approved by your supervisor should be used.
b. Smoking, open flames, and heat sources are not permitted in the immediate area in which a flammable commodity is being used.
c. Personal protective equipment shall be used when required.
d. Always read the label and know the substance you are using. Know the hazards and special precautions to be taken.
e. Use approved safety cans when handling flammable cleaning solvents.
f. You should not use unidentified commodities.
g. Store only in designated locations.

603 COMPRESSED GAS CYLINDERS

a. A mechanical device should be used for transporting cylinders whenever possible. Cylinders may be rolled on end, but safe lifting techniques must be used whenever manually moving cylinders.
b. Cylinders should always be considered as full and handled with appropriate care.
c. Empty cylinders shall be marked "EMPTY" with chalk or tagged. The valve shall be closed and the valve protection cap replaced.
d. Compressed gas cylinders shall be secured in an upright position by wire, chain, or other suitable means.
e. The threads on the regulator or union must correspond with those on the cylinder valve outlet. Do not force connections.
f. Leaking cylinders shall be removed to an outside location and slowly vented to atmosphere. These cylinders shall be tagged with a Defective Equipment Tag until repaired or replaced.
g. Before making connection to a cylinder valve outlet, except that of a hydrogen cylinder, crack the valve slightly to clear the opening of particles of dust or dirt. DO NOT CRACK HYDROGEN CYLINDER VALVES.
h. Cylinders should be stored upright on a level, fireproof floor and shall be adequately secured.

SECTION VII

MOBILE EQUIPMENT

700 VEHICULAR OPERATIONS

a. All drivers of Company operated vehicles must comply with the provisions of city ordinances, state traffic regulations and common sense rules of the road and should be familiar with and practice the principles of defensive driving. All drivers shall have a valid state drivers license for the type vehicle he is driving.
b. Seat belts shall be used properly where provided on all types of vehicles, tractors and equipment. If shoulder harness is provided it should be worn.
c. Personnel must not jump on or off vehicles while they are in motion. When riding on truck bodies, all persons must remain within the outer boundary of the body. Riding on top of cabs, side rails, bumpers or drawbar platforms are prohibited. Towed equipment shall not carry riders.
d. All vehicles so designed or loaded in such a way as to prevent the driver from clearly seeing conditions at the rear of the vehicle must be flagged while backing. Driver shall sound their horn when backing.
e. Heavy vehicles parked on inclines must not depend only on parking brakes to hold the vehicle. Chocks shall be placed firmly under rear wheels where good judgement indicates their use. Any vehicle loading or unloading with a fork lift truck shall have both rear wheels chocked at all times.
f. Only trained and authorized operators shall be permitted to operate a fork lift truck. No one but the operator shall be allowed to ride on the truck.
g. All published company rules for fork lift operations shall be observed. (Safety and Health Advisory No. 101).

701 FORKLIFT OPERATIONS

a. Persons other than driver should not be permitted to ride on forklift trucks.
b. The loads handled by a forklift truck should not exceed the rated capacity of the truck.
c. Keep the forks down. You should not operate your lift truck with the forks raised above minimum height to clear obstructions.

d. If a load is too high or too wide to see around, operate the lift truck in reverse.
e. When you park your lift truck, lower your forks to the ground and set your parking brake.
f. Back down a ramp or incline. Always use low gear and never turn sideways on an incline.
g. When a forklift truck is needed to provide access to an elevation, an approved safety work platform should be used.

SECTION VIII

SPECIAL WORK ACTIVITIES

800 GENERAL

a. Many work activities require special job planning, permits, or other considerations.
b. Hazard control instructions are given in detail in procedures for non-routine and special work activities such as entry into confined spaces, rigging, etc.
c. When in doubt about safe work practices relating to work activities, consult with your foreman/supervisor for instructions.

SECTION IX

LABORATORIES AND OFFICES

900 LABORATORY SAFETY

a. Wear approved personal protective equipment when handling acids, caustics, or any potentially hazardous chemicals.
b. Always pour acids or caustics INTO THE WATER when mixing them.
c. Know the exact location and operation of emergency equipment in the area (safety showers, eyewash units, etc.).
d. Should acid or caustics come in contact with your eyes or skin, flush with large amounts of water. DO NOT RUB YOUR EYES.
e. You should not use broken, chipped, scarred, or badly scratched glassware.

901 OFFICE SAFETY

a. Walk, do not run, in corridors or on stairs. Use hand rails.
b. Do not stand in front of closed doors, they may open suddenly.
c. Do not read correspondance or other material while walking. Stop or return to your desk. While concentrating on reading, you can become unaware of your surroundings and expose yourself to possible hazards.
d. Do not push or crowd at elevators, entrances, exits, or on stairways.
e. Be careful of swivel chairs. Do not slump back in them without testing your weight gradually.
f. Watch for telephone and office machine cords, wastebaskets, and other hazards underfoot which may cause tripping.
g. Use handles when closing files, desk drawers, and safe or vault doors.
h. Keep file drawers, desk drawers, and locker doors closed when not in use. Open only one file or desk drawer at a time. See that files are properly secured.
i. Check office furniture regularly for sharp edges, splinters, and loose casters or bolts.
j. Keep sharp objects in their proper place. Handle carefully.
k. Do not adjust or clean power-driven office machines when they are in operation.
l. Do not attempt to make electrical repairs. Call a qualified person.
m. If smoking is permitted, use ashtrays. Obey "No Smoking" signs.

SECTION X RIGGING

RECOMMENDED HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS

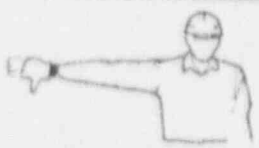
The following are the most commonly-used hand signals for directing boom equipment operations. Many special operations, such as pile-driving or very close work, may require adaptation of these basic hand signals. Changes should be agreed upon in advance by both the person signaling and the equipment operator.

Use Main Hoist Tap fist on head, then use regular signals.

Use Whip Line (auxiliary hoist) Tap elbow with one hand, then use regular signals.

Dog Everything Clasp hands in front of body.

Raise Boom and Lower Load With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



Lower Boom and Raise Load With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.

Travel (both tracks, crawler cranes only) Use both fists in front of body, making a circular motion about each other to indicate the direction of travel—forward or backward.

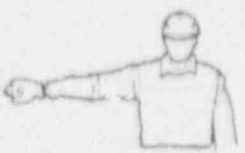
Bridge Travel Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

RECOMMENDED HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS

Extend Boom (telescoping booms) Both fists in front of body with thumbs pointing outward.

Retract Boom (telescoping booms) Both fists in front of body with thumbs pointing toward each other.

Open Clamshell Bucket Arm extended, open hand slowly.



Close Clamshell Bucket Arm extended, close hand slowly.

Trolley Travel Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.

Multiple Trolleys Hold up one finger for block marked "1," and two fingers for block marked "2." Regular signals follow.

Stop Arm extended down, wrist bent with palm down and open.

Emergency Stop Arm extended down, palm down and open, swing hand back and forth.

WIRE ROPE

Standard-link chains for hoisting or similar purposes should not be subjected to loads greater than shown in the tables below.

Safe Load in Pounds for New Improved Plow Steel Hoisting Rope—6 strands of 19 wires, Hemp Center Safety Factor of 6

Diameter in Inches	Weight per foot in lbs.	Safe Load pounds	Diameter in inches	Weight per foot in lbs.	Safe Load pounds
¾	10	1,050	1	1.60	15,000
7/8	16	1,500	1⅛	2.03	18,600
1	23	2,250	1¼	2.50	23,000
1⅛	31	3,070	1⅜	3.03	25,900
1¼	40	4,030	1½	3.60	30,700
1⅜	51	4,840	1⅝	4.23	35,700
1½	63	6,330	1¾	4.90	41,300
1⅝	90	8,770	1⅞	5.63	47,000
1¾	1.23	11,670	2	6.40	53,300

Safe Load in Pounds for New Improved Plow Steel Wire Rope, Slings Under Different Loading Conditions 6 Strands of 19 Wires, Hemp Center Safety Factor 8—Splice Efficiency 80 Percent

Size Diameter in Inches	Single Wire Rope Sling Vertical Lift	Sling or 2 Wire Ropes Used at:		
		60° Angle	45° Angle	30° Angle
				
¾	1,350	2,330	1,910	1,350
⅞	2,420	4,200	3,420	2,420
1	3,800	6,570	5,400	3,800
1⅛	5,260	9,100	7,400	5,260
1¼	7,000	12,100	9,900	7,000
1½	9,000	15,500	12,700	9,000
1¾	11,200	19,400	15,900	11,200
1⅞	13,800	23,900	19,550	13,800
1⅞	16,900	29,300	23,500	16,900
1⅞	20,000	34,600	28,200	20,000

Avoid angles less than 45°

A chain is no stronger than its weakest link and should be discarded when it shows evidence of having stretched. Stretching can be distinguished by small checks or cracks in the links, links binding on each other or elongation of links.

Protect sharp corners on chain slings.

Wrought iron chains frequently may be restored to full usefulness by annealing. This process eliminates metal fatigue, restores the chain's cohesive properties, and may lengthen the life of the chain.

Safe Load in Pounds for New Plow Steel Wire Rope Suitable for Stays 6 strands of 7 wires, Hemp Center

Diameter in inches	Weight per foot in lbs.	Safe Load pounds	Diameter in inches	Weight per foot in lbs.	Safe Load pounds
¾	10	940	⅝	.84	7,800
7/8	15	1,400	¾	1.15	10,700
1	21	2,000	1	1.50	13,900
1⅛	29	2,700	1⅛	1.90	17,400
1¼	38	3,600	1¼	2.34	21,200
1⅜	46	4,500	1⅜	2.84	25,400
1½	59	5,500	1½	3.38	30,000

When ropes are galvanized deduct 10% from strength shown above.

Safe Load in Pounds for New Wrought Iron Chain Slings

Diameter of Link Stock in inches	Single Chain Vertical Lift	Sling or 2 Chains Used at:		
		60° Angle	45° Angle	30° Angle
				
½	1,000	1,800	1,500	1,000
⅝	2,300	4,100	3,300	2,300
¾	4,200	7,300	6,000	4,200
⅞	6,600	11,400	9,300	6,600
1	9,500	16,500	12,500	9,500

Avoid angles less than 45°

MANILA ROPE

Warning: Inspect all fiber ropes carefully. The lay of the rope should be opened and examined. If there is evidence of broken or rotten fiber, harmful deformation or reduction in diameter, the rope should not be used.

Safe Load for New Manila Rope—3 Strand
Safety Factor 7

Circumference in inches	Diameter in inches	Safe Load Pounds	Circumference in inches	Diameter in inches	Safe Load Pounds
¾	¼	85	3	1	1,280
1⅛	⅜	185	3¾	1¼	1,900
1½	½	330	4½	1½	2,640
2¼	¾	780	5½	1¾	3,760
2½	13/16	920	6	2	4,400

When sisal rope is used, the weight of the load should be one-third less than shown in the table above, or rope the next size larger shown in the table above should be used.

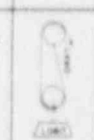
Safe Load in Pounds for New Standard 3-Strand Manila Rope Slings
Spliced for Hook at One End and Hook or Rings at Other End
Safety Factor 10—Splice Efficiency 80 Percent

Circumference in inches	Diameter in inches	Single Rope Sling Vertical Lift	Double Rope Slings 60° Angle	Double Rope Slings 45° Angle	Double Rope Slings 30° Angle
1¼-1½	½	210	365	300	210
2¼	¾	435	740	615	435
3	1	720	1,250	1,020	720
3¾	1¼	1,080	1,880	1,530	1,080
4½	1½	1,480	2,570	2,100	1,480
6	2	2,450	4,250	3,470	2,450

Avoid angles less than 45°.
When sisal rope is used, the weight of the load should be one-third less than shown in the table above, or rope the next size larger shown in the table above should be used.

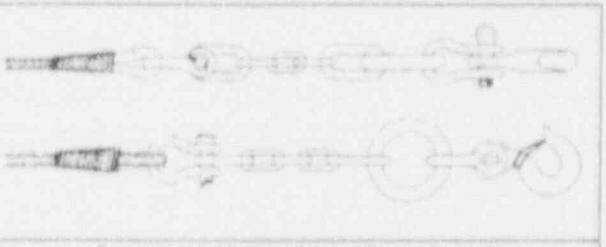
MANILA ROPE AND TACKLE

1. The tables below are for new manila rope.
2. For sisal rope, the values below should be reduced by one-third or rope the next size larger should be used.
3. Tackle values shown allow for one snatch block snatching lead line to engine spool.
4. It is advisable to use the fewest snatch blocks possible.
5. If more than one snatch block is necessary, one extra part should be added for each additional snatch block. This is in addition to the number of parts shown for the weight listed.

Circumference of Rope in inches	Diameter of Rope in inches	Min. Size of Blocks in inches	Lead Line Pull in pounds	Safe Loads in Pounds: 1 part falls 1 single block	2 part falls 2 single blocks	3 part falls 1 single block 1 double block
						
1½	½	4	530	475	850	1,200
2¼	¾	6	1,080	970	1,800	2,400
3	1	10	1,800	1,620	3,000	4,050
3¾	1¼	12	2,700	2,430	4,500	6,075
4½	1½	14	3,700	3,330	6,100	8,500

Circumference of Rope in inches	Diameter of Rope in inches	Min. Size of Blocks in inches	Lead Line Pull in pounds	Safe Loads in Pounds: 4 part falls 2 double blocks	5 part falls 1 double block 1 triple block	6 part falls 2 triple blocks
						
1½	½	4	530	1,400	*Do Not Use 5 or 6 part falls with ½" rope*	
2¼	¾	6	1,080	3,000	3,500	
3	1	10	1,800	5,000	6,300	6,700
3¾	1¼	12	2,700	7,500	9,000	10,000
4½	1½	14	3,700	10,500	12,000	13,500

MATERIAL HANDLING GEAR



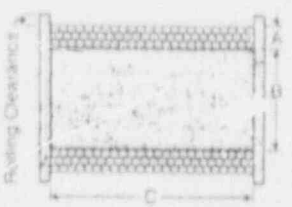
Recommended Minimum Sizes of Gear to Be Used With Various Sizes of Wire Rope

Improved Plow Steel Wire Rope		Round Pin or Screw Shackle		New Wrought Iron Chain
6 Strand: 19 Wire Hemp Center		Diameter of Pin in Inches		Diameter of Link Stock in Inches
Diameter in Inches	Safe Load Pounds	Screw Pin	Round Pin	
¼	4,300	½	½	½
5/16	5,400	⅝	⅝	5/16
⅜	6,600	¾	¾	⅜
½	9,400	1	⅞	½
⅝	12,800	1⅛	1	⅝
1	16,000	1¼	1⅛	1
1⅛	21,200	1⅜	1¼	1⅛
1¼	26,000	1½	1⅜	1¼
1⅜	31,400	1⅝	1½	1⅜
1½	37,000	2	2	1½

Unimproved Plow Steel Wire Rope		Steel Rings and Links			Drop Forged Steel Hooks	
6 Strand: 19 Wire Hemp Center		Diameter Stock			Diameter	
Diameter in Inches	Safe Load Pounds	Circle	Oblong	Triangle	Eye	Throat
¼	4,300	½	5/16	⅜	1½	1¾
5/16	5,400	1¼	⅜	⅜	1⅝	1⅞
⅜	6,600	1¼	⅜	⅜	1⅝	1⅞
½	9,400	1½	1	1	1⅞	2
⅝	12,800	1¾	1⅛	1⅛	2⅜	2⅝
1	16,000	2	1⅛	1⅛	2⅝	3
1⅛	21,200	2¼	1¾	1¾	3¼	3¾
1¼	26,000	2½	1⅜	1⅜	3⅝	4
1⅜	31,400	2⅝	1⅝	2	3⅝	4
1½	37,000	2⅞	1⅞	2⅛	4	4½

CAPACITIES OF REELS OR DRUMS

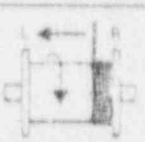
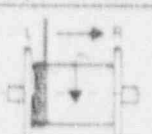
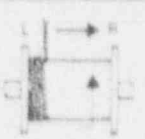
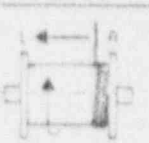
$L = (A + B)\,AxCxK$



L = Length of rope in feet
A = Depth of flange in inches. In computing capacity of reels, "A" is reduced to 1½" to 2" to provide for a clearance.
B = Diameter of drum in inches
C = Width of drum in inches
K = Constant which is given below for a given size of rope

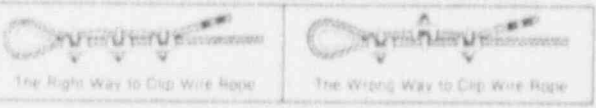
Rope Diameter in Inches	Value of "K" for taut winding	Rope Diameter in Inches	Value of "K" for taut winding
1/16	266.24	¼	342
5/64	66.56	1	262
3/32	29.76	1⅛	207
⅛	16.64	1¼	167
5/32	10.76	1⅜	13[illegible]
3/16	7.44	1½	116
7/32	4.16	1⅝	099
15/64	2.67	1¾	085
⅜	1.86	1⅞	074
7/16	1.37	2	066
½	1.05	2⅛	058
9/16	.829	2¼	052
⅝	.672	2⅜	[illegible]
¾	.465	2½	04[illegible]

SPOOLING STANDARDS ON DRUMS

Left Lay Rope	Right Lay Rope
 Overwind	 Overwind
 Underwind	 Underwind

APPLYING WIRE ROPE CLIPS

A correct method of attaching U-bolt wire rope clips to rope ends is shown in the illustration below. The base of the clip bears against the live end of the rope, while the "U" of the bolt presses against the dead end.



The Right Way to Clip Wire Rope | The Wrong Way to Clip Wire Rope

The clips are usually spaced about six rope diameters apart to give adequate holding power.

Before ropes are placed under tension, the nuts on the clips should be tightened. It is advisable to tighten them again after the load is on the rope to take care of any reduction in the rope's diameter caused by the weight or tension of the load.

A wire rope thimble should be used in the loop eye to prevent kinking when wire rope clips are used.

The correct number of clips for safe application, and spacing distances, are shown in the table below.

Number of Clips and Spacing for Safe Application

Rope Diameter in Inches	Approximate Weight in pounds	Minimum No. Clips for Each Rope End	Spacing of Drop Forged Clips in Inches
3/8	0.10	2	3 1/4
1/2	19	2	3 3/4
5/8	29	2	4 1/4
3/4	47	2	5
7/8	70	2	5 3/4
1	78	3	3
1 1/8	1.06	3	3 1/2
1 1/4	1.58	4	4 1/2
1 3/8	2.40	4	5 1/2
1 1/2	2.72	5	6
1 5/8	3.20	6	6 1/2
1 3/4	4.50	6	7 1/2
1 7/8	4.60	7	8 1/2
2	5.80	7	9
2 1/8	7.20	7	9 1/2
2 1/4	9.50	8	10 1/2
2 1/2	12.50	9	12
2 3/4	15.50	9	13 1/2
3	16.00	9	15

WIRE ROPE CONNECTIONS

Sockets Zinc Type —properly attached 100%

Wedge Sockets 70%

Clips—Crosby type 80%

Knot and Clip (contractors knot) 50%

Plate Clamp Three bolt type 80%

Smooth Clamp 80%

Spliced Eye and Thimble:

- 1/4" and smaller 100%
- 5/16" to 3/8" 95%
- 7/16" to 1" 88%
- 1 1/8" to 1 1/4" 82%
- 1 3/8" to 2" 75%
- 2 1/8" and larger 70%

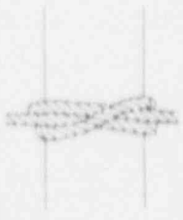
Percentages shown equal the connection's efficiency as compared to unaltered wire rope. For example, a smooth clamp on wire rope is 80% as strong as unaltered wire rope.

MANILA ROPE KNOTS

Square or Reef Knot
43%

Bowline (outside)
50%

Bowline (inside)
53%



Clove Hitch
75%

Timber Hitch and Half Hitch
72%

Sheepshank
35%

Short Splice
85%

Long Splice
68%

Eye Splice
85%

Percentages shown equal the knot's efficiency as compared to unknotted new manila rope. For example, a clove hitch is 75% as strong as unknotted new manila rope.

SEIZING WIRE ROPE

The end of an ordinary wire rope should have at least three seizings to prevent unlaying—unlaying can make the rope useless. Annealed iron wire should be wound tightly in a close helix around the rope.

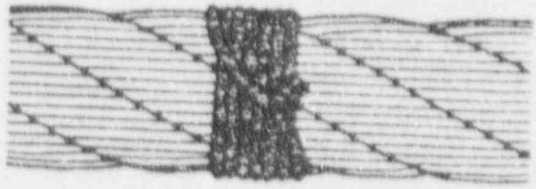
Any annealed low carbon steel wire may be used for seizings. A guide for selecting the correct size of seizing wire is shown below:

Soft Annealed Iron Seizing Wire

Diameter of Rope in Inches	Size Seizing Wire	Diameter of Rope in Inches	Size Seizing Wire
¼	No. 18	1⅛	No. 12
⅜	No. 17	1¼	No. 12
½	No. 16	1⅜	No. 11
⅝	No. 15	1½	No. 11
¾	No. 14	1¾	No. 10
⅞	No. 13	2	No. 10
1	No. 13		

Recommended Procedure for Seizing Wire Rope

1. Wind the seizing wire on the wire rope by hand, keeping the coil together with considerable tension on the wire, winding OVER from left to right.
2. Twist the ends of the wire together counter-clockwise by hand, so that the twisted portion of the wires is near the middle of the seizing.
3. Using "Carew" cutters, tighten the twist just enough to take up the slack. Do not try to tighten the seizing by twisting.
4. Tighten the seizing by prying the twist away from the axis of the rope with the cutters.
5. Tighten the twist again and repeat as often as necessary to make the seizing tight. Cut off the ends of the wire and pound the twist flat against the rope.



Example of a Finished Seizing

SOCKETING WIRE ROPES

Recommended Procedure for Socketing Wire Ropes

Fig. A

Fig. B

Fig. C

Fig. D

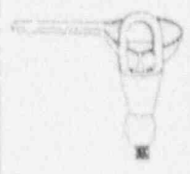


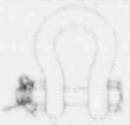
Fig. E

Fig. F

1. Measure from the end of rope a length equal to tapered basket of the socket.
2. Tie at this point with not less than three seizings. (Fig. A)
3. Cut out hemp center, but do not cut wire rope when used as a center.
4. Separate wire in strands, straightening each wire. (Fig. B)
5. Clean wires thoroughly with cleaning fluid from ends to seizing. Wipe dry.
6. Dip wires for three-quarters of length to first seizing into a solution containing equal parts of water and muriatic acid. Keep wires in solution long enough to be thoroughly cleaned. Do not let acid contact hemp core.
7. Knock the acid from the wires, then rinse in hot water, to which has been added 1 teaspoonful of baking soda to 2 quarts of water.
8. Seize ends so that they will pass into socket. (Fig. C)
9. Remove seizing and fan out wires.
10. Seal bottom of socket with clay. (Fig. D)
11. Pour in teaspoonful of rosin.
12. Be sure the wires are evenly distributed and socket is in line with axis of rope.
13. Heat socket until warm or until all moisture has disappeared.
14. Pour in molten zinc heated to 830°F (443.3°C) (just hot enough to set fire to a newspaper). (Fig. E)
15. Use high grade zinc; do not use babbit or other alloys.
16. While pouring, tap the socket gently with light hammer to remove air bubbles and get zinc into crevices of wires.
17. Remove fire clay and seizing wires. (Fig. F)

SHACKLES

Round Pin Type Shackle



Safety Type Shackle

Screw Pin Type Shackle

Safe Load in Pounds — Drop Forged Steel, Weldless

Diameter of Pin in Inches	Maximum Width Between Eyes in Inches	Safe Working Load in pounds	Diameter of Pin in Inches	Maximum Width Between Eyes in Inches	Safe Working Load in pounds
½	⅞	560	1¾	1⅞	16,000
⅝	1 1/16	1,400	1⅞	2	20,000
¾	1 5/16	2,700	1⅞	2⅛	24,000
⅞	1 9/16	3,600	1⅞	2¼	28,000
1	1 11/16	5,600	1⅞	2⅜	32,000
1	1¾	7,800	2	2⅜	36,000
1	1⅞	10,400	2¼	3¼	46,000
1¼	1⅞	13,200	2½	4	56,000

All shackle pins should be straight and all pins of screw pin type should be screwed in all the way. If width between the eyes is greater than listed above, the shackle has been overstrained and should not be used.

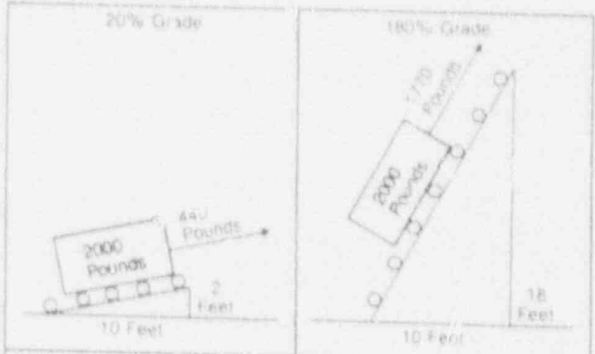
EYE HOOKS

Strength of Manufactured Eye Hooks — Drop Forged Steel, Weldless

Inside Diameter of Eye in Inches	Throat Opening	Safe Working Load in pounds	Inside Diameter of Eye in Inches	Throat Opening	Safe Working Load in pounds
¾	1	1,000	1¾	2	6,000
⅞	1 1/16	1,200	1⅞	2 1/16	8,000
1	1 1/16	1,400	2	2⅛	9,400
1⅛	1¼	2,400	2⅛	2½	11,000
1¼	1⅜	3,400	2⅜	3	13,600
1⅜	1½	4,100	2⅝	3⅛	16,000
1½	1⅝	5,000	3⅛	4	22,000

If the throat opening of any hook exceeds the dimension given above for the corresponding diameter of the eye, the hook has been overstrained and should not be used.

INCLINED PLANES

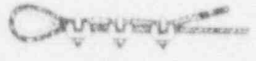


Stresses on Lines When Pulling Objects Up Inclined Planks on Rollers

Rise in each 10 Feet	Grade—Percent	Pull on Line in Pounds Per Ton of Load	Rise in each 10 Feet	Grade—Percent	Pull on Line in Pounds Per Ton of Load
1	10	240	8	80	1,280
2	20	440	9	90	1,370
3	30	620	10	100	1,440
4	40	780	12	120	1,560
5	50	930	14	140	1,650
6	60	1,070	16	160	1,720
7	70	1,180	18	180	1,770

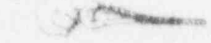
GOOD AND BAD RIGGING PRACTICES

Eye Splices

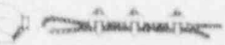


Good-Note use of thimble in eye splice.

Bad-Wire rope knot with only Efficiency 53% or less.



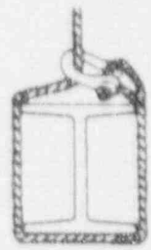
Good-Use of thimble in eye splice.



Bad-Thimble should be used to increase strength of eye and reduce wear on rope.

Hoisting Structural Steel

Good-Use space blocks and pad corners.



Bad-Can bend flanges and cut rope.

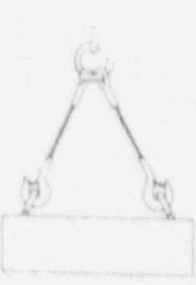
Good-Vertical lift on choker sling.

Bad-Lifting on eye bolts from an angle reduces safe loads as much as 90%.

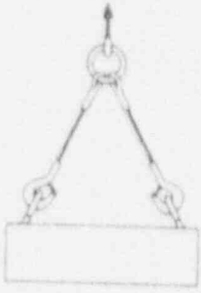
Suspending Needle Beams or Scaffolds

Good-Sharp corners padded.

Bad-Steel can cut rope.

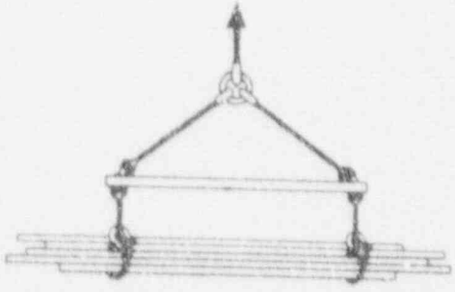


Good-Hooks are turned out

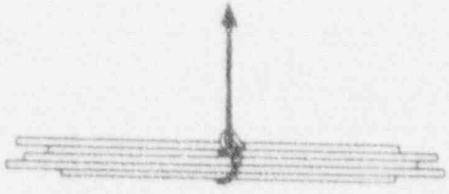


Bad-Hook openings should be turned out

Double slings should be used when hoisting 2 or more pieces of material over 12 feet long



Right-Load over 12 feet long



Wrong-Load over 12 feet long

Use of Chokers

Good-No cutting action on running lines

Bad-Because of cutting action of eye splice on running line

Bad-Bolt on running line can work loose

SECTION XI

WEIGHTS, MEASURES AND GENERAL INFORMATION

Handy Things to Know

To Find:

(a) the circumference of a circle, multiply the diameter by 3.1416.
(b) the diameter of a circle, multiply the circumference by .31831.
(c) the area of a circle, multiply the square of the diameter by .7854.
(d) the area of a triangle, multiply the base by ½ the perpendicular height.
(e) the volume of a sphere, multiply cube of the diameter by .5236.

A gallon of water weighs 8⅓ pounds and contains 231 cubic ins.

A cubic foot of water contains 7½ gals., 1728 cubic inches and weighs 62½ lbs.

In board measure all boards are assumed to be 1 inch thick. Area of a lineal foot multiplied by length in feet will give the surface contents in square feet.

Rules of Thumb

The following are not suggested as substitutes for accurate tables and reference material, but are sometimes useful in making a final safety check.

Nails

Safe Load lateral resistance in pounds equal eight (8) times the pennyweight.
1-6d nail = 8 x 6, or 48 pounds.
1-10d nail = 8 x 10, or 80 pounds.

Manila Rope

Safe load in tons equals diameter in inches squared. Not accurate in sizes larger than one inch (1").
1" rope = 1 x 1, or 1 ton safe load.
½" rope = ½ x ½, or ¼ ton safe load.
For sisal rope, decrease safe loads by one-third.

Plow-steel Cable

Safe load in tons is eight (8) times the diameter in inches squared.
¼" rope = ½ x ½ = ¼ x 8 = 2 tons.

Open Eye Hook

Safe load in tons is diameter of eye in inches squared.
2" hook, 2 x 2 = 4 tons.

Shackle

Safe load in tons is diameter of pin in one-fourth inches (¼") squared and divided by three (3).
¾" diameter = 3 quarters.
3 x 3 = 9 ÷ 3 = 3 tons or 2,667 pounds.

Chains

Safe load in tons is six (6) times the square of the diameter of chain stock.
½" diameter chain stock.
½ x ½ x 6 = 1½ tons or 3,000 pounds.

MEASURES

1 Square Mile	640 acres 6400 square chains
1 Acre	10 square chains 4,840 square yards 43,560 square feet a square, each side of which is 208.7 feet
1 Square Chain	16 square rods 484 square yards 4,356 square feet
1 Square Rod	30.25 square yards 272.25 square feet 625 square links
1 Square Yard	9 square feet
1 Square Foot	144 square inches
1 U.S. Gallon	0.1337 cu. feet 231 cu. inches 4 quarts 8 pints
1 Cubic Foot	7.48 U.S. gallons

METRIC CONVERSION GUIDE

	When you know:	You can find:	If you multiply by:
Length	Inches	Millimeters	25
	Feet	Centimeters	30
	Yards	Meters	0.9
	Miles	Kilometers	1.6
	Millimeters	Inches	0.04
	Centimeters	Inches	0.4
	Meters	Yards	1.1
	Kilometers	Miles	0.6
Area	Square inches	Square Centimeters	6.5
	Square Feet	Square meters	0.09
	Square yards	Square meters	0.8
	Square miles	Square Kilometers	2.6
	Acres	Square Hectometers (Hectares)	0.4
	Square Centimeters	Square inches	0.16
	Square meters	Square yards	1.2
	Square Kilometers	Square miles	0.4
	Square Hectometers (Hectares)	Acres	2.5

METRIC CONVERSION GUIDE

	When you know:	You can find:	If you multiply by:
Mass	Ounces	Grams	28
	Pounds	Kilograms	0.45
	Short tons	Megagrams (Metric tons)	0.9
	Grams	Ounces	0.035
	Kilograms	Pounds	2.2
	Megagrams (Metric tons)	Short tons	1.1
Liquid Volume	Ounces	Milliliters	30
	Pints	Liters	0.47
	Quarts	Liters	0.95
	Gallons	Liters	3.8
	Milliliters	Ounces	0.034
	Liters	Pints	2.1
	Liters	Quarts	1.06
	Liters	Gallons	0.26
Temperature	Degrees Fahrenheit	Degrees Celsius	5/9 (after subtracting 32)
	Degrees Celsius	Degrees Fahrenheit	9/5 (then add 32)

COMMON METRIC EQUIVALENTS*

1 inch	25.4 millimeters
1 foot	0.30 meter
1 yard	0.91 meter
1 mile	1.61 kilometers
1 sq. inch	6.45 centimeters
1 sq. foot	0.09 sq. meter
1 sq. yard	0.86 sq. meter
1 cubic inch	16.39 cu. centimeters
1 cubic foot	0.03 cubic meter
1 cubic yard	0.76 cubic meter
1 quart	0.95 liters
1 gallon	0.004 cubic meters
1 ounce	28.35 grams
1 pound	0.45 kilogram
1 horsepower	0.75 kilowatt
1 millimeter	0.04 inch
1 meter	3.28 feet
1 meter	1.09 yards
1 kilometer	0.62 mile
1 sq. centimeter	0.16 sq. inch
1 sq. meter	10.76 sq. feet
1 sq. meter	1.20 sq. yards
1 cu. centimeter	0.06 cu. inches
1 cu. meter	35.31 cu. feet
1 cu. meter	1.31 cu. yards
1 cu. meter	264.2 gallons
1 liter	1.06 quarts
1 gram	0.04 ounces
1 kilogram	2.20 pounds
1 kilowatt	1.34 horsepower

*Closest approximation

STEEL GAUGES AND WEIGHTS

Gauge	Thickness		Weight	
	Inches	mm	lb/Ft²	Kg/M²
00	½	9.5250	15.300	74.754
0	11/32	8.7313	14.025	68.525
0	5/16	7.9375	12.750	62.295
1	9/32	7.1450	11.475	56.066
2	¼	6.3500	10.200	49.836
3	.2391	6.0731	10.000	48.859
4	.2242	5.6947	9.375	45.805
5	.2092	5.3137	8.750	42.752
6	.1943	4.9352	8.125	39.698
7	.1793	4.5542	7.500	36.644
8	.1644	4.1758	6.875	33.591
9	.1495	3.7973	6.250	30.537
10	.1345	3.4163	5.625	27.483
11	.1196	3.0378	5.000	24.429
12	.1046	2.6568	4.375	21.376
13	.0897	2.2784	3.750	18.322
14	.0747	1.8974	3.125	15.268
15	.0673	1.7094	2.813	13.744
16	.0598	1.5189	2.500	12.215
17	.0538	1.3665	2.250	10.993
18	.0478	1.2141	2.000	9.772
19	.0418	1.0617	1.750	8.550
20	.0359	0.9119	1.500	7.329
21	.0329	.8357	1.375	6.718
22	.0299	.7595	1.250	6.107
23	.0269	.6833	1.125	5.497
24	.0239	.6071	1.000	4.886
25	.0209	.5309	0.875	4.275
26	.0179	.1547	.750	3.664
27	.0164	.4166	.688	3.361

Above are manufacturers standard gauges. Weights are based on density of 501.84 lb/ft³

WEIGHTS OF MATERIALS COMMONLY HANDLED BY RIGGERS

Material	Approximate Weight Per Cubic Foot-Lbs.
Aluminum	166
Ashes	43
Asphalt	81
Brass	524
Brick (common)	120 (about 3 tons per 1000)
Brick (fire)	145
Bronze	534
Concrete	150 (4050 lbs. per cu. yd.)
Copper	537
Crushed Rock	95 (2565 lbs. per cu. yd.)
Dry earth, loose	76 (2052 lbs. per cu. yd.)
Granite	179
Iron, casting	450
Lead	706
Lumber, Fir	32 (2066 lbs. 1000 ft.)
Lumber, Oak	62 (5166 lbs. 1000 ft.)
Marble	168
Mortar	100
Port. Cement	94 (376 lbs. per barrel)
River Sand	120 (3240 lbs. cu. yd.)
Steel	490
Tar	63
Tile	115
Water	62.5
Zinc	437

WEIGHTS OF METALS PER SQUARE FOOT

Thickness, In Inches	Weight, Pounds per Square Foot			
	Wrought Iron	Cast Iron	Steel	Copper
1/16	2.50	2.34	2.55	2.89
1/8	5.00	4.69	5.10	5.79
3/16	7.50	7.03	7.65	8.68
1/4	10.0	9.38	10.2	11.6
5/16	12.50	11.7	12.8	14.5
3/8	15.00	14.1	15.3	17.4
7/16	17.50	16.4	17.9	20.3
1/2	20.00	18.7	20.4	23.2
9/16	22.50	21.1	23.0	26.0
5/8	25.00	23.5	25.5	28.9
11/16	27.50	25.8	28.1	31.8
3/4	30.00	28.1	30.6	34.7
13/16	32.50	30.5	33.2	37.6
7/8	35.00	32.8	35.7	40.5
15/16	37.50	35.2	38.3	43.4
1	40.00	37.5	40.8	46.3

Thickness In Inches	Weight, Pounds per Square Foot			
	Tin	Zinc	Brass	Lead
1/16	2.41	2.26	2.63	3.7
1/8	4.81	4.55	5.26	7.4
3/16	7.22	6.83	7.89	11.1
1/4	9.63	9.10	10.5	14.8
5/16	12.0	11.4	13.2	18.5
3/8	14.4	13.7	15.8	22.2
7/16	16.8	15.9	18.4	25.9
1/2	19.3	18.2	21.1	29.7
9/16	21.7	20.5	23.7	33.4
5/8	24.1	22.8	26.3	37.1
11/16	26.5	25.0	28.9	40.8
3/4	28.9	27.3	31.6	44.4
13/16	31.3	29.6	34.2	48.2
7/8	33.7	31.9	36.8	51.9
15/16	36.1	34.1	39.5	55.6
1	38.5	36.4	42.1	59.3

For weights in square inches divide by 144

HEIMLICH MANEUVER

Choking on food can cause death in 4 minutes. A life can be saved using the Heimlich Maneuver. A person cannot breathe or speak when food creates a blockage of the throat airway.

Using the Heimlich Maneuver (described in the accompanying diagrams). You exert pressure that forces diaphram upward, compresses the air in the lungs, and expels the object blocking the breathing passage.

The victim should see a physician immediately after the rescue. Performing the Maneuver could result in injury to the victim. However, they will survive only if the airway is quickly cleared.

If no help is at hand, victims should attempt to perform the Heimlich Maneuver on themselves by pressing their own fist upward into the abdomen as described.

WHAT TO LOOK FOR
The victim of food choking

HEIMLICH SIGN FOR "I'M CHOKING"
(Grasp Neck with Thumb and Finger)

RESCUER STANDING
Victim standing or sitting

A person choking on food will die in 4 minutes — You can save a life using the

HEIMLICH
MANEUVER

- Stand behind the victim and wrap your arms around the waist.
- Place your fist thumb side against the victim's abdomen, slightly above the navel and below the rib cage.
- Grasp your fist with your other hand and press into the victim's abdomen with a quick upward thrust.
- Repeat several times if necessary.

RESCUER KNEELING
Victim lying face up

- Victim is lying on their back.
- Facing victim, kneel astride the hips.
- With one of your hands on top of the other, place the heel of your bottom hand on the abdomen slightly above the navel and below the rib cage.
- Press into the victim's abdomen with a quick upward thrust.
- Repeat several times if necessary.

When the victim is sitting, the rescuer stans behind the victim's chair and performs the maneuver in the same manner.


Georgia Power Company
Corporate Safety Department

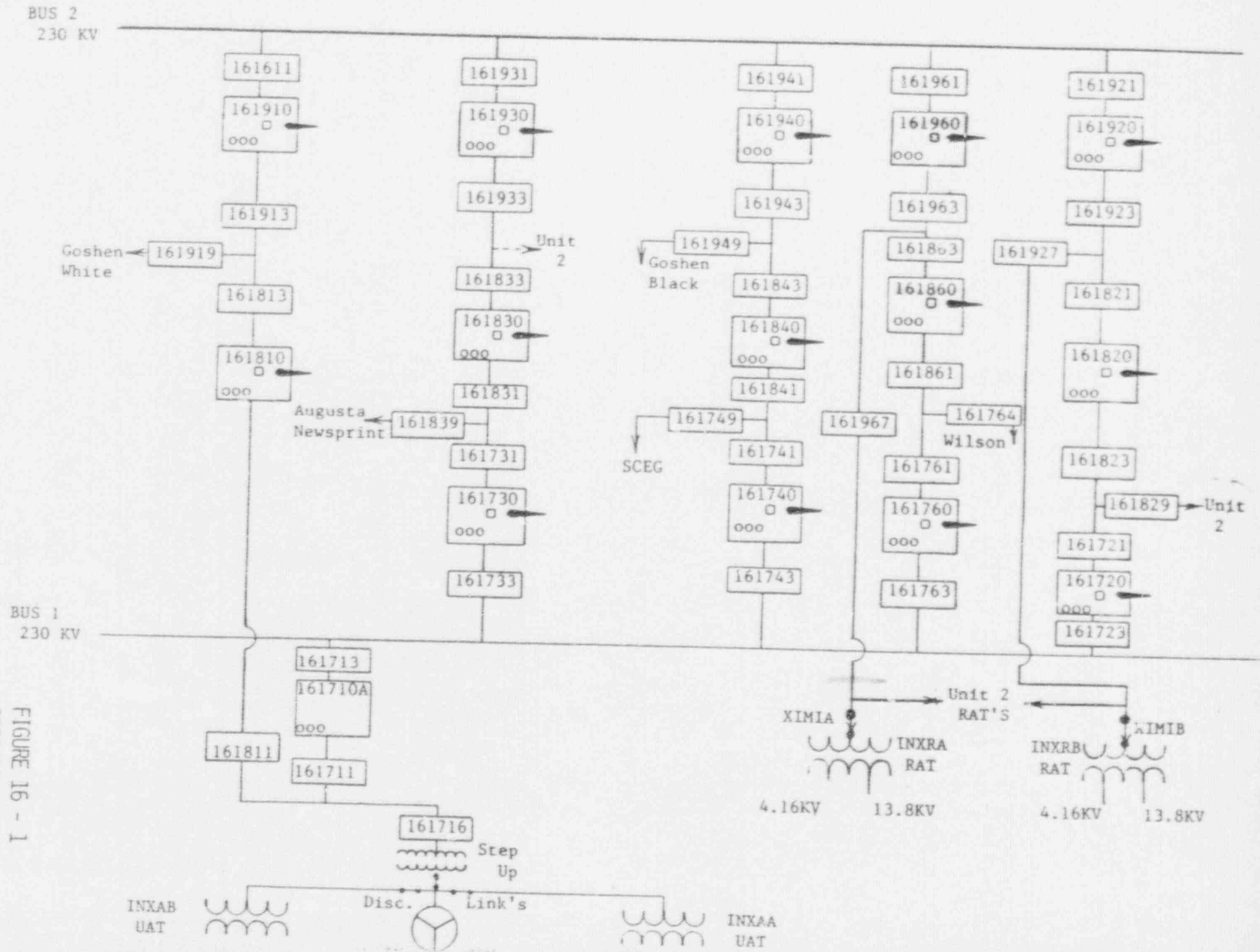


FIGURE 16 - 1
OFFSITE A C

2-120 № 5283

Georgia Power Company
Vogtle Electric Generating Plant
Unit 1 Control Log

Time WRB Tuesday Date 3/20/90

Time	
0007	14005-1 complete & sat
0103	RHR A CB 2457 @ 0005 CST - Williams
0301	Tygon tube 187'8"
0350	OSP 14801 complete + sat for NSCW transfer pump #8.
0409	14001-1 complete
0452	[illegible]
0456	——— RBS ———
0500	——— CRC ———
0523	Tygon tube @ 187'8" - manned continuously
0523	OSP 14811-1 complete + sat for BA xsfer pump #6.
0558	——— R+ ———
0623	——— LDV ———
	[redacted]
0703	Day Shift ON: RO [redacted]
	Plant Status: Mode 6 100 cps RCS Boron 2457 RHR Train 'A' in service for core cooling. Vessel at mid loop operations
0816	OSP-14225-1 DPS Weekly Surveillance logs Complete & Sat
0820	LOSP occurred - LOST 'A' RAT - D/G 1A TIED and tripped. Entered
	[redacted]
0841	D/G 1A Auto Started after Sequencer reset [illegible]
	water pressure.
	Site Area Emergency Declared - loss of Pwr > 10 min.; loss of
0859	[redacted]
LE 0856	D/G 1A Emergency Break Glass START Locally; NSCW Pumps 1 & 3 started NSCW Pump #3
0900	RHR pump 'A' started for shutdown cooling - core exit thermocouple @ 136°F and core cooling commenced.
0917	Emergency downgraded to an Alert
0937	Spent Fuel Pool Cooling Train 'A' restored to service
0942	Equipment Hatch bolted in place
1029	RAT 'B' Energized
1030	Normal Chiller NO. 1 placed in service
	[illegible] energized to [illegible] River Water Pumps
	[illegible] energized from 'B' RAT.
	[illegible] Train B Pumps 2 & 4 started
	[illegible] Pumps 2 & 4 started
	[illegible] pump 'B' Started
	RHR pump 'B' placed in service for shutdown cooling and RHR pump 'A'

№ 5284

gia Power Company
e Electric Generating Plant
Unit 1 Control Log

Date 3-20-90

Time	
	Westry
1155	D/G 1A placed back in remote
1157	1AA02 alternate incoming breaker closed in. Paralleling with DG 1A
1211	D/G 1A Loaded to 6800 kw to be run for 45 minutes due to low load operation
1234	OSP 14000-1 Complete & Sat. Day Shift
1241	Annunciators placed back on normal supply.
1247	Emergency Terminated
1324	D/G 1A TIE Breaker opened
1330	D/G 1A Shutdown
1405	D/G 1A placed in standby readiness
1416	RHR Train A Placed in shutdown cooling and RHR Train B removed from shutdown cooling & placed on recirc.
14A	RHR pump B Stopped
1504	Normal Chillers aligned in sequence 2-1
1648	WRB
1657	WRB
1705	
LE 1651	Aux Steam Header Pressure to 200 psig from Aux Boiler & crosstie to Unit Two is opened.
LE 1702	OSP 4915-1 Data sheet 9 complete & sat (Pre 0.25 in 2 amps @ 70°F)
1720	D/G 1A Declared Inoperable LCO NO.
1741	RAT A Energized.
1820	WRB MJH
1831	Both Diesel fire water pumps and electric fire pump secured and placed into AUTO.

Georgia Power Company
Vogtle Electric Generating Plant
Unit 2 Control Log

Nº 2601

2-121

Time WRS Date 3-20-90

2001	New day, New Book
0025	WMT #9 → River START
0128	BAST 5317 ppm, sample @ 0030.
0149	RCS diluted 775 gal.
0205	RCS diluted 125 gal.
0212	RCS diluted 500 gal.
0227	RCS Diluted 200 gal.
0237	RCS diluted 200 gal.
0249	RCS diluted 200 gal.
0248	WMT #9 → River stop
0300	BAST @ 1233 ppm
0314	RCS diluted 200 gal.
0345	Started new [illegible] NSW fans - 1 hr. run.
0411	Started CCW pump #1, stopped CCW pump # 3.
0437	STARTED CCW pump 3, stopped CCW pump 5.
[redacted]	
0454	STARTED CCW Pump #5, stopped CCW Pump #1.
0500	STOP
0501	Drain
0515	→ CAC
[redacted]	
0611	PZR
0620	DH
0631	Night shift SS, relieved by G. Ouellette, & Wainwright
[redacted]	(Grinding etc.)
0647	Boiler 7 gal for temp control
0749	Blowdown for NSCW TR B secured for Chemistry Request
0803	Dilute 25 gallons
0820	U2 Reactor TRIP due to turbine TRIP due to loss of B RAT Entered E 0
0821	Manual MS Isolation to Maintain PZR Level and [illegible]
1827	Transferred to Procedure 19001-2
0830	Broke condenser VAC due to Loss of All but DC Emergency Oil Pump (Time is Approximate)
0851	Secure TDAFW Pump

Georgia Power Company
Vogtle Electric Generating Plant
Unit 2 Control Log

No. 2602

Time WLB Date 3/20/96

Time	Entry
0902	Site Area Declared due to Loss of All AC on U1
0913	Power energized to TB UF, TCM
0925	Turbine on turning gear
0928	2HV17212 Bypass to Circ Water BD isolated due to Loss of River Pumps
0930	Site Area down graded to Alert
LE0830	MFP B miniflo isolated due to Loss of EBOP
LE0845	Cond pump # 2 stopped (# 3 had tripped)
0945	H_2 isolated to Main generator
0945	Page Announcement to smoking or grinding Turb Build
0957	B-RAT manual circuit switches 2HS-RIMIO opened
1035	Transferred to 12006-C
1100	Trip Circ pump 2 due to reported high vibrations
[illegible]	[illegible]
1111	Plant status 2BA03 supplied by DG2B, 2NA04 OOS, 2NAB OOS, RCP 2-4 OOS 2ND1 powered by 2NB01
1127	Stop A CCP
1134	Start ACCW pump 2 stop ACCW pump 1 to help keep Diesel loaded
LE 1053	14005-2 Shut Dn margin complete & SAT Keff .965 SD 3.67% ΔK/K
1151	14000-2 Tech Spec Rounds complete except for RCS Leak Rate and SAT for mode 3
1203	Lockout Relay 586T1 Main Gen Pri Diff Reset to allow closing Main Gen Output Breakers
1231	14915-2 Data Sheet 3 Discontinued due to previous Trip
1235	Mike Wright Chemistry Reports RCS Boron Conc 303 ppm taken 3/20/90 1033
1247	Emergency Terminated
1402	Running MG set shut down due to high Room temperature - will restart once CB Hyam units restarted
1407	2HS 115 and 2HS 7150 Opened to Waste gas system
LE 0651	Day Shift: RO G Ouellette, BOP RP Smith Status Bank D 228, RCS Tave 588.5 No Significant Problems
1418	14230-2 AC Source Verification Complete & SAT
1434	2HS115 + 2HS7150 Closed per RWO Request

eorgia Power Company
gtie Electric Generating Plant
Control Log

Nº 2603

Time - WRB Date 3/20/98

1647 OSP 14423-2 ON N1-31 Complete SAT
1651 MC
1715 WRB
1717 JCR
1728 14905-2 RCS Leak Rate Complete SAT —
Final Ident .033 final Unident .729
1731 Peo Reports from Aux boiler that U2 Rats being
sprayed with fire Water - Operator Dispatched
1736 UAT being sprayed Down PEO INSTRUCTED TO ISOLATE FIRE
Water to Deluge Spray
1230 14525-2 PR low SP ACOT Complete SAT
1741 Rat B Energized
1717 OSP 14423-2 SOUCE RANGE N35 ACOT N1-32
1748 2NA04 ENERGIZED FROM RAT B
51 2MO
1752 2NAB ENERGIZED
1755 Main Turbine ON TURNING GEAR
1759 Start Oil Lift Pump for RCP 2 RCP 4
1814 LR
1828 Start ACCW pump 1 - Stop ACCW Pump 2
1837 Relieved by Robert Rowland SAO
1937 Night shift ops: LQR Rowland BOP L Overby
Unit Status: 0% Power Tave 557°F

2-122

Georgia Power Company
Vogtle Electric Generating Plant
Unit 1 Shift Supervisor Log

№ 5413

Time	Date 3-20-90
0000	New day - same conditions as before
0017	OSP 14005-1 Shutdown Margin Calculation for Mode 5 entry complete & sat.
0230	JCR
0301	18 mo. Calibration on 1RE-003 per 43690-1 comp. & sat.
0355	OSP 14801-1 NSCW XFR Pump IST complete & sat.
0411	OSP, 14001-1 Shift Area Temperature log complete & sat. for 0400 hours.
0456	JDH
0502	OHC
0527	CBS
0546	Relieved by Bruce Snider David T. Woodfin Jr.
0622	OSP 14811-1 '0970 Dual Check Vlve IST' reviewed [illegible]
0720	SHIFT COMPLEMENT (UNIT #1) DATE: 3-20-90 — Mode 6
	OSOS [illegible] RO [illegible] FIRE TEAM
	UNIT SS [illegible] BOP [illegible] LEADER [illegible]
	SUPPORT SS [illegible] ABO [illegible] [illegible]
	STA FUNCTION [illegible] SSO [illegible] [illegible]
	SHIFT CLERK [illegible] TBO [illegible] [illegible]
	RWO [illegible] CBO [illegible] [illegible]
	ASO [illegible]
	OTHERS
0740	Authorized 24625-1 'RE-006' ACOT
0820	Loss of "A" RAT - power to AA02 lost - only RHR train lost. A D/G started - then tripped. [illegible] Entered AOP 18031-1 & 18017-1
0841	D/G 1A auto started by resetting sequencer. Tripped on low jacket water press
0856	D/G 1A locally emergency started, tied to bus automatically [illegible]
0857	Site area emergency declared for Unit 1 - loss of power > 15 min + loss of offsite & onsite power
0900	RHR pump "A" started - core exit thermo. @ 136°F
0903	Commenced cooling core via A RHR
0915	Emergency notification [illegible]

Georgia Power Company
Vogtle Electric Generating Plant
Shift Supervisor Log

№ 5414

Time: WM   Date: 3-20-90

Time	Entry
0924	S/G manways secured
[illegible]	[illegible]
0942	Equipment hatch bolted
1003	Air lock functional
1029	Power restored to "B" RAT
1040	1BA03 energized from normal source
1042	"B" train ACCW energized
1136	"B" RHR started & placed in service. "A" running on miniflow.
1157	Paralleled "A" D/G & AA02
[illegible]	[illegible]
1247	Emergency terminated
1248	OSP 14001-1 Temp Rounds reviewed SAT for 1000 dy.
1248	OSP 14000-1 "Tech Spec Rounds" reviewed SAT for Mode
[illegible]	[illegible]
1326	D/G A untied from grid & secured in standby.
1419	"A" RHR on line, "B" train secured
1530	OSP 14225-1 "Oper. Weekly Surv. Log" reviewed complete & SAT.
1400	OSP 14001-1 Temp Rounds reviewed SAT for 1400 dy.
1630	D/G "A" standby checklist reviewed SAT
1650	WRB
1703	[illegible]
1715	[illegible]
1720	Entered LCO 1-90-351 on A D/G & B D/G inop.
1741	Energized "A" RAT
1824	Relieved by B. Diehl Bruce Snider

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Georgia Power Company
Vogtle Electric Generating Plant
Unit 2 Shift Supervisor Log

2-123

N° 2875

Time 0028 Date 3-20-90

0028 24807-2 RUST L-991 ACOT complete and sat.
0050 Enter T.S. 3.2.1 action a., AFD outside target band.
0052 AFD restored within target Exit T.S. 3.2.1 action a. (2 penalty minutes)
0058 AFD 3-20-90 Enter T.S. 3.2.1 action a, AFD outside target band.
0100 AFD restored within target. Exit T.S. 3.2.1 action a. (4 penalty minutes total)
0125 Enter T.S. 3.2.1 action a, AFD outside target band.
0126 AFD restored within target. Exit T.S. 3.2.1 action a. (5 penalty minutes total)
[illegible] band.
0138 AFD restored within target. Exit T.S. 3.2.1 action. (6 penalty minutes total)
0141 AFD outside band
0142 [illegible] (7 penalty minutes total)
0153 AFD outside band
0154 AFD inside band (8 penalty minutes total)
0155 AFD outside band
0156 [illegible] (9 penalty minutes total)
0157 14553-2 ESF Room Cooler and Safety Related Chiller Flow Path Verif. by [illegible] complete and sat.
0358 14001-2 Shift Area Temp rounds reviewed complete and sat.
LE0100 Received ALB10D06 annunciation. Initiated 14915-2 Data Sheet 3.
0458 [illegible]
0505 [illegible]
0518 [illegible] CBC
0522 Relieved by G. Moore [illegible]
0551 [illegible]
0558 No further entries this page

Georgia Power Company
Vogtle Electric Generating Plant
Unit 2 Shift Supervisor Log

№ 2876

Time | Date 3-20-90

SHIFT COMPLEMENT (UNIT #2)			DATE: 3-20-90		
OSOS	HOPKINS	RO	OULLETE	FIRE TEAM	
UNIT SS	G. MOORE	BOP	R.P. SMITH	LEADER	CHRISTIANSEN
SUPPORT SS	CHASTIANSEN	ABO	MORRIS		GRANT
STA FUNCTION	SNIDER	OAO	MCDANIEL		BRANTLEY
SHIFT CLERK	P. JENKINS	TBO	BRANTLY		GOODRUM
RWO	HARPER	CBO	GRANT		JACKSON
	WILKERSON				
OTHERS:					

PLANT STATUS 100%, 1180 MW, 291 PPM, 226 STEPS, 588.6 °F
OOS U1 TRN 'B' CBCR HVAC, RE003, FCRV 456A, C3 SUMP PPS IN MANUAL, DRPI, PHY 94 & PI 438, PMG +24V, CNMT MAX CLR, 2HV 9422, RE 2532 'D' COND. VESSEL, WGS LEAK TEST

0556 AUTHORIZED START OF LOOP 1 ΔT-TAVG ACOT; 24810
0743 AUTHORIZED START OF 24334 ON CCW PI 1874
0817 24810 COMP SAT
0820 [illegible] RX TRIP [illegible] GEN [illegible]
0821 MANUAL MSLI
0827 ENTERED 19001-2
0830 BROKE COND VACUUM DUE TO LOSS OF ALL BUT DC EMER LUBE OIL PP
0851 SECURED TD AFW
0902 SITE AREA EMER DECLARE FOR U1 LOSS OF ALL AC
0930 SITE AREA DOWNGRADED TO ALERT
1100 TRIPPED RUNNING CIRC PP DUE TO REPORTED CIRC. PP VIB., PEO DISPATCHED TO PUMP REPORTED BOTH PUMP DISCH'S OPEN AND THE IDLE PP WAS VIBRATING - NEED TO SHUT DISCH VLV'S ON BOTH PP'S PRIOR TO STARTING EITHER
1035 ENTERED 12006 - #1 & #3 RCPS RUNNING - 2BA03 ENERGIZED BY THE 'B' D/G
1142 SHUTDOWN MARGIN 14005 COMP. SAT.
1247 EMERGENCY TERMINATED
1404 ENTERED LCO 2-90-097
1807 AUTHORIZED START OF 24553 TT-RX TRIP
1432 14230 COMP. UNSAT DUE TO 2BA03 BEING POWERED FROM THE EMERGENCY DIESEL GENERATOR
1446 24555 COMP. SAT.
1530 24695 - AUTHORIZED START OF HI Ø AT S/D
1545 DANNY JAMES OF THE FAA WAS INFORMED THAT THE UNIT 2 COOLING TOWER LIGHTS ARE OFF

Georgia Power Company
Vogtle Electric Generating Plant
Unit 2 Shift Supervisor Log

Date 3-26-90

Time	
1656	
1709	CV2 B
1716	24696-2 COMP. & SAT FOR U31 & U32
1741	Power restored to RAT "B"
1744	JCR
1822	RELIEVED BY J ROBINSON
1822	Night shift on: JC