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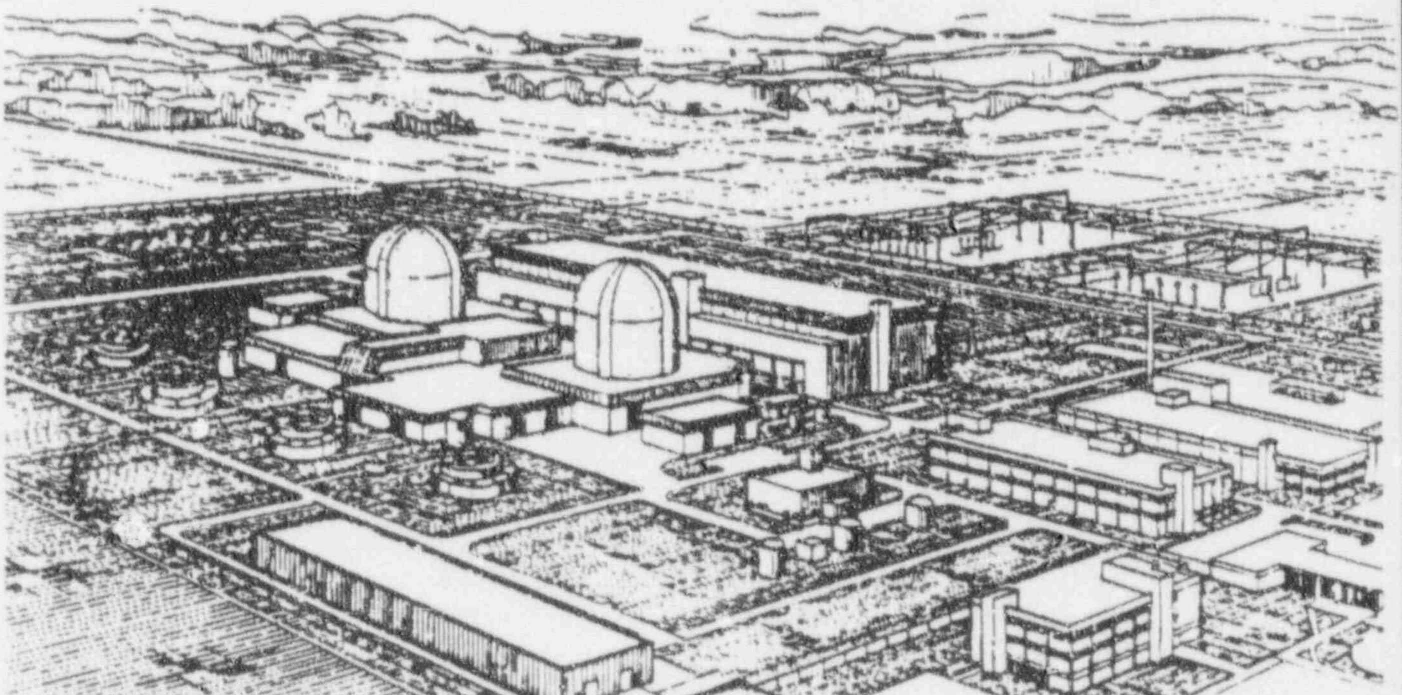
Georgia Power

VOGTLE ELECTRIC GENERATING PLANT

HANDBOOK FOR

GENERAL EMPLOYEE BADGE TRAINING



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The purpose of this document is to prepare employees and others for the examination required to obtain badge authorization for access to the Vogtle Electric Generating Plant site. This training is required for initial badge authorization, and is required on an annual basis to retain badging authorization.

Revisions from previous editions will be marked in the left border of the document with a revision code. The following is an example:

| This is an example of the revision code.

If there are questions pertaining to any items or sections in this document, please contact the Training Department at Plant Vogtle.

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List of Illustrations

INTRODUCTION

This General Employee Badge Training (GET) Handbook has been prepared to familiarize employees with knowledge and terminology in the following areas:

- Vogtle's description and basic design.
- VEGP's Administrative policies and procedures.
- Individual worker responsibilities for quality and safety.
- Identification of the various emergency conditions and alarms.
- Individual responsibilities and action responses for the classes of potential emergency conditions.
- Security procedures and responsibilities including methods for entering and exiting restricted areas.
- NRC regulations, guidelines, limits and policies.
- Methods to work safely in radiologically controlled areas and with radioactive materials.
- Basic radiation protection policies so that you, the employee, will have the basics necessary to establish a level of professionalism that would encourage your co-workers to perform their work responsibilities in a manner as safe and professional as you do yours.

A glossary of terms and a list of acronyms that are frequently used in nuclear power plant facilities have been provide as a reference.

Remember, the information in this manual is provided with one goal in mind, to assist you, the employee, in being the safest possible worker, thereby, making VEGP's work environment as safe as possible.

The Handbook is designed to allow the new employee to read it on his own, or to follow along in the text during a classroom lecture. Handbooks should be distributed to new employees during in-processing.

Each trainee is expected to read the sections on Plant Overview, Administrative Policies, Quality Assurance, Fire Protection, and Industrial Safety before attending the Badge Training Class. The employee must sign a form acknowledging that these sections have been read upon attending the class.

ACRONYMS

AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
ARM	Area Radiation Monitor
CAM	Continuous Air Monitor
CAS	Central Alarm Station
CCB	Chemical Control Block
CFR	Code of Federal Regulation
DC	Deficiency Card(Green Card)
DRD	Direct-Reading-Dosimeter (Pocket Dosimeter)
ED	Emergency Director
EDRD	Electronic Direct-Reading Dosimeter (Alarming Dosimeter)
EOF	Emergency Operations Facility
ERF	Emergency Response Facility
FPE	Fire Protection Engineer
FSAR	Final Safety Analysis Report
HP	Health Physics
ICRP	International Commission on Radiation Protection
MWO	Maintenance Work Order
NCRP	National Council on Radiation Protection
NOUE	Notification of Unusual Event
NRC	Nuclear Regulatory Commission
OCA	Owner Controlled Area
OSC	Operations Support Center
OSOS	On Shift Operations Supervisor
PA	Protected Area
PSAR	Preliminary Safety Analysis Report
QA	Quality Assurance
QC	Quality Control

RCA	Radiologically/Radiation Controlled Area
RWP	Radiation Work Permit
SAS	Secondary Alarm Station
SCBA	Self Contained Breathing Apparatus
SOR	Significant Occurrence Report
SS	Shift Supervisor
STA	Shift Technical Advisor
TLD	Thermoluminescent Dosimeter
TSC	Technical Support Center
VA	Vital Area
VEGP	Vogtle Electric Generating Plant

PLANT VOGTLE

Overview

Georgia Power Company's second nuclear generating facility is composed of two units (I & II) that are essentially identical and capable of producing approximately 1160 megawatts of power each.

Plant Vogtle is owned in part by Georgia Power Company. Percent ownership of the facility is as follows: [1]

Georgia Power Company	45.7%
Oglethorpe Power Corp.	30.0%
Municipal Electric Authority of Georgia(MEAG)	22.7%
City of Dalton	1.6%

Plant Vogtle is located approximately 35 miles southeast of Augusta in Waynesboro, Georgia.

Georgia Power undertook the construction of Plant Vogtle to meet the growing energy demands of the future. The population of Georgia and the Southeast is steadily rising along with economic growth and strength. Energy demands grow proportionally to population and economic growth.

The types of generating facilities[1] within the Georgia Power Company are:

Coal	80.49%
Hydro	3.60%
Nuclear	15.84%
Oil	0.04%
Gas	0.03%

Coal is the source which produces approximately 80% of the electricity sold by Georgia Power Company. There are many environment problems associated with the generation of electricity from coal.

The basic reasons Plant Vogtle was chosen as a nuclear facility rather than coal are as follows:

Less pollution is given off to the environment from nuclear power.
Nuclear fuel is cheaper than coal.
Less land area is needed to build a nuclear facility.

Electricity Production

Steam turbines are by far the most common method of supplying mechanical power to rotate generator shafts in power plants. The difference between plants is how the steam is produced. Whatever method is used to produce steam, it must supply heat in enormous quantities to generate the steam required to drive steam turbines.

In fossil fuel plants, heat is produced by burning coal, oil, or natural gas. With nuclear power plants, heat is produced from the nuclear fissioning of uranium.

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[1] Information from Facts & Figures 1989 Georgia Power.

In a nuclear power plant, a nuclear reactor replaces the boiler in the fossil fuel power plant. Instead of continuously preparing, injecting and burning fossil fuel, nuclear fuel produces the heat required to generate steam and this fuel is replaced about once a year in the reactor.

The heat generated in nuclear fuel is transferred to a fluid called the reactor coolant that flows pass the fuel.

There are two types of reactors that use water as the coolant.

1. Boiling Water Reactor (BWR)
2. Pressurized Water Reactor (PWR)

Plant Vogtle is a PWR facility.

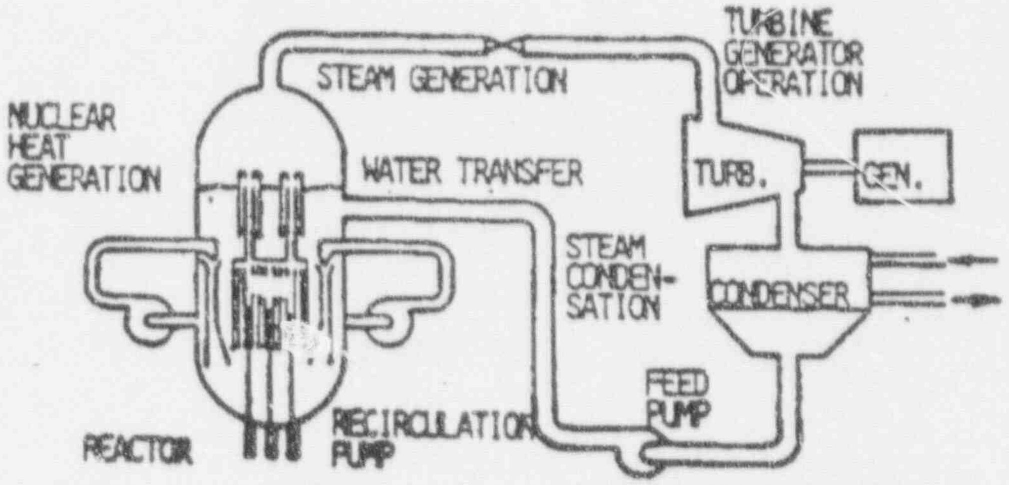

Figure 1. Basic Design of a BWR

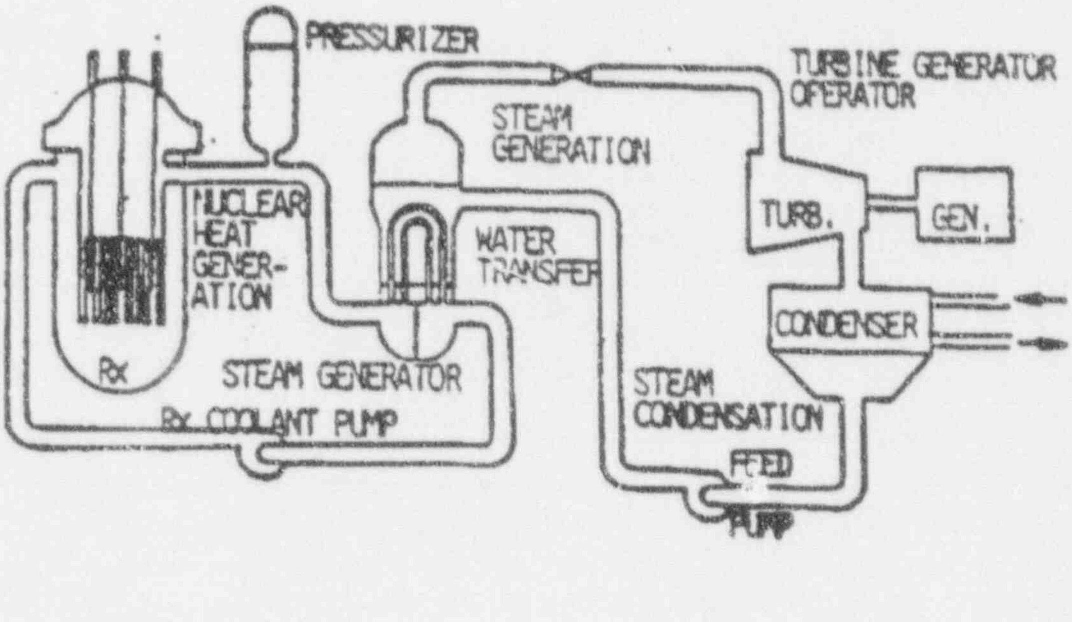

Figure 2. Basic Design of a PWR

In a BWR, heat is produced in the nuclear fuel and results the boiling of the coolant in the reactor. Steam from the reactor is transferred directly to the turbine.

In PWR, the coolant is kept at high pressures in the reactor to prevent boiling. The coolant heats up as it flows past the fuel and is pumped to large heat exchangers called Steam Generators, where it gives up its heat to a completely separate system containing water. This water is at a lower pressure than the reactor coolant and it boils when heated and is thereby converted to steam for use in the turbine.

After steam is generated, the basic processes in a PWR and a BWR are the same. Steam expands through a turbine, causing the turbine and generator shafts to rotate.

Heat--(steam)- > Turbine--(mechanical energy)- > Generator-- > Electricity

Once steam is condensed it is returned to where it was generated; the reactor in the BWR and the steam generator in a PWR.

Nuclear Steam Supply System (NSSS)

The Nuclear Steam Supply System for each unit at Plant Vogtle is a Westinghouse 4-loop PWR. In addition to the reactor, each unit contains ***4 Reactor Coolant Pumps*** (keeps reactor coolant circulating through the reactor), ***1 Pressurizer*** (maintains a pressure of 2235 psi on the reactor system) and ***4 Steam Generators*** (utilize heat from the reactor coolant to produce steam which is transferred to the turbine).

The Containment Buildings house the NSSS for each unit. They have concrete walls 3'9" thick with a 1/4" carbon steel liner. The dome is 2'6" thick.

All buildings and structures surrounding the Containment Buildings except the Administration Building are physically enclosed. This area is the ***Protected Area***. It is surrounded by a high-security fence and is patrolled continuously by the security force. The area is also monitored by an Intrusion Detection System and Closed-Circuit TV.

Isolation Zone - Restricted area, twenty feet on either side of the protected area. This area is to be kept clear of personnel vehicles and any equipment at all times.

Plant Vogtle Site Map

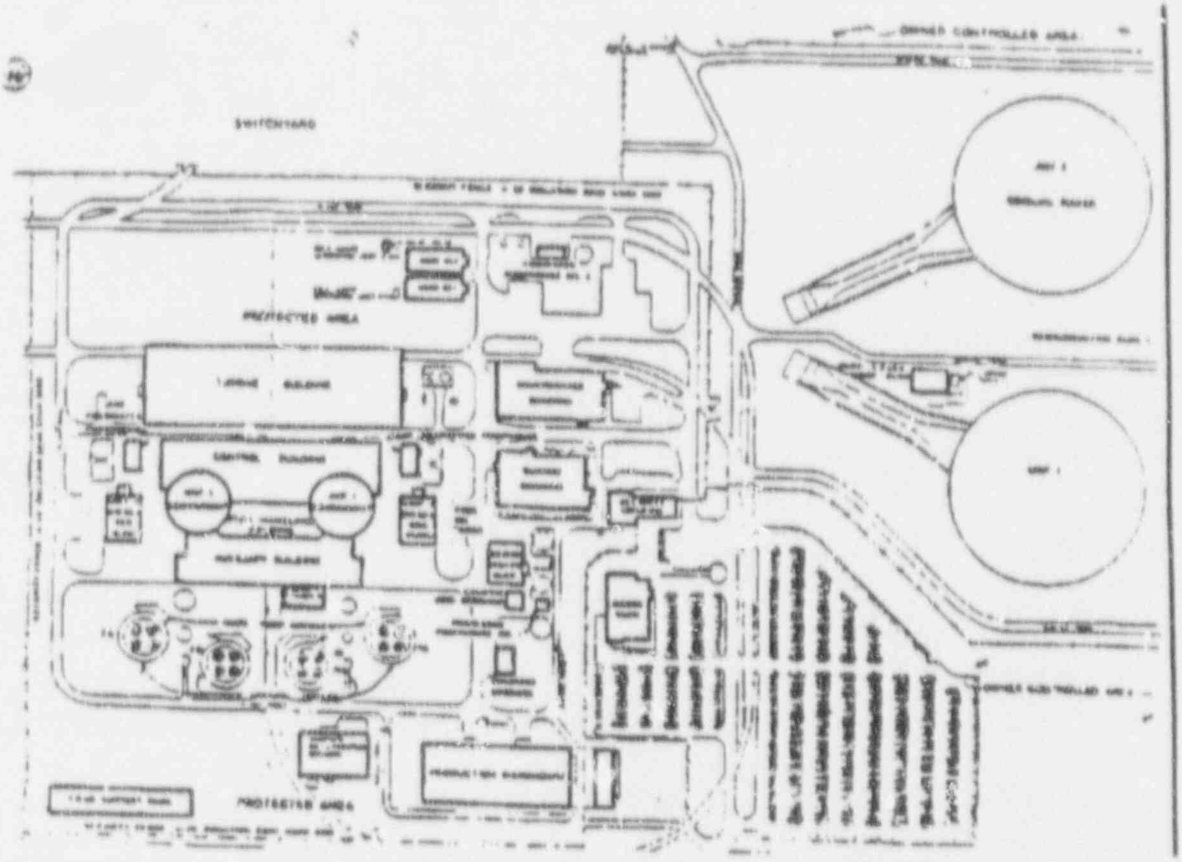

Figure 3. Vogtle Site Map

Plant Organization

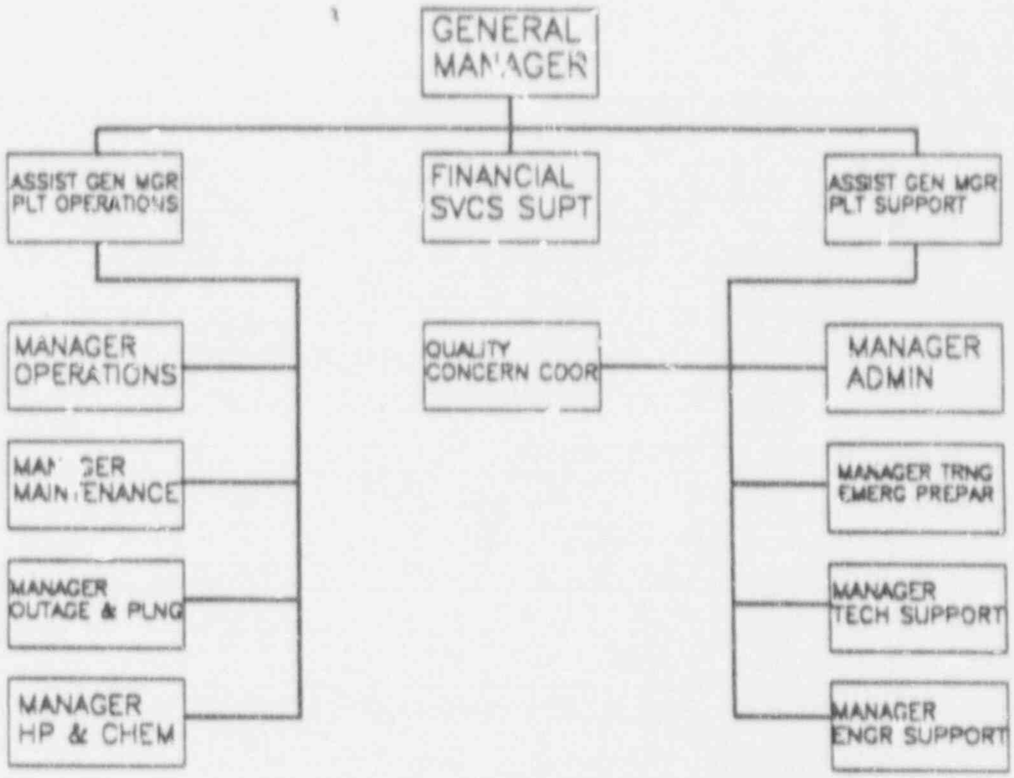

Figure 4. Plant Organization

Plant Administration

The following is a minimum list of some management policies that are required to be observed by all employees at VEGP site.

1. Policy 1 - **Safety** on the job is of the utmost importance. You are responsible for your safety and the safety of those working with you.
2. Policy 2 - **Quality is everyone's responsibility.** Intentional disregard of Quality requirements is strictly **prohibited.**
3. Policy 3 - **The badge** issued to you by the Georgia Power Company at Plant Vogtle is to be used **only by you** when entering or leaving the plant site. No one is to gain entrance or leave the plant in any other way other than by use of the access badge. Further, site personnel should produce their identification upon request.
4. Policy 4 - Possession, use or distribution of **drugs** or **alcoholic beverages** will **not** be allowed on site.
5. Policy 5- All personnel are responsible for the safe operations and proper parking of vehicles.
6. Policy 6 - An employee must telephone the plant site and inform his immediate supervisor if an unavoidable hardship should occur such as illness, accident, or automobile failure which would prevent or delay his reporting to work. All employees must inform their supervisor of any time they will be absent from work.
7. Policy 7 - Theft or dishonesty in any form will be cause for dismissal and may subject the individual to criminal prosecution.
8. Policy 8- Telephones, intercoms and radios are provided as a service for ***Business*** use only. Employees guilty of telephone misuse, subject themselves to the same disciplinary actions as for theft.

9. Policy 9 - Eating, drinking, smoking or chewing tobacco or gum in restricted areas, especially radiologically controlled areas, is prohibited and may result in termination.
10. Policy 10 - Gambling, lotteries and other games of chance or activities of this nature are not allowed on Company property.
11. Policy 11 - Other forms of unauthorized solicitation not previously covered e.g., campaigning, handing out non-job related literature and the selling of food or material items is prohibited.
12. Policy 12 - *Firearms*, other than those in locked vehicles, are not allowed on Company property, with the exception of those in the posession of our Security Department, law enforcement agency visitors, or specifically approved by the General Manager. Hunting weapons which remain locked in employees' vehicles are allowed in designated parking areas.
13. Policy 13 - Personal cameras and radios are not allowed in the protected area except by special permission.
14. Policy 14 - Defacing property in any fashion will not be permitted. This includes writing or drawing on walls or equipment; unauthorized removal of tags, nameplates, or components from any equipment.
15. Policy 15 - The posting and/or displaying of paintings, drawings and photographs of the nude or partially nude human body will not be permitted at any location on the Company property.
16. Policy 16 - Sleeping or fighting on the job site will not be permitted.
17. Policy 17 - Hunting or fishing will not be permitted on company property unless specifically approved.(Fishing is permitted at the recreation area pond.)
18. Policy 18 - The refusal to abide by established search procedures will not be tolerated.
19. Policy 19 - Harassment in any form (sexual, racial, religious, etc.) will not be tolerated.
20. Policy 20 - It is essential that all personnel understand and comply with tagging procedures and requirements prior to working on or operating any equipment, valves, etc.
21. Policy 21 - All personnel requiring unescorted access at Plant Vogtle must sucessfully pass General Employee Training (GET) annually. Georgia Power employees will be allowed up to three (3) attempts to pass GET. If they do not sucessfully pass GET, they will be disciplined as follows:
    - 1st attempt - counseling
    - 2nd attempt - written memo to file
    - 3rd attempt - termination

    Contractor personnel may be allowed up to two (2) attempts to pass GET.
22. Policy 22 - All plant (and contractor) personnel are responsible for plant cleanliness. All personnel, as part of their job requirements, will pick up trash, i.e. cigarette butts, paper, candy wrappers, etc. All plant personnel are responsible for cleaning each work area after performing a work activity. Work activities are not considered complete until proper collection and removal of trash, garbage, debris, litter, spills, and/or tools are accomplished.

These rules are considered to be an employment requirement.

Vogtle Nuclear Operations Anti-Alcohol and Drug Policy

Illegal Drugs

No individual shall use, sell, or have in his or her possession illegal drugs (defined as any drug or drug-like substance whose sale, use or possession is unlawful) during working hours or while on Georgia Power Company property at any time. No employee or individual shall report to work with illegal drugs in his or her system. No employee or individual shall be involved with unlawful activities concerning illegal drugs or narcotics on or off Company property.

Alcoholic Beverages

No individual shall use or have in his or her possession alcoholic beverages during working hours or while on Georgia Power Company property. Alcoholic beverages shall not be served at any function on Company property without the prior approval by the appropriate senior officer of

Georgia power Company as designated by the Chairman of the Board and Chief Executive Officer. No individual shall report to work with alcohol in his or her system in execess of .02 grams. Off-site involvement with alcohol that results in a criminal convection will be reviewed by management to determine what appropriate action, if any, is applicable.

Prescription Medicine

No individual shall abuse prescription or over-the-counter medication or use medication that is prescribed to another person. Individuals shall report the use of physician prescribed medication and or over-the-counter medication which may affect their ability to perform their job duties in a safe manner to their supervisor for a determination of fitness-for-duty. Every effort will be made to adjust the employee's duties until he can resume normal and safe work activities. If alternate duties are not available, the employee may be subject to temporary lay-off.

Discretionary Testing

All personnel are subject to "for cause" drug and/or alcohol screening tests in order to determine whether or not they are fit for duty. Any individual refusing to submit to such tests, when directed by supervision, will be discharged/terminated and barred.

Note: Any violation of the above policies will result in disciplinary action (up to and including discharge termination and barring) in accordance with existing company policies.

Random Testing

Effective December 1, 1988, random drug testing will begin for all GPC officers, managers, supervisors, and foreman. Additionally all vendors and contractor employees assigned to Nuclear Operations are subject to random drug testing. Effective March 1, 1989, all GPC employees are subject to random drug tests.

Search

All individuals, vehicles, property, equipment, and storage areas on the Company property are subject to search, to include searches by drug dogs. This includes individuals and vehicles entering or leaving the property and all areas, equipment, personal work space, and storage facilities, including but not limited to, desks, lunch and tool boxes, lockers, storage bins, etc. Any individual refusing to permit a search of his or her person, property, vehicle, or controlled area will be discharged terminated and barred.

Second Chance Policy

GPC employees who test positive for drugs or alcohol (random, discretionary, or post-accident) may be allowed a "second chance" if they are currently included in the Company's random drug testing program. A subsequent positive test at <u>any</u> time during their employment will result in termination.

Employee Assistance Program

All individuals who have drug or alcohol dependency problems should seek professional help. GPC employees have the Employee Assistance Program - (EAP) which is a confidential short-term counseling and referral service designed to help individuals resolve their personal, financial, legal, drug and alcohol dependency problems. Discipline will not be taken as a result of a self-referral or any findings from any medical evaluation conducted as a result of the self-referral. However, individuals identified by Georgia Power Company to be in violation of this policy cannot avoid disciplinary action by subsequently volunteering to participate in the EAP. Other Plant Vogtle employees are encouraged to utilize the Employee Assistance Program or a similar type assistance program, as necessary.

Use of Procedures

The following rules have been developed for the use of procedures:

1. Know the procedure system well enough to be sure you are using the right procedure.
2. In an undefined condition, place equipment in a safe condition per procedure: Safety **ALWAYS** comes first.
3. Do not execute a procedure that you know may cause injuries or equipment damage.
4. Develop a questioning attitude but execute procedures correctly.
5. Understand the procedure steps before doing.
6. Comply with the procedure step by step unless specifically permitted to do otherwise.
7. When procedure doesn't work, *stop*. Report procedure problems to your supervisor.
8. Uphold your individual responsibilities to make the procedure system work.
9. When you think of better ways to do things initiate procedure changes.
10. Make adherence to procedures a way of life.

For more specific details regarding use of procedures at Plant Vogtle refer to Procedure #00054-C.

QUALITY ASSURANCE

It is important that all employees understand the need for quality and realize that quality is the responsibility of all workers here at Plant Vogtle.

The Quality Assurance Department is an independent monitoring organization which provides confidence that all structures, systems and components vital to nuclear safety will perform satisfactorily in service.

This assurance is met only through the combined efforts of the QA department and each worker.

Title 10, Code of Fed Regulations 50.34

10 CFR 50.34 requires a Quality Assurance program for all nuclear power plants.

Quality is of utmost importance to Georgia Power Company because of its concern for the safety of its workers as well as the general public. For this reason, GPC would have a Quality Assurance Program even if it were not required by law.

10 CFR 50, Appendix B

10 CFR 50, Appendix B establishes the QA requirements for design, construction, and operation of a nuclear power plant.

Quality Assurance comprises all those planned and systematic actions necessary to provide adequate confidence that a structure system or component will perform satisfactorily in service. It includes:

1. Quality Control - Quality Assurance actions which provide a system for ensuring that the proper standards of a material, structure, component, or system meet pre-determined requirements.
2. Lists the 18 Point Criteria Which details the minimum requirements for a QA program.

The 18 Point Criteria

1. Organization
2. Quality Assurance Program
3. Design Control
4. Procurement
5. Instructions, Procedures and Drawings
6. Document Control
7. Control of Purchased Material, Equipment and Services
8. Identification and Control of Materials, Parts and Components
9. Control of Special Processes
10. Inspection
11. Test Control
12. Control of Measuring and Test Equipment
13. Handling, Storage and Shipping
14. Inspection, Test and Operating Status

15. Nonconforming Materials, Parts or Components
16. Corrective Actions
17. Quality Assurance Records
18. Audits

Many QA criteria are included in the procedures used to accomplish assigned tasks.

Many aspects of work must be preformed at a specific time, in a specific location, in a specific manner, with a special piece of test equipment. Reports of work are documented in a specific manner so acceptable conditions can be verified or corrective actions can be accomplished.

IT IS IMPORTANT TO FOLLOW PLANT PROCEDURES !!

Violating plant procedures can cause non-compliance with QA, Technical Specifications, and applicable portions of the CFR.

Results of Violations

1. Civil Penalties (Fine, Jail term)
2. Non-Issuance or Revocation of Operating License

Authorities/Responsibilities of QA

1. Independent of production pressures
2. Direct access to responsible level of management
3. Identify quality problems
4. Initiate, recommend, or provide solutions to problems
5. Verify implementation of solutions
6. Control further operation until problems are corrected

Audits and Surveillances

QA department ensures quality through <u>Audits and Surveillances.</u>

Audit	Planned periodic examination of <u>activities</u> and <u>records</u> to verify compliance with all aspects of the QA program and to determine its effectiveness.
Surveillance	Less formal method of monitoring work in progress for identifying problems or potential problems. Routine or special tour of plant facilities by QA personnel for observing specific or overall plant conditions.

Reports of Non-Compliance or Deficiencies

Georgia Power Company gives all workers at its nuclear facilities the opportunity to report any suspected or observed non-compliances or deficiencies of procedures or regulations.

Any person employed at VEGP may submit a Quality Concern:

1. In person to the QCP Coordinator
2. By telephone using TOLL-FREE Number
3. By mail or collection box by using QCP form

All concerns are treated **Confidentially** and are investigated. Investigations are fully documented and results are reported back to individual submitting the concern (i.e., if it was not anonymous).

Note: Any worker who observes or suspects non-compliance with procedures, regulations, or safety requirements should report the condition to his/her immediate supervisor or the next higher level of management.

The appropriate form for reporting observed or suspected deficiencies in the plant to management is the Deficiency Card, also called the DC or Green Card. Blank cards may be obtained from the Control Room or the Clearance and Tagging Office in the Control Building. Completed cards can be returned to the same locations. Plant Admin. Procedure 00150-C has more information on the use of this card.

Any concern that is reported and does not receive a reasonable and satisfactory response from management should be reported directly to the NRC.

Record Keeping

Maintaining a written account of information, facts or data.

1. Record making and keeping are very important aspects of this facility.
2. All employees especially those involved in making and keeping records must do so according to regulations and requirements.
3. Violating NRC regulations caused by intentional acts may subject the facility, the individual wrongdoer and others who know of such violations and condone them to criminal prosecution.

Note: Do not Falsify Records or Documents: ***Maintain Records Accurately!***

Record Changes

Any changes made in records documents should be lined through, corrected, initialed and dated by the person making the corrections. The following example illustrates the manner in which corrections are to be made:

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Example:  The pressurizer maintains a pressure of ~~1200~~ 2335 B 1/3/89 psi on the
reactor coolant system.
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Figure 5. **Example of correction of documents/records**

DO NOT use 'Whiteout', Erasures, Gummed labels or obliterate errors by any other means.

FIRE PROTECTION

Definition

A fire is a rapid persistent chemical reaction that gives off heat and light.

Components of a Fire

Oxygen, heat and fuel in proper proportions create a fire. Remove any one of the three elements and a fire cannot exist.

Classes of Fires

Listed below are the classes of fires and the most appropriate extinguishing agents:

CLASS	EXAMPLE	SYMBOL	EXTINGUISHING AGENT
A	Wood,Paper	Green Triangle	Water
B	Flammable Liquids Gases, greases	Red Square	Dry Chemical
C	Energized Electrical Equipment	Blue Circle	Dry Chemical
D	Combustable metals such as K, Al, Zr, Na Mg, etc.	Yellow Star	Dry powder agent

Figure 6. Classes of Fires

Vogtle Fire Response Procedure (92005-C,Rev3)

Describes the actions that each worker should practice to prevent fires and actions to be taken in the event of a fire.

1. Instructions
   a. It is the responsibility of every person on the Vogtle site to keep their work area and the surrounding area clean and free of fire hazards.
   b. Anyone who discovers an obvious or suspected fire hazard should immediately notify the Fire Protection Engineer *(FPE) X4341.* It is the responsibility of every person on the Vogtle site to become familiar with the evacuation plan and location of exits in the event of a fire.

2. Reporting Fires
    a. If you discover a fire, immediately notify the *Control Room at X4444* and give the following information:
        1) Location of the fire
        2) Description of the fire (class,size)
        3) Your name.
    b. Person reporting a fire should stay on the telephone until released by the Shift Supervisor unless physically endangered.
    c. Person reporting the fire should not attempt to extinguish the fire unless he has been trained on the use of the available fire protection equipment and he feels confident based on VEGP training received that he can do so safely.

WARNING

Keep in mind that most of the furnishings in Plant buildings emit toxic fumes when burned. These fumes may be colorless, odorless and can be lethal in very small concentrations.

    d. Control Room personnel can be notified of a fire condition by the activation of a fire alarm in the Control Room or by an individual reporting a fire.
3. Fire Evacuation Plan
    a. Upon hearing a fire alarm, all personnel not involved in fire fighting duties (Fire Alarm Response Team) will evacuate the building as quickly and orderly as possible via safest, nearest exit.

CAUTION

DO NOT use elevators to evacuate any building!!!

    b. Follow any special instructions which may be given by a supervisor, Fire Alarm Response Team Member or given during announcement of fire.
    c. Upon exiting the building, personnel should report to their immediate supervisor at the rally point for a head count. If supervisor is absent, report to the next level of supervision available.
    d. Results of the head count should be reported to the senior permanent site employee at that location.
4. *Rally Point Location* - Reporting area for employees upon hearing a fire alarm. For the buildings on site, rally point locations are listed below:
    a. **Administration Bldg** - Parking lot on south side of PESB.
    b. **Nuclear Training Bldg** - Far east parking lot
    c. **Maintenance Bldg** - Far east side of building
    d. **Service Building** - Maint bldg parking lot or open area by Condensate storage tanks.
5. Evacuation of Power Block Areas[2]
    a. Power Block Structure Alarm

    Upon hearing a fire alarm, all personnel not engaged in fire fighting duties will exit the fire area plus any area ordered evacuated by the Fire Team Capt or PA announcement.

    b. If the fire is in a RCA (Radiollogically Controlled Area)
        1) Personnel in the affected area should exit immediately. If personnel are in a contaminated area they should exit immediately and once in a safe area, notify HP so contamination control measures can be initiated.
        2) Personnel outside the affected area should remain alert for further instructions and/or announcements.
        3) Follow any special instructions given during announcement of the fire.

[2] Evacuation is in accordance with the Site Emergency Plan and information listed, which is sections 3.8.2 and 3.8.3 of Procedure 92005-C Rev.3.

Fire Barriers

1. Items described in the FSAR (walls, ceilings, floors) designed having 1 to 3 hours fire resistance ratings for isolation of fires.
2. Penetration sealing systems used for piping penetrations through fire barriers provide both necessary piping flexibility and containment of smoke and flames.
   a. Cables, cable trays, conduits and piping penetration at fire barriers are sealed to give the same hourly rating as that of the fire barrier.
   b. Penetration openings through fire area boundary barriers for ventilation systems are protected by fire dampers having ratings equivalent to that of the barrier.
3. Doors through fire barriers have fire ratings of the same measure as those required of the barrier and are of certified fire resistive construction.

   These doors are either normally secured self-closing, automatic closing-type or normally secured closed.

IMPORTANT

FIRE DOORS SHOULD NOT BE PROPPED OPEN WITHOUT A FIRE WATCH BEING IN EFFECT. ONLY WORK UNDER AN APPROVED MAINTENANCE WORK ORDER (MWO) IS GROUNDS FOR PROPPING OPEN A FIRE DOOR. EACH EMPLOYEE CONDUCTING SUCH WORK IS RESPONSIBLE FOR ENSURING THAT A TRAINED, PROPERLY EQUIPPED FIREWATCH IS POSTED BEFORE WORK STARTS AND THROUGHOUT THE DURATION OF THE WORK.

Fire Protection Systems

There are several automatically activated fire suppression systems installed here at Plant Vogtle. They are:

1. Sprinkler System
2. Water Spray Deluge
3. Halon System

The Halon System displaces the oxygen in the atmosphere of the area it protects. When the system is activated an alarm sounds. The system can be activated up to 15 minutes without posing a danger to personnel in displacing oxygen. However, heated Halon gases can be injurious and workers should leave the area as quickly as possible.

If the system is activated ***DO NOT PANIC*** -respond as follows:

1. Leave the room immediately
2. Close the door behind you
3. Evacuate the building

Locations of Halon System on site:

1. Hot Shutdown Panels
2. Computer Room-Level A Control Bldg
3. Record Storage Area just inside the control room
4. TSC
5. Document Control record storage areas
6. Security Alarm Stations (CAS & SAS)
7. Portable Halon extinguishers located in the switchgear rooms in the Turbine Building

Fire Brigade

Consists of the Fire Brigade Leader (SS) who will be in charge at the fire scene and a four man team from the Operations Department who are organized to deal with fires and related emergencies which might occur on site.

Each member of the Fire Brigade has received training in fire-fighting and plant safety related systems.

The Fire Brigade is on duty 24 hours a day, 7 days a week.

Smoking Rules

It is important to adhere to smoking rules. All plant locations that prohibit smoking will be designated with *NO SMOKING* signs.

Smoking is prohibited in vital areas (Power Block) or any other location designated as *NO SMOKING*.

Transient Fire Loads

Any combustible material, structure, or potential ignition source that enhances the possibility of a fire in vital areas.

Transient fire loads reduce the design specifications of fire barriers.

Example of Transient Fire Loads.

- Wooden Scaffolding
- Wooden Ladders
- Flammable Liquids

A permit is required from the FPE(Fire Protection Engineer) before any transient fire load is taken into vital areas. Each worker is responsible for ensuring that he has a permit before he takes transient combustibles or ignition sources into a safety-related area of the plant.

Control of Ignition Sources

A *BURN PERMIT* is required any time an ignition source is used outside of designated areas in the Power Block. Housekeeping requirements are to be met prior to use of the ignition source and additional fire protection equipment may be required. For additional information refer to Procedure no 92020-C.

General Information on Fire Protection

1. Types of extinguishers in use on the plant site:
   a. ABC - Dry chemical
   b. Pressurized water
   c. Halon
2. Hose stations are located in all buildings on site except the Nuclear Training Center. (In using the hoses, be aware of high pressure.)
3. Fire Protection Procedures 92000-92100 outlines the Procedures and guidelines for fire protection and equipment used on site for personnel safety and safe plant operation and shutdown.
4. Each worker is responsible for ensuring that his work does not block access to fire protection systems or equipment in the event they are needed.

INDUSTRIAL SAFETY

Safety policies, procedures, and activities that are to be observed by all employees in order to maintain an effective safety program and thereby enhance the quality of the work environment here at Plant Vogtle are addressed in this section.

Personal Protective Equipment

1. Plant workers are responsible for their safety and the safety of those working with them. An important part of this responsibility is to always follow procedures, guidelines regarding use of personal protective equipment. This equipment is used to help shield the worker from hazards.
   a. **Safety shoes-** Substantial working shoe with a defined heel must be worn in the Power Block, Warehouse (excluding office area), Demin bldg., Machine shop, Cooling Towers and River Intake Structure.
   b. **Hard hats-** All persons within the Protected Area (PA) of the plant shall wear a hard hat while traveling from place to place, or working except in the following locations in the PA or on plant site:
      1) Control Room
      2) Office Area
      3) Warehouse (designated areas only)
      4) Maintenance Bldg (designated areas require protection)
      5) Service Building
      6) Simulator Training Building
      7) Administration Building
      8) Travel to and from Plant Entry Security Building
      9) Areas requiring a RWP
      10) Fuel Handling Areas

      Note: Hard Hats are no longer required in areas that have both tile floors and tile ceilings. Hard hats are required in the alley between the Control and Turbine bldgs., as well as to and from the Control bldg.
   c. **Safety Glasses-** Are no longer required unless the job and/or area you are in requires their use.
   d. **Ear Protection-** Should be worn in high noise places.
   e. **Dust Masks-** Should be worn in areas where necessary to protect against inhalation of dust and other flying particles.
   f. **Safety Belts,Harnesses,Face Shields-** Are to be worn where the procedure requires or when instructed to do so by supervision. Ensure that they fit properly and are used correctly.
2. Proper Dress - Clothing worn should be suitable for the job being done and the work location. While on the job site:
   a. Shirts with buttons must be buttoned.
   b. Tank tops, mesh shirts, and short pants are prohibited on the plant site.
3. Clothing and Jewelry Hazards
   a. All outer clothing and jewelry should be removed to dress-out in protective clothing to enter a contaminated area. Personal items should not be taken in RCAs.
   b. Rings, wrist watches or other jewelry should not be worn when working on or near energized lines or moving, rotating machinery.

Note: *Be Cautious of activities that may pose a hazard as a result of wearing jewelry or other items.*

IMPORTANT!! ALL VEGP EMPLOYEES

Reporting On The Job Accidents and Injuries

Anytime you are injured while on the job you must report it immediately to your immediate supervisor. You will fill out a form 907 (First report of injury) and get your supervisor to sign. This form must be sent to the Corporate Safety & Health Office, on site, no later than the next working day.

Medical Assistance/Doctor Visits

1. First Aid treatment and a Nurse are available to treat work-related injuries, minor illnesses, or ailments. ***Emergency Phone Numbers: EXT 4444 (O.S.O.S.) and 4225 Medical Rm.***
2. Anytime an on the job injury requires medical treatment, other than by Safety or the site nurse, Company doctors will be used. According to state law, a panel of physicans has been established and this list is posted on bulletin boards around the site. Only these doctors will be used for on the job injuries. If you need to see a doctor, come by the nurse's office or the Corporate Safety Office and pick up the appropriate paper work to carry with you to the doctor's office.

   If a doctor's care is required after normal working hours, contact the O.S.O.S. He will give you the home phone number of the nurse or Safety & Health Advisors to contact. If for some reason you cannot contact the O.S.O.S or Safety, you may go to a hospital emergency room for treatment. The next day the Nurse or Safety Advisors must be contacted for further instructions. No personal doctors are to be used unless they are on call at the emergency facility you choose to use.

Housekeeping

1. Activities that are required of all employees to maintain plant areas and its environment to prescribed cleanliness, fire protection, and safety requirements.
   a. Clean-Up - Proper discarding of trash, debris, litter, proper handling of spills generated while performing a task, and return of tools used in performing a work task. The task is not complete until the work area is clean.
   b. Decontamination - Tasks performed to remove or reduce the level of contamination on personnel, equipment and specific areas.
2. It is important to keep the plant as "clean" as possible to enhance radiation protection. Always keep your work area clean, orderly and free of potential hazards. Plant cleanliness enhances safety, minimizes the spread of contamination and radwaste generation.

Smoking, Eating and Drinking Policy

1. In all cafeterias, breakrooms, office spaces and other areas specially identified for these purposes by posted notices, SMOKING, EATING, and DRINKING are allowed.
2. In the following areas, smoking, eating and drinking are prohibited except as specifically posted:
   a. Radiologically or Radiation Controlled Areas(RCAs) any posted radiation, high radiation, airborne radioactivity, contaminated or radioactive materials storage area.
   b. Battery Rooms
   c. Building Equipment/HVAC rooms
   d. Security Badge Islands
   e. Labs, Sample Stations, Counting/Instrument rooms

f. Cable spreading rooms and immediate vicinity of cable trays.
g. Diesel generator, AFW, Demin Water treatment plant buildings
h. Auxiliary, Containment, Fuel Handling, Radwaste and Control Buildings
i. Document Control records storage area and vault
j. Micrographic/reproduction work areas
k. Designated "clean areas"
l. Any other area, room and building specifically designated by management

The absence of containers for disposal of waste generated as a result of smoking or other uses of tobacco, eating, and drinking shall indicate that such activities are not allowed in the area.

Safe Work Procedures for Closed Vessels, Confined Spaces, Wet Locations and Systems

Safe work procedures describe proper/safe work actions or practices to ensure that a safe work environment is established for personnel required to work in closed vessels, confined spaces, or wet locations and on systems where combustible gases may be present. Included are instructions to account for personnel, equipment, tools and materials carried into and later removed from these spaces during work activities.

1. Descriptions of locations are as follows:
   a. Closed Vessel - Any enclosed volume/space closed off from the normal atmosphere usually during normal operating modes (areas normally sealed shut). EXAMPLES: Steam Generators, Feedwater heaters, condensers, storage tanks, pressurizers, drain tanks, Generator casings and Transformer oil reservoirs.
   b. Confined Space - An area which by design has limited openings for entry exit; unfavorable natural ventilation which could contain or produce dangerous air contaminants and which is not intended for continuous occupancy. EXAMPLE: Include but not limited to sewers, underground vaults, pipelines ventilation and exhaust ducts.
   c. Wet Location - Places with accumulations of moisture capable of providing a constant path for electric current. EXAMPLES: Closed Vessels and confined spaces not thoroughly drained.
2. General Precautions and Limitations
   a. Vessels containing any gas except normal air at atmospheric pressure shall be marked with "DANGER" signs at all possible points of personnel entry. The signs are posted when the gas is injected into the vessel and will remain in place until it is permanently cleared.
   b. Preparation for entry into a closed vessel or confined space includes affixing "ENTRY CAUTION" and "NO SMOKING" signs within 15 feet and at all possible points of personnel entry. Each "ENTRY CAUTION" sign which is signed and dated, must indicate that the atmosphere in the vessel has been tested by qualified personnel and is safe for entry.
   c. Personnel are required to wear or use proper personal protective equipment (such as hardhats, gloves, footwear, respirators, PC, welding hood, etc.) for the job and or as required by a Radiation Work Permit (RWP).
   d. A RESCUE PLAN shall be specifically designed for each entry into closed vessels or confined spaces. Before entry, all work crew members shall must be fully aware of all details of the plan. This plan shall be posted for frequent review at each entry point, where work is to be performed.
   e. Before unlatching opening the cover of a closed vessel, make sure that the air or gases contained within are at atmospheric pressure.
   f. Smoking shall not be permitted inside closed vessel or confined spaces.

WARNING

Never use pure oxygen to purge a vessel or confined space prior to entry nor while working in it to enhance breathing air. This could increase the potential for fire hazards.

Ensure that a radioactive, toxic or combustible atmosphere being purged does not endanger personnel in the venting area.

3. Safety Precautions to be taken prior to entering a closed vessel.
   a. All workers assigned to open a closed vessel are to be informed of any chemical or physical hazards before starting the opening of the vessel.
   b. Inventory of workers, tools, equipment and material is recorded on the Closed Vessel, Confined Space, Tools, Equipment Material Inventory form.
   c. RWP is issued if vessel interior is a Radiation Control Area.
   d. Tools and Equipment inspected to ensure that they are in a safe working condition. Electrical equipment should be properly wired and grounded.
   e. Training for rescue should be developed and all involved workers familiar with procedures and equipment required to remove a person from a closed vessel.
4. After opening vessel and before allowing work:
   a. Before initial entry into a closed vessel, ventilate it with fresh air to displace remaining stagnant air, vapors, mists, dust or gases and to prevent exposure to temperature extremes.
   b. Use fans, if possible to blow air into the vessel. Open a hatch or port on its opposite side and away from workers in the immediate area.
   c. In a radioactively contaminated area, have HP tech re-check radiological conditions; contaminated dust may have been disturbed by circulating air.
   d. Workers making initial entry (usually air testers) should wear respiratory protection equipment, approved safety harness, wristlets or vest with lifelines as determined by procedure or work supervisor.
   e. Post at least two workers outside a vessel during initial entry.
   f. Designated rescuers posted outside the vessel shall:
      1) Have an appropriate fire extinguisher.
      2) Be able to communicate with workers inside by voice, airhorn, telephone or other means.
      3) Be fully cognizant of rescue actions to take.
      4) Man lifelines and have a self-contained breathing apparatus (SCBA) ready to don.
      5) Have battery-powered lights (explosion-proof flashlights) available in case of power failures.

WARNING

During work inside of closed vessels, observe the following precaution:

All workers shall leave the closed vessel or confined space immediately, if strange odors, breathing difficulties or unusual sensations such as headaches and/or dizziness is noticed.

Protective Tagging

Procedural instructions that are provided for requesting issuing and releasing clearances on plant equipment or systems to ensure safety of personnel and protection of equipment during maintenance, testing or inspection.

1. Clearance - An authorization/permit to work on plant equipment that has been safely isolated.
   a. Hold Tags (Red Tags) are placed on equipment for which clearances are issued and released. The *TAG* indicates that operation of the piece of equipment or component to which it is attached is *STRICTLY PROHIBITED* in all circumstances.
   b. Functional Test Tag is placed on equipment in place of Hold Tag. This Tag indicates allo... testing of the equipment after it has been repaired.
2. Removal of any tag or operation of equipment upon which tags are attached without appropriate authorization is *STRICTLY PROHIBITED*.

WARNING

No Hold Tag shall be attached/removed without authorization from the shift supervisor.

Safety Harness Policy

1. Safety harnesses, wristlets or vest are provided for personnel if procedure requires or if it is determined by supervisory personnel that this equipment is needed in performing the job.
2. Fall protection equipment such as safety belts, and scaffolds are required when working 10 feet or higher off the ground or floor, and near open-sided floors and platforms when the possibility of a fall is present.

Spill Policy (SPCC Ref. Procedure 94001-C)

Procedure that outlines personnel actions in case of a spill of hazardous substances, hazardous wastes, or oil to minimize the potential for discharges of these materials into navigable U.S. waters.

1. Condition
   a. Detection of a hazardous waste substance spill is limited to the visible loss of integrity of the container which is known to contain such materials or the accumulation of such materials outside their containers.
   b. An oil spill may be indicated by:
      1) Oil slicks or suspected oil slicks at the discharge structure, in the yard drain effluents, or in the circulating water flumes.
      2) Oil in the DG day tank room floor or the DG room floor.
      3) Decreasing tank level in the underground fuel oil storage tanks not accounted for by use.
      4) Visual observation.
2. Individual Action

   All persons employed at Vogtle are responsible for reporting spills, leaks, or suspected leaks of oil, or hazardous substances waste. The person finding such an event is to notify the immediate supervisor, giving the following information:
   a. Time, place, type of incident (spill,leak,fire,release etc.),and <u>your name and present location.</u>
   b. Name and quantity of materials involved. Type and location of spill.
   c. Appropriate actions taken to contain the spill, leak, fire, and/or release. Estimate of quantity or extent of spill.
   d. Type cleanup in progress. Take appropriate action to contain the oil spill.
   e. Bodily injuries, extent of injuries, and hospital where injured person(s) is (are) taken if applicable.
   f. Potential hazards to human health or the environment outside plant boundaries and direction of flow of the potential hazard.
   g. Natural disaster associated with incident, if applicable i.e., tornado, earthquake, flood, or lightning.
   h. Individual notified by name and title.
3. In the event of a fire or explosion, the person finding the situation should undertake the following possible actions:
   a. Call the Control Room, Ext. ~~4444~~ immediately and provide your name, location, and a description of the situation.
   b. Check that fire doors are closed to isolate the affected area.
   c. Evacuate all personnel in the immediate area.
   d. Attempt to isolate flammable or combustible gases. Dispose of water, oil and solvents in proper containers.
   e. Remove injured personnel, as possible.
   f. Administer first aid, as qualified.
   g. Monitor the situation for Response personnel.

   Note: Actions taken by any worker(s) will depend upon the training received, keeping safety as the most important consideration. Take all necessary safety precautions when handling chemicals to prevent spills.

Heavy Equipment, Cranes and Hoists

1. Stay clear of work operations involving heavy equipment unless you are directly associated with the work.
2. Be cautious of overhead loads in areas where hoists or cranes are used. Stay clear of them.
3. Personnel using tuggers, spiders, baskets or other hoisting equipment are to be properly trained and authorized to use them.

Barricade Policy

Signs are to be placed throughout the power block and other locations as needed to warn personnel of areas where potential hazards exist due to the activities of the work being done or conditions.

OBSERVE ALL BARRICADES

The signs indicate that you must not enter the barricaded area unless associated with the work or authorized to do so. The barricade policy must be followed to ensure overall consistency and prevent possible injuries to personnel.

1. The barricade signs are yellow ban-gard tape, 3" wide with black lettering continuously repeating the message needed to prevent access into any area for specific reasons. The Barricade Policy is particularly vital during stages of equipment testing for turnover, startup and operations.
2. The following is a list of the barricade signs:

   a. **DO NOT ENTER** - Used when hazardous areas forbid any entry into the area.

   b. **MEN WORKING OVERHEAD** - Used when working, welding, cutting, rigging, etc. overhead poses a hazard to anyone below.

   c. **HIGH VOLTAGE** - Used when the danger of access into areas where high voltage testing of energized equipment, etc. exists.

   d. **RADIATION AREA** - Used for area where radiographic testing is in progress. Area is designated by magenta (purple) and yellow stranded rope with radiation signs attached to the rope and maybe red flashing lights at every accessible point of entry.

   e. **ORANGE FLAGGING BARRICADE MATERIAL** - Used to designate walk areas and roadways in outside areas where potential hazards exist and to warn of excavations, trenches, ditches, etc.

   f. Yellow Tape, 2" with a black stripe along the center is used to identify and designate storage areas when required in the power block.

3. Instructions to follow regarding Barricades:
   a. Barricades are always to be at least double stranded, at levels chest and below the waist high, at all points of entry or access into areas of exposure.
   b. Barricades are to be taken down and removed immediately when the hazard is corrected or resolved and the area is safe.
   c. Employees entering or directing others to enter a barricade area unauthorized is a serious matter and will be handled accordingly.
   d. Always follow the barricade policy to prevent exposure of any worker from a potential hazard unknowingly. Ensure that required areas are properly barricaded posted designated.

Drilling Into Walls or Columns

Activities that can create severe personnel hazards due to cutting, drilling, or digging into high energy fluid or electrical systems require special precautions.

1. To prevent accidental contact with embedded electrical circuits and reduce the risk associated with contact always follow the instructions given below:
   a. Plan work to avoid circuits. Where circuits are known to exist in an area of intrusion and cannot be precisely located verify that they are de-energized before work begins.
   b. If cutting or drilling is unavoidable in areas of high uncertainty, special tools or techniques designed for the application can be used that will isolate the worker from the circuit (insulating gloves and platform, remote control tools, etc.).
2. Any structure that contains embedded circuits will be marked or posted with warning signs. Take necessary precautions to prevent electrical shock.

Explosive Fire Hazards of Hydrogen

Hydrogen is a basic chemical element that has an extremely wide flammable range and the highest burning velocity of any gas. Its ignition temperature is reasonably high, but its ignition energy very low. Hydrogen contains no carbon, so it burns with a non-luminous flame which is often invisible in daylight. When released from containment, hydrogen presents both combustion explosion and fire hazards. The following conditions describe development of the hazards:

1. Hydrogen combustion explosions occur by very rapid pressure rises which are extremely difficult to vent effectively.
2. Open air or space explosions will occur from very large releases of gaseous hydrogen.
3. Gaseous hydrogen has a *LOW IGNITION ENERGY* when it is released at high pressure. Normally it will produce small heat sources; through the generation of friction and static resulting in prompt ignition releases in high pressure applications that will usually result in fires rather than combustion explosions.
4. A mixture of hydrogen and liquid oxygen is potentially explosive even when the quantities are small.
5. Areas in the plant where hazardous gas or mixture of gases may exist:
   a. Turbine generator exciter
   b. Hydrogen cooling gas in generator building
   c. Hydrogen or oxygen by radiolysis in the core and hydrogen for improved recombustion
   d. Off gases from vents
   e. Chemical Volume Control Systems (CVCS) - High concentrations of oxygen may be present; hydrogen is normally present
      1) Before breach of the following components, HP should test for Hydrogen prior to radiogas:
         a) Pressurizer
         b) Pressurizer Relief Tank
         c) Reactor Coolant Drain Tank
         d) Volume Control Tank
         e) Recycle Holdup Tanks
         f) Gas Decay Tanks
      2) It is your responsibility to ensure that tests are done and appropriate safety precautions are taken prior to breach of the components.
6. Areas in the plant where hydrogen or other hazardous gas mixtures may exist will be posted with warning signs of requirements of the area to make personnel aware of the potential hazards of the location and proper precautions to take.

Chemical Hazards

1. The Georgia Power Company maintains an inventory of over 5,000 chemical substances which may be hazardous to the users. Major categories of these substances include acids and caustics, solvents, cleaning agents, compressed gases, flammable liquids and paints. All of these substances may comprise physical hazards such as fire explosion, or health hazards such as sickness or death.
2. The basis of the plant's chemical control program is the Material Safety Data Sheet (MSDS) which lists ingredients, potential hazards, and protective measures. Employees should look at the MSDS before using the substance.

3. Emergency eye washers and showers are located throughout the plant for employees who have come in contact with the substances on their skin or in their eyes. Eyewashers should be used continously for 15 minutes. When using showers, the employee should enter the shower fully clothed and remove his clothing under the shower.
4. The following are important parts of the plant chemical control program:
    a. Uncontrolled chemicals in the plant should be reported immediately to the supervisor, the control room, and the chemistry department.
    b. Liquids are never poured into drains, sumps or open systems. Unused chemicals are returned to the Chemical Issue Area, waste goes to the waste storage area, and radioactively contaminated portions are given to HP for disposal.
    c. Only chemicals in appropriately marked containers can be brought inside the Chemical Control Block(CCB). The CCB includes parts of the plant, such as the Power Block, where foreign chemicals might intrude fluid systems.
    d. Chemicals with containers marked with a green sticker are allowed inside the CCB. Chemical containers marked with an orange sticker must remain outside the CCB.

Heat Stress Management

1. Heat stress is a major concern in the industrial workplace. Plant procedures define potential heat stress areas as any place with a dry temperature of 115°F or wet bulb temperature of 80°F. Some examples of these areas might be:
    - Containment
    - Steam Generators
    - Main Steam Valve Rooms
    - Spray rooms

    Supplemental cooling devices and a second worker present are required when the air temperature is between 120°F-160°F. Specific authorization of the plant manager or his designee is required for entry into areas where the temperature exceed 160°F.
2. Workers who are going into heat stress areas should wear light, loose fitting clothing, pace work and take frequent rest periods, and drink small amounts of cool water as frequently as possible.
3. Symptoms of heat stress include excessinve sweating; cool, clammy skin; flushed face; headache; confusion; loss of mental alertness; unquenched thirst; nausea or loss of coordination.
4. First aid for heat disorders include rest, immediate exit from the high temperature area, and increased cool fluid intake. Heat stroke is a genuine medical emergency and requires professional assistance. While waiting for health and safety, elevate the feet and lower the body temperature by whatever means available.

Reporting Hazards and Unsafe Conditions

Whenever hazards or unsafe conditions are found, they should be reported immediately to supervision and or the Safety Department. It is the responsibility of all employees to adhere to safety policies and procedures and to report any hazardous or unsafe conditions so that the necessary actions can be taken to correct the condition.

EMERGENCY AND DISASTER

Hazardous Conditions

The primary reason nuclear plant workers receive training on plant emergency conditions is so that they can protect themselves, their co-workers, and the General Public.

Unusual or hazardous conditions which may occur at Plant Vogtle/Hatch may be directly or indirectly related to radiological safety. Whether or not the condition is related to radiological safety will determine how the condition is handled.

Conditions that directly affect radiological safety should be reported to Health Physics. *EXAMPLES:*

- *Radioactive waste outside a Radiologically Controlled Area*
- *Radiation warning sign outside a Radiologically Controlled Area*
- *Portable tools with the "Hot Magenta" color outside a Radiollogically Controlled Area*

If the condition directly affects plant operation notify the Control Room. *EXAMPLES:*

- *Steam coming from a floor drain*
- *Liquid leaking from a pump seal*

When reporting an unusual or hazardous condition, provide the following information:

- Your Name
- Location of the Condition
- Description of the Condition
- Any additional information requested by HP or the Control Room

Contaminated Injuries

Injuries in radiologically controlled areas of the plant may be compounded by the presence of contamination in or near the site of the wound. Treatment of contaminated injuries depends upon the severity of the injury.

- For minor injuries, the wound is surveyed and decontaminated prior to medical treatment.
- For major (life threatening) injuries, medical treatment takes priority over decontamination. In such instances, decontamination may be delayed until after proper medical treatment is given.

Note: Only the OSOS can call an off-site ambulance.

Area Radiation Monitor (ARM)

Device that continuously monitors radiation levels in the plant. An alarming ARM indicates that the radiation dose rate is higher than expected at that location. If an ARM alarm sounds where you are working, respond as follows:

1. Stop Work - Stop all work and leave the area immediately.

2. Protect Others - Warn other personnel in the location to leave the area immediately. Keep unnecessary personnel away from the area. Call HP and the Control Room, giving the location and description of what has happened. (This action may require closing doors and verbally warning approaching personnel).
3. Protect Yourself - Leave the area. When you think you are out of the affected area, read your dosimeter. If issued a Pocket Ionization Chamber and it reads 3/4 of the scale or greater, notify HP.
4. Follow Instructions - Follow instructions of HP personnel, your department supervisor, or instructions given over the PA system.

Continuous Air Monitor (CAM)

Device that continuously monitors the air for radioactive particles and gases. An alarming CAM indicates that the airborne radioactivity is greater than expected for that location. If the CAM alarms in your work area, respond as follows:

1. Stop Work - Stop all work which might be causing the airborne activity, (i.e., grinding,welding on contaminated components). You may be unable to determine the cause. Therefore, stop work and leave.
2. Protect Others - Warn other personnel in the area to leave immediately. Call HP and the Control Room and give them the location and a description of what has happened.
3. Protect Yourself - Move out of the affected area. If possible step outside the area and close the door.

Alarms and Actions

Several different emergency conditions could develop at Plant Vogtle. For each condition an emergency notification signal and appropriate responses for general employees have been established.

Emergency condition notification signals are as follows:

Emergency	*Signal*
Fire	Siren + PA
Security Alert	Steady Tone + PA
Natural Occurring Phenomenon	PA
Notify of Unusual Event (NOUE)	PA
Alert	Warble + PA
Site Area	Pulse + PA
General	Yelp + PA

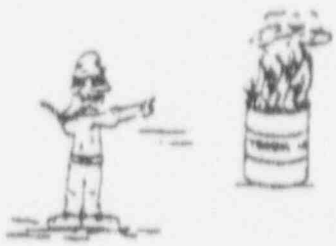
In high noise areas, *FLASHING RED LIGHTS* have been installed to warn personnel who might not be able to hear the public address system signal. If the flashing light is activated, all personnel should leave the area and inquire of other workers as to the nature of the emergency so that they are able to properly respond to the condition.

In order to avoid internal contamination, do not eat, drink, smoke or chew in the affected area during any type of *radiological condition* or declared emergency, alert or higher. For Alert Emergency, this means these activities are prohibited except in areas monitored by HP technicians. For Site Area and General Emergencies, these activities are prohibited everywhere on site except for specifically designated locations after they have been monitored.

Each type of emergency and the appropriate responses for emergency notification signals are detailed as follows:

Fire

PA Signal - Siren Tone



Actions:

1. Individuals Discovering Fire
   a. Contact the Control Room and give the following information:
      Your name
      Location of fire,type(class) and the size of the fire.
   b. Attempt to extinguish the fire (only if you have received training and are confident you can do so safely).
2. Other Individuals Not on Fire Team
   a. Remain at work
   b. Stay away from the area of the fire

Security Alert

PA Signal-Steady Tone

CONDITION - Bomb threat, civil disturbance or some form of overt threat.

Actions:

1. All personnel should remain at their present location, undercover, until further instructions have been received from Management, Security Supervisor or your immediate supervisor.
2. Escort visitors out of the PA.

Naturally Occurring Phenomenon

PA Signal-Page Announcement

CONDITION - Severe weather conditions occurring in the vicinity of the Plant (Tornado,Hurricane,Earthquake).

Actions:

1. All personel, including visitors, Seek refuge inside a designated permanent building.
2. Report to supervisor for instructions.

Notification of Unusual Event (NOUE)

PA Signal-Page Announcement

CONDITION - Unusual events in progress or have occurred, which indicate a potential degradation of the level of safety of the plant.

Actions:

1. Involved Personnel

   a. Contact the Control Room
   b. Give location, nature and extent of incident
   c. Limit incident, if possible
   d. Submit to survey for contamination, if necessary
2. Non-involved Personnel
   a. Observe PA announcement
   b. Stay clear of the area
   c. Observe for reclassification of emergency
   d. Continue normal work

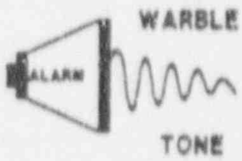
NOTE

> *ALL ESCORTED PERSONS SHOULD BE TAKEN TO THE SECURITY BUILDING (PESB) DURING A SECURITY ALERT AND ANY RADIOLOGICAL EMERGENCY EXCEPT NOUE.*

Alert Emergency

PA Signal-Warble Tone

CONDITION - Events are in progress or have occurred which involve actual or potential substantial degradation of the level of the safety of the plant.



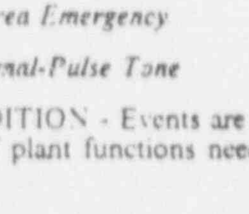
Actions:

1. Involved Personnel
   a. Immediately contact the Control Room
   b. Take rapid action to limit the incident, if possible
   c. Report to the designated Emergency Response Facility, if appropriate
2. Non-Involved personnel-Inside Protected Area
   a. Go immediately to the Administration bldg.
   b. Await further instructions from your supervisor
3. Non-Involved personnel-Outside Protected Area
   a. Remain at work station
   b. Await further instructions

Site Area Emergency

PA Signal-Pulse Tone

CONDITION - Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public (more severe than Alert-Evacuation status)



Actions:

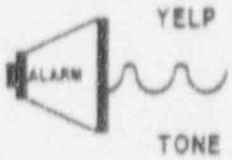
1. Involved Personnel
   a. Notify Control Room immediately.
   b. Take rapid action to limit the incident as you leave the area
   c. Report to assigned Emergency Response Facility (ERF) or evacuate the plant site.
2. Non-Involved Personnel
   a. Immediately evacuate the plant site and report to the designated Relocation Center.[3]

[3] Relocation Center: Meeting place for non-involved, non-essential personnel if evacuation is declared.

General Emergency

PA Signal-Yelp Tone

CONDITION - Events are in progress or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity.



Actions:

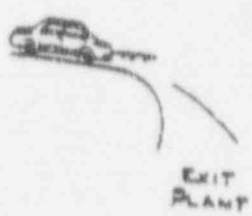
a. Involved Personnel
   1) Immediately notify the Control Room
   2) Take rapid action to limit the incident, if possible
   3) Report to assigned Emergency Response Facility (Essential Personnel[4]) or evacuate the plant site (Non-essential[5])

b. Non-Involved Personnel(Non-essential[5])
   1) Immediately evacuate the plant site and report to the designated Relocation Center.

Evacuation Procedure for Plant Vogtle

1. *Notification of Evacuation for Personnel Located Outside the PA*
   A High-Low Siren tone is activated by Security at the direction of the ED to warn personnel located outside of the PA that evacuation of the plant site is declared. Upon hearing the high-low siren tone, persons located in buildings, trailers, etc. outside the PA should go on the outside so that they can hear the page announcement of instructions for evacuation. The High-Low Siren tone is played for 30 seconds every Wednesday noon for testing purposes. In an actual emergency, it will be played for three minutes.

2. *All Non-Essential Personnel*



   a. Go immediately to your vehicle, exit plant site
   b. Report to the designated Relocation Center (based on wind direction) as directed by PA or Security officers on duty.
   c. Relocation Centers are:
      1) Plant Vogtle Employee Recreation Center-Primary Location
      2) Plant Wilson-Secondary
   d. Upon reporting to the Relocation Center, submit to a personal and auto contamination survey. If not contaminated, you will be released to go home.
   e. Leave the center and exit by way of directions given.

3. *Essential Personnel*
   a. Report to assigned Emergency Response Facility

   Note: SITE EVACUATION may occur during a Site Area and/or General emergency or at any time when authorized/directed by the Emergency Director (E.D.) at Plant Vogtle.

Early Dismissal

1. This is a technique to get non-involved, non-essential personnel off the plant site.
   a. Leave work area.
   b. Go immediately to your automobile and exit the plant site in a safe, orderly manner. It is not necessary to go to a relocation center. "DO NOT PANIC"!! There is no need to rush. No radioactive materials have been released.

---

[4] Essential Personnel: Workers assigned to emergency response teams or specific duty stations during an emergency.

[5] Non-essential Personnel - Persons that are not assigned responsibilities during an emergency.

2. Early dismissal can only be authorized during NOUE or Alert Emergency.

Emergency Response Facilities (ERF's) At Plant Vogtle

1. *Technical Support Center (TSC)*
   a. Location: Dedicated area just outside the main Control Room.
   b. Function: Provides management and technical support to the Control Room for plant activities.

      Primary information source to the EOF and the NRC for plant operations.
   c. When Activated: Alert or higher emergency is declared and E.D. authorization.
2. *Operations Support Center (OSC)*
   a. Location: Maintenance bldg-2nd floor
   b. Function: Provides an assembly point for shift support personnel (man power) for assignment of duties in support of emergency operations.
   c. When Activated: Alert or higher emergency is declared and E.D. authorization.
3. *Emergency Operations Facility*
   a. Location: VEGP Training Center (Simulator Site)-Basement, South Wing. Alternate location: GPC Waynesboro District Office.
   b. Function: Overall management of recovery operations, offsite radiological assessment and coordination with offsite authorities.
   c. When Activated: Site Area or General Emergency is declared and E.D. authorization.

      Note: Personnel assigned to the TSC and OSC must use the Security card readers when entering or exiting those facilities during a radiological emergency.

Emergency Planning Zones

The emergency plan designates Emergency Planning Zones (EPZ's) for the area surrounding the plant. There are two such zones, the 10-mile EPZ and the 50-mile EPZ.

1. 10-mile EPZ

   Because the 10-mile EPZ is the area within a 10-mile radius of the plant, it is in this area that people will be in the most danger of exposure to high concentrations of radioactive materials. Because of the risk of exposure, the 10-mile zone is also called the Plume Exposure Pathway Emergency Planning Zone. In this zone, short-term protective actions will be taken to reduce or prevent exposure from a radioactive plume.
2. 50-mile EPZ

   The 50-mile EPZ, which includes the 10-mile EPZ, is the area within a 50-mile radius of the plant. Because the concentrations of radioactive materials would be much lower outside the 10-mile EPZ, and, therefore, direct exposure from the plume less significant, the emphasis in the 50-mile EPZ is on the long-term protective actions rather than immediate ones. These actions are designated to prevent radiation exposure as a result of ingesting contaminated food or water. For this reason, the 50-mile EPZ is also called the Ingestion Exposure Pathway Emergency Planning Zone.

Emergency Information

1. Role of the company spokesperson

   The company spokesperson is the only authorized point of contact between the company and the news media during radiolocical emergencies. Normally he is a member of the company's Public Information Department. No other person is authorized to make statements to the news media.
2. Company policy on the release of information
   a. It is GPC policy to provide full disclosure and maintain open and honest communications with public officials.

b. We also provide prompt and accurate information to the public through established information channels. The company will make every effort to meet the information needs of the public and the company employees while continuing prompt communications with public officials.

c. All statements made to the media, the public or employees are released only after having been approved by a public information manager and the plant Emergency Director.

d. For NOUE and Alert Emergency, news releases will be made from the Vogtle Visitors Center. For Site Area and General Emergencies, an Emergency News Center will be set up in Waynesboro for this purpose.

3 Information for employees and their families

a. Company employees who are members of the Emergency Response Organization will be notified at home by telephone concerning radiological emergencies, Alert or higher, which occur while they are off duty.

b. Georgia Power supplies every residence and business in the 10-mile EPZ with a weather radio. These radios remain on standby untill activated by an emergency signal transmitted by NOAA(National Oceanic and Atmospheric Association). This is the primary means of notifying the public, employees and their families in the 10-mile EPZ.

c. Employees and their families who live beyond the 10-mile EPZ will receive information over the public and private radio and television stations as news is released from the Visitor's Center or Emergency News Center in Waynesboro, Ga.

VEGP Emergency Catagory Summary
Actions for Non-Involved Personnel

	NON-RADIOLOGICAL[1]			RADIOLOGICAL			
	Fire	Naturally Occuring Phenomenon	Security Alert	Unusual Event[2]	Alert Emergency[2]	Site Area Emergency	General Emergency
Condition	Fire	Earthquake, Cyclone Hurricane, Tornado	Action or Event Which Threatens Plant Security	Possible Degradation of Plant Safety	Possible Substantial Degradation of Plant Safety	Possible Failure of Safety Systems	Possible Core Degradation or Melting
Signal	Siren	Page Announcement	Steady Tone + Page Announcement	Page Announcement	Warble Tone + Page Announcement	Pulse Tone + Page Announcement	Yelp Tone + Page Announcement
Actions For All Plant Personnel	Remain at Work; Stay Away From Threatened Areas	Seek Shelter in Designated Severe Weather Shelter or Other Substantial Structure	Remain at Work Location Under Cover				
Actions For Non-Involved Personnel In PA	Remain At Work; Be Alert For Change In Status				Report To Admin Bldg; Await Instructions	Evacuate To Designated Assembly Area[3]	
Actions For Non-Involved Personnel Outside PA		Remain At Work; Be Alert For Change In Status					
Action For Escorts With Visitors In PA			All Visitors Return To PESB During Security Alert		All Visitors To Be Returned To PESB, Logged Out, Given Evacuation Instructions In Case Evacuation Is Ordered.		

1. At the discretion of the Emergency Director, or as required by regulation, any non-radiological emergency may serve as the basis for declaration of an unusual event or higher level radiological emergency.
2. At the Discretion of the Emergency Director, non-essential, non-involved personnel may be removed from the plant site by early dismissal during these two level of emergency. Reporting to an assembly area is not required during early dismissal.
3. Specific assembly area will be determined by the Emergency Director based on wind direction at the time of evacuation.

Figure 7. Summary of Emergency Responses

SECURITY

Inherent Responsibility

As employees of a nuclear power plant, we have an inherent responsibility to both our fellow employees and the local population for the safe operation and security of the plant.

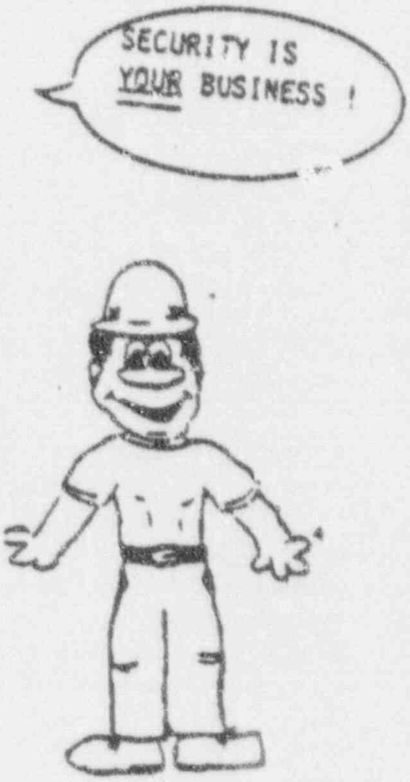
This responsibility to Security is outlined in Title 10, Code of Federal Regulations (10 CFR).

Security Responsibilities

The ultimate responsibility of plant security rest with the General Manager of Nuclear Operations or his designated alternate.

The Security Department Force is responsible for implementing security policies and procedures for the Security program at Plant Vogtle to include the following Controlled Area classifications:

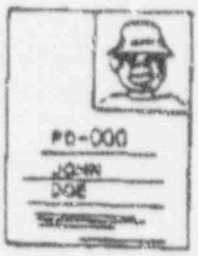
1. **Owner Controlled Area (OCA)**- All Georgia Power Company property associated with Plant Vogtle.
2. **Protected Area (PA)** - Portion of the plant site which is surrounded by a high-security fence.
3. **Vital Area (VA)** - Locations within the protected area such as the power block (Fuel Handling, Control and Aux Bldgs.), Containment, Diesel Generator and other buildings/structures housing vital equipment.
4. **Radiation Control Area (RCA)** - Locations in the plant where workers may receive occupational radiation exposure.



Employee Responsibilities

1. Understand the security system.
2. Learn its rules and procedures.
3. Assist security officers.
4. Report any security violations as quickly as possible.

Personnel Badging



1. Badge System is used to control the access of personnel to various locations at the plant based on qualifications and job requirements. Access to the Protected Area is through the Plant Entry Security Building (PESB).
2. Personnel access into and within the PA is controlled by Automated Controlled Access Terminals (ACATs), which are located in the PESB at the point of entry/exit into or from the PA, personnel entrance into and within the Control Building and at many Vital Area doors.

All nuclear operation employees are issued a Green Background Picture Identification Card which is to be worn, visibly displayed when in the owner controlled area.

3. To gain access to the protected area, report to the PESB, pass through Explosive-Metal Detector Portals, provide Security Officer in the Badge Island with name and Badge Number. Badges in use are as follows:
   a. **Yellow Background Picture Card Key Badge**-Allows unescorted access to the protected area and authorized vital and radiation controlled areas.
   b. **Blue Background Picture Card Key Badge**-Allows unescorted access to the protected area, but excludes unescorted access to vital areas and RCAs.
   c. **Visitor's Badge**- Red badge with the word "Visitor" stamped across the face. (No photo on the badge). Wearer's identity is recorded by Security when the badge is issued. Visitors must be escorted at all times. Escorted visitor access is authorized by the dept superintendent or a higher level of management.

   Note: Ensure that you are issued your Protected Area Card Key by the Security officer at the Badge Island.

   The visitor's badges can be used in the Card readers at the PESB turnstiles but may not be used at card readers to Vi[illegible] Area controlled doors. Ensure that you are issued your own Protected Area Card K[illegible] by the Security Officer at the Badge Island.
4. Using the ACAT and the Card Key
   a. ACATs (Card Readers) in the PESB have number key pads located on them.
      1) To enter the PA via the PESB, place the card key close to the face of the ACAT; the card key is scanned.
      2) Enter your personal access number into the number Key pad.
      3) Upon receiving a PASS light, enter the turnstile and pass through into the PA.

      Note: The turnstile will allow only one person to pass through at a time. Persons in line must wait for the person ahead of him to pass through the turnstile before presenting his her Card key to the ACAT. The "PASS" light for the person ahead must go out before the person behind presents his/her Card Key to the ACAT.
   b. To enter or exit other areas equipped with the ACAT, hold the Card Key in front of and close to the face of the ACAT. (No contact w/the ACAT is necessary).
   c. The ACAT scans the Card Key and unlocks the door or turnstile if the Card Key holder is authorized access to that area.

d. It is the responsibility of each individual to verify no one enters/exits an area before the door is again secured, unless that individual has presented his/her Card Key to the card reader or is being escorted.

The door must be immediately (within 10 to 20 seconds) closed to the locked position after entry or exit. If door remains open, the individual must notify Security prior to using the card reader and Security will implement appropriate measures. If Card Key fails to open the door, the individual must call the CAS. Report all door, reader or card problems to the CAS.

e. If a Card Key is presented at an ACAT and the holder is not authorized to access the area, the door will remain locked and an alarm will sound at Security.

Note: Do not attempt to access the PA or vital area locations that you are not authorized to enter. If you are unsure about your authorized areas of access, ask your supervisor.

f. When exiting the PA, the employee badges out at the PESB, turns his Card Key in at the Badge Island window, then walk through the HP portal contamination monitor and the badge and dosimetry detector.

5. Always wear your badge. Wear it in the protected area unless it causes a:
   a. Safety hazard
   b. Radiological hazard
6. Badge should be worn in the chest area where clearly visible at all times. If you must dress out in protective clothing and a security officer is not on duty at the control point to hold your card key, it should be placed in your coveralls pocket along with your dosimetry.
7. If you lose your badge, report the loss to Security and your supervisor immediately. Lost badges must be reported to Security within ten minutes of the time of the discovery of the loss.

Search

1. All persons, materials and vehicles are subject to search at any time while on the plant site.
2. For entry into the Protected Area:
   a. All personnel/visitors will be electronically scanned for metallic objects and explosives by passing through Metal and Explosive Detector Portals.
      1) All items in pockets must be placed on a conveyor belt and run through an x-ray machine as personnel/visitors pass through detector portals.
      2) A Hands-On Search will be performed if deemed appropriate by Security.
      3) Persons who refuse to submit to a search will be denied access to the Protected Area.
   b. All materials/packages will be x-rayed and/or hand searched, including those brought in the Receiving Warehouse.
   c. Access to the Protected Area will be denied any person who refuse to submit to a search.
   d. Vehicles will be thoroughly searched.

ATTENTION - FEMALE EMPLOYEES

Due to regulatory concern regarding females that alarm the explosive detector (does not apply to the metal detector) please note the following adjustment to the "Hands On Search" requirement:

- Females that wear pants will receive the same hands on search they are now receiving when they alarm the explosive detector.
- Females that wear dresses or skirts will be searched in the same manner as females that wear pants. However, if the garment fit does not facilitate the search, the garment will be raised/lowered as appropriate. A privacy area has been installed in the PESB for this purpose.
- Female searches will be performed by female security officers.

Note: If a female alarms an explosive detector, she has the option of not being searched and the denial will not be recorded against the female in any manner by Security. However, access to the PA will be denied, and the employee is responsible for attendance per existing plant policy.

Contraband/Prohibited Items

1. Fire arms, ammunition, explosives, incendiary materials, or weapons of any nature.
2. Alcoholic beverages or illegal drugs (or persons under the influence).
3. AM/FM radios or any other electronic entertainment devices, except by special permission.
4. Cameras, unless authorized by the General Manager's office.

Isolation Zone

A 20 feet area maintained around the entire protected area, both inside and outside the protected area fence. These two 20 foot zones are referred to as the "Isolation Zone" and are to be kept clear of personnel, vehicles, structures, and all equipment.

Any worker requiring access to the Isolation Zone will notify Security and receive a security escort prior to entering the area.

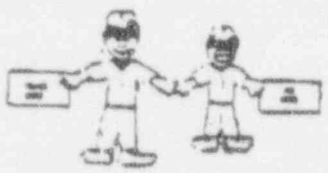
Vital Buildings

1. Normal access to the powerblock is through the Control Building Door. (C-125).
2. All external doors to the vital operating buildings are equipped with balanced magnetic switches to detect opening. The doors that are card reader equipped, require use of the card key.
3. For doors that are not card reader equipped, call Security at CAS/SAS before you enter or exit and provide the following information:
   a. Name
   b. Badge Number
   c. The door you are opening
   d. Purpose of passage: work related, inspection, operation, or maintenance.

Escort

1. Employees with Yellow Background Picture Card Keys have unescorted access to the protected area, authorized vital areas, and RCAs and may perform escort duties.
2. Persons with Blue Background Picture Card Keys have unescorted access to the protected area. If entering a vital area, the employees must be escorted; they may perform escort duties in the Protected Area only.
3. All other persons must be escorted at all times while in the Protected Area.

Escort Responsibilities



1. Ensure that visitor is properly logged in at PESB and receives necessary safety protective equipment.
2. Remain with and keep control of persons you are escorting at all times.
3. The maximum number of visitors that can be escorted:
   a. **Five (5) person, Vital Areas (VA)**
   b. **Ten (10) persons, anywhere else in Protected Area (PA)**

Designated Protected Area Vehicles

1. Vehicles within the protected area must be locked when not in use. Keys must be removed, but may be in possession of the operator with unescorted access.
2. Vehicles other than "designated vehicles" must be escorted by a security officer while in the protected area. If the vehicle will be inside for an extended time, the vehicle must be secured locked and the keys controlled by Security.
3. Fork lifts, tractors, and mobile cranes located outside of the buildings within the protected area will be locked, the keys removed with the steering wheel locked when not occupied.
4. *Maximum speed limit in the protected area is 10 MPH.*
5. All vehicles will be parked in such a manner as to allow a minimum of 20 feet clearance between the vehicle and any fence.

Material Control

1. All materials or items removed from the protected area must be authorized by a Material Pass which is presented to the Security Officer at the PESB upon exit from the area.
2. The VEGP Material Pass will authorize the removal of material or items from the protected area.
3. Packages and materials leaving the protected area may be screened by portal or portable monitors for radioactive contamination.
4. Security officers may ask to inspect any parcel, purse or lunch box for GPC property.

Unidentified Person/Intruder-Suspected Sabotage

1. An unidentified person is:
   a. Person improperly badged for the area.
   b. Person who has become separated from his escort.
2. Actions to take if an intruder is observed:
   a. Attempt to keep the person at the location.
   b. **Call CAS/SAS at Ext. 4051/4589 or 4015/4530**
   c. **Once the person has been** removed from the area, check it throughly for anything that **does not** belong there or something that the person might have tampered with.

Bomb Threats

1. The telephone bomb threat is probably the most common form of overt threat.
2. If you receive a bomb threat:
   a. Refer immediately to the Bomb Threat Checklist which is maintained near each telephone capable of receiving off-plant site calls. If no checklist is available, take notes on a piece of paper.
   b. Try to keep the caller talking and gather as much information as possible as outlined on the checklist.
   c. Notify **Security at Ext. 4051/4589.**
3. Bomb Search

a. The persons best qualified to conduct a bomb search are the persons who normally work in a given area. Knowledge of an area is of utmost importance when conducting a bomb search.
b. Public areas should be checked first. These areas are most readily accessible to the potential saboteur.
c. Maintain a calm atmosphere when responding to a bomb threat/search.
d. Security will assist, but not perform the search unless other personnel are unavailable.

4. Actions to take if suspected bomb/explosive device is found:
   a. Don't touch it.
   b. Don't operate a radio near it.
   c. Call **Security at Ext. 4051/4589.**
   d. Evacuate an area 300 feet in diameter around the device, one floor above and below the device.

Bomb Threat Checklist

INSTRUCTIONS FOR HANDLING BOMB/OVERT THREAT INFORMATION

TELEPHONE TECHNIQUE

1. BE CALM. BE COURTEOUS. DON'T INTERRUPT CALLER.
2. NOTIFY SUPERVISOR/OR FELLOW EMPLOYEE TO LISTEN IN.
3. PRETEND DIFFICULTY WITH HEARING. KEEP CALLER TALKING.
4. IF BUILDING IS OCCUPIED, INFORM CALLER THAT DETONATION COULD CAUSE INJURY OR DEATH.
5. IF CALLER SEEMS AGREEABLE TO FURTHER CONVERSATION, ASK THE FOLLOWING:

When will the bomb go off? ________ Certain hour ________ Time remaining ________

Where is it located? ____________ Building ____________ Area ____________

Are you familiar with the building (area)? ________ Yes ________ No

How do you know about the bomb? ______________________________

What is your name and address? ______________________________

REPORTING OF DATA

The following checklist must be completed immediately after the telephone call.

ORIGIN OF CALL		CALLER'S IDENTITY	
___ Local	___ Long Distance	___ Male	___ Female
___ Residence	___ Booth	___ Adult	___ Juvenile
___ Company Extension			
ACCENT		**VOICE CHARACTERISTICS**	
___ Local	___ Not Local	___ Loud	___ Soft
___ American	___ Foreign	___ Deep	___ High Pitched
___ Race		___ Raspy	___ Pleasant
		___ Intoxicated	___ Other
			____________
SPEECH		**BACKGROUND NOISES**	
___ Fast	___ Slow	___ Quiet	___ Bedlam
___ Distinct	___ Distorted	___ Voices	___ Music
___ Slurred	___ Lisp	___ Factory Machines	___ Office Machines
___ Stutter	___ Nasal	___ Trains	___ Airplane
	___ Other	___ Animals	___ Mixed Party
	____________	___ Street Traffic	___ Other
		___ Atmosphere	____________
MANNER		**LANGUAGE**	
___ Calm	___ Angry	___ Excellent	___ Poor
___ Rational	___ Irrational	___ Educated	___ Abusive
___ Coherent	___ Incoherent	___ Foul	___ Other
___ Deliberate	___ Emotional		____________
___ Righteous	___ Other		
	____________		

WRITE OUT THE MESSAGE IN ITS ENTIRETY ON THE BACK OF THIS FORM.

Date ____________

Employee Name ______________________ Time ____________

706159 H1 *Notify Security 3911, Immediately*

Figure 8. Bomb Threat Checklist

Reporting Security Violations

1. All observed, suspected, or self-committed Security violations should be immediately reported to Security at Ext. 4051/4589.
2. It is the responsibility of all employees at VEGP to support the security program by observing its policies and procedures and by reporting violations, unusual activities and intruders in the work area.

REMEMBER, SECURITY IS EVERYONE's RESPONSIBILITY.

RADIATION PROTECTION

TERMS

Term	*Description*
Activity	The number of nuclear transformations occurring in a given quantity of material per unit of time.
Acute Radiation Exposure	To receive a very large dose of radiation in a short period of time.
Airborne Contamination	Radioactive material that is dissolved or suspended in the air.
ALARA	Acronym for "As Low As Reasonably Achievable", the principle for developing work practices using time distance and shielding to minimize radiation exposure.
Alpha Particle	Positively charged particle emitted from the nucleus of an atom and composed of two protons and two neutrons.
Background Radiation	Low level radiation from natural or man-made sources that is always present.
Beta Particle	Negatively charged particle emitted from the nucleus having mass and charge equal to that of the electron.
Chronic Radiation Exposure	To receive a small amount of radiation exposure repeatedly over a long period of time.
Compound	Combination of two or more elements. For example, a combination of hydrogen and oxygen makes water.
Contamination	Radioactive material where it is not wanted and where it can get onto or into the body.
Curie	The special unit of activity. One curie equals exactly 3.7x10 to the tenth nuclear transformations per second.
Decay	Disintegrations of the nucleus of an unstable atom by emission of radiation.
Decontamination	Removal of radioactive material from an undesired location.

Disintegration Per Minute(DPM)	The number of nuclear events occurring per minute. For contamination control purposes, DPM is expressed as dpm/100cm².
Dose	The amount of radiation exposure a person receives to his body.
Dose Rate	The speed/rate at which the body receives radiation dose per unit of time (Rem/hr or mrem/hr).
Fixed Contamination	Radioactive material that has become firmly embedded in an object. It cannot be spread easily and is very difficult to remove.
Gamma Ray	Short wavelength electromagnetic radiation emitted from the nucleus of unstable atoms. Gamma rays have no mass and are very penetrating.
Half-Life (T1/2)	Time required for a radioactive substance to lose one-half its original activity by decaying.
Ionization	Process by which atoms or molecules take on positive or negative charges.
Isotope	Any two or more atoms of an element having the same atomic number (# of protons) but with different atomic mass numbers and different nuclear properties. A radioactive isotope emits radiation as it decays to a stable state.
Millirem	1/1000 Rem (1000 mrem = 1 Rem)
Max Permissible Concentration(MPC)	Concentration of radioactivity in air or water which must not be exceeded without the use of appropriate respiratory equipment or dilutionto control internal contamination.
Protected Area	Area of the plant encompassed by a physical barrier to which access is controlled.
Neutron	Neutrally charged particle emitted from the nucleus of an unstable atom.
Rad	Radiation absorbed dose; basic unit of absorbed dose of ionizing radiation.
Radiation	Emissions of particles and energy from an unstable radioactive isotope as it decays back to a stable state.
Radioactivity	Spontaneous emission of particles and energy from an unstable radioactive isotope.
Radiologically Controlled Area	One in which workers may be exposed to radiation or radioactive materials. Radiation Warning Signs and barriers are posted in such areas to protect personnel from unnecessary exposure and to prevent the spread of contamination.
Roentgen	Unit of exposure; dose of ionizing radiation.
Roentgen Equivalent Man (REM)	Quantity of any type of ionizing radiation which when absorbed by man takes into account biological effects. Unit of dose measuring biological effects from radiation.

Smearable Contamination — Radioactive material that loosely adheres to the objects it settles on. It is not bound tightly to objects and can be easily removed.

Vital Area — Any area that contains essential plant equipment important to safe shutdown of the plant.

FUNDAMENTALS

In order to perform your job at Plant Hatch or Plant Vogtle in the safest manner possible, it is important for you to understand the characteristics of radioactive materials and their related health hazards.

Atoms

The most basic substances that can be identified are Elements. Scientists have discovered 92 different elements that occur naturally and have created 12 more "synthetic" elements in laboratories. Oxygen, hydrogen, and gold are examples of natural elements. Elements make up everything from the eggs you eat for breakfast and the water you brush your teeth with, to the components of television sets and parts of bulldoziers. These basic substances are composed of building blocks called Atoms. Each element is composed of its own unique type of atom. For example, the element hydrogen is composed of hydrogen atoms; the element oxygen is composed of oxygen atoms. Hydrogen cannot be built from oxygen atoms, and oxygen cannot be built from hydrogen atoms. However, the elements hydrogen and oxygen can be combined to make the compound H2O, or water.

All atoms have the same basic structure. An atom has two parts; the nucleus, composed of protons and neutrons and the electrons in the surrounding orbitals.

PROTONS, located in the nucleus, are positively charged particles.
NEUTRONS, also located in the nucleus, are neutral particles that do not have charges.
ELECTRONS, located in the orbitals that surround the nucleus, are negatively charged.

The following drawing shows the protons, neutrons, and electrons in a helium atoms.

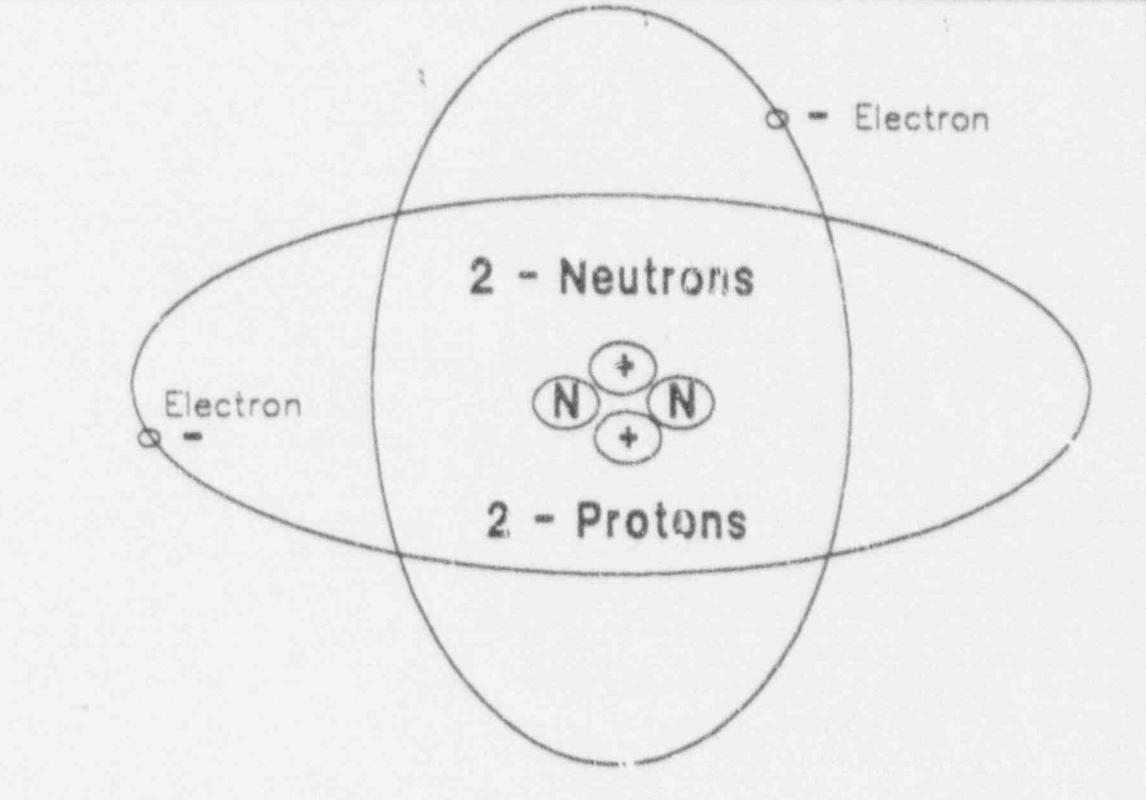


Figure 9. The Helium Atom

Unstable (Radioactive) Atoms

The atoms that compose the elements around us are either stable or unstable. Stable atoms are just that, stable. They do not change their structure nor do they release energy or particles. Unstable atoms, however, are constantly changing at various rates and speeds depending on the type of atom.

Everything in nature seeks to move from a high energy to a low-energy level. Gas in a car, rocks on a hill, water flow, etc., for example. Because of this oddity of nature the unstable or radioactive atoms likewise seek to become stable. In order for a radioactive atom to become stable it must release the excess energy that is causing it to be unstable.

The process in which the radioactive atoms become stable is called radioactive decay. It is during this time that the atom "throws away" the excess energy or particles. The particles or energy thrown away by the atom are called radiation. The atom may throw away alpha, beta or neutron particles and or gamma energy rays. The type of particles or energy thrown away also depends on the type of atom.

A common misunderstanding exists regarding the relationship between radiation and contamination. The energy or particles thrown away by the atom (radiation) are not contamination. If these particles come in contact with your body you have been exposed to radiation but not contamination. When radioactive atoms are found in liquid, steam, or gas materials these materials become radioactive. These radioactive materials are contained by pipes, vessels, etc., to protect workers and the public. If you stand near a containment pipe or vessel that has radioactive material in it, you may be exposed to radiation from the particles or energy thrown away by the radioactive atoms in the material; but you would not be contaminated by those particles. If there is a break, leak, or other breach of the containment structure and the material containing the radioactive atoms escape, the area becomes contaminated. If you come into contact with that radioactive material, not only are you exposed to radiation, but you also become contaminated.

Types of Radiation

Radiation is given off from radioactive atoms as they decay. When the cells in the body are exposed to these particles or waves of energy, damage can occur. Although none of the human senses can detect radiation, it can be detected by special instruments located in the plant. therefore workers can be protected from exposure to these materials.

ALPHA

Is a positively charged particle. Compared to the other three types of ionizing radiation, it is large and slow moving. Because it is large and relatively slow, alpha has a greater chance of bumping into and interacting with other atoms in its path. Each time an alpha particle interacts with another atom, it loses energy. Because its energy is given up rapidly, it only travels short distances.

SOURCES

Uranium fuel.

BIOLOGICAL HAZARD

Internal. Alpha particles are very easy to stop when they are outside the body. However, radioactive materials that give off alpha radiation can be inhaled or swallowed along with food or water. When radioactive material is internalized, the radiation given off can cause damage to bones and organs. Even though alpha radiation is not a serious external hazard, it is still a potential source of damage.

DETECTION

Special Instruments

SHIELDING REQUIREMENTS

Thin sheet of paper, clothing, skin.

IMPORTANCE AS EXPOSURE SOURCE

You are not likely to be exposed to alpha particles as a part of your routine work in the plant.

BETA

Is a negatively charged particle. It is much smaller than an alpha particle and moves faster. Therefore, it interacts with fewer particles and does not give up its energy as quickly as alpha particles. Beta particles travel in dense substances.

SOURCES

Radioactive waste, contaminated tools and equipment, most open fluid transfer systems

BIOLOGICAL HAZARD

External. Major damage to skin and eyes.

DETECTION

Special Instruments

SHIELDING REQUIREMENTS

Several millimeters (less than one inch) of plastic, aluminum, or plywood.

IMPORTANCE AS EXPOSURE SOURCE

Major; you are likely to be exposed to beta particles as a part of your routine work in the plant because of the numerous sources of beta radiation.

GAMMA

Is an electromagnetic ray. It moves very rapidly and has great penetrating capabilities. Because gamma rays have no charge and move faster than either alpha or beta particles, they travel further in dense substances.

SOURCES

Radioactive waste, contaminated tools and equipment, most fluid transfer systems.

BIOLOGICAL HAZARD

External. Damage to all tissues.

DETECTION

Special Instruments

SHIELDING REQUIREMENTS

Lead, steel, or concrete

IMPORTANCE AS EXPOSURE SOURCE

Major; you are likely to be exposed to gamma rays as a part of your routine work in the plant because of the numerous sources of gamma rays and their great penetrating capabilities.

NEUTRONS

Are neutral particles. This very penetrating radiation can travel long distances in dense substances. In addition, neutron radiation can cause certain non-radioactive atoms to become radioactive. This process is called <u>neutron activation.</u> None of the other three types of ionizing radiation can activate other atoms.

SOURCE

Operating reactor (during the fission process).

BIOLOGICAL HAZARD

External. Damage to all tissues.

DETECTION

Special Instruments

SHIELDING REQUIREMENTS

Water, hydrogenous material, for example paraffin (wax).

IMPORTANCE AS EXPOSURE SOURCE

Minor. You are not likely to be exposed to neutron radiation as a part of your routine work at the plant.

Unlike the ultraviolet radiation that comes from the sun, ionizing radiation does not make you feel uncomfortable before damage is caused. When you remain in the sun too long, you get hot and your skin may feel dry and burned. To protect your body from serious damage, you search for some form of shielding from the sun rays, such as shade or going in doors. When you are exposed to small doses of ionizing radiation you may be unaware of the hazard. Exposure will not raise your body temperature or cause you to feel hot or burned. In fact, special instruments are required to detect alpha, beta, gamma, and neutron radiation. Although all four types of ionizing radiation can harm the body, ***beta and gamma are our greatest concern*** because they are the most common hazards in a nuclear power plant. Because of its penetrating power, gamma rays are probably responsible for most of the radiation exposure that is received by workers. Alpha and neutron radiation are not common hazards.

Units of Measuring Radiation

When discussing the potential hazards of radiation, two units of measurement are particularly important. The first, DPM, measures radioactivity. The second, REM, measures radiation dose. DPM stands for disintegrations per minute. As a unit of measure, it assesses the rate of radioactive decay. REM stands for roentgen equivalent man. As a unit of measure, it assesses body damage caused by radiation dose. REM accounts for the amount of the type of radiation exposure to the human body. Because some types of radiation are more penetrating than others they are more likely to damage tissue.

REM is often measured as millirem (mrem). When used before a unit of measure, milli means one-thousandths (.001), 1000 millirem is equivalent to 1 rem.

1000 mrem = 1 rem
1 mrem = .001 rem

To convert rem to millirem, multiply the number of rem by 1000.

2 rem x 1000 = 2,000 millirem
4.5 rem x 1000 = 4,500 millirem
25 rem x 1000 = 25,000 millirem

To convert millirem to rem, divide the number of millirem by 1000.

3000 mrem divided by 1000 = 3 rem
400 mrem divided by 1000 = .4 rem
1250 mrem divided by 1000 = 1.25 rem

Special Detecting and Measuring Instruments

Because radiation cannot be seen or felt, it must be detected and measured with special instruments. The frisker, thermoluminescent dosimeter (TLD), and pocket dosimeter are particularly important.

1. Friskers detect the presence of radioactive contamination on people or equipment. They are used primarily to detect radioactive material emitting beta or gamma radiation.
2. Thermoluminescent Dosimeters and Pocket Dosimeters are used to measure dose. Both of these measuring devices are worn by workers at all times in radiation areas. The TLD measures beta, gamma and neutron radiation. Because the operation of the TLD depends upon radiationsensitive crystals that are processed by special equipment, it cannot be read by you. The pocket dosimeter measures gamma radiation. Unlike the TLD, it can be read by you.

Radiation that Surrounds Us

Every day you are exposed to small amounts of radiation from sources in our environment. The radiation that is always present in homes and workplaces, in products, as well as air, food, and soil, is called ***background radiation***. The average American receives a dose of 180-200 millirem each year from background radiation. Some background radiation occurs naturally, and some comes from man-made products.

Radiation from natural sources accounts for almost 68 percent of your average yearly dose. This radiation comes from the sun and other sources in outerspace (cosmic rays) and from the deposits of radioactive elements, such as uranium, radium, and thorium, in the earth (ground or terrestrial radiation). Dose from cosmic and terrestrial radiation varies widely depending upon where you live. Additional sources of naturally occurring radiation are food, water, and air. These sources lead to internal exposure and cause everyone to be slightly radioactive.

Radiation from man-made sources accounts for almost 32 percent of the average dose. The largest contributors to this source are medical and dental x-rays. In fact, radiation for diagnosing and treating diseases contributes about 95 percent of the dose you receive from man-made sources. Other sources include consumer products such as watches with luminous dial, smoke detectors, and color televisions; the fallout from testing nuclear weapons; and the operation of nuclear power plants. The radiation from nuclear power plants contributes only 1 millirem to your average yearly dose.

Radiation is not confined to nuclear power plants. It is a part of everyday life and has been a part of the environment since the earth was formed. The following chart lists some sources of background radiation and the dose the average American receives from these sources each year.

Sources of Background Radiation

NATURAL SOURCES	Millirem/Year	
	Florida	Wyoming
Radiation from Sun and Other Space	38	70
	East Coast	Colorado
Radiation from the Earth	15	140
	Men	Women
Radioactive Elements in the Body	20	15

MAN-MADE SOURCES	Millirem/Year
Medical and Dental X-Rays	90
Consumer Products	1
Fallout from Weapons Testing	4
Operation of Nuclear Plants	1
TOTAL AVERAGE EXPOSURE	180 mrem/yr

Figure 10. Background Radiation Sources

Radiation that Occurs in Nuclear Power Plants

Although everyone is exposed to background radiation, workers at nuclear power plants learn to deal with additional risks. The hazards to guard against begin while the plant is being built and continues through operation, repair, and maintenance.

CONSTRUCTION. While the plant is being built, no nuclear fuel is on the site and the reactor is not working. Before the nuclear fuel is loaded, the only possible radiation hazard comes from the instruments used to x-ray pipe welds when checking for defects. X-ray sources are potentially harmful but, if used properly, they are not threatening to workers.

FUEL LOADING. During fuel loading, inhaling the finely powdered uranium on the outside of fuel rods presents a possible hazard. If this radioactive material is inhaled, internal exposure from alpha particles can result. This hazard only exists for those who are working with the fuel.

REACTOR OPERATION. After the reactor becomes operational the hazards become more complex and widespread. Radiation levels in the immediate reactor areas are high. Workers are effectively shielded from high radiation levels by a containment structure and radiological protection procedures, devices and work practices.

Access Control - Postings

Nuclear power plants allow limited entry into areas where possible radiation hazards exist. These areas are labeled with radiological warning signs that identify the extent of radiological hazards as described in Title 10, Code of Federal Regulations, Part 20. The signs are posted in radiologically controlled areas and are intended to protect workers from exposure and prevent the spread of contamination by identifying places where radiation and/or radioactive materials exist. A radiologically controlled area is one where you may be exposed to radiation and/or radioactive material. Radiological warning signs are standard throughout the nuclear power industry. Their colors are yellow and magenta and their most obvious design is a three-blade propeller and the word **Caution** or **Danger**. Each sign also identifies the type of area posted, and may indicate requirements for entry to the area. Changing or moving these signs without authorization is a serious offense and will likely result in disciplinary action. Nuclear power plants are required to clearly post the appropriate radiological sign for the hazard present, according to 10 CFR 20.

Basic Radiation Warning Signs

Radiologically Controlled Area(RCA)

Any area which contains radiation, contamination, or radioactive materials in quantities or levels sufficient to require posting or protective measures. Each area is classified as a Radiation Area, High Radiation Area, Contaminated Area, Airborne Radioactivity Area and/or Radioactive Material Area. Access is controlled by the use of a Radiation Work Permit(RWP). Any worker entering an RCA must have dosimetry, a TLD, and a pocket dosimeter.

Radiation Area

An area where you may be exposed to a whole-body dose of more than 5 millirem in one hour or more than 100 millirem in five consecutive days is posted as a Radiation Area per 10 CFR 20. When you work in a radiation area you must wear radiation monitoring devices to measure your radiation exposure.

At VEGP a Radiation Area is posted at any location where the whole body may be exposed to a dose rate in excess of 2.5 mrem hour. The area is posted with a warning sign as follows:

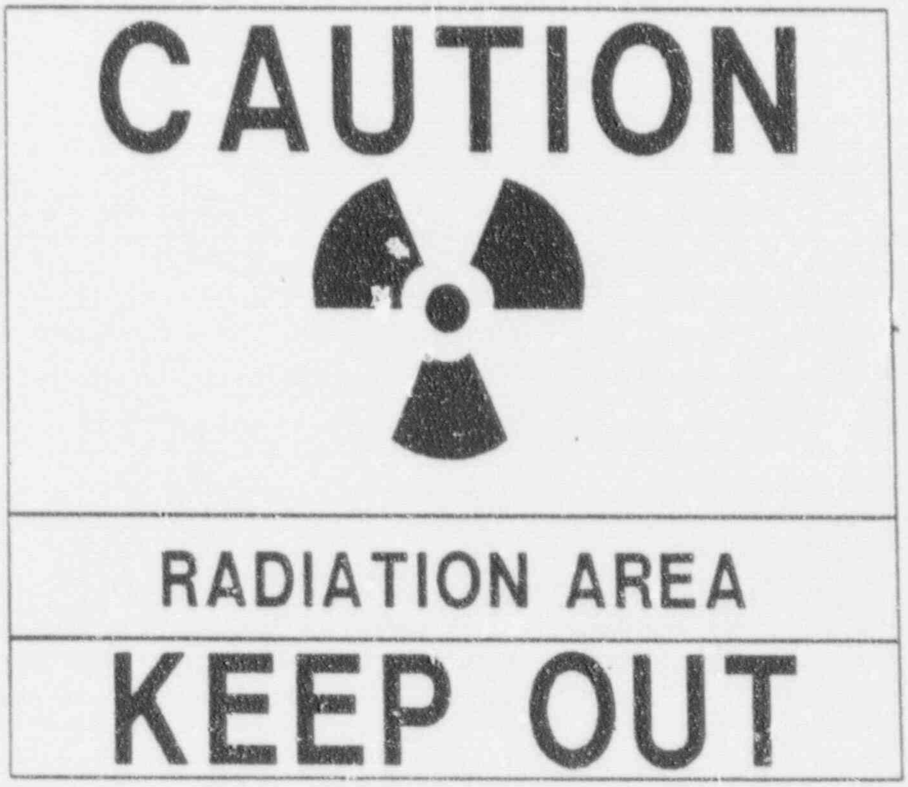


Figure 11. Radiation Area Warning Sign

Requirements

The dosimeter must be checked *Periodically*

TLD required for entry

High Radiation Area(HRA)

An area where you may be exposed to a whole-body dose of more than 100 millirem in one hour is posted as a High Radiation Area. A High Radiation Area has special requirements for entry. The area is posted with a warning sign as follows:

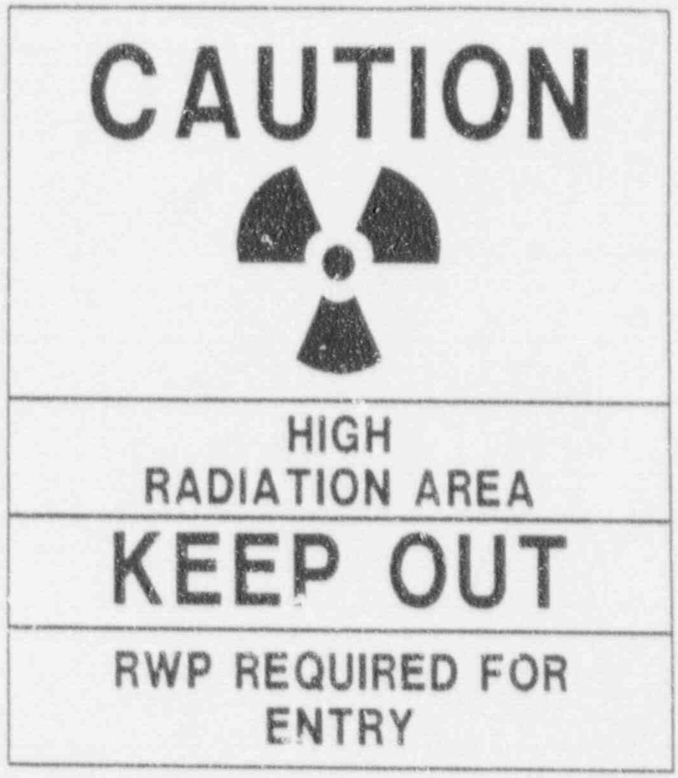


Figure 12. High Radiation Area Warning Sign

Requirements

Specific RWP required for entry

Check pocket dosimeter *Periodically*

Notify HP prior to entry

Locked High Radiation Area(HRA)

Any area accessible to personnel in which radiation fields exists at such levels that the whole body could receive a dose rate equal to or in excess of 1000 mrem/hour. Entry doors to ***Locked*** HRAs will be locked to prevent unauthorized entry. Locked HRAs are posted with a warning sign as follows:

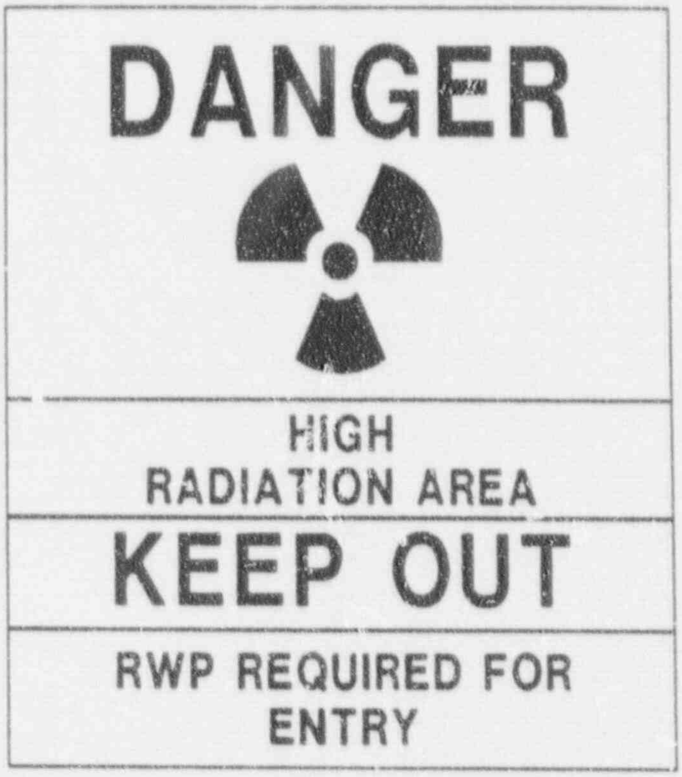


Figure 13. Locked High Radiation Area Warning Sign

Requirements

Specific RWP required for entry

Check pocket dosimeter ***Periodically***

HP escort required for entry

Airborne Radioactivity Area

An area where radioactive material in the air (gas, dust, or mist) has exceeded 25 percent of the maximum permissible concentration (.25 MPC) is posted as an Airborne Radioactivity Area. Maximum Permissible Concentration (MPC) is the maximum amount of airborne radioactive material that you can safely be exposed to without exceeding internal exposure limits. Maximum permissible concentrations are listed in Table 1 Appendix B, 10 CFR 20. The warning sign posted is as follows:

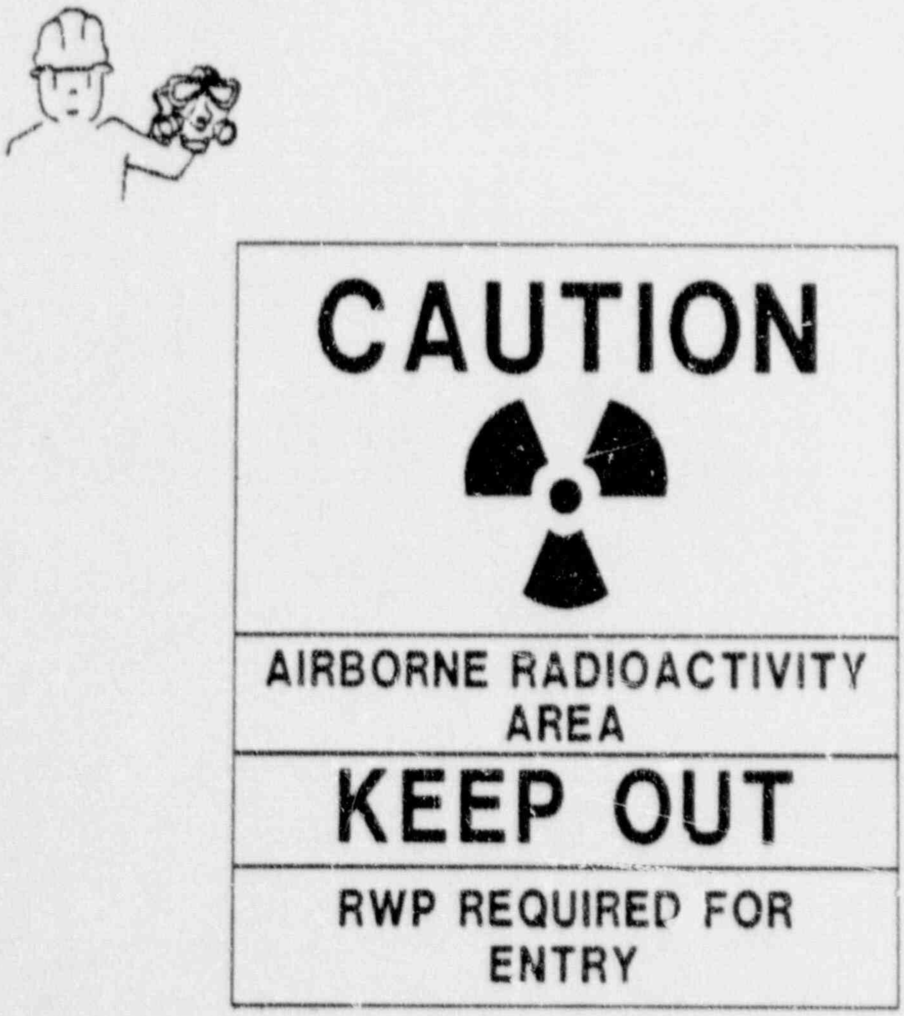


Figure 14. Airborne Radioactivity Area Warning Sign

Requirements

Specific RWP required for entry

Notify HP prior to entry

Contaminated Area

When radioactive material exceeds the limit of 1000 dpm/100 cm^2, the area is posted as a Contaminated Area. The warning sign posted is as follows:

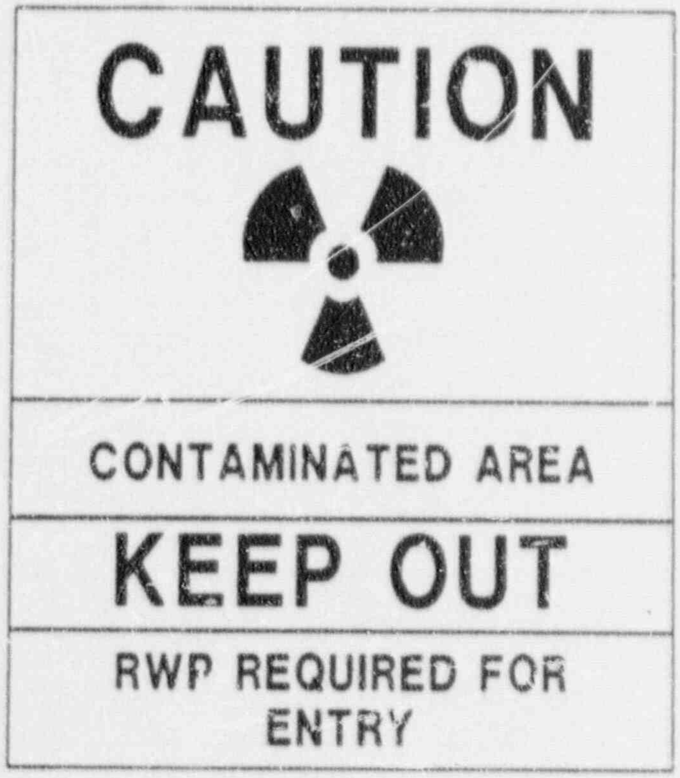


Figure 15. Contaminated Area Warning Sign

Requirements

TLD required for entry

Radioactive Materials Area

When radioactive material is stored in amounts higher than the limits specified in Appendix C, 10 CFR 20 the area is posted as a Radioactive Materials Area. Radioactive Materials Areas are often kept locked. The warning sign posted is as follows:

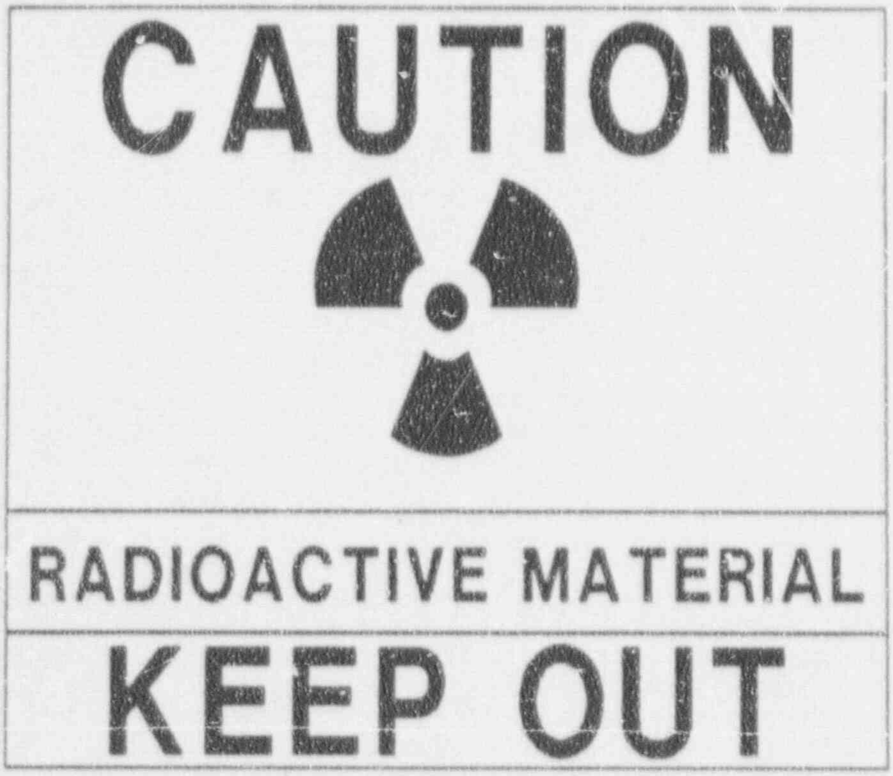


Figure 16. Radioactive Material Warning Sign

Requirements

TLD required for entry

Areas controlled for Radiation Protection Purposes at VEGP:

1. Permanent Areas
   a. Power Block
      1) Auxiliary Building
      2) Fuel Handling Building
      3) Containment
   b. Control Building-Equipment Rooms
   c. Rad Waste Building
2. Potential Temporary Areas
   a. Turbine Building
   b. Any place where radioactivity or contaminated materials exists or are stored.

Note: All personnel must monitor themselves for contamination upon exit from a RCA.

Regulating the Nuclear Industry

Like other utilities, nuclear power plants must comply with government regulations. One group of requirements described in the Title 10 Code of Federal Regulations, Part 10 (10 CFR 19), sets forth the legal rights of radiation workers. There are four groups of individuals who have responsibilities that are outlined in 10 CFR 19. These groups include the government agency in charge of enforcement (NRC), the company employing nuclear workers (for example, Georgia Power Company), the workers in the nuclear plant, and the Health Physics Department.

Responsibilities of the Federal Government.

As the technology of the nuclear industry advanced and its special hazards became known, the need for a regulatory agency developed. This government agency was needed to oversee and advise research and development, ensure the protection of workers as well as the public. The Nuclear Regulatory Commission (NRC) was established to accomplish this task. The NRC is in charge of licensing and regulating the nuclear industry. It established legal requirements for radiation protection. More specifically, its responsibilities include:

1. Protecting the workers in the nuclear industry, the public, and the environment from unnecessary exposure to radiation.
2. Overseeing the design, construction, and operation of reactors.
3. Licensing reactors.
4. Overseeing the safe transport and storing of nuclear materials.
5. Controlling the export and import of nuclear materials

To meet its responsibilities, the NRC developed a complex program of enforcement and information gathering. It enforces compliance with government regulations such as those set forth in 10 CFR 19 and can penalize any company found to be in violation of these regulations. However, in addition to its duties as an enforcer of government regulations, the NRC conducts research into ways of increasing the efficiency and safety of nuclear facilities and acts as an advisor to the nuclear industry. It publishes Regulatory Guides, which explain acceptable methods for complying with government regulations, and USNRC Reports (NUREGS), which offer information about topics such as radiation protection.

Responsibilities of the Company

According to 10 CFR 19, Georgia Power and all other companies with nuclear facilities have certain responsibilities to provide information to workers. This information includes reports of current or potential exposure to radiation and posted notices regarding a worker's rights.

1. All nuclear plants must post in plain view, easy for workers to see, up-to-date copies of the following documents:
   a. NRC Form 3, **Notice to Employees** is a discussion of the company's responsibility to inform and protect its workers. In addition to listing the addresses for NRC offices across the country, it also provides information for contacting the NRC. A copy of NRC Form 3 is included at the end of this chapter.
   b. Notices of violations involving radiological working conditions.
   c. Notices of fines imposed on the company by the NRC.
2. Copies of all NRC inspection reports should be available at the plant site for workers to read.
3. All companies with nuclear facilities must guarantee the following rights to workers:
   a. Workers should receive radiological protection training. Workers should learn the hazards associated with exposure to radiation, precautions and procedures that will minimize exposure, and appropriate responses to various warning sirens. The course you are now taking, General Employee Badge Training, is designed to fulfill this responsibility.
   b. Upon request, workers may receive notifications of their radiation exposure from the company at least once each year. At Plant Vogtle, employees can check their unofficial exposure on a daily basis by looking in the Daily Dose Report at the HP Control Point. The Daily Dose Report lists employees by department and shows th[illegible] whole

body gamma exposure for the current week, quarter, and year. Other information included is the individual exposure ID number and status of respirator qualification.

c. Upon request, when leaving the company, workers may receive a report of their occupational radiation exposure. This report includes the total occupational exposure received during employment with the company. Georgia Power Company will provide this information within 30 days from the date requested or 30 days after total exposure can be determined, whichever date is later.

d. Workers may talk privately with NRC officials without fear of being fired from their jobs. This communication may take place during NRC inspections as well as other times. Workers may visit the NRC Resident Inspector's office on the third floor of the Service Building at any time.

Responsibilities of Workers

The general responsibilities for workers in the nuclear industry specified in 10 CFR 19 are like those for workers in any other industry.

1. Workers must be responsible for their personal safety. This responsibility includes protection against possible hazards from radiation exposure.
2. Workers should notify the company of any unusual radiological condition or potentially dangerous situation. This responsibility includes notifying plant management of possible violations of NRC regulations. Plant management should also be notified when a supervisor gives instructions that might result in unnecessary exposure to workers. If the company does not take action to correct hazardous conditions and provide a safe work environment, workers should contact the NRC. The green deficiency card ("green card") is an appropriate form for reporting radiological deficiencies to management.

| Figure 17. NRC Form 3, Notice to Employees Poster

UNITED STATES NUCLEAR REGULATORY COMMISSION
Washington, D.C. 20555

NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION (PART 20); NOTICES, INSTRUCTIONS AND REPORTS TO WORKERS; INSPECTIONS (PART 19); EMPLOYEE PROTECTION

WHAT IS THE NUCLEAR REGULATORY COMMISSION?

[illegible]

WHAT DOES THE NRC DO?

[illegible]

WHAT RESPONSIBILITY DOES MY EMPLOYER HAVE?

[illegible]

WHAT IS MY RESPONSIBILITY?

[illegible]

HOW DO I REPORT VIOLATIONS?

[illegible]

WHAT IF I WORK IN A RADIATION AREA?

[illegible]

MAY I GET A RECORD OF MY RADIATION EXPOSURE?

[illegible]

HOW ARE VIOLATIONS OF NRC REQUIREMENTS IDENTIFIED?

[illegible]

MAY I TALK WITH AN NRC INSPECTOR?

[illegible]

MAY I REQUEST AN INSPECTION?

[illegible]

HOW DO I CONTACT THE NRC?

[illegible]

CAN I BE FIRED FOR TALKING TO THE NRC?

[illegible]

WHAT FORMS OF DISCRIMINATION ARE PROHIBITED?

[illegible]

HOW AM I PROTECTED FROM DISCRIMINATION?

[illegible]

WHAT CAN THE LABOR DEPARTMENT DO?

[illegible]

WHAT WILL THE NRC DO?

[illegible]

UNITED STATES NUCLEAR REGULATORY COMMISSION REGIONAL OFFICE LOCATIONS

[illegible]

Regional Offices

REGION	ADDRESS	TELEPHONE
I	U.S. Nuclear Regulatory Commission Region I 631 Park Avenue King of Prussia, PA 19406	215 337-5000
II	[illegible]	404 221-4503
III	[illegible]	312 790-5500
IV	[illegible]	817 860-8100
V	[illegible]	415 943-3700

NRC FORM 3

Summary

1. As they decay, radioactive atoms give off particles and energy called radiation. When radioactive substances are found in areas where they are not wanted, it is called radioactive contamination.
2. The four types of ionizing radiation are alpha, beta, gamma, and neutron. Beta and gamma are the types you are most likely to be exposed to in a nuclear power plant.
3. Radioactivity is measured in disintegrations per minute (dpm). Radiation Dose Equivalent is measured in Roentgen Equivalent Man (rem).
4. The frisker is used to detect radioactive contamination on people or equipment. The TLD and pocket dosimeter are used to measure radiation dose.
5. The average American receives an average dose of 180 millirems of radiation each year. This background radiation can occur naturally, or it can come from man-made sources. Naturally occurring sources are responsible for about 68 percent of the exposure from background radiation; man-made sources are responsible for about 32 percent. The most significant man-made contributors are medical and dental x-rays.
6. The Nuclear Regulatory Commission (NRC) is responsible for licensing and regulating the nuclear industry. The NRC is the government agency that establishes the legal requirements for radiation protection.
7. According to 10 CFR 19, companies that employ nuclear workers are responsible for providing certain kinds of information. It must post copies of the NRC Form 3, which tells workers about their rights and responsibilities as nuclear plant workers as well as how to contact the NRC. Notices of violations involving radiological work conditions, and notices of fines imposed by the NRC must also be posted by the company. Upon request the company must also provide yearly and cumulative occupational exposure information to workers. Workers can talk with officials from the NRC at any time without the fear of being fired.
8. Workers in nuclear power plants are responsible for their own radiological safety. They are also responsible for reporting unusual radiological conditions, potentially hazardous situations, and possible violations of NRC regulations to plant management. If the problems are not corrected, workers should then contact the NRC.
9. Radiation Warning Signs identify radiollogically controlled areas in the plant. RCA's are locations where you may be exposed to radiation and or radioactive material.

   Radiation warning signs are standard throughout the nuclear industry. These signs are yellow and magenta with a three-bladed propeller design and the words "CAUTION" or "DANGER" to indicate a posted area. The type of area and the requirements for entry will be listed on the sign.
10. Five areas are posted with warning signs:
    a. Radiation Area
    b. High Radiation Area
    c. Airborne Radioactivity Area
    d. Contaminated Area
    e. Radioactive Materials Area
11. Altering or removing radiation warning signs or barriers without authorization will result in disciplinary action by plant management.
12. Permanent RCA's at VEGP include the Powerblock, Equipment Rooms in the Control Building, and the Radwaste Building. These locations are always posted and radiation protection requirements must be met prior to entry.

BIOLOGICAL EFFECTS

The damage that can result from radiation exposure varies according to the circumstances. The type of radiation a worker is exposed to, the amount of radiation exposure, and the rate of radiation exposure affect the potential damage. Given time the body can usually repair cell damage due to radiation exposure. Your body cannot repair damage that occurs when you receive a large dose of radiation during a short period of time.

Radiation Dose and Dose Rate

Radiation dose is the amount of radiation exposure. Dose is measured in rem or millirem. Dose rate is the amount of radiation exposure received per unit of time. Dose rate is measured in rem/hour or millirem/hour. The effect of a particular dose of radiation depends not only on the amount of the dose but also on the rate it is received in a specific period of time. It is difficult for the body to repair itself after it is exposed to a large dose of radiation in a short period of time. However, if expose to small amounts of radiation over a long period of time, the body may be able to repair the damage. There are four classifications of radiation dose:

CLASSIFICATION	*EXPLANATION*
Acute Dose	A large amount of radiation exposure during a short period of time.
Chronic Dose	A small amount of radiation exposure during a long period of time.
Cumulative Dose	Is the total radiation exposure during your lifetime.
Lethal Dose	Is the amount of radiation exposure that may cause death.

General Effects of Exposure to Radiation

The human body contains many organs, each of which is composed of more than one type of tissue. Each type of tissue is built from unique cells. Ionizing radiation can bring about hazardous chemical changes in the water that makes up about 70 percent of each cell. It can also damage the cell membrane and the nucleus. In the same way that they differ in the tissues they build, cells also differ in their sensitivities to radiation. Some cells are more sensitive to radiation than others. Blood cells are the most sensitive and therefore are more easily damaged by radiation exposure; while nerve cells are the least sensitive and less likely to be damaged.

It should be clear by now that the damage resulting from exposure is affected by several factors. These include the amount and type of radiation the body is exposed to, the rate of exposure and the type of cells that are exposed. The results of radiation exposure are difficult to predict. Four possible results of radiation exposure to cells of the body are:

1. The cells are not damaged.
2. The cells are damaged and later repair themselves.
3. The cells die.
4. The cells are damaged and can no longer reproduce normally. Abnormal growth occurs.

If exposure to radiation results in harm to the body, the effects may appear promptly, showing up shortly after the time of exposure; or they may be delayed, showing up years later. Three different effects may occur;

1. **Somatic effects** are confined to the person that receives the dose. The damage may be prompt or delayed, ranging from immediate death to diseases like leukemia or cateracts that may show up many years after exposure.
2. **Genetic effects** may appear in the future generations of the exposed person. The damage may include birth defects.
3. **Teratogenic effects** may appear in children who have been exposed to radiation before birth. If a women receives a significant dose of radiation during pregnancy, the unborn child may be affected.

Effects of Acute Exposure

The chance of receiving an acute dose of radiation in a nuclear power plant is very small. Federal exposure limits and plant administrative exposure guidelines are designed so that you should be able to perform the maximum amount of work while receiving minimum exposure. This limit will minimize the possibility of you suffering any ill effects from low level exposure. The possibility of receiving accidental acute levels of radiation exposure does exist if procedures and HP instructions are not followed. Acute exposure can result in serious illness or death, depending upon the dose and the dose rate. The following chart lists the symptoms, the amount of time that will elapse before the symptoms appear, and the possibility of death. It relates each concern to a stage of exposure.

Effects of Acute Exposure

STAGE	Symptoms	Most Critical Period After Exposure	Possibility Of Death
0-100 rems	None	Not applicable	Not applicable
100-500 rems	Possible nausea and vomiting, tiredness, loss of appetite, white blood cell decrease, infection hair loss, sterilization	0 - 6 weeks	0 to 40 %
above 500 rems	All symptoms from previous stage, diarrhea, fever, bleeding, loss of muscle control, convulsions, coma	1 hr-2 weeks	90 to 100 %

Acute exposure may cause somatic effects and genetic effects. These effects may be prompt as well as delayed. For example, acute doses of less than 500 rems can lead to hair loss in six weeks or less and also to leukemia, sometimes after a delay of several weeks.

Figure 18. Effects of Acute Exposure

Effects of Chronic Exposure

A chronic dose, for example 20 millirem each week for 30 years, is more likely to be received than an acute dose. Because chronic exposure takes place over a longer period of time, it is difficult to separate the damage caused by radiation from damage caused by other environmental factors. Acute exposure can be compared to a tidal wave, very destructive and quickly over. Chronic exposure, on the other hand, is comparable to water dripping from a leaky faucet onto a concrete driveway. If allowed to drip long enough, often enough, and with enough force, the water may eventually damage the concrete.

The effects of chronic exposure are so difficult to confirm that predictions regarding potential damage are based on observations of victims who have received acute exposure. These observations suggest that chronic exposure may lead to delayed effects that are similar to the effects from acute exposure-cancer, birth defects in future generations, cataracts, skin scores/rashes and life-span shortening.

Risks

To understand the possible dangers of working in a nuclear power plant, you must understand the risks that are associated with certain hazards. Risk is the probability that illness or death will be caused by some activity. Most people take risks every day. You risk having an automobile or motorcycle accident when you drive to work. You risk contracting lung cancer each time you walk into a room filled with cigarette smoke. You risk contracting skin cancer when you go out into the sun. Even if you stay in your home and avoid these outside hazards, you risk contracting cancer every time you use products that contain saccharin and caffeine.

The American Cancer Society has reported that approximately 25 percent of all adults between the ages of 20 and 65 will develop cancer. Cancer may be caused by exposure to many substances in the environment such as cigarette smoke, food, alcohol, drugs, air pollution, and natural background radiation. If one rem of radiation exposure is added to the health risks already present in the environment, the number of cases of cancer will increase an average of .03 percent. If 10 rems are added, the average number of cancer cases increases by .3 percent. The following list compares the cumulative occupational dose (the total amount of radiation a worker receives on the job) with the chance of developing cancer:

Cumulative Occupational Dose	*Chance of Developing Cancer*
none	25 percent
1 rem	25.03 percent
10 rem	25.3 percent
100 rem	28 percent

Consider these percentages according to the increase in actual cases they predict. Suppose there is a group of 10,000 workers. Of that group, 2500 can be expected to develop cancer from sources other than exposure to radiation. whether they work in a nuclear plant or not, 2500 people out of 10,000 will develop cancer. If these 10,000 people are exposed to 1 rem of radiation during their lifetimes, 2503 (3 more) can be expected to develop cancer.

In order to have an idea of how small the risks are, look at the risks from radiation exposure in relation to the risks from other more familiar hazards. The following chart estimates the number of days each health risk shortens the life of the average American.

Estimated Loss Of Life Expectancy From Health Risks

HEALTH RISK	ESTIMATE OF DAYS OF LIFE EXPECTANCY LOST, AVERAGE
Smoking 20 Cigarettes/day	2370 (6.5 years)
Overweight (by 20%)	985 (2.7 years)
All Accidents Combined	435 (1.2 years)
Auto Accidents	200
Alcohol Consumption (U.S. Average)	130
Home Accidents	95
Drowning	41
Natural Background Radiation calculated	8
Medical Diagnostic X-Rays (U.S.Average), calculated	6
All Catastrophies (earthquake, etc.)	3.5
One (1) Rem Occupational Radiation Dose, calculated (Industry average for the higher-dose job categories is 0.65 rem/yr)	1.0
One (1) Rem/Yr for 30 Years, calculated	30

SOURCE: Adapted from Cohen and Lee, "A Catalogue of Risk", Health Physics 36, July 1979.

On the average, receiving 1 rem of radiation each year for 30 years decreases life expectancy by an estimated 30 days. Smoking a pack of cigarettes a day decreases life expectancy by an estimated 2370 days or 6.5 years. Notice also that the average American loses 6 days of life from medical x-ray diagnosis.

Figure 19. Average Days Loss of Life From Health Risks

The risks associated with working in the nuclear industry can also be compared to the risks associated with working in other industries. The following chart lists the estimated days of life expectancy workers lose through employment in various industries.

Estimated Loss of Life Expectancy From Industrial Hazards	
INDUSTRY TYPE	ESTIMATED DAYS OF LIFE EXPECTANCY LOST BY WORKERS IN VARIOUS INDUSTRIES AVERAGE
All Industries	74
Wholesale and trade	30
Manufacturing	43
Services	47
Government	55
Transportation and utilities	164
Agriculture	277
Construction	302
Mining and quarrying	328
Radiation accidents, death from exposure	1
Radiation dose of 0.65 rem/yr (industry average) for 30 years, calculated	20
Radiation dose of 5 rem/yr for 50 years	250
Industrial accidents at nuclear facilities (non-radiation)	58

SOURCE: Adapted from Cohen and Lee, "Catalogue of Risk", Health Physics 36, July 1979; and World Health Organization, Health Implication of Nuclear Power Production, December 1975.

Figure 20. Estimated Loss of Life-Industrial Hazards

Notice that there is almost no risk of death from radiation accidents in comparison to working in a coal mine.

The following chart allows you to compare the risks associated with various occupations according to the number of accidental deaths in a group of 10,000 workers over a period of 40 years.

Probability of Accidental Death By Type of Occupation	
OCCUPATION	NUMBER OF ACCIDENTAL DEATHS FOR 10,000 WORKERS for 40 Yrs.
Mining	252
Construction	228
Agriculture	216
Transportation and public utilities	116
All Industries	56
Government	44
Nuclear Industry (1975 data excluding construction)	40
Manufacturing	36
Services	28
Wholesale and trade	24

Source: Adapted from National Safety Council, Accident Facts, 1979; and Atomic Energy Commission, Operational Accidents and Radiation Exposure Experience, WASH-1192, 1975.

Figure 21. Probability of Accidental Death

Notice that the nuclear industry has had fewer accidental deaths than the government and not many more than the manufacturing industries. The risk of accidental deaths in the nuclear industry is less than the average risk of accidental death for all other occupations.

As you can see, the risks associated with working in a nuclear power plant are very small even though the hazards are great. From its beginning, the industry has been concerned with safety and has developed reliable procedures for protecting its workers. In addition, it is important to remember that risks are only possibilities. Most workers in nuclear power plants suffer no ill effects at all.

Acceptable Risks

The recommendations for maximum occupational radiation exposure are based on the concept of acceptable risk. This concept requires that the potential benefits derived from radiation exposure are weighed against the potential damage that the exposure can cause. Two assumptions are involved in establishing limits based on acceptable risk:

1. Any exposure to radiation, no matter how small, carries some risk of injury.
2. The possible effects of low doses of radiation are predicted from observations of people who have received high doses.

The following is an example of acceptable risk:

> If you drive 85 mph in a 55 mph zone and forget to fasten your seat belt your risk is higher than if you drive 55 mph in a 55 mph zone with your seat belt fastened. In either situation you are taking a risk, by driving your car. However one of the alternatives offers an acceptable risk while the other does not. The limits on maximum exposure in the nuclear industry are similar to the speed limits on the highway. If you stay within the established limits, the risk remains acceptable.

Prenatal Risks

Expectant mothers need to be especially careful in avoiding exposure to radiation. Studies have shown that the risks of leukemia and other cancers in children increases if the mother is exposed to a significant amount of radiation during pregnancy because rapidly growing tissue is more sensitive to injury than tissue that grows slowly. Therefore, an unborn child is more likely to be harmed by exposure to radiation than an adult. The fetus is at "Greatest Risk During The First Three Months After Conception". To decrease the possibility of harming an unborn child, it is recommended in ***Regulatory Guide 8.13*** that a ***pregnant female*** receive no more than ***"500 mrem"*** of radiation exposure during the ***entire 9 Months of her pregnancy***. Female radiation workers who are not pregnant shall be limited to 500 mrem per quarter, at Vogtle unless individually a female specifies in writing the limit set in the Administrative Guidelines. ***Radiation exposure to pregnant female radiation workers and visitors shall be limited to 100 mrem/quarter and shall not exceed 500 mrem for the entire period of pregnancy.*** Additionally, pregnant female radiation workers and visitors at VEGP shall be prohibited from entering any RCA. All female employees who work in radiologically controlled areas are required to state in writing that they have been informed of the risks associated with prenatal exposure. Any female employee who works in a radiologically controlled area is urged to notify her supervisor as soon as pregnancy is suspected or confirmed. Regulatory Guide 8.13 begins on the next page. Each worker granted unescorted access at Plant Vogtle must sign a statement indicating he she has read and understands the Reg. Guide.

Regulatory Guide

Revision 1
December 1987

U.S. NUCLEAR REGULATORY COMMISSION

REGULATORY GUIDE

OFFICE OF NUCLEAR REGULATORY RESEARCH

REGULATORY GUIDE 8.13
(Task OP 031-4)

INSTRUCTION CONCERNING PRENATAL RADIATION EXPOSURE

A. INTRODUCTION

Section 19.12, "Instructions to Workers," of 10 CFR Part 19, "Notices, Instructions, and Reports to Workers; Inspections," requires that all individuals working in or frequenting any portion of a restricted area[1] be instructed in the health protection problems associated with exposure to radioactive materials or radiation, in precautions or procedures to minimize exposure, and in the regulations that they are expected to observe. The present 10 CFR Part 20, "Standards for Protection Against Radiation," has no special limit for exposure of the embryo/fetus.[2] This guide describes the instructions an employer should provide to workers and supervisors concerning biological risks to the embryo/fetus exposed to radiation, a dose limit for the embryo/fetus that is under consideration, and suggestions for reducing radiation exposure.

This regulatory guide takes into consideration a proposed revision to 10 CFR Part 20, which incorporates the radiation protection guidance for the embryo/fetus approved by the President in January 1987 (Ref. 1). This revision to Part 20 was issued in January 1986 for comment as a proposed rule. Comments on the guide as it pertains to the proposed Part 20 are encouraged. If the new Part 20 is codified, this regulatory guide will be revised to conform to the new regulation and will incorporate appropriate public comments.

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Parts 19 or 20, which provide the regulatory basis for this guide. The information collection requirements in 10 CFR Parts 19 and 20 have been cleared under OMB Clearance Nos. 3150-0044 and 3150-0014, respectively.

B. DISCUSSION

It has been known since 1906 that cells that are dividing very rapidly and are undifferentiated in their structure and function are generally more sensitive to radiation. In the embryo stage, cells meet both these criteria and thus would be expected to be highly sensitive to radiation. Furthermore, there is direct evidence that the embryo/fetus is radiosensitive. There is also evidence that it is especially sensitive to certain radiation effects during certain periods after conception, particularly during the first 2 to 3 months after conception when a woman may not be aware that she is pregnant.

Section 20.104 of 10 CFR Part 20 places different radiation dose limits on workers who are minors than on adult workers. Workers under the age of 18 are limited to one-tenth of the adult radiation dose limits. However, the present NRC regulations do not establish dose limits specifically for the embryo/fetus.

The NRC's present limit on the radiation dose that can be received on the job is 1,250 millirems per quarter (3 months).[3] Working minors (those under 18) are limited to a dose equal to one-tenth that of adults, 125 millirems per quarter. (See § 20.101 of 10 CFR Part 20.)

Because of the sensitivity of the unborn child, the National Council on Radiation Protection and Measurements (NCRP) has recommended that the dose equivalent

[1] Restricted area means any area that has controlled access to protect individuals from being exposed to radiation and radioactive materials.

[2] In conformity with the proposed revision to 10 CFR Part 20, the term "embryo/fetus" is used throughout this document to represent all stages of pregnancy.

[3] The limit is 3,000 millirems per quarter if the worker's occupational dose history is known and the average dose does not exceed 5,000 millirems per year.

RADIATION DOSE LIMITS

The NRC's present limit on the radiation dose that can be received on the job is 1,250 millirems per quarter (3 months).* Working minors (those under 18) are limited to a dose equal to one-tenth that of adults, 125 millirems per quarter. (See § 20.101 of 10 CFR Part 20.)

Because of the sensitivity of the unborn child, the National Council on Radiation Protection and Measurements (NCRP) has recommended that the dose equivalent to the unborn child from occupational exposure of the expectant mother be limited to 500 millirems for the entire pregnancy (Ref. 2). The 1987 Presidential guidance (Ref. 1) specifies an effective dose equivalent limit of 500 millirems to the unborn child if the pregnancy has been declared by the mother; the guidance also recommends that substantial variations in the rate of exposure be avoided. The NRC (in § 20.208 of its proposed revision to Part 20) has proposed adoption of the above limits on dose and rate of exposure.

ADVICE FOR EMPLOYEE AND EMPLOYER

Although the risks to the unborn child are small under normal working conditions, it is still advisable to limit the radiation dose from occupational exposure to no more than 500 millirems for the total pregnancy. Employee and employer should work together to decide the best method for accomplishing this goal. Some methods that might be used include reducing the time spent in radiation areas, wearing some shielding over the abdominal area, and keeping an extra distance from radiation sources when possible. The employer or health physicist will be able to estimate the probable dose to the unborn child during the normal nine-month pregnancy period and to inform the employee of the amount. If the predicted dose exceeds 500 millirems, the employee and employer should work out schedules or procedures to limit the dose to the 500-millirem recommended limit.

It is important that the employee inform the employer of her condition as soon as she realizes she is pregnant if the dose to the unborn child is to be minimized.

INTERNAL HAZARDS

This document has been directed primarily toward a discussion of radiation doses received from sources outside the body. Workers should also be aware that there is a risk of radioactive material entering the body in workplaces where unsealed radioactive material is used. Nuclear medicine clinics, laboratories, and certain manufacturers use radioactive material in bulk form, often as a liquid or a gas. A list of the commonly used materials and safety precautions for each is beyond the scope of this document, but certain general precautions might include the following:

1. Do not smoke, eat, drink, or apply cosmetics around radioactive material.

2. Do not pipette solutions by mouth.

3. Use disposable gloves while handling radioactive material when feasible.

4. Wash hands after working around radioactive material.

5. Wear lab coats or other protective clothing whenever there is a possibility of spills.

Remember that the employer is required to have demonstrated that it will have safe procedures and practices before the NRC issues it a license to use radioactive material. Workers are urged to follow established procedures and consult the employer's radiation safety officer or health physicist whenever problems or questions arise.

*The limit is 3,000 millirems per quarter if the worker's occupational dose history is known and the average dose does not exceed 5,000 millirems per year.

TABLE 1

EFFECTS OF RISK FACTORS ON PREGNANCY OUTCOME

Effect	Number Occurring from Natural Causes	Risk Factor	Excess Occurrence from Risk Factor
		RADIATION RISKS	
		Childhood Cancer	
Cancer death in children	1.4 per thousand (Ref. 5)	Radiation dose of 1000 millirems received before birth	0.6 per thousand (Ref. 4)
		Abnormalities	
		Radiation dose of 1000 millirads received during specific periods after conception:	
Small head size	40 per thousand (Ref. 6)	4-7 weeks after conception	5 per thousand (Ref. 7)
Small head size	40 per thousand (Ref. 6)	8-11 weeks after conception	9 per thousand (Ref. 7)
Mental retardation	4 per thousand (Ref. 8)	Radiation dose of 1000 millirads received 8 to 15 weeks after conception	4 per thousand (Ref. 8)
		NONRADIATION RISKS	
		Occupation	
Stillbirth or spontaneous abortion	200 per thousand (Ref. 9)	Work in high-risk occupations (see text)	90 per thousand (Ref. 9)
		Alcohol Consumption (see text)	
Fetal alcohol syndrome	1 to 2 per thousand (Ref. 10)	2-4 drinks per day	100 per thousand (Ref. 11)
Fetal alcohol syndrome	1 to 2 per thousand (Ref. 10)	More than 4 drinks per day	200 per thousand (Ref. 11)
Fetal alcohol syndrome	1 to 2 per thousand (Ref. 10)	Chronic alcoholic (more than 10 drinks per day)	350 per thousand (Ref. 12)
Perinatal infant death (around the time of birth)	23 per thousand (Refs. 13, 14)	Chronic alcoholic (more than 10 drinks per day)	170 per thousand (Ref. 15)
		Smoking	
Perinatal infant death	23 per thousand (Refs. 13, 14)	Less than 1 pack per day	5 per thousand (Ref. 13)
Perinatal infant death	23 per thousand (Refs. 13, 14)	One pack or more per day	10 per thousand (Ref. 13)

APPENDIX B

PREGNANT WORKER'S GUIDE

POSSIBLE HEALTH RISKS TO CHILDREN OF WOMEN WHO ARE EXPOSED TO RADIATION DURING PREGNANCY

During pregnancy, you should be aware of things in your surroundings or in your style of life that could affect your unborn child. For those of you who work in or visit areas designated as Restricted Areas (where access is controlled to protect individuals from being exposed to radiation and radioactive materials), it is desirable that you understand the biological risks of radiation to your unborn child.

Everyone is exposed daily to various kinds of radiation: heat, light, ultraviolet, microwave, ionizing, and so on. For the purposes of this guide, only ionizing radiation (such as x-rays, gamma rays, neutrons, and other high-speed atomic particles) is considered. Actually, everything is radioactive and all human activities involve exposure to radiation. People are exposed to different amounts of natural "background" ionizing radiation depending on where they live. Radon gas in homes is a problem of growing concern. Background radiation comes from three sources:

	Average Annual Dose
Terrestrial - radiation from soil and rocks	50 millirem
Cosmic - radiation from outer space	50 millirem
Radioactivity normally found within the human body	25 millirem
	125 millirem*
Dosage range (geographic and other factors)	75 to 5,000 millirem

The first two of these sources expose the body from the outside, and the last one exposes it from the inside. The average person is thus exposed to a total dose of about 125 millirems per year from natural background radiation.

In addition to exposure from normal background radiation, medical procedures may contribute to the dose people receive. The following table lists the average doses received by the bone marrow (the blood-forming cells) from different medical applications.

*Radiation doses in this document are described in two different units. The rad is a measure of the amount of energy absorbed in a certain amount of material (100 ergs per gram). Equal amounts of energy absorbed from different types of radiation may lead to different biological effects. The rem is a unit that reflects the biological damage done to the body. The millirad and millirem refer to 1/1000 of a rad and a rem, respectively.

X-Ray Procedure	Average Dose*
Normal chest examination	10 millirem
Normal dental examination	10 millirem
Rib cage examination	140 millirem
Gall bladder examination	170 millirem
Barium enema examination	500 millirem
Pelvic examination	600 millirem

*Variations by a factor of 2 (above and below) are not unusual.

NRC POSITION

NRC regulations and guidance are based on the conservative assumption that any amount of radiation, no matter how small, can have a harmful effect on an adult, child, or unborn child. This assumption is said to be conservative because there are no data showing ill effects from small doses. the National Academy of Sciences recently expressed "uncertainty as to whether a dose of, say, 1 rad would have any effect at all." Although it is known that the unborn child is more sensitive to radiation than adults, particularly during certain stages of development, the NRC has not established a special dose limit for protection of the unborn child. Such a limit could result in job discrimination for women of child-bearing age and perhaps in the invasion of privacy (if pregnancy tests were required) if a separate regulatory dose limit were specified for the unborn child. Therefore, the NRC has taken the position that special protection of the unborn child should be voluntary and should be based on decisions made by workers and employers who are well informed about the risks involved.

For the NRC position to be effective, it is important that both the employee and the employer understand the risk to the unborn child from radiation received as a result of the occupational exposure of the mother. This document tries to explain the risk as clearly as possible and to compare it with other risks to the unborn child during pregnancy. It is hoped this will help pregnant employees balance the risk to the unborn child against the benefits of employment to decide if the risk is worth taking. This document also discusses methods of keeping the dose, and therefore the risk, to the unborn child as low as is reasonably achievable.

to the unborn child from occupational exposure of the expectant mother be limited to 500 millirems for the entire pregnancy (Ref. 2). The 1987 Presidential guidance (Ref. 1) specifies an effective dose equivalent limit of 500 millirems to the unborn child if the pregnancy has been declared by the mother; the guidance also recommends that substantial variations in the rate of exposure be avoided. The NRC (in § 20.208 of its proposed revision to Part 20) has proposed adoption of the above limits on dose and rate of exposure.

In 1971, the NCRP commented on the occupational exposure of fertile women (Ref. 2) and suggested that fertile women should be employed only where the annual dose would be unlikely to exceed 2 or 3 rems and would be accumulated at a more or less steady rate. In 1977, the ICRP recommended that, when pregnancy has been diagnosed, the woman work only where it is unlikely that the annual dose would exceed 0.30 of the dose-equivalent limit of 5 rems (Ref. 3). In other words, the ICRP has recommended that pregnant women not work where the annual dose might exceed 1.5 rem.

C. REGULATORY POSITION

Instructions on radiation risks should be provided to workers, including supervisors, in accordance with § 19.12 of 10 CFR Part 19 before they are allowed to work in a restricted area. In providing instructions on radiation risks, employers should include specific instructions about the risks of radiation exposure to the embryo/fetus.

The instructions should be presented both orally and in printed form, and the instructions should include, as a minimum, the information provided in Appendix A (Instructor's Guide) to this guide. Individuals should be given the opportunity to ask questions and in turn should be questioned to determine whether they understand the instructions. An acceptable method of ensuring that the information is understood is to give a simple written test covering the material included in Appendix B (Pregnant Worker's Guide). This approach should highlight for instructors those parts of the instructions that cause difficulties and thereby lead to appropriate modifications in the instructional curriculum.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

Except in those cases in which an applicant or licensee proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the NRC will use the material described in this guide to evaluate the instructional program presented to individuals, including supervisors, working in or frequenting any portion of a restricted area.

Summary

1. **Radiation dose** is the amount of radiation the body is exposed to. The risks associated with exposure to radiation vary with the type and amount of dose and the dose rate. In addition, the effects of radiation vary according to the sensitivity of the cells that have been exposed.
2. Somatic, genetic, and teratogenic effects may result from radiation exposure. Somatic effects may appear in the exposed person; genetic effects may appear in future generations of the exposed person; and teratogenic effects may appear in children who were exposed to radiation before birth.
3. An acute dose results from exposure to a large amount of radiation within a short period of time. The effects of acute radiation exposure can be somatic or genetic; in addition, they can be prompt or delayed.
4. A chronic dose can result from exposure to small amounts of radiation over a longer period of time. The effects of chronic radiation exposure may be somatic or genetic; the effects are delayed.
5. The health risks associated with chronic exposure to radiation are much less than those associated with smoking a pack of cigarettes a day or being 20 percent overweight.
6. Special risks from radiation exposure apply to unborn children. The fetus is easily damaged by exposure to radiation especially during the first three months after conception. Reg Guide 8.15 recommends that a pregnant female not receive radiation dose greater than .5 rem for her entire pregnancy.

EXPOSURE CONTROL

Exposure to radiation can cause damage to the human body. The amount and type of damage depends upon the type of radiation to which you are exposed, the dose received and the time period in which it is received. The body can repair limited cell damage but, as it is exposed to larger dose of radiation in shorter periods of time, its ability to repair itself cannot keep pace with the damage it incurs. Georgia Power Company insures the control of radiation exposure by complying with exposure limits that have been established by the NRC and by developing safe work practices for employees.

Occupational Dose Limits

Occupational Dose Limits are described in the Title 10 Code of Federal Regulations, Part 20 (10 CFR 20) Radiation Protection Standards. It restricts the maximum occupational radiation exposure a person can receive during a calendar quarter (approximately 12-14 weeks). Different limits are established for various parts of the body. The whole body includes the head, trunk of the body, lens of the eyes, arms from shoulder to elbow, legs from hips to ankles, blood-forming organs, and sex organs (gonads). Extremities include the hands, forearms, feet, and ankles. The skin includes all external skin on the whole body.

10 CFR 20 Exposure Limits

Whole body - Head, trunk of the body, lens of the eyes, active blood forming organs and gonads.

1 1/4 Rem/qtr (Maximum - 5 Rem/yr)
3 Rem/qtr (Maximum or 12 Rem/yr)[6]

Extremities - Hands, feet, forearms, and ankles.

18 3/4 Rem/qtr

Whole Body Skin
7 1/2 Rem/qtr

Illustration of areas of the body and limits set forth in 10 CFR 20.

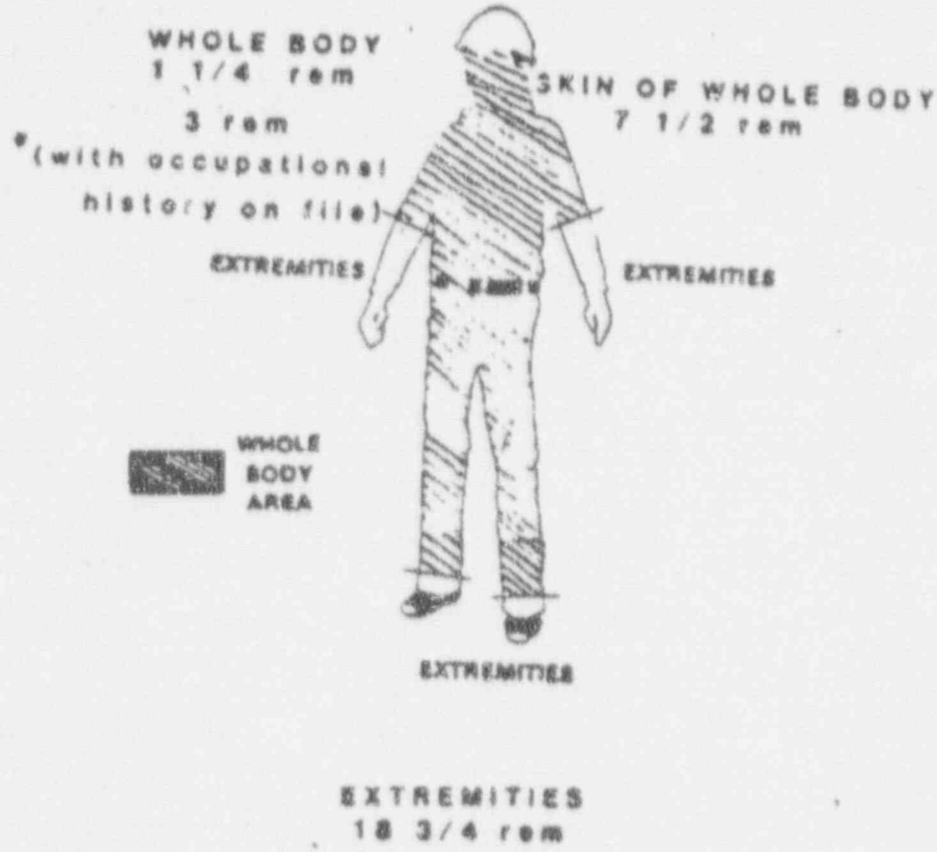


Figure 22. 10 CFR 20 Quarterly Exposure Limits

The normal quarterly occupational whole body exposure limit is 1 1/4 rem (1250 mrem). In order to qualify for the higher 3 rem (3000 mrem) quarterly occupational whole body exposure limit, two criteria must be met:

1. The worker must have an NRC Form 4 (Occupational External Exposure History) or its equivalent on file at the plant.
2. A potential quarterly whole body exposure of 3 rem (3000 mrem) when added to the worker's previous occupational radiation exposure, can not exceed the worker's permissible lifetime dose.

Permissible lifetime dose determines how much occupational radiation a person is allowed at any point during his or her lifetime. It is based on the amount of radiation exposure a person could accumulate if he receives a dose of 5 rem each year. The lifetime dose varies according to age.

Permissible Lifetime Dose (REM) - 5(N-18)

N = Age in whole years.

* In order to qualify for the higher 3 rem (3000 mrem) quarterly occupational whole body exposure limit, two criteria must be met:

1. The worker must have an NRC Form 4 (Occupational External Exposure History) or its equivalent on file at the plant.
2. A potential quarterly whole body exposure of 3 rem (3000 mrem) when added to the worker's previous occupational radiation exposure, can not exceed the worker's permissible lifetime dose.

5 = Amount of radiation exposure permitted each year.
18 = Age at which lifetime dose is established.

Permissible lifetime dose is important when determining a worker's quarterly dose limit. The following examples use the formula to show how to determine a worker's quarterly dose limit.

1. Reginald is 20 years old. According to his NRC Form 4, he has no previous occupational radiation exposure during his lifetime.
   a. What is his permissible lifetime dose?
   b. Does he qualify for the higher 3 rem quarterly whole body exposure limit?
   a. Reginald's permissible lifetime dose
      = 5 (20-18) rem
      = 5 (2) rem
      = 10 rem

      Reginald's permissible lifetime dose is 10 rem.
   b. Reginald's previous occupational exposure of 0 rem plus the 3 rem/qtr exposure limit will not exceed his permissible lifetime dose of 10 rem. Therefore, Reginald qualifies for the 3 rem quarterly whole-body exposure limit.
2. Jane is 40 years old. According to her NRC Form 4, she has previous occupational exposure of 10 rem during her lifetime.
   a. What is her permissible lifetime dose?
   b. Does she qualify for the 3 rem quarterly whole-body exposure limit?
   a. Jane's permissible lifetime dose
      = 5 (40-18) rem
      = 5 (22) rem
      = 110 rem

      Jane's permissible lifetime dose is 110 rem.
   b. Jane's previous occupational exposure of 10 rem plus the 3 rem/qtr exposure limit will not exceed her permissible lifetime dose of 110 rem. Therefore, Jane qualifies for the 3 rem quarterly whole-body exposure limit.

Making Decisions About Limits

When you exceed your exposure limits, you increase your health risk. Georgia Power Company could also be fined for violating NRC regulations. If you suspect that your quarterly limits have been reached or that working on a particular job will cause you to exceed your limits, you should inform your supervisor and the Health Physics Department.

In order to maintain your occupational exposure within the specified limits, it must be determined when your permissible lifetime dose has been reached. Remember that the permissible lifetime dose determines how much radiation exposure you may receive at any point during your lifetime. Your previous occupational dose when added to the 3 rem/qtr whole body exposure limit, must not exceed 5(N-18) rem.

For example, Eric is 35 years old. He has received whole-body occupational exposure of 1/2 rem (500 mrem) in the first month of this quarter. Review the following situations:

1. How much additional radiation exposure is he permitted to receive if his NRC Form 4 is not on file?

   Step 1 Because Eric's exposure history is not on file, his quarterly whole-body exposure limit is 1 1/4 rem (1250 mrem).

   Step 2 Eric's remaining radiation exposure for the quarter is the difference between his allowed quarterly whole body exposure limit and his current quarterly whole body radiation exposure.

   Remaining dose = 1 1/4 rem(1250 mrem) - 1/2 rem (500 mrem) = 3/4 rem (750 mrem).

Eric is permitted to receive an additional 3/4 rem (750 mrem) of whole body radiation exposure for the remainder of the quarter.

1. If Eric's exposure history is on file and indicates previous occupational whole body exposure of 4 rem (4000 mrem), how much additional whole body radiation exposure is he allowed for the remainder of the quarter?

   Step 1 Because Eric's exposure history is on file, Eric **may** qualify for the higher quarterly whole body exposure limit of 3 rem (3000 mrem). However, the higher limit **Must Not** cause him to exceed his permissible lifetime dose.

   Step 2 Eric's permissible lifetime dose must be calculated.

   Permissible Lifetime Dose = 5(N-18) rem = 5(35-18) rem = 5(17) rem = 85 rem.

   Step 3 Eric's permissible lifetime dose is 85 rem (85,000 mrem). His previous occupational whole body radiation exposure is 4 rem (4000 mrem). The quarterly occupational whole body radiation exposure limit for an individual with an NRC Form 4 on file is 3 rem (3000 mrem). His previous occupational whole body exposure of 4 rem (4000 mrem) plus the quarter whole body exposure limit of 3 rem (3000 mrem) is less than his permissible lifetime dose of 85 rem (85,000 mrem). Therefore, Eric qualifies for the higher 3 rem quarterly whole body exposure limit.

   Step 4 Using Eric's 3 rem (3000 mrem) quarterly whole body exposure limit, if he received 1/2 rem (500 mrem) of exposure in the first month of the quarter, his remaining occupational exposure for the quarter is 2 1/2 rem (2500 mrem).

   3 rem (3000 mrem) - 1/2 rem (500 mrem) = 2 1/2 rem (2500 mrem)

Eric is allowed an additional 2 1/2 rem (2500 mrem) of occupational whole body exposure for this quarter.

1. If Eric's supervisor asks him to do a job which will cause his dose to exceed his remaining 2 1/2 rem (2500 mrem) whole body exposure in one quarter, what should he do?

   Eric's remaining whole body exposure for the quarter is 2 1/2 rem (2500 mrem). If he were to do the job, Eric would receive more exposure than the NRC allows. This increased dose makes the health risks higher than acceptable and would cause Georgia Power Company to be in violation of the law. Eric should notify his supervisor and the Health Physics Department immediately.

Administrative Exposure Limits/Guidelines

Administrative exposure limits are established to provide guidelines for plant operations in order that personnel exposure will be maintained within the maximum limits established in 10 CFR 20. The administrative limits do not relieve the individual or his supervisor of their responsibility to keep all radiation exposure ALARA.

Plant Vogtle	*Georgia Power Company*
Whole Body-1 rem/qtr	Whole Body-5 rem/yr
-4.5 rem/yr	

Note: With **written** supervisory and HP authorization, the 1 rem/qtr. exposure guide can be exceeded. The extension(s) will be granted in increments of 500 mrem up to the person's federal whole body limit. The individual's agreement is not required as long as the limit stays below the federal limit.

Emergency Exposure Limits.

Emergency conditions are unusual circumstances. During an emergency there may arise situations that require action to protect plant property or equipment. During non-life threatening situations, the maximum recommended whole body dose is 25 rem. In a life threatening situation, the life of an employee may be in danger. During this type of situation the maximum recommended whole body dose is 75 rem.

Regulatory Guide 8.13

All female employees who work in the protected area of the plant shall receive instructions as to their rights to care for themselves during the gestation period (limit the amount of radiation exposure if pregnant or if pregnancy is suspected in order to limit the exposure to the unborn child).

At Plant Vogtle, quarterly whole body exposure to female radiation workers who are not pregnant is limited to 500 mrem/quarter; individually a female may select in writing, the administrative guidelines for radiation workers.

Radiation exposure to pregnant female radiation workers and visitors shall be limited to 100 mrem/quarter and shall not exceed 500 mrem for the entire period of pregnancy. Additionally, pregnant female radiation workers and visitors shall be prohibited from entering any Radiation Controlled Area at Vogtle.

Any female radiation worker who could enter a Radiation Control Area is responsible for notifying the dosimetry office upon learning that she is pregnant.

The woman must sign a statement acknowledging that she received instructions concerning Regulatory Guide 8.13 and she must choose to be included in the exposure limits set up according to the Admin Guidelines or to limit her exposure below the guidelines, in order to protect her unborn child if she may become or is pregnant.

Internal Exposure.

Total exposure to radiation includes both whole body external exposure and exposure due to the uptake of radioactive materials into the body. This internal radioactive material produces radiation which affects particular body organs. Internal radioactive material can be detected by a whole body count which measures the amount of such material inside the body.

Whole body counts will normally be performed when first employed as a radiation worker, annually while employed, and upon termination of employment. The internal dose is added to the whole body dose to give the total dose.

More frequent whole body counts should be performed whenever an employee suspects he may be internally contaminated. If internal contamination occurs or is suspected, HP should be immediately notified.

Medical Exposure

Equal doses of medical and occupational radiation exposure have equal risks. Medical exposure to radiation should be justified for reasons quite different than occupational exposure. Each worker must decide on the acceptability of any occupational hazard.

1. Consider a worker who receives a dose of 2 rems in a quarter from a series of x-rays or radioactive medicine in connection with an injury or illness; this dose and its associated risk should be justified on medical grounds.

2. If a worker had received a dose of 2 rems in the same quarter on the job, the combined dose of 4 rems would not injure the worker. A dose of 4 rems is not dangerous and is small compared to cumulative dose. Restricting the worker from additional job exposure during the remainder of the quarter would have no noticeable affect one way or the other on the risk from 2 rems already received from medical exposure.

3. If the worker accepts the risk associated with the x-rays on the basis of medical benefits and the risks associated with job-related exposure on the basis of employment benefits, it would be unfair to restrict the individual from employment in radiation areas for the remainder of the quarter.

Note: The dose received from medical exposure does not affect the dose received occupationally. Medical Exposures are not part of the exposure limits established in 10 CFR 20.

At VEGP, personnel receiveing medical treatment using radioisotopes are required to notify HP. Notify Dosimetry immediately of any medical uptake. The TLD of a worker receiveing medical uptake may need to be "pulled".

Personnel having medical uptake of radioisotopes may cause contamination monitors to *ALARM* if within 10 to 15 feet of them. The monitors may go into saturation for up to 30 minutes preventing their use.

Also detection of radioisotopes have occurred in the Sewage Treatment Plant as a result of personnel medical uptake.

Remember, Dosimetry should be notified if medical uptake is received by a worker at VEGP.

Responsibilities of Health Physics Staff

To help fulfill its responsibilities to the workers and to help workers insure their own safety, Georgia Power Company has especially trained technicians and staff that comprise the Health Physics Department. Health Physics is the department within the plant to contact for information about radiation protection policies. The responsibilities of the Health Physics Department include:

1. Monitoring the radiological conditions in the plant.
2. Helping workers minimize radiation exposure.
3. Helping workers control contamination from radioactive materials.
4. Helping workers prevent unnecessary radioactive waste.

The Dosimetry section of Health Physics is responsible for maintaining personnel radiation exposure records. One of the Dosimetry section's most important record-keeping tasks involves the NRC Form 4, *Occupational Exposure History*. The NRC Form 4 is required by law if the worker is to exceed the 1 1/4 Rem/quarter federal limit. This form is a complete history of a worker's occupational exposure to radiation. If a worker's exposure is not expected to exceed the limit, NRC regulations permit the use of a local form. At Plant Vogtle, a local form is used.

Summary

1. Based on the concept of acceptable risk, the NRC has established quarterly dose limits and has made recommendations for limits during emergencies. The requirements that specify quarterly dose limits are established in 10 CFR 20.
2. Violation of these limits can result in plant fines from the NRC. Violations can also make health risks too high to be acceptable. Any potential violation should be reported to the individual's supervisor and the Health Physics Department immediately.
3. The Health Physics (HP) Staff is responsible for helping workers insure their radiation protection and for keeping records of personnel occupational exposure. A worker's lifetime occupational radiation exposure is documented on the NRC Form 4 or an equivalent form.

EXPOSURE REDUCTION TECHNIQUES

Although limits control maximum exposure, safe work practices will keep your exposure even lower. It is difficult to decide in advance exactly what to do in all situations because conditions in the plant may change from one day to the next. Because radiation levels vary depending upon plant operating status, you may receive different instructions for each job in radiation areas. Regardless of the changes that occur from one job to the next all safe work practices are based on the ALARA principle. Safe work practices should keep your exposure *As Low As Reasonably Achievable (ALARA)*.

There are many ways to apply ALARA concepts in work situations:

1. Plan the job before entering the work area.
2. Carefully select all tools needed for the job.
3. Do not take more tools than you need.
4. Take the tools that are necessary to do your work so that you do not have to leave the area to get extra tools.
5. Practice on a mock-up of the job prior to entering the radiologically controlled area.
6. Use experienced personnel to train new workers.
7. Read necessary work procedures prior to beginning work.
8. Ask questions of your supervisor and HP prior to beginning work.
9. Move to areas with lower dose rates if your work is delayed.

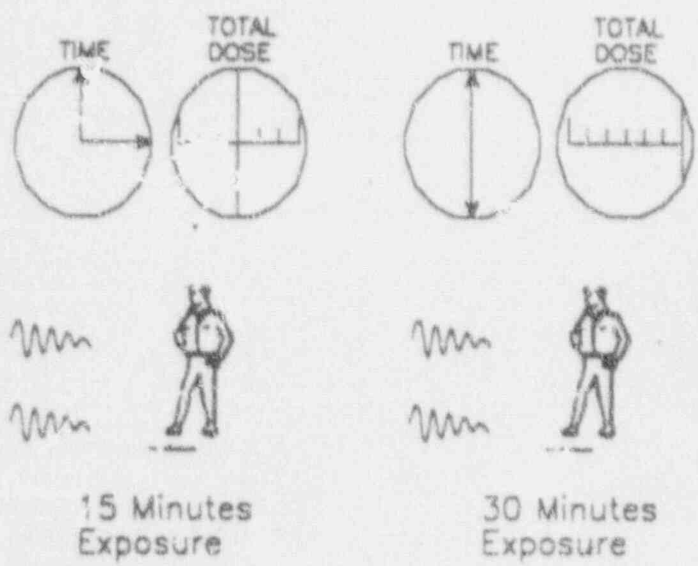
The three factors common to every job that can be used to minimize exposure according to ALARA are *time, distance, and shielding.*

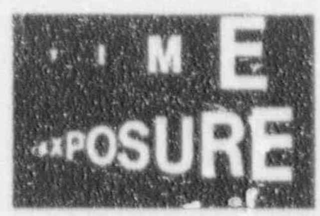
Time

The less time you spend in radiologically controlled areas, the less dose you receive. Radiation dose exposure is equal to the dose rate at a given location multiplied by the time spent in that location.

Dose = Dose Rate x Time

Dose rate refers to the amount of radiation exposure in a certain period of time. If the dose rate is 200 millirem/hour, then you will be exposed to 200 millirem during each hour that you are in the area.





If the dose rate for an area is 50 millirem/hour and you spend 2 hours in the area then you have been exposed to 100 millirem.

Dose = 50 mrem/hr x 2 hr; Dose = 100 mrem.

If the time spent in the area is decreased to one hour the exposure is reduced.

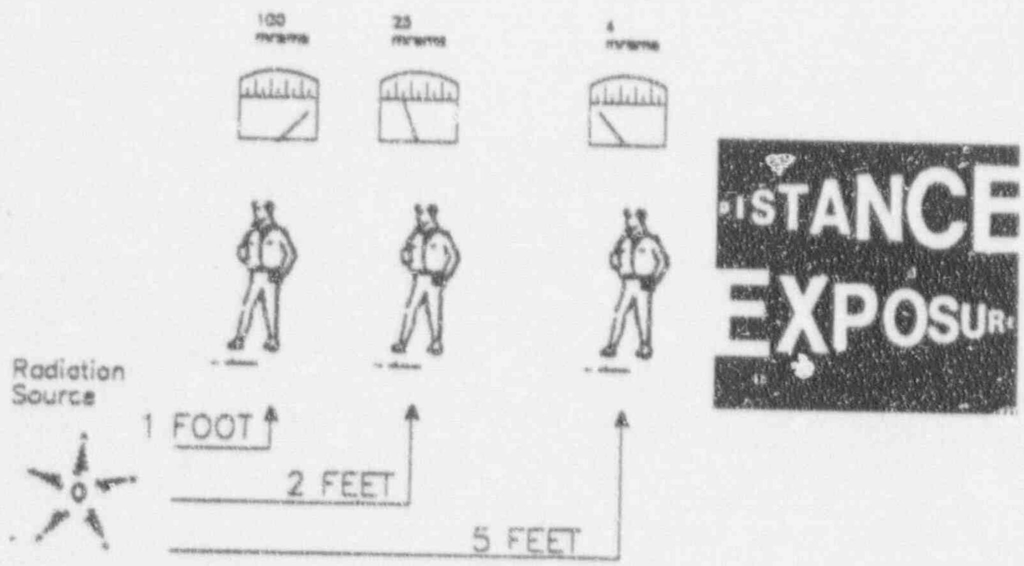
Dose = 50 mrem/hr x 1 hr; Dose = 50 mrem.

The shorter the exposure time, the lower the dose.

Distance

The greater the distance separating you from the source of radiation, the lower your dose. Radiation rapidly loses its energy as it travels. By staying as far away from a radioactive source as possible, your exposure is kept at a minimum.

DISTANCE	DOSE RATE
1 foot	1000 mrem/hr
2 feet	250 mrem/hr
3 feet	111 mrem/hr
4 feet	63.5 mrem/hr

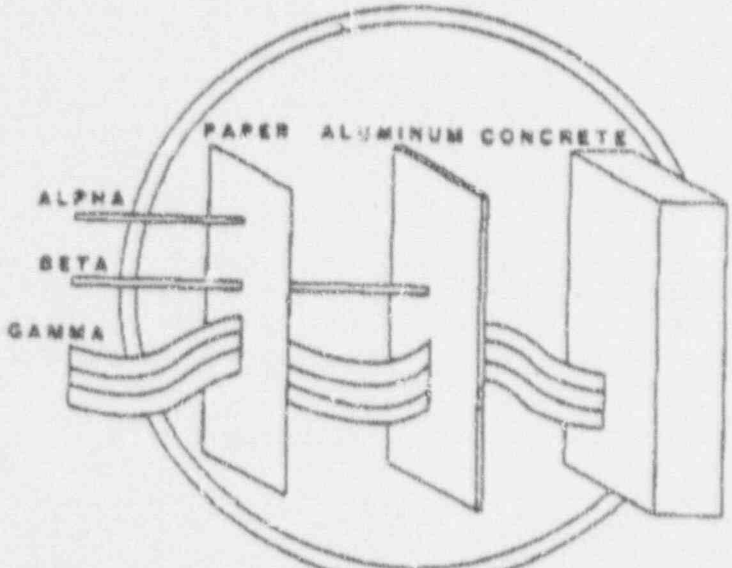


Shielding

The more shielding material separating you from the source of radiation the lower your dose exposure. Appropriate shielding materials are paired with each radiation type in the list below:

Radiation Type	*Shielding Material*
Alpha radiation	paper, clothing
Beta radiation	tin, aluminum, plastic, wood
Gamma radiation	lead, steel, concrete
Neutron radiation	water, wax (paraffin)

The Health Physics Staff is responsible for the installation of shielding. You should never install or remove shielding without authorization and/or supervision from Health Physics. However, you should always look for ways of using installed components as shields against exposure to radiation.



ALARA considerations are included on the Radiation Work Permit (RWP) for a job. Always consult your RWP prior to starting work!

If you are required to remain in an area while not actively engaged in work, always utilize ALARA Low Dose Rate Waiting Areas.

*** *THINK ALARA* ***

ALARA also applies to minimizing the amount of radioactive waste and trash generated in the plant. Work practices that you should follow to minimize radioactive waste generation will be discussed later.

ALARA At Plant Vogtle

The objective of the ALARA program is to maintain all personnel exposure, both internal and external, at the lowest practical level.

The concept of ALARA (As Low As Reasonably Achievable) pertains to keeping dose received low. This idea may apply to an individual's dose or the collective dose of a group of workers.

Management here at Plant Vogtle is committed to ALARA as is expressed in the Radiation Protection Program. However, the actual means of maintaining dose to a minimum is through the daily efforts of the individual worker.

ALARA Policy for Vogtle is as follows:

Georgia Power Company (GPC) is committed to operating the Vogtle Electric Generating Plant (VEGP) in a manner that provides protection for the health and safety of employees and the public. In order to fulfill this commitment, VEGP shall maintain a radiation protection program in compliance with the requirements of the Nuclear Regulatory Commission (NRC). These regulations stipulate that radiation dose to individuals must be below limits and as low as reasonably achievable (ALARA).

This goal is accomplished through the diligent and intelligent use of operational procedures, efficient work practices, training and radiation protection equipment.

The responsibility for implementing the ALARA program is as follows:

> **The overall responsibility for VEGP's program resides with the General Manager Vogtle Nuclear Operations (GMVNO), with primary support from the Health Physics Superintendent and the ALARA committee.**
> **Radiation safety is also an individual responsibility. Each person working at VEGP shall make every reasonable effort to maintain radiation exposures ALARA.**

The VEGP administrative and operational ALARA procedures are designed to guide personnel in maintaining their exposures ALARA. These procedures shall, at a minimum, contain the requirements for job planning, ALARA preparation, record keeping, special equipment, post-job evaluation, and additional policies as may be necessary to accomplish the ALARA objective. Line supervisors and the radiation protection staff shall ensure that procedures are followed, that precautions are being observed, and that potential radiological hazards are identified and mitigated as quickly as possible. The information generated by post-job reviews shall be used as a basis for future job planning, radiation work procedure modification, equipment modifications, or other revisions that may be necessary to achieve ALARA levels.

Your individual responsibilities to the ALARA Programs are as follows:

1. Know your current whole body dose.
2. Cooperate fully with HP personnel in all matters while in the plant.
3. Comply with plant directives, standard operating procedures, and warning signs/barriers that concern radiation and contamination control.
4. Know principal radiation sources and exposure rates on the job site as defined by HP.
5. Properly use the exposure reduction tools and methods available.
6. Discuss exposure reduction ideas with HP and supervisory personnel.

Under certain conditions, pre-job briefings may be required to advise workers of radiological conditions in their work area. These conditions may be set by Procedure or by unusual conditions in the plant. If a pre-job briefing is required by the RWP, workers should report to the HP Control Point for briefing before entering the plant.

Summary

1. In addition to complying with maximum limits allowed by the NRC, the nuclear power industry develops its work practices according to the ***ALARA*** concept. These work practices are intended to keep exposure ***As Low As Reasonably Achievable***.
2. The three factors common to every job that are determined by the ALARA principle are ***time, distance, and shielding.***

CONTAMINATION CONTROL

Contamination is defined as radioactive material in an area where it does not belong. This unwanted radioactive material is a potential source of both internal and external exposure and can result in a serious hazard for workers. Contamination occurs when radioactive materials escape the plant's primary system. The escape can occur in several ways. Components in the primary system can wear out and allow radioactive materials to leak or drip from damaged valves and seals. Valve packing can give way and pump seals can deteriorate. Radioactive materials can also escape during maintenance operations. Despite precautions, some radioactive substances will be released when the system is opened. Radioactive contamination can also be caused by human error. Improper operation of a system, lack of communication between the departments in the plant, or insufficient training can lead to mistakes that result in the release of radioactive material.

Surface contamination and airborne contamination are the two types of radioactive contamination. Surface contamination is unwanted radioactive material on skin, the surface of tools and equipment, or in the work area. Airborne contamination is unwanted radioactive material in the air.

Surface Contamination

Surface Contamination is radioactive material on floors, walls, equipment. It can be loose or fixed. Loose contamination can occur from radioactive liquid leaks. When the liquid evaporates, a residue of loose contamination is left behind. Loose contamination can also result from cutting or grinding in radioactive areas.

Loose surface contamination on the surface of floors and equipment can be assessed by the Health Physics Staff, by performing a smear survey. Small discs made of cloth, called smears, are wiped over a surface area of about 4 square inches. The radioactivity of each smear is then measured or "counted". Loose surface contamination is reported in disintegrations per minute per 100 square centimeters (dpm/100 cm^2).

Fixed Contamination is like ground-in dirt. Firmly embedded in an object, this unwanted radioactive material is difficult to remove and does not spread easily. Fixed contamination may result if loose contamination is painted over or worked into the porous wooden handle of a tool. Like a good shirt with oil or grease stains, a tool with fixed contamination may have to be discarded.

Although you cannot see radioactivity, certain conditions should warn you that a work area is likely to have surface contamination. The conditions are as follows:

1. A posted airborne radioactivity area will probably also have loose surface contamination.
2. Steam or liquid leaks in radiologically controlled areas may result in loose contamination.
3. When work is performed on or with contaminated equipment, particles of radioactive substances may settle on floors, walls, or workers.

Recently, workers at nuclear power plants have experienced cases of contamination with pin point size specks (or "*Hot Particles*") of radioactive material. This type of contamination is quite different from the more typical "*loose surface contamination*".

"Hot Particles" are very small particles of radioactive material (in some cases, microscopic in size) which have high radiation dose rates. "*Hot particles*" are often so small that they cannot be seen by the human eye.

When a hot particle is deposited on the skin, it can cause significant exposures to a small area of the skin. A hot particle on the skin can produce a very large exposure to the immediate skin area (1 cm^2) but the dose drops off rapidly as the distance from the particle increases. The biological significance of a "*skin dose*" is much lower than for a "*whole body dose*".

"*Hot particles*" affect only those areas with which they are in close contact. This makes them difficult to detect when frisking. However, if a worker is contaminated with a "*hot particle*", the portal monitor or whole body frisker in the plant will alarm during counting. If this happens to you, immediately notify Health Physics. They will perform surveys to determine the extent of the hazard involved.

The following are characteristics of "*hot particles*":

1. There are two different sources for "*hot particles*:" activated metal particles and fuel fragments. The most common source is activated metal particles, usually stellite from valve seats which activates to Cobalt-60, Cobalt-58, and Chromium-51. It should be noted, however, that *ANY* metal particulate material can be a "*hot particle*".

2. 90-95% of the contact dose rate from radioactive "*hot particles*" is due to very *low energy betas*, so the particle can be missed on a normal frisk. One plant's encounter with a "*hot particle*" involved only 150 CPM measured through the sole of a shoe, the particle itself, when measured on contact, read almost 1 R/hr (3,500,000 CPM).

3. Because of their static charge, "*hot particles*" stick to almost anything. At one plant, a small room was evaluated with 60 smears and thought to be clean. However, the use of special hot particle survey techniques revealed eight "*hot particles*", each measuring greater than 100,000 DPM.

4. Once the particle is removed there is no residue.

The goal of Plant Vogtle is to minimize the effect of Hot Particles by limiting the spread of such particles and by training workers in the proper detection techniques.

Increased vigilance in self-frisking procedures is essential when personnel move between frisking locations within a contamination control zone and when they leave contaminated areas. Proper use of Whole Body Friskers and Portal Monitors is critical for the efficient detection of any Hot Particles.

To further assist in control of hot particles, HP has established Hot Particle Control Areas (HPCA) in locations where they exist or are likely to be present. These HPCA may require the use of multiple layers of protective clothing and multiple step off pads. Workers should read their radiation work permit (RWP) carfully before entering HPCAs.

Airborne Contamination

Airborne Contamination is radioactive material present in the air. It can either be particles or gas. The most common airborne gases are usually not as dangerous as airborne particles. Some gases are usually completely expelled from the lungs when exhaling. Radiation exposure from some radioactive gases, therefore, is more external than internal.

There are four ways that contamination can become airborne:

1. Welding, cutting, or grinding on or with contaminated equipment.
2. Sweeping in a contaminated area.
3. Steam and/or liquid leaks from the plant's primary systems.
4. Opening or venting plant systems for inspection or maintenance.

Airborne contamination is like surface contamination in that it cannot be seen or felt, however, warning signs are often present. Signs of airborne contamination are steam leaks, haziness in the air, and observance of any of the activities listed above.

Controlling the Spread of Contamination

The spread of radioactive contamination must be carefully controlled. It is important to keep all areas in the plant as free from contamination as possible and to protect yourself and other workers from becoming contaminated.

Protective clothing prevents workers in contaminated areas from getting materials on their skin and hair. These heavy cotton clothes, rubber boots and gloves also provide some protection against beta radiation. Follow all procedures for properly donning, removing, and using protective clothing and respirators. Do not take contaminated clothing or respirators into clean areas.

Step-Off-Pads are placed at the entrances and exits of contaminated areas. Specifically labeled yellow and magenta floor pads clearly identify the boundaries of the clean and contaminated areas. You should never allow contaminated materials to touch the step-off pad. Always perform a whole-body frisk after leaving a contaminated area. Assume that you are contaminated until it has been proven otherwise.

Potentially contaminated materials should be placed in Yellow Plastic Bags before being carried into clean areas. Even if materials are being moved from one contaminated area to another, contaminated items must be bagged. Avoid touching any outside portion of the bag with the contaminated item. The Health Physics staff will ensure that the material is properly bagged, labeled, and surveyed before you are allowed to remove it from contaminated area.

Glove Boxes are used to handle radioactive materials in a small work area. A glove box can also be used to prevent the spread of contamination to a larger area. By putting your hands in the gloves, you can manipulate work tools and equipment to perform maintenance work in the box. The Glove Box helps you to avoid touching contaminated surfaces, tools, or equipment and decreases the amount of protective clothing you may have been required to wear otherwise.

Containment Tents are used for performing work that could result in the spread of contamination over a large area. In addition, these tents have a ventilation system equipped with a high efficiency particulate air (HEPA) filter that removes contaminated particles from the air.

Drip Trays catch contaminated liquids from leaks in the primary system. Do Not step in puddles. Whenever you are in a radiologically controlled area, always assume that any puddle of water is contaminated. Notify the Health Physics staff if puddles are present in the plant.

Floor Drains allow liquids to drain into the floor drain collector tank until they can be disposed of properly. You should never pour any kind of liquid into these drains. To dispose of liquids, contact the Health Physics staff.

Respirators are used by workers in Airborne Radioactivity Areas to control the hazard of inhaling airborne radioactive material.

Contamination: Do not carry radioactive materials home with you. Procedures to follow to prevent the spread of contamination are list listed below:

1. Do not smoke, eat, drink, or chew in radiation controlled areas.
2. Properly wear protective clothing and respiratory protection whenever required by signs or HP.
3. Remove protective clothing and respiratory protection properly to minimize spread of contamination.
4. Perform frisk properly. Assume that you are contaminated. Whole body frisk is required when leaving contaminated areas.
5. Minimize the spread of a known or possible radioactive spill; notify HP promptly.
6. Do not unnecessarily touch a contaminated surface or allow clothing, tools, or other equipment to do so.
7. Material must be surveyed after leaving a radiation controlled area. Contaminated items must be bagged, labeled and stored properly.
8. Report the presence of open wounds to HP and medical personnel prior to working in areas where radioactive contamination exists; immediately notify HP if a wound occurs in such an area.
9. Minimum protective clothing items for contaminated areas is:
   a. Cloth shoe covers.
   b. Rubber shoes.
   c. Cotton gloves.
   d. Rubber gloves.
   e. Lab coat
10. Tools, equipment, trash or any material leaving the operating buildings must be surveyed by HP prior to exit.
11. Do not step in puddles. Notify HP if you observe leaking or standing water inside RCAs.

Contamination is always best controlled if handled at its source.

Control of Radioactive Waste

When clothing, tools, and equipment come in contact with contaminated surfaces, they also may become contaminated. These contaminated materials must then either be decontaminated or disposed of as radioactive waste. It is very important to limit the amount of material that must be decontaminated or disposed of as waste. The following procedures are intended to help you accomplish that goal:

1. Do not take tools, equipment, or other materials that you do not need into contaminated areas.
2. Limit the use of water on contaminated surfaces.
3. Keep contaminated trash separate from trash that is not contaminated. The plant uses color-coded drums or plastic bags for disposal of contaminated and non-contaminated materials.

Dispose of material in the proper color-coded drum or container (plastic bag).

a. ***Dark Blue***-Contaminated laundry (rubber and cloth).
b. ***Yellow Drums***-Contaminated trash.
c. ***White Drums***-Non-Contaminated trash.
d. ***Magenta (Red) Drum***-Contaminated hard hats.
e. Contaminated ***Respirators*** are properly bagged at the exit point from the area and are given to an HP Technician or placed in a "***Labeled***" container.[1]

4. Use previously contaminated tools to perform work in a contaminated area, if possible. Contaminated tools are marked and stored in the "Hot Tool Room".
5. Perform all jobs in RCAs in a manner that generates as little radwaste as possible.

Radioactive Spills

A radioactive spill is any unplanned release of radioactive liquid. If you are involved in or observed a radioactive spill, follow these instructions:

1. Stop/Contain the spill; ensure that you are properly protected, avoid contaminating yourself.
2. If the spill is from an overturned container, try to set it upright.
3. The amount of time spent stopping a difficult leak should depend upon the radiation levels involved, the possibility of inhaling airborne radioactivity from the spill, and the consequence of not making a prompt closure.
4. If the spill is minor, immediately cover the spill with the most convenient absorbent material to soak up the liquid.
5. Protect yourself by remaining outside the area covered by the spill.
6. Protect other workers by warning anyone else in the area. Notify Health Physics and the Control Room immediately.
7. Follow instructions given by Health Physics, your supervisor, and any directions given over the public address system by the Control Room.

Decontamination

Sometimes, in spite of the care and procedures used to control the spread of contamination, it does occur and it must be removed. Decontamination is the removal of radioactive material from any area where it does not belong. The process of decontamination does not destroy the radioactive material, but simply removes it from the person or item. The decontamination process allows tools and equipment to be reused and workers to be freed from exposure hazards. All decontamination should be performed according to instructions from the Health Physics staff.

It is very important to keep radioactive material from entering the body. The decontamination process is designed to remove contamination as quickly as possible and to prevent its spread. To decontaminate skin or hair requires washing with warm water and soap. This is usually sufficient for removing external contamination from individuals. Material decontamination is slightly different from personnel decontamination. Unlike personnel safety, the first concern when decontaminating materials is cost. Sometimes it is often cheaper to replace an item than it is to decontaminate it. If the cost is justified, materials can be decontaminated by washing with approved detergents and water.

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[1] Unless instructions to do otherwise are received from HP.

Internal Contamination

Internal contamination occurs when radioactive material gets inside the body. Internal contamination is very serious because there is no way to internally shield body tissues from exposure when radioactive material has been swallowed, inhaled, or absorbed. Radioactive material accumulates in certain tissues. For examples, iodine accumulates in the thyroid gland and plutonium concentrates in the lungs and bones. Radioactive material enters the body through several possible routes.

1. It can be inhaled.
2. It can be ingested through the mouth.
3. It can enter the body through open wounds or sores.
4. It can be absorbed through skin pores.

While there is no decontamination process for internal contamination, there are several things you can do to prevent the possibility of becoming internally contaminated.

1. Wear a respirator in airborne radioactivity areas.
2. Do not eat, drink, smoke, or chew in radiologically controlled areas.
3. Keep hands and other potentially contaminated objects away from your face and mouth.
4. If you have a cut or scratch, show it to the Health Physics staff before you enter a contaminated area to determine if the bandage is sufficient protection.
5. Notify the Health Physics staff immediately if you cut yourself while working in an area with radioactive contamination.
6. After you have worked in a contaminated area, you must be careful to wash thoroughly and monitor your body for external contamination before eating and drinking.

Internal contamination can be detected by a whole-body count and bioassay analysis. Just as there are limits on the amount of external exposure there are limits on internal exposure as well. The limit for internal exposure is based on the amount of airborne contamination (in MPC's) and your stay time in the area (in hours) 40 MPC hours per week is the maximum permissible internal exposure level. If you suspect that you are internally contaminated, report to the Health Physics staff immediately.

Respiratory Protection Equipment

Purpose

Respiratory protection equipment is used to protect against internal contamination that can result from the inhalation of gaseous or particulate radioactive material that is dissolved or suspended in the air. Although it does not provide some protection against β-radiation, it is not designed to protect against external radiation exposure.

Before being allowed to use a respirator an individual must meet the following requirements.

1. Attend respiratory protection training.
2. Pass a written test on the training.
3. Medical Exam and certification that the individual is medically qualified to use respiratory equipment.
4. Be successfully fitted and tested with a respirator.

Note: To be properly fitted, an individual must be clean-shaven.

Summary

1. Surface contamination is unwanted radioactive material on tools and equipment, floors and walls, and skin or hair. The two types of surface contamination are **Loose and Fixed.** Loose contamination is measured in dpm/100cm^2.
2. Airborne contamination is radioactive particles or gases in the air. Radioactive materials can become airborne during welding, cutting, or grinding on or with contaminated equipment; sweeping in contaminated areas; and by steam leaks.
3. Protective clothing, step-off pads, plastic bags, for contaminated tools, glove boxes, containment tents, drip trays, and floor drains are devices used to control the spread of contamination.
4. External contamination can often be removed from skin and hair by washing with soap and water. It can often be removed from tools and equipment by washing with approved detergent and water.
5. Internal contamination can result from inhalation, ingestion, absorption of radioactive materials and through broken skin. Once inside the body, these radioactive materials can deposit in some body tissues and result in internal exposure.
6. Internal contamination can be detected by whole-body counts and bioassay analysis. If you suspect that you are internally contaminated, contact the Health Physics staff.
7. Respiratory Protection equipment is worn by workers entering Airborne Radioactivity Areas to minimize the inhalation of radioactive materials.

ADVANCED ACCESS CONTROL

Working In Radiologically Controlled Areas

Working in an area where you could be exposed to radiation and/or radioactive material requires special precautions. All workers must wear appropriate radiation monitoring devices in radiologically controlled areas. Also a radiation work permit (RWP) is required to gain entry to and work in posted areas. The permit contains instructions about the required radiation monitoring devices, the use of respirators and protective clothing, and the work practices that are appropriate for the job which will be performed in the area. A radiation work permit is required in each of the following situations:

1. Entry into High Radiation Areas.
2. Entry into Contaminated Areas.
3. Entry into Airborne Radioactivity Areas.
4. Entry into any area posted "Keep Out-RWP Required".

You may encounter ***Hot Spots*** while you are in a radiologically controlled area. A ***Hot Spot*** is a specific area that produces radiation levels much higher at that spot than what is measured in the general area. You should avoid standing near a ***Hot Spot*** to maintain your radiation exposure as low as reasonably achievable. By procedure at Vogtle, a ***Hot Spot*** is a component or item having localized contact readings greater than 250 mrem/hour and more than 5 times the general area dose rates.

Requirements For Posting Basic Radiation Warning Signs

Radiation Warning Signs are posted in locations in the plant where radiological hazards exist by the limits set in 10 CFR 20 or by plant procedural limits.

Radiologically Controlled Area(RCA)

An area which contains or potentially contains radiation, contamination, or radioactive materials in quantities or levels sufficient to require posting or protective measures.

Radiation Area

An area where you may be exposed to a whole-body dose of more than 5 millirem in one hour or more than 100 millirem in five consecutive days is posted as a Radiation Area by 10 CFR 20 limits. When you work in a radiation area you must wear radiation monitoring devices to measure your radiation exposure. At VEGP a Radiation Area is posted at any location accessible to personnel where the whole body could receive a dose rate in excess of 2.5 mrem/hour.

Requirements for entering a Radiation Area

TLD is required for entry
Dosimeter is required to be checked ***periodically***.

High Radiation Area(HRA)

An area accessable to personnel in which radiation fields exist at such a level that the whole-body could receive a dose rate equal to or in excess of 100 mrems/hour is posted as a High Radiation Area. A High Radiation Area has special requirements for entry:

1. If the dose rate is more than 100 millirem in one hour but less than 1000 millirem in one hour, the area must be barricaded.
2. If the dose rate is more than 1000 millirem in one hour, the entrance must have a locked door and the keys controlled by Health Physics. Radiation warning signs to "Locked" High Radiation Areas" will bear the word **Danger**.
3. A Health Physics technician must accompany workers while in the high radiation area to perform radiation surveys and ensure that proper work practices are followed.

Requirements for entering a High Radiation Area

1. Contact HP prior to entry
2. TLD required for entry
3. Dosimeter is required to be checked *periodically*.
4. Areas with dose rates greater than 1000 millirem/hr are locked at all times; entry must be obtained through H.P.

Locked High Radiation Area

An area where the dose rate is greater than 1000 mrem/hour is posted as a Locked High Radiation Area. Entrance doors to each "Locked" HRA will be locked to prevent unauthorized entry and not to prevent exit from the area. Keys to Locked HRAs are held by H.P. Locked HRAs are posted as follows:

DANGER
KEEP OUT
High Radiation Area
RWP Required for Entry
HP Escort Required for Entry
TLD Required for Entry

Note: For each "Locked" HRA where no enclosure can be reasonably constructed, the area shall be roped-off and a *Flashing Yellow Light* installed as a warning device. The Flashing Yellow Light, ropes, barriers, etc. associated with Locked HRAs are not to be tampered with. It is the responsibility of each worker entering any Locked HRA to strictly adhere to all requirements and instructions for accessing the area. It is the responsibility of the worker and HP to ensure that Locked HRA doors are locked upon exit. Only HP personnel are qualified to perform escort duties in Locked HRAs. Entrance is controlled by a Specific RWP.

Airborne Radioactivity Area

An area where radioactive material in the air (gas, dust, or mist) has exceeded 25 percent of the maximum permissible concentration (.25 MPC). It is posted as an Airborne Radioactivity Area. Maximum Permissible Concentration (MPC) is the maximum amount of airborne radioactive material that you can safely be exposed to without exceeding internal exposure limits. Maximum permissible concentrations are listed in Table 1 Appendix B, 10 CFR 20, and are used to establish the limits for the various kinds of airborne radioactive materials. The Health Physics Staff will specify the use of appropriate respiratory protection equipment in airborne radioactivity areas.

Requirement

Health Physics will determine the respiratory protective equipment that is necessary to be worn for entry to area.

Contaminated Area

Any area where loose surface contamination exceeds the limit of 1000 dpm/100 cm^2 for beta-gamma and 20 dpm/100 cm^2 for alpha, the area is posted as a Contaminated Area. You must wear appropriate protective clothing to perform a job in a contaminated area. Before entering the area, report any cuts or wounds to the Health Physics Staff. Before leaving the contaminated area, any items that you want to remove must be sealed in yellow or magenta plastic bags. These items must also be labeled and surveyed by Health Physics before leaving the contaminated area to prevent the spread of radioactive materials. You must also monitor yourself for contamination immediately after leaving the area.

Requirements

1. Protective clothing must be worn in the area. Protective clothing requirements will be designated on the RWP.
2. Minimum protective clothing required for entry into a contaminated area are cloth and rubber gloves, cloth and rubber shoes, and a lab coat.
3. Proper dress/undress procedure must be followed to ensure prevention of contaminating yourself.

4. Must perform a whole body frisk upon exit from the area.
5. Open cuts/wounds should be reported to H.P. prior to entry and if incurred while in the area.
6. Tools/equipment removed from the area must be placed in yellow or magenta plastic bags, sealed and surveyed for contamination by H.P. prior to exit.

Radioactive Materials Area

When radioactive material is stored in amounts higher than the limits specified in Appendix C, 10 CFR 20 the area is posted as a Radioactive Materials Area. Radioactive Materials Areas are often kept locked. You should contact the Health Physics Office if you must gain entry to a radioactive materials area to determine what precautions you should take prior to entering the area.

Requirements

HP will determine what precautions must be met for entry into the area.

| **Hot Particle Control Area(HPCA)**

| Any work area where hot particles are known to be present or likely to be present are designated as HPCA. The location may be a room, roped-off area, or a containment used to confine particle contamination. ***Hot Particles*** are microscopic radioactive particles that emit intense beta particles, gamma, and x-rays. An HP escort is required for entry into a HPCA.

| **Hot Particle Buffer Area(HPBA)**

| An area free of ***hot particles***, surrounding a HPCA. The area is surveyed frequently to determine that ***hot particles*** are not transported out of the HPCA. Increased HP surveillance is required.

| ***Hot particles*** and ***Hot spots*** may be encountered in RCAs. Special precautions should be taken to ensure your radiological safety when working in areas where they exist.

ALARA Guidelines for RCAs

1. Minimize time spent in radiation areas.
2. Increase the distance between yourself and the radiation source.
3. Use shielding to reduce exposure.
4. Plan all radiation work.
5. Practice mockups so that you can do your work in a radiological environment in less time.
6. | Stay away from ***Hot Spots***
7. | Monitor carefully upon exit from HPCAs. Follow all HP instructions while working in and upon exit from all RCAs and especially from HPCAs.

Handling Radioactively Contaminated Material

1. Previously contaminated materials (tools/equipment which could not be completely decontaminated) should be reused whenever possible for work in contaminated areas. Tools for use in RCAs are painted magenta/red.
2. HP must be notified prior to removing material from contaminated areas.
3. If practical, contaminated materials or potentially contaminated materials must be placed in containers or yellow bags/wrapping material prior to being transferred from the contaminated area. HP may specify special requirements or precautions while handling the material.
4. All containers/wrappings should be properly sealed to prevent the spread of contamination. Containers/wrappings should only be opened when work is actually in progress that involves the contained/wrapped material.
5. Anyone observing damaged/torn containers or wrappings of radioactive material should notify HP immediately.
6. Materials removed from contaminated areas shall be handled as radioactive until monitored by HP. Non-contaminated materials will be released by HP. Contaminated materials will be tagged, indicating the radiation and contamination levels and will be handled as radioactive material.

7. HP must be notified prior to moving contaminated material from one contaminated area to another.
8. Personnel should always minimize their exposure/prevent the spread of contamination when handling contaminated material.
9. YELLOW and MAGENTA plastic indicate the item is radioactive or radioactively contaminated material. Yellow and magenta plastic bags, tubing and wrapping should be used only with radioactive material or systems. ***Non-radioactive Applications are not Permitted.***

Radiological Housekeeping

In order to keep the plant in a safe radiological condition, it is important that each individual performing work inside a radiologically controlled area clean up at the end of his job in the area. Good radiological work practices are very important and need to be habitual. The following are some basic guidelines:

1. Be prepared to contain whatever amount of water which comes out of a contaminated system when opened.
2. Don't take unnecessary items into a contaminated area. This generates unnecessary contaminated waste.
3. Minimize waste by taking only the necessary amount of consumable items into the area; remove packaging and containers before transferring material into the radiation controlled area.
4. When finished with your job, remove all items that were taken into the area. Leave the area as clean or cleaner than you found it.
5. Place contaminated clothing and trash in the proper containers (i.e., contaminated trash into yellow drums or bags, and contaminated laundry into dark blue drums).
6. Call H.P. if you see a container greater than 75% full. ***Do not push or try to pack materials, PC items, etc. into containers***

Rules For Leaving Radiologically Controlled Areas (RCAs)

Leave the area if:

1. Job is completed.
2. You are injured.
3. An evacuation alarm sounds.
4. H.P. notifies you to leave.
5. You have reached your specified time or dose limit.
6. You tear or get your protective clothing wet.
7. You feel ill.

Radiation Work Permit

1. The radiation work permit (RWP) is a written permit to control and minimize radiation exposure that is receive from work performed in radiation areas, high radiation areas, contaminated areas and airborne radioactivity areas. Examples of conditions requiring RWP are as follows:
   a. Entry into containment.
   b. Entry into areas of measurable neutron exposure.
   c. Entry into an area of unknown conditions.
   d. Entry into any area posted **Keep Out-RWP Required.**
   e. Entry into any RCA.

   Note: An Emergency or Urgent RWP may authorize entry when critical, immediate action is required with approval from HP supervision or the Shift Supervisor.
2. The types of RWP's used at Plant Vogtle:
   a. **Specific**-Good for duration of the job; modified on the basis of surveys. Required for entry into High Rad Areas (locked or unlocked). Specific RWP's are terminated/suspended whenever the job is:

Completed
Cancelled
Or significant changes in radiological conditions occur.

b. **General**-Used to cover certain routine or repetitive work. It is issued for such groups as Operations, Health Physics, plant supervisors, etc. General RWPs shall be terminated whenever significant changes in radiological conditions occur, or at the end of each calander year. General RWPs shall be reviewed by HP supervision each calander quarter.

Note: General RWPs will not be issued for work in High Radiation Areas, areas of significant loose contamination, or in areas requiring a specific job survey by HP prior to entry.

Jobs under General RWP.
Operator Rounds Observations and Inspections.
Supervision.
Chemistry Sampling.
Radiation Exposure Control Activities.
Laundry Operations.
Valve Lineups.
Work Assignment Evaluations.
Training Exercises

3. **RWP Issuance**

The work planning group or the job supervisor is responsible for the work requiring the RWP and should initiate the permit. The following information should be provided on the RWP Request Form:

a. MWO (job) Description.
b. Location.
c. Additional MWO #s referenced by the RWP.
d. MPL #s (Master Part List No.s) associated with the RWP.
e. Activities which job may involve such as Welding, Grinding, etc.
f. Date.
g. Estimation of man-hours required for job completion and number of people.
h. Name, SSN and exposure ID number of personnel assigned to do the job.
i. Work supervisor should enter his signature in the "**Requested by**" section and forward it to the Health Physics supervisor or his designated alternate.

4. Health Physics
   a. The Health Physics supervisor or his alternate will review the work to be performed for conditions which may effect the safety of the plant or personnel involved. The names of the personnel listed will be checked for the amount of accumulated exposure.
   b. A Health Physics technician will make a survey of the area and check the following:
      1) Dose rates in the area - using dose rate meter that measures beta and gamma radiation levels.
      2) Contamination level - smears/swipes of the area.
      3) Airborne activity - air samples.

      From the data received, protective equipment required, monitoring devices required, special hazards, and any special instructions will be entered on the RWP. The work category, RWP # and the start date and completion date for the RWP will also be listed.
      4) Indicate need of an ALARA pre-job briefing, if necessary.
   c. The Health Physics foreman or his alternate will review the RWP, enter the estimated rem and sign the HP approval section.
5. Health Physics foreman and the shift supervisor/foreman will keep a copy of the RWP with the original posted on the RWP board next to the HP Control Point (main access point to the RCA boundry) and a copy posted at the job location. After completion of all RWP requirements prior to entering the area to do the job, personnel must access via the HP Control Point Access terminal to begin work.
6. Personnel Responsibilities
   a. Work Supervisor
      1) Ensure his work crew complies with RWP requirements.

2) Notify HP of each shift prior to starting job.
3) Request RWP to support work to be performed in controlled areas.
4) Notify HP if any problems occur.
5) Notify HP if an RWP extension will be necessary.

b. Personnel working under RWP.

The personnel performing the work are required to read and understand the RWP. They must log into the RCA using the RWP#, exposure ID number and the EDRD reader. When a worker enters the RWP number on the EDRD reader Keypad, he is indicating that he has read, understands, and will comply with the requirements of the RWP. Every time the worker leaves the RCA, he must log out of the RCA access/exit terminal and if he reenters he must log in again, using the EDRD and its Reader as before. If the EDRD Reader is inoperable, the worker(s) must log in and out using Dose Cards which are available at the HP Control Point. (RWP information may be entered into a data terminal at the HP Control Point located just inside the Control Building door, C-125). While in the Area, workers must:

1) Practice ALARA while on the job.
2) Comply with all RWP requirements.
3) Comply with radiation protection procedures, regulations and rules.

c. H.P. Staff

1) Perform and document radiological surveys and analysis as required.
2) Classify, post and barricade radiologically-controlled areas properly.
3) Determine the radiological controls necessary for working in controlled areas.
4) Perform ALARA pre-job briefing.

d. At Plant Vogtle, names of workers authorized to use RWP's are kept in the HP computer but are not listed on the RWP itself. If a worker keys an incorrect RWP number into the EDRD reader, it will tell him he is using an invalid RWP. At this time he should check with the HP Control Point.

7. Termination of RWP's

a. RWP's are terminated when:

1) The job is completed or cancelled.
2) The time limit expires.
3) A significant change in radiological conditions occur.
4) HP policies/procedures are violated.

It is important to **Always** strictly follow all Health Physics instructions and requirements. HP can terminate any RWP if radiation protection instructions, procedures, or requirements are violated.

Summary

1. An RWP is required for entry into an RCA and must be reviewed daily by each worker prior to entry.
2. It is important to read and understand the RWP before entering any RCA. The RWP will define the entry requirements and instructions for the RCA.
3. The minimum requirements for entry into any RCA at Vogtle is personal dosimetry(EDRD and TLD) and being listed on an RWP.
4. Radiation Work Permits (RWPs) are used to control the access of workers into areas where radiation hazards exist. The two types used at Vogtle are General and Specific.
5. Upon exit from any RCA you must always monitor yourself for contamination.

MONITORING

Radiation cannot be seen or felt, therefore, its presence must be detected by special monitoring devices. Some instruments monitor radiation exposure, while others detect radioactive contamination on skin or tools. There are also instruments that determine the level of radiation or contamination in the plant.

Monitoring Exposure

Thermoluminescent dosimeters (TLD) and pocket dosimeters are used to measure how much radiation you have been exposed to. These two devices measure accumulated radiation exposure, therefore, they are effective even when you move from one area to another in the plant. Changes in radiological conditions will not affect their ability to monitor radiation exposure. These devices are required to be worn in all radiologically controlled areas. They must be worn next to each other between the neck and the waist no further than a hand's width apart.

Placement of Dosimetry

Figure 23. Wearing Dosimetry

Thermoluminescent Dosimeter (TLD)

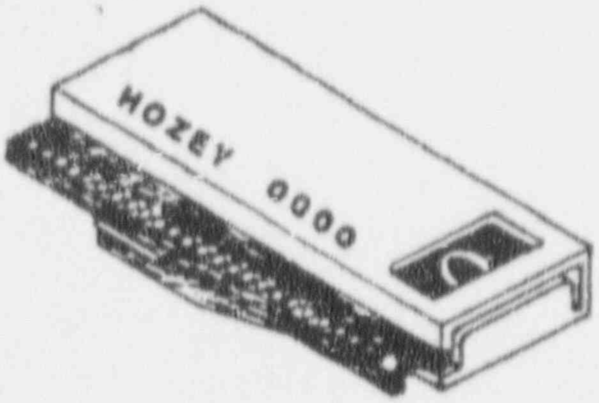


Figure 24. TLD

TLDs measure beta, gamma, and neutron radiation very accurately and are used to determine your official radiation exposure. TLDs cannot be read by the person who wears them. Once a month, TLDs are sent to a laboratory outside the plant to determine official radiation exposure. The label on the TLD contains your name, exposure ID number, and the month for which the TLD is valid.

There are some important rules you should remember about using a TLD.

1. Wear the TLD in all radiologically controlled areas.
2. Wear the TLD next to the pocket dosimeter, positioned so that the side with your name and number face outward.
3. When you leave a contaminated area, make sure you remove the TLD along with the pocket dosimeter from your protective clothing.
4. Take precautions to protect the TLD from moisture.
5. If you lose your TLD, report the loss to the Health Physics Staff as soon as possible. If the loss occurs in a radiologically controlled area, leave the area immediately and then report to the Health Physics Staff.

Pocket Dosimeters

Electronic Direct Reading Dosimeter (EDRD)

The EDRD is an alarming pocket dosimeter and dose rate meter.

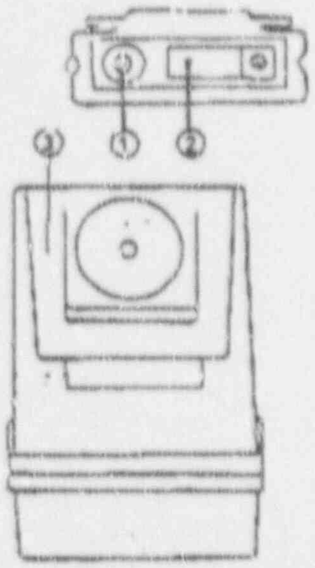


Figure 25. EDRD

1. *dose* display
2. 4 digits display
3. clip

1. The EDRD must be worn in all radiation controlled areas
2. Pick up an EDRD from the HP Control Point Dosimeter Board.
3. The EDRD is designed to be worn alone or as part of a complete computerized dosimeter system.
4. It consists of a sturdy, waterproof pocket size plastic box which has a clip that allows it to be worn in the shirt pocket or clipped on work clothes. It is to be worn at all times above the waist (in the chest area) within a hand's width of the TLD with the clip side facing away from the body.
5. Dose and Dose rate are pre-set on the EDRD and if either are exceeded the device will alarm.
6. Indications displayed by the EDRD.
   a. **bLO**: Battery is low; device will function "in zone" for eight hours after this indication is given.
   b. **dEF**: Problems exists with the device; if this occurs while the EDRD is "in zone" (active mode) this message accompanied by an intermittent audible alarm; exit the RCA and report to HP.
   c. **Al**: Alarm level for total integrated dose has been exceeded. This display alternates with the measured dose and any other alarm message. This alarm is accompanied by an intermittent audible alarm. Exit the RCA immediately and report it to HP.
   d. **rAl**: Alarm level for the dose rate has been exceeded: display alternates with the measured dose rate and any other alarm message. Alarm is accompanied by a continuous audible alarm. This alarm stops as soon as the dose rate falls below the alarm level.
   e. **P(Pause)**: Normal display; inactive mode.
7. Use of the EDRD.
   a. Select an EDRD from the Dosimeter Board at the HP Control Point. Never take a dosimeter which has any reading except "P" unless the EDRD Reader is not working.(see No. 8).

      Note: The EDRD Reader must be turned "ON" and indicating "INSERT DOSIMETER" prior to use.
   b. Place the dosimeter in the EDRD Reader, clip side facing away from the body.
   c. On command of the reader, enter your exposure ID number on the key pad.

      Note: Exposure ID number can be found on your TLD or in the Daily Dose Report.
   d. On command of the reader, enter your RWP number.

e. The reader will set your EDRD from "P" to zero, display your quarterly remaining margin, and set the alarms for dose and dose rate, depending on your remaining quarterl exposure margin and work to be done(RWP).

f. Remove EDRD from reader upon command and proceed into the plant. Wear the EDRD in the chest area of the body, clip side out, in proximity to the TLD. Check it periodically while inside the RCA.

Note: The Reader is designed to read, analyze, and transmit information acquired and or stored in the EDRD.

g. Upon exiting the RCA insert EDRD in the reader and enter your exposure ID number and wait for the reader to analyze and store information. When EDRD reading returns to "P", remove from reader and return to the Dosimeter Board.

h. Whenever any EDRD or reader fails to operate when expected, report to HP at the Control Point.

Note: Some EDRDs will rezero themselves while in use. When this occurs, exit RCA and report to HP.

8. Inoperable EDRD readers:

a. When readers are not functional, HP techs will set dosimeters on zero before placing them in the Dosimeter Board.

Note: Do Not use EDRDs not zeroed.

b. Select an EDRD and complete a Daily Dose Card. Cards are available at the HP Control Point.

1) Enter name, signature, exposure ID number, date, RWP number and time in ***(Central Time Zone, military time)*** on the Dose Card in the appropriate space.
2) Look up remaining quarterly dose (margin) from the Daily Dose Report and enter on card. The margin is the amount of administrative exposure limit not yet used this quarter. Proceed into the plant.
3) Carry the card with you while in the plant.
4) Upon exiting the plant, enter time out and EDRD reading. Calculate and enter net reading.
5) Return the EDRD to the Dosimeter Board.
6) Return the Dose Card to HP.

IMPORTANT

Once you enter required information using the key pad (EDRD, its reader and the bar code on the security badge, when it becomes operational), or use of the manual method using the EDRD and the Dose Card it means that you have ***read, understand*** and ***will comply with all requirements on the RWP***. When RWP's are ***cancelled, expire***, or are no longer needed due to job completion, the original should be returned to the Health Physics office.

I Pocket Ionization Chamber(PIC)

A PIC gives a continuous readout of accumulated gamma radiation exposure. This monitoring device is about the size of a fountain pen and has a graduated scale that uses a hairline indicator. The indicator in the PIC moves across the scale as your radiation exposure increases. PICs may be either low-range or high-range. With the exception of the different scales, both dosimeters look very much alike.

Pocket Ionization Chamber

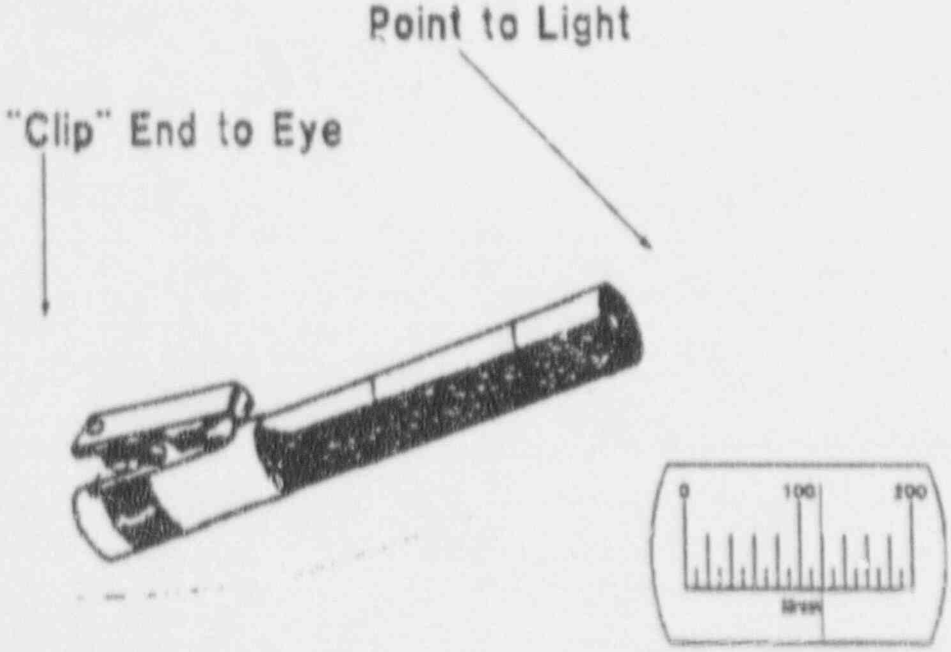
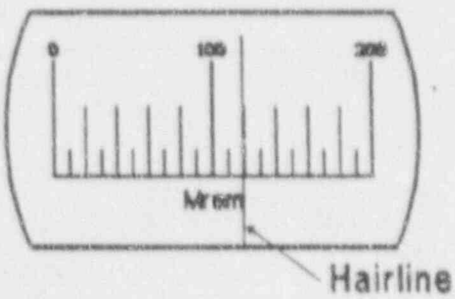


Figure 26. Pocket Ionization Chamber

To read the exposure level, point the dosimeter toward a light source with the clip end near your eye, and look into the dosimeter for the hairline on the scale. An enlarged scale from a low-range pocket dosimeter follows. Each division represents 10 millirem.



What is the wearer's radiation exposure?

This worker has been exposed to 120 millirem. The scale on the high-range pocket dosimeter is similar to that of the low-range pocket dosimeter. It measures dose exposure from 0 to 1 rem, 0 to 5 rem, and 0 to 10 rem, etc., dependent upon the scale of the high range dosimeter.

At Plant Vogtle, pocket dosimeters are issued to visitors entering the RCA boundary. Temporary workers or visitors entering any posted RCA will be issued an EDRD and a TLD after a Radiation Protection briefing by HP and a whole body count.

Violations of Dosimetry Rules

Violating the rules for wearing the TLD and the pocket dosimeter can have very serious consequences. Consider these examples:

1. Oscar entered a radiologically controlled area without the dosimetry specified on the radiation work permit. Because Oscar had entered the required information on the EDRD reader, he indicated his understanding and willingness to comply with RWP specifications. Oscar was counseled by his supervisor for this violation.
2. Alice entered a contaminated area without her TLD. She left the TLD clipped on her badge at the HP check point. Alice was counseled by her supervisor for this violation.
3. Ken lost his TLD. Someone found it and turned it into the Dosimetry Office. When Ken was questioned about his missing TLD, it was discovered that he was wearing someone else's TLD. Ken was counseled by his supervisor for this violation. Later Ken was caught again working without a TLD. Ken was fired for this violation.

General Rules Concerning Dosimetry

1. Everyone who enters a Radiologically Controlled Area must wear a TLD and a dosimeter.
2. TLD and pocket dosimeter must be worn properly at all times while in RCAs.
3. Both devices are worn adjacent to each other between the neck and waist.

Detecting Radioactive Contamination

Portal monitors, hand and foot monitors, hand held friskers, and frisking booths are instruments that are used to detect the presence of radioactive contamination on workers. Hand held friskers can also be used to detect contamination on tools and equipment. Portal monitors, hand and foot monitors, and frisking booths are large, stationary instruments. Hand held friskers are smaller, portable instruments.

Portal Monitors

A portal monitor is a large monitoring device that looks like a doorway. This very sensitive device is simple to use. Step into the doorway of the instrument, wait for the proceed statement, and walk through. If an alarm sounds, repeat the process. If it sounds a second time, notify the Health Physics Staff. At Plant Vogtle, the HP portal monitors are located in the PESB and at the exits from the RCA. A person is required to stand in the monitor until the tone sounds or "clear" signal is received while being surveyed for contamination.

Hand and Foot Monitors

The hand and foot monitor is a very sensitive detector that is also easy to use. Put your feet and hands in the spaces indicated and press down with your hands. If the alarm sounds, repeat the procedure. If it sounds a second time, notify the Health Physics Staff.

Hand-Held Friskers

Hand-held friskers are portable instruments that detect contamination on the body as well as on tools and equipment. A hand and foot frisk must be performed if you are in normal transit and have not been in a contaminated area. A whole-body frisk must be performed when you leave a contaminated area, when contamination has been detected by portal or hand and foot monitor, and when the Health Physics Staff instructs it to be performed.

Use the following steps to perform a whole body frisk:

1. Check the frisker to make sure it is functioning properly.
   a. Is it turned on?
   b. Is the probe cable tightly plugged in?
   c. Is the response switch in the "slow" position?
   d. Is a background radiation level registering on the meter?

2. If you suspect that a frisker is not working properly, contact the Health Physics staff for assistance. ***Do Not Touch The Frisker.*** If your hand is contaminated, you may spread the unwanted radioactive material to the frisker.
3. Take careful note of the background level registered on the frisker. If the background radiation level is higher than 200 counts per minute (cpm), go to another frisker in the area where the background radiation level is lower. Report the higher background radiation level at the first frisker to Health Physics.

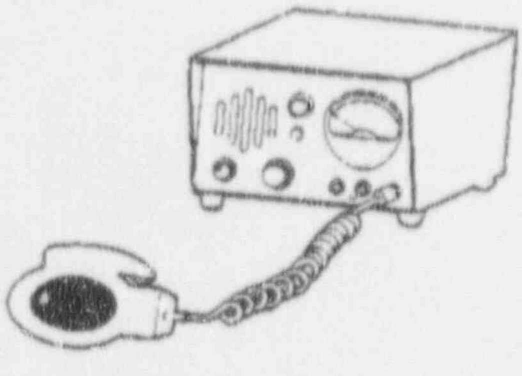


Figure 27. Hand-Held Frisker

4. Procedures for Frisking.
   a. Before picking up the probe, monitor the hand that you will use to hold it.
   b. If the needle does not deflect (move up) more than 100 above the background radiation level, pick up the probe with the hand you have surveyed and continue the frisk.
   c. Watch for visual response of the frisker and listen for an increase in audible clicks. Hold th probe approximately 1/4" to 1/2" away from the area being surveyed and frisk slowly (minimum-3 to 5 minutes).
   d. If the needle deflects 100 CPM above the background and or the audible alarm sounds, contact HP immediately. If possible, remain in the area, preventing the spread of the contamination until HP arrives.
   e. If no contamination is detected (needle does not deflect 100 cpm or greater above background) return the probe to the proper location.
5. Rules for Frisking
   a. Required to stop at every frisking station posted and check the hands and feet for contamination.
   b. Required to stop at frisking station when exiting any designated "Contaminated Area" or any area where protective clothing is worn. You must perform as a minimum, a frisk of the forearms, face, hands, and feet. Prior to re-dressing in street clothing, you must use the IPM-7 (whole body frisker) for a survey of the whole body.

Some common errors that occur while frisking include picking up the probe before surveying one of your hands, holding the probe either too far from or too close to the surface being surveyed, and moving the probe too fast. You should frisk your hands and feet for about 30 seconds each and the rest of your body for about two minutes.

The Whole Body Frisker (IPM-7) is a large, stationary instrument that will frisk your body automatically. The IPM-7s in use at VEGP are microprocessor-based radiation detection systems designed to provide a rapid indication of beta, gamma and alpha contamination on personnel. Instructions for Operating/Using the IPM-7:

1. Perform a secondary frisk with a hand-held frisker. If the employee has been in a contaminated area, it will include head, face, hands, forearms, and feet.
2. Enter the device when the display indicates "READY" (Green Light on at side panel).

Note: Ensure that hands are inserted as far as possible into hand operatives to activate finger tip switches.

3. Stand on foot pad, insert hands into the hand operatives and place chest against detectors. Once in the correct position, device automatically begins monitoring and the Display should indicate "CHECKING" (Yellow light on at side panel).
4. Do Not puncture detector when using the IPM-7; they are fragile. Be careful when using sharp tools and other objects or when carrying them in the pockets. Beware that polyester pants/clothing may cause an alarm (Noble gases readily adhere to this material).

   If "RECHECK" is displayed, one or more of the switches is deactivated and monitoring must be restarted (Yellow light on at side panel). To restart the monitoring, step out of the device, re-enter, reposition as before and the device will start monitoring.
5. Upon completion of the first monitoring period, you will receive a "TURN" Display and a chime (repeating tone). Turn around, position your back against the detectors and depress the hand switches; verify that the device indicates "CHECKING".
6. If the device gives a "CLEAN" indication upon completion of the second monitoring period, you may exit the monitor. If Display indicates "CONTAMINATED" or any other indication, excluding "RECHECK", contact HP for assistance and/or decontamination. (Red light on at side panel indicates person being monitored is contaminated or instrument is malfunctioning).

Radiation Surveys

To assess radiation dose rates and contamination levels throughout the planet, radiation surveys are conducted with special instruments available only to the Health Physics staff. The results of these surveys help determine if an area should be posted with a radiological warning sign, what kinds of protective clothing respiratory equipment workers should wear, and precautions which should be taken to keep exposure ALARA. Radiation surveys are conducted routinely to determine any changes in posted areas and as needed in other work areas.

To determine radiation dose rate in an area, **Dose Rate Meter** is an instrument used which measures the quantity of radiation delivered per unit of time (mrem/hr, Rem/hr).

Summary

1. A worker's exposure is monitored by a TLD and a pocket dosimeter. These devices must be worn next to each other between the neck and the waist. The TLD and EDRD are required in all radiologically controlled areas. PICs are normally issued to workers during an emergency or for multi-badging purposes.
2. Radioactive contamination is detected by portal monitors, hand and foot monitors, frisking booths, and hand held friskers. Portal monitors, hand and foot monitors, and frisking booths are large stationary devices that work automatically. Hand-held friskers have probes that can be moved over the body to detect radioactive contamination.
3. Radiation surveys are conducted periodically by the Health Physics staff to check radiation levels in various areas of the plant. They require the use of special instruments that are only available to trained Health Physics technicians.

GUIDELINES FOR FULL PROTECTIVE CLOTHING

Dress

All personnel should dress in protective clothing described in the following steps.

1. Remove all outer clothing and jewelry, leaving your undergarments and shoes on. (Omit this step during classroom training.)
2. Put on cloth booties over your shoes.
3. Put on the coveralls. Put TLD in the inside chest pocket and zip up coveralls. The dosimeter may be worn in a plastic bag on the outside of the coveralls, in close proximity to the TLD. (For classroom Dress Out Exercise, See Step 10.)
4. Ensure that the cloth shoe covers (booties) are tucked inside coverall legs. Tighten velcro gather at ankles. Put on rubber shoe covers. Tape the cloth booties to coveralls leaving no open gaps. Place tabs on tape ends for easy removal.
5. Put on cotton gloves and pull coverall sleeves over them.
6. Put on rubber gloves and pull up over the coverall sleeves.
7. Tape the rubber gloves to coveralls leaving no open gaps. Place tabs on tape ends for easy removal later.
8. Put on a hood and pull down over the coverall top. Ensure that velcro strip is sealed at neck area. At no time during work is the hood to be worn open.
9. Put on magenta hard hat where required.
10. Sign in at the Control Point on the VEGP Daily Dose Card, your name, exposure ID number, signature, date, time entering and dosimeter reading "entering" in the appropriate spaces. For the classroom exercise, the TLD and dosimeter are picked up at this point. They are to be properly placed. (This step is for classroom Training ONLY.)

Undress Guidelines

1. Remove all tape and deposit in the contaminated trash (yellow) drum.
2. Remove dosimeter bag and open by grasping each side of the bag with one open end of the bag pointed downward; allow the dosimeter to slide out and onto the edge of the clean step-off pad. The last step off pad is always considered a ***clean area***.
3. Remove outer rubber shoe cover from one foot. Deposit the shoe cover in the contaminated rubber laundry receptacle. Repeat for the other foot.
4. Remove rubber gloves, turning them inside out and dispose of them in the contaminated rubber laundry receptacle.
5. Remove hard hat and place in the contaminated hard hat (magenta red) receptacle.
6. Remove your hood and place in the contaminated cloth laundry (2nd blue) receptacle.
7. Keeping cotton gloves on, remove your TLD from the coverall pocket and place on the edge of the clean step-off pad. Unfasten the velcro strip and unzip the coveralls. Peel coveralls from the body by turning inside out. Place in the contaminated cloth laundry receptacle.
8. Remove inner cloth shoe covers in the same manner as specified above and place your foot on the clean step-off pad. Deposit the shoe covers in the contaminated clothing laundry receptacle.
9. Remove one cotton glove, and dispose of it in the contaminated trash receptacle.
10. Pick up TLD and dosimeter with the remaining gloved hand. Proceed to the nearest frisker station or designated personnel monitoring area.
11. Check frisker settings for proper operation. If clean frisk ungloved hand; if contaminated, contact HP. Frisk TLD and dosimeter; if clean, place on clean surface; if contaminated, contact HP. Remove cotton glove and dispose of as contaminated trash.

As a minimum, perform a frisk of the forearms, hands, face, and feet at the nearest frisker. In the plant, perform a whole body frisk (using IPM-7) prior to re-dressing. If contaminated, contact HP.

Summary

1. Protective clothing are used to prevent workers entering contaminated areas from getting radioactive material on the body. They do provide some protection against beta radiation, but are primarily used to prevent contamination of personnel. Protective clothing requirements are listed on the RWP.
2. As a minimum upon exit from a contaminated area, use the hand-held frisker to survey forearms, hands, face, and feet. Before redressing in your street cloths, you must perform a whole body frisk using the whole body frisker(IPM-7).
3. Every time you exit any RCA you must monitor yourself for contamination.

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A

B

C

D

E

T

V

W

D. WILLHITE GET
Training Dates

10/28/86 & 10/29/86
10/30/87 requal
9/30/88 requal
9/26/89 requal

4279
4/99

05-63-90

Event Report No. 1-90-003
Report: Page____of____

Additional Support Items

a. Unit 1 Shift Supervisor Log

b. Unit 1 Control Log

c. Unit 1 Outside Area Operating Log

d. Unit 1 Control Building Operator Log

e. Unit 1 Auxiliary Building Operating Log

f. Unit 1 Auxiliary Building Radwaste Operator Log

g. Turbine Building Operating Log

h. ERF Computer Printouts

i. TSC Manager's Log (Attached to W. F. Kitchens Personnel Statement

j. Classification Determination - Data Sheet 1

k. Site Area Emergency/General Emergency Checklists (2 Each)

l. Alert Checklist

m. Emergency Director Checklist

n. Emergency Director Log

o. Press Release #1

p. Press Release #2

q. Safety Analysis - Corporate Follow-up Commitment

r. Diesel Generator Test Schedule

s. LDCR for Emergency Start on Loss of Offsite Power

t. LDCR Delineating the Pre-Event Electrical Lineup

u. Emergency Notification Numbers 1 thru 9

v. TSC Hp Supervisor Notes

Additional Support Items

w. OSC Support Request Infor. Form (Team #2)

x. EOF Manager's Log

y. NRC Notificatio Checklist

z. VEGP Security Department Call Checklist

aa. EOF Sequence of Events

bb. South Carolina EPD Interoffice Memo

cc. Extract from SRS Communications Log

dd. South Carolina EPD Fax

ee. Security Incident Report

ff. GPC Notification Checklist #4

gg. NRC AIT Quarantine Notice

hh. SAE 8-hour Follow-up Report

ii. Deficiency Card

jj. OSC Manager's Log (Attached to H. M. Handfinger's Personal Statment

kk. Security Vehicle Access Logsheet

ll. Transcript of GEMA Tape Recordings

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

Event Report No.
Report: Page 124 of 104

Nº 53

Time

Date 3-20-90

Time	
0000	New day - same conditions as before
0017	OSP 14005-1 Shutdown Margin Calculation for Mo... entry complete & sat.
0230	JCR
0301	18 mo. Calibration on 1RE-003 per 43690-1 comp. &
0355	OSP 14801-1 NSCW XFR Pump IST complete & sat.
0411	OSP 14001-1 Shift Area Temperature log complete & sat. for 0400 hours.
0456	
0502	QAR
0527	CSJ
0546	Relieved by Bruce Snider David T. Woodfin Jr.
0622	OSP 14811-1 'DATE a ... Check Valve IST' ... complete & SAT for A train
0720	Mode 6
0740	Authorized 24625-1 'RE-006' ACOT
0820	Loss of "A" RAT - power to AA02 lost - only ... A D/G started - then tripped. ... AOP 18021-1 & 18019-1
0841	D/G 1A auto started by resetting sequencer. Tripped on ... jacket water press
0856	D/G 1A locally emergency started, tied to bus ... manually.
0859	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...
0902	Commenced cooling core via A RHR
0912	Emergency notifications complete
0915	G. Bockhold relieved T. Hopkins as E.D.
0917	Emerg. downgraded to alert

SHIFT COMPLEMENT (UNIT #1) DATE: 3-20-90

				FIRE TEAM
OSOS	Hopkins	RO	Waters	
UNIT SS	Snider	BOP	Humphries	LEADER Chastain
SUPPORT SS	Chastain	ABO	Grady	Grant
STA FUNCTION	Snider	SAO	Whitman	Assembly
SHIFT CLERK	Jackson	TBO	Jackson	Jackson
RWS	Morgan	CBO	Erickson	Erickson
ABO	Hutcheson			
OTHERS				

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

Event Report No. ________ Nº
Report: Page 35 of 164

Time: ww

Date: 3-20-90

Time	Entry
0924	SG manways secured
0937	SFPC cooling restored
0945	Equipment hatch bolted
1003	Air lock functional
1239	Power restored to "A" RAT
1242	1AA03 energized from normal source
1042	"A" train "AC's" energized
1136	"A" RHR started & placed in service. "B" on minifla
1157	Paralleled "A" D/G & AA02
1211	Loaded A D/G to 6800 MWe for 45 min
1247	Emergency terminated
1248	OSP 14001-1 Temp Rounds reviewed SAT for
1248	OSP 14000-1 "Tech Spec Rounds" reviewed SAT for 6 only.
1326	D/G A unloaded, shut down & secured in standby
1419	"A" RHR on line, "B" train secured
1520	OSP 14225-1 "Spec. Weekly Surv. Log" reviewed comp. SAT.
1623	OSP 14201-1 Temp Rounds reviewed SAT for 1600.
1640	D/G "A" standby checklist reviewed SAT
1650	~~ERS~~
1709	~~ms~~
1715	~~mc~~
1720	Entered LCO 1-90-351 on A D/G & B D/G inop
1741	Energized "B" RAT
1824	[redacted] by B Diehl Bruce Snider
1825	No [redacted] Entries This Page

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

Event Report No.
Report: Page 126 of 354 Nº

Time | Date 3-26-90

1845 Night Shift On Shift — Plant Status

SHIFT COMPLEMENT (UNIT #1) DATE: 3-26-90

OSOS	CARTER	RO	BROWN	FIRE TEAM	
UNIT SS	DIEHL	BOP		LEADER	BALLENGER
SUPPORT SS	BACKGREEN	ABO			
STA FUNCTION	CARTER	OAO			
SHIFT CLERK		TBO			
RWP		CBO			
AAB	WILLIX				
OTHERS					

Plant Status
Rx Pwr 100 %
Tavg 99 °
RCS Cb 2457
Mode 1 Reason
not fully rest in
Emergency Out
① Trn "A" FHB Emer Filt
② 1DFA
③ NSCW Pump #6
④ CCP "A"
⑤ 1001
⑥ Trn "B" ESF Chiller
⑦ Trn "B" CREFS
⑧ D/G 1B
⑨ D/G 1A
⑩ Trn "A" SSPS in T
Trn "B" SSPS auto
⑪ BAST Cb low
⑫ [illegible]
⑬ Trn "B" Cont Cooler
⑭ RAT "B" supplying
1AA02 & 1BA03

1849 Authorized ACOT 2450VR-C on ARRC 1119 and 245 on ARRC 1112, Enter LCO 1-90-2992

1900 Authorized MWO 19000740 on NSCW Trn "B" level
[illegible]: 12-1601

2225 [illegible]-1 Area Temp Rounds results
complete & SAT

2335 1RE0018 isolated by clearance 19000371
rendering [illegible] INOPERABLE Enter T.S. Action
3.3.3.9 Action 37; no releases in progress
at this time and Al Duval of Chem
notified of 1RE0018 Inoperability & requirements
of T.S. 3.3.3.9 Action 37 for sampling releases. DS
1-90-1266 written

2400 END OF DAY NO Further ENTRIES

Georgia Power Company
Vogtle Electric Generating Plant
Unit 1 Control Log

Event Report No.
Report: Page 27 of [illegible]

№

Time Tuesday Date 3/20/90

Time	Entry
0007	1400[illegible] complete & sat
0103	RHR [illegible] CB 2457 @ 0005 CST - williams
0301	Tygon tube 187'8"
0350	OSP 14801 complete + sat for NSCW transfer pump #
0409	14001-1 complete
0452	SON
04[illegible]	LBS
0500	CLC
0523	Tygon tube @ 187'8" - manned continuously
0527	OSP 14811-1 complete + sat for RA xfer pump #
0558	P[illegible]
0623	LDK
0703	~~[illegible]~~ 3/20/90 Night shift SS relieved by P.Thomas - JEK
0703	Day Shift ON: - RO W Vennie BOP PR HUMPHREY
	PLANT STATUS: Mode 6. 100 cpt RCS Boron 2457 RHR Train 'A' service for core cooling. Vessel at mid loop operation
0816	OSP-14225-1 DPS Weekly Surveillance logs Complete
0820	LOSP occurred. Lost 'A' RAT - D/G 1A Tied and tripped. AOP 18031 and 18019
0841	D/G 1A Auto Started after sequencer reset & tripped on low water pressure.
0859	Site Area Emergency Declared. loss of RHR > 10 min; loss offsite & onsite power
LE 0856	D/G 1A Emergency Break Glass START Locally; NSCW Pumps 1 & 3 Started
0900	RHR Pump 'A' Started for shutdown cooling - core exit thermocouple ~~and~~ core cooling commenced.
0917	[illegible] Downgraded to an Alert
0937	[illegible] Cooling Train 'A' restored to service
0948	Equipment Hatch bolted in place
1029	RAT 'B' Energized
1030	Normal Chiller No. 1 placed in service
1038	AHA01 Reenergized to start River Water Pumps
1040	1BA03 Energized from 'B' RAT.
1059	NSCW Train B Pumps 2 & 4 started
1103	CCW Pumps 2 & 4 started
1131	RHR PUMP 'B' Started
1159	RHR Pump 'B' placed in service for shutdown cooling and [illegible] Removed from cooling mode & placed on recirc.

Georgia Power Company
Vogtle Electric Generating Plant
Unit 1 Control Log

Event Report No. ______ №
Report: Page 58 of 104

Time	Worthy	Date 3-20-90
1155	D/G 1A placed back in remote	
1157	1AA02 Alternate Incoming Breaker closed on Paralleling with	
1211	D/G 1A Loaded to 6800 kw to be run for 45 minutes due to load operation	
1224	OSP 14000-1 Complete & Sat. Day Shift	
1241	Annunciators placed back on normal supply.	
1247	Emergency Terminated	
1321	D/G 1A TIE Breaker opened	
1326	D/G 1A Shutdown	
1405	D/G 1A placed in standby readiness	
1416	RHR Train A Placed in shutdown cooling and RHR Train B from shutdown cooling & placed on secure.	
1419	RHR pump B Stopped	
1514	Normal Chillers aligned in sequence 2-1	
1648	WJW	
1657	WRB	
1705	[illegible]	
LE 1651	Aux Steam Header Pressurized to 200 psig from Aux Boiler valve to unit Two is opened.	
LE 1708	OSP [illegible] Data sheet 9 complete & sat (Air or Sea Temp < 70°F	
1720	D/G 1A Declared Inoperable LCO No.	
1741	RAT A Energized.	
1812	WB	
1820	MH	
1831	Both Diesel fire water pumps and electric fire pump and placed into Auto.	
1855	Relieved by E. Brown LP Vanaman	
1855	Night shift on duty. RU C Brown BOP L Hight Mode 6, RHR 'A' In service, Vessel at mid loop, Source range reading 100 cps	
1956	Aux boiler being shutdown 1115 5898 chart	
2041	Tec Spec rounds for modes 5-6 complete and SAT!	
2031	DG 1A in maintenance mode for moisture check	
2032	Investigation by Rx alter CST to VAC degas from P2 pressure reveals [illegible] pump and fuel [illegible] pump off	
2058	1NB11 trouble annunciator and loss of air compr. Started air compressor #4	
2119	Started DG 1A	

Time	Tuesday Date 3-20-90
2122	DG 1A' output breaker shut and gave to 1AA02
2128	Started air comp #2 because of vibration on AC #4
2129	Stopped air comp #4
2153	Alternate feeder to 1AA02 (breaker #1) opened and 1AA02
	being powered by DG 1A
2201	Normal feeder to 1AA02 closed in (1AA02 breaker #5)
2205	DG 1A output breaker opened
2206	DG 1A shutdown
2223	DG 1'A' started
2228	DG 1'A' secured
2233	DG 1'A' started
2227	Temperature [illegible] complete and SAT (OSP 14001-1)
2250	Tygon tube watch reduced from continuous to every 4 hours
2254	DG 1'A' secured
2400	Last entry of [illegible] day

Georgia Power Company
Vogtle Electric Generating Plant
Unit 1 Outside Area Operating Log

Event Report No. ______
Report: Page 50 of 164

Nº 2339

Date 20 March 90

Time	
0000	NEW Day
0030	Rounds completed
0330 0350	Completed surv per proc. 14801-1 on NSCW transfer pump 8 A-train
0440	Stopped NWWRB
0600	Equipment Status: NSCW pmps 1,2,3,4
	"B" D/G tagged out
	"B" D/G, AYE 1 & 2 tagged out
	"B" MDAFW pmp tagged out
	"B" RAT tagged out
	TDAFW tagged out
	Aux BLR in Hot Stand by
0622	Relieved by [illegible]
0720	Pressurized N2 header to 700 psig for U-2 accum
0820	LOSP. DG1A started and tripped
0841	DG1A started and tripped
0856	DG1A started by emergency breakglass and continued to run.
1020	N2 header isolated
1038	River water pumps started
1155	DG1A placed in remote
1326	DG1A stopped
1430	Started pumping down U1 WWRB
1824	Relieved by [illegible]
1828	Logs reviewed last 5 day [illegible] reviewed
1830	[illegible] Fire water pp 1 & 2 and electric fire water pp stop
1952	[illegible] shut down [illegible]
2110	Aux Blr in Hot stand by
2021	D/G 1A [illegible] started
2119	Started D/G 1A
2206	Stop D/G 1A
2223	D/G 1A Started
2227	D/G 1A Stop
2238	D/G 1A Started
2254	D/G 1A Stop
2359	Last entry end of day

704766 MCS128

Unit 1 Control Building Operator Log

Event Report No. ______
Report: Page 31 of 64

002199

Date 3-20-90

Time	
0001	New DAY.
0625	BENNIE White relieved by W L [illegible] - [illegible]
	WLB
0859	Site Area emergency declared due to loss of off site power and failure of diesel Gen 1A to load.
0917	Site area emergency ~~[illegible]~~ reduced to alert emergency due to startup and loading of Diesel Gen 1A.
1247	Emergency status over.
1445	After several attempts to restart Normal chiller #3, Placed chiller #1 into service. Shutdown Chiller #1 and realigned the chillers for a 2-1 sequence. Started normal chiller #2 with the sequence switch in N-S. In order to maintain condenser pressure above 2 psi had to place normal chiller #2 in the cold weather mode of operation.
1730	Station Status - Normal Chiller #2
	Normal Chilled water pumps 2+3
	TSC chilled water pump
	CAS chilled water pump
	Battery chargers 1AD1CA + 1AD1CB on Equalize
	D train batteries out of service
1810	Relieved by [illegible] WLB
	[illegible]
1820	[redacted] on As CBO
1930	[redacted] stated
2245	[redacted] complete equipment status: Normal Chiller #2
	Normal chill wtr pumps 2&3
2359	End of Day

[illegible]

7034866 H1

Georgia Power Company
Vogtle Electric Generating Plant
Unit 1 Auxiliary Building Operating Log

Event Report No.
Report: Page 32 of 104 N? 2226

Time	Date 3.20.90
0001	New Day & Equipt Status: CCW pmp # 1,2,3,4
	RHR pmp A
	RMWST pmp #1
	Aux Bldg Cont Exh Units #1:2
0200	Piping [illegible] Test "A" (14515-1)
0330	BAST pmp and Check Vlv Test pmp #6 (14811-1)
0612	N.J. [illegible] Relieved by DL Gandy NJS.
	DLG
0630	Reviewed logs for past 5 days.
0645	Rounds Started
0818	All Equipment tripped due to loss of off site power.
0855	Rounds Complete All equip. off due to loss of off site power.
0856	"A" diesel emergency started
0857	CCW pmp # 1 & 3 started DLG
0859	"Site area emergency" declared
0900	RHR pmp "A" started
0917	Emergency down graded to an "Alert area emergency"
1103	CCW pmp # 2 + 4 started
1131	RHR pmp "B" started
1138	RHR pmp "B" in service. "A" running on recirc
1247	Emergency terminated
1416	RHR pmp "A" in service. "B" running on recirc.
1419	RHR pmp "B" stopped.
1800	Equip. status. CCW pmp # 1,2,3 + 4
	Aux Bldg Exh unit # 1 + 2
	"RHR pmp "A"
1823	[redacted] relieved by N.J. [illegible] DLG
	NJM
0830	Began Rounds
2330	Completed Rounds
2359	End of Day

Georgia Power Company
Vogtle Electric Generating Plant
Unit 1 Auxiliary Building Radwaste Operator Log

Event Report No.
Report: Page 33 of 104 № 2358

Date 3/20/90

Time	
0002	NEW DAY
[illegible]	Starting Rounds
[illegible]47	Rounds Complete
[illegible]	[illegible] Control Room is [illegible] to WMT
0400	Starting Rounds
0426	Rounds Complete
[illegible]	Relieving [illegible]
0755	Rounds U2 rx trip
0956	U1 SFP pump tripped due to loss of power
1300	Site general emergency was declared. [illegible] rounds are now complete, all equipment same status except 'A' train SFP now in service. 'B' train taken out per control room
1352	Placed info tags on RCDT HS's due to [illegible] off a pump casing drain valve open in CNMT
1358	'A' train [illegible] in service, informed SS
1405	Working on waste gas [illegible]
1620	Rounds, waiting on permit for WMT 009, WMT 012 still on recirc thru ATB
1710	Relieved Day [illegible]
2010	Rounds started
1930	Made containment entry for RCDT lineup.
2049	WMT # 12 on recirc lab notified - Hamilton
2230	Processing WMT #9 ~~[illegible]~~ → WMT # 13
2359	End of Day

[redacted]

Turbine Building Operating Log

Event Report No. ______ Nº 2322
Report: Page 34 of 164

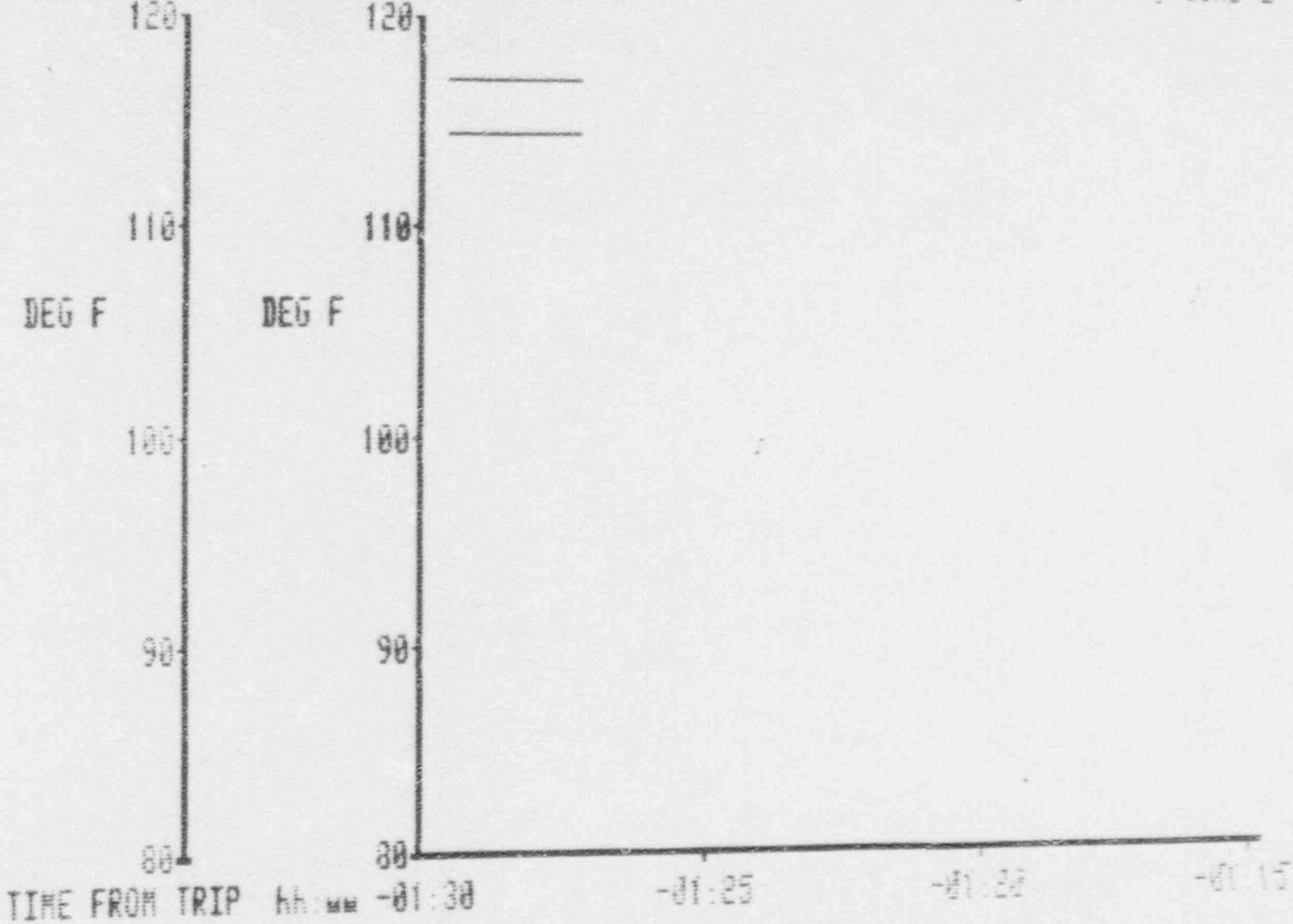
Date 3-20-90

Time	
0001	NEW DAY
0220	Started pumping the TB-DDT to the WWRB using alternate pumps per proc. 13211-1
0445	stopped pumping the TB-DDT to the WWRB
~~0445~~	Equipment in service - A/C 2+3, instrument air dryer 5C3.
	monitor EHC temp. - heaters are out of & temp. is about 100°.
0622	Relieved by J. Jackson
0622	J. Jackson on as TBO #1 - Reviewed Rounds & Logs for 3 days
0644	CL 19015499 Remove + IND201 Close/Lim
08:20	Assisted U-1 OAD at 1A Diesel after trip on U-2
12:21	Reset Breaker #7 on 1NBL-02 to Restore Lighting back to Level 1 Southside of Turbine Bldg.
12:40	Turned on heater to EHC skid to raise temp.
14:48	Racked out breaker 1NA04-15 per C.R.
14:55	Racked breaker 1NA04-15 back in per C.R.
LE. B??	Started Rounds
17:35	Finished Rounds
18:20	J. Jackson Relieved by Robert Cook
1821	R. Cook on as U1 TBO, rounds reviewed & logs reviewed for past 5 days
2058	A/C #2 tripped on high discharge temp, started #4
2138	A/C #4 tripped on high vibration, started #2, reset #4 high vib [redacted]
2205	R[redacted]
2358	R[redacted] Building status;
	[redacted] #2,3
	- I/A #2 ✓
2359	End of day

RX TRIP
POST TRIP REVIEW
TRIP@ 10:14:59 03/20/90

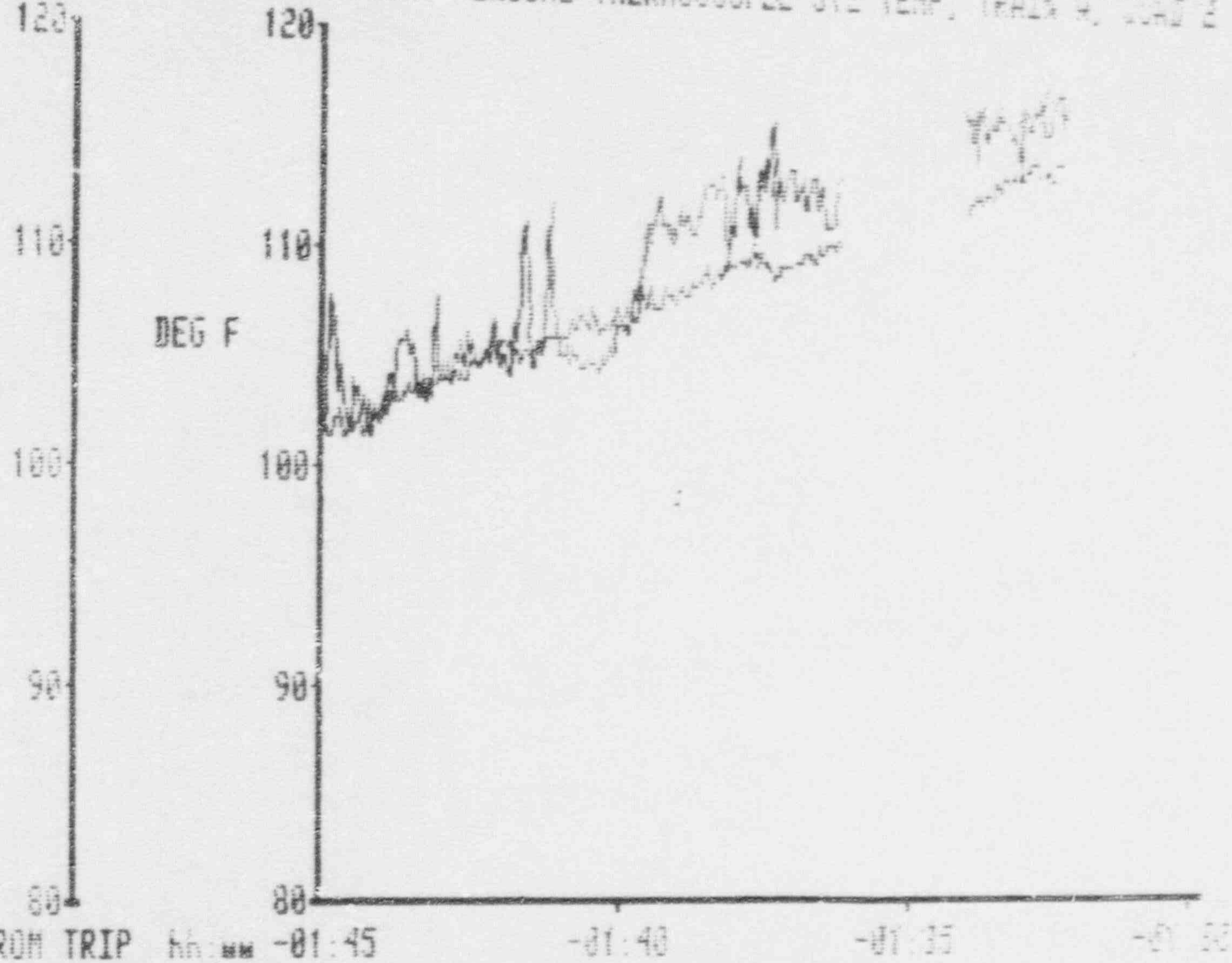
UNIT 1

T5033 INCORE THERMOCOUPLE E13 TEMP, TRAIN A
T5041 INCORE THERMOCOUPLE J12 TEMP, TRAIN A



XX TRIP
POST TRIP REVIEW
TRIP@ 10:14:59 03/20/90

T5033 INCORE THERMOCOUPLE ... TEMP, TRAIN ...
T5041 INCORE THERMOCOUPLE ... TEMP, TRAIN ...



Event Report No.
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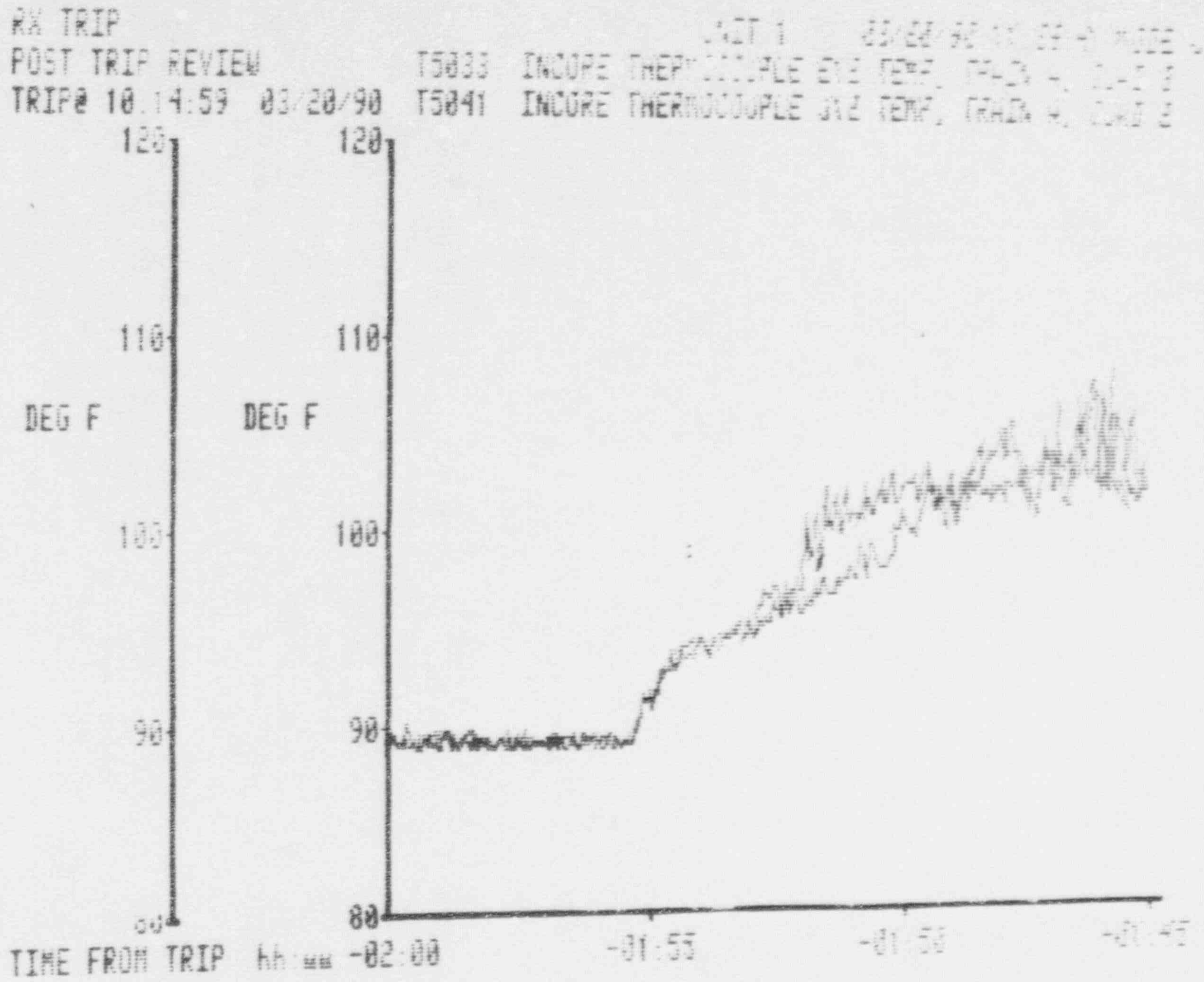
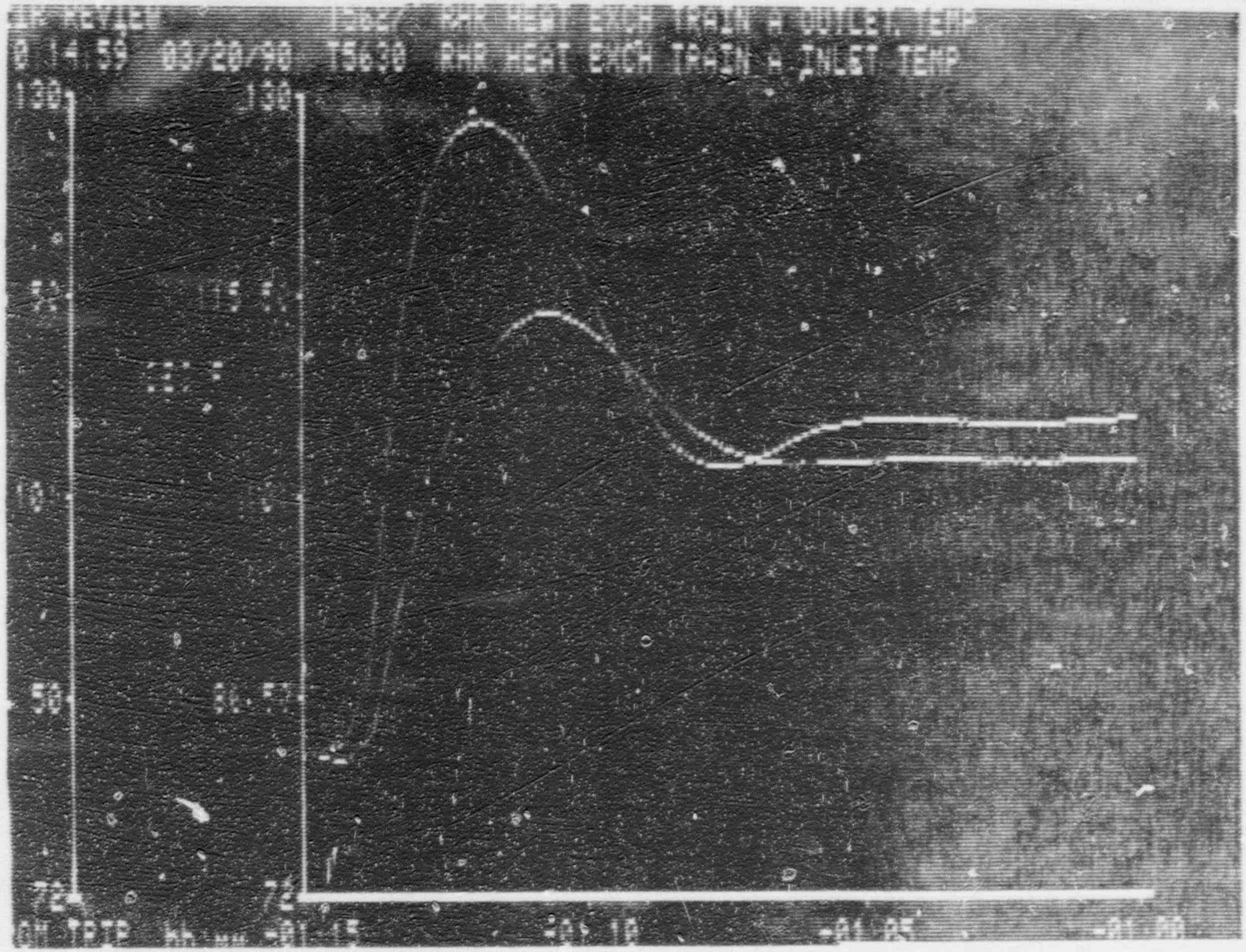

RX TRIP
POST TRIP REVIEW
TRIP@ 10:14:59 03/20/90
T5033 INCORE THER
T5041 INCORE THERMOCOUPLE
120
110
100
90
DEG F
DEG F
80
TIME FROM TRIP hh:mm -02:00
-01:55
-01:50



RHR HEAT EXCH TRAIN A OUTLET TEMP
03/20/90 T5630 RHR HEAT EXCH TRAIN A INLET TEMP
130
100
50
72

DATA SHEET 1

CLASSIFICATION DETERMINATION

1. Evaluate status of fission product barriers:

	Breached/Challenged	
a. Fuel Cladding Integrity (See Figure 1)	YES ___	NO ___
b. Reactor Coolant System Integrity (See Figure 2)	YES ___	NO ___
c. Containment Integrity (See Figure 3)	YES ___	NO ___

N/A

2. Determine the highest emergency classification level for present plant conditions (See Figure 4).

Check One:

___ Notification of Unusual Event
✓ Alert
___ Site Area Emergency
___ General Emergency

Comments: Downgraded when diesel powering A emergency bus.

3. Assume the position of Emergency Director.

Signature T Bockhold
Emergency Director

Date 3/20/90

Central Time ~~08 / 003~~ 0915

4. Proceed to Notification of Unusual Event, Alert, Site Area Emergency/General Emergency Checklist of this procedure.

Sheet 1 of 2

SITE AREA EMERGENCY/GENERAL EMERGENCY CHECKLIST

1. Maintain a log of the incident (this may be delegated to other personnel, as available).

2. Make an announcement over the public address system for all areas as follows:

   NOTE
   Wording in [ ] may not be applicable to all situations.

   "ATTENTION ALL PERSONNEL - THIS IS AN ACTUAL EMERGENCY - A SITE AREA EMERGENCY (GENERAL EMERGENCY) HAS BEEN DECLARED [FOR UNIT 1]."

   (Give a brief description of the event) Loss of all off site and on site AC power for more than 15 minutes

   [EMERGENCY RESPONSE PERSONNEL REPORT TO YOUR ASSIGNED RESPONSE FACILITY. NON-ESSENTIAL PERSONNEL EXIT THE PROTECTED AREA, REPORT TO ASSEMBLY AREA.]
   (Repeat Announcement)

3. Sound the appropriate alarm:

   Site Area Emergency - pulse tone
   General Emergency - yelp tone

4. Repeat the announcement from Step 2.

5. Direct early dismissal of non-essential personnel or site evacuation as described under Early Dismissal/Site Evacuation on the Emergency Director Checklist in Procedure 91102-C, "Duties Of The Emergency Director".

6. Determine offsite relocation center for site evacuation.

7. Notify security of early dismissal or of evacuation routes prior to making the PA announcement.

8. Implement notifications in accordance with Checklist 1, Emergency Director Notification Checklist, in Procedure 91002-C, "Emergency Notifications".

PROCEDURE NO.		REVISION	PAGE NO.
VEGP	91001-C	7	12 of 12

Sheet 2 of 2

SITE AREA EMERGENCY/GENERAL EMERGENCY CHECKLIST

9. If a radiological release is involved, request offsite dose projections be performed (see Procedure 91304-C, "Computerized And Manual Back-Up Methods For Release Rate And Dose Calculations").

10. Perform accountability of operations staff not badged into control room (if not completed in Alert Checklist) Procedure 91401-C, "Assembly and Accountability". (This maybe delegated to other personnel, as available).

11. As necessary, make protective action recommendations per Procedure 91305-C, "Protective Action Guidelines".

12. Continue with subsequent actions per the Emergency Director Checklist in Procedure 91102-C, "Duties Of The Emergency Director".

Signature J.Q.[illegible]
Emergency Director

Date/Central Time 3/20/90 0840

Sheet 1 of 2

SITE AREA EMERGENCY/GENERAL EMERGENCY CHECKLIST

RGriffin

1. Maintain a log of the incident (this may be delegated to other personnel, as available).

2. Make an announcement over the public address system for all areas as follows:

   NOTE
   Wording in [ ] may not be applicable to all situations.

   "ATTENTION ALL PERSONNEL - THIS IS AN ACTUAL EMERGENCY - A SITE AREA EMERGENCY (GENERAL EMERGENCY) HAS BEEN DECLARED [FOR UNIT ONE]."

   (Give a brief description of the event) Loss of ALL AC Power on Unit ONE

   [EMERGENCY RESPONSE PERSONNEL REPORT TO YOUR ASSIGNED RESPONSE FACILITY. ~~NON-ESSENTIAL PERSONNEL EXIT THE PROTECTED AREA, REPORT TO ASSEMBLY AREA.~~] SOH 3-20-90
   (Repeat Announcement)

3. Sound the appropriate alarm:

   Site Area Emergency - pulse tone
   General Emergency - yelp tone

   1791

4. Repeat the announcement from Step 2.

5. Direct early dismissal of non-essential personnel or site evacuation as described under Early Dismissal/Site Evacuation on the Emergency Director Checklist in Procedure 91102-C, "Duties Of The Emergency Director".

6. Determine offsite relocation center for site evacuation.

7. Notify security of early dismissal or of evacuation routes prior to making the PA announcement.

8. Implement notifications in accordance with Checklist 1, Emergency Director Notification Checklist, in Procedure 91002-C, "Emergency Notifications".

Sheet 2 of 2

SITE AREA EMERGENCY/GENERAL EMERGENCY CHECKLIST

9. If a radiological release is involved, request offsite dose projections be performed (see Procedure 91304-C, "Computerized And Manual Back-Up Methods For Release Rate And Dose Calculations").

10. Perform accountability of operations staff not badged into control room (if not completed in Alert Checklist) Procedure 91401-C, "Assembly and Accountability". (This maybe delegated to other personnel, as available).

11. As necessary, make protective action recommendations per Procedure 91305-C, "Protective Action Guidelines".

12. Continue with subsequent actions per the Emergency Director Checklist in Procedure 91102-C, "Duties Of The Emergency Director".

CCE 0902
Signature ____________
Emergency Director

Date/Central Time 10902

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Sheet 1 of 1

ALERT CHECKLIST

1. Maintain a log of the incident (this may be delegated to other personnel, as available).

2. Make an announcement over the public address system, for all areas as follows:

NOTE
Wording in [ ] may not be applicable to all situations.

"ATTENTION ALL PERSONNEL - THIS IS AN ACTUAL EMERGENCY - AN ALERT HAS BEEN DECLARED [FOR UNIT 1]."

(Give a brief description of the event, if appropriate, and repeat the announcement.)

Conditions Improving, Diesel Running

"EMERGENCY RESPONSE PERSONNEL REPORT TO YOUR ASSIGNED EMERGENCY RESPONSE FACILITY. NON-ESSENTIAL PERSONNEL EXIT THE PROTECTED AREA, REPORT TO ASSEMBLY AREA."
(Repeat Announcement)

3. Sound the alarm for an Alert - warble tone.

4. Repeat the announcement from Step 2.

5. Implement notifications in accordance with Checklist 1, Emergency Director Notification Checklist, Procedure 91002-C, "Emergency Notifications".

6. If a radiological release is involved, request offsite dose projections be performed (see Procedure 91304-C, "Computerized And Manual Back-Up Methods For Release Rate And Dose Calculations").

7. Perform accountability of operations staff not badged into control room. (Procedure 91401-C, "Assembly and Accountability". This maybe delegated to other personnel, as available).

8. As necessary, make protective action recommendations per Procedure 91305-C, "Protective Action Guidelines".

9. Continue with subsequent actions per the Emergency Director Checklist in Procedure 91102-C, "Duties Of The Emergency Director".

Signature R Bockhold
Emergency Director

Date/Central Time ~~0905~~ 0920 / 3/20/90
RB

PROCEDURE NO.	REVISION	PAGE NO.
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Sheet 2 of 8

EMERGENCY DIRECTOR CHECKLIST

SUBSEQUENT ACTIONS

Transfer of Responsibilities

1. Review with the ED:

   a. Summary of events

   b. Plant status

   c. Equipment status

   d. Emergency classification

   e. Status of notifications of offsite authorities

   f. Protective and corrective actions

   g. Completed checklist items

   h. Status of facilities activation

   i. Any noted deficiencies

   j. Status of assembly and accountability, if initiated

   k. Outstanding orders

   l. Recovery plan of action, if known

comp Burke GEMA

CAUTION

Assure that initial actions in Procedure 91001-C, "Emergency Classification And Implementing Instructions", have been completed as necessary prior to proceeding with this checklist.

2. Review facility readiness with facility managers.

3. Assure that logkeeper maintains a log of ED actions and records any transfer of responsibility.

4. Formally assume from the OSOS the position of ED, using the following message format:

AT 0915 (Central Time) ON 9/20/90 (Date) I AM ASSUMING THE EMERGENCY DIRECTOR POSITION AND HEREBY RELIEVE YOU OF ALL EMERGENCY DIRECTOR RESPONSIBILITIES.

G Bockhold

ED LOG

This is not a Drill

3/20/90

Sequence of Events

Event Report No. 1-90-003
Report: Page ___ of ___

0820 U2 tripped DG 1A started, tripped on low jacket water pressure

~~0835 Steve Cheeney - Lockedup Containment~~ B

0840 Site Area Emergency declared. loss of power

0841 DG 1A tied to 1E bus and tripped.

0856 Local emergency started DG1A power to 1E bus - NSCW pumps on

STET ~~0850~~ LE ~~0854~~ B Notification of Site Area emergency (Used backup CRN) started.

0900 CCW pumps started 1 & 3

0900 RHR A pump started (max. temp 136°F)

0901 Pag announcement to site

0903 RHR cooling indicated A train

0905 RHR pump 99°F

0905 Employee/personnel accountability commenced by Security

This is not a Drill

4/20/90

Sequence of Events

Event Report No. 1-90-003
Report: Page ___ of ___

0906 RHR temp 94°F

0910 RHR temp stabilized at 102°F

0913 Complete initial notification (Burke Co. & GA cannot be reached)

0915 GB relieved J. Hopkins as ED (Briefed & statused)

0915 Site area downgraded to ALERT due to improving conditions and 'B' 'A' diesel generator carrying the load.

0938 ED phoned TSC Mgr (for briefing) status

0937(IE) Spent fuel pool cooling restored

0938 RHR temp 98°F

0942 Equipment hatch bolted

0955 ED departed Cont. Room for TSC

3/20/90 Sequence of Events 7

Event Report No. 1-90-003
Report: Page ____ of ____

0956 ED arrived at TSC (assumed responsibilities))

1000 Briefing / discussions:
Messages
Restoration of B RAT to emerg bus (then downgrade on)
Cannot contact GEMA from Cont Room
Priority work list discussed
Trouble restoring power to RAT
DC power on "B" train - concern ?
(Engr. to take action / load on above
Personnel location / acc't clarified on PA system

1010 ED phoned B'ham for update / status

1013 Maint supv. instructed mechanics to check all elevators in search of possible unaccounted personnel

1015 ED, TSC, EOF on phone conf call:
personnel accountability
local radio communication
diesel generator
status of events

3/20/90 Sequence of Events

This is not a drill

Event Report No. 1-90-003
Report: Page ___ of ___

1022 ED contacted B'ham to discuss points-of-contacts

1030 RCS level to be taken up to 189.6

1030 U1 'B' RAT has offsite power to hi-side

(LE) 1032 Unit 2 stable in Mode 3

1040 1BA03 energized from offsite power

1043 All busses off 1BA03 are energized

LE 1105 Line from switchyard to 1A+2B-R damaged - Will be repaired later today by Augusta Division. (To run 2B D/G till line is repaired).

1045 News release/press conf times finalized
2:30 Atlanta, Ga
4:30 Visitors Center (VEGP)

1056 ED notified/briefed on personnel accountability by Security

Sequence of Events

Event Report No. 1-90-003 ...
Report Page ___ of ___ 11

1113 Hydraulic cooling towers employees directed to go back to work

1121 ED discussed pressurizing manway

1122 TSC Briefing

1129 Status of personnel acc't

1137 ED spoke w/ NRC ~~Commissioner~~ Regional Administrator

1141 ED discussed having PEO stationed at generator

1159 1AA02 ~~parallel - transferring~~ closed to 'B' RAT to pickup B loads

1200 ED identified names of seniors at B ~~discussed point of contacts~~ at ~~for~~ local emergency facilities:

Burke Co. (404) 554-6655 - Chief Sanders
SRS EOC (803) 725-3333 - J.C. Davis
GEMA (404) 624-7000 - Jim Hill
So. Carolina (803) 734-8020 - Still Wolfe
Aiken Co. - ~~Peggy Rhinehart~~
Barnwell Co (803) 259-7013 - Peggy Rhinehart
Allendale Co (803) 584-4081 - Lynn Hankins
NRC - Region and NRR

Sequence of events Event Report No. 1-90-003 This is not
Report: Page ___ of ___

1202 ~~Loads on 1AA02 transferred to B offsite power.~~ D/G 1A being loaded - Parallel to grid ~~due to B being operated at low power~~ for normal shutdown.

1210 ED spoke on bridge line to local agencies. Items of discussion:
- Restored offsite power to both emergency busses
- Both RHR cooling loops in service
- Downgraded to emergency ~~no status~~ (normal refueling configuration
- Termination of emergency forthcoming
- Question/answer session

1213 ~~Offsite power resto~~ & B Diesel fully loaded for shutdown run.

1247 Emergency Terminated - Resume work activities

1250 Critique session in progress

Event Report No. 1-90-003
Report: Page ____ of ____

1255 Public Info / Visitor Ctr. notified of termination notice

1858 ED inspected switchyard

Approved
[illegible] Boeblad
3/21/90

[illegible] 3-20-90

Event Report No. 1-90-003
Report: Page ___ of ___

#1 Release
March 20, 1990
9:50 CST

A site area emergency was declared at Vogtle Nuclear Plant near Waynesboro at 9:00 A.M. (CST) today. The emergency was declared due to a loss of on- and off-site power to Unit 1 for approximately 36 minutes. Power has been restored to essential equipment in the plant, and the situation was downgraded to an alert status at about 9:15 A.M. (CST).

Unit 2 tripped off line but did not experience a loss of power and currently is being maintained in a stable condition.

The loss of power to Unit 1 occurred when a construction vehicle backed into a power pole in the switchyard adjacent to the plant.

A site area emergency is declared whenever on- and off-site power is lost for more than 15 minutes. There has been no release of radiation and no danger to the public. Non-essential personnel were evacuated as a precaution about 9:00 A.M. (CST).

10:25

CKmyrg

Event Report No. 1-90-003
Report: Page ____ of ____

#2 Release
March 20, 1990
10:30 A.M.

The Vogtle Nuclear Plant continues to operate in "alert" status. "Alert" is the second least serious emergency classification. The plant is stable.

Unit 1 was already down for its second refueling outage. Switchyard maintenance was in progress in connection with that outage when a construction vehicle struck a switchyard power pole. One of two diesel generators attempted to start to supply power, but failed. It then was started manually. The second diesel generator was out of service for planned maintenance, also in connection with Unit 1's planned outage. That inability to supply emergency diesel-generated power for more than 15 minutes resulted in the declaration of the "site area emergency" at 9:00 A.M. (CST). Unit 2, operating at normal power, tripped off-line due to power fluctuations on the Unit 1 side of the plant. Unit 2 did not lose essential electrical power, however.

Shortly after 9:00 A.M. (CST), non-essential personnel were assembled and accounted for in accordance with emergency operating procedures. They were not evacuated as initially reported.

Work is underway to restore normal power to Unit 1.

Neither unit sustained any damage. No one was injured, and there was no release of radioactivity.

VEGP 00057-C, "Event Investigation," paragraph 4.6.4 requires an assessment of the safety consequences and implications of an event. This assessment has been made and is included in the attached draft event critique for the 3/20/90 site area emergency event. In order to meet the intent of the event investigation procedure, design engineering review of this assessment and development of a detailed analysis is requested to supplement the event critique.

1. In the analysis, develop recommendations that reduce the probability of occurrence of such an event or that mitigate the severity or consequences of such an event. Specifically, summarize the relevant assumptions, effects, conclusions, and recommendations of REA VG-9011 response, dated February 16, 1990, concerning loss of core cooling while in mid-loop operation.

2. Consider the impact of transient combustibles in plant areas outside plant buildings.

3. Review electrical lineups for modes 5 and 6, evaluate possible failures, and recommend lineups to use or to avoid.

4. The results of this analysis should be presented for review to Vogtle Project management no later than April 13, 1990, prior to issuance of the final report.

Skip

Al Chafee

ENG COPY MGL
ORIGINAL RLM

CSM
JGA
RLM

Southern Company Services Inc
Post Office Box 2625
Birmingham, Alabama 35202
Telephone 205 877 7936

W. C. Ramsey, Jr.
Project Engineering Manager - Vogtle

Southern Company Services
the southern electric system

February 16, 1990

Copy to PMK
Copy to JGA
[redacted]
Original to File

Vogtle Electric Generating Plant - Units 1 and 2
Final Response to Request for Engineering Assistance
No. VG-9011
File: X7BD111 Log: SG-8817 Security Code: NC

Mr. C. C. Miller
Manager of Engineering
Vogtle Project - Nuclear Operations
Georgia Power Company
Post Office Box 1295
Birmingham, Alabama 35201

Dear Mr. Miller:

The attached report is the Phase II response to REA VG-9011 which addresses the specific NRC concerns identified in Generic Letter Number 88-17 and subsequent responses. Also, this report verifies plant specific findings for WCAP 11916 that apply to Plant Vogtle Units 1 and 2. The results from the RCS venting analysis were discussed with a WOG contact at Westinghouse for concurrence prior to the issuance of this report.

This document completes activities concerning REA VG-9011. If you have any questions, please call David Dotson at extension 6850.

Very truly yours,

W. C. Ramsey, Jr.

WCRJr/DRD/sm
Attachment
xc: G. Bockhold, Jr. (w/att.)
A. E. Cardona (w/att.)
M. W. Horton (w/att.)
CRM C. R. Myer
R. E. Patrick (w/att.)
S. Pietrzyk (w/att.)
P. D. Rushton
NORMS
Document File (w/att.)
Project File

LOSS OF DECAY HEAT REMOVAL

ANALYTICAL STUDIES

for

VOGTLE ELECTRIC GENERATING PLANT

UNITS ONE AND TWO

A RESPONSE TO GENERIC LETTER 88-17

for

GEORGIA POWER COMPANY

SONOPCO PROJECT-VOGTLE

Prepared by

SOUTHERN COMPANY SERVICES, INC.

NUCLEAR PLANT SUPPORT-VOGTLE

EXECUTIVE SUMMARY

This report is the result of a Southern Company Services study conducted for the Vogtle Electric Generating Plant, REA VG-9011, regarding issues and concerns in NRC Generic Letter (GL) 88-17. This letter discusses the loss of the residual heat removal system during periods of reduced inventory in the reactor coolant system. This report partially fulfills the request made in NRC GL 88-17.

Westinghouse WCAP-11916 is a study of generic two, three, and four loop plants operating at a reduced inventory or "mid-loop" condition. The thermal hydraulic analyses performed in the Westinghouse study predict RCS behavior following the loss of RHRS cooling during mid-loop operations. Concerns addressed by the analyses include time to core boiling, the RCS pressurization rate, time to core uncovery, openings in the RCS boundary that can impact RCS recovery responses, and recovery operations for various RCS configurations.

This plant-specific study, VG-9011, verifies that assumptions used and conclusions drawn in WCAP-11916 encompass Plant Vogtle. Calculations were performed on the major operational considerations listed in the WCAP. No alternate recovery operations are suggested to replace those described in the WCAP. Suggested methods for improvements were made for operations not encompassed by the WCAP results. Plant Vogtle was modeled using the decay heat for 48 hours after shutdown and uprated fuel of 3565 MWt. A gravity flow calculation was performed which modeled RCS inventory addition from the refueling water storage tank (RWST) through paths other than those described in the WCAP.

In general, the results are as follows:

- o The assumptions listed in the WCAP which maximize the core heatup rate and pressurization and minimize the time to boiling and core uncovery encompass Plant Vogtle.

- o The estimated time to boiling of 8.3 min, time to core uncovery of 57 min, and RCS heatup rate of 8.6 F/min are conservatively close to the results predicted in the WCAP for a four-loop plant. The information in the operation procedures taken from the WCAP encompass Plant Vogtle's operation.

- o The WCAP analysis implies that any vent with an area of 0.5 ft^2 or larger is adequate to prevent RCS pressurization. This finding does not encompass Plant Vogtle. If a RCS cold leg opening is present the sum of the pressurizer manway or the three safety relief valves [illegible] could result in an upper plenum pressure great enough to [illegible] inventory out the cold leg opening. It is suggested that this RCS configuration be avoided.

- o Gravity flow from the RWST to the RCS can be accomplished up to an RCS pressure of 16 psig. The gravity flow paths chosen and their respective flowrates are shown in Figures 2.2 and 2.3.

- The calculated time for working inside containment without a respirator is 27 min after inventory boiling begins. The calculated time for working inside containment until the temperature reaches 160 $^{\circ}F$ is 21 min with no containment coolers operating. With an open containment, a minimum of three coolers must be operated to ensure that temperature remains below 160$^{\circ}F$ for 57 min after loss of RHR; this would be necessary to allow personnel to continue containment closure activities prior to core uncovery.

- A review of the NRC questions to Georgia Power Company relating to GL Number 88-17 is in Section 4. This review relates the plant specific findings of this report to questions posed by the NRC.

- A review of GPC procedures was done to insure generic information from WCAP 11916 used in the procedures encompassed Plant Vogtle. Information concerning the use of [redacted].

CONTENTS

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LIST OF FIGURES

INTRODUCTION

Section 1 of this report reviewed and performed plant specific analysis in response to Generic Letter (GL) 88-17 programmed enhancements. Reviews were performed on GL 88-17 and Georgia Power Company (GPC) procedures to determine what information in WCAP-11916 required verification. A technical review was performed on WCAP-11916. A comparison was made of the decay heat rate and power levels between Plant Vogtle and the WCAP modeled plant. Information was obtained about the MAPP computer system, which can model various plant conditions, including mid-loop operations. Several calculations were performed to verify that results of the WCAP study encompassed Plant Vogtle. The calculations were time required to saturation, time required to expose the core, and Reactor Coolant System (RCS) heatup rate.

The analyses conducted in this section were based on NRC recommendations made to GPC in the initial GL 88-17. Section 3.4 of the letter directs: Conduct analyses to supplement existing information and develop a basis for procedures, instrumentation installation and response, and equipment/Nuclear Steam Supply System (NSSS) interactions and response. The analyses should encompass thermodynamic and physical states to which the hardware can be subjected and should provide sufficient depth that the basis is developed. Emphasis should be placed upon obtaining a complete understanding of NSSS behavior under nonpower operation. In its discussion, the NRC states that the Westinghouse Owners Group (WOG) has made an excellent start toward meeting this recommendation. Further mention is made of the different thermal/hydraulic analyses performed by (WOG) in WCAP-11916 for generic two, three, and four loop plants. The analyses and calculations performed in VG-9011 supplement the WCAP information for Plant Vogtle.

Section 2 of this report analyzed how nonpower condition phenomena impact plant operations. The background for the reviews was based on recommendations made in GL 88-17 and in the 60-day response letter. As in Section 1, several plant specific calculations were performed to verify that data in the WCAP encompassed Plant Vogtle. The calculations performed verify the RCS pressurization rate, the amount of inventory addition capable by gravity flow from the refueling water storage tank (RWST) to the RCS, and the adequacy of vent openings in the RCS to relieve RCS pressure buildup. The RCS mid-loop water level instrumentation was studied to determine its response to the different system effects including the affect of draindown.

Section 3 of this report investigated the feasibility of continuing work inside containment once boiling begins within the reactor vessel and creates a steam environment within the containment. Calculations were performed to determine the amount of time required to receive a radioactive dose equal to the maximum allowable individual maximum permissible concentration (MPC) and the number of containment coolers needed to keep the containment temperature below 160 °F for the 57 min prior to core uncovery.

Section 4 of this report reviewed GL 88-17 and the response letters to ensure all six program enhancements recommended by the NRC have been adequately addressed.

1.0 REVIEW AND PERFORM PLANT SPECIFIC ANALYSIS

1.1 GENERAL DESCRIPTION OF REVIEWS AND ANALYSIS

Plant Vogtle operational procedures were reviewed for changes which incorporated information found in WCAP-11916. Procedure 18019-C, "LOSS OF RHR," contains steps and cautions obtained from information in WCAP-11916. This information includes the time to core uncovery, time to boiling, heatup rate, and RCS gravity fill from the RWST. All of this information except the last item is discussed in this section. The last item will be discussed in Section 2 of this report. Because this specific information is used for plant operation, it was necessary to verify that the WCAP, which analyzed generic two, three, and four loop plants, encompasses Plant Vogtle. The results of these reviews are in Section 1.3.

The WCAP analysis list 13 assumptions for the generic study. All of the assumptions except the decay heat power, encompass Plant Vogtle. Since the fuel modeled in the WCAP was 12-month cycle fuel and Vogtle uses 18-month cycle fuel, this assumption needed verification.

WCAP-11916 assumes a generic four-loop 17 x 17 fuel plant with a thermal power of 3700 MW and a core average burnup of 30,000 MWd/MTU. Even if Plant Vogtle was uprated, the power level would be a maximum of 3565 MW. The decay heat generation rate essentially increases linearly with power level. Considering the planned fuel management strategy, the core average burnup at Plant Vogtle could approach 40,000 MWd/MTU. Increases in burnup above the 30,000 MWd/MTU level increase the decay heat rate only slightly. For Plant Vogtle, the decrease in decay heat rate due to a lower power level is significantly larger than the small increase due to increased burnup. Therefore, there is reasonable margin between the WCAP results and any expected mode of operation at Plant Vogtle. Also, the results of an evaluation of the Vogtle decay heat source using the NRC Branch Technical Position ASB 9-2, Rev.2, July 1981, showed the WCAP and Vogtle models to be very close (Attachment 1). Although neither model bounded the other at all times after reactor shutdown, the differences between the two models was small compared to the margin between the assumptions in WCAP and Plant Vogtle's core average burnup. Based on these findings, the decay heat generated by each unit at Plant Vogtle will always be bounded by the results of WCAP-11916.

Using the WCAP decay heat source, calculations were performed using conditions at 48 hours after shutdown for comparison with the findings of the WCAP. The calculations performed were time required to saturation, time required to expose the core, and RCS heatup rate. To ensure that no geometrical differences between the WCAP model and Plant Vogtle affected calculation results, the inventory volume for Vogtle was calculated. Comparisons of the plant specific calculation to the WCAP findings are discussed in Section 1.3.

A brief history and structure of the MAAP computer program along with a description of its mid-loop analysis capability are presented in Attachment 2.

1.2 PLANT SPECIFIC CALCULATIONS

This section develops Plant Vogtle-specific data for comparison with data and results from WCAP-11916. The methods suggested in WCAP Section 3.10 for calculating plant-specific data were used as general guidance.

1.2.1 TIME REQUIRED TO SATURATION

The assumptions used in this calculation are listed below. Assumptions used in the WCAP were also used for this calculation.

1. Initial condition for pipe, vessel and water is 140°F.
2. Water elevation is 187 ft-0 in (mid-loop conditions).
3. Uprated power is used (3565 MWt).
4. WCAP-11916, Figure 3.2.4-1 "Decay Heat Power vs Time After Shutdown," applies to Vogtle.
5. Power level used is for 48 hours after shutdown (per WCAP).
6. Water volumes used for time to saturation include the core region, upper internals region, and 30% of the hot legs. Volumes used for time to core uncovery include upper internals region, hot and cold legs, surge line, and a portion of the reactor coolant pump (RCP) bowl and RCP suction line.
7. Solid heat capacities for the thick vessel metal sections will not be included for conservatism.
8. Heat loss through insulation is conservatively left out.
9. All residual heat remover (RHR) cooling and flow is lost at time t=0 min.
10. RCS openings include the pressurizer (PZR) manway during heatup and a steam generator (SG) manway during boiling.
11. Containment and (RCS) are at atmospheric pressure.
12. SGs are not available for cooling.

Using WCAP figure 3.2.4-1 and uprated fuel for Vogtle, the decay heat rate for Vogtle is

$$(3565\ \text{MWt})(.0048) = 17.11\ \text{MWt or } 16{,}230\ \text{Btu/s } (973{,}800\ \text{Btu/min}).$$

With an RCS initial water temperature of 140°F, and a final water temperature of 212°F the temperature increase for the scenario is 72°. Because different water volumes and heat capacities are needed for all of the calculations, the RCS was divided into separate regions for analysis. The regions are shown in Figure 1.1.

The total volume of the core region is

$$[(\pi/4)(152.5\ \text{in.})^2(160.5\ \text{in.})]/12^3 = 1696\ \text{ft}^3.$$

From FSAR section 4.1 and 4.2, the fuel volume is

$$[(151\ \text{in.})(\pi/4)(0.374\ \text{in.})^2(264\ \text{rods})(193\ \text{assemblies})]/12^3 = 489\ \text{ft}^3.$$

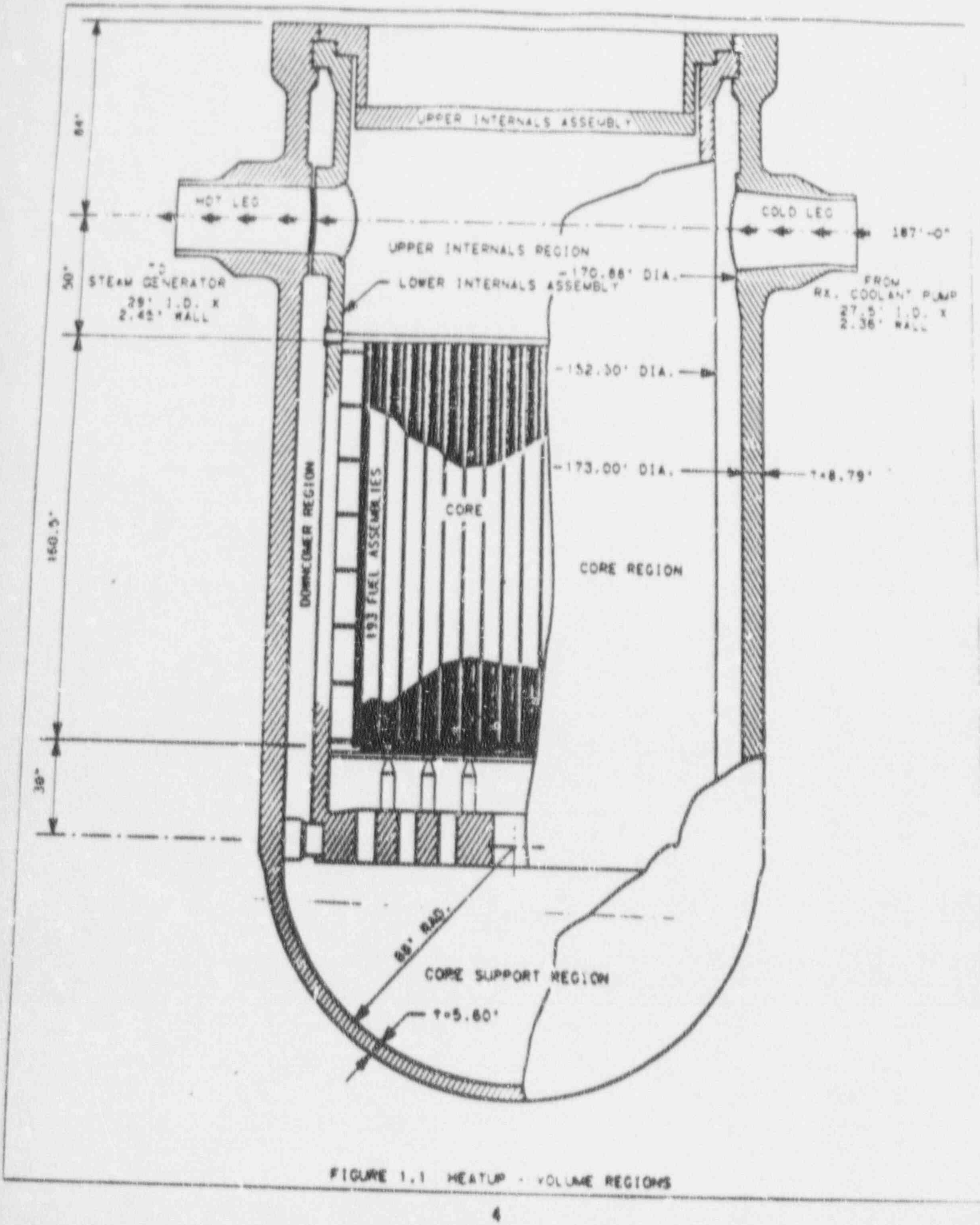


FIGURE 1.1 HEATUP - VOLUME REGIONS

From FSAR table 9.1.5-3, the lower internals weight is 260,000 lbm. Using the 501.3 lbm/ft^3 as the density of stainless steel, the volume of the lower internals is

$$(260,000\ lbm)(501.3\ lbm/\ ft^3) = 519\ ft^3.$$

About 30 percent, or 155 ft^3, of the lower internals volume is estimated to be in the core region, with a solid heat capacity of 9324 Btu/lbm-F. The weight of UO_2 and clad in the core region are 222,739 lbm and 45,296 lbm, respectively, from FSAR Table 4.3.-1. The specific heat (Cp) for fuel is 0.06 Btu/lbm-F and for Zircalloy-4 clad is 0.081 Btu/lbm-F.

Therefore, subtracting the fuel and metal volumes from the total volume, the core region water volume is

$$1696\ ft^3 - 489\ ft^3 - 155\ ft^3 = 1052\ ft^3$$

with a solid heat capacity of

$$(222,739\ lbm)(0.06\ Btu/lbm\text{-}F) + (45,296\ lbm)(0.081\ Btu/lbm\text{-}F) = 17,033\ Btu/F.$$

The total volume of the core support region is

$$[(4\pi/3)(88\ in./12)^3(0.5)] + [(\pi/4)(152.2\ in./12)^2(2.5\ ft)] = 1143\ ft^3.$$

About 35 percent, 182 ft^3, of the lower internals volume is estimated to be in the core support region. The weight of the lower internals is 260,000 lbm, with a specific heat capacity of 0.12 Btu/lbm-F.

Therefore, the core support region water volume is

$$1143\ ft^3 - 182\ ft^3 = 961\ ft^3$$

with a solid heat capacity of

$$(260,000\ lbm)(0.12\ Btu/lbm\text{-}F) = 31,200\ Btu/F.$$

The total volume of the upper internals region to the 187 ft-0 in. elevation is

$$[(\pi/4)(132.5\ in.)^2(50\ in.)]/12^3 = 528\ ft^3.$$

From FSAR table 9.1.5-3, the upper internals weight is 132,000 lbm. The total volume is calculated to be 264 ft^3. About 15 percent of the lower internals volume (79 ft^3) is estimated to be in this region.

Therefore the upper internals region water volume is

$$528\ ft^3 - 79\ ft^3 = 449\ ft^3,$$

with a solid heat capacity of

$$(132,000\ lbm)(0.12\ Btu/lbm\text{-}F) = 15,840\ Btu/lbm.$$

The total volume of the downcomer region is

$$[(\pi/4)((173\text{in.})^2 - (152.5\text{in.})^2)(210.5\text{in.})]/12^3 = 638\ \text{ft}^3$$

which is also the water volume of this region.

The four cold leg pipes and nozzles have a 27.5-in. inside diameter and are each 27 ft long. The four hot leg pipes and nozzles have a 29-in. inside diameter and are each 19 ft long. The total water volume with initial level at the hot and cold leg center line is

$$0.5\ [(\pi/4)(27.5\ \text{in.}/12)^2(108\text{ft.})] + 0.5\ [(\pi/4)(29.0\text{in.}/12)^2(77\ \text{ft.})] = 400\ \text{ft}^3.$$

This is 223 ft^3 cold leg volume and 177 ft^3 hot leg volume. The heat capacities for the hot and cold legs are calculated using all of the pipe metal volume as a heat sink. The solid heat capacity for the hot pipes is 7760 Btu/F.

For the scenario described in the WCAP, the water capacities in the core, upper plenum, and 30 percent of the hot leg are heated to 212 ^oF. The total water heat capacity is

$$[1052\ \text{ft}^3 + 449\ \text{ft}^3 + (0.3)(177\ \text{ft}^3)](61.35\ \text{lbm/ft}^3)(1\ \text{Btu/lbm-F})(72\ \text{F}) = 6{,}864{,}329\ \text{Btu}.$$

The heat capacity for the fuel and clad over the 72 degree temperature rise is

$$(17{,}033\ \text{Btu/F})(72\ \text{F}) = 1{,}226{,}376\ \text{Btu}.$$

Combining the fuel and metal heat capacities with the water heat capacity, the time required for the heatup is

$$(6{,}864{,}329\ \text{Btu} + 1{,}226{,}376\ \text{Btu})/(973{,}800\ \text{Btu/min.}) = 8.3\ \text{minutes}.$$

1.2.2 TIME REQUIRED TO EXPOSE CORE

This calculation determines the length of time it takes to heat and boil off the water above the top of the core. The boil off volume of water is composed of

1. Hot leg and surge line water volumes.
2. Upper Internals Region water volume.
3. Downcomer water volume above the upper core plate.
4. Cold leg and pump suction water volume above the bottom of the cold legs.

All of the assumptions used in the previous section are valid for this calculation. A spill penalty of 35 percent of the boiloff mass is assumed based on the WCAP analysis.

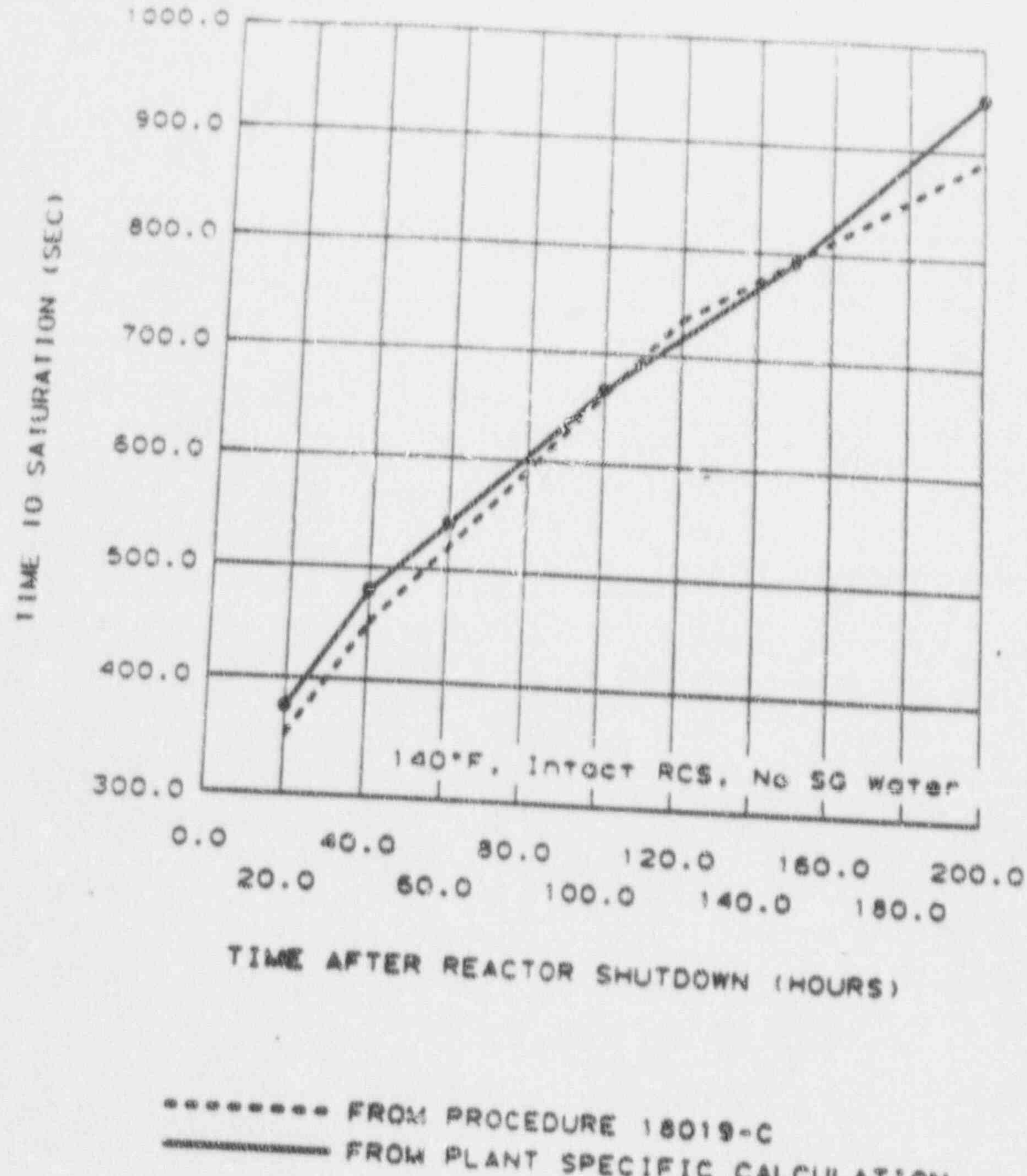


FIGURE 1.2 - TIME TO SATURATION

The hot leg side steam generator elbow water volumes are added to the water volume of the previously computed hot legs. This gives a total water volume of

$$177\ ft^3 + \pi/4(2.41\ ft)^2(3.3\ ft)(4\ pipes)(1/2) = 220\ ft^3.$$

The surge line water volume is calculated assuming the line is half full from the entrance up to the second elbow. Therefore the total length of pipe is 22.79 ft and the water volume is 16 ft^3.

The length of the downcomer region with a water volume to be boiled off is 3 ft. The water volume for this region is 109 ft^3.

Each RCP is assumed to have a water volume equal to its inside diameter, 4 ft, times the area of the cold legs. The cold leg steam generator elbow contains water for 1.15 ft. Then, the volume for the RCPs and the SG elbows and cold leg nozzel is

$$\pi/4(2.29\ ft)^2(4\ ft)(4)(1/2) + 20\ ft^3 + \pi/4(2.58\ ft)^2(1.15\ ft)(4) = 77\ ft^3.$$

Adding the water volume of the upper internals region, 449 ft^3, the boil off water volume is 1094 ft^3. At 140 $^{\circ}F$, the weight is 67,150 lbm. Subtracting a 35 percent spill penalty from this gives 43,648 lbm. Using the enthalpies of water at 140 $^{\circ}F$ and saturated steam at 212 $^{\circ}F$, the decay heat required to heat and boil off this mass is

$$(1150.9\ Btu/lbm - 107.96\ Btu/lbm)(43,648\ lbm) = 45,520,499\ Btu.$$

The decay heat required to heat the core region water volume from 140 $^{\circ}F$ to 212 $^{\circ}F$ is

$$(180.16\ Btu/lbm - 107.96\ Btu/lbm)(64,571.76\ lbm) = 4,662,081\ Btu.$$

The total heat capacity of the RCS metal used for heat sinks over the 72 $^{\circ}F$ degrees temperature rise is

$$(81,157\ Btu/F)(72\ F) = 5,843,317\ Btu.$$

The heat input required to boil-off enough water to expose the core is the sum of all the heat inputs, which is 56,025,897 Btu. The decay energy for 48 hours after shutdown is 16,230 Btu/s The time to boil off is then

$$(56,025,897\ Btu)/(16,230\ Btu/s)(60\ s/min) = 57\ min.$$

1.2.3 RCS HEATUP RATE FOR 48 HOURS

To determine the degrees F per minute heatup for 48 hours after reactor shutdown, divide the total degrees change by the amount of time required for that change to occur.

$$(72\ ^{\circ}F) / (8.3\ min.) = 8.6\ ^{\circ}F/min.$$

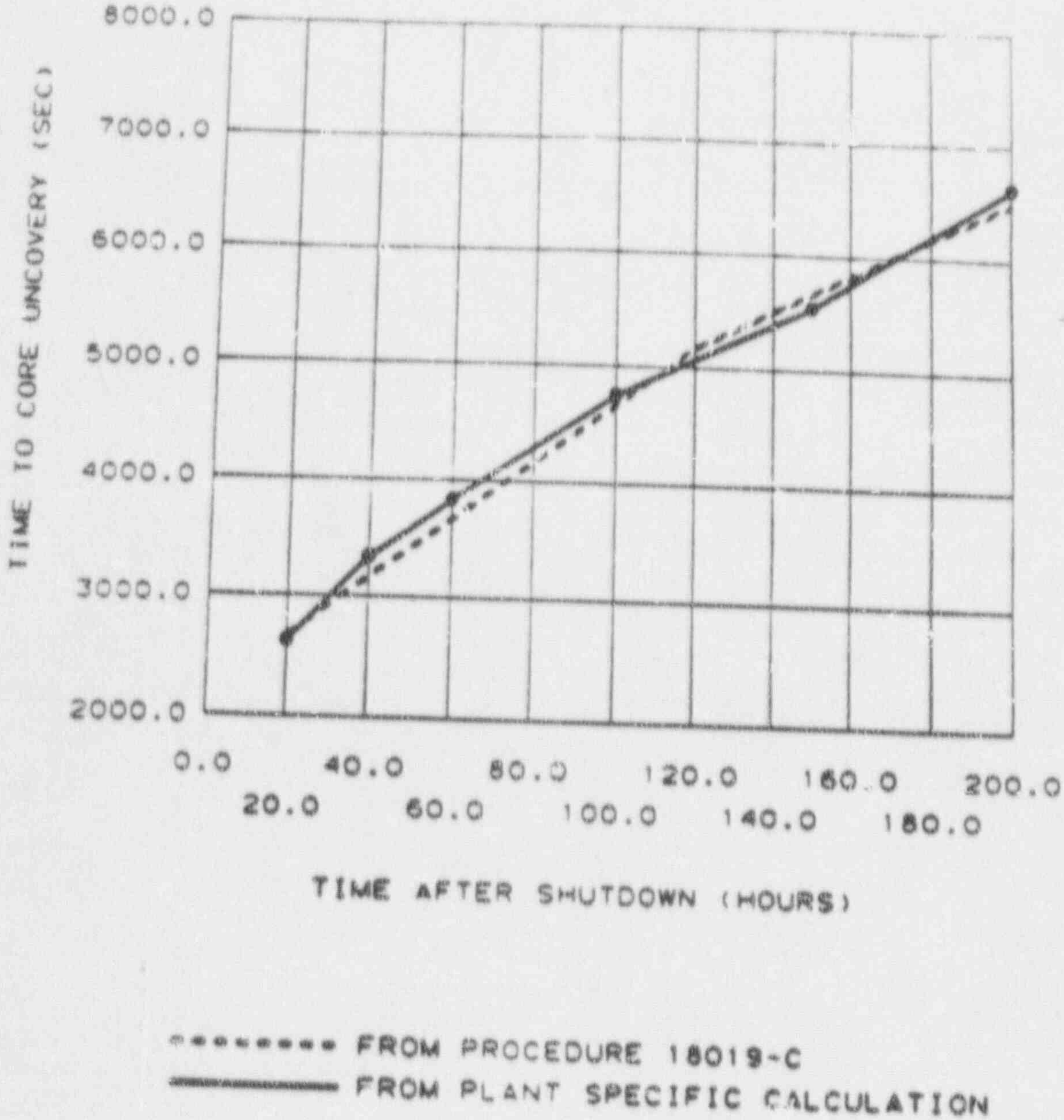


FIGURE 1.3 - TIME FOR CORE UNCOVERY

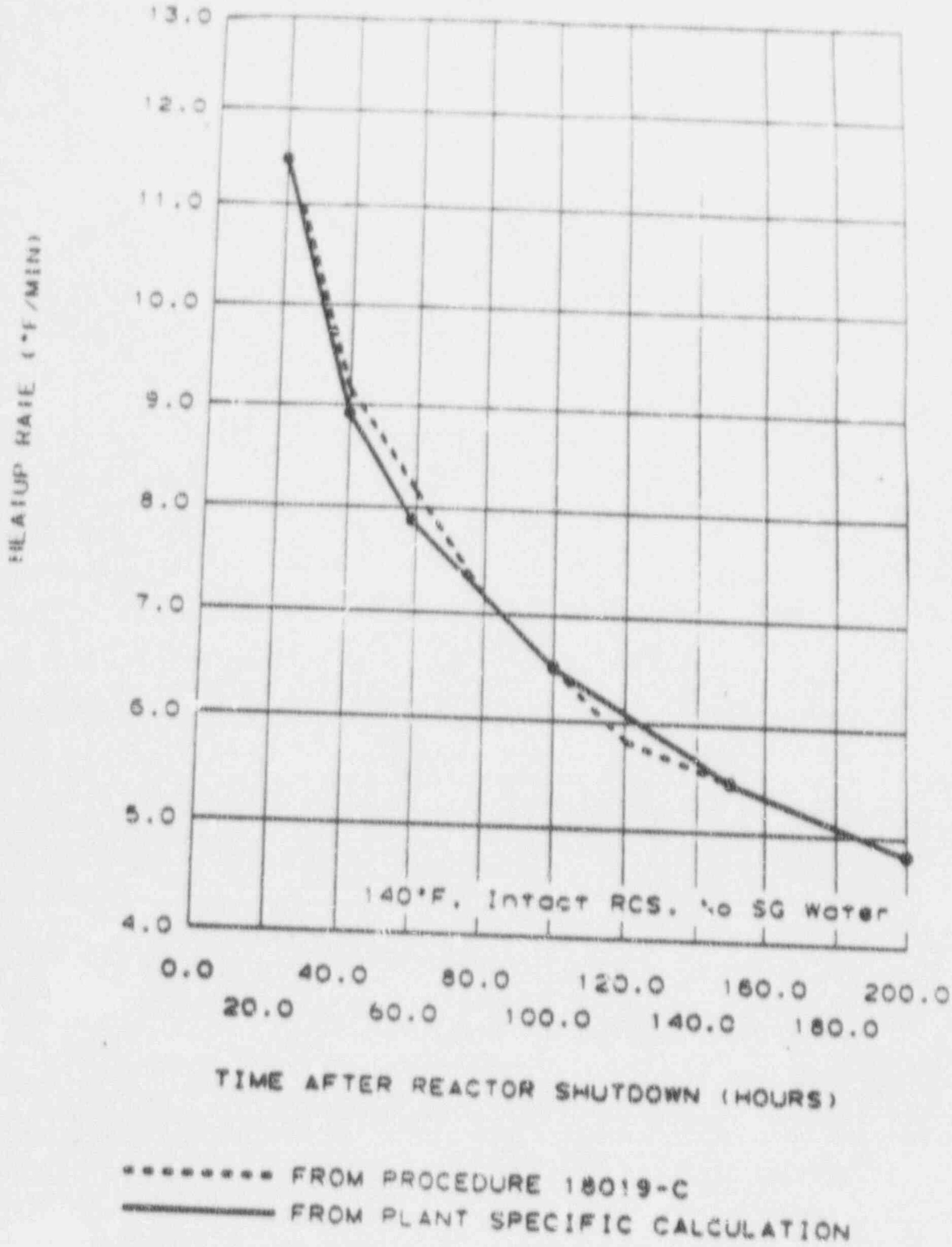


FIGURE 1.4 - HEATUP RATE

1.3 SUMMARY OF CONCLUSIONS

The inputs and assumptions used for the TREAT program are in WCAP section 2.3.4, pages 11 through 14. All of the assumptions used for this generic analysis were verified to be applicable to Plant Vogtle. This includes the assumption about the decay heat power which was studied to ensure that differences in the fuel did not cause significant differences in decay heat power.

Specific calculations were performed to estimate the time to saturation, time for core uncovery, and RCS heatup rate for Vogtle. The WCAP approach considered only heating the water volume directly around the fuel to 212°F which takes approximately 8 min. The plant-specific calculation estimated 8.3 minutes or approximately 8 minutes for this heatup to occur. The heatup rate for this volume of water, upper plenum, and part of the hot legs is estimated to be 8.6 °F per minute. The WCAP estimated a slightly higher heatup rate. After the water is heated, it takes approximately 49 more minutes to boil off the water volume above the core and expose the upper core plate. The WCAP estimated a slightly faster time to core uncovery.

Assuming all of the conditions except the decay heat rate remain the same throughout the scenario, graphical comparisons can be made at various times after shutdown. Curves, plotted in Figures 1.2, 1.3, and 1.4, show the data from the plant-specific calculation on graphs from Procedure 18019-C. The data points shown on the graphs indicate calculation points using the assumption mentioned above. The data for the procedure graphs are from the WCAP generic 4 loop plant analysis. All of the plant-specific curves follow the WCAP curves in the regions for which the specific calculation were performed. Some of the differences in the data can be attributed to the accuracy of computer iterations of several changing conditions such as heat sink conduction and water and vapor volumes. Another difference is that the Vogtle calculations estimate a larger heatup volume and a smaller boil off volume than used in the WCAP analysis. However, the time estimate outcomes do not differ significantly from the graphs used in the Georgia Power Company procedures.

For the information analyzed in this section, only Procedure 18019-C was found to contain information requiring verification. Other procedures will be discussed in subsequent sections.

Since all of the assumptions used in the WCAP computer program are valid for conditions at Plant Vogtle and since the plant-specific calculations correlate to results predicted by the WCAP analysis, the WCAP results discussed in this section encompass Plant Vogtle.

2.0 ANALYSIS OF NONPOWER CONDITION PHENOMENA

2.1 GENERAL DESCRIPTION OF ANALYSIS

The WCAP was reviewed for information and generic calculations relating to nonpower condition phenomena that would affect the operation of the RCS during loss of RHR during mid-loop. The related topic discussed in the WCAP was RCS pressure buildup due to inadequate venting on an intact RCS. A pressure buildup could cause an uncontrolled loss of inventory, allowing the core to become exposed. During this time of pressure buildup, the instrument accuracy could vary, which would give false readings to operators. Also, a pressure buildup would limit the types of recovery actions the operators are able to perform, including limitation on gravity flow. Plant-specific calculations were performed on these topics to determine the applicability of the WCAP results for Vogtle. The plant-specific calculations performed were to determine the RCS pressurization rate, the adequacy of different vents used while at mid-loop, inventory addition possible via gravity flow from the RWST, and the accuracy of instrument readings during the different conditions including system draindown.

2.2 PLANT-SPECIFIC CALCULATIONS

This section develops Plant Vogtle specific data for comparison with data and results from WCAP-11916. The methods used in WCAP section 3.10 for calculation plant-specific data were used as general guidance.

2.2.1 RCS PRESSURIZATION RATE

A simplified calculation was performed for general comparison with the WCAP-11916 RCS pressurization analysis. This calculation neglects the affects of air and RCS metal heat sinks and assumes steady-state equilibrium for any given heat input. Despite these limitations, the most important factors in determining the pressure buildup are the plant-specific heat rate and liquid and vapor volumes; therefore, this calculation is useful in examining the general trend of the pressurization. Because of the simplifying assumptions, the calculation should be used for comparison purposes only. Assumptions for this calculation are listed below.

1. Core water temperature is initially at 212°F.
2. Per WCAP-11916, 13 percent of the decay heat generated by the fuel is used to heat core metal.
3. Volume of water in RCS is 12,462 ft^3.
4. The ratio of water to vapor volume does not change significantly over length of time required for RCS pressurization.
5. RCS is intact with no vent openings and no SG with secondary side water. Nozzle dams are not in place.
6. Decay heat for Vogtle fuel is a constant 16230.5 Btu/s.
7. Effects of any noncondensibles are neglected.
8. RCS metal heat sinks are neglected.
9. Steady-state conditions are assumed for any given heat input, i.e., uniform liquid and vapor temperatures.

For this scenario, the first law of thermodynamics will be applied for a system that undergoes a change of state. The control boundary for the system is the entire RCS volume. As the system undergoes a change of state, the only energy to cross the boundary will be the decay heat input by the fuel. Therefore, the net change in the internal energy of the system will be exactly equal to the net energy input by the decay heat.

The reference point for the addition of energy (heat) will be at an RCS temperature of 212°F and time = 0 s, where

$$U_{RCS} = U_f\, m_f + U_g\, m_g$$

$$= (180.11 \text{ Btu/lbm})(3335 \text{ ft}^3/0.016716 \text{ ft}^3/\text{lbm}) + (1077.6 \text{ Btu/lbm})(8927 \text{ ft}^3/26.8 \text{ ft}^3/\text{lbm})$$
$$= 38{,}447{,}423 \text{ Btu.}$$

This is the total internal energy for the system. The decay heat rate for Vogtle assuming 13 percent for core metal heatup is

$$16230.5 \text{ Btu/s} - [(0.13)(16230.5 \text{ Btu/s})] = 14{,}120.5 \text{ Btu/s}$$

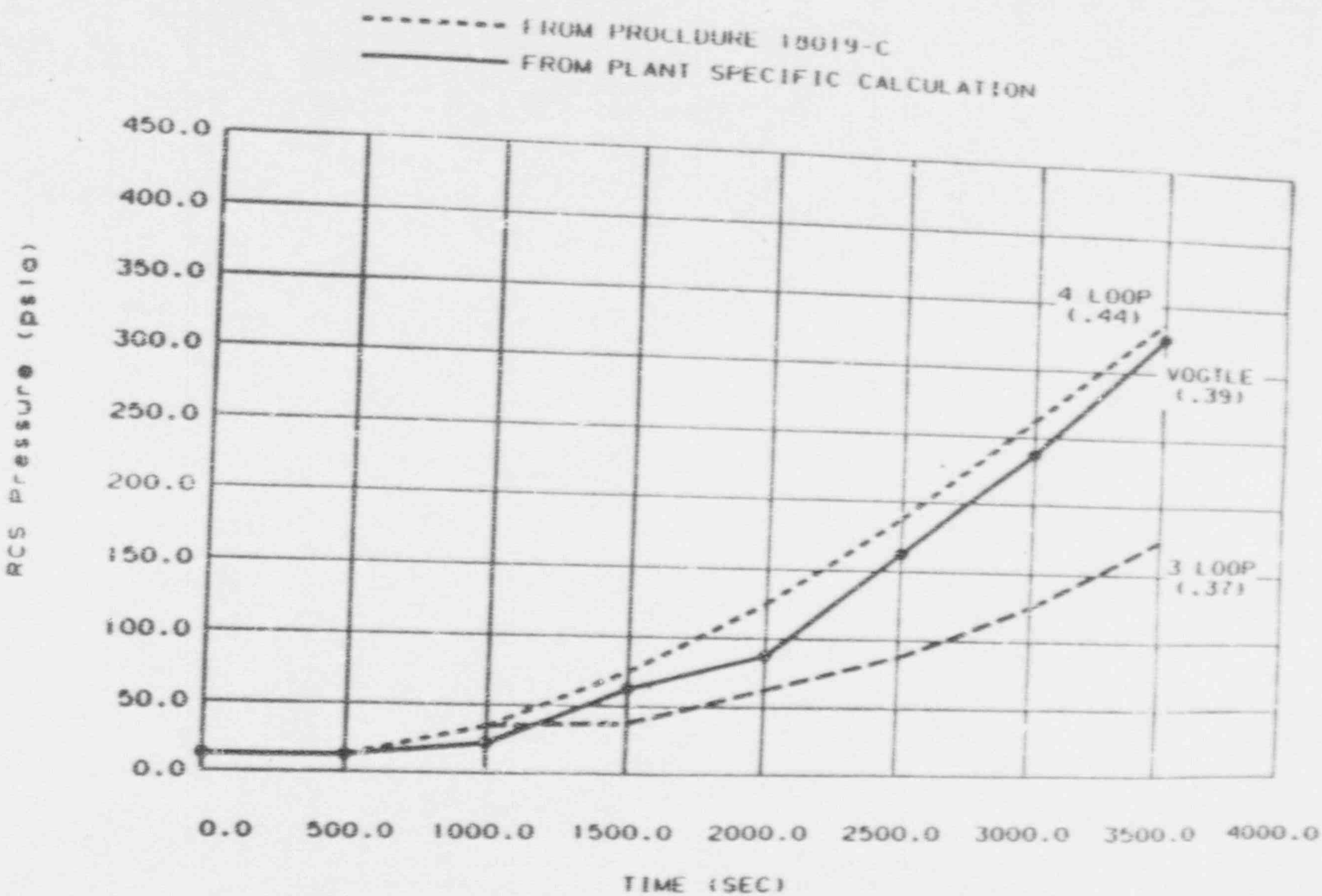
So, for a 500-s interval, the energy input into the boundary is 7,060,268 Btu. Then, the total internal energy for the system after 500 s is 45,507,691 Btu. Since the internal energy is now known, thermodynamic properties can be substituted into the energy balance equation

$$U_{500} = U_f\,(3535/\,v_f) + U_g\,(8927/\,v_g)$$

to obtain the new states of temperature and pressure. If the properties at 240°F are substituted into the equation, the value for U is 44,219,735 Btu. If the properties at 250°F are substituted, the value for U is 46,132,817 Btu. By interpolating between these two numbers for a U of 45,507,691 Btu, the final temperature is 247°F, which corresponds to a saturation pressure of 28 psig. So after 500 s, the RCS pressure has increased from 14.7 psig to 28 psig.

This method is used for 500 s intervals from the time boiling begins up to 3500 s afterwards.

Figure 2.1 is a plot of this plant-specific data and the generic four and three loop plant WCAP data. Numbers at end of each line are the power to vapor volume ratios described in the WCAP.



FOUR-LOOP AND THREE-LOOP CASE, 48 HRS, INTACT PCS, NO SG WATER, P/Vg

FIGURE 2.1 RCS PRESSURE

2.2.2 GRAVITY FLOW INVENTORY ADDITION

This calculation determines flowrates for gravity flows from the RWST, through different systems, to the RCS. The systems analyzed include the chemical and volume control system normal charging flow path which was mentioned in the WCAP, the CVCS safety injection flowpath, the safety injection system flowpath, and the residual heat removal system cold leg injection flowpath for both units. Assumptions used in this calculation are listed below.

1. All valves in the flowpaths are full open. All needle valves are modeled as throttled globe valves.
2. Pumps are modeled as a reducer and an elbow.
3. Weld-o-lets cause insignificant pressure drops for gravity flow conditions and therefore are not modeled.
4. The RCS water level is at 187 ft-0 in.
5. The RWST is full for each RCS pressure condition. Full was defined as a level just above the minimum level allowed to meet technical specifications.

The initial water level for the RWST was determined by the low alarm setpoint of the tank. The water level in the vessel is 187'-0". All of the pipe from the tank to the entry point in the RCS was modeled for each of the systems in Unit 1. The system for Unit 1 with the highest flowrate was modeled for Unit 2 analysis. To obtain pipe information, the current isometric drawings were used for determining the length of pipe, number of fittings, and elevations. The Bernoulli equation, modified for use with equivalent lengths, was used to determine the flows.

$$Q=[(P_{atm}-P_{rcs}+\Delta Z)/(\Sigma\, fl/2Dga^2 + 1/n^2\ \Sigma\, fl/2Dga^2)]^{1/2}.$$

The variables are as follows:

Q	= total flow
P_{atm}	= atmospheric pressure head
P_{rcs}	= RCS pressure head
ΔZ	= elevation difference
D	= pipe diameter
a	= pipe area
f	= friction factor
l	= equivalent length of pipe
n	= number of pipe branches

To determine the equivalent length of each pipe, the number of elbows, tees, valves, and pipe enlargements and contractions were counted. The number of elbows, tees, and valves were multiplied by the appropriate value for their pipe size. All equations are from Crane Technical Paper 410.

For the Safety Injection System, the pipe information is:

Pipe Size (ft)	Area(ft^2)	Equivalent Length (ft)	Friction Factor
24" (1.885)	2.7921	344.75	0.012
10" (0.729)	0.4176	311.08	0.014
8" (0.665)	0.3474	303.58	0.014
6" (0.505)	0.2006	294.92	0.015
4" (0.318)	0.0798	553.50	0.018
3" (0.255)	0.0513	5.00	0.018
2" (0.172)	0.0233	262.25	0.019

These data include the computations for the pump and FE-922. To determine the flowrate when the RCS pressure is 30 psig (69.2 ft) input the pipe data into the flow equation.

$$Q = [(0 - 69.2 + 81.4)/(10.67 + 141.75)]^{1/2} = 0.282 \ ft^3/s$$
$$= 127 \ gal/min.$$

This same method is used for pressures of 0, 10, 20, and 35 psig.

For the chemical volume and control system (SI mode) the pipe information is:

Pipe Size (ft)	Area(ft^2)	Equivalent Length (ft)	Friction Factor
24" (1.885)	2.7921	601.25	0.012
8" (0.665)	0.3474	361.84	0.014
6" (0.505)	0.2006	199.75	0.015
4" (0.287)	0.0645	793.08	0.017
3" (0.218)	0.0375	213.83	0.018
1.5" (0.111)	0.0097	515.00	0.021

These data include computations for the pump, FE-917, FE-927, and the needle valves throttled to approximately 50 percent. The branch flow is calculated for the four lines which are used to inject water into the RCS. The branch flow losses are

$$h_b = 1/16 \ (fl/2Dga^2)$$
$$= 1/16 \ (0.021)(515)/2(0.111)(32.2)(0.0097)^2$$
$$= 1005 \ sec^2/ft^5$$

The flowrate when the RCS pressure is 30 psi is

$$Q = [\ (81.4-69.3) \ / \ (1005 + 234)]^{1/2} = 0.099 \ ft^3/s$$
$$= 45 \ gal/min.$$

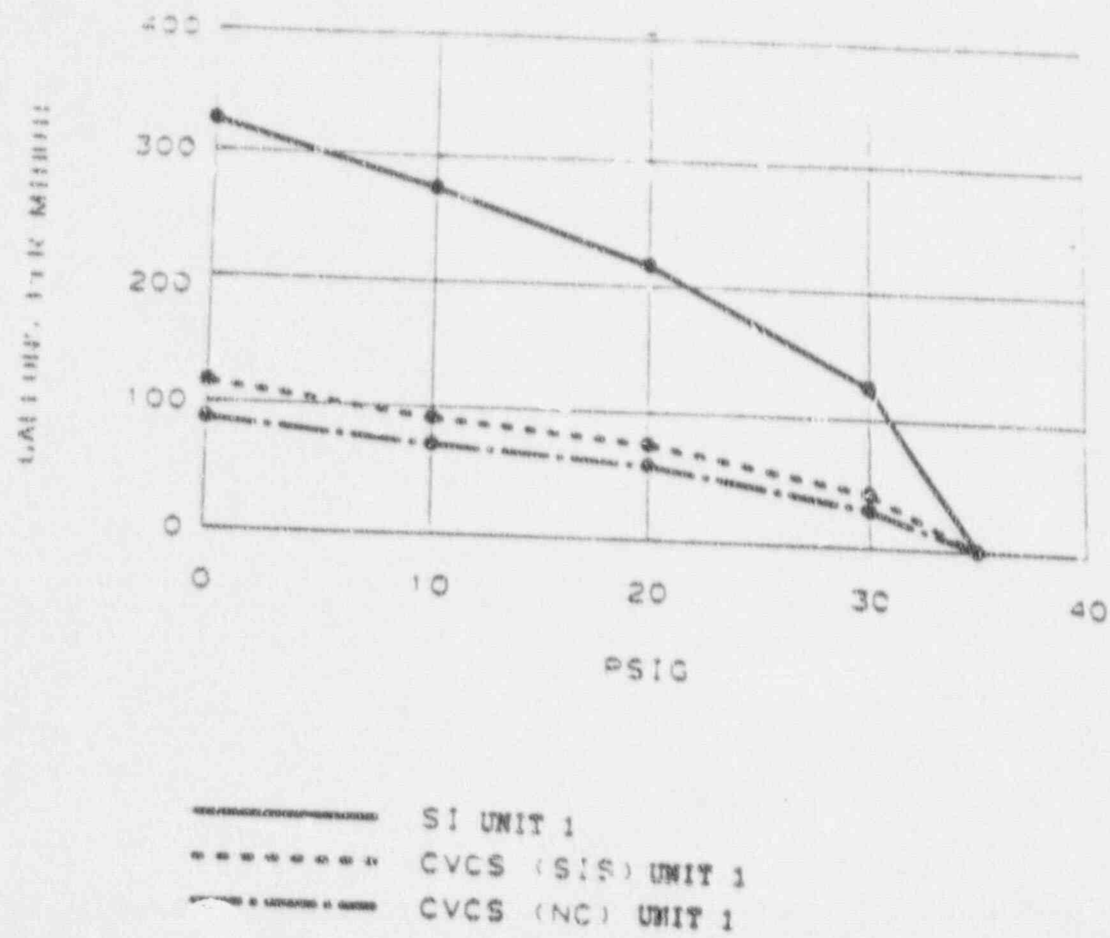


FIGURE 2.2 GRAVITY FLOW for CVCS and SI

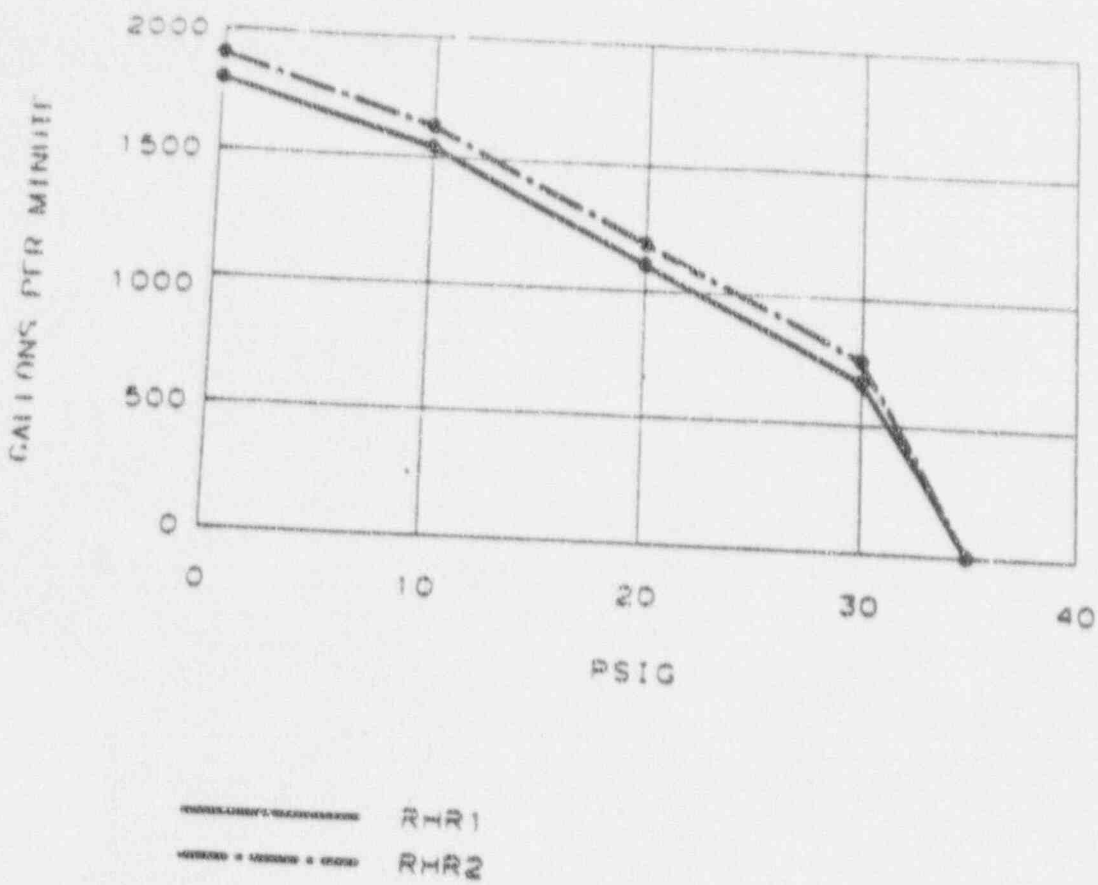


FIGURE 2.3 GRAVITY FLOW for RHR UNITS 1 and 2

2.2.3 RCS VENTING

This calculation is for the case where the RCS has a hot leg vent path. Possible vent paths can be created by removing a SG manway, pressurizer manway, or all three safety relief valves from the pressurizer. The hot leg vent size is adequate if the steam generated by the inventory boiling due to decay heat is able to pass through the opening without substantial pressurization of the RCS. The pressure buildup for venting through the safety relief valve lines and the pressurizer manway will be calculated to see if they are sufficient to relieve the pressure buildup. Assumption and criteria for this calculation are

1. All three PSVs or the PZR manway have been removed.
2. Containment is at atmospheric pressure.
3. Rated power of the reactor is 3565 MWt.
4. Decay heat is 0.48 percent of rated power.
5. RHR is lost 48 hours after reactor shutdown.
6. No line is filled or partially filled with water. (The water level has already been decreased to a level corresponding to the bottom of the hot leg.)

To verify the vent capacity, a pressure in the vessel is assumed and the pressure drops in the system are computed. A final pressure is then calculated and compared to the initial pressure. This comparison is done for verification.

The first calculation is for venting through the safety relief valves, and an initial pressure of 10 psig (25 psia) was chosen. There are 11.5 ft of 29-in. ID hot leg piping to the surge line with an entrance (KV nozzle) and a fitting (Tee) as minor losses. From steam tables, the specific volume of the steam is 16.301 ft^3/lbm and the latent heat of evaporation is 952.1 Btu/lbm. The mass flowrate is 17.05 lbm/s Therefore the volumetric flowrate is

$$q = (17.05 \text{ lbm/s})(16.301 \text{ ft}^3/\text{lbm}) = 277.93 \text{ ft}^3/\text{s}$$

Using this flow to calculate a Reynolds Number and a friction factor(f), solving for the total minor losses (K) gives

$$K = f\ L/D = (0.013)(11.5 \text{ ft}/2.42 \text{ ft}) = 0.062.$$

The pressure drop for the hot leg is then

$$\text{delta } P = [3.62\ (K)(\text{density})(q)^2]\ /\ d^4$$

$$\text{delta } P = [3.62\ (0.062)(0.061 \text{ lbm/ft}^3)(277.93 \text{ ft}^3/\text{s})^2\ /\ (29^4 \text{ in}) = 0.02 \text{ psid.}$$

The pressure at the inlet to the surge line is

$$10.0 \text{ psig} - 0.02 \text{ psig} = 9.98 \text{ psig},$$

or still about 10 psig.

From the hot leg pipe to the 16 in. x 14 in reducer in the surge line, there are 37.84 ft of 12.812 inch ID pipe, a flush entrance nozzle with an assumed sharp edge, a bend with a radius of 6.667 ft, a bend with a radius of 7.167 ft, and the reducer. The total K value and the pressure drop are 1.48 and 0.91 psid respectively. This produces a pressure at the start of the 14-in. pipe of 9.07 psig.

For 9.07 psig, the specific volume of steam is 16.936 ft^3/lbm which gives a new volumetric flowrate of

$$q = (17.05\ lbm/s)(16.936\ ft^3/lbm) = 288.76\ ft^3/s$$

From the reducer to the PZR there are 7 ft of 11.188 in. ID pipe, one bend with a radius of 5.933 ft, and one exit nozzle. The total K value and the pressure drop are 1.33 and 1.54 psid, respectively. This produces a pressure at the entrance to the PZR of 7.53 psig. For 7.53 psig, the specific volume of steam is 18.373 ft^3/lbm which gives a new volumetric flowrate of

$$q = (17.05\ lbm/s)(18.373\ ft^3/lbm) = 313.26\ ft^3/sec.$$

The PZR is assumed to be a 24-in. pipe. This is justified to allow for a free flow path for the steam from the surge line entrance to the valve exit without interfering with the heaters. The total K value and the pressure drop is 0.34 and 0.02 psid, respectively. This produces a pressure at the exit to the PZR of 7.51 psig.

For each of the three PZR relief valve openings, the volumetric flowrate is

$$(313.26\ ft^3/s) / (3\ valves) = 104.42\ ft^3/s\ per\ valve.$$

From the PZR to the relief valve flange there are 6 ft of 6-in. schedule 160 pipe, four 90°F elbows, and an exit through the flange for each of the valves. The total K value is 2.55. The pressure drop is 7.51 psid, which produces a new pressure at the exit of

$$7.51\ psig - 7.51\ psig = 0\ psid.$$

This indicates that a vessel pressure of 10 psig is required to allow the steam flow produced by the decay heat to exit through the relief valve vents. Since the pressure drop over this segment is greater than 10 percent of the upstream pressure, a recalculation is required for the volumetric flowrate. An average of the specific volumes at 0 psig and 7.51 psig is used to compute the flowrate. The new flowrate is then used to find a new pressure drop. The new pressure drop is 9.26 psid, which indicates that the vessel pressure will be less than

$$10.0\ psig - (7.51\ psig - 9.26\ psig) = 11.75\ psig.$$

In the second calculation, venting through the PZR manway, an initial pressure of 4 psig (19 psia) was chosen. Using the same method as described for the relief valve pressure drops, the pressure in the vessel required to vent the steam produced by the decay heat through the PZR manway will be slightly greater than 4 psig.

2.3 INSTRUMENTATION ASPECTS

Instrumentation has been provided to assist the operator in safely maintaining adequate level in the RCS hot legs during mid-loop and draindown operations. This instrumentation is shown in Figure 2.4. Instrumentation has also been provided to assist the operator in quickly identifying air ingestion in the RHR pumps. A brief description is given below:

Two differential pressure transmitters are connected to the RCS to provide independent level indications in the main control room. One transmitter is connected to the RCS Loop 1 hot leg and provides narrow range indication of the hot leg level. This instrument loop also provides annunciation of low hot leg level. The other transmitter is connected to the RCS Loop 4 hot leg and provides wide range indication from the reactor vessel flange to the bottom of the hot leg. The instrument loops are powered from separate instrument buses to maximize the availability of the indication.

Local RCS level indication is available via two permanent level sight glasses located in the containment building. One of the sight glasses shows the RCS level in the region between the bottom of the pressurizer and the reactor vessel flange. The other sight glass shows the RCS level in the region of the reactor coolant pump seals and the reactor coolant system hot legs. The piping for these sight glasses is connected to the RCS as required during Mode 5 and Mode 6.

Current transducers monitor the 4160-V power feeders to each RHR pump. The output of these transducers is routed to the emergency response facilities (ERF) computer. Historical traces of the pump motor current can be obtained at any ERF computer terminal. The logic associated with the Mode 5 and Mode 6 core cooling critical safety function status trees provides a visual and audible alarm at the ERF computer safety parameter display system (SPDS) console in the main control room if the motor current becomes unstable during Mode 5 and Mode 6 operation. This alarm will alert the operator to take any necessary corrective actions to maintain adequate core cooling.

2.3.1 Level Measurement During Steam Generator Tube Draining

Nitrogen may be injected into the steam generator channel head drains to assist in steam generator tube draining when the RCS level is at the reactor vessel flange (el 194 ft-0 in.). At this elevation, level transmitters, LT11310 and LT11320, will be pegged high. The level can be determined using sight glass LG-10402 and PZR level indicator LI-462. This phase of draining takes place well above the RHR suction nozzles (el 186 ft-7 in.). Any pressure rise due to the introduction of nitrogen will not affect the transmitter readings since the pressurizer and the reactor head are kept at the same pressure by their connections to the PRT. Thus, the reference and sensing lines of the transmitters can cancel out the increase in head.

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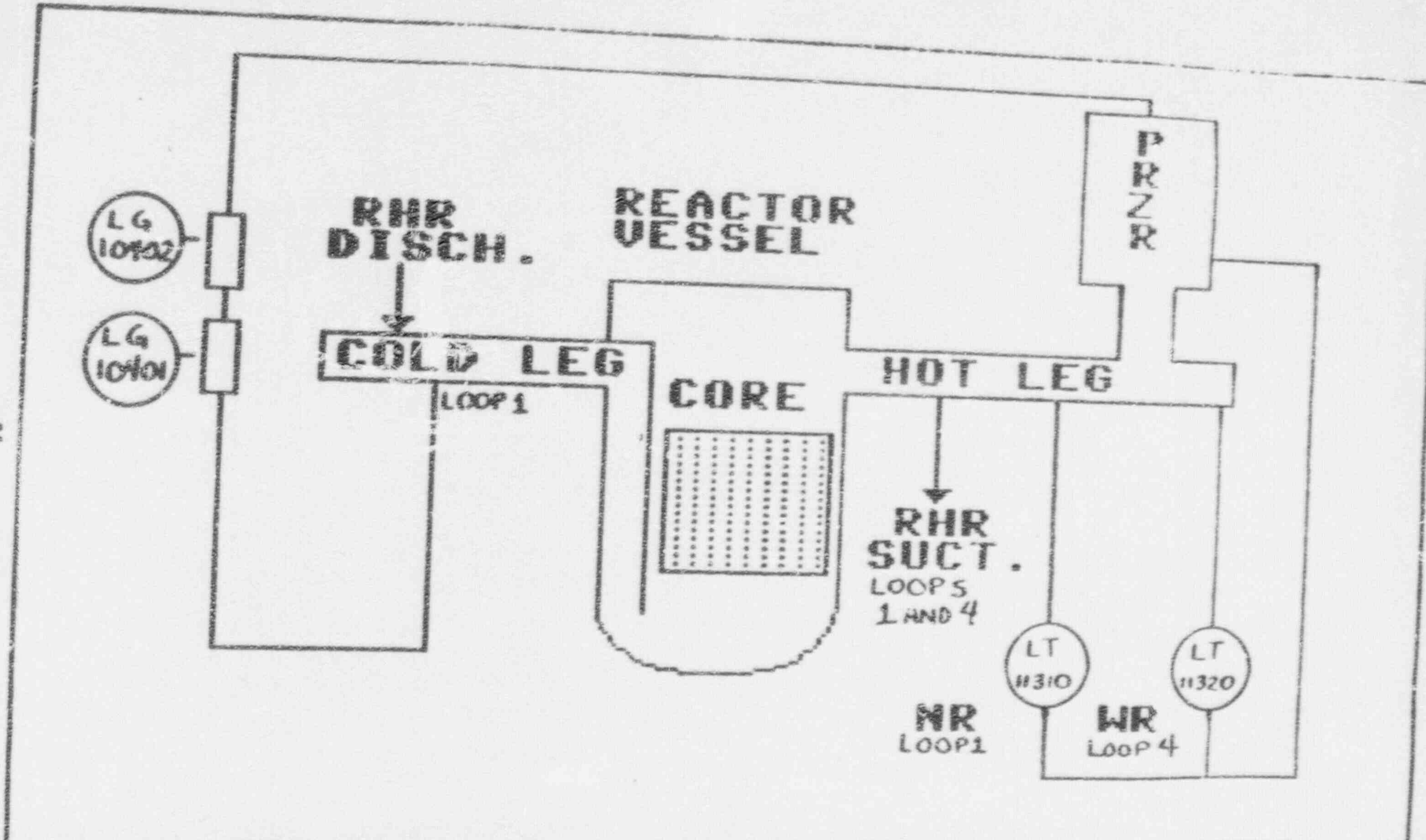


FIGURE 2.4 LEVEL INSTRUMENTATION

During draindown below el 189 ft-0 in., the steam generator tubes begin to drain by gravity. Because there is no vent at the top of the tubes, this draining occurs as random slug flow (also called gurgling). As the slugs of water enter the hot and cold legs they create large swells in the level in the legs. The swells will be seen both on the control room indicators and on the sight glasses; however, the swelled level will not necessarily be equal in the Loops 1 and 4 hot and cold legs since the steam generator tubes drain randomly and independently. During gurgling, the level measurements will be erratic and the low level alarm may activate and clear several times during this period. The operator should use the control room indicator for the transmitter attached to the hot leg being used for RHR suction since the level in this hot leg is critical to maintaining RHR performance. The operator should use the minimum value indicated as the level in the hot leg to ensure that the RHR suction nozzle is covered. The sight glass LG-10401, which measures Loop 1 cold leg level, should not be used to determine level during gurgling unless the transmitters are out of service. Also, during steam generator tube draining it is extremely important that the operators closely monitor RHR parameters including pump flowrate, discharge pressure, and motor current in order to quickly detect loss of pump function should vortexing occur.

2.3.2 Measurement Errors During Mid-Loop Operation

Differential pressure transmitters sense head and, as such, are subject to density differences between the sensing line fill fluid and the density of the process fluid. According to design criteria DC-1505, the ambient temperature in the containment can be as low as 60°F. The pressure gauges used to calibrate the level transmitters will compensate for the ambient temperature at the time of calibration. The water in the RCS will be at approximately 140°F. The difference between the process water density (at 140°F) and the reference leg density (at 60°F) will introduce an error of 1.6 percent (0.5-in.) on the narrow range indicator and 1.6 percent (1.5-in.) on the wide range indicator. During outages where low containment temperatures are expected, this error can be minimized by adjusting the calibrated span of the transmitters as calculated below:

Calibrated Span=(d_{amb}/d_{hl})x(physical span)

where: Physical span= 30 inches for LT-11310, narrow range
Physical span= 96 inches for LT-11320, wide range
d_{amb} = density of water at ambient temperature
d_{hl} = density of water at hot leg temperature

The uncertainty in the transmitter loops due to hardware was determined by a method similar to that used for technical specification surveillance indicators. The hardware-related uncertainties are expected to introduce an error of 3.0 percent (0.9-in.) on the narrow range indicator and 3.0 percent (2.9-in.) on the wide range indicator. Since the hardware-related errors and the process density errors act independently, they can be combined using the "square root sum of the squares" method to obtain an overall indication error.

Narrow range error = $(1.6 \text{ percent}^2 + 3.0 \text{ percent}^2)^{1/2}$ = 3.4 percent (1.0-in.)

Wide range error = $(1.6 \text{ percent}^2 + 3.0 \text{ percent}^2)^{1/2}$ = 3.4 percent (3.3-in.)

The error values presented were obtained from calculation X5CP11310.

Static pressure changes in the RCS will have no effect on the transmitters since they utilize a reference leg to cancel out static pressure.

The sight glasses LG-10401 and LG-10402 are also head sensing measurement devices and suffer from density-induced inaccuracies. The density induced errors for various ambient temperatures are shown in Figure 2.5. The error is less than 1/2 in. at mid-loop elevations. This error leads in the conservative direction, i.e., the sight glasses show a lower level than actually exists in the RCS.

Parallax error in reading the meniscus of the fluid in the sight glasses can also cause measurement inaccuracies of around 1/2 in. Because the Loop 1 drain line is used to connect the sight glasses to the RCS, sight glass LG10401 only shows Loop 1 cold leg level, which may not exactly equal the hot leg level under certain conditions, such as steam generator tube draining and loss of RHR.

2.4 SUMMARY OF CONCLUSIONS

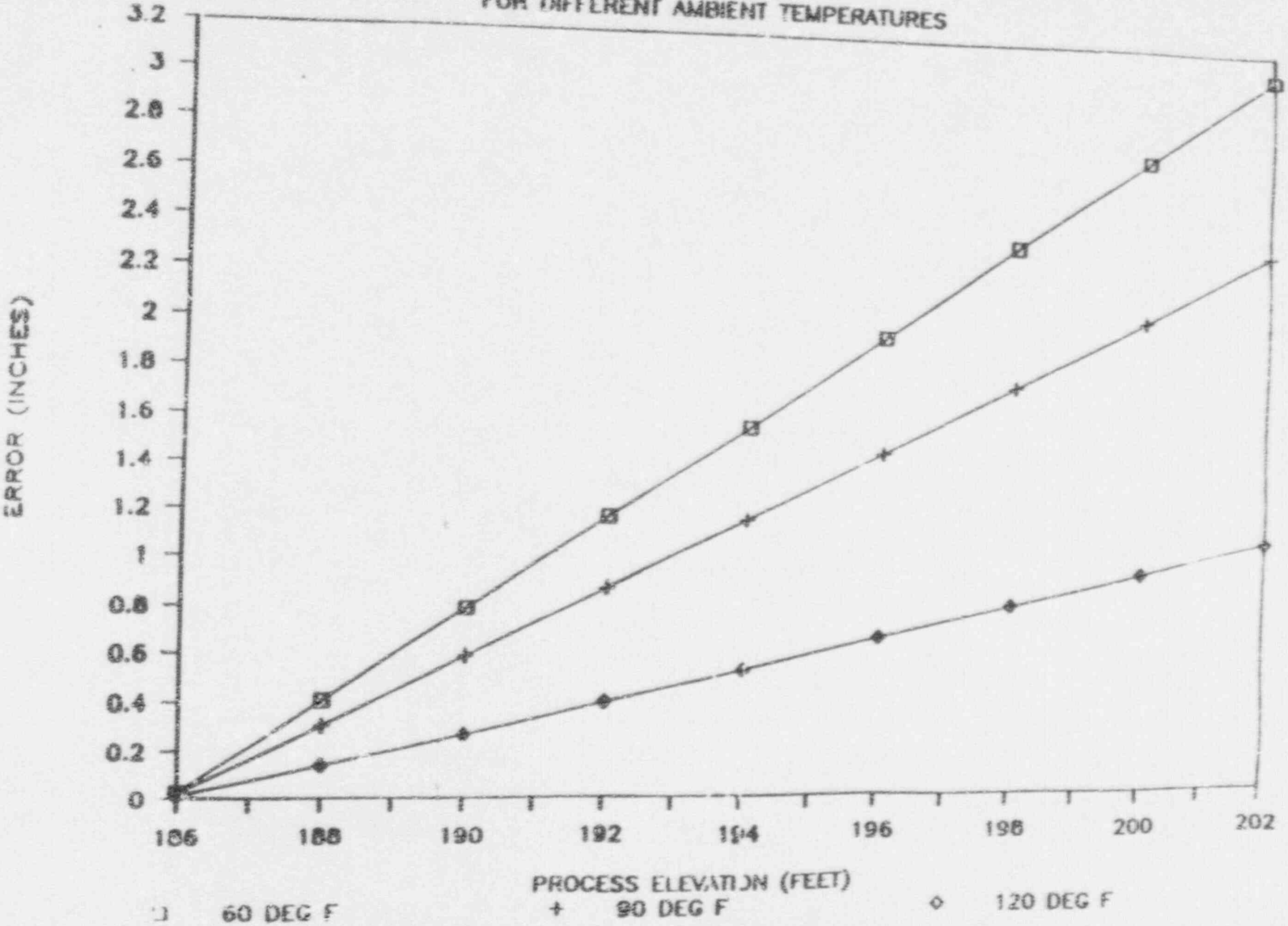
When venting through the three safety relief valve openings, the pressure in the reactor could be greater than 10 psig for the steam flowrate to equal the amount of vaporization generated by the decay heat. When venting through the pressurizer manway, the pressure in the reactor could be approximately 4 psig. When a condition exists where there is a large cold side opening, a vessel pressure of 4 psig is great enough to force inventory out of the cold side opening and uncover the core. For Plant Vogtle, this finding does not concur with the finding of the WCAP discussed in section 3.4.2, "Summary of Large Vent Analysis". The WCAP analysis implies that any vent with an area of 0.5 ft^2 or larger is adequate to prevent RCS pressurization. An upper plenum pressure of 4 psig along with a large cold leg opening and a hot leg vent path located in the PZR could cause the water level to go below the upper core plate. This result indicates that only a SG manway vent is adequate when a large cold leg opening exists. It is recommended that procedures 12000-C, 12006-C, and 12007-C be reviewed and revised as necessary to reflect these results. Any of the vents presently specified in the GPC procedures are adequate to prevent pressurization that would exceed the working pressure of SG nozzle dams. Also, these vents are adequate to ensure that gravity flow from the RWST can be accomplished.

If vortexing occurs and RHR is lost, the level transmitters and sight glasses will still be usable but will begin to lose accuracy. This loss of accuracy is due to density changes within the RCS and will become more pronounced as the water temperature in the RCS continues to rise. The cold legs will differ from the level in the hot legs due to heating in the core; therefore, the level transmitters should be used in lieu of the sight glasses. If RCS level drops below the reactor vessel hot and cold leg nozzles, the transmitters and the sight glasses will not offer any information on the level of water above the core. The operable incore thermocouples will provide temperature information which will indicate localized steam voids. The temperature information cannot be easily corroborated or cross checked by the operator and, therefore, will probably be of little use. During recovery operations, water injected into the RCS may cause false level readings on the indicators and the sight glasses, but once the RCS has stabilized from the injection operations, the level indicators and sight glasses may be used to determine RCS level within their normal accuracies.

While operating with the RCS level below 17% pressurizer level, level transmitters 11310 and 11320 should be used to monitor RCS water level. The narrow range hot leg transmitter will provide the most accurate reading while in midloop. Periodic channel checks between the two transmitters should be done to insure readings are accurate. The transmitters should be considered out of service when the readings differ by more than 7%. The midloop sightglass, LG-10401, should be relied on only if transmitters are out of service because there could be actual level differences between the sightglass and the transmitters.

LG ERROR VS. PROCESS ELEVATION

FOR DIFFERENT AMBIENT TEMPERATURES



3.0 CONTAINMENT ENVIRONMENTAL CONDITIONS

3.1 GENERAL DESCRIPTION OF REVIEWS AND ANALYSIS

Calculations were performed which determined the temperature in containment after a given time, the cooling required for containment to keep the temperature below 160°F prior to the time a core uncovery could result, and the MPC in containm t after a given time. The environmental conditions in containment were [illegible]ted using data calculated in Sections 1 and 2 of this report. Information was obtained from plant procedures and plant personnel concerning the requirements for containment closure and physiological limitations for working a harsh environment.

3.2 PLANT-SPECIFIC CALCULATIONS

This section develops Plant Vogtle-specific data for environmental and radiological conditions in containment. The methods used and the results achieved were not developed for comparison with information in WCAP 11916. These calculations were developed to provide a better understanding of conditions that will exist in Plant Vogtle's containment and to aid in determining what changes need to be made to procedures to lessen the consequences of a mid-loop accident.

3.2.1 MID-LOOP CONTAINMENT RADIATION LEVEL

The objective of this calculation is to determine the maximum exposure time in containment before a respirator is required. Assumptions used in this calculation are listed below.

1. The assumptions from Sections 1.2.1 and 1.2.2 apply.
2. The atmosphere in the containment volume above the operation floor is considered to be perfectly mixed at all times.
3. The containment volume used for this calculation is assumed to consist of the clear space above the top of the steam generators plus 80 percent of the gross containment volume between the 220-ft grade and the top of the SG.
4. The air which is expelled from the containment is assumed to contain no radioactivity. This is a conservative assumption and it should be noted that should these conditions exist, there will be a release at ground level directly to the environment.
5. The initial activity at reactor shutdown is considered to be the dose equivalent iodine (DEI) limit specified in Technical Specification 3.4.8. The potential for the occurrence of an iodine spike immediately prior to shutdown is not included because the cleanup systems will rapidly reduce any such spike to within the DEI limit value.
6. Only I-131 is considered in the calculation.
7. The plateout of the iodine on the surfaces of the containment is conservatively ignored.
8. No containment coolers are operational.
9. The containment equipment hatch is open.

The initial conditions are

Steam boiling rate	= 16.72 lbm/sec
MPC of I-131	= 9.00E-09 uCi/cc
Activity limit	= 1.00 uCi/g
I-131 half life	= 8.07 days
Decay time	= 2 days (48 hours after shutdown)
Partition factor	= 0.01
Containment free volume	= 2.26E06 ft^3

The rate of insertion of radioactivity into the containment air is assumed to be equal to the mass transfer rate of the steam multiplied by the partition factor to reflect the tendency of iodine to remain in the water phase.

The steam boiling rate is

(16.72 lbm/s)(453.59 g/lbm) = 7.585E03 g/sec.

The radiation decay factor is

EXP [-0.693(decay time)/(half life)]

EXP [-0.693(2 days)/(8.07 days) = 0.842.

From these, the activity insertion rate can be determined. Multiply the steam boiling rate by the activity limit, the partition factor, and the radiation decay factor.

(7.585E03 g/s)(1.00 uCi/g)(0.01)(0.842) = 63.9 uCi/s

By choosing a time after boiling begins, the activity released during that time can be calculated. If the time is 27 minutes, then

(27 min.)(60 s/min)(63.9 uCi/s) = 1.04E05 uCi

and,

(1.04E05 uCi)/(2.26E06 ft^3)(30.48 $cc/ft^3)^3$ = 1.62E-06 uCi/cc

is the concentration in containment. Dividing this by 2 gives an average activity of 8.09E-07 uCi/cc for this time period. Since this time period is less than the 40 hours used to calculate the MPC, an adjusted MPC can be calculated for the 27-min time period.

[(9.00E-09 uCi/cc)(40 hrs)]/[(27 min)/(60 min/hr) = 8.00E-07 uCi/cc.

The average activity is then compared to the adjusted MPC to determine if the time chosen allowed for an exposure to the MPC. In this instance, the ratio of average activity to adjusted MPC is 1.011, which indicates the time chosen, 27 min, is the length of time required to receive a radioactivity dose equal to the maximum allowable for the isotope chosen.

3.2.2 CONTAINMENT TEMPERATURE ASSESSMENT

In the event that RHR is lost during midloop conditions and cannot be restored, containment isolation will be initiated. If a large RCS vent path exists, a steam environment will be created inside the containment once boiling initiates within the reactor vessel. To assess the effect of the increased temperature on the containment closure activities, calculations were performed to determine the temperatures that could result. The calculations were divided into separate cases to determine: (1) the time required for the containment atmosphere temperature to reach 160°F after core boiling initiates with no containment coolers operating, and (2) the temperature at 60 minutes after coil boiling initiates for various numbers of containment coolers operating.

The following general assumptions were made for both of the above cases:

1. The contribution to the containment energy of piping motors, lights, and other equipment is assumed to be negligible.

2. The heat sink represented by the massive concrete and steel structures inside the containment is ignored in the calculation. This is a significant conservatism which is partially offset by assumption 1 above.

3. The entire amount of reactor decay heat is assumed to be consumed in the conversion of reactor water at 212°F to steam at that same temperature.

4. The reactor energy is assumed to be the decay heat rate at 48 hours after shutdown from maximum reactor power.

5. The reduction in reactor water volume represented by the removal of the steam through the pressurizer is considered negligible. Thus, the entire mass of steam produced in the boiling process is vented into the containment air space.

6. The initial conditions inside the containment are assumed to be 120°F at 100% relative humidity.

In addition, the following assumptions apply to the first case only:

7. The atmosphere in the containment volume above the operating floor is considered to be perfectly mixed at all times so that saturation conditions exist in the containment atmosphere.

8. The containment volume used for the calculations is assumed to consist of the clear space above the top of the steam generators plus 80 percent of the gross containment volume between the 220 ft grade elevation and the top of the steam generators.

9. The pressures are considered to be constant at one atmosphere in all volumes during the event. This assumption presumes that the containment is open to atmosphere so that sufficient venting of containment air is possible to avoid any significant pressure buildup inside containment.

10. The air which is expelled from the containment is assumed to be at its initial conditions. That is, the vented steam does not mix with the air which is vented. This assumption is conservative in that it precludes the removal from the containment atmosphere of any of the energy from the boiled off steam.

11. No containment coolers are operating.

Utilizing these assumptions, a simplified mass and energy balance was established to determine the approximate time required to reach 160°F with no containment coolers operating and the containment open. The results indicate this time would be 21.5 min.

For the second case, a model was developed to determine the containment atmosphere temperatures at 60 min after coil boiling initiates, with zero, two, three, and four containment coolers operating (zero coolers means that the fans are operating but no cooling water is available). The model performs a mass balance at 5 min intervals to accommodate the steam addition from the RCS boiling. The model assumes saturated atmosphere conditions and performs an energy balance at the end of the 60 minute time span to verify the assumed conditions are reasonable. The following assumptions are utilized, in addition to assumptions (1) through (6) above:

12. The atmosphere in the entire containment volume is considered to be perfectly mixed at all times so that saturation conditions exist in the containment atmosphere. This is reasonable because at least one cooling fan is assumed to be running.

13. The condensation of the released steam is neglected in the calculation. This, in effect presumes the presence of an additional heat source of sufficient size to ensure that the vapor boiled off the reactor remains in the vapor state rather than partially condensing as it warms the containment air.

14. The containment volume used for the calculations is assumed to consist of the entire containment volume.

15. The pressures are considered to be constant at one atmosphere in all volumes during the event. This assumption presumes that the containment is open to atmosphere so that sufficient venting of containment air is possible to avoid any significant pressure buildup inside containment.

16. The air expelled from the containment is assumed to be at the energy condition existing at the end of the previous time step.

17. The containment coolers are presumed to perform at the temperature existing at the start of each time step. The energy removed by the coolers is assumed to be 100% latent heat removal. Thus, the energy removed by the coolers can be used to directly compute the cooler drain flow.

The results are tabulated below and are shown in graphical form in figure 3.1:

With at least one cooler fan running:

Number of Coolers Operating	Temperature in Containment at the following times after start					
	10	20	30	40	50	60
0	139.4	150.8	159.4	166.4	172.0	176.8
2	136.0	144.7	151.2	156.5	160.7	164.3
3	134.3	141.6	147.0	151.3	154.6	157.4
4	132.5	138.5	142.8	146.1	148.6	150.6

It can be seen from the above that a minimum of three coolers would need to be in operation to ensure that containment temperature does not exceed 160°F withi. 60 minutes.

3.3 SUMMARY OF CONCLUSIONS

The assumptions for the calculations performed in this section were conservative to allow the changes in the containment environment to evolve over time without numerous iterations. The initial conditions of 120°F and 100 percent relative humidity will take some time to develop and the heat sinks present in a massive containment structure will tend to delay the heat up rate. Also, since none of the contamination was modeled as exiting containment, the actual time until MPC limits are reached will be somewhat longer than calculated.

The calculated time for working inside containment without a respirator is 27 min after inventory boiling begins. This is without containment coolers and purge or exhaust fans operating. Personnel inside containment when boiling begins would need to exit containment within 27 min to stay within the MPC for a 40-hour week. The time for continued work inside containment after the 27 min would depend on the condition of the respirators and should be determined by Health Physics.

The calculated time for working inside containment until the temperature reaches 160°F is 21 min without containment coolers operating. At a temperature around 160°F, the air is hot enough to burn the lungs. For work to continue inside an open containment to complete closure activities, all available containment coolers should be operated. At a minimum, three coolers would need to operate to ensure that 160°F is not exceeded prior to the predicted time for core uncovering (57 minutes).

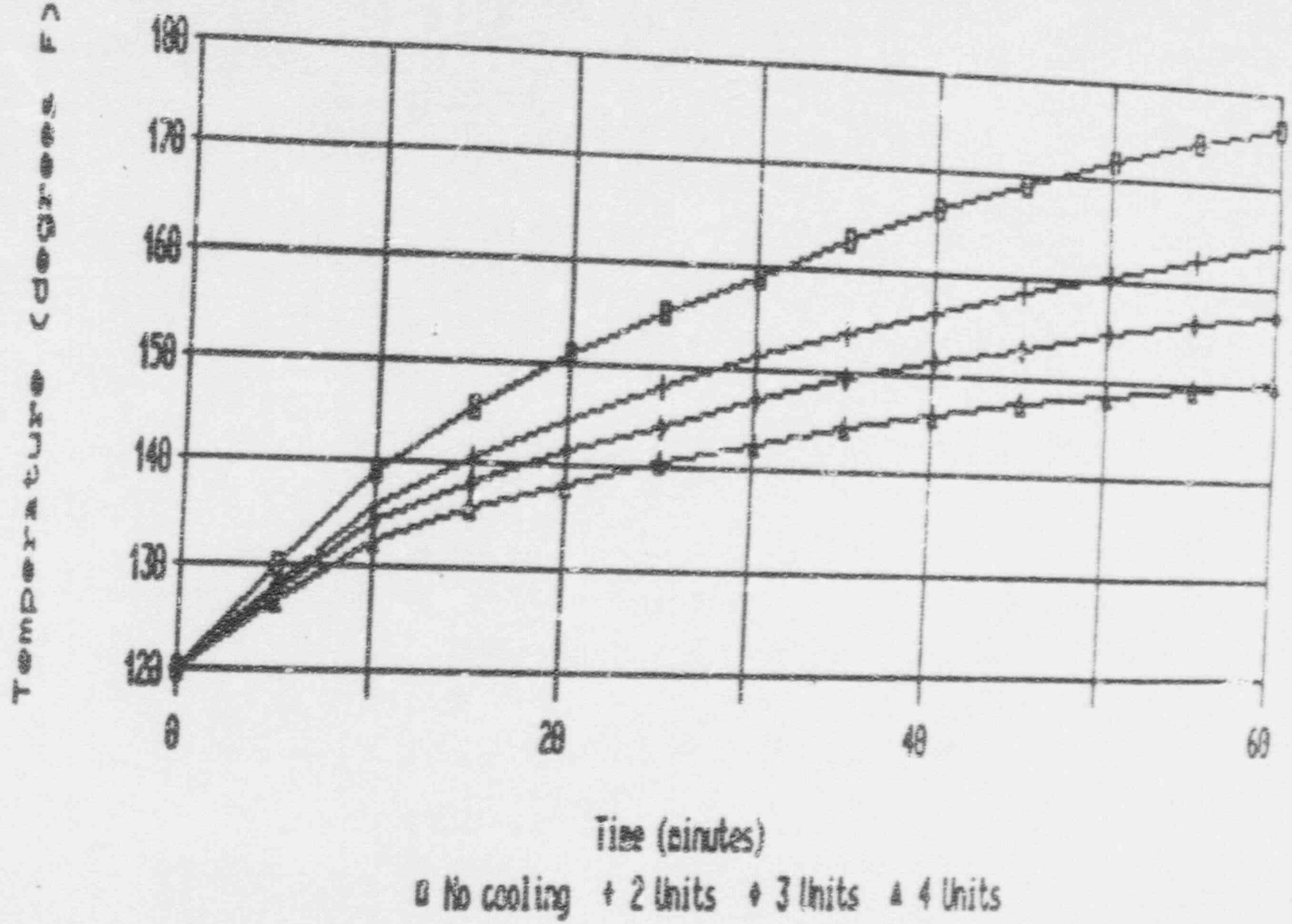


FIGURE 3.1 CONTAINMENT TEMPERATURE vs TIME with COOLERS

4.0 REVIEW OF GENERIC LETTER 88-17

4.1 GENERAL DESCRIPTION OF REVIEW

This section consists of an overall review of Vogtle design and operation in regard to the NRC mid-loop concerns addressed in GL 88-17 and the response letters. The concerns are divided into two groups, expeditious actions and programmed enhancements. Because some of these concerns have been addressed in other documents, only concerns relating to information verified in this report will be addressed. Where applicable, portions of these documents are included as attachments for reference. Documents too extensive to be included are summarized. GL 88-17 is Attachment 3.

4.2 EXPEDITIOUS ACTIONS

In Attachment 1 of GL 88-17, the NRC recommended that eight actions be implemented prior to operating in a condition where the reactor vessel water level is lower than 3 ft below the reactor vessel flange. Georgia Power Company addressed the recommendations of GL 88-17 for Plant Vogtle. The NRC's response to those recommendations is in Attachment 4. Each recommendation/response was reviewed for the possibility of adding information that came out of the WCAP 11916 verification review.

Item 2 of the NRC response addresses the time available for containment closure including those penetrations other than the equipment hatch. Item 2 of the Recommended Action attachment to GL 88-17 requires containment closure prior to the time at which a core uncovery could result from a loss of DHR, coupled with an inability to initiate alternate cooling or addition of water to the RCS inventory. Since the time allowed to close the equipment hatch would also be the time allowed to close other penetrations, the results from Section 2 of this report apply. The time to core uncovery is approximately 57 minutes. If the assumptions used in the calculation apply and the RCS is adequately vented so no upper plenum pressurization occurs, containment penetrations may need to be closed within 57 min of the loss of RHR cooling.

Item 3 of the NRC response addresses the ability to cool containment and the feasibility of continued work within containment once a steam environment exists. Topics 2 and 3 of this report address these concerns. Since, after the loss of RHR, the control room level instruments will provide a more accurate reading than the sight gauge, no operations personnel are required inside containment for monitoring after loss of RHR. If personnel are required inside an open containment to complete containment closure activities, all available containment coolers should be operated to minimize the temperature increase. Provided that mid loop operations start no earlier than 48 hours after reactor shutdown, three coolers at a minimum must operate to ensure that containment temperatures remain below 160°F for 57 minutes after loss of RHR. Maximum permissible dose levels may be reached as early as 27 minutes after core boiling begins for those personnel inside containment without a respirator. To continue containment activities, persons not exposed in the initial 27 minutes could enter containment with a respirator.

Items 3, 4, and 5 on page 2 of the NRC response address lesson plan descriptions. The results of this report support WCAP 11916 findings for Plant Vogtle. Also described in this report are more adequate ways to use the instruments available during a loss of RHR and a computer program that would simulate different scenarios for a Plant Vogtle loss of RHR. This information should aid in developing a more complete understanding of RCS behavior during a loss of RHR accident.

Item 6 on page 2 of the NRC response addresses the effectiveness of openings in the RCS used for venting. Section 2 of this report details specific calculations performed to verify that vents described in Procedure 12006-C, part D4.2.15 (3) are adequate for reliving the steam produced in the RCS. The calculation does not support the use of the safety relief valve piping or the pressurizer manway as hot leg vents if a cold leg opening is present. Pressure buildup in the upper plenum could occur if the pressurizer is used as a vent path. It is recommended that only the SG manway be used for a hot leg vent path if a cold leg opening is present.

4.3 PROGRAMMED ENHANCEMENTS

In Attachment 1 of GL 88-17, the NRC recommends that six programmed enhancements be developed to replace, supplement, or add to the expeditious actions. A preliminary copy of Georgia Power Company's (GPC) plans for addressing these recommendations of GL 88-17 are in Attachment 5. As in the expeditious actions, a discussion of the recommendations/items follows.

Item 1 addresses reliable indication of parameters that describe the state of the RCS and the performance of systems normally used to cool the RCS for both normal and accident conditions. The GPC response discusses an engineering study and a design change development which will satisfy this enhancement. Both of these topics have been completed. The engineering study, REA VG-9010, was completed in June of 1989. Findings from this study were formulated into a Design Change Request and subsequent Design Change Packages 89-V1N051 and 89-V2N052. Implementation of the DCPs is scheduled for the 1R2 and 2R2 refueling outages.

Item 2 addresses the development and implementation of procedures that cover reduced inventory operations. The data incorporated into the GPC procedures from WCAP 11916 will reflect the Vogtle RCS behavior. Examples of this are the graphs from Abnormal Operating Procedure 18019-C which are verified in Section 1 and the adequacy of RCS vents described in Procedure 12006-C and discussed in Section 2 of this report.

Item 4 addresses an analysis to supplement existing information and develop a basis for procedures, instrumentation installation and response, and equipment/NSSS interactions and responses. As stated in Enclosure 2, section 3.4 of GL 88-17, WCAP 11916 is an excellent start toward meeting the analysis recommendation. GPC analysis for this item was conducted in REA VG-9011. This report is the product of the analysis and verifies the use of WCAP-11916 at Plant Vogtle. Additionally, a plant-specific calculation was performed to support inventory addition via gravity flow from the refueling water storage tank. The results are reported in Section 2.2.2. Also discussed in item 4 was the special preoperational test (ST-38) performed on Unit 2 which varied RCS level and RHR system flow to determine susceptibility to vortexing. This test is discussed further in the next section.

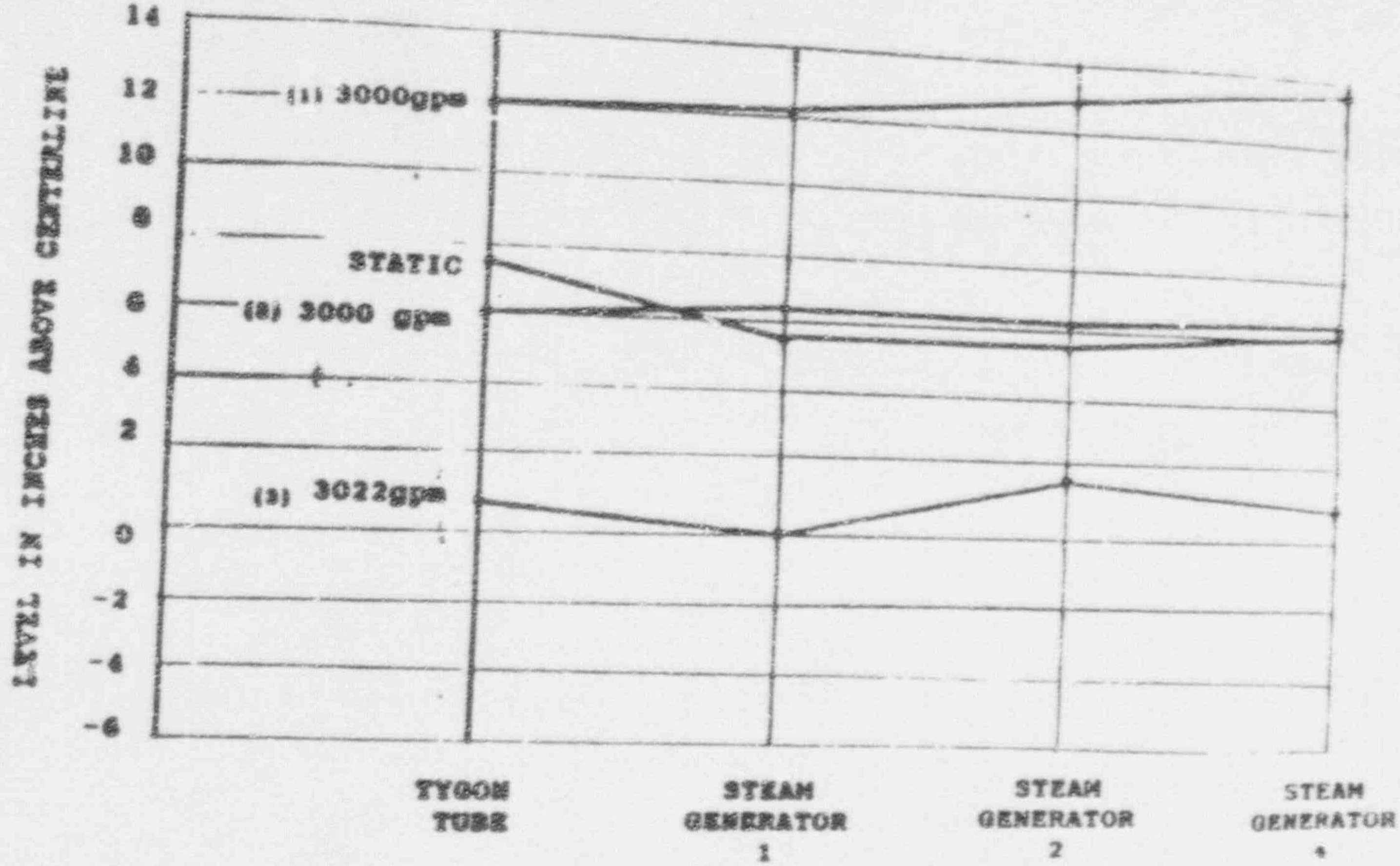
4.4 WCAP-11916 SECTION 2 REVIEW

Westinghouse built a model using dimensional analysis for parameters that are significant in vortex formation. Data recorded during the test for a Vogtle type plant were converted into hot-leg water level as a function of RHR intake flowrate. A graph of these data is shown in Figure 2-14, on page 2-35 of the WCAP. This graph shows that an RHR flow of 3000 gal/min needed a water level of approximately 1 3/4 in. above centerline of the pipe. Westinghouse test data also show that differences in water levels existed between active cold legs, inactive cold legs, active hot legs, and inactive hot legs. The magnitude of level difference was significant—approximately 1 to 2 in.

During startup testing on Unit 2, an RHR flow test, Special Test 38, was conducted to determine the maximum RHR flow that could be achieved at different RCS water levels. Because of the similarities between this test and the test conducted by Westinghouse, the ST-38 procedure and results were reviewed for comparison with the WCAP results.

Using information from the test supervisor, the ST-38 test log, and the WCAP, assumptions about the test procedure such as the RHR valve line-up, the adequacy of time between each test phase for the water level to stabilize, and the placement of the tygon tube connection were verified. With the data from results of ST-38, graphs were constructed to show the water elevations at different points in the RCS. These graphs are in Figures 4.1 and 4.2. The static line on each graph is the water level recorded at each position prior to starting the test. Since no equipment was operating at this time, the static line should be the same elevation at each position. There is a significant level difference between these data points and also between the train A and train B data points.

Information found to explain these differences included MWO 28902165 on valve 2-1201-U4-001, MWO 28900173 on level transmitters 2LT-950A and B, and a MWO on the startup strainers for both RHR pumps. The valve is used for the tygon tube connection. The MWO reported that the valve was difficult to open because valve stem threads were stripped. This would cause the valve not to open, thereby giving a false reading on tygon tube level. The level transmitters which are used to send the water level signal to the control room were also found out of calibration. The startup strainers for both RHR pumps were not removed until after the test was complete. This information makes the test data inconclusive since it is unclear what effect(s) this information would have on the test results. Therefore, the data were not used to verify the results of the Westinghouse test reported in Section 2 of the WCAP.



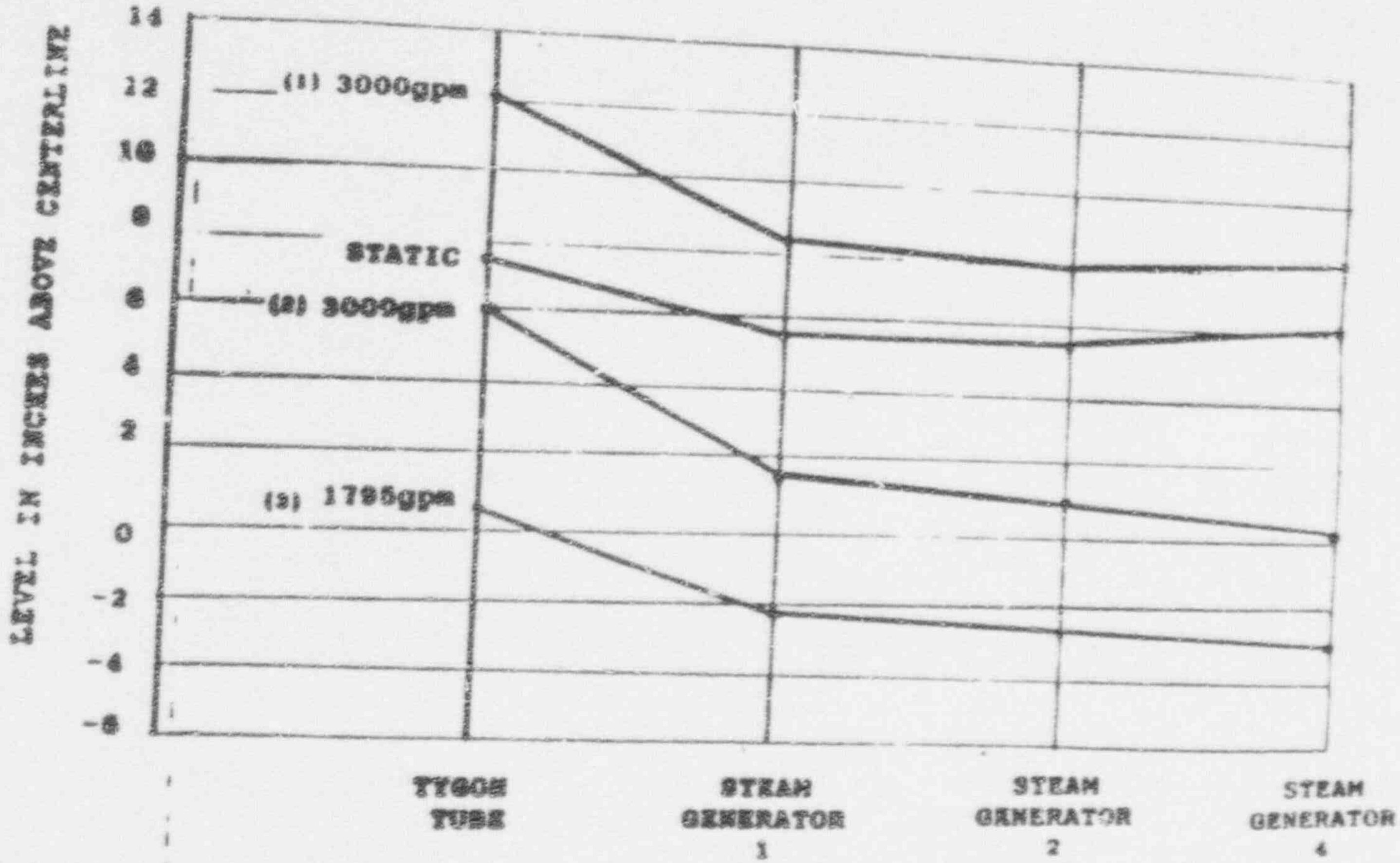
(1) RCS Performance at 188'-0"

(2) RCS Performance at 187'-0"

(3) Maximum RHR Flow at 187'-0"

HOT LEG WATER MEASUREMENTS

FIGURE 4.1 TEST DATA from SPECIAL TEST 38 TRAIN A



HOT LEG WATER MEASUREMENTS

(1) RCS Performance at 188'-6"

(2) RCS Performance at 187'-6"

(3) Maximum RHR Flow at 187'-0"

FIGURE 4.2 TEST DATA from SPECIAL TEST 38 TRAIN B

REFERENCES

1. WCAP-11916, "Loss of RHR Cooling while the RCS is Partially Filled", Rev. 0, July 1988.

2. United States Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Generic Letter 88-17, "Loss of Decay Heat Removal, October 17, 1988.

3. Calculation X4C1201S02, "Mid-Loop Operation - Loss of RHR Radiation Assessment", February, 1990.

4. Calculation X4C1201S01, "Mid-Loop Operation - Loss of RHR Temperature Assessment", February, 1990.

5. Calculation X4C1201S03, "Venting the [illegible] During Mid-Loop Loss of Cooling", February, 1990.

6. Calculation X4C1201S04, "REA VG-9011 Thermal Analysis and RCS Pressurization Rate", February, 1990.

7. Calculation X4C1201S05, "REA VG-9011 Gravity Flow Units 1 and 2", February 1990.

8. VEGP Nuclear Operations Procedure, 18019-C, "Abnormal Operating Procedure Loss of Residual Heat Removal", Rev. 6.

9. VEGP Nuclear Operations Procedure, 12000-C, "Refueling Recovery", Rev. 15.

10. VEGP Nuclear Operations Procedure, 12006-C, "Unit Cooldown to Cold Shutdown", Rev. 14.

11. VEGP Nuclear Operations Procedure, 12007-C, "Refueling Entry", Rev. 13.

12. VEGP Nuclear Operations Procedure, 13005-1, "Reactor Coolant System Draining", Rev. 9.

13. VEGP Nuclear Operations Procedure, 23985-1, "RCS Temporary Water Level System", Rev. 1.

14. VEGP Unit [illegible] Special Test Procedure ST-38, "RHRS Operating Demonstration with RCS Partially Filled", Rev. 0.

15. VEGP Drawing 1X6AB02-264, "Reactor General Assembly", Rev. 1.

16. "Response to Generic Letter 88-17", GPC letter log number ELV-00109, file number X7GJ17-V110, December, 1988.

17. U.S. NRC DOCKET Nos. 50-424, 50-425, "Comments on the Georgia Power Company response to Generic Letter 88-17 for the Vogtle Plant, Units 1 and 2 for expeditious actions for Loss of Decay Heat Removal", January 1989.

18. "Response to Generic Letter 88-17". GPC letter log number ELV-00186, file number X7GJ17-V110.

ATTACHMENTS

ATTACHMENT 1

Intracompany Memo

Southern Company Services

DATE: December 15, 1989

RE: Vogtle Electric Generating Plant
Loss of RHR

CAV-NF-260
PC-1431

FROM: R. D. Jones R. D. Jones

TO: W. C. Ramsey

This letter is in response to your October 12, 1989, letter to L. B. Long requesting that PWR Core Analysis confirm that the current and expected Vogtle burnup and power levels are bounding relative to those assumed in WCAP-11916. Further discussions with David Dotson of your SCS Vogtle Support Group were necessary in order to make an appropriate response.

In comparing the expected Plant Vogtle operation to the analyses performed in WCAP-11916, there are two factors which need to be considered. WCAP-11916 assumes a generic four-loop 17x17 fuel plant with a thermal power of 3,700 MW and a core average burnup of 30,000 MWD/MTU. Even if Plant Vogtle is uprated, the power level will be a maximum of 3,565 MW. The decay heat generation rate increases essentially linearly with power level. Considering the planned fuel management strategy, the core average burnup at Plant Vogtle could approach 40,000 MWD/MTU. Increases in burnup above the 30,000 level increase the decay heat rate only slightly. For Plant Vogtle, the decrease in decay heat rate due to a lower power level is significantly larger than the small increase due to increased burnup. Thus, there is reasonable margin between the WCAP-11916 results and any expected mode of operation at Plant Vogtle.

The decay heat source model used in WCAP-11916 and shown in Figure 3.2.4-1 of that report is based on Westinghouse methodology and is not available to us. In our evaluation, we utilized the NRC Branch Technical Position ASB 9-2 Rev. 2, July 1981 decay heat source model. We have shown that the two models give very close results; however, neither bounds the other at all times after reactor shutdown. The differences between the two models is small compared to the margin between the assumptions in WCAP-11916 and Plant Vogtle conditions.

Attached Figure 1 shows a comparison between the WCAP-11916 and the BTP ASB 9-2 decay heat models. Figure 2 gives a comparison between the WCAP-11916 decay heat model and three possible Plant Vogtle modes of operation: (1) Current power level with 30,000 MWD/MTU burnup, (2) Current power level with 40,000 MWD/MTU burnup, and (3) Uprated power level with 40,000 MWD/MTU burnup.

Based on the results of our evaluation, we conclude that the decay heat generated by both units of Plant Vogtle will always be bounded by the results of WCAP-11916.

If you have any questions, please contact me at extension 5079.

Approved by:

Warren M Andrews

Warren M. Andrews
Manager, PWR Core Analysis

RDJ/gps

Attachments

cc: L. B. Long
B. E. Hunt
W. M. Andrews (w/att)
B. C. Armstrong (w/att)
D. R. Dotson (w/att)
C. R. Myer
R. E. Patrick

000798

FIGURE 1

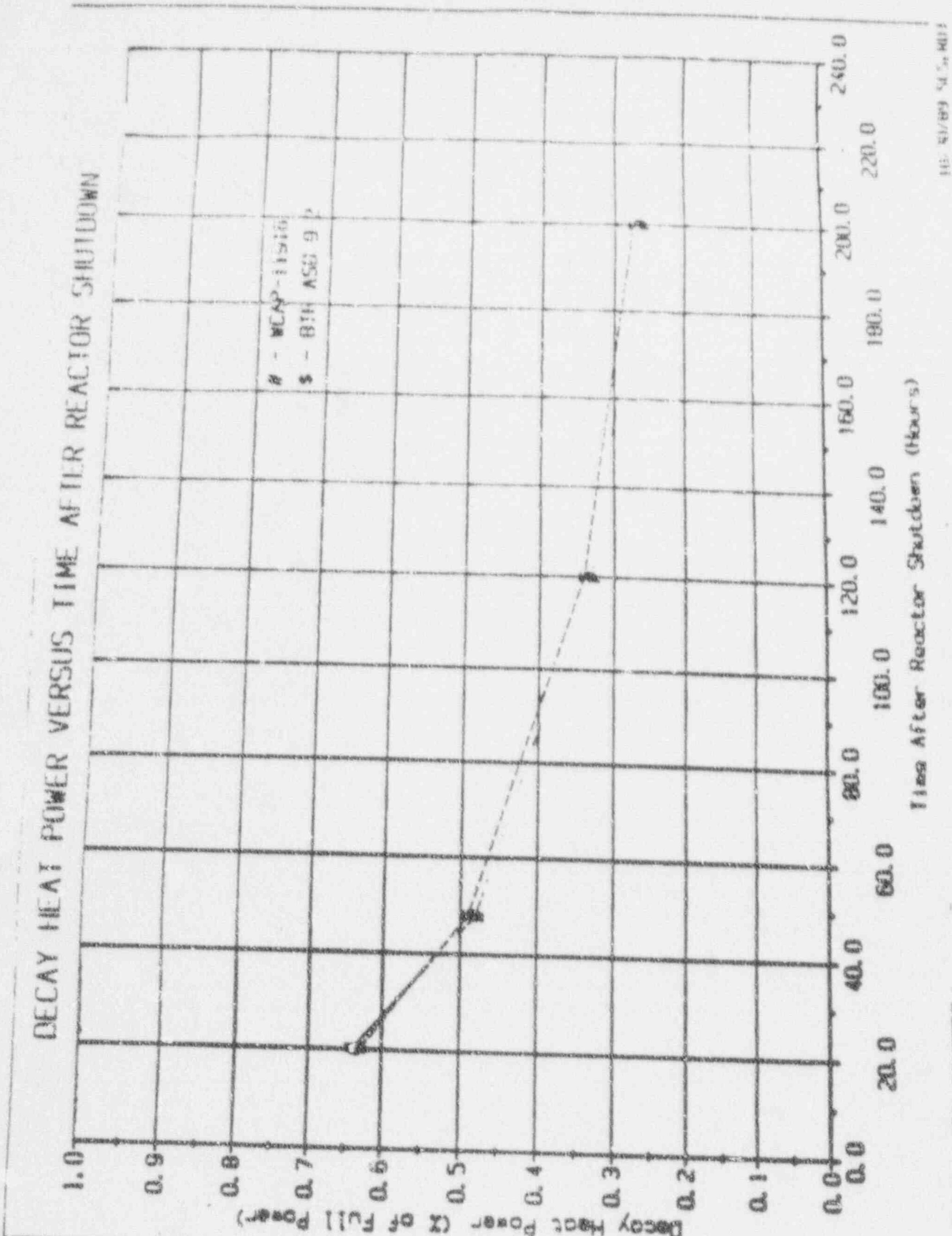
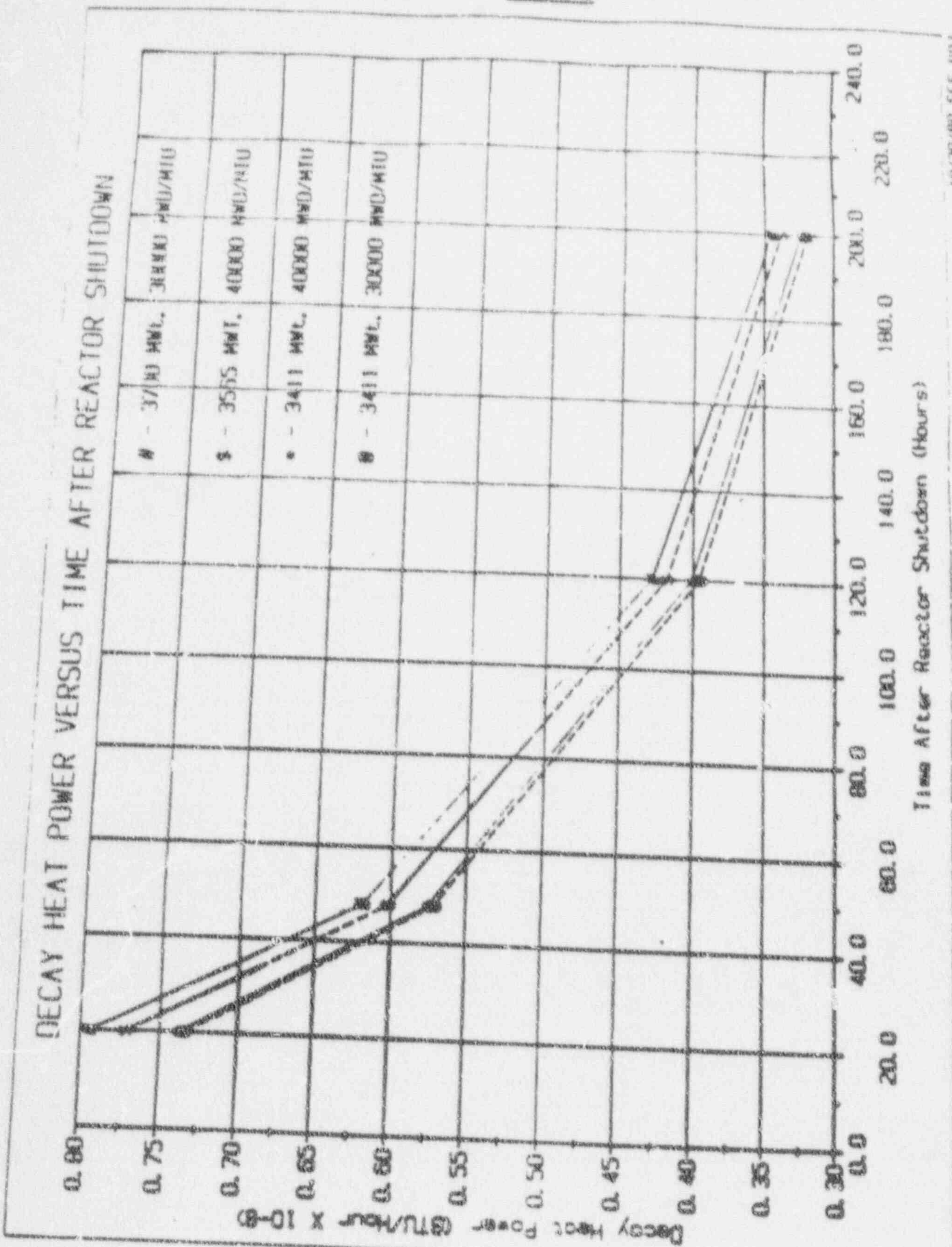

DECAY HEAT POWER VERSUS TIME AFTER REACTOR SHUTDOWN
Decay Heat Power (% of Full Power)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Time After Reactor Shutdown (Hours)
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
200.0
220.0
240.0

FIGURE 2


DECAY HEAT POWER VERSUS TIME AFTER REACTOR SHUTDOWN
$ - 3565 MWt, 40000 MWD/MTU
* - 3411 MWt, 40000 MWD/MTU
@ - 3411 MWt, 30000 MWD/MTU
Decay Heat Power (BTU/Hour X 10-8)
Time After Reactor Shutdown (Hours)

MAAP AS A POSSIBLE TOOL
FOR
MID-LOOP OPERATION ANALYSIS

Purpose

The purpose of this paper is to provide information for evaluating the capabilities of the Modular Accident Analysis Program (MAAP) for analyzing the PWR mid-loop operation condition.

History of MAAP

The MAAP code was originally developed by the Industry Degraded Core Rulemaking program (IDCOR) and is now maintained by EPRI. Given an accident or a transient, MAAP simulates the plant response specifically accounting for system responses including operator interventions. The simulation continues either until a permanently coolable state is achieved or until the containment has failed and depressurized. Models are included for all the important phenomena that might occur during accident sequences leading to degraded core conditions. The code is highly modularized so that it can incorporate alternate physical models and can be adapted to different plant configurations such as power operation or shutdown conditions.

The MAAP code was obtained in 1987 when it was made available to utilities participating in the IDCOR program. Subsequently, SONOPCO Project (Technical Services) converted the MAAP code to run on a 386 personal computer. Technical Services personnel have received formal training on the use of MAAP and actively participates in an EPRI sponsored MAAP Users Group.

Structure of MAAP

Two sets of inputs are required by MAAP. One set of approximately one thousand inputs is the parameter file which in general specifies the following:

- Plant geometry (primary, secondary, containment, auxiliary building).
- Operating conditions (pressures, temperatures, water levels).
- System performance (including design specifications).
- Modeling parameters (shape factors, emissivities, particle sizes).
- MAAP execution control (time steps, print file identification).

The second set of inputs is the control card file (input deck) which includes the following.

- Accident sequence to be analyzed.
- Temporary changes to parameters.
- Manual operation or specific automatic controls.

The intervention conditions which MAAP uses to determine the timing of manual operations or automatic controls include various events or parameters such as the opening of safety valves, actuation of systems, pressures, temperatures, and levels. With the satisfaction of such predetermined conditions, MAAP may be instructed to take actions such as actuating specified components or systems.

For its output, MAAP prints a log of control inputs (directions from the input deck), a chronology of accident initiating events and imposed operator interventions, plus any MAAP system messages. Additionally, a tabular output file consisting of selected variables in all system compartments is written at the user-specified time interval. When the run terminates, a scenario summary of significant events is printed in the output.

Printed output of adequate detail can become excessive during a lengthy accident sequence, hence emphasis is placed on graphical output. Graphical output allows one to quickly interpret results, analyze trends, and capture fine detail missed by printed output. Technical Services uses the GRAPHER plotting software package to graphically display MAAP output data.

Benchmarking and Acceptance of MAAP

At present the primary application of MAAP is for use in addressing the severe accident issue as a part of the Individual Plant Examination (IPE). For the IPE work, MAAP will be used to determine success criteria (both core damage and containment performance) and to calculate source-term releases. It appears that most utilities plan to use MAAP for their IPE work if plant specific analysis is required. Although the NRC has not formally approved MAAP, it has not objected to the use of MAAP in the IPE effort.

Various benchmarking projects to validate the MAAP thermal-hydraulic models against actual plant data have been completed. Examples of favorable MAAP benchmarking include the modeling of the TMI accident and the Davis-Besse loss of feedwater transient. In addition, favorable benchmarking has been performed against RELAP (Seabrook by EG&G and Browns Ferry by TVA) and against MARCH 3 (PWR and BWR by the Nordic Nuclear Safety Program).

Mid-Loop Application of MAAP

After the publication of Generic Letter 88-17, "Loss of Decay Heat Removal," an interest was expressed by some utilities concerning modifications to MAAP that will allow the mid-loop accident to be modeled. Pacific Gas and Electric was the first utility to express an interest. However, General Public Utilities (GPU) on its own accord funded these modifications to MAAP. These modifications will allow MAAP to analyze the mid-loop accident to fuel uncovery. The MAAP Users Group has now authorized funding to modify MAAP to enable the analysis to continue past fuel uncovery. Although GPU has used the modified code for analyzing mid-loop accidents, these capabilities are not scheduled to be incorporated into the archived version of MAAP until June 1990.

The major features of MAAP that will allow modeling of mid-loop accidents include:

- Arbitrary initial conditions in the primary system.
    - o Initial water level or initial water mass.
    - o Air in the primary system.
    - o Input for a time since scram to calculate decay heat or core power as a function of time.
- Any initial conditions in the steam generator.
    - o Arbitrary water level.
    - o Air in the steam generator.
- User input for RHR inflow and outflow.
- Use of RHR heat exchanger.

MAAP will allow the user to determine the following:

- The primary system pressurization curve.
- Confirmation that various available injection paths and injection flows can control the accident.
- Estimation of the times available for action.
- Prediction of the system response that an operator would see.

Effort Involved in Using MAAP for Mid-Loop Analysis

Although a plant specific parameter file does not exist for Plant Vogtle at this time, it is anticipated that one will be created for the Vogtle IPE by the middle of 1991 with an effort of approximately 6 man-months. Many of these plant parameters will be obtained from design drawings and the FSAR.

A number of postulated loss of decay heat removal scenarios during shutdown, such as the following three scenarios for Seabrook that were analyzed manually can be evaluated by MAAP:

- The reactor is vented and remains at atmospheric pressure and t. steam generators are dry, and the RHR cooling is lost.

- The reactor coolant system is not vented, the steam generators are dry, the vessel is filled with water, and the RHR cooling is lost.

- Conditions are the same as the previous scenario, except that the water is initially in the secondary side of some steam generators.

These scenarios could be expanded based on parameters such as the number of hours from scram and the initial water level in the vessel.

In the case of Vogtle, if the particular accident sequences are defined, Technical Services can create input decks to model these sequences. Depending upon the complexity of the sequence, an input deck could take approximately 4 hours to create. Although the Technical Services has run MAAP on the main frame computer, using the PC version of MAAP eliminates that expense. It is estimated that running a mid-loop scenario on the PC-based MAAP will require between 1 to 2 hours of computer time. As stated previously, the most effective analysis can be achieved by observing the plotted results of MAAP calculated parameters.

Conclusion

This discussion of MAAP as a possible tool for mid-loop operation analysis is based primarily on two presentations by other utilities at MAAP User Group meetings. MAAP with the modifications scheduled for mid-1990 appears to have sufficient capabilities to be considered as a useful tool for mid-loop operation analysis.

ATTACHMENT 3

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

October 17, 1988

TO ALL HOLDERS OF OPERATING LICENSES OR CONSTRUCTION PERMITS FOR PRESSURIZED WATER REACTORS (PWRs)

SUBJECT: LOSS OF DECAY HEAT REMOVAL (GENERIC LETTER NO. 88-17) 10 CFR 50.54(f)

Loss of decay heat removal (DHR) during nonpower operation and the consequences of such a loss have been of increasing concern for years. Numerous industry and NRC publications have addressed the subject. The Diablo Canyon event of April 10, 1987, and ensuing work by both the staff and industry organizations have provided additional insight. Yet the problems continue, as illustrated by (1) the inadequacies demonstrated by many licensees in their response to Generic Letter (GL) 87-12; (2) the event at Waterford on May 12, 1988; (3) the event at Sequoyah on May 23, 1988; (4) the DHR perturbations due to inadequate level at San Onofre on July 7, 1988; and (5) the apparent lack of a complete industry understanding of the potential seriousness of such events.

The report of the Diablo Canyon event, NUREG-1269, stated that operating a plant with a reduced reactor coolant system (RCS) inventory was a particularly sensitive condition and identified many generic weaknesses in DHR. GL 87-12, which requested information from all PWR licensees, provided additional insight, and NUREG-1269 was transmitted with the generic letter to ensure that licensees had the latest information. Despite this, many of the responders to GL 87-12 demonstrated that they did not understand the identified problems.

Deficiencies exist in procedures, hardware, and training in the areas of (1) prevention of accident initiation, (2) mitigation of accidents before they potentially progress to core damage, and (3) control of radioactive material if a core damage accident should occur. Although deficiencies exist in all PWRs, certain design features make initiation and the time available for mitigation in the Westinghouse and Combustion Engineering designs of more concern than in the nuclear steam supply systems (NSSSs) designed by Babcock and Wilcox. Nevertheless, we believe expeditious actions are necessary at all PWRs to rectify these deficiencies. These should be paralleled by programmed enhancements which supplement, add to, or replace the expeditious actions to accomplish a more comprehensive improvement. Recommendations covering these items are summarized in the attachment, and additional information and guidance are provided in the three enclosures.

8810180350

Pursuant to 10 CFR 50.54(f), we request your response regarding your plans with respect to each of the recommendations as related to operation following placement of the NSSS on shutdown cooling, or following the attainment of NSSS conditions under which shutdown cooling would normally be initiated. Your response is to include the following:

1) A description of the actions you have taken to implement each of the eight recommended expeditious actions identified in the attachment. Your reply shall be submitted to us within 60 days of receipt of this letter.

2) A description of enhancements, specific plans, and a schedule for implementation for each of the six programmed enhancement recommendations identified in the attachment. Your reply shall be provided to us within 90 days of receipt of this letter.

Individual deviations from the recommendations will be considered on a case by case basis provided compensatory measures are provided which will achieve a comparable level of protection.

No further responses are required to GL 87-12 and licensees or construction permit holders need not provide supplemental information in a response to GL 87-12 to which they previously responded.

We will accept documents such as technical reports, action plans, and schedules prepared by industry groups when accompanied by commitments from participating licensees in lieu of individual documents from those licensees. Alternatively, such industry group documents may be incorporated by reference in licensee documentation. We encourage your participation in cooperative efforts to effectively resolve these issues.

Your written response shall be submitted under oath or affirmation under the provisions of Section 182a, Atomic Energy Act of 1954, as amended. Your written response is needed to determine whether actions to modify, suspend, or revoke your license are necessary. An analysis as required by 10 CFR 50.109 has been performed regarding this request.

The original copy of your written response shall be transmitted to the U. S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555 for reproduction and distribution.

This request is covered by Office of Management and Budget Clearance Number 3150-0011 which expires December 31, 1989. The estimated average burden hours is 200 person-hours per licensee response, including assessment of the new requirements, searching data sources, gathering and analyzing the data, and preparing the required reports. Comments on the accuracy of this estimate and suggestions to reduce the burden may be directed to the Office of Management and Budget, Room 3208, New Executive Office Building, Washington, D.C. 20503, and to the U. S. Nuclear Regulatory Commission, Records and Reports Management Branch, Office of Administration and Resources Management, Washington, D.C. 20555.

If you have technical questions regarding this matter please contact Wayne Hodges at 301-492-0895. Other questions may be directed to the NRR Project Manager assigned to this issue, Charles M. Trammell (301-492-3121) or to the Project Manager assigned to your plant.

Dennis M. Crutchfield
Dennis M. Crutchfield
Acting Associate Director for Projects
Office of Nuclear Reactor Regulation

Attachment:
Recommended Actions

Enclosures:
1. Overview and Background Information Pertinent to Generic Letter 88-17
2. Guidance for Meeting Generic Letter 88-17
3. Abbreviations and Definitions

LIST OF RECENTLY ISSUED GENERIC LETTERS

Generic Letter No.	Subject	Date of Issuance	Issued To
88-16	REMOVAL OF CYCLE-SPECIFIC PARAMETER LIMITS FROM TECHNICAL SPECIFICATIONS	10/04/88	ALL POWER REACTOR LICENSEES AND APPLICANTS
88-15	ELECTRIC POWER SYSTEMS - INADEQUATE CONTROL OVER DESIGN PROCESSES	09/12/88	ALL POWER REACTOR LICENSEES AND APPLICANTS
88-14	INSTRUMENT AIR SUPPLY SYSTEM PROBLEMS AFFECTING SAFETY-RELATED EQUIPMENT	08/08/88	ALL HOLDERS OF OPERATING LICENSES OR CONSTRUCTION PERMITS FOR NUCLEAR POWER REACTORS
88-13	OPERATOR LICENSING EXAMINATIONS	08/08/88	ALL POWER REACTOR LICENSEES AND APPLICANTS FOR AN OPERATING LICENSE
88-12	REMOVAL OF FIRE PROTECTION REQUIREMENTS FROM TECHNICAL SPECIFICATIONS	08/02/88	ALL POWER REACTOR LICENSEES AND APPLICANTS
88-11	NRC POSITION ON RADIATION EMBRITTLEMENT OF REACTOR VESSEL MATERIALS AND ITS IMPACT ON PLANT OPERATIONS	07/12/88	ALL LICENSEES OF OPERATING REACTORS AND HOLDERS OF CONSTRUCTION PERMIT
88-10	PURCHASE OF GSA APPROVED SECURITY CONTAINERS	07/01/88	ALL POWER REACTOR LICENSEES AND HOLDERS OF PART 95 APPROVALS
88-09	PILOT TESTING OF FUNDAMENTALS EXAMINATION	05/17/88	ALL LICENSEES OF AL BOILING WATER REAC AND APPLICANTS FOR BOILING WATER REACT OPERATOR'S LICENSE UNDER 10 CFR PART 5
88-08	MAIL SENT OR DELIVERED TO THE OFFICE OF NUCLEAR REACTOR REGULATION	05/03/88	ALL LICENSEES FOR AND NON-POWER REAC AND HOLDERS OF CONSTRUCTION PERMI FOR NUCLEAR POWER REACTORS

ATTACHMENT TO GENERIC LETTER

RECOMMENDED ACTIONS

Expeditious actions and programmed enhancements are recommended concerning operation of the NSSS during shutdown cooling or during conditions where such cooling would normally be provided. The recommendations apply whenever there is irradiated fuel in the reactor vessel (RV). These recommendations are summarized below and discussed further in enclosure 2:

Expeditious actions:

The following expeditious actions should be implemented prior to operating in a reduced inventory condition*:

(1) Discuss the Diablo Canyon event, related events, lessons learned, and implications with appropriate plant personnel. Provide training shortly before entering a reduced inventory condition.

(2) Implement procedures and administration controls that reasonably assure that containment closure** will be achieved prior to the time at which a core uncovery could result from a loss of DHR coupled with an inability to initiate alternate cooling or addition of water to the RCS inventory. Containment closure procedures should include consideration of potential steam and radioactive material release from the RCS should closure activities extend into the time boiling takes place within the RCS. These procedures and administrative controls should be active and in use:

(a) prior to entering a reduced RCS inventory condition for NSSSs supplied by Combustion Engineering or Westinghouse, and

(b) prior to entering an RCS condition wherein the water level is lower than four inches below the top of the flow area of the hot legs at the junction of the hot legs to the RV for NSSSs supplied by Babcock and Wilcox,

and should apply whenever operating in these conditions. If such procedures and administrative controls are not operational, then either do not enter the applicable condition or maintain a closed containment.

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* A reduced inventory condition exists whenever RV water level is lower than three feet below the RV flange.

** Containment closure is defined as a containment condition where at least one integral barrier to the release of radioactive material is provided. Further discussion and qualification which the integral barrier must meet are provided in enclosure 2 and in the definitions provided in enclosure 3.

(3) Provide at least two independent, continuous temperature indications that are representative of the core exit conditions whenever the RCS is in a mid-loop condition* and the reactor vessel head is located on top of the reactor vessel. Temperature indications should be periodically checked and recorded by an operator or automatically and continuously monitored and alarmed. Temperature monitoring should be performed either:

(a) by an operator in the control room (CR), or

(b) from a location outside of the containment building with provision for providing immediate temperature values to an operator in the CR if significant changes occur. Observations should be recorded at an interval no greater than 15 minutes during normal conditions.**

(4) Provide at least two independent, continuous RCS water level indications whenever the RCS is in a reduced inventory condition. Water level indications should be periodically checked and recorded by an operator or automatically and continuously monitored and alarmed. Water level monitoring should be capable of being performed either:

(a) by an operator in the CR, or

(b) from a location other than the CR with provision for providing immediate water level values to an operator in the CR if significant changes occur. Observations should be recorded at an interval no greater than 15 minutes during normal conditions.**

(5) Implement procedures and administrative controls that generally avoid operations that deliberately or knowingly lead to perturbations to the RCS and/or to systems that are necessary to maintain the RCS in a stable and controlled condition while the RCS is in a reduced inventory condition.

If operations that could perturb the RCS or systems supporting the RCS must be conducted while in a reduced inventory condition, then additional measures should be taken to assure that the RCS will remain in a stable and controlled condition. Such additional measures include both prevention of a loss of DHR and enhanced monitoring requirements to ensure timely response to a loss of DHR should such a loss occur.

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* A mid-loop condition exists whenever RCS water level is below the top of the flow area of the hot legs at the junction with the RV.

** Guidance should be developed and provided to operators that covers evacuation of the monitoring post. The guidance should properly balance reactor and personnel safety.

(6) Provide at least two available* or operable means of adding inventory to the RCS that are in addition to pumps that are a part of the normal DHR systems. These should include at least one high pressure injection pump. The water addition rate capable of being provided by each of the means should be at least sufficient to keep the core covered. Procedures for use of these systems during loss of DHR events should be provided. The path of water addition must be specified to assure the flow does not bypass the reactor vessel before exiting any opening in the RCS.

(7) (applicable to Westinghouse and Combustion Engineering nuclear steam supply system (NSSS) designs) Implement procedures and administrative controls that reasonably assure that all hot legs are not blocked simultaneously by nozzle dams unless a vent path is provided that is large enough to prevent pressurization of the upper plenum of the RV. See references 1 and 2.

(8) (applicable to NSSSs with loop stop valves) Implement procedures and administrative controls that reasonably assure that all hot legs are not blocked simultaneously by closed stop valves unless a vent path is provided that is large enough to prevent pressurization of the RV upper plenum or unless the RCS configuration prevents RV water loss if RV pressurization should occur. Closing cold legs by nozzle dams does not meet this condition.

Programmed enhancements:

Programmed enhancements should be developed in parallel with the expeditious actions and they may replace, supplement, or add to the expeditious actions. For example, programmed enhancements may be used to change expeditious actions as a result of better understanding or improved procedures. This may lessen the initial impact of expeditious actions such as the speed with which containment closure must be achieved and may include consideration of such factors as the decay heat rate. Additional guidance is provided in enclosure 2. For example the first paragraph of section 2.2.2 and the first paragraph of section 3.3.2 illustrate the flexibility we have in mind as long as safety is adequately addressed. We intend that programmed enhancements be incorporated into plant operations as they are developed when this results in significant safety improvement or enhancement of plant operations with no decrease in safety. Procedural and hardware modifications may be implemented without prior staff approval where the criteria of 10 CFR 50.59 are met, although it is our intent to review and/or audit such changes. Programmed enhancements should be implemented as soon as is practical, but no later than the following schedule:

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*Available means ready for use quickly enough to meet the intended functional need.

(1) Programmed enhancements consisting of hardware installation and/or modification, and programmed enhancements that depend upon hardware installation and/or modification, should be implemented:

(a) by the end of the first refueling outage that is initiated 18 months or later following receipt of this letter, or

(b) by the end of the second refueling outage following receipt of this letter,

whichever occurs first. If a shutdown for refueling has been initiated as of the date of receipt of this letter, that is to be counted as the first refueling outage.

(2) Programmed enhancements that do not depend upon hardware changes should be implemented within 18 months of receipt of this letter.

We recommend you implement the following six programmed enhancements:

(1) Instrumentation

Provide reliable indication of parameters that describe the state of the RCS and the performance of systems normally used to cool the RCS for both normal and accident conditions. At a minimum, provide the following in the CR:

(a) two independent RCS level indications

(b) at least two independent temperature measurements representative of the core exit whenever the RV head is located on top of the RV (We suggest that temperature indications be provided at all times.)

(c) the capability of continuously monitoring DHR system performance whenever a DHR system is being used for cooling the RCS

(d) visible and audible indications of abnormal conditions in temperature, level, and DHR system performance

(2) Procedures

Develop and implement procedures that cover reduced inventory operation and that provide an adequate basis for entry into a reduced inventory condition. These include:

(a) procedures that cover normal operation of the NSSS, the containment, and supporting systems under conditions for which cooling would normally be provided by DHR systems.

(b) procedures that cover emergency, abnormal, off-normal, or the equivalent operation of the NSSS, the containment, and supporting systems if an off-normal condition occurs while operating under conditions for which cooling would normally be provided by DHR systems.

(c) administrative controls that support and supplement the procedures in items (a), (b), and all other actions identified in this communication, as appropriate.

(3) Equipment

(a) Assure that adequate operating, operable, and/or available equipment of high reliability* is provided for cooling the RCS and for avoiding a loss of RCS cooling.

(b) Maintain sufficient existing equipment in an operable or available status so as to mitigate loss of DHR or loss of RCS inventory should they occur. This should include at least one high pressure injection pump and one other system. The water addition rate capable of being provided by each equipment item should be at least sufficient to keep the core covered.

(c) Provide adequate equipment for personnel communications that involve activities related to the RCS or systems necessary to maintain the RCS in a stable and controlled condition.

(4) Analyses

Conduct analyses to supplement existing information and develop a basis for procedures, instrumentation installation and response, and equipment/NSSS interactions and response. The analyses should encompass thermodynamic and physical (configuration) states to which the hardware can be subjected and should provide sufficient depth that the basis is developed. Emphasis should be placed upon obtaining a complete understanding of NSSS behavior under nonpower operation.

(5) Technical Specifications

Technical specifications (TSs) that restrict or limit the safety benefit of the actions identified in this letter should be identified and appropriate changes should be submitted.

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*Reliable equipment is equipment that can be reasonably expected to perform the intended function. See Enclosure 2 for additional information.

(6) RCS perturbations

Item (5) of the expeditious actions should be reexamined and operations refined as necessary to reasonably minimize the likelihood of loss of DHR.

Additional information and guidance are given in enclosure 2.

REFERENCES

(1) C. E. Rossi, "Possible Sudden Loss of RCS Inventory during Low Coolant Level Operation," NRC Information Notice 88-36, June 8, 1988.

(2) R. A. Newton, "Westinghouse Owners Group Early Notification of Mid-Loop Operation Concerns," Letter from Chairman of Westinghouse Owners Group to Westinghouse Owners Group Primary Representatives (1L, 1A), OG-88-21, May 27, 1988.

ATTACHMENT 4

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

January 27, 1989

Docket Nos.: 50-424
50-425

Mr. W. G. Hairston, III
Senior Vice President -
Nuclear Operations
Georgia Power Company
P.O. Box 1295
Birmingham, Alabama 35201

Dear Mr. Hairston:

SUBJECT: COMMENTS ON THE GEORGIA POWER COMPANY RESPONSE TO GENERIC LETTER 88-17 FOR THE VOGTLE PLANT, UNITS 1 AND 2 FOR EXPEDITIOUS ACTIONS FOR LOSS OF DECAY HEAT REMOVAL (TAC NOS. 69789 AND 69790)

The NRC staff has reviewed your response to Generic Letter 88-17. We find that it generally meets the intentions of the generic letter with respect to expeditious actions and is adequate for plant operation.

The most significant contributor to risk reduction of the eight generic letter recommendations is the capability to close containment. Your response appears to be incomplete in the following respects:

1. Tracking of containment penetrations references only those that have been opened by "manual means."

2. You specifically address closure of the equipment hatch via Operations Procedure 12006-C which ensures "that the containment equipment hatch can be closed." Abnormal Operating Procedure 18019-C "will instruct the operators to initiate containment closure." We find no reference to actual completion of containment closure within allowable times, particularly with respect to penetrations other than the equipment hatch.

3. You identify that "all available containment cooling fans be started to help mitigate the effects of a loss of RHR on the containment environment." You do not identify what reasonable assurance is available that fans will be available nor do you address whether you have investigated the feasibility of continued work within containment once boiling initiates within the reactor vessel and creates a steam environment within the containment.

VOGTLE

In regards to the other expeditious items, the program identified in your response has the capability to adequately address the concerns expressed in the generic letter. However, your responses are brief and, therefore, do not allow us to fully understand your action taken in response to GL 88-17. You may wish to consider several observations in order to assure yourselves that the actions are adequately addressed:

1. You reference the commitments as implemented prior to the next planned entry. We assume your meaning is for any entry into a reduced inventory condition that is deliberate on the part of the operators. Hence, an entry for the purpose of repairing an unanticipated reactor coolant pump seal failure would be a planned entry. An entry due to a loss of coolant accident would be unplanned. Any other meaning will not meet the intent of the generic letter.

2. You also reserve the right to make changes "in the future if appropriate." The intent of the generic letter is to allow changes under the guidance of the programmed enhancement recommendations and subject to your 50.59 review, as applicable.

3. The lesson plan description did not identify the need for instrumentation other than level indication. Temperature and the ability to monitor RHR behavior are also important.

4. The lesson plan description did not identify such vortex detail as symptoms and suitable operator response to prevent loss of RHR.

5. The lesson plan description is stated to provide "an adequate awareness on the part of personnel involved in mid-loop operations." Historical experience shows many RHR losses caused by apparently trained personnel - often by maintenance and test personnel. Your program should be designed to avoid such difficulties.

6. You indicate removal of a pressurizer manway, steam generator manway, or three pressurizer code safety valves as means to provide RCS venting. We note that relatively large hot side openings in the RCS, such as a pressurizer manway, can still lead to a pressure of several psi due to the large steam flow and the combination of flow restrictions in the surge line - lower pressurizer hardware - manway opening. Calculations should be performed to verify the effectiveness of the opening.

There is no need to respond to the above at this time.

As you are aware, the expeditious actions you have briefly described are an interim measure to achieve an immediate reduction in risk associated with reduced inventory operation, and these will be supplemented and in some cases replaced by programmed enhancements. While your response is adequate, we intend to audit both your expeditious actions and your programmed enhancement program. The areas where we do not fully understand your responses as indicated above may be covered in the audit of expeditious actions.

Sincerely,

Jon B. Hopkins

Jon B. Hopkins, Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

cc: See next page

ATTACHMENT 5

ELV- 00186
X7GJ17-V110
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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

PLANT VOGTLE - UNITS 1, and 2
NRC DOCKET 50-424, 50-425
OPERATING LICENSE NPF-68, CONSTRUCTION PERMIT CPPR-109
RESPONSE TO GENERIC LETTER 88-17

Gentlemen:

In accordance with 10 CFR 50.54(f), Georgia Power Company hereby submits the enclosed response to the recommended programmed enhancements of Generic Letter 88-17 related to loss of residual heat removal while operating in a reduced inventory condition. This response applies to both Units 1 and 2, even though unit specific details may refer to Unit 1. Georgia Power Company responded to the recommended expeditious actions of Generic Letter 88-17 by letter dated December 29, 1988

Georgia Power Company expects to implement all hardware changes resulting from the programmed enhancements prior to resuming critical plant operations following the second Unit 1 and first Unit 2 refueling outages. Enhancements that do not involve hardware changes are scheduled to be implemented by May 3, 1990.

Evaluation of hardware changes for level instrumentation and residual heat removal system performance indication has not been completed. In that the evaluation is not complete, Georgia Power Company cannot be more specific than the enclosed response. Georgia Power Company will submit a description of these hardware changes within approximately two months following completion of the evaluations, which is currently projected for October 1, 1989.

The enclosed responses are based upon current or proposed practices and may be changed in the future, if appropriate. Georgia Power Company will ensure that any future changes will maintain the intent of Generic Letter 88-17. Information related to this issue will be available onsite for NRC review.

If there are any questions concerning this letter, please advise.

Mr. W. G. Hairston, III states that he is a Senior Vice President of Georgia Power Company and is authorized to execute this oath on behalf of Georgia Power Company and that, to the best of his knowledge and belief, the facts set forth in this letter and enclosures are true.

GEORGIA POWER COMPANY

By: ______________________
W. G. Hairston, III

Sworn to and subscribed before me this day of January, 1989.

____
Notary Public

c: Georgia Power Company
Mr. P. D. Rice
Mr. C. K. McCoy
Mr. G. Bockhold, Jr.
GO-NORMS

U. S. Nuclear Regulatory Commission

Mr. M. L. Ernst, Acting Regional Administrator
Mr. J. B. Hopkins, Licensing Project Manager, NRR (2 copies)
Mr. J. F. Rogge, Senior Resident Inspector-Operations, Vogtle

ENCLOSURE

GEORGIA POWER COMPANY RESPONSE TO
NRC GENERIC LETTER 88-17
PROGRAMMED ENHANCEMENTS

The following discussion of Georgia Power Company's (GPC) plans for addressing the programmed enhancements of Generic Letter 88-17 at Plant Vogtle (VEGP) is provided pursuant to 10 CFR 50.54(f):

1. NRC RECOMMENDATION

Provide reliable indication of parameters that describe the state of the reactor coolant system (RCS) and the performance of systems normally used to cool the RCS for both normal and accident conditions. At a minimum, provide the following in the control room:

(a) Two independent RCS level indications.

(b) At least two independent temperature measurements representative of the core exit whenever the reactor vessel (RV) head is located on top of the RV. (We suggest that temperature indications be provided at all times.)

(c) The capability of continuously monitoring residual heat removal (RHR) system performance whenever an RHR system is being used for cooling the RCS.

(d) Visible and audible indications of abnormal conditions in temperature, level, and RHR system performance.

GPC RESPONSE

(a) As stated in our December 29, 1988 submittal, RCS water level is monitored via temporary level instrumentation whenever the RCS is in a reduced inventory condition. Operations procedures include instructions to notify Instrumentation and Control personnel to install temporary level instruments prior to draining the RCS. Instrumentation and Control Procedure 23906-1, "RCS Temporary Water Level System", provides instructions for installation of two independent channels of level indication using temporary transmitters and existing level instrumentation in the control room. Level is measured directly from the hot leg between the RVLIS upper range lower tap and the pressurizer to minimize thermodynamic and pressure errors. One channel provides wide range level indication from approximately one foot below mid-loop to the vessel flange. The other channel provides narrow range level indication from approximately one foot below mid-loop to the top of the hot leg. Level is continuously monitored and alarmed in the control room. A low level alarm is set at three inches above the center of the hot leg.

GPC is presently evaluating a design change which will provide for permanent installation of the level transmitters. We expect to have this evaluation completed by October1 , 1989.

The design development will include a review of the instrumentation design and an error analysis. GPC will also perform a quality control and follow-up review of the installation and review maintenance and calibration practices.

(b) As stated in our December 29, 1988 submittal, Operations Procedures presently require at least two core exit thermocouples to be operable at all times during reduced inventory conditions with the RV head in place. These procedures will be revised to require either:

- Temperature will be monitored and recorded by an operator in the control room at intervals no greater than 15 minutes, or
- Temperature will be continuously monitored and alarmed via the Emergency Response Facility (ERF) computer in the control room.

These two core exit thermocouples will provide continuous, independent, and representative indication of the core temperature.

(c) An engineering study will be made to determine the specific parameters that will provide timely, reliable indication of the onset of degraded RHR pump performance. The study will include consideration of the recommendations of Generic Letter 88-17 such as indication of pump motor current, noise monitoring, suction pressure indication, and a possible correlation of parameters. We expect to complete this study by October 1, 1989. The results of this study will be implemented according to the schedule discussed in the cover letter to this transmittal.

(d) As discussed above, RCS level is continuously monitored and alarmed in the control room during operation in a reduced inventory condition. Temperature will either be checked and recorded by an operator in the control room at intervals no greater than 15 minutes, or continuously monitored and alarmed via the ERF computer in the control room. The engineering study discussed in item (c) above, will include consideration of visible and audible indication of RHR system performance.

2. <u>NRC RECOMMENDATION</u>

Develop and implement procedures that cover reduced inventory operation and that provide an adequate basis for entry into a reduced inventory condition. These include:

(a) Procedures that cover normal operation of the NSSS, the containment, and supporting systems under conditions for which cooling would normally be provided by the RHR system.

(b) Procedures that cover emergency, abnormal, off-normal, or the equivalent operation of the NSSS, the containment, and supporting systems if an off-normal condition occurs while operating under conditions for which cooling would normally be provided by the RHR system.

(c) Administrative controls that support and supplement the procedures in items (a), (b), and all other actions identified in Generic Letter 88-17, as appropriate.

GPC RESPONSE

(a) As stated in our December 29, 1988 submittal, the controlling procedure for operation in a reduced inventory condition is Operations Procedure 12006-C, "Unit Cooldown to Cold Shutdown." This procedure contains precautions and limitations concerning operation in a reduced inventory condition and provides guidance for preparing the RCS for draining. This guidance address temperature and level instrumentation, RHR pump performance, and the use of a safety injection pump for inventory addition, if needed.

Procedure 13005-1, "Reactor Coolant System Draining", provides instructions for draining the RCS. This procedure also contains precautions concerning the effects of RCS level on RHR system operability and instructions which should minimize the impact of draining on level indication.

Procedure 13011-1 "Residual Heat Removal System", provides the necessary instructions for operation of the RHR system including operation in a reduced inventory condition. The precautions of this procedure address the effect of RHR system flow on pump suction during reduced inventory operation.

(b) In the event of a loss of RHR, Abnormal Operation Procedure 18019-C, "Loss of RHR", will provide the necessary guidance to ensure core cooling and direct the operators to initiate containment closure. Containment closure will be accomplished via Maintenance Procedure 27506-C, "Opening and Closing Containment Equipment Hatch" and administrative control in the form of an Information Limiting Condition for Operation (LCO), which will ensure that all penetrations opened by manual means are tracked.

(c) As stated in our December 29, 1988 submittal, the Shift Supervisor maintains cognitive control over the equipment hatch and all penetrations opened by manual means. Administrative controls will also ensure that the following is available for recognizing and mitigating a loss of RHR event:

- Instrumentation,
- Equipment for inventory addition,
- Adequate hot leg vent path, and
- Safe work environment to complete containment closure.

GPC believes that, with the revisions to procedures discussed in our December 29, 1988 submittal, VEGP procedures will reflect the best current practice with regard to operation in a reduced inventory condition. However, any further guidance that results from Westinghouse Owners' Group activity on this topic will be reviewed and incorporated into procedures as appropriate.

3. NRC RECOMMENDATION

(a) Assure that adequate operating, operable, and/or available equipment of high reliability is provided for cooling the RCS and for avoiding a loss of RCS cooling.

(b) Maintain sufficient existing equipment in an operable or available status so as to mitigate loss of RHR or loss of RCS inventory, should they occur. This should include at least one high pressure injection pump and one other system. The water addition rate capable of being provided by each equipment item should be at least sufficient to keep the core covered.

(c) Provide adequate equipment for personnel communications that involve activities related to the RCS or systems necessary to maintain the RCS in a stable and controlled condition.

GPC RESPONSE

(a) The RHR system at VEGP is part of the Emergency Core Cooling System (ECCS). This system is safety related and therefore highly reliable. Furthermore, the RHR autoclosure interlock function is defeated in Modes 5 and 6 which eliminates the associated potential for spurious closure of the RHR suction isolation valves.

(b) Inventory addition will be accomplished via a centrifugal charging pump and a safety injection pump. Both of these pumps are part of the ECCS and are therefore highly reliable. The flowrates available from these pumps will be more than sufficient to keep the core covered. Administrative controls will ensure that flow paths are available for these pumps and that flow will not bypass the core. Furthermore, Procedure 18019-C provides for the use of the steam generators as an alternate means of cooling when appropriate.

(c) Adequate equipment for personnel communications during reduced inventory operation presently exists at VEGP and is required by procedure.

4. NRC RECOMMENDATION

Conduct analyses to supplement existing information and develop a basis for procedures, instrumentation installation and response, and equipment/NSSS interactions and response. The analyses should encompass thermodynamic and physical (configuration) states to which the hardware can be subjected and should provide sufficient depth that the basis is developed. Emphasis should be placed upon obtaining a complete understanding of NSSS behavior under non-power operation.

GPC RESPONSE

GPC, as a member of the Westinghouse Owners' Group, has reviewed WCAP-11916 and utilized the analysis and guidance provided therein as a basis for the hardware and procedural changes discussed in our December 29, 1988 submittal. Further analysis is being performed by Westinghouse to validate the abnormal operating procedure guidance. When this analysis is complete and the procedural guidance finalized, GPC will review the information for VEGP and make changes as appropriate. In addition, the design review discussed for RCS level instrumentation will account for effects that may introduce level inaccuracies. Furthermore, special pre-operational testing has been performed on Unit 2 which varied RCS level and RHR system flow to determine susceptibility to vortexing. Finally, a plant specific analysis will be made to support inventory addition via gravity flow from the refueling water storage tank to the RCS.

5. NRC RECOMMENDATION

Technical Specifications that restrict or limit the safety benefit of the actions identified in this letter should be identified and appropriate changes should be submitted.

GPC RESPONSE

GPC plans to pursue a change to the Technical Specifications which will allow the safety injection pumps to be available during operation in a reduced inventory condition without having to invoke 10 CRF 50.54X.

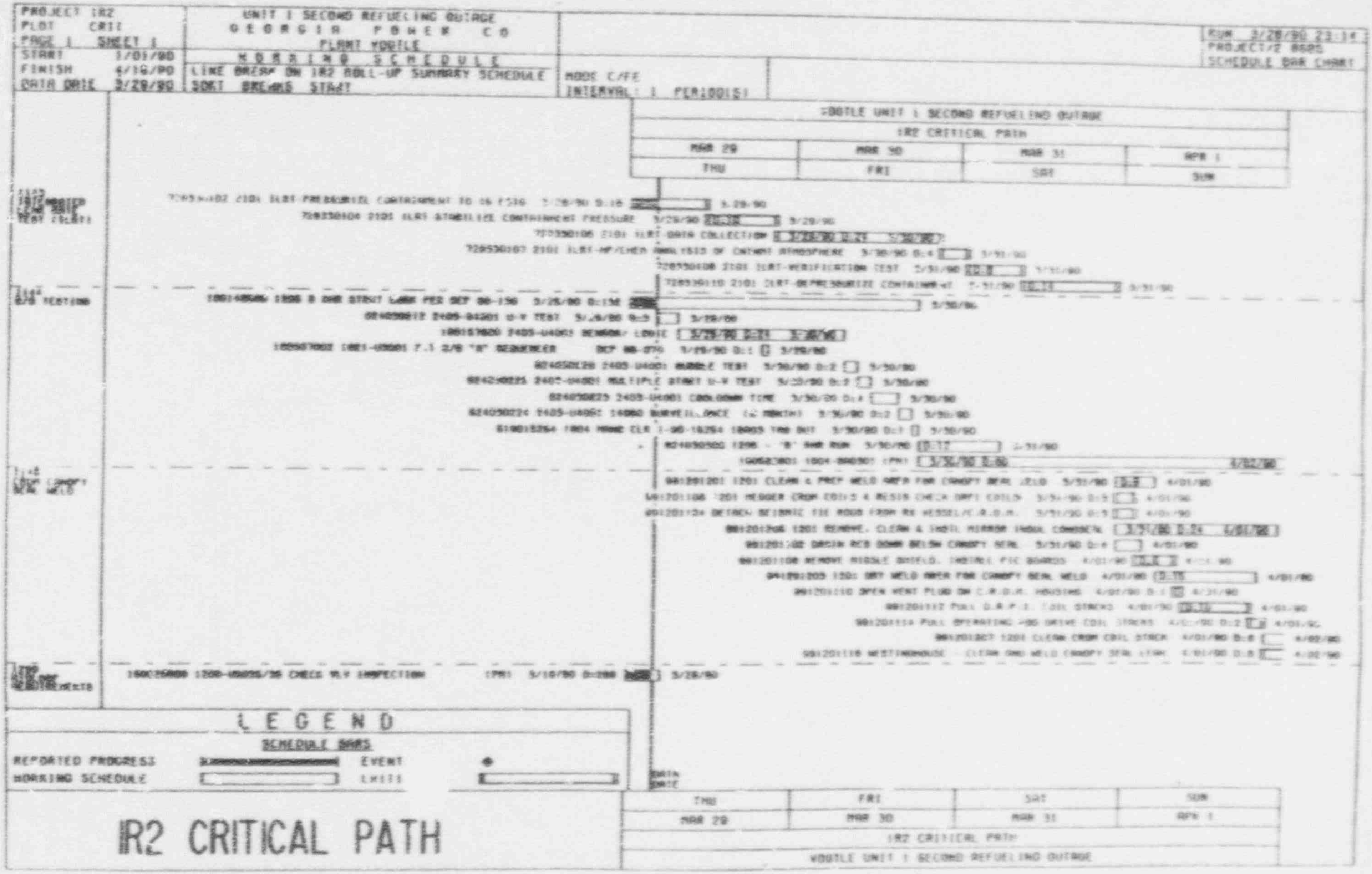
6. NRC RECOMMENDATION

Item (5) of the expeditious actions should be reexamined and operations refined as necessary to reasonably minimize the likelihood of loss of RHR.

GPC RESPONSE

As stated in our December 29, 1988 submittal, VEGP has procedures in place that require authorization from the Unit Shift Supervisor prior to performing any work. Operations procedures include precautions to scrutinize and limit work activities that have the potential for reducing RCS inventory while in a reduced inventory condition. These procedures will be revised to ensure that any work that may impact RHR capability while in a reduced inventory condition be closely scrutinized. Work will not be allowed to be performed unless adequate measures exist (such as enhanced monitoring of critical parameters and precautions and limitations) to prevent a loss of RHR.

GPC believes that the above measures in conjunction with the emphasis placed on mid-loop operations during licensed operator training and the other measures discussed in this letter and our December 29, 1988 letter are adequate to minimize RCS perturbations during reduced inventory operation.



PROJECT IR2
PLOT CRIT
PAGE 1 SHEET 1
START 3/01/90
FINISH 4/16/90
DATA DATE 3/28/90
UNIT 1 SECOND REFUELING OUTAGE
G E O R G I A P O W E R C O
PLANT VOGTLE
W O R K I N G S C H E D U L E
LINE BREAK ON IR2 ROLL-UP SUMMARY SCHEDULE
SORT BREAKS START
MODE C/FE
INTERVAL: 1 PERIOD(S)
RUN 3/28/90 23:14
PROJECT/2 BARS
SCHEDULE BAR CHART
VOGTLE UNIT 1 SECOND REFUELING OUTAGE
IR2 CRITICAL PATH
MAR 29
MAR 30
MAR 31
APR 1
THU
FRI
SAT
SUN
LEGEND
SCHEDULE BARS
REPORTED PROGRESS
WORKING SCHEDULE
EVENT
DATA DATE
IR2 CRITICAL PATH

DESIGN CHANGE REQUEST

ENGINEERING SUPPORT

DCR NO. 90-V1N0133 REV 0 UNIT ONE DATE 3-24-90

SAFETY RELATED ✓ YES ___ NO DRAWING CHANGE ONLY ___

EXEMPT ___ NON-EXEMPT ✓ SITE ___

SYSTEM or COMPONENT (Designation/Plant No. & Description): SYSTEM 2403 DIESEL GENERATORS

DESIGN OBJECTIVE: ENSURE THAT D/G PROTECTIVE TRIPS THAT ARE ENABLED DURING AN LOSP ARE CONSISTENT WITH THE NEED FOR THE D/G IN AN LOSP.

SUGGESTED CHANGE (attach sketches, marked-up dwgs, etc) - if known: ELIMINATE ALL UNNECESSARY D/G TRIPS ON AN LOSP, I.E., ADD THE BYPASSES THAT PRESENTLY EXIST FOR AN SI ACTUATION

REFERENCES: ___

LICENSING DOCUMENT CHANGE REQUIRED: ✓ YES ___ NO. IF YES, Describe: ___

ACCOUNT NO: ___ ESTIMATED COST: ___

[illegible signature] 3/24/90 — Responsible Engineer /Date

[illegible signature] 3/24/90 — Engineering Support Supt. / Date FOR MWH

DESIGN APPROVAL

DCR approved for Design Development (Exempt and Non-Exempt) ✓ YES ___ NO

O&M 1R2

[illegible signature] 3-24-90 — Plant Support Manager/Date

DESIGN CHANGE PACKAGE REVIEWED AND ACCEPTABLE

___ Responsible Engineer / Date ___ Eng. Support Supt. / Date

---

IMPLEMENTATION APPROVAL

DCP SAFETY RELATED:

PRB RECOMMENDS:

___ Proceed with implementation - Licensing document change approval required

___ Do not proceed until licensing document approval received

___ Proceed - No licensing document changes necessary

___ DCP rejected. Reason ___

___ PRB Chairman /Date PRB Mtg No. ___ Date ___

Implementation as Recommended Approved ___ YES ___ NO

___ GENERAL MANAGER ___ DATE

DCP Non Safety Related:

___ PLANT SUPPORT MGR ___ DATE

FIGURE 1

ATTACHMENT TO DCR ____________________

- JUSTIFICATION

[ ] REGULATORY REQUIREMENT/LICENSING COMMITMENT

[ ] DEFICIENCY CORRECTION DC NO. __________ RER NO. __________

[✓] IMPROVE SYSTEM/OPERATION PERFORMANCE

DETAILED EXPLANATION:

ON 3/20/90, UNIT ONE D/G A TRIPPED TWICE FOLLOWING A LOSS OF OFFSITE POWER. UPON BEING EMERGENCY STARTED (MOST D/G TRIPS BYPASSED) THE D/G CONTINUED TO RUN. TROUBLESHOOTING AND INVESTIGATIONS TO DATE INDICATE THAT ONE OR MORE TRIPS NOT BYPASSED ON AN LOSP RESULTED IN AN ~~[illegible]~~ 3/24/90 THE LOSS OF ALL A.C. POWER EVENT.

THIS DCR WAS GENERATED TO ELIMINATE (BYPASS) ALL D/G TRIPS THAT ARE UNDESIREABLE ON AN LOSP EVENT.

- COST/BENEFIT ANALYSIS (NOTE: Required if change is requested to improve performance)

N/A

- INSTALLATION

[ ] NO SPECIAL OUTAGE OR PLANT CONDITIONS REQUIRED

(PROVIDE OUTAGE DETAILS FOR SYSTEMS, PLANT CONDITIONS, PRESSURE/TEMP, ETC. IF EITHER OF THE FOLLOWING BLOCKS IS CHECKED)

[✓] PARTIAL MAY BE WORKED W/O OUTAGE TRAIN OUTAGES WILL BE REQUIRED

[ ] OUTAGE REQUIRED

FIGURE 1 (CONT'D.)

DCR No. ______________

DESIGN CHANGE PACKAGE CLOSURE

	Yes	No	N/A
MWO's Completed and Closed?	___	___	___
ABNs Issued?	___	___	___
FCRs Approved and Attached?	___	___	___
Deficiencies Resolved.	___	___	___
Testing Complete & Results Acceptable?	___	___	___

MWO Nos: ____

ABN Nos: ____

FCR Nos: ____

DC Nos: ____

Systems/equipment may be returned to service based upon satisfactory completion of testing, availability of as-builts, and adequate training and to revised operating procedures.

____
Operations Supervisor/ Date

All Closeout Requirements Have Been Completed.

______________________ ______________________
Responsible Engineer / Date Eng. Supv. / Date

FINAL PRB REQUIRED: Yes ___ No ___

FINAL REVIEW ______________________ Date ______________
Engineering Support Supt.

DCP Closure Acceptable ____ YES ____ NO. If NO, explain: ________

______________________ PRB Meeting No. ________ Date ________
PRB Chairman / Date

FIGURE 1 (CONT'D.)

LICENSING DOCUMENT CHANGE REQUEST

Attachment

LDCR No. FS-88-6

4.1 Originator: Paul A Herrmann 7/22/88 Priority Level 2

Print Name Date

Affected Document: FSAR Sections 3.3.1.1.2 & 3.3.1.2.D

Impacted Document(s): ____________

Change: See attached (last 2 pages of attachment 1)

Justification: See attached

Does this change:

(1) Constitutes an Unreviewed Safety Question? YES [ ] NO [✓]

(2) Constitutes a reduction in QA Program Commitment? YES [ ] NO [✓]

(3) Constitutes a change in Technical Specifications? YES [ ] NO [✓]

If change affects Emergency Plan, answer (4) otherwise; N/A N/A [✓]

(4) Reduces effectiveness of the Emergency Plan? YES [ ] NO [ ]

If change affects Security, answer (5) otherwise; N/A N/A [✓]

(5) Reduce effectiveness of the Security Plan or Guard Training and Qualification Plan? YES [ ] NO [ ]

NRC Approval is Required prior to implementation if any of the above are YES.

Originating Dept. Head Approval ____________ 7-22-88

Signature Date

Concurrence:

4.2 LDCR Coordinator: ____________ 9/9/88 NSAC Mgr: ____________

Signature Date Signature Date

4.3 PRB Meeting No. 88-144 Date 9-16-88

PRB Chairman: Signature ____________ Date 9-16-88

GMVEO Approval: Signature ____________ Date 9/20/88

Comments: ____________

4.4 Document Change Review:

Change: As Requested [✓] Not As Requested [ ]

Follow-Up Action: ____________

Change Implemented: Document no. & Rev. FSAR Amend #39

LDCR Coordinator Signature ____________ Date 3-15-89

EXAMPLE, FIGURE 1

Vogtle Electric Generating Plant
Post Office Box 1600
Waynesboro, Georgia 30830
Telephone (404) 826-3608

Mikey,
This looks good to me, do you have a problem with this?
JES

Southern Company Services
the southern electric system

Attachment 1 to
... R F ... 88-... Rev. 1
(12 pages)

August 26, 1988

Plant Vogtle - Unit No. I and II
Intertie of Class 1E 4160V Buses
REA VG-8621, Additional Response
File: X7BD108/X3BC03 Log: NPFSG-02486

Mr. S. H. Chesnut
Georgia Power Company
333 Piedmont Building, 20th Floor
Atlanta, Georgia

Dear Mr. Chesnut:

This letter was written at the request of the Engineering Support Department to clarify our previous response to REA VG-8621 regarding the connection of both Class 1E 4160V buses to the same RAT during Shutdown Modes 5 and 6. The initial response to this REA was sent to you in a letter dated July 20, 1988, Log: NPFSG-02142. Enclosed is the revised Safety Evaluation (Revision 1) for the subject REA which was amended to address the power source to the non-Class 1E 13.8KV buses.

Our previous response specified that the non-Class 1E 4160V buses be energized through the UATs as part of this configuration. This was based upon the capability of the RATs as described in existing calculations and demonstrated by functional test. The response to FSAR Question 430.59 commited to this condition of isolation to ensure the integrity of the one remaining offsite power source to the required Class 1E buses. Although not specifically stated, our previous response to the REA assumed that the 13.8KV buses would also be powered by the UATS. Given that in this configuration there is only one operable offsite power source for the Class 1E buses, the additional connection of a 13.8KV bus to the energized RAT would create a decrease in reliability of the Class 1E distribution system. More importantly, the specific configuration of both Class 1E 4160V buses and a non-Class 1E 13.8KV bus energized from one RAT has not been evaluated by calculation nor adequately demonstrated by functional test, which is an NRC requirement to verify the adequacy of the power distribution system under degraded conditions.

The attached Safety Evaluation (which supersedes the previous one) incorporates requirements concerning the 13.8KV bus supply from the UATs and also provides corresponding mark-ups of applicable FSAR sections.

This completes the response for REA VG-8621. If you have any questions regarding this matter contact David Gambrell at extension 4480.

This additional evaluation was completed within the initial budget for this REA, therefore no new authorization is required.

Very truly yours,

FTKuester

for R. L. George, Manager
Nuclear Plant Support - Vogtle

DLG/dl
Attachment*

xc: A. L. Mosbaugh *
T. E. Richardson
J. D. Hurd
J. M. Wheless
J. L. Haratyk *
S. Pietrzyk *
W. C. Ramsey *
R. E. Lide *
J. A. Bailey
J. E. Hallmark
F. Thompson *
K. Kopecky *
A. Farruk *
P. M. Kochery *
NORMS *
PFE-DDC *
GPC Reading Files * (2)
NPFSG Files *
2-02488

SAFETY EVALUATION

a. Description of proposed change, test or experiment.

The following temporary configuration of the Unit 1 AC power system is required in order to remove either one of the Reserve Auxiliary Transformers (RAT; 1NXRA,B) from service during Cold Shutdown. This shall be implemented during operational Modes 5 and 6 only in order to meet Technical Specification LCOs. To implement this configuration, the normal preferred offsite source circuit breaker of one of the Class 1E 4160 V switchgear (1AA02 or 1BA03: 1-1804-S3-A02 and A03 respectively) will be transferred to the alternate offsite source breaker cubicle. This will electrically connect both safety buses to the same RAT. All Non-Class 1E buses (13.8 and 4.16 KV) will be powered from the Unit Auxiliary Transformers (UAT) which will be 'back-fed' from the 230 KV bus through the Main Step-Up Transformers. This will require the main generator to be isolated at the disconnect links. Also to ensure isolation and not exceed the RAT capability, the alternate incoming breakers (feed from RATs) on the Non-Class 1E buses must be 'racked-out' and tagged to prevent actuation by an automatic bus transfer. Applicable plant procedures must be revised to reflect the proper system alignment and concerns as a result of this configuration.

This temporary configuration of the 'Cross-Train' intertie may only be implemented during Modes 5 and 6, Per Tech. Spec. LCOs 3.8.1.2, 3.8.3.1 and 3.8.3.2, based upon Regulatory Guide 1.93. Per these specifications one of the energized safety buses and its corresponding support systems (ie. diesel generator) shall be fully operable in order to supply power to the loads required during Cold Shutdown.

(continued on Page 2 of 5)

b. Reason for proposed change, test or experiment.

The purpose of this temporary configuration is to de-energize one of the RATs for maintenance purposes while providing reliable power to both Class 1E buses 1AA02 and 1BA03, through the remaining RAT, and to the plant auxiliary loads through the UATs during cold shutdown (Modes 5 and 6 only). The 'Cross-Train' intertie of the Class 1E buses has been discussed in the FSAR for use in emergency situations only. Also the question and answer section of the FSAR, and the SER address this configuration. Preoperational test 1-300-01, "Integrated Safeguards and Load Sequencing Test", demonstrated the capability of each RAT to power both Class 1E 4160 V buses in conjunction with an ESFAS signal. The NRC staff (Per SSER 5;3.3.1) found this configuration fully acceptable, provided all other Technical Specifications are met.

SAFETY EVALUATION CONTINUATION SHEET

Part A, cont..

The electrical connection of the other Class 1E switchgear to this bus will conform to the separation requirements of Regulatory Guide 1.75 in that the breaker isolation and availability of the standby power source will ensure the integrity of the required power supply regardless of failures on the alternate switchgear.

The body of this Safety Evaluation will provide more discussion on the specific impact of this configuration upon the FSAR and F.O.L. Tech Spec. Below is a summary of all applicable references.

F.O.L. Technical Specification
LCOs: 3.8.1.2, 3.8.3.1, 3.8.3.2
Bases: 3/4.8.1, 3/4.8.2, 3/4.8.3, 3/4.9.8

Final Safety Analysis Report
1.9.8.2, 8.1.4.1, 8.1.4.2, 8.3.1.1.2, Figures; 8.3.31-1 and 8.3.1-2
Table 8.3.1-2, Questions: 430.59 and 430.60

Safety Evaluation Report
8.3.1 and Supplement 5 (8.3.1)

GDC-17 in appendix A of 10 CFR Part 50

Regulatory Guides 1.93 and 1.75 (IEEE 384.1974)

Preoperational Test 1-300-01 (Section 8.3.42)

Vogtle Design Criteria: 1000-E, 1801, 1804, 1821

c. Does the proposed change involve a change to Technical Specifications?

(Includes Environmental Tech. Spec.) Yes ______ No X

As stated in parts A and B of this Safety Evaluation, this configuration shall be implemented only during Modes 5 and 6. The LCOs of 3.8.1.2 and 3.8.3.2 require that only one offsite power source and only one train of the emergency buses must be energized in Modes 5 and 6, provided that the corresponding diesel generator is operable. Therefore these conditions will be met and exceeded by the availability of both Class 1E distribution systems. Thus a change to the Technical Specifications is not required; however, this configuration should be carefully considered in relation to the Action Statements of the above sections.

d. Does the proposed change involve a change in the facility as described or implied in the FSAR?

Yes X No ______

FSAR Section 8.3.1.1.2 describes the Class 1E power system. The third paragraph in this section which describes the capacity of the RATs, should be revised to indicate that each RAT also has the capacity to provide power to both Class 1E Trains. FSAR Section 8.3.1.1.2.D states that the transfer to an alternate offsite source by an emergency bus would be done only if the normal source, the standby source, and the redundant bus were all lost simultaneously. This statement should be revised to show that this may also be done during Modes 5 and 6 for maintenance purposes. FSAR Questions 430.59 and 430.60 discuss the RAT power capabilities and the Class 1E 4.16KV source breaker arrangement, respectively. The Responses to these Questions refer to the FSAR sections above and should be revised accordingly. See the attached FSAR mark ups for the suggested changes.

Other sections of the FSAR, as listed in part A of this Safety Evaluation, discuss the Class 1E power system, but do not require revision.

e. Does the proposed change involve a change in procedures described or implied in the FSAR?

Yes X No ____

FSAR Section 8.3.1.2.D implies the adherence to the Class 1E distribution system alignment procedures. The Response to FSAR Question 430.60 details minimum actions which must be performed to intertie the two Class 1E 4.16KV buses. Applicable procedures should be revised accordingly to reflect the changes in the FSAR provided as a result of this temporary configuration and this Safety Evaluation. These procedures should indicate the system alignment required to implement this configuration including the back feed through the UATs. Specific requirements should include, but not limited to: 1) the alignment to remove either RAT from service, 2) rack-out and tag Non-Class 1E breakers (from RATs) to prevent automatic bus transfer, 3) safety concerns and 4) any applicable system limitations.

f. Does the proposed change involve a test or experiment not described or implied in the FSAR?

Yes ____ No X

This alignment is a temporary change in the Class 1E power system configuration and does not constitute a test or experiment. The provisions for this scheme have been stated in Section 8.3.1.1.2 and are further evaluated in Questions 430.59 and 430.60. This configuration was addressed and found acceptable by the NRC as shown in SSER 5, section 8.3.1.

g. Does the proposed change, test, or experiment increase the probability of occurrence or consequences of an accident described in the FSAR?

Yes ____ No X

FSAR Section 15, specifically 15.2.6, does not discuss the occurrence of an accident in Modes 5 and 6 which concerns the availability of redundant safety buses. If an event should occur which activates the ESFAS system, the ESF sequencer has demonstrated its operability for this configuration. (Ref: SSER 5 Section 8.3.1). Therefore this system alignment does not increase the probability of an accident as described in the applicable FSAR sections.

h. Does the proposed change, test, or experiment increase the probability of occurrence or consequences of the malfunction of any equipment or component assumed to function in accidents analyzed in the FSAR?

Yes ______ No X

This configuration is temporary and shall be administratively implemented in operational Modes 5 and 6, only. FSAR section 15.3 shows that in Cold Shutdown the plant does not require the operation of any equipment or component which would not be available to perform i's safety related function as a result of this alignment of the power systems. Therefore this configuration does not increase the probability of malfunction related to the equipment assumed to function in accidents, specifically during Cold Shutdown.

i. Does the proposed change, test or experiment create the possibility of an accident or equipment/component malfunction not described and analyzed in the FSAR?

Yes ______ No X

Based upon the FSAR and Design Criterion references of part A, this modified configuration (Modes 5 and 6 only) fully conforms to the functional requirements of the Class 1E buses, the safety loads and the ESF system. Therefore this modification does not create the possibility of any equipment malfunction, specifically during Cold Shutdown.

j. Does the proposed change, test or experiment decrease the margin of safety defined by the bases of the Technical Specifications?

Yes ______ No X

Bases 3/4.8.1, 3/4.8.2 and 3/4.8.3 were evaluated concerning the impact of this temporary configuration. The availability of both Class 1E power trains meets and exceeds the initial condition assumptions of the applicable safety analyses and provides at least one set of distribution systems required for operation during Cold Shutdown. The modified plant configuration in these Modes is consistent with requirements of Regulatory Guide 1.93 and GDC-17 in appendix A of 10 CFR PART 50. The operability of the diesel generator Per 3.8.1.2 provides additional assurance that the safety function of critical systems is not lost coincident with an accident in those Modes. Therefore this alignment does not decrease any margin of safety defined in the Tech. Spec.

k. Does the proposed change, test, or experiment involve an unreviewed safety question?

Yes ____ No X

Based upon the responses to parts G,H,I, and J of this Safety Evaluation the proposed configuration described herein does not involve an unreviewed safety question. Furthermore this configuration is fully acceptable and is consistent with the requirements of the FSAR and F.O.L. Tech. Spec. provided that the proper administrative controls and applicable LCOs are not exceeded. Specific concerns and limitations are made evident in this Safety Evaluation and therefore shall be integrated into this configuration and the applicable procedures.

LDRE David L. Gambrell Date 8/23/88

LDS John L. Haraf Date 8/23/88

Power/Mechanical/Nuclear DS [signature] Date 8/24/88

PEMV/Designee [signature] Date 8.26.88

starting to open utilizing an early "b" control scheme. No paralleling of the two power sources occurs during the transfer.

Each unit auxiliary transformer has the capacity to supply the connected non-Class 1E load.

8.3.1.1.2 Class 1E System

The Class 1E ac power system is the power source used in or associated with shutting down the reactor and preventing or limiting the release of radioactive material following a design basis event. The system is divided into two independent ac power trains, train A and train B, each fed from an independent Class 1E bus with immediate access to offsite power sources. Figure 8.3.1-1 shows a schematic of the Class 1E ac power system. All safety-related equipment is housed in Seismic Category 1 structures.

The Class 1E ac system distributes power at 4.16 kV, 480 V, and 120 V ac to all safety-related loads. Also, the Class 1E ac system supplies through isolation devices certain selected loads which are not safety related but are important to the plant operation. Figure 8.3.1-2 indicates the major safety-related and isolated nonsafety-related loads supplied by the Class 1E ac system.

The non-Class 1E ac system supplies preferred (offsite) power to the Class 1E ac system through the reserve auxiliary transformer 4.16-kV windings. Each reserve auxiliary transformer has the capacity to supply all connected non-Class 1E running loads and to start and run the loads of one Class 1E train, or to start and run the loads of both Class 1E trains. See paragraph 8.3.1.1.2.D for further discussion. ADD

In addition to the above power distribution, the Class 1E ac system contains standby power sources which provide the power required for safe shutdown in the event of a loss of the preferred power sources. The power, control, and instrumentation cables essential for safe shutdown are routed with adequate separation from their redundant counterparts.

The following describes various features of the Class 1E systems:

A. Power Supply Feeders

Each 4.16-kV load group can be supplied by one of two preferred power supply feeders or one diesel generator (standby) supply feeder. Each 4.16-kV bus supplies

ATTACHMENT TO S.E. (REV. 1) FOR REA VG-8621

motor loads and 4.16-kV/480-V load center transformers with their associated 480-V buses.

B. Bus Arrangements

The Class 1E ac system is divided into two redundant trains per unit (trains A and B). For each unit, either one of the trains is capable of providing power to safely reach shutdown for that unit. Each ac train consists of a 4.16-kV bus, 480-V load centers, 480-V motor control centers, and lower voltage ac supplies. The dc control power to each train is provided from dc power supplies of the same train.

C. Loads Supplied from Each Bus

Refer to figure 8.3.1-2 for a listing of Class 1E system loads and their respective buses.

D. Manual and Automatic Interconnections Between Buses, Buses and Loads, and Buses and Supplies

No provisions exist for automatically connecting one Class 1E train to another redundant Class 1E train or for automatically transferring loads between trains.

Each Class 1E bus is provided with two (normal and alternate) offsite preferred power sources and one standby power source. During normal operation with both offsite sources available, each Class 1E bus is supplied from a separate reserve auxiliary transformer. Only one circuit breaker is provided for the two cubicles available at each Class 1E 4.16-kV bus for connections to the normal and alternate preferred offsite power sources. Transfer to the alternate offsite source would be done manually by administrative control if the normal preferred power source, the standby power source, and the redundant Class 1E 4.16-kV bus were all lost simultaneously. See paragraph 8.3.1.1.3D for further discussion of this subject.

ADD

During unit shutdown, (Modes 5 and 6, only), both Class 1E 4.16-KV buses may be manually connected to the same offsite power source (RAT) by administrative control provided that all the non-Class 1E buses (13.8 and 4.16 KV) powered by that source are shed and the automatic bus transfer schemes are disabled.

E. Interconnections Between Safety-Related and Nonsafety-Related Buses

No interconnections are provided between the safety- and nonsafety-related buses at the same voltage level. The reserve auxiliary transformers supply power through the same 4.16-kV winding to both non-Class 1E and Class 1E buses.

Question 430.59

FSAR paragraph 8.3.1.1.2 states that each reserve auxiliary transformer has the capacity to supply all connected non-Class 1E running loads and to start and run the loads of one Class 1E train. Justify the capability to start and run only one Class 1E train from each offsite source. Is this capability limited by the capacity of the "Y" transformer winding or by the total transformer capacity? Following a loss of one preferred power supply to a Class 1E bus, do you intend that the diesel generator will supply the bus for the entire length of time allowed under this limiting condition for operation? Identify the loading on the diesel for this condition, and justify its operation at that light load for that extended period.

Response

The normal configuration of the onsite auxiliary power system is subdivided into two groups of equipment, each of which is powered from a separate reserve auxiliary transformer (RAT). Each group of equipment consists of one 4.16-kV Class 1E train, one or more nonsafety-related 4.16-kV buses, and one 13.8-kV nonsafety-related bus. The electrical connections from the offsite source to the RATs and from the RATs to the Class 1E buses are designed in accordance with the requirements of General Design Criterion 17. Each of these sources of preferred power has immediate access to the offsite power sources. IEEE 308-1974, as endorsed by Regulatory Guide 1.32, requires a minimum of one offsite source per train which shall normally be available during operation and accident conditions. The VEGP design has two sources of preferred power, each of which is sized for the normally connected load and has access to all transmission system power sources. The statement in the FSAR addresses the normal configuration of the auxiliary power distribution at the 4.16-kV level. Under the conditions discussed in paragraph 8.3.1.1.2.D ~~(which requires that the transfer be made to the alternate source only if the normal preferred power source, the standby power source, and the redundant Class 1E 4.16-kV bus are all lost simultaneously)~~ DELETE the system can be reconfigured to allow access to the alternate preferred power source at the 4.16-kV level. Under the conditions identified in paragraph 8.3.1.1.2.D, (excluding the connection of both Class 1E buses to the same RAT) ADD only one Class 1E train would be available; therefore, there is no possibility of overloading the alternate source RAT.

The capability of a RAT is limited by the capacity of the "Y" transformer winding, in that this winding is sized to provide power to one Class 1E train in addition to the connected non-Class 1E loads (approximately one-half of the non-Class 1E loads per unit). Following a loss of one preferred power

ATTACHMENT TO S.E. (REV. 1) FOR REA VG-8621

Question 430.60

FSAR paragraphs 8.3.1.1.2.D and 8.3.1.1.3.D indicate that only one circuit breaker is provided for the two cubicles available at each Class 1E 4.16-kV bus for connection to the normal or alternate offsite power source. Paragraph 1.9.6.2 seems to indicate that the arrangement may also be used to interconnect the redundant 4.16-kV safety buses when operating from the standby source (diesel generators). Interlocks should exist which preclude the manual closing of both interconnecting circuit breakers. This will prevent overloading of a preferred power source and interconnection of the redundant safety buses. Discuss your compliance.

Response

Paragraph 1.9.6.2 states that provision has been made for manually connecting redundant Class 1E trains together. This is only done under administrative control ~~if the normal preferred power source, the standby power source, and the redundant Class 1E 4.16-kV bus were all lost simultaneously,~~ as discussed in paragraph 8.3.1.1.2.D, by removing the normal Class 1E 4.16-kV breaker from its cubicle and installing it in the alternate (empty) cubicle. The normal preferred source Class 1E 4.16-kV breaker should not be removed from its cubicle and installed in the alternate cubicle when operating from the standby source. Should this inadvertently occur, interlocks have been provided so that when the diesel generator breaker is closed, neither of the incoming preferred source breakers can be closed locally at the switchgear. Should circumstances arise which would require the closing of a preferred source breaker in parallel with the associated diesel generator breaker, it can only be done administratively from the main control room by synchronizing the incoming preferred power source and the diesel generator. At least three manual actions must be performed to reconfigure the system in this manner: physical relocation of the 4.16-kV breaker; obtaining a handle for the synchronizing switch and closing the synchronizing switch for the alternate source voltage; and turning of the alternate breaker control switch to "close" after synchronizing the two voltages. These basic steps must be followed whether or not voltage is present from the preferred source. Ammeters are mounted in the control room to monitor the current drawn from each power source to avoid overload. Considering the failures that must have occurred and the administrative steps that would have to be followed to reconfigure the system, credit is taken for the operator monitoring the load on each power source. Information will be provided to the operator concerning the maximum permissible load which can be drawn from the RATs and the standby diesel generator.

47 Delet

Nuclear Plant Field Support Group (NPFSG)
Vogtle Electric Generating Plant
Post Office Box 1600
Waynesboro, Georgia 30830
Telephone (404) 826-3608

Terry,
Prepare an LDER
JES

Attachment 1 to
LDCR FS 88-099
(9 pages)

Southern Company Services
the southern electric system

DATE: July 20, 1988

RE: Plant Vogtle Units I and II
Intertie of Class 1E 416V Buses
REA VG-8621
File: X7BD108/X3BC03
Log: NPFSG-02142
Security Code: NC

FROM: R. L. George
NPSV Manager

TO: S. H. Chesnut

Enclosed please find the response to REA VG-8621 regarding the connection of both Class 1E 4160V buses to the same Reserve Auxilliary Transformer (RAT) during shutdown (Modes 5 and 6). A Safety Evaluation was performed and the applicable FSAR and Technical Specifications sections have been identified for required changes. Attachments to this letter include comments concerning specific aspects of this configuration and a complete Safety Evaluation with FSAR mark-ups.

If you have any questions regarding this matter contact David Gambrell at extension 4486.

This completes REA VG-8621. The original response to this REA will be transmitted to R. E. Lide.

[signature]

DLG/tmm

Attachments: 1. Comments on REA Response
2. Safety Evaluation w/FSAR mark-ups

xc: A. L. Mosbaugh	w/att	R. E. Lide	w/att
T. E. Richardson	w/o att	J. A. Bailey	w/o att
J. D. Hurd	w/o att	J. E. Hallmark	w/o att
J. W. Wheless	w/o att	F. Thompson	w/o att
J. L. Haraytk	w/o att	K. Kopecky	w/att
S. Pietrzyk	w/att	A. Parruk	w/att
W. C. Ramsey	w/att	NORMS	w/att
GPC Reading Files	w/att (2)	PFE-DDC	w/att
NPFSG Files	w/att	6-02142	

RESPONSE TO REA VG-8621

As requested by this REA the Safety Evaluation for connecting both Class 1E 4160V Buses to the same RAT has been completed and is submitted with this document. The impact to the FSAR and Tech. Spec. was reviewed and the corresponding comments and changes are included in this evaluation. Although not stated in the description of this REA, it should be understood that it is required to shed the non-Class 1E 4160V buses from the energized RAT. These loads may be powered by the UATs during this time by 'back-feeding' through the Main Step-up Transformer. Also it is required that the Non-Class 1E 4160 V Incoming breakers from the RATs must be 'racked-out' and tagged in order to prevent an automatic bus transfer from loading these buses on the energized RAT. This configuration will be implemented through the applicable procedures which shall be revised in accordance with the response to this REA. It should be noted that the disconnect links at the main generator terminals, (by which the UAT back-feed is made possible), are not shown on the Unit 1 One-Line and Three-Line Diagram drawings. This should be clarified and added to the applicable drawings.

The capability of each RAT to start and run the loads of both Class 1E distribution systems has been demonstrated by means of the following. During the ESFAS Preoperational Test 1-300-01 each RAT was shown to be capable of accommodating both Class 1E trains in conjunction with an ESF actuation signal. This capability was accepted by the NRC and is documented in SSER 5, section 8.3.1. The power rating of each RAT is more than capable of providing the required power to both trains in any mode of operation. Calculation X3CA03-1 (Aux Power System Voltage Study) documents the capability of the RATs during worst case heavy and light load conditions. Section D-2 demonstrates acceptable minimum voltage levels in conjunction with a degraded power source and worst case loading. Sections C and D-4 verify acceptable maximum voltage levels under light load conditions. These sections are in compliance with the applicable design bases and provide sufficient proof of the capability of each RAT to supply reliable power under conditions much more severe than will be experienced in the configuration proposed by this REA.

The intertie of the Class 1E 4160V buses does not conflict with the Technical Specifications LCOs regarding the AC Sources and Onsite Power Distribution Systems for Modes 5 and 6. (Sections: 3.8.1.2 and 3.8.3.2), and therefore complies with Regulatory Guide 1.93. The requirements of Reg. Guide 1.75 are met in that the breaker scheme and supporting systems of the operable Class 1E bus provide sufficient isolation and protection to prevent a common mode failure of the distribution system under this configuration during Cold Shutdown. This Safety Evaluation does not address the Technical Specifications' interpretation of equipment operability in Modes 5 and 6, with the exception of Sections 3.8.1.2 and 3.8.3.2. The interpretation of related Tech. Spec. LCOs is the responsibility of Georgia Power Company.

Based upon these comments and the Safety Evaluation this configuration is considered fully acceptable provided that the proper administrative controls and applicable LCOs are not exceeded.

DLK 7/20/88

DL015

SAFETY EVALUATION

a. Description of proposed change, test or experiment.

The following temporary configuration of the Unit 1 AC power system is required in order to remove either one of the Reserve Auxiliary Transformers (RAT; 1NXRA,B) from service during Cold Shutdown. This shall be implemented during operational Modes 5 and 6 only, in order to meet Technical Specification LCOs. To implement this configuration, the normal preferred offsite source circuit breaker of one of the Class 1E 4160 V switchgear (1AA02 or 1BA03: 1-1804-S3-A02 and A03 respectively) will be transferred to the alternate offsite source breaker cubicle. This will electrically connect both safety buses to the same RAT. The Non-Class 1E loads will be powered from the Unit Auxiliary Transformers (UAT) which will be 'back-fed' from the 230 KV bus through the Main Step-Up Transformers. This will require the main generator to be isolated at the disconnect links. Also to ensure isolation and not exceed the RAT capability, the alternate incoming breakers (feed from RATs) on the Non-Class 1E 4160 V buses must be 'racked-out' and tagged to prevent actuation by an automatic bus transfer. Applicable plant procedures must be revised to reflect the proper system alignment and concerns as a result of this configuration.

This temporary configuration of the 'Cross-Train' intertie may only be implemented during Modes 5 and 6, Per Tech. Spec. LCOs 3.8.1.2, 3.8.3.1 and 3.8.3.2, based upon Regulatory Guide 1.93. Per these specifications one of the energized safety buses and its corresponding support systems (ie. diesel generator) shall be fully operable in order to supply power to the loads required during Cold Shutdown.

(continued on Page 2 of 5)

b. Reason for proposed change, test or experiment.

The purpose of this temporary configuration is to de-energize one of the RATs for maintenance purposes while providing reliable power to both Class 1E buses 1AA02 and 1BA03, through the remaining RAT, and to the plant auxilary loads through the UATs during cold shutdown (Modes 5 and 6 only). The 'Cross-Train' intertie of the Class 1E buses has been discussed in the FSAR for use in emergency situations only. Also the question and answer section of the FSAR, and the SER address this configuration. Preoperational test 1-300-01, "Integrated Safeguards and Load Sequencing Test", demonstrated the capability of each RAT to power both Class 1E 4160 V buses in conjunction with an ESFAS signal. The NRC staff (Per SSER 5;8.3.1) found this configuration fully acceptable, provided all other Technical Specifications are met.

SAFETY EVALUATION CONTINUATION SHEET

Part A. cont..

The electrical connection of the other Class 1E switchgear to this bus will conform to the separation requirements of Regulatory Guide 1.75 in that the breaker isolation and availability of the standby power source will ensure the integrity of the required power supply regardless of failures on the alternate switchgear.

The body of this Safety Evaluation will provide more discussion on the specific impact of this configuration upon the FSAR and F.O.L. Tech. Spec. Below is a summary of all applicable references.

F.O.L. Technical Specification
LCOs: 3.8.1.2, 3.8.3.1, 3.8.3.2
Bases: 3/4.8.1, 3/4.8.2, 3/4.8.3, 3/4.9.8

Final Safety Analysis Report
1.9.8.2, 8.1.4.1, 8.1.4.2, 8.3.1.1.2, Figures; 8.3.31-1 and 8.3.1-2
Table 8.3.1-2, Questions: 430.59 and 430.60 (Ammend. 7)

Safety Evaluation Report
8.3.1 and Supplement 5 (8.3.1)

GDC-17 in appendix A of 10 CFR Part 50

Regulatory Guides 1.93 and 1.75 (IEEE 384-1974)

Preoperational Test 1-300-01 (Section 6.3.42)

Vogtle Design Criteria: 1000-E, 1801, 1804, 1821

c. Does the proposed change involve a change to Technical Specifications?

(Includes Environmental Tech. Spec.) Yes ____ No X

As stated in parts A and B of this Safety Evaluation, this configuration shall be implemented only during Modes 5 and 6. The LCOs of 3.8.1.2 and 3.8.3.2 require that only one offsite power source and only one train of the emergency buses must be energized in Modes 5 and 6, provided that the corresponding diesel generator is operable. Therefore these conditions will be met and exceeded by the availability of both Class 1E distribution systems. Thus a change to the Technical Specifications is not required; however, this configuration should be carefully considered in relation to the Action Statements of the above sections.

d. Does the proposed change involve a change in the facility as described or implied in the FSAR?

Yes X No ____

FSAR Section 8.3.1.1.2 describes the Class 1E power system. The third paragraph in this section which describes the capacity of the RATs, should be revised to indicate that each RAT also has the capacity to provide power to both Class 1E Trains, (See attached mark-up). FSAR Section 8.3.1.1.2.D states that the transfer to an alternate offsite source by an emergency bus would be done only if the normal source, the standby source, and the redundant bus were all lost simultaneously. This statement should be revised to show that this may also be done during cold shutdown for maintenance purposes.

Other sections of the FSAR, as listed in part A of this Safety Evaluation, discuss the Class 1E power system, but do not require revision.

e. Does the proposed change involve a change in procedures described or implied in the FSAR?

Yes X No ____

FSAR Section 8.3.1.2.D implies the adherence to the Class 1E distribution system alignment procedures. These procedures should be revised, as applicable, to reflect the changes in the FSAR provided as a result of this temporary configuration and this Safety Evaluation. These procedures should indicate the system alignment required to implement this configuration including the back feed through the UATs. Specific requirements should include, but not limited to; 1) the alignment to remove either RAT from service, 2) rack-out and tag Non-Class 1E 4160V breakers (from RATs) to prevent automatic bus transfer, 3) safety concerns and 4) any applicable system limitations.

f. Does the proposed change involve a test or experiment not described or implied in the FSAR?

Yes ______ No X

This alignment is a temporary change in the Class 1E power system configuration and does not constitute a test or experiment. The provisions for this scheme have been stated in Section 8.3.1.1.2 and are further evaluated in Questions 430.59 and 430.60. This configuration was addressed and found acceptable by the NRC as shown in SSER 5, section 8.3.1.

g. Does the proposed change, test, or experiment increase the probability of occurrence or consequences of an accident described in the FSAR?

Yes ______ No X

FSAR Section 15, specifically 15.2.6, does not discuss the occurrence of an accident in Modes 5 and 6 which concerns the availability of redundant safety buses. If an event should occur which activates the ESFAS system, the ESF sequencer has demonstrated its operability for this configuration, (Ref: SSER 5 Section 8.3.1). Therefore this system alignment does not increase the probability of an accident as described in the applicable FSAR sections.

h. Does the proposed change, test, or experiment increase the probability of occurrence or consequences of the malfunction of any equipment or component assumed to function in accidents analyzed in the FSAR?

Yes ______ No X

This configuration is temporary and shall be administratively implemented in operational Modes 5 and 6, only. FSAR section 15.3 shows that in Cold Shutdown the plant does not require the operation of any equipment or component which would not be available to perform its safety related function as a result of this alignment of the power systems. Therefore this configuration does not increase the probability of malfunction related to the equipment assumed to function in accidents, specifically during Cold Shutdown.

i. Does the proposed change, test or experiment create the possibility of an accident or equipment/component malfunction not described and analyzed in the FSAR?

Yes ____ No X

Based upon the FSAR and Design Criterion references of part A, this modified configuration (Modes 5 and 6 only) fully conforms to the functional requirements of the Class 1E buses, the safety loads and the ESF system. Therefore this modification does not create the possibility of any equipment malfunction, specifically during Cold Shutdown.

j. Does the proposed change, test or experiment decrease the margin of safety defined by the bases of the Technical Specifications?

Yes ____ No X

Bases 3/4.8.1, 3/4.8.2 and 3/4.8.3 were evaluated concerning the impact of this temporary configuration. The availability of both Class 1E power trains meets and exceeds the initial condition assumptions of the applicable safety analyses and provides at least one set of distribution systems required for operation during Cold Shutdown. The modified plant configuration in these Modes is consistent with requirements of Regulatory Guide 1.93 and GDC-17 in appendix A of 10 CFR PART 50. The operability of the diesel generator Per 3.8.1.2 provides additional assurance that the safety function of critical systems is not lost coincident with an accident in these Modes. Therefore this alignment does not decrease any margin of safety defined in the Tech. Spec.

k. Does the proposed change, test, or experiment involve an unreviewed safety question?

Yes ____ No X

Based upon the responses to parts G,H,I, and J of this Safety Evaluation the proposed configuration described herein does not involve an unreviewed safety question. Furthermore this configuration is fully acceptable and is consistent with the requirements of the FSAR and F.O.L. Tech. Spec. provided that the proper administrative controls and applicable LCOs are not exceeded. Specific concerns and limitations are made evident in this Safety Evaluation and therefore shall be integrated into this configuration and the applicable procedures.

LDRE David Gambrell Date 7/15/88

LDS John E Hanafy Date 7/18/88

Power/Mechanical/Nuclear DS [signature] Date 7/18/88

PEMV/Designee G T Kwestan Date 7/20/88

ATTCH. TO S.E. for REA VG-3621

starting to open utilizing an early "b" control scheme. No paralleling of the two power sources occurs during the transfer.

Each unit auxiliary transformer has the capacity to supply the connected non-Class 1E load.

8.3.1.1.2 Class 1E System

The Class 1E ac power system is the power source used in or associated with shutting down the reactor and preventing or limiting the release of radioactive material following a design basis event. The system is divided into two independent ac power trains, train A and train B, each fed from an independent Class 1E bus with immediate access to offsite power sources. Figure 8.3.1-1 shows a schematic of the Class 1E ac power system. All safety-related equipment is housed in Seismic Category 1 structures.

The Class 1E ac system distributes power at 4.16 kV, 480 V, and 120 V ac to all safety-related loads. Also, the Class 1E ac system supplies through isolation devices certain selected loads which are not safety related but are important to the plant operation. Figure 8.3.1-2 indicates the major safety-related and isolated nonsafety-related loads supplied by the Class 1E ac system.

The non-Class 1E ac system supplies preferred (offsite) power to the Class 1E ac system through the reserve auxiliary transformer 4.16-kV windings. Each reserve auxiliary transformer has the capacity to supply all connected non-Class 1E running loads and to start and run the loads of one Class 1E train, or to start and run the loads of both Class 1E trains. See paragraph 8.3.1.1.2.D for further discussion. ADD

In addition to the above power distribution, the Class 1E ac system contains standby power sources which provide the power required for safe shutdown in the event of a loss of the preferred power sources. The power, control, and instrumentation cables essential for safe shutdown are routed with adequate separation from their redundant counterparts.

The following describes various features of the Class 1E systems:

A. **Power Supply Feeders**

Each 4.16-kV load group can be supplied by one of two preferred power supply feeders or one diesel generator (standby) supply feeder. Each 4.16-kV bus supplies

ATTCH TO S.E. for REA VG-8621

motor loads and 4.16-kV/480-V load center transformers with their associated 480-V buses.

B. Bus Arrangements

The Class 1E ac system is divided into two redundant trains per unit (trains A and B). For each unit, either one of the trains is capable of providing power to safely reach shutdown for that unit. Each ac train consists of a 4.16-kV bus, 480-V load centers, 480-V motor control centers, and lower voltage ac supplies. The dc control power to each train is provided from dc power supplies of the same train.

C. Loads Supplied from Each Bus

Refer to figure 8.3.1-2 for a listing of Class 1E system loads and their respective buses.

D. Manual and Automatic Interconnections Between Buses, Buses and Loads, and Buses and Supplies

No provisions exist for automatically connecting one Class 1E train to another redundant Class 1E train or for automatically transferring loads between trains.

Each Class 1E bus is provided with two (normal and alternate) offsite preferred power sources and one standby power source. During normal operation with both offsite sources available, each Class 1E bus is supplied from a separate reserve auxiliary transformer. Only one circuit breaker is provided for the two cubicles available at each Class 1E 4.16-kV bus for connections to the normal and alternate preferred offsite power sources. Transfer to the alternate offsite source would be done manually by administrative control if the normal preferred power source, the standby power source, and the redundant Class 1E 4.16-kV bus were all lost simultaneously. See paragraph 8.3.1.1.3D for further discussion of this subject.

ADD

During unit shutdown, both Class 1E 4.16-KV buses may be manually connected to the same offsite power source by administrative control provided that the non-Class 1E 4.16-KV buses powered by that source are shed.

E. Interconnections Between Safety-Related and Nonsafety-Related Buses

No interconnections are provided between the safety- and nonsafety-related buses at the same voltage level. The reserve auxiliary transformers supply power through the same 4.16-kV winding to both non-Class 1E and Class 1E buses.

Sheet 1 of 3

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR
STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the information on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (Freq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS ~~IS~~/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) Pauline Jenkins AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [x] Savannah River Site
- [x] State of South Carolina
- * [x] Georgia Emergency Management Agency
- * [x] Burke County
- [x] Aiken County
- [x] Allendale County
- [x] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE
The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 1

1. [A] THIS IS A DRILL [X] THIS IS AN ACTUAL EMERGENCY
2. AUTHENTICATION: 90 (Number) PORPOISE (Codeword)
3. TIME/DATE: 0940 (Eastern) / 03 mm / 20 dd / 90 yy REPORTED BY: Pauline Jenkins (Name)
4. SITE: VOGTLE UNIT: 1 CONFIRMATION PHONE NUMBER: 1-404-554-6762

5. EMERGENCY CLASSIFICATION:
[A] NOTIFICATION OF UNUSUAL EVENT [B] ALERT [X] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

6. [A] EMERGENCY DECLARATION AT: TIME/DATE 0940 (Eastern) / 3 mm / 20 dd / 90 yy

[B] EMERGENCY TERMINATION AT: TIME/DATE ____ (Eastern) / ____ mm / ____ dd / ____ yy (If B, go to item 16.)

7. EMERGENCY DESCRIPTION: LOSS OF ALL ON SITE AND OFF SITE AC FOR MORE THAN 15 MINUTES INITIATED AT 0920 (EASTERN). Power has been restored at 0956.

8. PLANT CONDITION: ~~[X] IMPROVING~~ ~~[X] STABLE~~ [X] DEGRADING [D] UNDETERMINED

3-20-90 RC RC

9. EMERGENCY INVOLVES:

[X] NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING: Started ____ Expected Duration ____
[B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED: Started ____ Stopped ____

10. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL N/A

[A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES
[B] RADIOACTIVE LIQUIDS [D] OTHER ____

11. RELEASE: [ ] CURIES PER SEC [ ] CURIES

[A] NOBLE GASES ____ [C] IODINES ____
[B] IODINE/NOBLE GAS RATIO (if available) ____ [D] OTHER N/A

12. REACTOR STATUS: [X] SHUTDOWN TIME/DATE ____ (Eastern) / ____ mm / ____ dd / ____ yy [B] ____ % POWER

13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ____ HRS.

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY	N/A			
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [X] NOT AVAILABLE

[A] WIND DIRECTION (from) ____ ° [C] STABILITY CLASS ____
[B] WIND SPEED (mph) ____ [D] PRECIPITATION (type) ____

15. RECOMMENDED PROTECTIVE ACTIONS:

[X] NO RECOMMENDED PROTECTIVE ACTIONS
[B] SHELTER ____
[C] EVACUATE ____
[D] OTHER ____

16. APPROVED BY: [illegible signature] (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: 0948 (Eastern) / 03 mm / 20 dd / 90 yy

0948

80310.9

GOVERNMENT AGENCIES NOTIFIED

Record the name, date, time and agencies notified

1	Leory Spriggs (name)		
*	3-20-90 (date)	1047 (time)	State of Georgia (agency)
2	Stitt Wolfe Ops Officer (name)		
	3/20 (date)	(time)	State of South Carolina (agency)
3	BARBARBELL CC operat (name)		
	3/20 (date)	10:05 (time)	DOE - SRP (agency)
4	Virginia Kitchens Dispatcher (name)		
*	3/20 (date)	(time)	Burke County, GA (agency)
5	Shirley Anderson Disp (name)		
	3/20 (date)	10:05 (time)	Aiken County, SC (agency)
6	Lynn Hankins Ops Off (name)		
	3/20 (date)	10:13 (time)	Allendale County, SC (agency)
7	Bobby Morris Chief Disp (name)		
	3/20 (date)	10:07 (time)	Barnwell County, SC (agency)

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR
STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the information on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (Freq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS ~~IS~~/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) TERESA Jones AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [x] Savannah River Site
- [x] State of South Carolina
- [x] Georgia Emergency Management Agency
- [x] Burke County
- [x] Aiken County
- [x] Allendale County
- [x] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE
The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 02

1. [A] THIS IS A DRILL [X] THIS IS AN ACTUAL EMERGENCY
2. AUTHENTICATION: N/A 33 (Number) Ba thing Suit (Codeword)
3. TIME/DATE: 1003 (Eastern) 3 mm, 20 dd, 90 yy REPORTED BY: Teresa B. Jones (Name)
4. SITE: VOGTLE UNIT: 1 CONFIRMATION PHONE NUMBER: 1-404-554-6762
5. EMERGENCY CLASSIFICATION:
   [X] NOTIFICATION OF UNUSUAL EVENT [X] ALERT [C] SITE AREA EMERGENCY [D] GENERAL EMERGENCY
6. [A] EMERGENCY DECLARATION AT: TIME/DATE ~~0840~~ 0940 WRB (Eastern) 3 mm, 20 dd, 90 yy
   [B] EMERGENCY TERMINATION AT: TIME/DATE ______ (Eastern) / ___ mm / ___ dd / ___ yy (If B, go to item 16.)
7. EMERGENCY DESCRIPTION: Downgrade from Site Area emergency to ~~Unusual Event~~ WRB 3-20-90 ALERT Event. Onsite power restored at 0956 Eastern.
8. PLANT CONDITION: [X] IMPROVING [B] STABLE [C] DEGRADING [D] UNDETERMINED
9. EMERGENCY INVOLVES:
   [X] NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING Started ____ Expected Duration ____
   [B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED Started ____ Stopped ____
10. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL
    [A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES
    [B] RADIOACTIVE LIQUIDS [D] OTHER ______
11. RELEASE: [ ] CURIES PER SEC. [ ] CURIES
    [A] NOBLE GASES ______ [C] IODINES ______
    [B] IODINE/NOBLE GAS RATIO (if available) ______ [D] OTHER ______
12. REACTOR STATUS: [A] SHUTDOWN: TIME/DATE ______ (Eastern) / ___ mm / ___ dd / ___ yy [B] ___ % POWER
13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ______ HRS.

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [X] NOT AVAILABLE
    [A] WIND DIRECTION (from) ______ ° [C] STABILITY CLASS ______
    [B] WIND SPEED (mph) ______ [D] PRECIPITATION (type) ______
15. RECOMMENDED PROTECTIVE ACTIONS:
    [A] NO RECOMMENDED PROTECTIVE ACTIONS
    [B] SHELTER ______
    [C] EVACUATE ______
    [D] OTHER ______
16. APPROVED BY: [signature] (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: 1015 (Eastern) 3 mm, 20 dd, 90 yy

80310.9

GOVERNMENT AGENCIES NOTIFIED

Record the name, date, time and agencies notified:

1. Leory Spriggs (name)
   3-20-90 (date) 1050 (time) State of Georgia (agency)

2. Robert Duggleby (name)
   3-20-90 (date) 1034 (time) State of South Carolina (agency)

3. Barbara Bell (name)
   3-20-90 (date) 1031 (time) DOE - SHP (agency)

4. Rusty Sinders (name)
   3-20-90 (date) 10:56 (time) Burke County, GA (agency)

5. Pat Page (name)
   3-20-90 (date) 1038 (time) Aiken County, SC (agency)

6. Lynn Hankins (name)
   3-20-90 (date) 1029 (time) Allendale County, SC (agency)

7. Bobby Morris (name)
   3-20-90 (date) 1022 (time) Barnwell County, SC (agency)

Sheet 1 of 3

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR
STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the information on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (Freq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS ~~IS~~/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) Pauline Jenkins AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [x] Savannah River Site
- [x] State of South Carolina
- [x] Georgia Emergency Management Agency
- [x] Burke County
- [x] Aiken County
- [x] Allendale County
- [x] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE
The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 3

1. [A] THIS IS A DRILL [X] THIS IS AN ACTUAL EMERGENCY
2. AUTHENTICATION 89 (Number) Starfish (Codeword)
3. TIME/DATE 1035 (Eastern) , 3 (mm) , 20 (dd) , 90 (yy) REPORTED BY: PAULINE JENKINS (Name)
4. SITE: VOGTLE UNIT: 1 CONFIRMATION PHONE NUMBER: 1-404-554-6762

5. EMERGENCY CLASSIFICATION:
[A] NOTIFICATION OF UNUSUAL EVENT [X] ALERT [C] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

6. [A] EMERGENCY DECLARATION AT: TIME/DATE 0940 (Eastern) , 3 (mm) , 20 (dd) , 90 (yy)
[B] EMERGENCY TERMINATION AT: TIME/DATE ______ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) (If B, go to item 16.)

7. EMERGENCY DESCRIPTION: Onsite power restored at 0956.
Core temperature stable at 98°F

8. PLANT CONDITION: [X] IMPROVING [B] STABLE [C] DEGRADING [D] UNDETERMINED

9. EMERGENCY INVOLVES:
[X] NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING Started ____ Expected Duration ____
[B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED Started ____ Stopped ____

10. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL
[A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES
[B] RADIOACTIVE LIQUIDS [D] OTHER ____

11. RELEASE: [ ] CURIES PER SEC [ ] CURIES
[A] NOBLE GASES ____ [C] IODINES ____
[B] IODINE/NOBLE GAS RATIO (If available) ____ [D] OTHER ____

12. REACTOR STATUS: [X] SHUTDOWN: TIME/DATE ____ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) [B] ____ % POWER

13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ____ HRS.

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [X] NOT AVAILABLE
[A] WIND DIRECTION (from) ____ ° [C] STABILITY CLASS ____
[B] WIND SPEED (mph) ____ [D] PRECIPITATION (type) ____

15. RECOMMENDED PROTECTIVE ACTIONS:
[A] NO RECOMMENDED PROTECTIVE ACTIONS
[B] SHELTER ____
[C] EVACUATE ____
[D] OTHER ____

16. APPROVED BY: A Bockhold (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: 1035 (Eastern) , 3 (mm) , 20 (dd) , 90 (yy)

103109

GOVERNMENT AGENCIES NOTIFIED

Record the name, date, time and agencies notified.

* 1. Leroy Spriggs
(name)
3-20-90 | 1059 | State of Georgia
(date) | (time) | (agency)

2. Jennie Giddings Coord
(name)
10:50 | State of South Carolina
(date) | (time) | (agency)

3. Barbara Bell Com Oper
(name)
10:48 | DOE - SRP
(date) | (time) | (agency)

* 4. Rusty Sanders Chief
(name)
Burke County, GA
(date) | (time) | (agency)

5. Pat Page Com Supv
(name)
10:46 | Aiken County, SC
(date) | (time) | (agency)

6. Lynn Hankins Ops Officer
(name)
10:45 | Allendale County, SC
(date) | (time) | (agency)

7. Betty Morris Chief Disp
(name)
10:44 | Barnwell County, SC
(date) | (time) | (agency)

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR
STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the information on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (I.eq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS IS/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) ________ AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [x] Savannah River Site
- [x] State of South Carolina
- [x] Georgia Emergency Management Agency
- [x] Burke County
- [x] Aiken County
- [x] Allendale County
- [x] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE
The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 4

1. [A] THIS IS A DRILL [X B] THIS IS AN ACTUAL EMERGENCY

2. AUTHENTICATION: 32 (Number) Fibers (Codeword)

1105 3. TIME/DATE: 1105 / 3 / 20 / 90 (Eastern) mm dd yy REPORTED BY: E Pickett (Name)

4. SITE: VOGTLE UNIT: One CONFIRMATION PHONE NUMBER: 1-404-554-6762

826-3??8

5. EMERGENCY CLASSIFICATION:

[A] NOTIFICATION OF UNUSUAL EVENT [X B] ALERT [C] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

6. [X A] EMERGENCY DECLARATION AT: TIME/DATE: 9.40 / 3 / 20 / 90 (Eastern) mm dd yy

[B] EMERGENCY TERMINATION AT: TIME/DATE: ____ / ____ / ____ / ____ (Eastern) mm dd yy (If B, go to item 16.)

7. EMERGENCY DESCRIPTION: Loss of ALL on site power, On site power has been restored.

8. PLANT CONDITION: [X A] IMPROVING [B] STABLE [C] DEGRADING [D] UNDETERMINED

9. EMERGENCY INVOLVES:

[X A] NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING: Started ____ Expected Duration ____

[B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED: Started ____ Stopped ____

10. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL

[A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES

[B] RADIOACTIVE LIQUIDS [D] OTHER ____

11. RELEASE: [ ] CURIES PER SEC. [ ] CURIES

[A] NOBLE GASES ____ [C] IODINES ____

[B] IODINE/NOBLE GAS RATIO (If available) ____ [D] OTHER ____

12. REACTOR STATUS: [A] SHUTDOWN: TIME/DATE: ____ / ____ / ____ / ____ (Eastern) mm dd yy [B] ____ % POWER

13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ____ HRS.

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [ ] NOT AVAILABLE

[A] WIND DIRECTION (from) 300 ° [C] STABILITY CLASS A

[B] WIND SPEED (mph) 9 [D] PRECIPITATION (type) None

15. RECOMMENDED PROTECTIVE ACTIONS:

[X A] NO RECOMMENDED PROTECTIVE ACTIONS

[B] SHELTER ____

[C] EVACUATE ____

[D] OTHER ____

16. APPROVED BY: T Beckham (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: 11:02 / 3 / 20 / 90 (Eastern) mm dd yy

90/10.9

Sheet 1 of 3

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR
STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the information on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (Freq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS ~~IS~~/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) Elmer Pickett AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [X] Savannah River Site
- [X] State of South Carolina
- [X] Georgia Emergency Management Agency
- [X] Burke County
- [X] Aiken County
- [X] Allendale County
- [X] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE
The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 5

1. [A] THIS IS A DRILL [B] THIS IS AN ACTUAL EMERGENCY
2. AUTHENTICATION: 6? (Number) Ice Chest (Codeword)
3. TIME/DATE: ____ (Eastern) / 3 (mm) / 20 (dd) / 90 (yy) REPORTED BY: E Pickett (Name)

Rec'd 11:35

4. SITE: VOGTLE UNIT: One CONFIRMATION PHONE NUMBER: 1-404-554-6762

TSC 1-404-826-3504

5. EMERGENCY CLASSIFICATION:
[A] NOTIFICATION OF UNUSUAL EVENT [B] ALERT [C] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

6. [A] EMERGENCY DECLARATION AT: TIME/DATE: 940 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)
   [B] EMERGENCY TERMINATION AT: TIME/DATE: ____ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) (If B, go to item 16.)
7. EMERGENCY DESCRIPTION: Restoring offsite electrical power, Presently on onsite emergency power.
8. PLANT CONDITION: [A] IMPROVING [B] STABLE [C] DEGRADING [D] UNDETERMINED
9. EMERGENCY INVOLVES:
   [A] NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING: Started ____ Expected Duration ____
   [B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED: Started ____ Stopped ____
10. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL
    [A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES
    [B] RADIOACTIVE LIQUIDS [D] OTHER ____
11. RELEASE: [ ] CURIES PER SEC. [ ] CURIES
    [A] NOBLE GASES ____ [C] IODINES ____
    [B] IODINE/NOBLE GAS RATIO (If available) ____ [D] OTHER ____
12. REACTOR STATUS: [A] SHUTDOWN: TIME/DATE: ____ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) [B] ____ % POWER
13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ____ HRS

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [ ] NOT AVAILABLE
    [A] WIND DIRECTION (from) 300 ° [C] STABILITY CLASS A
    [B] WIND SPEED (mph) 9 [D] PRECIPITATION (type) None
15. RECOMMENDED PROTECTIVE ACTIONS:
    [A] NO RECOMMENDED PROTECTIVE ACTIONS
    [B] SHELTER ____
    [C] EVACUATE ____
    [D] OTHER ____
16. APPROVED BY: R Bockhold (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: 11:30 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)

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Sheet 1 of 3

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR
STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the information on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (Freq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS ~~IS~~/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) Elmer Pickett AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [x] Savannah River Site
- [x] State of South Carolina
- [x] Georgia Emergency Management Agency
- [x] Burke County
- [x] Aiken County
- [x] Allendale County
- [x] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE
The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 6

1. [A] THIS IS A DRILL   [B] THIS IS AN ACTUAL EMERGENCY
2. AUTHENTICATION: 51 (Number)   Fail (Codeword)

12:05 3. TIME/DATE: 12:05 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)   REPORTED BY: Elmer Pickett (Name)

4. SITE: VOGTLE   UNIT: One   CONFIRMATION PHONE NUMBER: 1-404-554-6762

404-826-3508

5. EMERGENCY CLASSIFICATION:
   [A] NOTIFICATION OF UNUSUAL EVENT   [X] ALERT   [C] SITE AREA EMERGENCY   [D] GENERAL EMERGENCY

6. [X] EMERGENCY DECLARATION AT: TIME/DATE 9:40 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)
   [B] EMERGENCY TERMINATION AT: TIME/DATE ____ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) (If B, go to item 16.)

7. EMERGENCY DESCRIPTION: Off site power has been restored

8. PLANT CONDITION: [X] IMPROVING   [B] STABLE   [C] DEGRADING   [D] UNDETERMINED

9. EMERGENCY INVOLVES:
   [X] NO RELEASE (If A, go to item 14.)   [C] A RELEASE IS OCCURRING   Started ____ Expected Duration ____
   [B] POTENTIAL RELEASE   [D] A RELEASE HAS OCCURRED   Started ____ Stopped ____

10. TYPE OF RELEASE: [ ] ELEVATED   [X] GROUND LEVEL
   [A] RADIOACTIVE GASES   [C] RADIOACTIVE PARTICULATES
   [B] RADIOACTIVE LIQUIDS   [D] OTHER ____

11. RELEASE: [ ] CURIES PER SEC.   [ ] CURIES
   [A] NOBLE GASES ____   [C] IODINES ____
   [B] IODINE/NOBLE GAS RATIO (If available) ____   [D] OTHER ____

12. REACTOR STATUS: [A] SHUTDOWN: TIME/DATE ____ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy)   [B] ____ % POWER

13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW   [ ] UNCHANGED   DURATION: ____ HRS.

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [ ] NOT AVAILABLE
   [A] WIND DIRECTION (from) ~~300~~ 345 °   [C] STABILITY CLASS A
   [B] WIND SPEED (mph) ~~9~~ 5   [D] PRECIPITATION (type) None

15. RECOMMENDED PROTECTIVE ACTIONS:
   [X] NO RECOMMENDED PROTECTIVE ACTIONS
   [B] SHELTER ____
   [C] EVACUATE ____
   [D] OTHER ____

16. APPROVED BY: [signature] (Name)   EMERGENCY DIRECTOR (Title)   TIME/DATE: 12:02 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)

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Sheet 1 of 3

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the informacion on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (Freq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS ~~IS~~/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) Elmer Pickett AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [x] Savannah River Site
- [x] State of South Carolina
- [x] Georgia Emergency Management Agency
- [x] Burke County
- [x] Aiken County
- [x] Allendale County
- [x] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE
The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 7

1. [A] THIS IS A DRILL [B] THIS IS AN ACTUAL EMERGENCY
2. AUTHENTICATION: 93 (Number) Sandflea (Codeword)

12 35 3. TIME/DATE: 12.35 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy) REPORTED BY: Elmer Pickett (Name)

4. SITE: VOGTLE UNIT: One CONFIRMATION PHONE NUMBER: ~~1-404-554-6762~~ 404-826-3503

5. EMERGENCY CLASSIFICATION:
[A] NOTIFICATION OF UNUSUAL EVENT [B] ALERT [C] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

6. [A] EMERGENCY DECLARATION AT: TIME/DATE: 9:40 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)
[B] EMERGENCY TERMINATION AT: TIME/DATE: ______ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) (If B, go to item 16.)

7. EMERGENCY DESCRIPTION: Offsite power has been restored.

8. PLANT CONDITION: [A] IMPROVING [B] STABLE [C] DEGRADING [D] UNDETERMINED

9. EMERGENCY INVOLVES:
[A] NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING Started ____ Expected Duration ____
[B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED Started ____ Stopped ____

10. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL
[A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES
[B] RADIOACTIVE LIQUIDS [D] OTHER ______

11. RELEASE: [ ] CURIES PER SEC. [ ] CURIES
[A] NOBLE GASES ______ [C] IODINES ______
[B] IODINE/NOBLE GAS RATIO (If available) ______ [D] OTHER ______

12. REACTOR STATUS: [A] SHUTDOWN: TIME/DATE: ______ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) [B] ____ % POWER

13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ______ HRS.

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [ ] NOT AVAILABLE
[A] WIND DIRECTION (from) 345 ° [C] STABILITY CLASS A
[B] WIND SPEED (mph) 5 [D] PRECIPITATION (type) None

15. RECOMMENDED PROTECTIVE ACTIONS:
[A] NO RECOMMENDED PROTECTIVE ACTIONS
[B] SHELTER ______
[C] EVACUATE ______
[D] OTHER ______

16. APPROVED BY: T Bechhold (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: 12:32 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)

80310.9

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR
STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the information on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (Freq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS ~~IS~~/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) Elmer Pickett AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [x] Savannah River Site
- [x] State of South Carolina
- [x] Georgia Emergency Management Agency
- [x] Burke County
- [x] Aiken County
- [x] Allendale County
- [x] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE
The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 8

1. [A] THIS IS A DRILL [X B] THIS IS AN ACTUAL EMERGENCY

2. AUTHENTICATION: 63 (Number) Sharks (Codeword)

1:05 3. TIME/DATE: ____ (Eastern) / 3 (mm) / 20 (dd) / 90 (yy) REPORTED BY: Elmer Pickett (Name)

4. SITE: VOGTLE UNIT: One CONFIRMATION PHONE NUMBER: 1-404-554-6762

404-826 3500

5. EMERGENCY CLASSIFICATION:

[A] NOTIFICATION OF UNUSUAL EVENT [X B] ALERT [C] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

6. [X A] EMERGENCY DECLARATION AT: TIME/DATE 9:40 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)

[B] EMERGENCY TERMINATION AT: TIME/DATE ____ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) (If B, go to item 16.)

7. EMERGENCY DESCRIPTION: offsite power restored.

8. PLANT CONDITION: [X A] IMPROVING [B] STABLE [C] DEGRADING [D] UNDETERMINED

9. EMERGENCY INVOLVES:

[X A] NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING: Started ____ Expected Duration ____

[B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED: Started ____ Stopped ____

10. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL

[A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES

[B] RADIOACTIVE LIQUIDS [D] OTHER ____

11. RELEASE: [ ] CURIES PER SEC. [ ] CURIES

[A] NOBLE GASES ____ [C] IODINES ____

[B] IODINE/NOBLE GAS RATIO (If available) ____ [D] OTHER ____

12. REACTOR STATUS: [A] SHUTDOWN: TIME/DATE ____ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) [B] ____ % POWER

13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ____ HRS.

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [ ] NOT AVAILABLE

[A] WIND DIRECTION (from) 345 ° [C] STABILITY CLASS A

[B] WIND SPEED (mph) 5 [D] PRECIPITATION (type) None

15. RECOMMENDED PROTECTIVE ACTIONS:

[X A] NO RECOMMENDED PROTECTIVE ACTIONS

[B] SHELTER ____

[C] EVACUATE ____

[D] OTHER ____

16. APPROVED BY: T Boehler (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: 1:00 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)

80310 9

Sheet 1 of 3

CHECKLIST 2

EMERGENCY NOTIFICATION MESSAGE FOR STATE AND LOCAL RESPONSE AGENCIES

A. INSTRUCTIONS:

1. Complete as much of the information on this form as possible.
2. Have the Emergency Director sign the form to authorize release.
3. These notifications MUST be made within 15 minutes of event classification.
4. Use communication circuits in the following order of priority:
   a. ENN (broadcast to all stations simultaneously)
   b. SC Backup ENN (Two digit phone numbers found in VEGP Emergency Response Telephone Directory)
   c. Commercial telephones (Phone numbers in VEGP Emergency Response Telephone Directory)
   d. Radios:
      1. Use SRS radio in TSC (Freq. 1, ask SRS to notify other South Carolina agencies).
      2. Use Burke County radio in TSC (ask Burke County to notify the Georgia Emergency Management Agency).

B. INITIAL ROLL CALL: State the following:

THIS ~~IS~~/IS NOT A DRILL! (Cross out one)
HELLO, THIS IS (Name) Elmer Pickett AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EMERGENCY NOTIFICATION FORM. STANDBY TO RECEIVE A MESSAGE. (Proceed with roll call in the following order, check box for responding agencies)

- [X] Savannah River Site
- [X] State of South Carolina
- [X] Georgia Emergency Management Agency
- [X] Burke County
- [X] Aiken County
- [X] Allendale County
- [X] Barnwell County

C. NOTIFICATION MESSAGE TRANSMISSION: Transmit complete notification form, obtain roll call and record acknowledgements.

NOTE

The Emergency Notification Message for State and Local Response Agencies (Sheet 2 and 3 of 3) Checklist 2, of this procedure is a reproduction of the actual form. The actual form should be used, although reproduction of the form in this procedure is authorized.

EMERGENCY NOTIFICATION

Number 9

1. [A] THIS IS A DRILL [B] THIS IS AN ACTUAL EMERGENCY
2. AUTHENTICATION: 54 (Number) Lig... 40450 (Codeword)
3. TIME/DATE: 1:50 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy) REPORTED BY: Elmer Pickett (Name)

Dec 1:35

4. SITE: VOGTLE UNIT: One CONFIRMATION PHONE NUMBER: ~~1-404-554-6762~~ 404-826-3508

5. EMERGENCY CLASSIFICATION: None

[A] NOTIFICATION OF UNUSUAL EVENT [B] ALERT [C] SITE AREA EMERGENCY [D] GENERAL EMERGENCY

6. [A] EMERGENCY DECLARATION AT: TIME/DATE: 9:40 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)

[B] EMERGENCY TERMINATION AT: TIME/DATE: 1347 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy) (If B, go to item 16.)

7. EMERGENCY DESCRIPTION: ______

8. PLANT CONDITION: [A] IMPROVING [B] STABLE [C] DEGRADING [D] UNDETERMINED

9. EMERGENCY INVOLVES:

[A] NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING: Started ____ Expected Duration ____
[B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED: Started ____ Stopped ____

10. TYPE OF RELEASE: [ ] ELEVATED [X] GROUND LEVEL

[A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES
[B] RADIOACTIVE LIQUIDS [D] OTHER ____

11. RELEASE: [ ] CURIES PER SEC. [ ] CURIES

[A] NOBLE GASES ____ [C] IODINES ____
[B] IODINE/NOBLE GAS RATIO (If available) ____ [D] OTHER ____

12. REACTOR STATUS: [A] SHUTDOWN: TIME/DATE: ____ (Eastern) / ____ (mm) / ____ (dd) / ____ (yy) [B] ____ % POWER

13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ____ HRS.

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [ ] NOT AVAILABLE

[A] WIND DIRECTION (from) ____ ° [C] STABILITY CLASS ____
[B] WIND SPEED (mph) ____ [D] PRECIPITATION (type) ____

15. RECOMMENDED PROTECTIVE ACTIONS:

[A] NO RECOMMENDED PROTECTIVE ACTIONS
[B] SHELTER ____
[C] EVACUATE ____
[D] OTHER ____

16. APPROVED BY: A Bockhold (Name) EMERGENCY DIRECTOR (Title) TIME/DATE: 1:48 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)

80310.9

TSC HP Supv. Notes

0914 MET TOWER DATA NOT ON ERF
RAD MONITOR DATA NOT ON ERF

0920 HABITABLITY AT TSC ESTABLISHED - OK
0925 OK TO RETURN TO HPCP
0946 MET TOWER DATA FROM BASE OF MET TOWER
7-9 MPH
68°-71°
$\Delta t = -2.0$

~0950 MONITOR READINGS BEING TAKEN FROM PERMS COMPUTER
ALL NORMAL

1029 WIND 5MPH 345°
1100 MONITORS STILL NORMAL

OSC SUPPORT
REQUEST INFORMATION FORM

Date 3/26/90

Team # 2

	Onsite/Offsite
Radio Channel	1 / 5
Telephone #	4552 /724-0642

Time of call __:__ Received by: OSC Mgr [✓] Other ________

Source: TSC Mgr [ ] Maint Supv [ ] ED [ ] Other ________

TYPE OF REQUEST

Take Met Tower data

Destination: Bldg____ Lvl____ Rm____ Other Met Tower

Plant Status: Power [ ] Alert [ ] Site Area [✓] Gen Emerg [ ]

Radiological/Hazard conditions: None [ ] Specify ________

Number of people: I&C__ HP__ MEC__ EL__ OPS__ CHEM__ SEC__

NAME (PLEASE PRINT)	EXPOSURE ID#	PRESENT EXPOSURE	ALLOWABLE EXPOSURE	DOSE REC.
1. Bob Dunmire (Leader)	53245		968	
2. Mike Brett	50717		1000	
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

*Call OSC every 30 minutes
*Periodically check Dosimeter
*Observe for any unusual conditions
*Report to OSC Mgr for debriefing when retur ning to OSC
*Sign out before leaving OSC
*Call OSC when you have reached your destination

White copy: OSC Mgr
Yellow copy: Team
Green copy: Status Loop
Orange copy: Doc Cont

TIME OUT 10:30 TIME RETURNED __:__

3-20-90 - This is not a drill

ES 16 01 ~~0920~~ Loss of all offsite power to Unit 1.
Site Area Emergency declared

~~1015 EOF activated~~ Power restored by the 'A' D/G to 1AA02 buss

1030 Downgraded to an Alert Emergency

1035 Standby Status

LE 0920 Lost 1A & 2B RAT due to swyd accident
Unit 1 - loss of AC power
Unit 2 - tripped

LE 0956 1A D/G tie in to 1AA02 - attempting to energize 1B RAT

LE 1001 Site Area Emergency declared

LE 1015 Downgraded to alert
→ Conference w/ facility managers

LE 1033 RHR stabilized on Unit 1

1039 Closing containment on Unit 1.

1040 Assembly and accountability performed

1102 Containment integrity set

1117 Unit 1 is attempting to restore 1BA03 by paralleling to grid.

1131 1B RAT is Re-energized.

1141 1BA03 is restored.

1145 1BA03 loads restored (480V swgr, MCC's)

1221 Facility Managers briefing in Conference room.

Assembly and accountability - 39 people are unaccounted for inside protected area.

News Conference - 4:30 p.m today at Visitors Center - Mr. McCoy will attend.

Need to set up area for NRC. NRC is on the way to the site from Atlanta.

All inquiries should be directed to Public Information in Atlanta (404) 526-7676.

1225 Public Information returned to Visitors Center. May be contacted at extension 3630.

LE 1042 Equipment hatch closed

LE 1101 Personnel hatch closed.

1257 ~~13~~ Diesel 1A train paralleled to grid. 1AA02 is being powered from off site source and emergency diesel generator

1312 EOF Manager, [illegible], has conference call with Emergency Director, George [illegible], discussing with State and local authorities termination of the emergency.

1347 Emergency has been terminated by Emergency Director

CK#1

#2 Release
March 20, 1990
~~[illegible]~~ A.M.
1130

The Vogtle Nuclear Plant continues to operate in "alert" status. "Alert" is the second least serious emergency classification. The plant is stable.

Unit 1 was already down for its second refueling outage. Switchyard maintenance was in progress in connection with that outage when a construction vehicle struck a switchyard power pole. One of two diesel generators attempted to start to supply power, but failed. It then was started manually. The second diesel generator was out of service for planned maintenance, also in connection with Unit 1's planned outage. That inability to supply emergency diesel-generated power for more than 15 minutes resulted in the declaration of the "site area emergency" at 9:00 A.M. (CST). Unit 2, operating at normal power, tripped off-line due to power fluctuations on the Unit 1 side of the plant. Unit 2 did not lose essential electrical power, however.

Shortly after 9:00 A.M. (CST), non-essential personnel were assembled and accounted for in accordance with emergency operating procedures. They were not evacuated as initially reported.

Work is underway to restore normal power to Unit 1.

Neither unit sustained any damage. No one was injured, and there was no release of radioactivity.

Updated information: Please note that no one was evacuated.

MAR 20 '90 12:26 088 CORP COMM 1 P.01

Sheet 1 of 3

CHECKLIST 3

NRC NOTIFICATION CHECKLIST

Initiate contact on the ENS line. When contact is made, the caller shall state:

"THIS IS/IS NOT (cross out one) A DRILL"

"HELLO. THIS IS (NAME): ______________________ AT THE VOGTLE ELECTRIC GENERATING PLANT. PLEASE OBTAIN A COPY OF THE EVENT NOTIFICATION WORKSHEET AND STAND BY TO RECEIVE A MESSAGE".

NOTES

a. If no response on the ENS is obtained, use a commercial line and one of the following numbers:

(301) 951-0550 (301) 427-4259
(301) 492-8893 (301) 427-4056

b. The Event Notification Worksheet (NRC Form 361) in this procedure is a reproduction of the actual NRC form. The actual NRC Form 361 should be used, although reproduction of the form in this procedure is authorized.

NRC FORM 361
(6-89)

U.S. NUCLEAR REGULATORY COMMISSION
OPERATIONS CENTER

EVENT NOTIFICATION WORKSHEET

NOTIFICATION TIME	FACILITY OR ORGANIZATION	UNIT	CALLER'S NAME	CALL BACK #: ENS or
0958 CST	Vogtle - Unit 1 & 2	1/2	JT Gasser	(404) 554 - 6762

EVENT TIME & ZONE	EVENT DATE
0840 CST 0820 CST	3 / 20 / 90
POWER/MODE BEFORE	**POWER/MODE AFTER**
6/1	

	EVENT CLASSIFICATIONS	
	GENERAL EMERGENCY	GEN/AAEC
X	SITE AREA EMERGENCY	SIT/AAEC
	ALERT	ALE/AAEC
	UNUSUAL EVENT	UNU/AAEC
X	50.72 NON EMERGENCY	(see next columns)
	PHYSICAL SECURITY (73.71)	D???
	TRANSPORTATION	NTRA
	20.403 MATERIAL/EXPOSURE	B???
	OTHER NDAM, NLCO, NBNL, NINF, NLTR, NONR, CDEF, FLOM, EIRR, GCON	

	1 Hr Non Emergency 10 CFR 50.72(b)(1)		
	(i)(A)	TS Required S/D	ASHU
	(i)(B)	TS Deviation	ADEV
	(ii)	Degraded Condition	ADEG
	(ii)(A)	Unanalyzed Condition	AUNA
	(ii)(B)	Outside Design Basis	AOUT
	(ii)(C)	Not Covered by OPs/EPs	ACNC
	(iii)	Earthquake	ANEA
	(iii)	Flood	ANFL
	(iii)	Hurricane	ANHU
	(iii)	Ice/Hail	ANIC
	(iii)	Lightning	ANLI
	(iii)	Tornado	ANTO
	(iii)	Oth Natural Phenomenon	ANOT
	(iv)	ECCS Discharge to RCS	ACCS
	(v)	Lost ENS	AENS
	(v)	Lost Emerg. Assessment	AARC
	(v)	Lost Offsite Comms	AESS
	(vi)	Fire	AFIR
	(vi)	Toxic Gas	ACHE
	(vi)	Rad Release	ARAD
	(vi)	Oth Hampering Safe Op.	AHIN

	4 Hr Non Emergency 10 CFR 50.72(b)(2)		
	(i)	Degrade While S/D	ADAS
X	(ii)	RPS Actuation (scram)	ARPS
	(ii)	ESF Actuation	AESF
	(iii)(A)	Safe S/D Capability	AINA
	(iii)(B)	RHR Capability	AINB
	(iii)(C)	Control of Rad Release	AINC
	(iii)(D)	Accident Mitigation	AIND
	(iv)(A)	Air Release > 2X App B	AAIR
	(iv)(B)	Liq Release > 2X App B	ALIQ
	(v)	Offsite Medical	AMED
	(vi)	Offsite Notification	APRE

DESCRIPTION

Truck backed into tower in switchyard causing loss of 1A + 2B RATs. This caused a unit loss of offsite AC power. D/G 1A started + tied then tripped. It restarted, tied + tripped. RCS at midloop with temperature at 128°F. At 0856 D/G 1A tied to A bus.

0915 downgraded to Alert. Loss of 2B RAT caused trip of Unit 2 from 100% - 1029 CST RAT B reenergized.

1040 1BA03 reenergized.

1157: 1AA02 paralleled with D/G 1A & RAT B

1247 CST: Emergency terminated.

Include: Systems affected, actuations & their initiating signals, causes, effect of event on plant, actions taken or planned, etc.

NOTIFICATIONS	YES	NO	WILL BE
NRC RESIDENT			X
STATE(s)	X		
LOCAL	X		
OTHER GOV AGENCIES		X	
MEDIA/PRESS RELEASE		X	

ANYTHING UNUSUAL OR NOT UNDERSTOOD?		YES (Explain above)	X	NO
DID ALL SYSTEMS FUNCTION AS REQUIRED?	X	YES unit 2	X	NO unit 1 (Explain above)
MODE OF OPERATION UNTIL CORRECTED: 6/3		ESTIMATE FOR RESTART DATE: unknown		ADDITIONAL INFO ON BACK?

NRC FORM 361 (6-89)

RADIOLOGICAL RELEASES: CHECK OR FILL IN APPLICABLE ITEMS (specific details/explanations should be covered in event description)

	LIQUID RELEASE		GASEOUS RELEASE		UNPLANNED RELEASE		PLANNED RELEASE		ONGOING		TERMINATED
	MONITORED		UNMONITORED		OFFSITE RELEASE		T.S. EXCEEDED		RM ALARMS		AREAS EVACUATED
	PERSONNEL EXPOSED OR CONTAMINATED				OFFSITE PROTECTIVE ACTIONS RECOMMENDED				*State release path in description.		

	Release Rate (Ci/sec)	% T.S. LIMIT	HOO GUIDE	Total Activity (Ci)	% T.S. LIMIT	HOO GUIDE
Noble Gas			0.1 Ci/sec			1000 Ci
Iodine			10 uCi/sec			0.01 Ci
Particulate			1 uCi/sec			1 mCi
Liquid (excluding tritium & dissolved noble gases)			10 uCi/min			0.1 Ci
Liquid (tritium)			0.2 Ci/min			5 Ci
Total Activity						

	PLANT STACK	CONDENSER/AIR EJECTOR	MAIN STEAM LINE	SG BLOWDOWN	OTHER
RAD MONITOR READINGS:					
ALARM SETPOINTS:					
% T.S. LIMIT (if applicable)					

RCS OR SG TUBE LEAKS: CHECK OR FILL IN APPLICABLE ITEMS: (specific details/explanations should be covered in event description)

LOCATION OF THE LEAK (e.g., SG #, valve, pipe, etc.):

LEAK RATE:	UNITS: gpm/gpd	T.S. LIMITS:	SUDDEN OR LONG TERM DEVELOPMENT:
LEAK START DATE:	TIME:	COOLANT ACTIVITY & UNITS: PRIMARY –	SECONDARY –

LIST OF SAFETY RELATED EQUIPMENT NOT OPERATIONAL:

EVENT DESCRIPTION (Continued from front)

DOWNGRADE TO ALERT

Sheet 1 of 1

CHECKLIST A

VEGP SECURITY DEPARTMENT CALL CHECKLIST

NOTE

After normal working hours or after an early dismissal or site evacuation, there may not be any personnel at the locations listed below.

Organization or Individual	Person Contacted	Primary Number	Alternate Number	Central Time/Initials
Visitor Center	STACIE RUTKER	-3630	-3631	1032 /
Training Center	KAY SMITH	-3901	-3903	1035 /
Recreation Park	REBA CLACK	-3650	-3494	1036 /
Engineering and Construction Department	DONNIE FIGUETTE	-3580 (days)	-3585 (days)	1043 /
	N/A	beeper # -828-9400	beeper # -828-9510	N/A / N/A
GPC Vogtle Central Warehouse	(NO ANSWER)	-3425	-3297	N/A / N/A
Corporate Garage	BOB PARKER	-4205		1040 /
Nuclear Operations Inprocessing Center	(NO ANSWER)	-3352	-3120	N/A / N/A

NOTE

If an Alert, Site Area Emergency or General Emergency is declared and is after normal working hours, perform the following in accordance with Checklist B "Emergency Recall Instructions"

CAPT.
PAT O'NEIL
[illegible] / 1043 hrs

SITE AREA DECLARED

Sheet 1 of 1

CHECKLIST A

VEGP SECURITY DEPARTMENT CALL CHECKLIST

NOTE

After normal working hours or after an early dismissal or site evacuation, there may not be any personnel at the locations listed below.

Organization or Individual	Person Contacted	Primary Number	Alternate Number	Central Time/Initials
Visitor Center	ANNA WILLIAMS	-3630	-3631	1009 /
Training Center	KEN HOLMES	-3901	-3903	1011 /
Recreation Park	REBA BLACK	-3650	-3494	1012 /
Engineering and Construction Department	DONNIE FIGUETTE	-3580 (days)	-3585 (days)	1017 /
	n/a	beeper # -828-9400	beeper # -828-9510	n/a / n/a
GPC Vogtle Central Warehouse	ELLIS LOCETT	-3425	-3297	1013 /
Corporate Garage	BOB PARKER	-4205		1015 /
Nuclear Operations Inprocessing Center	(NO ANSWER)	-3352	-3120	n/a / n/a

NOTE

If an Alert, Site Area Emergency or General Emergency is declared and is after normal working hours, perform the following in accordance with Checklist B "Emergency Recall Instructions"

CAM
PAT O'NEAL
[signature] / 1007 HRS

[illegible] TIME	EOF - Sequence of Events
0920	LOST 1A & 2B RAT DUE TO SWYD ACCIDENT -
	- UNIT 1 - LOSS OF AC POWER
	- UNIT 2 TRIPPED
0956	1A D/G tied to 1AA02 - ATTEMPTING TO ENERGIZE
	1B RAT
1001	SITE AREA EMERGENCY Declared
1015	DOWNGRADED TO ALERT
1033	RHR stabilized on UNIT 1
1037	CLOSING CONTAINMENT on UNIT 1
1040	ASSEMBLY AND ACCOUNTABILITY PERFORMED
1117	UNIT 1 IS ATTEMPTING TO RESTORE 1BA03 by
	PARALLELING TO GRID
1131	1B RAT IS REENERGIZED

1141	1BA03 IS RESTORED
1145	1BA03 LOADS RESTORED (480V SWGR, MCCs)
1257	1AA02 IS BEING POWERED FROM OFF SITE SOURCE
	AND EMERG. DIESEL GENERATOR
1347	TERMINATED THE EMERGENCY

Eastern Time	Loss of All offsite power to UNIT-1
0920	Site Area Emergency Declared
	Power Restored by the 'A' D/G to 1AA02 bus
1030	Down Grade to Alert

UNIT #1 PLANT PARAMETERS

	(EASTERN TIME)	1045	1115	1126	1145	1230	0105
PRIMARY	RX POWER	0	0	0	0	0	0
	RCS PRESS. (PSIG)	0	10	10	10	10	10
	RCS TEMP. (T-AVE) (°F)	104	100	106	105	100	100
	PRZ LEVEL (%)	0	0	0	0	—	—
	RCP STATUS (# PUMPS ON)	OFF	OFF	OFF	OFF	OFF	OFF
CORE COOLING	CORE EXIT TEMP (°F)	—	99	99	98	96	98
	RVLIS (%)	—	—	—	—	—	—
	SUBCOOLING (°F)	108	112	112	113	115	119
SECONDARY	S/G LEVEL (%)-(PRESS (PSIG) 1	—	—	98	98/0	98/0	98/0
	2	—	—	96	[illegible]/0	96/0	96/0
	3	—	—	100	100/0	100/0	100/0
	4	—	—	98	[illegible]/0	98/0	98/0
	CONT. PRESS (PSIG)	0.1	0.1	0.1	0.1	0.1	0.2
	CONT. TEMP. (°F)	76	76	76	76	76	76
	CONT. SUMP LEVEL	—	0	0	0	0	0

South Carolina EPD
Interoffice Memo

MEMORANDUM

TO: Stitt Wolfe

THRU: George Schneider

FROM: Bob Duggleby

DATE: March 20, 1990

SUBJ: VEGP SAE.

1. SAE declared at VEGP at 0940, 3/20/90. Reason, loss of on- and off-site AC power for more than 15 minutes.

2. State WP received ENN msg. #1 at 0959. WP notified SCEPD and DHEC 1010 and 1014 respectively. SCEPD operator confirmed Aiken, Allendale and Barnwell County notification 1016, 1018, 1025 respectively.

3. Concurrently with ENN call to State WP, Operations Branch Manager received 1st ENN message. SEOC activated at 1010. County desk officers confirmed Aiken, Allendale and Barnwell County notification at 1010, 1015 and 1010 respectively.

4. Significant action timings, etc. documented on Operations Desk Journals (Encl. 1). Green sheet messages (Encl. 2).

5. Offsite emergency notification procedures to all S.C. agencies were IAW NUREG 0654 standards. State agency emergency response excellent.

Extract from SRS Communications Log

WESTINGHOUSE
SAVANNAH RIVER COMPANY

P. O. BOX 616, BLDG 703-73A
AIKEN, S.C. 29802

FAX COVER SHEET

DATE: 3/26/90

TO: Name: LAWRENCE Mayo
Location: Plant Vogtle TRAINING Center

Phone Number: 724-0654
Confirmation Number: 722-0624

FROM: Name: FRED WEBB
Location: WSRC/EP SAVANNAH River

WSRC Emergency Preparedness
(803) 725 - 8037 FTS 239 - 8057
RETURN FAX NO. (803) 725-8392/FTS 239-8392

Number of Pages 2
(Cover Page Not Included)

Westinghouse
Savannah River Company

P.O. Box 616
Aiken, SC 29802

ESH-EPS-900115

March 26, 1990

Mr. Jim Roberts
Georgia Power Company
Plant Vogtle-Training Center
River Road
Waynesboro, GA 30830

Dear Mr. Roberts:

Request for Emergency Notification Network (ENN) Time Log

Per your request, attached please find the SRS time log for the Plant Vogtle event on 3-20-90. A consultation with the Department of Energy Office of External Affairs (DOE-OEA) and a review for classification has allowed release of this information to you.

If you have additional questions, I may be reached at 725-2944.

Sincerely,

M. G. Smith

M.G. Smith, III, Manager
Emergency Operations

FSW/lrm

Attachment

FSH-EPS-90115
Attachment

ENN Messages from Dictolog Recorder, 3-20-90

ENN #1 - 9:56 am(Start)	10:08 (Terminate)	<u>SAE</u>
ENN #2 - ? (Start)	10:22 (Terminate)	<u>ALERT</u>
ENN #3 - <u>NOT RECORDED</u>		<u>ALERT</u>
ENN #4 - 11:02 am (Start)		<u>ALERT</u>
ENN #5 - 11:29 am (Start)		<u>ALERT</u>
ENN #6 - 11:58 am (Start)		<u>ALERT</u>
ENN #7 - 12:28 pm (Start)		<u>ALERT</u>
ENN #8 - 12:59 pm (Start)		<u>ALERT</u>
ENN #9 - 1:43 pm (Start)		<u>TERMINATE</u>

REC'D 10:35 AM 3-20-90 RGB

SOUTH CAROLINA
EMERGENCY PREPAREDNESS DIVISION, OTAG

FACSIMILE TRANSMISSION NUMBER: 476

NUMBER OF PAGES TO FOLLOW: 1

TRANSMIT TO: Georgia Emergency Management

FROM: S.C. EPD, OTAG (SEOC-Columbia, S.C.)

AGENCY/OFFICE: ______

ORIGINATOR NAME: Stitt Wolfe

CITY/LOCATION: ______

ORIGINATOR TELEPHONE: ______

FACSIMILE TELEPHONE: ______

FASCIMILE TELEPHONE: 803 734-8062

VERIFICATION TELEPHONE: ______

OPERATOR INITIALS: NCS

DATE TRANSMITTED: 3/20/90

TIME TRANSMITTED: 10:30 am
(24 Hour - Eastern Time)

MAR-20-'90 10:34 ID:SC SEOC OPS CENTER TEL NO:803 734 8062 #453 P02

Pauline Jenkins

EMERGENCY NOTIFICATION

Message Number: 1

1. [A] THIS IS A DRILL [B] ✓ THIS IS AN ACTUAL EMERGENCY
2. AUTHENTICATION: 90 (Number) Porpoise (Codeword)
3. TIME/DATE: 0940 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy) REPORTED BY: Pauline Jenkins (Name)
4. SITE: Vogtle UNIT: 1 CONFIRMATION PHONE NUMBER: 1-404-554-676
5. EMERGENCY CLASSIFICATION:
   [A] NOTIFICATION OF UNUSUAL EVENT [B] ALERT [C] ✗ SITE AREA EMERGENCY [D] GENERAL EMERGENCY
6. [A] EMERGENCY DECLARATION AT: TIME/DATE: 0940 (Eastern) / 3 (mm) / 20 (dd) / 90 (yy)
   [B] EMERGENCY TERMINATION AT: TIME/DATE: ____ (Eastern) / ____ mm / ____ dd / ____ yy (If B, go to item 16)
7. EMERGENCY DESCRIPTION: Loss of all on-site and off site AC for More than 15 Minutes initiated at 0920 ES Time. Power restored at 0950
8. PLANT CONDITION: [A] ✗ IMPROVING [B] STABLE [C] DEGRADING [D] UNDETERMINED
9. EMERGENCY INVOLVES:
   [A] ✓ NO RELEASE (If A, go to item 14.) [C] A RELEASE IS OCCURRING: Started ____ Expected Duration ____
   [B] POTENTIAL RELEASE [D] A RELEASE HAS OCCURRED: Started ____ Stopped ____
10. TYPE OF RELEASE: [ ] ELEVATED [✗] GROUND LEVEL
    [A] RADIOACTIVE GASES [C] RADIOACTIVE PARTICULATES
    [B] RADIOACTIVE LIQUIDS [D] ✓ OTHER NA
11. RELEASE: [ ] CURIES PER SECOND [ ] CURIES
    [A] NOBLE GASES ____ [C] IODINES ____
    [B] IODINE/NOBLE GAS RATIO (if available) ____ [D] ✓ OTHER NA
12. REACTOR STATUS: [A] ✗ SHUTDOWN TIME/DATE Shut down for refueling (Eastern) mm dd yy ____ % POWER

NA 13. ESTIMATE OF PROJECTED OFFSITE DOSE: [ ] NEW [ ] UNCHANGED DURATION: ____ HOURS

Distance	Wholebody DOSE RATE (mrem/hr)	Child Thyroid DOSE RATE (mrem/hr)	Wholebody (mrem)	Child Thyroid (mrem)
SITE BOUNDARY				
2 MILES				
5 MILES				
10 MILES				

14. METEOROLOGICAL DATA: [✓] NOT AVAILABLE
    [A] WIND DIRECTION (from) ____ [C] STABILITY CLASS ____
    [B] WIND SPEED (mph) ____ [D] PRECIPITATION (type) ____
15. RECOMMENDED PROTECTIVE ACTIONS:
    [A] ✓ NO RECOMMENDED PROTECTIVE ACTIONS
    [B] SHELTER ____
    [C] EVACUATE ____
    [D] OTHER ____

Plant A. W. Vogtle
SECURITY DEPARTMENT REPORT
Security Incident Report

1	a. Report Number 3941-90	b. Report Date 03-20-90	c. Log Time/Date [illegible] / 03-20-9[illegible]
2	a. Classification of Incident by: W.C. Guthrie; b. Classificaton: 4234	c. Circle One 73.71 / Internal	d. Reportable YES (NO)
3	a. Type of Incident/Situation/Violation: Prime CPU Failure (Computer)		b. Location of Incident: [illegible] CPU "B"
	c. Date of Incident [illegible]	d. Time of Incident [illegible]	e. Reported by Name: Becker, H. / f. Date/Time Incident Reported [illegible]

4	Persons Involved Name	Company or Dept.	Job Title	Security Badge No.	Supervisor of Involved Person (If Employed on Site)	How Involved (If n Employee State SSN Address of Individ
a	Becker, H.	Security	ASC	0065	Taylor, W	CAS Operat
b	[illegible], R.	Security	ASC	1014	Taylor, W	Radio Operat
c	[illegible]	Security	ASC	[illegible]	Taylor, W	SAS Operato
d	Johnson, W	Security	SNS-CPT	0015	Huyck, D.	Notified
e	Huyck, D.	Security	NSSS	1753	Dannemiller, T	Notified
f	Willhite, D	GPC/G+CD	Operator	1405	Phillips, R.	Subject
g	Ferry, R.	Security	ANSS	2912	McCay, T.	Vehicle Esc
h	Phillips, R	GPC	Maintenance Foreman	2776	[illegible]	Subject's Superv. Notified

5 Incident Chronology

0721 HRS - PLANT POWER OUTAGE CAUSED CPU "B" TO GO OFF LINE, SWITCHED OVER TO BACK-UP POWE[R]

0722 HRS - CPU "A" TOOK OVER AS PRIME CPU

[illegible] HRS - CPU "B" RETURNED TO NORMAL AS BACK-UP CPU. SNS-CPT JOHNSON NOTIFIED

[illegible] HRS - ONE POINT PER MUX TEST INITIATED.

1546 HRS - ONE POINT PER MUX TEST COMPLETED

* REFERENCE EVENT CHRONOLOGY OF EMERGENCY PLANT CONDITIONS ON CONTINUATION SHEETS.

(Continue on Continuation Sheet if Necessary)

PLANT SECURITY REPORT - CONTINUATION SHEET

3941-90
REPORT NUMBER

#4 PERSONS INVOLVED [illegible]

[illegible]	SECURITY	NSC	[illegible] DANNEMILLER, T.	WAYNESBORO NEWS CENTER COORDINATOR	
[illegible]	SECURITY	SSS	[illegible] MIDDLETON, A.	WAYNESBORO NEWS CENTER COORDINATOR	
[illegible]	SECURITY	SSS	1272 MIDDLETON, A.	WAYNESBORO NEWS CENTER COORDINATOR	
[illegible], J.	SECURITY	SNS	0341	MIDDLETON, A.	WAYNESBORO NEWS CENTER COORDINATOR
[illegible], G.	SECURITY	ASST	[illegible] O'NEIL, D.	TSC COORDINATOR	
[illegible], A.	SECURITY	ANSC	1720 MCKAY, J.	TSC COORDINATOR ASSISTANT	
HARRIS, J.	SECURITY	ANSC	1891 STEWART, A.	TSC ACCESS CON[illegible]	
[illegible]	OPERATIONS	SCS	[illegible] Shoemaker, J.	SCS	
KITCHENS, C.	SECURITY	UNKNOWN	0025	DANNEMILLER, T.	ECF COORDINATOR
MCQUILLEN, T.	SECURITY	SNSA	0042	DANNEMILLER, T.	ECF COORDINATOR
CANADA, J.	SECURITY	SSS	0652	HUYCK, D.	ECF COORDINATOR
[illegible]	PLANT MANAGEMENT	PLANT MGR.	0001	N/A	PLANT GENERAL MANAGER

PLANT SECURITY REPORT - CONTINUATION SHEET

3941-90
REPORT NUMBER

Page 2 of 3 3 of 6

#5

EMERGENCY PLANT CONDITION EVENT CHRONOLOGY:

HRS - WILLHITE (TRUCK OPERATOR ESCORTED BY BERRY) BACKED A TRUCK INTO A SUPPORT POLE, KNOCKING DOWN A INSULATER HOLDING A HIGH VOLTAGE WIRE. THIS RESULTED IN A PLANT WIDE POWER OUTAGE AND CAUSED UNIT #2 TO TRIP OFF LINE, WITH POWER LOSS TO UNIT #1

1001 HRS - SITE AREA EMERGENCY DECLARED, ACCOUNTABILITY IN[ITIATED]

1002 HRS - SECURITY NET NOTIFIED OF EVENT, OSC AND TSC CARD READERS ACTIVATED, ENN COMMUNICATER DISPATCHED TO CONTROL ROOM

1005 HRS - A. MIDDLETON, J. HOLLAND, D. TAMMARO, AND J. MOORE DISPATCHED TO WAYNESBORO EMERGENCY NEWS CENTER

1012 HRS - G. GRIMES AND H. GEISBER DISPATCHED TO THE TSC (TSC COORDINATOR)

1013 HRS - POST 73C (GATE 4) NOTIFIED TO PREPARE ON OFF SITE SUPPORT VEHICLES

1015 HRS - ANSO DISPATCHED TO OSC TO ASSIST

1017 HRS - PLANT PA ANNOUNCEMENT FOR EARLY DISMISSAL

1019 HRS - POST 79C RELEASED FROM TURBINE DECK

1020 HRS - H.P. DOSIMETRY SENT TO GATE 4

1022 HRS - HARRIS DISPATCH FOR TSO ACCESS CONTROL

PLANT SECURITY REPORT - CONTINUATION SHEET

3941-90
REPORT NUMBER

#5
EMERGENCY PLANT CONDITION EVENT CHRONOLOGY CONTINUED:

1022 HRS - NOTIFICATION RECEIVED THAT THE EMERGENCY WAS DOWN GRADED TO A ALERT AT 1015 HRS.

1025 HRS - PA ANNOUNCEMENT THAT THE EMERGENCY WAS DOWN GRADED TO AN ALERT. CSOS HOPKINS REQUESTED SUPPORT FOR TWO REPAIR VEHICLES TO BE PROCESSED THROUGH GATE 4.

1028 HRS - KITCHENS, MCQUILLEN, AND CANADA DISPATCHED TO THE ECF

1040 HRS - ANSO AT THE VAR (BADGE ISLAND) NOTIFIED TO ~~EXPITE~~ EXPIDITE REPAIR CREW AND THEIR VEHICLES INTO THE PA.

1044 HRS - ESCORT OFFICERS DISPATCHED TO GATE 4 TO SUPPORT REPAIR CREW PA ENTRY

1047 HRS - TSC REQUESTED ACCOUNTABILITY STATUS

1051 HRS - SUPPORT REQUESTED FROM WAYNESBORO POLICE DEPARTMENT AND BURKE COUNTY SHERIFF'S DEPARTMENT FOR OFF SITE TRAFFIC

1058 HRS - PLANT GENERAL MANAGER (G. BOCKHOLD) ARRIVED AT THE TSC AND ASSUMED DUTY'S AS THE EMERGENCY DIRECTOR

PLANT SECURITY REPORT - CONTINUATION SHEET

3941 - SC
REPORT NUMBER
#5

EMERGENCY PLANT CONDITION EVENT CHRONOLOGY CONTINUE

1111 HRS - SECURITY PATROL ESTABLISHED OUTSIDE THE PA TO DIRECT THE NEWS MEDIA TO THE NEWS RELEASE CENTER

1112 HRS - G. GRIMES (TSC COORDINATOR) NOTIFIED THAT UNIT #2 IS A MODE-3 STAGE

1350 HRS - PLANT EMERGENCY TERMINATED, ALL PLANT PERSONNEL WAS ALLOWED ENTRY INTO THE PA

PLANT SECURITY REPORT - CONTINUATION SHEET

3941-90
REPORT NUMBER
#5

EMERGENCY PLANT CONDITION EVENT CHRONOLOGY CONTINUE

1111 HRS -- SECURITY PATROL ESTABLISHED OUTSIDE THE PA TO DIRECT THE NEWS MEDIA TO THE NEWS RELEASE CENTER

1112 HRS - G. GRIMES (TSC COORDINATOR) NOTIFIED THAT UNIT #2 IS A MODE-3 STAGE

1350 HRS - PLANT EMERGENCY TERMINATED, ALL PLANT PERSONNEL WAS ALLOWED ENTRY INTO THE PA

6 Immediate Corrective Actions

CPU "A" TOOK OVER AS PRIME CPU, BACK-UP POWER ON LINE, NOTIFICATIONS MADE, ONE POINT PER MUX TESTED.

7 Root Cause

PLANT POWER OUTAGE, CAUSE BY A TRUCK OPERATED BY WILLHITE THAT WAS BACKED INTO A SUPPORT POLE KNOCKING DOWN A INSULATER HOLDING A HIGH VOLTAGE LINE.

8 Enclosures

3-COMPUTER TRANSACTION PRINTOUT
4-STATEMENTS
5-CONTINUATION SHEETS

9

BECKER, H. L. [signature]
a. Print & Sign
Individual Making Report

Carr W. [illegible] Jr / [signature]
b. Print & Sign
Shift Supervisor

c. Print & Sign
Approving Supervisor

10 SECURITY ADMINISTRATION SECTION REVIEW

a Security Report entered into system: ______ Date: / /
(Initials of person entering information into system)

b Security Report Corrective Action Distribution (If Applicable - Print Information if Copy of Report Sent.)
If Deficiency Card is issued, enter card number here ______ and print information below.

NAME	DEPARTMENT	DATE TRANSMITTED	REPLY REQUESTED YES/N

EXAMPLE
DATA SHEET #3

SS-405
ACM-405

VOLUNTARY STATEMENT
SECURITY DEPARTMENT

(1) Date 3/28 19 90 (2) Time 9:30 (3) Place Low Voltage

(4) Name of Person Giving Statement: Donnie Willhite

(5) Address: 820 session Road Soperton Ga

(6) Work/Home Phone Number: 912-529-6569 / 3361

(7) The following information is given voluntarily:

I Drove service Truck into Low voltage swict yard. To check Fuel in welder. The posion I stop Had The pole in The blind. When I return to Truck and Back into pole

JOB TITLE operator

SUPERVISORS NAME/WORK EXTENSION Ronnie Phillips 3361

EMPLOYED BY E&CD, G.P.C.

Page of Pages

EXAMPLE
DATA SHEET #3

VOLUNTARY STATEMENT
SECURITY DEPARTMENT

(1) Date 3/20 19 90 (2) Time 1306 (3) Place PESB

(4) Name of Person Giving Statement: Berry, Richard O.

(5) Address: Rt. 1, Box 215 [illegible], GA 30833

(6) Work/Home Phone Number: Work# 3737 / Home# 404 (547-6757)

(7) The following information is given voluntarily:

I WAS ESCORTING MR. WILHITE TO FREE UP EQUIPMENT. HE WENT INTO THE SWITCH YARD ON THE NORTH SIDE OF THE TURBINE BUILDING TO FREE UP A COMPRESSOR (WELDING). THE COMPRESSOR WAS FULL, SO WE BEGAN TO BACK OUT OF THE SWITCH YARD AND HE BACKED INTO A POLE IN THE SWITCHYARD AND BROKE A CABLE. HE STATED THAT IT WAS IN HIS BLINDSPOT AND HE JUST DIDN'T SEE IT.

JOB TITLE Trained Nuclear Security Officer

SUPERVISORS NAME/WORK EXTENSION James [illegible] Gilway EXT# 3737

EMPLOYED BY Georgia Power Company

Page of Pages

O.S.C. ACCOUNTABILITY

DATE ____________

BADGE NUMBER	NAME
NO- 766	H. L. Robinson

BADGE NUMBER	NAME
NO-	

PAGE ____________

O.S.C. ACCOUNTABILITY

DATE 3-10-90

BADGE NUMBER NO-	NAME
[illegible]21	Patton [illegible]
[illegible]	[illegible]
[illegible]	[illegible]
577	Jones R.E
946	B.L. D[illegible]
1118	Glenn Harris
916	Handerson Harvey M
[illegible]	Bob Allen
[illegible]	Clinton Hatfield
[illegible]	Farris, H.J.
[illegible]	H.G. Daniel[illegible]
[illegible]	[illegible]
NC 133	Moore, Paul E
NC 960	Arnold Holland F
NC 811	Collins Reginald L

BADGE NUMBER NO-	NAME

PAGE ____________

O.S.C. ACCOUNTABILITY

DATE 3/20/90

BADGE NUMBER	NAME
NO-5G [illegible]	[illegible]
N[illegible]7	[illegible] S. Lee
[illegible] 413	Ralph Robert [illegible]
SG 360	Joe R. Wilson

BADGE NUMBER	NAME
NO-	

PAGE ______

O.S.C. ACCOUNTABILITY

DATE 3/20/90

BADGE NUMBER	NAME	BADGE NUMBER	NAME
NO- 1068	DENNIS WIDNER	NO-	
NO 1731	Bridgette Whittemore		
[illegible]	MARCUS K. JACOBS		

PAGE ________

O.S.C. ACCOUNTABILITY

DATE 3-20-90

BADGE NUMBER	NAME		BADGE NUMBER	NAME
NO-607	F Scoggins	HP	NO-	
..-824	V. Morgan	HP		
[illegible]	[illegible]	[illegible]		
~~NO 491~~				
NO 491	D Schreiber	OPS		
NO 612	T [illegible]	HP		
NO 723	R Weevel	[illegible]		
SC 753	L Bailey	HP		
52092	T.H. WRIGHT	ELECT.		
NC 243	J.M. KITCHENS	ELECT.		
NO 710	M [illegible]	[illegible]		
NO 693	M D Duncan	I&C		
NO 228	C D McKinney	Maint		
NO 531	J M Machak	Maint		
SC 4055	Jasper Taylor	HP		
SC 4022	Allen [illegible]	H.P.		
SC 432	Terrell Benton	HP		
SC 1950	Rich Yarnell	WASTE/DECON		
NC 741	C Cockrell	Maint		
~~3595~~	R Barlow	[illegible]		
SC 871	Terrance [illegible]			

PAGE ____________

O.S.C. ACCOUNTABILITY

DATE 3/20/90

BADGE NUMBER	NAME
NO-243	JIM M. Garrison
NO525	Jim FAIRES
[illegible]28	JOHN HANYCK
[illegible]61	[illegible] E PARK[illegible]
[illegible]461	SAMUEL E. WHITTEN
NO295	John Strouse
NO1129	Lorenzo Walder
[illegible]402	[illegible]
[illegible]3	Mike [illegible]
[illegible]	[illegible] Morris
NO504	JAMES GRANAY

BADGE NUMBER	NAME
NO-	

PAGE ______

O.S.C. ACCOUNTABILITY

DATE 3-20-90

BADGE NUMBER	NAME	
NO- [illegible]	[illegible]	✓
564	M.T. RAYBURN	✓
[illegible]	[illegible] Cooper	✓
[illegible]	M. R. Brown	✓
[illegible]	[illegible] HEATH	
443	[illegible]	✓
127	[illegible]	✓
[illegible]	[illegible]	✓
[illegible]	D. [illegible]	✓
[illegible]	[illegible]	✓
1665	[illegible]	✓
425	[illegible]	✓
[illegible]	[illegible] Holcomb	✓
596	J.P. HOPKINS	✓
273	H. E. Jeffers	✓
[illegible]	Brent Ansley	✓
697	Allen A. A	✓
564027	Ed Bellair	✓
[illegible]	[illegible]	✓
564293	Alvin Kinsey	✓
[illegible]	WARREN ACKER	✓
4450	JOSEPH CRIDER	✓
[illegible]	[illegible]	✓

BADGE NUMBER	NAME
NO-	

PAGE ______

O.S.C. ACCOUNTABILITY

DATE 31c0140

BADGE NUMBER	NAME
NO-30	Louavin Stokes

BADGE NUMBER	NAME
NO-	

PAGE ________

O.S.C. ACCOUNTABILITY

DATE 2-20-90

BADGE NUMBER	NAME
NO- 13	Jan Cipollone
418	Stanley Pierce
1194	SHELTON SAYLORS
503	Douglas H Hall
750	Troy Reeves III
NO-266	Betty Clark
NO 1119	MYERS PORTER
NO-050	Jerry Faulkner
NO-026	GARY HEATH
NO 1030	Jack Cole
NO 1020	Gary L Barwick
NO-890	Jimmi Williams
NO 352	Bill K White
NO 1225	N W Hendrix
NO 203	J.M. Coffey
NO 232	[illegible]
NO 198	JERRY LUCOT
SG 1951	STEVEN M[illegible]
SC 284	JEFFRIE [illegible]
NO 598	CARTER, W.R.
NO 530	HEATH, A.N.
[illegible]	Brinkley Control Rm
0776	W.H. Lewis
1216	Clifton
2360	Walden
1990	Kaiser Cntw VT

BADGE NUMBER	NAME
NO-	

PAGE ______

Billy Baker NO 566 •
~~Stan Garrison NO 243~~
Ricky Herren NO 629
Dean Gustafson NO 767 ✓
Darry Brown NO-240 ✓
Lamar Dean NO 923
James Harrell NO 245 ✓
Mike Silva NO 425 ✓
Shawn morris NO 497 ✓
Thomas Willis NO 402 ✓ – Lct-G 013
Lorenzo Wilder NO-1139 ✓
Weyman Carter NO-598 ✓
Harry Blet NO-063
~~Hattie Mo~~
James ~~Brandy~~ ~~Grad~~ Grandy NO 504 ✓
Dennis Crouch S6-4182
Theodore Davis S6-4044
Donnie Hutchins NO-306
Gary mattlage NO-199
Larry Lyda NO-128 ✓
Carl Kyle NO-246
Wayman Hutcheson NO-158 ✓
Thomas Howe NO-436 ✓
Wooldridge Holcomb NO-149 ✓
Kenneth Trippe NO-875 ✓
Amos Cordell NO-582
G A Thompson NO 302

PAGE 1 OF 1

LINE NO	ARRIVAL DATE	ARRIVAL TIME	DEPARTURE DATE	DEPARTURE TIME	NAME	AFFILIATION/ ORGANIZATION	BADGE NO	PROOF OF IDENTIFICATION	OFFICERS INITIALS	REMARKS
1	[illegible]	12:38	[illegible]	13:[illegible]	Austin Rhodes	WRDW-TV Ch 12	N/A	Drivers License Press Card	CA	
2	[illegible]	12:38	[illegible]	13:21	[illegible]	WRDW TV Ch 12	N/A	Drivers License	[illegible]	
				LAST	ENTRY [illegible]					

LINE NO	ARRIVAL DATE	ARRIVAL TIME	DEPARTURE DATE	DEPARTURE TIME	NAME	AFFILIATION/ ORGANIZATION	BADGE NO	PROOF OF IDENTIFICATION	OFFICERS INITIALS	POSITION	REMARKS
2[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
21	3-20 [illegible]	[illegible]	[illegible]		Dan Roebuck	GPC	[illegible]	Co. ID	[illegible]	GPC Sec	
22	[illegible]	[illegible]	[illegible]		[illegible]	GPC	[illegible]	[illegible]	[illegible]	[illegible]	
—	—	—		LAST ENTRY		J Moore					

PAGE 1 OF 2

LINE NO	ARRIVAL DATE	ARRIVAL TIME	DEPARTURE DATE	DEPARTURE TIME	NAME	AFFILIATION/ ORGANIZATION	BADGE NO	PROOF OF IDENTIFICATION	OFFICERS INITIALS	POSITION	REMARKS
			LOG	OPENED 1045 HRS 03-20-79							
					G.S. McCutcheon	GPC	101	SC [illegible]	[illegible]	[illegible]	
1	3-20-79	1050	3-2[illegible]		Larry Wolfe	GPC	n/a	Company ID	[illegible]	[illegible]	
2	3-20-79	1055	[illegible]		[illegible]	GPC	n/a	Company ID	[illegible]	[illegible]	
3	3-20-79	1[illegible]	[illegible]		Steve Fiester	GPC	170	Company ID	[illegible]	GPC	
4	3-20-79	10[illegible]	[illegible]		[illegible]	GPC	n/a	Company [illegible]	[illegible]	GA Sec	
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	GPC	n/a	Company [illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	GPC	n/a	Company [illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	GPC	n/a	Company [illegible]	[illegible]	[illegible]	
8	[illegible]	[illegible]	[illegible]		[illegible] Reynolds	GPC	174	Company ID	[illegible]	[illegible]	
9	3-20-79	11[illegible]	[illegible]		L.N. Brooks	GPC	182	Company ID	[illegible]	[illegible]	
10	3-20-79	11[illegible]	[illegible]	1[illegible]	Jim [illegible]	GPC	[illegible]	Company ID	[illegible]	[illegible]	
11	3-20-79	11[illegible]	[illegible]		[illegible]	GPC	[illegible]	Company ID	[illegible]	[illegible]	
12	3-20-79	11[illegible]	[illegible]		[illegible]	GPC	198	Company ID	[illegible]	[illegible]	
13	3-20-79	11[illegible]	[illegible]		[illegible]	GPC	[illegible]	Company ID	[illegible]	[illegible]	
14	3-20-79	[illegible]	[illegible]		[illegible]	GPC	183	[illegible]	[illegible]	[illegible]	
15	3-2[illegible]	11[illegible]	[illegible]		[illegible]	GPC	13[illegible]	Co ID	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	n/a	Co ID	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	12[illegible]	[illegible]	GPC	n/a	Co ID	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]		R.J. [illegible]	GPC	n/a	Co ID	[illegible]	[illegible]	
19	3-2[illegible]	[illegible]	[illegible]		R. [illegible]						
[illegible]	[illegible]	[illegible]	[illegible]								

Sheet 1 of 2

CHECKLIST 4

GEORGIA POWER COMPANY NOTIFICATION CHECKLIST

NOTE

This checklist to be completed by a Control Room Communicator following completion of initial notifications to State and Local authorities.

IMMEDIATE ACTION

1. Obtain the latest approved version of Checklist 2.
2. If any individual cannot be reached, proceed to the next person and repeat notification steps later.
3. Make the notifications below and inform the Emergency Director of any problems encountered.

   (1) Notify each individual below when any emergency class is declared or changed. Inform each of the:

   (a) time of classification
   (b) the emergency classification
   (c) the description of the event

   Utilize the information in the latest version of Checklist 2.

	Primary Number	Alternate Number	Beeper	Central Time/Initials
Security (PESB)	3737	4111	312	0902, SEG
VEGP General Manager	3118	3119	001	0903, SEG
Plant Wilson Manager	8-526-3140	8-526-3129		0903, SEG

NOTE

Request Vogtle Duty Manager to notify the On Call Project Manager

Vogtle Duty Manager	[see PLAN OF THE DAY]	0907, SEG

Sheet 2 of 2

CHECKLIST 4

GEORGIA POWER COMPANY NOTIFICATION CHECKLIST

	Primary Number	Alternate Number	Beeper	Central Time/Initials
NRC Resident Inspector(s) VEGP	4116	4249	293 009 305	0908 [illegible] /
Assistant General Manager Plant Operations	3140	404/592-2867	002	/
Manager Operations	3618		044	0909, JBG
Assistant General Manager Plant Support	3143		200	0910 JBG
Manager Training and Emergency Preparedness	3901	3903	303	0912 JBG

3-25-90

17:15 [illegible]
EST

ATTENTION

At all times, the licensee is responsible for quarantined equipment and can take action involving this equipment it deems necessary to:

- Achieve or maintain safe plant conditions,
- Prevent further equipment degradation, or
- Test or inspect, as required by the plant's Technical Specifications.

To the maximum degree possible, these actions should be coordinated with the Team Leader in advance, or notification made as soon as possible.

Effective Time: 241000MAR90

The Licensee is maintaining the following Items Quarantined: 3-24-90

~~1.~~ Mid-Loop Instrumentation still connected. Released per K. Brockman @ 17:15 1

2. PERMS

3. Met Tower (To include the data transmission connections)

4. POL Truck (Allowable to use for normal deliveries)

5. Emergency Notification Network (ENN) (Notification Procedures excluded)

6. 230 KV Insulator to Reserve Auxiliary Transformer 1A (broken on 20 Mar 90)

7. All replaced CALCON Switches for 1A & 1B Diesel Generators

The following restrictions concerning Diesel Generator troubleshooting, repair, and testing are agreed to: This Applies to DG A & DG B except as noted.

1. Any component replacements will be concurred with by the Team Leader prior to performing the work. All replaced components will be retained until released by the Team Leader.

2. The following test procedures will be reviewed by the team prior to performance:

   a. 1B UV Test
   b. 1A UV Test (#1)
   c. 1A UV Test (#2)

3. The following tests will be announced to the team leader, or a designated representative, 4 hours prior to initiation. It will not be performed until approved by the Team Leader.

  a. 1B Sequencer Test
  b. 1B UV Test
  c. 1A UV Test (#1)
  d. 1A UV Test (#2)

The following personnel will not take vacation until approved by the Team Leader (normal off days are not restricted):

  a. All Operations Department Management
  b. All operators (licensed and non-licensed) in the Operations Department who were on duty during the 20 Mar 90 event
  c. All Event Critique Team members.

Nuclear Plant Vogtle

Georgia Power

DATE: March 20, 1990

RE: **Site Area Emergency/Alert**
Emergency Follow-Up Report
Log: NOTS-00334

FROM: G. Bockhold, Jr.

TO: Distribution List

The attached is a written follow-up report for the Site Area Emergency/Alert Emergency which occurred at Vogtle Electric Generating Plant on March 20, 1990.

If you have any questions, please contact R. M. Odom at 404-826-3201.

G Bockhold

TEW:dmh

Attachment

Distribution Attached

8 - HOUR FOLLOW-UP REPORT FOR LOSS OF A.C. POWER CAUSING SITE AREA EMERGENCY

The following is a summary of occurrences and actions taken for the VEGP Site Area Emergency which occurred on March 20, 1990.

At 0820 CST, Unit 2 was at 100% power and Unit 1 was in its second refueling outage (Mode-6). A construction vehicle backed into a support pole damaging an incoming voltage line, resulting in a loss of offsite power.

The Unit 2 Generator tripped sensing a ground fault resulting in a Unit 2 Reactor trip. Unit 2 Diesel Generator (DG) started and essential electrical power was maintained.

At 0840 CST, a Site Area Emergency was declared due to loss of A.C. power for Unit 1 for greater than 15 minutes. Unit 1B DG was out of service for planned maintenance and the Unit 1A DG failed to automatically pick up the electrical buses with loss of offsite power. Non-essential personnel were assembled and accounted for in accordance with emergency operating procedures.

At 0856 CST, the Unit 1 DG started and loaded successfully, restoring power to the unit.

At 0915 CST, the Site Area Emergency was downgraded to an Alert Emergency.

At 1247 CST, the Alert Emergency was terminated when offsite power was restored to onsite electrical buses.

Neither unit sustained any damage. No one was injured, and there was no radioactive release as a result of this event. Further information will be provided at a later date.

DISTRIBUTION:

Paul R. Lunsford
Director, Emergency Preparedness Division
State of South Carolina
1429 Senate Street
Columbia, South Carolina 29201

Bobby R. Mauney
Aiken County Emergency Services
828 Richland Avenue, West
Aiken, South Carolina 29801

J. Hair
Barnwell County Disaster Preparedness Agency
Barnwell County EOC
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Harold W. Awbrey
Director Allendale County Disaster Preparedness Agency
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Billy J. Clack
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James Earl Porterfield
Burke County Emergency Management Agency
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Waynesboro, Georgia 30830

Heyward Shealy
Chief, Bureau of Radiological Health
S. C. DHEC
2600 Bull Street
Columbia, South Carolina 29201

U. S. Department of Energy
Savannah River Operations Office
Office of External Affairs
P. O. Box A
Aiken, South Carolina 29801
ATTENTION: James M. Gaver

C. K. McCoy
42 Inverness Center Parkway
Birmingham, Alabama 35242

xc: Mr. Stewart Ebneter
United States Nuclear Regulatory Commission
Region II
Suite 2900
101 Marietta Street, Northwest
Atlanta, Georgia 30323

DEFICIENCY CARD

18594

CARD # 190 0123 UNIT 1 (X) UNIT 2 ( ) COMMON ( )

1. DESCRIPTION OF DEFICIENCY (ADDITIONAL SHEETS ATTACHED? YES NO)

Loss of all offsite and all onsite A.C. Power for more than 15 min

COMPLETED BY INITIATOR

LOCATION OF THE DEFICIENCY? Unit one

WHAT IS AFFECTED BY THE DEFICIENCY? Unit one AC Power

HOW WAS THE DEFICIENCY DISCOVERED? Visual in C.R.

EVENT TIME 0821 DATE 3-20-90 DISCOVERY TIME Same DATE Same

DISCOVERED BY? J. Hopkins WORK # 3.05 DEPT. ops

2. SHIFT SUPERVISOR REVIEW

COMPLETED BY SS WITHIN 2 HOURS

NAME OF SS REPORTED TO? R.B. Snyder TIME 0821 DATE 3-20-90

PLANT MODE/CONDITION: 6 - Midloop

IS IMMEDIATE NOTIFICATION REQUIRED? YES NO

IF YES, 1 HOUR, 2 HOUR, OR 24 HOUR REPORTED: DATE 3-20-90 TIME 0913

TECH. SPEC. REQUIRED ACTION TAKEN? YES NO N/A

LIST APPLICABLE TECH. SPEC. SECTION(S) 3.8.1.2, 3.8.3.2

SUMMARIZE COMPENSATORY ACTION TAKEN: D/G A tied to 1AA02; B RAT restored & tied to 1BA03, then 1AA02

LCO INITIATED NO YES #

TYPE: INFO LCO FIRE

WRT INITIATED NO YES #

SIGNATURE OF SS R Snyder TIME 1100 DATE 3-20-90

COMPLETED IN 1 DAY

3: TSCHNICAL SUPPORT REVIEW

NSAC EVALUATION/REVIEW (CHECK APPROPRIATE BOX) DATE RECEIVED 3-21-90

A.		NOT A DEFICIENCY. SEND COPY TO RESPONSIBLE DEPT., CLOSE ORIGINAL.
B.	X	REPORTABLE DEFICIENCY. REPORT # DER # 1-90-7
C.		DEFICIENCY, NOT REPORTABLE.

EXPLANATION

This event is reportable per 10 CFR 50.73(a)(2)(vii)(B) because a single event led to a system becoming inoperable which is designed to remove residual heat

RESPONSIBLE DEPT: Tech. Support

NSAC REVIEWER: Tim Webb DATE: 3-21-90

NSAC SUPERVISOR: A.R. Rickman for R.M. Odom DATE: 3-22-90

COMPLETED IN 1 MONTH BY RESPONSIBLE DEPT.

4: DISPOSITION, FOR DEFICIENCIES IN ITEM 3C ABOVE ONLY.

CAUSE CODE: EVENT CODE: (ATTACH SHEETS FROM 00058-C)

CAUSING DEPT(S):

DEPARTMENT MANAGER: DATE:

START	END	
10:13 (AM)	10:16AM	ON ENN - PLANT VOGTLE TSC CALLED CONTROL ROOM - NO RESPONSE, - THEN PERFORMED AN ENN ROLL CALL, WITH ANSWERS FROM GEMA, SOUTH CAROLINA, S.R. AND ALLENDALE COUNTY, BUT NO RESPONSE FROM BURKE CO, AIKEN CO. AND BARNWELL COUNTY.
10:15(AM)	10:16 AM	ON PHONE (DURING ENN ROLL CALL) PAULINE JENKINS "OF PLANT VOGLE" (LATER WAS TOLD BY L. MAYO SHE WAS CALLING FROM THE CONTROL ROOM) "THIS IS NOT A DRILL" WHEN SHE ASKED "DID YOU GET THE MESSAGE ON THE ENN?" L. SPRIGGS REPLIED "HE HAS NOT BROADCAST IT YET, HE IS DOING A ROLL CALL." JENKINS THEN SAID "I HAD BROADCAST IT ONE TIME EARLIER AND I COULD NOT GET... WHEN I DID THE ROLL CALL I COULD NOT GET GEMA NOR BURKE COUNTY SO I WAS TRYING TO DO A FOLLOW UP." WHEN L. SPRIGGS SAID "OK... I DID NOT GET YOUR BROADCAST, AND HE'S BRINGING EVERYBODY UP ON THE CIRCUIT NOW FROM THE TSC" — THEN JENKINS RESPONDED "OK, WELL, YOU CAN GET IT FROM THEM, THEN."

START	END	
10:19	10:20	GARRETT (GEMA) CALLED VOGTLE TSC ON ENN — SAID NOTHING HAD BEEN HEARD SINCE THE ROLL CALL (ON THE ENN) AND ASKED IF THERE WOULD BE FURTHER MESSAGES. TSC SAID THEY WERE CALLING THE STATION THAT DID NOT RESPOND TO THE ROLL CALL AND "WHEN WE HAVE EVERYBODY ON LINE, WE'LL PROCEED TO A FURTHER ANNOUNCEMENT." WHEN ASKED, THE TSC REPLIED "THIS IS NOT A DRILL."
10:22	10:22	THE VOGTLE EOF CALLED THE TSC "FOR AN ENN COMMUNICATIONS CHECK. THE TSC DID RESPOND.
GARRETT CALLS S. CAROLINA		
10 29		GARRETT (GEMA) CALLED TSC ON ENN — "DO YOU HAVE A MESSAGE TO BROADCAST?" TSC SAID "WE HAVE NOT BEEN GIVEN A MESSAGE TO BROADCAST AT THIS TIME. I CAN INFORM YOU THAT THE SITE AREA EMERGENCY HAS BEEN DOWNGRADED TO AN ALERT EMERGENCY." GARRETT THE ASKED "YOU HAVE NOT HAD ANY MESSAGE TO SEND OUT AT ALL?" TSC REPLIED

"THERE WAS A MESSAGE SENT FROM THE CONTROL ROOM INITIALLY... WE HAVE NOT SENT ANY MESSAGES OFFICIALLY FROM THE TSC, SINCE THE TSC WAS ACTIVATED."

GARRETT: "BUT YOU DON'T HAVE ANYTHING THAT'S BEEN BROADCAST?"

TSC: "NO, I DON'T HAVE A COPY OF ANYTHING THAT WAS SENT."

(GARBLED VOICE, UNKNOWN SOURCE)

GARRETT: "AM I SPEAKING TO THE CONTROL ROOM OR THE TSC?"

TSC: "YOU HAVE THE VOGLE TSC"

GARRETT: "ACCORDING TO GEORGE SCHNIDER OF SOUTH CAROLINA EMERGENCY PREPAREDNESS DIVISION, A SITE AREA EMERGENCY WAS DECLARED."

TSC: 'THAT IS CORRECT"

GARRETT: "AND THAT THEY RECEIVED THAT INFORMATION ON THE ENN FROM YOU."

TSC: "THEY DID NOT RECEIVE IT FROM VOGTLE TSC, THEY WOULD HAVE RECEIVED IT FROM THE CONTROL ROOM."

GARRETT: "WHY HAVE WE NOT RECEIVED THAT INFORMATION?"

4

TSC: "I CANNOT SAY THAT. WHEN THE TSC WAS ACTIVATED... WE HAVE NOT BEEN GIVEN A FORMAL MESSAGE TO TRANSMIT YET, AND WE CAME IN ON THIS AT THE POINT WHERE THE CONTROL ROOM WAS STILL MAKING NOTIFICATIONS THROUGH THE VARIOUS CHANNELS."

GARRETT: "IS THE CONTROL ROOM NOT ON THE CIRCUIT AT THIS TIME?"

TSC: WE CAN ASK FOR THEM TO COME UP. I DON'T KNOW IF THEY'RE MONITORING THE CIRCUIT AT THIS TIME.

GARRETT: "ASK THE CONTROL ROOM SUPERVISOR TO COME ON THIS CIRCUIT SO WE CAN VERIFY WHETHER OR NOT THEY HAVE PASSED TRAFFIC ON THIS CIRCUIT TO ANYONE

"I CAN ATTEMPT TO FIND THAT OUT BY OTHER MEANS

IMMEDIATE CORRECTIVE ACTIONS

The following actions have been completed/implemented since the event:

The switchyard has been temporarily barricaded to prevent unauthorized entry. Entry is controlled by the Operations shift.

A letter from the General Manager was issued with requirements for flagmen for trucks.

Maintenance was conducted on the ERF computer that allowed it to receive data from the MET tower.

A standing order was implemented to provide guidance for shift and communicators on the use of ENN equipment and priorities for notifications.

Note: checklist will be sent - NRC along with the certification letter.

SPDS CHECKLIST

05-24-90

This checklist is intended to aid licensees in determining the status of their SPDS. Bracketed, [ ], information refers to the section in NUREG-1342 where discussions on the specific question(s) may be found.

1.0. GENERAL DESCRIPTION

1.1 Plant Name: Vogtle Electric Generating Plant - Unit 1

1.2 Who/What organization developed the original version of the SPDS software implemented at your site?

__X__ Utility (in-house)

_____ Utility Owner's Group; which? __________

_____ Contractor; which? __________

_____ Other; who? __________

1.3 If the SPDS software has undergone significant modifications (i.e., more than 25 percent of software replaced or modified) since original implementation, list the organization performing the modification:

N/A

_____ Utility (in-house) __________

_____ Utility Owner's Group __________

_____ Contractor __________

_____ Other __________

1.4 What is the hardware host on which the current SPDS software is implemented?

______ Westinghouse P250

______ Westinghouse P2500

______ Gould/SEL, Model Number ______

______ Digital (DEC), Model Number ______

______ IBM, Model Number ______

______ MODCOMP, Model Number ______

______ Babcock & Wilcox (Recall) ______

______ Honeywell, Model Number ______

______ Burroughs, Model Number ______

X Other: Manufacture, Model FOXBORO 1/A

1.5 How many total CPUs are accessible by SPDS software on the computer system described in the previous question? One

1.6 What is the approximate MIPS rating of all the CPUs counted above?

0.8 MIPS NOTE: Use a decimal fraction if less than 1.0

If SPDS does not run on a single computer system, provide the following information for the minority parameter set provide by a second computer system. For example, a frequent occurrence of this case is where a separate but adjacent computer terminal provides radiological parameters.

1.7 Manufacturer N/A

1.8 Model Number N/A

1.9 List parameters provided: N/A
(on the second system)

1.10 Are significant changes in hardware or software planned in the next two years? ____ YES X NO.

If YES, briefly describe planned changes and list a schedule of major milestones.

N/A

2.0 PARAMETER SELECTION

This section is divided into two parts: the safety functions, and the parameters used to depict each safety function.

2.1 Plant-Specific Safety Functions [III.F.]

List the title of the plant-specific safety function(s) displayed on your SPDS that is (are) equivalent to the safety function in Supplement 1 to NUREG-0737.

Supplement 1 To NUREG-0737 Safety Functions	Plant-Specific Safety Functions
2.1.1. Reactivity Control	Reactivity

2.1.2 Core Cooling and Heat Removal	Core Cooling Heat Sink
2.1.3. RCS Integrity	RCS Integrity RCS Inventory
2.1.4. Radioactivity Control	Radiation
2.1.5. Containment Conditions	Containment

2.2 Parameters Selected to Display Each Safety Function

The purpose of this section is to specify a list of parameters used to depict each of the five safety functions identified in Supplement 1 to NUREG-0737. Lists of parameters that have been found acceptable to NRC through previous SPDS post-implementation reviews have been provided. One list of parameters applies to pressurized water reactors in general, and the other list applies to boiling water reactor.

NOTE: Check any parameters that have been selected as an SPDS parameter. List any additional parameters under the relevant "Others" category. Include additional safety functions and parameters that are a part of your SPDS.

PRESSURIZED WATER REACTOR SPDS PARAMETER SELECTION CHECKLIST [III.F.1]

Supplement 1 To NUREG-0737 Safety Functions		Parameters
2.2.1	Reactivity Control	Neutron Flux X Source Range X Intermediate Range X Power Range X Other: (List) Source Range Startup Rate Intermediate Range Startup Rate
2.2.2	Reactor Core Cooling and Heat Removal from the Primary System	X RCS Level X Subcooling Margin * Hot Leg Temperature X Cold Leg Temperature X Core Exit Thermocouples X Steam Generator Level X Steam Generator Pressure X RHR Flow X Other: (List) Number of RCPs Running Available Feedwater Flow

* T AVG is used instead of Hot Leg Temperature

2.2.3	RCS Integrity	X RCS Pressure X Cold Leg Temperature * Containment Sump Level (See 2.2.5) X Steam Generator (Pressure, Level, Radiation) X Other: (List) RCS Level Pressurizer Level PORV Position

* Is provided as a Containment Parameter; see 2.2.5

2.2.4 Radioactivity Control X Stack Monitor
X Steamline Radiation
X Containment Radiation
X Other: (List) All Technical Specification Radiation Monitors

2.2.5 Containment Conditions X Containment Pressure
* Containment Isolation
* Containment Hydrogen Concentration
X Other: (List) Containment Radiation
Containment Temperature
Containment Sump Level

* Located on top level display, not in the CSFST's.

2.2.6 Other Safety Functions X YES ___ NO
If yes, list functions & parameters.
2.2.2 Includes Heat Sink
2.2.3 Includes RCS Inventory

BOILING WATER REACTOR SPDS PARAMETER SELECTION CHECKLIST [III.F.2]

Supplement 1 to NUREG-0737 Safety Functions		Parameters
2.2.6	Reactivity Control	___ APRM ___ SRM ___ Other: (List) N/A
2.2.7	Reactor Core Cooling & Removal	___ RPV Water Level ___ Drywell Temperature ___ Other: (List) N/A

2.2.8 Pressure Vessel Integrity

___ RPV Pressure
___ Other: (List) ___N/A___

2.2.9 Radioactivity Control

___ Main Stack or Offgas (Pretreatment) Monitor
___ Containment Radiation Monitor
___ Other: (List) ___N/A___

2.2.10 Containment Integrity

___ Drywell Pressure
___ Drywell Temperature
___ Suppression Pool Temperature
___ Suppression Pool Level
___ Containment Isolation Valve Status
___ Drywell Hydrogen Concentration
___ Drywell Oxygen Concentration
___ Other: (List) ___N/A___

2.2.11 Other Safety Functions ___ Yes ___ No

If yes, list functions & parameters

___N/A___

2.3 Detailed Parameter Questions [III.F.1.e and III.F.2.e]

2.3.1 Are containment isolation demand signals input to SPDS (e.g., PWR Phase A/B Isolation Demand Signal or BWR Group Isolation Demand Signals)?
_X_ YES ___ NO

2.3.2 Does the SPDS use actual containment isolation valve position as an input to monitor successful isolation? _X_ YES ___ NO

3.0 DISPLAY OF SAFETY FUNCTIONS [III.F.]

3.1 Does the SPDS provide the status of all five safety functions on one display page? _X_ YES ___ NO

3.2 Are the individual parameters that support the safety functions grouped by safety function? X YES ___ NO

3.3 Is the status of all five safety functions always displayed on the SPDS? [III.B.2] X YES ___ NO

4.0 RELIABLE DISPLAY [III.A.3 except as noted]

4.1 Is the SPDS Hosted on the same computer system as the plant process computer? ___ YES X NO

If NO, does the SPDS computer rec[illegible] some of the computer point inputs from the process computer? ___ YES X NO *

* The SPDS and the plant process computer share some inputs. However, the signal splits upstream of the CPU, i.e., no datalinks.

4.2 List location of accessible (e.g., keyboards) devices capable of changing SPDS data. [III.A.3.a]

The Vogtle SPDS does not allow use of manually entered data.

The Vogtle SPDS does allow removal of data points known to be invalid. This removal is accomplished by a special keyboard insert which is controlled by the Shift Supervisor. These removed points are flagged as "Bad" and are magenta in color.

4.3 Are SPDS hardware availability data documented? X YES ___ NO

If YES, what is the documented percent availability of the SPDS hardware over the past 12 months? NOTE: Availability should be based on power operation, startup, hot standby, and hot shutdown only and not include other plant modes. 99.936 (excluding Radiation Monitors) % Available

4.4 Are the SPDS computer points included in routine instrument loop surveillances? [III.A.3.a] X YES ___ NO

4.5 What percentage of software verification and validation has been completed?

X 100%
___ Approximately half
___ Planned in the future
___ Other, describe ___

4.6 Have changes to the SPDS host computer and software been maintained under a formal Software/Hardware Change Request (or equivalent) system? Check all that apply below:

__X__ Yes: For how long? __2__ years *
____ No
____ Have plans to in the future

* Changes prior to commercial operations were documented by the software vendor (GPC-Atlanta)

4.7 How frequently does the SPDS display invalid or erroneous information? [III.A.3.a]

____ frequent (above 5 percent)
____ infrequent (1-5 percent)
__X__ rare (less than 1 percent of the time)

4.8 How frequently have any of the critical safety functions been in a false alarm condition? [III.A.3.a]

____ frequent (above 5 percent)
____ infrequent (1-5 percent)
__X__ rare (less than 1 percent of the time)

4.9 Does the SPDS display valid parameter information during adverse containment conditions? __X__ YES ____ NO

5.0 HUMAN FACTORS [III.E except as noted]

Human factors in the context of SPDS design includes the usefulness of the technical information displayed on the screen to users and their performance during emergency operations. Human factors also includes display design techniques, such as labeling, display layout, and control/display integration.

This section provides a sample of the kinds of questions to be asked to help determine the degree to which the SPDS design incorporates accepted human factors principles.

5.1 Who is the prime user of the SPDS? [III.B.1]

____ Shift Supervisor
____ Shift Technical Advisor
____ Board Operators
__X__ Other (specify) All of above

5.2 Are all SPDS controls located at the SPDS workstation? __X__ YES ____ NO [III.B.1]

If NO, where are the controls located? ______________________

5.3 Is all SPDS-related information physically displayed such that the information can clearly be read from the SPDS user's typical position? [III.A.1 and III.B.1]

__X__ YES ____ NO

If NO, what specific information is available at other locations?

5.4 How are SPDS displays accessed? [III.A.2]

- ________ Continuous display, no interaction possible.
- ___X___ Keyboard, one or two keystroke function key.
- ________ Keyboard, greater than 2 keystrokes.
- ________ Touchscreen
- ________ Cursor/menu (mouse, joystick, up/down key).

5.5 Does the SPDS consistently respond to user commands in less than 10 seconds? [III.A.2]

__X__ YES ____ NO

If NO, is feedback provided to the user regarding delays in response? ____ YES ____ NO

5.6 Does the SPDS sampling rate for parameters match the display update rate those parameters? [III.A.2]

__X__ YES ____ NO *

* Numerous SPDS data points are received via the ERF Data Concentrator which interfaces with the Westinghouse supplied PSMS. The Data Concentrator scans the PSMS once per sec. The ERF scans the Data Concentrator every 2.5 seconds which is the SPDS display update rate. Non-PSMS data, excluding radiation monitoring data, is scanned and updated every 2.5 seconds. Therefore, the sampling rate for parameters occurs at least as frequently as the SPDS display update rate except for radiation monitoring data which may take as long as 10 seconds to update. Additionally, if the primary communications link between the Plant Effluent Radiation Monitoring System (PERMS) and the SPDS is not functioning, then swap-over to the backup communications link can slow the update rate for PERMS data to once per minute. In such a case, a screen message appears to warn the operator of the slow update rate for PERMS data.

If NO, what specific parameters do not match?

5.7 Are all parameter units of measure displayed on the SPDS consistent with the units of measure included in the emergency operating procedures?
__X__ YES ____ NO

5.8 Are all parameter labels and abbreviations consistent with the labels and abbreviations included in the emergency operating procedures? __X__ YES ____ NO

5.9 Is any of the displayed information in a form that requires transformation or calculation?
____ YES __X__ NO

If YES, what types of transformations or calculations are necessary?

5.10 Are the high and low-level setpoints consistent with hard-wired parameter instrumentation and reactor protection system setpoints? ____ YES __X__ NO

Emergency Operation Procedure Limits dominate, limits vary by mode and match trips or are more conservative to alert operators.

5.11 Does SPDS display high-and low-level setpoints?
__X__ YES ____ NO

5.12 Are the SPDS calculated values such as subcooling margin, consistent with calculated values on the plant process computer?
__X__ YES ____ NO

5.13 Are all parameter units of measure displayed on SPDS consistent with the hard wired instrumentation?
__X__ YES ____ NO

5.14 Are all parameter labels and abbreviations consistent with hard-wire instrument labels and abbreviations?
__X__ YES ____ NO

5.15 Were the technical basis for software specifications verified with plant-specific data (for example, heat-up and cool-down limits, variable steam generator setpoints and high and low level alarm setpoints)?
__X__ YES ____ NO

5.16 List LERs written as a result of SPDS software problems.
NONE

6.0 TRAINING [III.C.2 all questions]

6.1 Does simulator training include training in the use of the SPDS?
__X__ YES ______ NO

6.2 How long is formal classroom training for SPDS users?
____ No formal classroom training
____ Less than 2 hours
____ 2-4 hours
__X__ More than 4 hours

6.3 Is there periodic requalification training for SPDS? __X__ YES
____ NO

If YES, how often? Used during every simulator session

6.4 When are SPDS users given training regarding the relationship of the parameters to the plant safety functions? Check all that apply below:

______ Not trained
______ On the job or required reading
______ During requalification training
__X__ During an initial SPDS training program

7.0 ELECTRICAL ISOLATION [III.C.1 all questions]

7.1 What isolation devices are currently used?

Optical isolators located in the Reliance Electric Co Isomate digital isolation system.

Datalinks from PSMS and PERMS provide spatial separation, one-way flow of data and optical isolators are installed on data links providing protection to the safety systems.

NSSS Analog Isolators from Westinghouse 7300 Process Control System.

Isolation Device

NLP Group 1 card
NLP Group 2 card
NLP Group 3 card
NLP Group 4 card

Referenced Correspondence

Log
BS 6704 dated 10/24/86
GN 1143 dated 10/31/86
GN 1164 dated 11/12/86
GP 11896 dated 11/14/86
GN 1226 dated 12/10/86
GN 1305 dated 01/09/87

7.2 Are these devices the same ones that were originally installed and approved by NRC? _X_ YES ____ NO

Memo—Long Form

ITEMS ON FUEL TRUCK 05-65-90
FOR G. WEST

DATE 3/30/90

TO

TO

TO

TO

TO

- [ ] NOTE AND FILE
- [ ] NOTE AND RETURN TO ME
- [ ] RETURN WITH MORE DETAILS
- [ ] NOTE AND SEE ME ABOUT THIS
- [ ] PLEASE ANSWER
- [ ] FOR YOUR APPROVAL
- [ ] PREPARE REPLY FOR MY SIGNATURE
- [ ] TAKE APPROPRIATE ACTION
- [ ] PER YOUR REQUEST
- [ ] SIGNATURE
- [ ] FOR YOUR INFORMATION
- [ ] INVESTIGATE AND REPORT

COMMENTS

Fueling Truck - Maximum Capacities

85W140 - Gear Oil - 187 gal.
15W40 - Motor Oil - 187 gal
W32 - Hydraulic Oil - 38 gal.
Grease - 55 gal. or 400 lb.
Transmission Fluid - 187 gal.
#68 Hydraulic Oil - 187 gal.
Antifreeze - 75 gal.
Water - 75 gal.
Gasoline - 200 gal.
Diesel Fuel - 300 gal.
Waste Oil - 122 gal.

700219A

~~05-66-90~~
05-66-1-90
[illegible]

Exhibit A-13

Photograph Log Sheet

Investigation Title I.IT, Vogtle Unit 1 Page 1 of 2

Photographer GARMON WEST, JR.

Facility/Location Control Room, Unit One

Camera Type minolta 5000

Lighting Type Automatic

Film Type 35 MM

Date of Event march 20, 1990

Time of Event 9:20 AM (EST)

Film Roll No. 1

Picture No.	Scene/Subject	Date of Photo	Time of (in CST) Photo	Direction Camera Pointing
1	Augusta/Goshen Voltmeters	March 24, 1990	circa CST 12:13P	toward control room panels
2	Auto XFMR No. 2			
3	Auto XFMRs Nos 1 and 2			
4	Electrical Panel			
5	Electrical Panel & Annunciators			
6	Electrical Panel and Annunciators			
7, 8	Letdown/Chg. Flow & Bst. Press			
9, [illegible]	Accumulator Pressure Tanks 1&2			
10	Accumulator Pressure Tanks 3&4			
11	PROTEUS Computer Display			
12	RWST Reset Switches (2) & RHR SUCT VENT LINE TRN-B			
13	RHR TO HL, RHR SUCT VENT LINE TRN-A, RWST RESET			

Exhibit A-13

Photograph Log Sheet

Investigation Title IIT, Vogtle Unit 1 Page 2 of 2

Photographer GARMON WEST, JR.

Facility/Location Control Rm, Unit 1

Camera Type Minolta 5000

Lighting Type Automatic

Film Type 35 MM

Date of Event March 20, 1990

Time of Event 9:20 AM (EST)

Film Roll No. 1

Picture No.	Scene/Subject	Date of Photo	Time of (circa EST) Photo	Direction Camera Pointing
14	RHR HX TRAIN A&B outlet & bypass	3/24/90	circa 12:13p	toward control room panels
15	RHR PUMP PRESSURE Trains A&B			
16	Incore TC			
17	Operator aid for mid-loop op			
	RCS Loop 1 Hot Leg NR Level RCS Loop 4 Hot Leg WR Level			
18	SI PUMP DISCH Trains A&B			

05-66-2-90
Jn Do Bay

Exhibit A-13

Photograph Log Sheet

Investigation Title IIT Vogtle Unit 1 Page 1 of 2

Photographer GARMON WEST, JR.

Facility/Location Control Room Unit 1

Camera Type Minolta 5000

Lighting Type Automatic

Film Type 35 MM

Date of Event March 20, 1990

Time of Event 9:20 AM (EST)

Film Roll No. 2

Picture No.		Scene/Subject	Date of Photo	Time of (in EST) Photo	Direction Camera Pointing
1,2	19,20	Plant Safety monitoring System	3/24/90	circa 12:13PM	toward control room panels
3	21	Control Rod Position			
4	22	RCS Flow Trip Alarm			
5	23	PRZR Press., PRZR Spray, PRZR LVL			
6	24	RCS PRESS, RCS HL TEMP			
7	25	RCS CL TEMP OPΔT, OTΔT, ΔT			
8	26	CHG Flow, RCS Loops 1-4, ΔT			
9	27	PRESS, LTDN Flow, RCS Loop 4, RCS TEMP Loop 3, ΔT			
10	28	RCS Loop 4, RCS TEMP Loop 2, ΔT			
11	29	Safety A, RCS Loop 1 HL Press., RCS Temp Loop 1, ΔT			
12	30	RCS LOOP 4 (ΔT, OPΔT, OTΔT, T-AVG & RC Flow Loop 4			

Exhibit A-13

Photograph Log Sheet

Investigation Title IIT Vogtle Unit 1 Page 2 of 2

Photographer GARMON WEST, JR.

Facility/Location Control Room Unit 1

Camera Type Minolta 5000

Lighting Type Automatic

Film Type 35 MM

Date of Event March 20, 1990

Time of Event 9:20 AM (EST)

Film Roll No. 2

Picture No.		Scene/Subject	Date of Photo	Time of (in EST) Photo	Direction Camera Pointing
13	31	RCS LOOP 4, & RCS Flow Loop 4	3/21/90	circa 12:13PM	toward control room panels
14	32	RCS Loop 2, & RCS Flow Loop 2			
15	33	RCS Loop 1, & RCS Flow Loop 1			
16	34	RCS Loop 1 HL PRESS, RCS TEMP LOOP 1, ΔT			
17	35	PRZR Relief Temp, RCS Loop 1			
18	36	In Core TC			
19-23	37-41	Electrical panel & annunciators			

05-66-3-90

Exhibit A-13

Photograph Log Sheet

Investigation Title IIT Vogtle Unit 1 Page 1 of 2

Photographer GARMON WEST, JR.

Facility/Location Refueling Truck-Related Pictures at the Equipment Vehicle Maintenance Area

Camera Type Minolta 5000

Lighting Type Automatic

Film Type 35 MM

Date of Event March 20, 1990

Time of Event 9:20 AM (EST)

Film Roll No. 3

	Picture No.	The Truck Scene/Subject	Date of Photo	Time of (in EST) Photo	Direction Camera Pointing
1,2	~~42,43~~	Rear View	3/25/90	circa 4 pm	at various positions around truck
3-6	~~44-47~~	Blind Spot Assessment (180 to 195 feet)			
7	~~48~~	Left View			
8	~~49~~	Fuel Cam			
9	~~50~~	Closeup of event-related damaged area 1			
10	~~51~~	Closeup of event-related damaged area 2			
11,12	~~52,53~~	Closeup of event-related damaged area 1			
13	~~54~~	Closeup of event-related damaged area 2			
14	~~55~~	Fire Extinguisher			
15	~~56~~	Fire Extinguisher			
16,17	~~57,58~~	Front View			
18	59	Inside Cab-(Driver's Door Open)			

Exhibit A-13

Photograph Log Sheet

Investigation Title IIT Vogtle Unit 1 Page 2 of 2

Photographer GARMON WEST, JR.

Facility/Location Refueling Truck-Related Pictures at the 'Equipment Vehicle maintenance area

Camera Type Minolta 5000

Lighting Type Automatic

Film Type 35 mm

Date of Event March 20, 1990

Time of Event 9:20 AM (EST)

Film Roll No. 3

	Picture No.	The Truck Scene/Subject	Date of Photo	Time of (in EST) Photo	Direction Camera Pointing
19	~~60~~	Front Windshield (from inside)	3/25/90	around 6 pm	at various positions in/around truck
20-23	~~61-64~~	Blind spot assessment thru left & right mirrors	(	)	(
24	~~65~~	Left side view	(	)	)