

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

March 25, 1991

United States Nuclear Regulatory Commission
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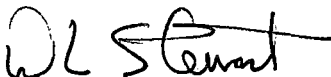
Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
REVISIONS TO EMERGENCY PLAN

Pursuant to 10 CFR 50.54(q), enclosed is a revision to the Surry Power Station Emergency Plan. This revision incorporates an increase in the augmentation time for the Core - Technical Support Team Member which was approved by the NRC in a letter dated May 18, 1990. The balance of the revision does not decrease the effectiveness of our Emergency Plan, and the entire plan, as changed, continues to meet the standards of 10 CFR 50.47(b).

The plan, as changed, restructures the document format and reflects the annual update as indicated by revision bars. Please update your manual by replacing your existing copy of the plan with the revised plan.

Very truly yours,


W. L. Stewart

Enclosures

cc: U. S. Nuclear Regulatory Commission
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Mr. W. E. Holland
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Surry Power Station

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50-280 Superseded Per Rev. 33 To Surry River Station
Emergency Plan dtd 3/25/91 # 9103290208

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RECOMMEND APPROVAL: <u>John B. Costello</u>			DATE: 4-27-89																																									
APPROVED STATION NUCLEAR SAFETY AND OPERATING COMMITTEE: <u>DDAC</u>			DATE: 4-27-89																																									
APPROVED (MANAGER) (If Required): <u>[Signature]</u>			DATE: APR 27 1989																																									

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UNIT NOS. 1 & 2

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SURRY POWER STATION
EMERGENCY PLAN

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SECTION 1

DEFINITIONS

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1.0 Definitions - Glossary of Terms

Annually - Every 12 months plus or minus 3 months.

Assessment Actions - Those actions taken during an accident to obtain and process information that is necessary to make decisions to implement specific emergency measures.

Biannual - Occurring twice a year.

Biennial - Occurring every two years.

Buffer Sectors - Those parts of the ten-mile EPZ in which immediate protective action is taken during a radiological emergency and corresponds to the two 22 1/2° sectors flanking each side of the 22 1/2° primary sector. Therefore, immediate protective action is taken in a 67 1/2° sector.

Commonwealth of Virginia Radiological Emergency Response Plan (COVERERP) - Annex to Volume II of the Commonwealth of Virginia Emergency Operations Plan - Peacetime Disasters. Provides the State organization for direction and control of emergency operations in the event of a radiological emergency at a fixed nuclear facility and other radiological emergencies.

Control Room - The control room is the Emergency Control Center. Throughout the plan, "Control Room" means the Emergency Control Center to eliminate any confusion with regard to terminology.

Corrective Actions - Those emergency measures taken to reduce or terminate an emergency situation at or near the source of the problem in order to prevent an uncontrolled release of radioactive material or to reduce the magnitude of a release, e.g., shutting down equipment, fire fighting, repair and damage control.

Drill - A supervised instruction period aimed at testing, developing and maintaining skills.

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Emergency - Any situation that may result in undue risk to the health and safety of the public and/or site personnel, or significant damage to property or equipment. The following phases of emergencies apply:

Occurrence Phase - Encompasses the physical event itself, the initiation of any automatic alarms, and the immediate (precautionary or required) protective actions which may be provided within the facility.

Emergency Phase - Encompasses all actions which may be taken to promptly save lives and to protect property. To be effective, these actions will be taken by plant personnel onsite at the time of the event. Only equipment and resources immediately available will be of value in this phase.

Recovery Phase - There is not sharp line of distinction between the emergency and recovery phase. In this phase, actions are planned, organized, and directed towards recovery from the results of the event. Additional equipment and personnel may be brought into action during this phase and additional outside help may be obtained. This phase results in the establishment of control over the situation.

Restoration Phase - Encompasses the program for restoring the Station to its pre-emergency state, establishing some intermediate state if acceptable, or abandoning the restoration efforts.

Emergency Action Levels - Events, such as equipment malfunctions, natural phenomena, radiological dose rates, et cetera, that may be used as thresholds for initiating such specific emergency measures as designating a particular class of emergency, initiating a notification procedure, or initiating a particular protective action.

Emergency Classification - The four classes of emergencies used in this Plan, listed in order of increasing severity are:

- (1) Notification of Unusual Event
- (2) Alert
- (3) Site Area Emergency, and
- (4) General Emergency

Emergency Control Center (ECC) - The main Control Room is the Emergency Control Center. Other locations for the control and coordination of emergency activities are the Technical Support Center (TSC), the Operational Support Center (OSC) and the Local Emergency Operations Facility (LEOF).

Emergency Core Cooling System (ECCS) - Includes the pertinent pumps, piping, valves, et cetera, of the Safety Injection (SI) system to cool the reactor core and to provide additional shutdown capability.

Emergency Plan Implementing Procedures (EPIPs) - Set of emergency response procedures initiated and followed by the Station Emergency Manager and others to activate the appropriate sections of the Emergency Plan, assess and classify the emergency, notify the appropriate authorities, and provide response documentation.

Emergency Planning Zones (EPZ)

Plume EPZ - An area delineated by an approximate ten-mile radius circle around the Surry Power Station used in preplanning of protective actions required by potential exposure from airborne radioactive material.

Ingestion EPZ - An area delineated by an approximate fifty-mile radius circle around the Surry Power Station used in pre-planning of protective actions required by potential internal exposure from the ingestion of radioactive material through the food pathway.

Exclusion Area - The area within 1650 feet of Surry Unit 1 containment owned by Virginia Power.

Exercise - A practice of a prescribed scenario that permits the evaluation of training and response to a given situation.

HSB - Hot Standby - Reactor is critical and the neutron flux power range instrumentation indicates less than or equal to 2% rated power.

LOCA - Loss of Coolant Accident

Local Counties - This term shall be used to denote the Counties of Surry, Isle of Wight, York and James City - the principal counties located in the approximate ten (10) mile Emergency Planning Zone. Included within this designation are the cities of Williamsburg and Newport News. Other references include local communities and local cities and counties.

Local Emergency Operations Facility (LEOF) - This facility, attached to the Simulator Building in the Training Complex, will be used to continually evaluate and coordinate activities related to an emergency having or potentially having environmental consequences. This facility will accommodate representatives from Federal, State and local governments, as appropriate. Here the major State response agencies representatives will assist in data analysis. The Local Emergency Operations Facility (LEOF) will provide information needed by Federal, State and local authorities for implementation of offsite emergency plans in addition to a centralized meeting location for key representatives from the agencies. Recovery operations shall be managed from this facility.

Local Media Center (LMC) - This Center is located at the Surry Nuclear Information Center. Members of the news media shall be briefed at this location by Federal, State, and Virginia Power representatives.

Nearsite - Within the Exclusion Area, but beyond Protected Area.

Offsite - Beyond the Exclusion Area.

Onsite - Within the Protected Area, (surrounded by security fence).

Operational Support Center (OSC) - The Conference Room, located on the third floor of the Maintenance Building, is designated as the Operational Support Center (OSC) during an emergency. Adjacent office space is used as a staging area for the Damage Control, Fire, First Aid, and Search and Rescue teams.

Primary Sector - That part of the ten-mile EPZ in which immediate protective action is taken during a radiological emergency and corresponds to the $22\frac{1}{2}^{\circ}$ sector which bounds the existing wind direction.

Projected Dose - Established radiation dose which affected population groups may potentially receive if no protective actions were taken.

Protected Area - The immediate area surrounding units which have construction completed and enclosed by a fence or other barriers.

Protective Action Guides (PAG) - The projected dose to individuals in the general population which warrants taking protective actions.

Protective Actions - Those emergency measures taken for the purpose of preventing or minimizing radiological exposures before or after an uncontrolled release of radioactive material has occurred.

Recovery Actions - Those actions taken after the emergency to store the station as nearly as possible to its pre-emergency condition.

Rem (Roentgen Equivalent Man) - A unit of radiation dose that relates exposure to the biological effects of the exposure (absorbed exposure or dose). A unit related to the rem is the millirem (mrem). $1 \text{ mrem} = 1/1000 \text{ rem}$.

Restricted Area - Any area where access is controlled for the purpose of radiation protection.

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Station Emergency Manager (SEM) - Designated onsite individual having the responsibility and authority for implementing the Emergency Plan. He will direct all site efforts to limit the consequences of the emergency and bring it under control.

Technical Support Center (TSC) - The Technical Support Center (TSC) is adjacent to the Station Control Room. This center contains instrumentation to provide station status to those individuals who are knowledgeable and responsible for engineering and management support of reactor operations during an emergency. Upon activation, this facility will provide the main communications link between the station, the Operational Support Center, the NRC, and the Local Emergency Operations Facility (LEOF). The TSC shall be staffed by station management and technical personnel.

Thyroid Exposure - Radiation exposure to the thyroid through inhalation or ingestion of radioactive iodine.

Unrestricted Area - Any area where access is not controlled for the purpose of radiation protection of individuals from exposure to radiation and radioactive materials. Any area used for residential quarters.

Whole Body Exposure - Direct external radiation exposure to the body from airborne radioactive materials, contamination, or direct radiation.

1.1 Acronyms and Abbreviations

A/E - Architect/Engineer

AC - Alternating Current

ANSI - American National Standards Institute

APs - Abnormal Procedures

Asst. - Assistant

B & W - Babcock & Wilcox

cc - Cubic Centimeter

cm - Centimeter

COVRERP - Commonwealth of Virginia Radiological Emergency Response Plan

cpm - counts per minute

CR - Control Room

CRO - Control Room Operator

CSD - Cold Shutdown

DBA - Design Basis Accident

DC - Direct Current

DES - Department of Emergency Services

DOE - Department of Energy

dpm - disintegrations per minute

EALs - Emergency Action Levels

ECC - Emergency Control Center

ECCS - Emergency Core Cooling System

ENS - NRC Emergency Notification System

EPs - Emergency (Operating) Procedures

EPC - Emergency Planning Coordinator

EPIPs - Emergency Plan Implementing Procedures

EPZs - Emergency Planning Zones

ERFCS - Emergency Response Facility Computer System

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ESFs - Emergency Safeguards Features

HP - Health Physics

HPN - Health Physics Network (Communications System)

HSD - Hot Shutdown

IRAP - Interagency Radiological Assistance Plan

I & C - Instrumentation and Control

ISD - Intermediate Shutdown

LEOF - Local Emergency Operations Facility

LOCA - Loss of Coolant Accident

MCV - Medical College of Virginia

mph - miles per hour

mR/hr - Milli Rem per hour

MSL - Mean Seal Level

NRC - Nuclear Regulatory Commission

NSSS - Nuclear Steam Supply Steam

OPX - Off-Premises exchange (Communications System)

OSC - Operational Support Center

PAGs - Protective Action Guides

PBX - Private Branch exchange (Communications System)

QC - Quality Control

Reg. Guide - Regulatory Guide

rem - Roentgen Equivalent Man

R/hr - Rem per hour

RO - Reactor Operator

S & W - Stone & Webster

SCBA - self contained breathing apparatus

SEM - Station Emergency Manager

SEP - Surry Emergency Plan

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SI - Safety Injection

SNSOC - Station Nuclear Safety & Operating Committee

SPDS - Safety Parameter Display System

SPS - Surry Power Station

SRO - Senior Reactor Operator

SUPT - Superintendent

SUPV - Supervisor

Tavg - Average Temperature

Tech. Spec. - Technical Specification

THY. - Thyroid

TLD - Thermoluminescent Dosimeter

TSC - Technical Support Center

μ Ci - Micro (μ) Curie

UHF - Ultrahigh frequency (radio)

V - Volt(s)

W - Westinghouse

SURRY POWER STATION

EMERGENCY PLAN

SECTION 2

SCOPE AND APPLICABILITY

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2.0 Scope and Applicability

2.1 Site Specifics

The Surry Power Station consists of two units each of which include a three loop pressurized light water reactor nuclear steam supply system (NSSS) and turbine generator furnished by Westinghouse Electric Corporation. The balance of the station was designed and built by the Company with the assistance of Architect/Engineer (A/E), Stone and Webster Engineering Corporation. Each reactor is designed for initial core output 822 MWe. The units are located in Surry County, Virginia, on a point of land called Gravel Neck, which juts out into the James River from the South. The 840 acre site is located approximately 25 miles NW of Norfolk, Virginia; 46.5 miles to the SE of Richmond, Virginia; 17 miles NW of Newport News, Virginia; 18.5 miles NW of Hampton, Virginia; and, approximately 7.0 miles south of Williamsburg, Virginia. Cooling water is obtained from the James River.

The areas within 10 miles of the site covers parts of Surry, Isle of Wight, James City and York Counties. The cities of Newport News and Williamsburg and the counties of James City and York are dominated by growing population centers and large transient tourist trade. The city of Williamsburg and parts of Newport News lie within the 10 mile zone. The counties of Surry and Isle of Wight, which surround the site on the south side of the James River, are predominately rural and characterized by farmland, wooded land and marshy wet lands.

2.1 Site Specifics (continued)

Surry County has the largest agricultural area within the 10 mile zone, covering over 9000 acres of major cropland. Peanuts, corn and soybeans are the principal crops of the area. Two (2) dairy farms are in this zone, located close to Bacon's Castle.

2.2 Emergency Plan

The Surry Power Station Emergency Plan relates the necessary guidelines concerning responsibilities, authorities, actions, and resources required to cope with a broad range of occurrences which may arise at the station. In particular, its implementation establishes an organization with responsibilities and authority to stop construction or other activities onsite, order onsite evacuation, alter the operating status of the station, commit company resources or deviate from otherwise accepted policy, exceed established personnel exposure limits, and contact or advise other agencies, as appropriate. Except for certain preplanned actions or procedures, the Plan and its implementing procedures are compatible with existing procedures and the Station Radiation Protection Manual; however, where conflicts arise, the resulting decisions for emergency actions will supersede.

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2.2 Emergency Plan (continued)

The Plan is formulated for compatibility with existing Local, State and Federal agencies or organizations which may have responsibilities or have agreed to respond and give assistance should the need exist. It is intended to relate, in an organized format, an overview which reflects a combination of Operating

Procedures, Administrative Procedures, Security Plan, Abnormal Procedures, Emergency Procedures, and Emergency Plan Implementing Procedures (EPIPs).

The Plan is intended to provide a flexible while well defined framework for organizing an effective effort to protect the health and safety of the general public and station personnel to the greatest extent possible and minimize damage to both public and private properties.

The basic purpose of the Plan is first, to provide the guidelines to define potential types of emergencies; second, to establish an organization to manage the emergency; third, to provide measures to cope with the emergency, fourth, to provide the facilities to carry out the selected measures; fifth, to provide for a recovery program following the emergency; and sixth, to provide methods for maintaining the Plan active and current.

2.2 Emergency Plan (continued)

Emergency Plan Implementing Procedures (EPIPs) provide for classification of the emergency as well as notification of Corporate, Federal, State, and county officials and/or agencies who may lend assistance. Additionally, selected Abnormal or Emergency Procedures lead the operator to the appropriate EPIPs.

After the emergency condition is defined, EPIPs will be utilized by the station staff to assist them in their actions. The Plan provides for the activation of the Technical Support Center (TSC), the Operational Support Center (OSC), Local Emergency Operations Facility (LEOF), and the Corporate Emergency Response Center (CERC). The Corporate Emergency Response Plan will be implemented as required by this Plan. The Commonwealth of Virginia Radiological Emergency Response Plan, and the Surry, Isle of Wight, James City/Williamsburg, York and Newport News Radiological Emergency Response Plans will also be implemented, as required. The Medical College of Virginia's Radiation Emergency Plan provides for medical assistance for injured personnel who are contaminated with radioactivity and/or overexposed to radiation.

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EMERGENCY PLAN

SECTION 3

SUMMARY OF EMERGENCY PLAN

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3.0 Summary of Emergency Plan

The types of emergencies are divided into four classifications which cover the broad spectrum of potential occurrences. The classifications range from "Notification of Unusual Event" in which offsite officials are notified of an unusual condition through "General Emergency" in which onsite and offsite evacuation may be evaluated and a major state of emergency preparedness and actions exist. Such classification is compatible with the various State and local plans.

The organizational effort provided to manage an emergency varies according to the needs that exist. The Station Emergency Manager, whose responsibilities are described in Section 5 of the Surry Emergency Plan, and follows the course of the emergency through the recovery stage. Normal station supervision and staff assist the Station Emergency Manager, as necessary. Emergency measures provide pre-planned methods for timely activation of an emergency organization and evaluation of conditions.

Methods and procedures provide corrective and protective actions including evaluation of the operability of the unaffected unit; the use of protective equipment, protective action guides and exposure limits are pre-specified. The facilities available for assessment and management of the emergency consist of emergency onsite and offsite response centers, communication systems, and portable or fixed equipment and systems for detection and measurement of many parameters whether causing or resulting from the emergency. Medical facilities are also available.

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3.0 Summary of Emergency Plan (continued)

A recovery program describes certain conditions and actions required to re-start the affected unit. Contamination and radiation level criteria are given as objectives to be considered for declaring an area recovered. Most efforts during recovery are pre-planned and executed through controlled radiation exposure and with detailed documentation.

The Station Nuclear Safety and Operating Committee (SNSOC) annually reviews the Plan and the Emergency Plan Implementing Procedures to maintain them active and current. Periodic drills and situation exercises involving communications, fire fighting, radiological monitoring and Health Physics activities are routinely conducted. A joint exercise involving Federal, State, and Local response agencies will be held on alternate years at Surry (the other years being held at North Anna) to ensure all major elements of the Plan are tested over a five year period. The state will hold, therefore, one joint exercise a year, either at Surry or North Anna. Critiques of each implementation of the Plan allow for critical reviews of technique, methods, and shortcomings. Improvements will be factored into the Plan and/or its implementing Procedures through revisions approved by the SNSOC.

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SURRY POWER STATION
EMERGENCY PLAN

SECTION 4

EMERGENCY CONDITIONS

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4.0 Emergency Conditions

The following guidelines describe the criteria used by station personnel in classifying or determining the type of an emergency. The types of potential accidents or emergencies are numerous and vary in magnitude. Accordingly, the classification system is wide-ranged, although flexible and straight forward, to reflect this need.

The classification system is not intended to include permissible deviations during normal operation.

4.1 Emergency Classification System

The four Emergency classifications that have been established, each with associated examples of initiating conditions, are:

1. NOTIFICATION OF UNUSUAL EVENT
2. ALERT
3. SITE AREA EMERGENCY
4. GENERAL EMERGENCY

The rationale for the NOTIFICATION OF UNUSUAL EVENT class is to provide notification to appropriate offsite support groups and station personnel about an abnormal condition at the station that has potential to degrade the level of safety of the plant. This declaration assures that the first step has been taken towards any emergency response that may later be required. Appropriate and well defined conditions lead to the declaration of a Notification of Unusual Event, which may bring the operations personnel to a state of readiness.

The rationale for the ALERT class is to provide early and prompt notification of events that could lead to more serious consequences and to provide the means to activate Surry Power Station emergency response facilities and personnel.

The SITE AREA EMERGENCY class reflects conditions under which some significant radiation releases are likely or are occurring, but where core melt is not currently indicated. Emergency personnel, monitoring teams and associated communications are fully mobilized in this situation. A SITE AREA EMERGENCY can be declared for reasons other than radiological release.

The GENERAL EMERGENCY class involves actual or imminent substantial core degradation or melting with the potential loss of Containment, or non-radiological events that could endanger public health and/or safety (Table 6.3). The minimum immediate action for this classification is sheltering (staying inside) until an assessment can be made that (1) an evacuation is recommended and that (2) an evacuation, if indicated, can be completed prior to significant release and transport of radioactive material to the affected areas.

The example initiating conditions listed in Tables 4.1A through 4.1D form the basis of the specific station indication, which, if exceeded, will initiate the emergency declaration.

Background information on radiation release potential for the various classes is provided in Section 4.5. The release potential given reflects the amount that could be released over a long time period or under favorable meteorological conditions without exceeding the exposure criteria of a more severe classification. Release of these amounts in a short time period under unfavorable meteorological conditions might result in escalation of the emergency class.

INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

1. Safety Injection System (Emergency Core Cooling) initiation not caused by spurious signal.
2. Technical Specifications Limiting Conditions of Operation, including Engineered Safety Features and Fire Protection System, have been exceeded.
3. Failure of a safety or relief valve in a safety related system to close following reduction of applicable pressure.
4. Process or effluent indicators or alarms required for incident assessment not available.
5. Loss of meteorological instrumentation.
6. Loss of communications capability.
7. Safety limits of the Technical Specifications have not been met or have been exceeded.
- 8 - 9. Reactor Coolant System leak rate exceeds Limiting Conditions of Technical Specifications.
10. Indications of damage to fuel.
11. Indications of damage to spent fuel storage cask.
12. Loss of Containment integrity.
13. Radiological effluent exceeds Technical Specification instantaneous limit.
14. Transportation of contaminated injured individual from site to offsite hospital.
15. Loss of Secondary Coolant System.
16. Loss of offsite power or onsite AC capability.
17. Fire in the Protected Area or Switchyard which lasts more than ten (10) minutes.
- 18 - 19. Security threat, attempted unauthorized entry or attempted sabotage.
- 20 - 23. Other station conditions exist that warrant increased awareness on the part of State and/or Local offsite authorities.
- 24 - 27. Natural phenomenon being experienced or projected beyond usual events.
28. Other station conditions exist that warrant increased awareness on the part of State and/or Local offsite authorities.

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INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

CONDITION/ APPLICABILITY	INDICATION
1. Non-spurious ECCS initiation ABOVE CSD CONDITION	Non-spurious ECCS initiation as validated by Emergency Procedures
2. Mode reduction required by Tech. Spec. Limiting Condition of Operation POWER & HSB	Intentional reduction in Power, Load or Temperature because the unit has entered an Action Statement or will exceed a Limiting Condition for Operation
3. Failure of a safety or relief valve to close after pressure reduction ALL CONDITIONS	a) Pressurizer safety or PORV flow as indicated by acoustical or temperature monitoring equip- ment AND RCS subcooling - LESS THAN 30°F OR b) Excessive flow through Steam Generator Safety, PORV or Decay Heat Release valve indicated by RCS cooldown rate > 50°F per hour
4. Indications or alarms on process or effluent parameters required for incident assessment NOT available ABOVE CSD CONDITION	Intentional reduction in Power, Load or Temperature because the unit has entered an Action Statement or will exceed a Limiting Condition for Operation
5. Failure of meteorological instrumentation required to perform offsite dose calcu- lations ALL CONDITIONS	Loss of all onsite and offsite meteorological monitoring capabili- ty

INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

CONDITION/ APPLICABILITY	INDICATION
6. Loss of plant communications capability ALL CONDITIONS	Complete failure of: * Station PBX Phone System AND * Station Gai-Tronics System AND * Station UHF Radio System
7. Tech. Spec. Safety Limits for RCS exceeded POWER & HSB	Verification of any Tech. Spec. Safety limit for RCS
8. RCS leak rate requiring plant shutdown IAW T.S. 3.1.C POWER & HSB	Intentional reduction in Power, Load or Temperature because the unit has entered an Action Statement or will exceed a Limiting Condition for Operation a) Unidentified RCS leakage GREATER THAN 1 gpm OR b) Identified leakage GREATER THAN 10 GPM OR c) Non-isolatable fault of RCS pressure boundary

INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

CONDITION/ APPLICABILITY	INDICATION
9. Primary to Secondary leakage- GREATER THAN 1 gpm ABOVE CSD CONDITION	Intentional reduction in Power, Load or Temperature because the unit has entered an Action State- ment or will exceed a Limiting Condition for Operation a) Primary to Secondary leakage - GREATER THAN 1 gpm OR b) GREATER THAN 500 gal. per day per generator
10. Fuel clad damage indication ABOVE CSD CONDITION	Intentional reduction in Power Load or Temperature because the unit has entered an Action Statement or Will exceed a Limiting Condition for Operation OR High Range Letdown Radiation Monitor indication increases GREATER THAN 10 ⁵ cpm within 30 minutes AND remains for at least 15 minutes
11. Spent Fuel Storage Facility accident ALL CONDITIONS	Verified Spent Fuel Storage Cask seal leakage OR Spent Fuel Storage Cask dropped or mishandled
12. Loss of Containment integrity ABOVE CSD CONDITION	Intentional reduction in Power, Load or Temperature because the unit has entered an Action Statement or will exceed a Limiting Condition for Operations OR Loss of Containment integrity as indicated by OP-1E, Containment Integrity Checklist

INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

CONDITION/ APPLICABILITY	INDICATION
13. Effluent release GREATER THAN T.S. allowable Limit ALL CONDITIONS	Any of the following: * Ventilation Vent Gaseous Monitor (RM-VG-110) or RM-VG-131) GREATER THAN 100% T.S. value as determined from Attachment 1, AP-5.20 * Process Vent Gaseous Monitor (RM-GW-102 or RM-GW-130) - GREATER THAN 100% T.S. value as determined from Attachment 1, AP-5.01. * Air Ejector Monitor (RM-SV-111 -211) - GREATER THAN 1.99×10^5 cpm AND Air Ejector Exhaust - NOT diverted to containment * Discharge Canal Monitor (RM-SW-120, -220) - GREATER THAN 1.3×10^4 cpm * Sampling and Analysis Team confirms effluent release GREATER THAN 100% T.S. value as determined from EPIP-4.01
14. Transportation of contaminated injured individual to off-site facility ALL CONDITIONS	Contaminated injured individual enroute to off-site facility for treatment
15. Major Secondary line break ABOVE CSD CONDITION	Faulted steam generator as indicated by EP-2.00, Loss of Reactor or Secondary Coolant

INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

CONDITION/ APPLICABILITY	INDICATION
16. Loss of off-site power or on-site AC power capability ALL CONDITIONS	Unit Main Generator AND both Emergency Diesel Generators out of service OR Loss of all 34.5KV Reserve Station Service Buses
17. Fire lasting - GREATER THAN 10 minutes ALL CONDITIONS	Fire within the Station which is not under control within 10 minutes after fire fighting efforts begin
18. Security threat, unauthorized attempted entry, or attempted sabotage ALL CONDITIONS	Supervisor Security Shift has initi- ated applicable Security Contingency Program Implementing Procedure
19. Bomb threat or discovery ALL CONDITIONS	Shift Supervisor notification of a bona fide bomb threat OR Shift Supervisor notification of bomb discovery within the Protected Area
20. Aircraft crash or unusual aircraft activity ALL CONDITIONS	Confirmed notification of aircraft crash within the site boundary OR Unusual aircraft activity in the vicinity of the site as determined by the Shift Supervisor or Security Shift Supervisor
21. Onsite explosion ALL CONDITIONS	Confirmed report of unplanned explo- sion onsite

INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

CONDITION/ APPLICABILITY	INDICATION
22. On or nearsite release of toxic or flammable liquids or gases ALL CONDITIONS	Unplanned release of toxic OR flammable agents which may effect safety of station personnel OR equipment
23. Turbine rotating component failure with no casing pene- tration POWER AND STARTUP	Failure of Turbine/Generator rotating equipment resulting in unit trip
24. Earthquake detected ALL CONDITIONS	Confirmed earthquake which acti- vates the Event Alarm on the Strong Motion Accelerograph
25. Tornado onsite ALL CONDITIONS	Tornado visually detected onsite
26. High winds ALL CONDITIONS	Sustained wind speed onsite measured or projected to be between 73 mph and 80 mph OR System Operator notification of hur- ricane watch for Surry County
27. Flood or low water level ALL CONDITIONS	Flood in the James River GREATER THAN +12 FEET MSL but LESS THAN +21 feet MSL OR Water level in the Surry Power Sta- tion Intake Canal LESS THAN 23½ feet AND NOT INCREASING

INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

CONDITION/ APPLICABILITY	INDICATION
28. Station conditions which warrant increased awareness of state and/or local author- ities ALL CONDITIONS	Shift Supervisor judgement that any of the following exist: * Intentional reduction in Power, Load or Temperature because the unit has entered an Action Statement or will exceed a Limiting Condition for Opera- tion * Unit shutdown is other than a controlled shutdown * Unit is in an uncontrolled con- dition during operation * A condition exists that has the potential for escalation and, therefore, warrants notifica- tion

INITIATING CONDITIONS: ALERT

1. Loss of a function needed for unit Cold Shutdown.
2. Failure of the reactor protection system to initiate and complete a trip, when required.
3. All annunciators lost with unit not in a shutdown condition.
4. Evacuation of the Control Room is anticipated or required, with local control of shutdown systems established within 15 minutes.
5. Primary coolant leak rate exceeding 50 gpm.
6. Reactor coolant pump locked rotor at power leading to fuel failure.
7. Steam generator tube failure with loss of offsite power.
8. Gross steam generator tube failure.
9. Severe loss of fuel cladding.
10. Fuel damage with release of radioactivity to the Containment or Fuel building.
11. Loss of cask/fuel containment barriers or accidental criticality.
12. Containment radiation (high-high monitor) and pressure or temperature exceed specified limits.
13. High radiation levels or high airborne contamination levels which indicated a severe degradation in the control of radioactive materials (e.g., increase of factor of 1000 in direct radiation readings within facility).
14. Radiological effluents greater than ten (10) times Environmental Technical Specification instantaneous limits.
15. Steam line breaker with significant primary to secondary leakage OR failure of a Main Steam Trip Valve to close.
16. Loss of offsite power and all onsite power.
17. Loss of all onsite DC power.
18. Fire potentially affecting safety systems.
- 19 - 20. Ongoing security compromise.
- 21 - 25. Other station conditions exist that warrant precautionary activation of the onsite Technical Support Center and Local Emergency Operations Facility.

- 26 - 29. Severe natural phenomenon being experienced or projected.
- 30. Other station conditions exist that warrant precautionary activation of the onsite Technical Support Center and the Local Emergency Operations Facility.

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
1. Loss of cooling function needed for Cold Shutdown and Refueling Condition CSD & RSD	Secondary System Cooling Capability unavailable AND Loss of any of the following systems with RCS temperature greater than 140°F: * Service Water * Component Cooling * Residual Heat Removal
2. Trip following ATWT that takes the Rx Subcritical POWER & HSB	ATWT - Manual Reactor Trip following failure of Auto Trip Circuit AND Reactor Power - DECREASING
3. All main board annunciator alarms and unit computer lost POWER & HSB	Simultaneous loss of all annun- ciator alarms on panels "A" to "K" AND Loss of unit computer
4. Evacuation of Main Control Room required ALL CONDITIONS	Evacuation of the Control Room with stable shutdown control established within 15 minutes

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
5. RCS leak rate exceeds 50 gpm ABOVE CSD CONDITION	Intentional reduction in Power, Load or Temperature because the unit has entered an Action Statement or will exceed a Limiting Condition for Operation a) Actions required IAW AP-16, Excessive Primary Plant Leakage AND b) RCS inventory balance indicates leakage - GREATER THAN 50 gpm
6. RCP locked rotor leading to fuel damage POWER	Flow in one or more RC loops LESS THAN 90% AND RCP trip caused by Phase Overcurrent Relay - ACTUATION AND High Range Letdown Radiation Monitor (RM-CH-118, -218) indication increases to GREATER THAN 5×10^5 cpm

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
7. Excessive Primary to Secondary leakage with loss of offsite power ABOVE CSD CONDITION	Intentional reduction in Power, Load or Temperature because the unit has entered an Action Statement or will exceed a Limiting Condition for Operation a) Primary to Secondary leakage - GREATER THAN 1 gpm OR GREATER THAN 500 gal. per day per generator. AND b) Zero volts for 4160V busses D, E & F
8. Gross Primary to Secondary leakage ABOVE CSD CONDITION	EP-4.00, Steam Generator Tube Rupture IMPLEMENTED
9. Severe Fuel Clad Damage ABOVE CSD CONDITION	RCS specific activity GREATER THAN 300 μ Ci/gram dose equivalent I-131 OR High Range Letdown Radiation Monitor (RM-CH-118, -218) indication increases GREATER THAN 5×10^5 cpm within 30 minutes AND remains for at least 15 minutes

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
10. Fuel damage accident with release of radioactivity to containment or fuel buildings ALL CONDITIONS	a) Verified accident involving damage to irradiated fuel AND b) Health Physics confirms fission product release from fuel OR Readings on the Ventilation Vent Gaseous Monitor (RM-VG-110) - GREATER THAN 1×10^6 cpm
11. Loss of cask/fuel containment barriers or accidental criticality ALL CONDITIONS	Verified loss of all cask/fuel containment barriers AND Health Physics confirms fission product release
12. High Containment radiation, pressure and temperature ABOVE CSD CONDITION	a) Outside Containment High Range Radiation Monitor (RM-RMS-161, -261) -GREATER THAN 10^1 mR/hr AND b) Containment pressure GREATER THAN 17.7 psia OR Containment temperature GREATER THAN 150°F

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Table 4.1B

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
13. High radiation or airborne contamination levels indicate a severe degradation in control of radioactive material ALL CONDITIONS	Valid unexpected readings on any of the following monitors have in- creased by a factor of 1000: * Control Room Area Monitor (RM-RMS-157) * Auxiliary Building Control Area Monitor (RM-RMS-154) * Auxiliary Building Drumming Area Monitor (RM-RMS-155) * Decontamination Building Area Monitor (RM-RMS-151) * Fuel Pit Bridge Area Monitor (RM-RMS-153) * New Fuel Storage Area Monitor (RM-RMS-152) * Laboratory Area Monitor (RM-RMS-158) * Sample Room Area Monitor (RM-RMS-156)

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
14. Effluent Release GREATER THAN 10 TIMES T.S. instantaneous allowable limits ALL CONDITIONS	Any of the following: * Ventilation Vent Gaseous Monitor (RM-VG-110 or RM-VG-131) - GREATER THAN 1000% T.S. value as determined from Attachment 1, AP-5.20 * Process Vent Gaseous Monitor (RM-GW-102 or RM-GW-130) - GREATER THAN 1000% T.S. value as determined from Attachment 1, AP-5.01 * Air Ejector Monitor (RM-SV-111, -211) - GREATER THAN 1×10^6 cpm AND Air Ejector Exhaust - NOT diverted to containment. * Discharge Tunnel Monitor (RM-SW-120, -220) - GREATER THAN 1.3×10^5 cpm. * Sampling and Analysis Team confirms effluent release GREATER THAN 1000% T.S. value as determined from EPIP-4.01
15. Major Secondary line break with Primary to Secondary leakage GREATER THAN 10 gpm ABOVE CSD CONDITION	a) Faulted steam generator as indicated by EP-2.00, Loss of Reactor or Secondary Coolant AND b) Condenser Air Ejector Radiation Monitor (RM-SV-111, -211) - GREATER THAN 1×10^6 cpm OR Steam Generator Blowdown Radia- tion Monitor (RM-SS-112, -113, -212, -213) - GREATER THAN 10^5 cpm

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
16. Loss of all off-site and on-site AC power ALL CONDITIONS	Ammeters for 4160V Reserve Station Service Buses D, E, & F all - ZERO AMPS AND Ammeters for 4160V Station Service Buses A, B, & C all - ZERO AMPS AND Ammeters for 4160V Emergency Buses H and J both - ZERO AMPS
17. Loss of all on-site DC power ALL CONDITIONS	All Station Battery voltmeters - ZERO VOLTS AND No light indication available to Reserve Station Service Breakers 15D1, 15E1 and 15F1
18. Fire potentially affecting station safety systems ABOVE CSD CONDITION	Fire within the Station which has potential for causing a safety system NOT to be operable as defined by T.S.1.0.D and 3.0.2
19. Ongoing Security compromise ALL CONDITIONS	Supervisor Security Shift has notified the Shift Supervisor of a confirmed unneutralized intrusion into the Protected Area
20. Bomb potentially affecting station safety systems ALL CONDITIONS	Shift Supervisor notification of a verified bomb discovered on OR near a safety related system

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Table 4.1B

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
21. Aircraft crash on the facility ALL CONDITIONS	Aircraft crash within the Protected Area
	OR
	Aircraft crash in Station Switchyard
22. Explosion damage to facility ALL CONDITIONS	Unplanned explosion resulting in damage to plant structure or equipment
23. Entry of toxic or flammable gases or liquids into plant facility ALL CONDITIONS	Uncontrolled release of toxic OR flammable agent which cause:
	a) Evacuation of personnel from plant areas
	AND
	b) Safety related equipment to be rendered inoperable
24. Missile damage to safety related equipment or structures ABOVE CSD CONDITION	Notification of missile impact causing damage to safety related equipment or structures
25. Turbine failure with penetration POWER	Failure of Turbine/Generator rotating equipment resulting in casing penetration

INITIATING CONDITIONS: ALERT

CONDITION/ APPLICABILITY	INDICATION
26. Earthquake greater than OBE levels ALL CONDITIONS	a) Confirmed earthquake which activates Event Alarm on the Strong Motion Accelerograph AND b) AP-37, Seismic Event, calcula- tions indicate horizontal motion of 0.07g OR GREATER OR Safety related equipment is rendered inoperable by earth- quake
27. Tornado striking facility ALL CONDITIONS	Tornado visually detected striking within the Protected Area or Switch- yard
28. Extreme Winds ABOVE CSD CONDITION	Sustained extreme winds between 80 and 100 mph, Hurricane or other severe weather conditions
29. Flood or low water level near design levels ALL CONDITIONS	Flood in the James River - GREATER THAN +21 feet MSL but LESS THAN +27 feet MSL OR Low water level in the Surry Power Station Intake Canal - LESS THAN 23½ feet AND DECREASING
30. Station conditions which warrant precautionary Protective Action Recom- mendations ALL CONDITIONS	Shift Supervisor/Station Emergency Manager judgement

INITIATING CONDITIONS: ALERT

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CONDITION/ APPLICABILITY	INDICATION
30. Station conditions which warrant precautionary Protective Action Recom- mendations	Shift Supervisor/Station Emergency Manager judgement
ALL CONDITIONS	

INITIATING CONDITIONS: SITE AREA EMERGENCY

1. Loss of all functions needed to take the unit to hot shutdown.
2. Reactor Protection System required trip failure.
3. Loss of all main board annunciators and unit computer for more than 15 minutes during a unit transient.
4. Evacuation of the Control Room where control of the shutdown systems is not established within 15 minutes.
5. Loss of coolant accident (LOCA) in which RCS leak rate exceeds makeup capability.
6. Gross steam generator tube failure and loss of offsite power.
7. Core damage with possible loss of cooling capability.
8. Major fuel damage with release to containment or fuel building.
9. Containment radiation (high-high monitor) and pressure or temperature exceed specified limits.
10. Projected doses at the site boundary of from 0.5 Rem to 2 Rem whole body exposure or 1 Rem to 12 Rem thyroid exposure.
11. Steam line breaker with primary to secondary leakage greater than 50 gpm and indication of fuel damage.
12. Loss of offsite power and onsite AC power for more than 15 minutes.
13. Loss of all onsite DC power for more than 15 minutes.
14. Fire affecting safety system.
15. Imminent loss of control of the physical security of the station.
- 16 - 19. Other station conditions exist that warrant activation of emergency centers and monitoring teams and a precautionary public notification.
- 20 - 22. Severe natural phenomenon being experienced with the unit(s) not in cold shutdown condition.
23. Other station conditions that warrant activation of emergency centers and monitoring teams and a precautionary public notification.

INITIATING CONDITIONS: SITE AREA EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
1. Loss of Function needed for unit HSD condition ABOVE CSD CONDITION	Total loss of Charging/SI System OR Total loss of Main Feedwater
2. Failure of the Reactor to trip (ATWT) POWER & HSB	Rx trip setpoint and coincidences EXCEEDED AND Manual Rx trip INITIATED AND Rx power indication - NOT DECREASING
3. All main board annunciator alarms and unit computer lost for more than 15 minutes during a unit transient POWER & HSB	Complete loss of all annunciator alarms on panels "A" to "K" AND Loss of unit computer for GREATER THAN 15 minutes AND Unit operational transient - IN PROGRESS
4. Evacuation of Main Control Room with control NOT estab- lished within 15 minutes ALL CONDITIONS	Evacuation of the Control Room with stable shutdown control NOT estab- lished within 15 minutes
5. RCS leak rate exceeds makeup capability ABOVE CSD CONDITION	EP-2.00, Loss of Reactor or Secondary Coolant - IMPLEMENTED AND Pressurizer level cannot be main- tained with operating Charging/SI Pumps

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Table 4.1C

INITIATING CONDITIONS: SITE AREA EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
6. Gross Primary to Secondary leakage with loss of offsite power	EP-4.00, Steam Generator Tube Rupture, - IMPLEMENTED
ABOVE CSD CONDITION	AND Loss of offsite power indicated by zero volts for 4160V Buses D, E & F
7. Core damage with possible loss of coolable geometry	Fuel clad failure as indicated by any of the following:
ABOVE CSD CONDITION	* RCS Specific activity - GREATER THAN 60 μ Ci/gram dose equivalent I-131 * High Range Letdown Radiation Monitor (RM-CH-118, -218) indication - GREATER THAN 1×10^6 cpm AND Loss of cooling as indicated by any of the following: * 5 confirmed core exit thermocouples - GREATER THAN 1200°F * Core ΔT - ZERO * Core ΔT - RAPIDLY INCREASING

INITIATING CONDITIONS: SITE AREA EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
8. Major fuel damage accident with radioactive release to containment or fuel buildings ALL CONDITIONS	a) Water level in Rx vessel during refueling - BELOW TOP OF CORE OR Water level in Spent Fuel Pit verified - BELOW TOP OF SPENT PIT AND b) Verified damage to irradiated fuel resulting in readings on Ventilation Vent Gaseous Moni- tor - GREATER THAN 1×10^6 cpm
9. High Containment radiation, pressure, and temperature ABOVE CSD CONDITION	a) Outside Containment High Range Radiation Monitor (RM-RMS-161, 261) - GREATER THAN 2×10^1 mR/hr AND b) Containment pressure - GREATER THAN 23 psia and is NOT decreasing OR Containment temperature - GREATER THAN 200°F
10. Projected or actual site boundary doses of 0.5 Rem to to 2 Rem W.B. or 1 Rem to 12 Rem thyroid exposure ALL CONDITIONS	Confirmed actual projected site boundary doses - GREATER THAN 0.5 Rem Whole Body or 1.0 Rem Thyroid exposure as determined from EPIP-4.01

INITIATING CONDITIONS: SITE AREA EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
11. Major Secondary line break with Primary to Secondary leakage GREATER THAN 50 gpm and fuel damage indicated	a) Faulted steam generator as indicated by EP-2.00, Loss of Reactor or Secondary Coolant
	AND
ABOVE CSD CONDITION	b) RCS specific activity GREATER THAN 300 μ Ci/gram
	OR
	Letdown High Range Radiation Monitor (RM-CH-118, -218) - GREATER THAN 10^5 cpm
	AND
	c) Condenser Air Ejector Radiation Monitor (RM-SV-111, -211) - GREATER THAN 10^6 cpm
	OR
	Steam Generator Blowdown Radia- tion Monitor (RM-SS-112, -113, -212, -213) GREATER THAN 10^6 cpm
	OR
	MS Line High Range Radiation Monitor (RM-RI-MS-124, -125, -126, -224, -225, -226) - GREATER THAN 2.55×10^{-1} mR/hr

INITIATING CONDITIONS: SITE AREA EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
12. Loss of off-site and on-site AC power for more than 15 minutes ALL CONDITIONS	The following conditions exist for a period - GREATER THAN 15 minutes a) Ammeters for 4160V Reserve Station Service Buses D, E, & F all - ZERO AMPS AND b) Ammeters for 4160V Station Service Buses A, B, & C all ZERO AMPS AND c) Ammeters for 4160V Emergency both Buses H & J both ZERO AMPS
13. Loss of all on-site DC power for - GREATER THAN 15 minutes ALL CONDITIONS	The following conditions exist for a period GREATER THAN 15 minutes a) All station Battery voltmeters - ZERO VOLTS AND b) No light indication available to Reserve Station Service Breakers 15D1, 15E1 and 15F1
14. Fire resulting in degradation of safety systems ABOVE CSD CONDITION	Fire within the Station which causes major degradation of a safety system function required for protection of the public. AND Affected systems are caused NOT to be operable as defined by T.S.1.0.D and 3.0.2

INITIATING CONDITIONS: SITE AREA EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
15. Imminent loss of physical Station control ALL CONDITIONS	Supervisor Security Shift has notified the Shift Supervisor of imminent intrusion into a Vital Area
16. Aircraft damage to vital plant systems ABOVE CSD CONDITION	Aircraft crash adversely affects vital structures by impact or fire
17. Severe explosive damage ABOVE CSD CONDITION	Explosion which results in severe degradation of any systems required for safe shutdown
18. Entry of toxic or flammable gases into plant vital areas ABOVE CSD CONDITION	a) Uncontrolled release of toxic OR flammable agents into Vital Areas AND b) Evacuation of Vital Area required OR Loss of a safety system function required for protection of the public
19. Severe missile damage to safety systems ABOVE CSD CONDITION	Missile impact causing severe degradation of safety systems required for unit shutdown

INITIATING CONDITIONS: SITE AREA EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
20. Earthquake greater than DBE levels ABOVE CSD CONDITION	a) Earthquake which activates the Event Alarm on the Strong Motion Accelerograph AND b) AP-37, Seismic Event, calcula- tions indicate horizontal motion of 0.15g OR GREATER OR Safety related systems are sig- nificantly degraded by earth- quake
21. Severe winds ABOVE CSD CONDITION	Sustained severe winds in excess of 100 mph caused by Hurricane, Tornado or other severe weather condition
22. Flood or low water level above design levels ALL CONDITIONS	Flood in the James River - GREATER THAN +27 feet MSL OR Water level in the James River - LESS THAN -9 feet MSL as indicated by loss of Emergency SW Pump suction
23. Station conditions which warrant activation of emergency facilities monitoring teams and precautionary Protection Action Recommendations ALL CONDITIONS	Shift Supervisor/Station Emergency Manager judgement

INITIATING CONDITIONS: GENERAL EMERGENCY

1. Loss of 2 and potentially all 3 fission product barriers.
2. Fuel failure with Steam Generator tube rupture.
3. Core melt with LOCA and Emergency Core Cooling System (ECCS) failure.
4. Core melt with loss of heat sink.
5. Core melt with loss of Reactor Protection System.
6. Loss of AC power and all feedwater.
7. LOCA with loss of ECCS and Containment Cooling.
8. Extremely high containment radiation, pressure and temperature.
9. Projected or actual Site Boundary Dose exposure exceeds 2 Rem whole body or 12 Rem thyroid.
10. Loss of control of physical security of the Station.
11. Any major internal or external event which singularly or in combination cause massive damage to Station facilities.

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Table 4.1D

INITIATING CONDITION: GENERAL EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
1. Loss of 2 of 3 fission product barriers with potential loss of 3rd barrier ALL CONDITIONS	Any two of a), b) or c) exist and the third is imminent a) Fuel clad integrity failure as indicated by any of the following: * RCS specific activity - GREATER THAN OR EQUAL TO 300 $\mu\text{Ci/gram}$ dose equivalent I-131. * 5 or more core exit thermo- couples reading - GREATER THAN 1200°F b) Loss of RCS integrity as indi- cated by any of the following: * PORV failed open * Loss of Reactor Coolant * Outside Containment High Range Gamma Radiation Moni- tor (RM-RMS-161, -261) reading - GREATER THAN 2×10^1 mR/hr c) Loss of containment integrity as indicated by any of the fol- lowing: * Containment pressure - GREATER THAN 60 psia AND NOT DECREASING * OP-1E, Containment Inte- grity Checklist

INITIATING CONDITION: GENERAL EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
2. Fuel failure with steam generator tube rupture	Any two of a), b) or c) exists and the third is imminent
ALL CONDITIONS	a) Fuel clad integrity failure as indicated by any of the follow- ing: * RCS specific activity GREATER THAN 300 μCi/gram dose equivalent I-131 * 5 or more core exit thermo- couples indicate - GREATER THAN 1200°F b) S/G tube rupture as indicated by both of the following: * RCS Low Pressure SI - INI- TIATED * EP-4.00, Steam Generator Tube Rupture - IMPLEMENTED c) Loss of Secondary integrity as indicated by: * Steam discharge to atmos- phere * Faulted steam generator as indicated by EP-2.00, Loss of Reactor or Secondary Coolant

INITIATING CONDITION: GENERAL EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
3. Probable large radioactivity release initiated by LOCA with ECCS failure leading to core degradation	EP-2.00, Loss of Reactor or Secondary Coolant - IMPLEMENTED
ABOVE CSD CONDITION	AND RCS specific activity - GREATER THAN 300 μ Ci/gram dose equivalent I-131
	AND High or Low Head ECCS flow - NOT being delivered to the core
4. Probable large radioactivity release initiated by loss of heat sink leading to core degradation	Loss of Main FW system and Condensate System
ABOVE CSD CONDITION	AND Loss of Auxiliary FW System
	AND RHR System - NOT OPERABLE
5. Probable large radioactivity release initiated by failure of protection system to bring Rx subcritical and causing core degradation	a) Rx nuclear power after a trip remains - GREATER THAN 5%
	AND b) RCS pressure GREATER THAN 2485 psig AND NOT decreasing
	OR Containment pressure and temperature are RAPIDLY INCREASING

INITIATING CONDITION: GENERAL EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
6. Probable large radioactivity release initiated by loss of AC and all feedwater ABOVE CSD CONDITION	ECA-1.00, Loss of All AC Power, - IMPLEMENTED AND Turbine Driven Auxiliary Feedwater Pump NOT OPERABLE AND Restoration of either the above not likely within 2 hours
7. Probable large radioactivity release initiated by LOCA with loss of ECCS and containment ABOVE CSD CONDITION	a) EP-2.00, Loss of Reactor or Secondary Coolant - IMPLEMENTED AND b) High OR Low Head ECCS flow NOT being delivered to the core AND c) Containment RS sump temperature GREATER THAN 190°F AND NOT DECREASING OR Containment Spray and Recirculation Spray Systems - NOT OPERABLE

INITIATING CONDITION: GENERAL EMERGENCY

CONDITION/ APPLICABILITY	INDICATION
8. Extremely high Containment radiation, pressure and temperature ABOVE CSD CONDITION	a) Outside Containment High Range Radiation Monitor (RM-RMS-161, -261) - GREATER THAN 5×10^2 mR/hr AND b) Containment pressure - GREATER THAN 45 psia AND is NOT decreasing. OR Containment temperature - GREATER THAN 280°F
9. Projected or actual site boundary doses exceed 2 Rem W.B. or 12 Rem thyroid exposure ALL CONDITIONS	Confirmed actual or projected site boundary doses - GREATER THAN 2.0 Rem Whole Body OR 12.0 Rem Thyroid exposure as determined from EPIP-4.01
10. Loss of Station physical control ALL CONDITIONS	Shift Supervisor has been informed that the security force has been neutralized by attack, resulting in loss of physical control of station. OR Shift Supervisor has been information of intrusion into one or more Vital Areas which are occupied or controlled by an aggressor
11. Any major internal or external events which singularly or in combination cause massive damage to station facilities ALL CONDITIONS	Shift Supervisor/Station Emergency Manager judgement

4.2 State and Local Government Classification System

The Commonwealth of Virginia Radiological Emergency Response Plan (COVERERP) emergency classification system defines two levels of projected radiological doses resulting from the release of radioactive materials from a fixed nuclear facility. Virginia Power will provide projected radiological doses based on plant parameters. Provisions are in COVERERP for dose assessments within 50 miles of the station for the ingestion of radioactive material via the food pathway.

The projected radiation doses and response levels are:

<u>Projected Radiation Dose</u>	<u>Radiological Response Level</u>
Exceeds 2 Rem whole body exposure or exceeds 12 Rem thyroid exposure due to inhalation of radioactive material.	GENERAL EMERGENCY
0.5 Rem to 2.0 Rem whole body exposure or 1 to 12 Rem thyroid exposure due to inhalation of radioactive material.	SITE AREA EMERGENCY

A SITE AREA EMERGENCY or GENERAL EMERGENCY can also be declared for reasons other than radiological releases.

COVERERP's and local government's protective actions based on projected doses to the population-at-risk are based on approximately 50% of the projected doses recommended in Table 5.1 of EPA-520/1-75-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents.

4.3 Emergency Plan Implementing Procedures

The following procedures comprise the Emergency Plan Implementing Procedures and therefore will be activated as necessary to implement the requirements of the Plan.

1. Emergency Control Procedures

- 1.01 Emergency Manager Controlling Procedure
- 1.02 Response to Notification of Unusual Event
- 1.03 Response to Alert
- 1.04 Response to Site Area Emergency
- 1.05 Response to General Emergency

2. Notification Procedures

- 2.01 Notification of State and Local Governments
- 2.02 Notification of NRC

3. Augmentation Procedures

- 3.01 Callout of Emergency Response Personnel
- 3.02 Activation of Technical Support Center
- 3.03 Activation of Operational Support Center
- 3.04 Activation of Local Emergency Operations Facility

4. Radiological Monitoring and Dose Assessment Procedures

- 4.01 Radiological Assessment Director Controlling Procedure
- 4.02 Radiation Protection Supervisor Controlling Procedure
- 4.03 Dose Assessment Controlling Procedure
- 4.04 Emergency Personnel Radiation Exposure
- 4.05 Respiratory Protection
- 4.06 Personnel Monitoring and Decontamination
- 4.07 Protective Measures
- 4.08 Initial Offsite Release Assessment
- 4.09 Source Term Assessment
- 4.10 Determination of X/Q
- 4.11 Follow-up Offsite Release Assessment
- 4.12 Offsite Environmental Monitoring Instructions
- 4.13 Offsite Release Assessment with Environmental Data
- 4.14 In-Plant Monitoring
- 4.15 Onsite Monitoring
- 4.16 Offsite Monitoring
- 4.17 Monitoring of OSC and TSC
- 4.18 Monitoring of LEOF
- 4.19 Radio Operations for Health Physics Monitoring
- 4.20 Health Physics Actions for Transport of Contaminated Injured Personnel
- 4.21 Evacuation and Remote Assembly Area Monitoring
- 4.22 Post Accident Sampling of Containment Air
- 4.23 Post Accident Sampling of Reactor Coolant
- 4.24 Gaseous Effluent Sampling During an Emergency
- 4.25 Liquid Effluent Sampling During an Emergency
- 4.26 High Activity Sample Analysis

- 4.27 Dose Control Emergency Response
- 4.28 Class "A" Dose Calculation Model
- 4.29 TSC/LEOF Radiation Monitoring System

5. Protective Action Procedures

- 5.01 Transportation of Contaminated Injured Personnel
- 5.02 Search and Rescue
- 5.03 Personnel Accountability
- 5.04 Access Control
- 5.05 Site Evacuation
- 5.06 Emergency Radiation Exposure Authorization
- 5.07 Administration of Radioprotective Drugs
- 5.08 Damage Control Guideline

6. Recovery and Restoration Procedures

- 6.01 Re-entry/Recovery Guideline

4.4 Early Warning System

Prompt alerting and notification of the population within the 10-Mile EPZ is accomplished using the Early Warning System (EWS). The EWS consists of sirens installed and maintained by the Company, route alerting utilizing State and local emergency vehicles, institutional alerting initiated by State and local governments, the Emergency Broadcast System (EBS), and personal notifications. The Federal Emergency Management Agency (FEMA) has determined that the alert and notification system installed around the Surry Power Station satisfies the requirements of NUREG-0654/FEMA-REP-1, Revision 1, and FEMA-REP-10. The purpose of the system is 1) to allow initial notification to the residents of the 10-Mile EPZ within 15 minutes of the time that State and local officials are notified that a situation exists requiring urgent action, 2) to ensure that essentially 100% of population within 5 miles from the site can be alerted within this time, and 3) to ensure that essentially 100% of the population from 5 to 10 miles from the site can be alerted within 45 minutes from this time.

The State and local governments bear the ultimate responsibility for warning the public. Should it be necessary, State and local authorities will alert the public within the 10-Mile EPZ using alternative methods (Reference COVERP, Appendix 3).

Members of the public within the 10-Mile EPZ shall be informed of what actions to take following activation of the EWS. Upon hearing the sirens, they have been instructed to turn on their radios or television sets to EBS stations to receive further instructions. Surry and James City counties and the State have 24 hour capacity of activating the EWS sirens. Messages sent out over the EBS are initiated by the State Department of Emergency Services.

4.5 Spectrum of Postulated Accidents

Examples of minor accidents that may occur at the Station include small spills of radioactive liquid, external contamination of personnel or personal effects, unplanned or uncontrolled releases of small amounts of radioactive material, or equipment malfunctions.

Major occurrences, though not expected to take place, have been postulated and designed against because their consequences could include the potential for release of significant amounts of radioactive material.

Postulated accidents described in Section 14 of the UFSAR are as follows:

- a. Major reactor coolant pipe ruptures (LOCA).
- b. Major secondary system pipe rupture (steam line break).
- c. Steam generator tube rupture.
- d. Fuel handling accidents.
- e. Rupture of a control rod drive mechanism housing (rod cluster control assembly ejection).

Of the accidents listed above and analyzed in the UFSAR, three are considered to release significant amounts of radioactivity. These are the loss of coolant accident, steam generator tube rupture and the fuel handling accident. The nature of these three accidents are such that a radiological safety analysis can produce results which vary considerably in the radiological consequences. This analysis depends on assumptions used concerning such items as the status of primary coolant radioactivity content, meteorological conditions, or performance of station safety systems. For example the accident analysis in the Environmental Report, which is based on more realistic assumptions, indicates no significant radiological effects offsite for the three accidents (i.e., all thyroid and whole body doses are calculated to be less than 10 CFR 100

requirements). The UFSAR makes much more conservative estimates of the consequences.

In summary, the examples given above show that the entire range is within the classification system.

4.6 Requirements for Written Summaries of Emergency Events

A written summary is provided to the Virginia Department of Emergency Services following activations of the Surry Emergency Plan. The schedule for submitting the written summary of a Notification of Unusual Event is within 72 hours of its declaration; for any other classification, the schedule for submitting the written summary is within 8 hours of its termination. This schedule was established with the concurrence of the Virginia Department of Emergency Services. (Reference Letter Serial 84-302 dated 5-31-84.)

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requirements). The UFSAR makes much more conservative estimates of the consequences.

In summary, the examples given above show that the entire range is within the classification system.

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SURRY POWER STATION
EMERGENCY PLAN

SECTION 5

ORGANIZATIONAL CONTROL OF EMERGENCIES

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5.0 Organizational Control of Emergencies

It is within the scope of the Emergency Plan to assure that Notification of Unusual Event, Alert, Site Area Emergency, General Emergency and certain station emergency classifications are effectively managed.

During training on emergency preparedness, all employees are instructed to contact the Shift Supervisor on duty to report any emergency. This notification and the information available to the Shift Supervisor in the Control Room enable a timely classification of the emergency and subsequent actions.

During an emergency, the Shift Supervisor performs functions outlined in the EPIPs for the Station Emergency Manager (SEM) until relieved. If required by the emergency classification, or if deemed appropriate by the SEM, emergency response personnel will be notified and instructed to report to the station as soon as possible. The Shift Supervisor is relieved as SEM when the Station Manager or his designated alternate reports to the Control Room, and receives an update on the status of the plant, emergency actions taken and current status of the emergency. Following this relief, the SEM will relocate to the Technical Support Center (TSC) where he will ensure effective cooperative efforts of those people assigned tasks during the emergency.

5.1 Normal Station Organization

Station organization is administrated by the Station Manager who is ultimately responsible for the operation and conduct of the station. The manning of the Station is accomplished by the normal complement of station personnel (day shift, Monday through Friday) and the basic shift complement (back shift).

The basic shift complement of personnel is comprised of Operations, Health Physics, Chemistry and Security personnel with coverage by Maintenance on designated shifts. In addition, technical/engineering support is available on all shifts from the Shift Technical Advisor. Station administrative procedures provide the details of the normal station organization, including reporting relationships.

5.2 Onsite Emergency Organization

The first line of control of an emergency at Surry Power Station lies with the basic onshift personnel. The basic shift complement (Figure 5.1) is staffed with personnel qualified to take actions necessary to manage the control of a Notification of Unusual Event emergency classification. The capability of the basic shift personnel to effectively manage a Notification of Unusual Event allows for timely assembly of personnel response and for smooth integration into the structure of emergency management if the onshift emergency organization requires the assistance of augmentary emergency response personnel.

Should the plant conditions degrade and cause escalation of the emergency classification to an Alert, Site Area Emergency or General Emergency, or should the SEM decide that additional emergency response personnel are needed, he shall augment the onshift Emergency Organization with off duty emergency response personnel.

Station emergency response personnel are trained in their respective emergency response roles in accordance with Section 8 of this Plan. Table 5.1 presents the minimum number and the estimated response times of personnel that could augment emergency operations.

Specific emergency assignments are based on individual job qualifications. Sufficient emergency response personnel are trained to ensure the capability of continuous (24 hour) emergency operations for a protracted period. Additional provisions have been made for rapid assistance from offsite support groups and agencies.

The onsite emergency organization prior to augmentation by additional emergency response personnel includes:

- Station Emergency Manager
 - Emergency Communicator
 - Security Team
 - Damage Control Team
 - Search and Rescue Team
 - Fire Team
 - First Aid Team
 - Chemistry Team
 - Radiological Assessment Director
 - Inplant Monitoring Team
 - Shift Supervisor or Assistant Shift Supervisor
 - On Duty Operations Personnel
 - On Duty Shift Technical Advisor

The coverage provided by the Damage Control Team may not be available on a full-time basis. However, augmentation of the onsite emergency organization will specifically provide such coverage.

The personnel assigned to the Search and Rescue Team, the First Aid Team, and the Fire Team may be assigned other functions. The organizational relationship of the emergency teams and positions prior to augmentation is shown in Figure 5.1.

If an emergency occurs on one of the two units, one Shift Supervisor or Assistant Shift Supervisor assumes the operational responsibility for the unaffected unit. This allows the other Shift Supervisor or Assistant Shift Supervisor to assume the position of SEM in order to evaluate and direct the emergency response operations.

Augmentation of the onshift emergency organization may become necessary either by the escalation of the emergency classification to a level of Alert or greater or by judgement of the SEM. If required, the SEM shall initiate the augmentation of the onsite emergency organization by instructing Station Security to commence call out of emergency response personnel. The onsite emergency organization after augmentation by emergency response personnel includes:

- _ Station Emergency Manager
 - _ Emergency Communicator
 - _ Emergency Procedures Coordinator
 - _ Emergency Operations Director
 - _ Shift Supervisor or Assistant Shift Supervisor
 - _ On Duty Operations Personnel (including Control Room Shift Technical Advisor)
 - _ Emergency Maintenance Director
 - _ Maintenance Support Team
 - _ Emergency Technical Director
 - _ Technical Support Team
 - _ Chemistry Team
 - _ Emergency Administrative Director
 - _ Administrative Support Team
 - _ Security Team

- _ Radiological Assessment Director
 - _ Dose Assessment Team
 - _ Offsite Monitoring Teams
 - * Evacuation Monitoring Team
- _ Radiation Protection Supervisor
 - _ Inplant Monitoring Team
 - _ Sample Analysis Team
 - * Personnel Monitoring and Decontamination Team
 - _ Onsite (Out of Plant) Monitoring Team
- _ Operational Support Center Director
 - * Fire Team
 - * First Aid Team
 - * Damage Control Team
 - * Search and Rescue Team

* These teams will be activated only if events require their function to be performed.

The Fire Team, the First Aid Team, the Damage Control Team, and the Search and Rescue Team normally report to the OSC Director in the Operational Support Center. When coverage provided by these teams is required, control the teams will transfer to the SEM or to the appropriate emergency director.

Figure 5.2 shows the organizational relationship of the Emergency Teams and positions after augmentation.

5.2.1 Emergency Position and Team Descriptions

Department superintendents and supervisors are responsible for designating individuals to serve as primary, interim, or alternate emergency response personnel. Table 5.3 lists recommended candidates for each position. Designated individuals who have met the training requirements contained in Section 8 of this Plan are listed on the Roster of Qualified Emergency Response Personnel.

5.2.1.1 Station Emergency Manager

The principal candidate for this position before augmentation of the emergency organization is the Shift Supervisor. Relief may be provided by any designated, qualified candidate (e.g., regular shift turnover). Following augmentation, the principal candidate is the Station Manager.

The SEM normally operates from the Control Room or the TSC and reports to the Recovery Manager. The SEM has the responsibility of managing and directing emergency operations during the course of the emergency. The SEM is responsible for:

- 1) Classifying the emergency,
- 2) Notifying NRC, State and local governments of the emergency status,
- 3) Recommending protective actions,
- 4) Authorizing emergency exposure limits,
- 5) Activating emergency personnel and facilities,
- 6) Reducing power or shutting down both reactors,
- 7) Committing company funds as necessary,
- 8) Acquiring emergency equipment or supplies,

- 9) Ordering site evacuation,
- 10) Restricting access to the site,
- 11) Notifying company management,
- 12) Implementing work schedules, and
- 13) Directing onsite emergency activities.

Items 1 through 4 above may not be delegated. Upon activation of the Local Emergency Operations Facility (LEOF), the Recovery Manager will be responsible for notifying the State and local agencies of the emergency status. In addition, the Recovery Manager will be responsible for recommending offsite protective measures to the State.

5.2.1.2 Emergency Communicator

The Emergency Communicator reports to the SEM in the Control Room prior to activation of the TSC, and in the TSC after its activation.

The primary duty of the Emergency Communicator is to notify the Emergency Operations Centers of the communities within the 10-mile Emergency Planning Zone, the Department of Emergency Services (DES), and the NRC. Upon activation of the LEOF, the LEOF staff assumes responsibility for notification of State and local governments from the TSC. The Emergency Communicator collects and ensures the accuracy of plant status data and ensures communications between the TSC and the LEOF. Multiple emergency communicators may be assigned as the situation dictates.

5.2.1.3 Emergency Procedures Coordinator

The Emergency Procedures Coordinator (EPC) reports to the SEM in the TSC. The responsibilities of the EPC include: assisting the SEM in maintaining a working document of the controlling EPIP and other appropriate procedures, in ensuring that all appropriate procedures are initiated, in obtaining all procedures generated as a result of the emergency, and in preparing these documents for review by the Station Nuclear Safety and Operating Committee (SNSOC).

5.2.1.4 Emergency Operations Director

The Emergency Operations Director (EOD) reports to the SEM in the TSC. The duties of the EOD include: ensuring the activities of Operations personnel, advising the SEM on emergency operations, and ensuring the development of procedures necessary for conducting emergency operations.

5.2.1.5 Emergency Maintenance Director

The Emergency Maintenance Director (EMD) reports to the SEM in the TSC. The duties of the EMD include: directing the activities of the Maintenance Support and Damage Control Teams, advising the SEM on emergency maintenance activities, and directing the development of procedures necessary for conducting emergency maintenance.

5.2.1.6 Emergency Technical Director

The Emergency Technical Director (ETD) reports to the SEM in the TSC. The duties of the ETD include: directing the activities of the Technical Support and Chemistry teams; ensuring analysis of and solutions to mechanical, electrical, instrumentation and control, thermohydraulic, thermodynamic, and reactor physics problems, providing technical support to the SEM, and ensuring development of procedures necessary for conducting emergency operations and maintenance. The ETD will assist in resolving questions concerning license requirements with the NRC.

5.2.1.7 Shift Technical Advisor (Control Room)

The Shift Technical Advisor will advise the Shift Supervisor or Assistant Shift Supervisor on operational safety considerations.

Shift Technical Advisor coverage is provided for 24-hour, 7 days per week to ensure timely assistance in the Control Room.

5.2.1.8 Emergency Administrative Director

The Emergency Administrative Director (EAD) reports to the SEM in the TSC. The EAD directs activities of the Administrative Support Team and advises the SEM on emergency first aid, fire protection, security, administrative and logistical support activities. The EAD coordinates the acquisition of equipment, supplies, personnel, and other assistance necessary to cope with the emergency.

5.2.1.9 Radiological Assessment Director

The principal candidate for this position before augmentation of the emergency organization is the Health Physics Shift Supervisor. Following augmentation, the principal candidate is the Superintendent Health Physics. The Radiological Assessment Director (RAD) reports to the SEM in the Control Room or TSC.

The RAD directs the activities of the Radiation Protection Supervisor in maintaining the Radiation Protection Program onsite during an emergency. He also directs and assists the activities of the Dose Assessment Team in determining offsite consequences of radiological release until control is assumed by the Radiological Assessment Coordinator (RAC) at the LEOF.

Other duties of the RAD are to provide the status of offsite releases to the SEM, to evaluate radiological conditions, to recommend onsite and offsite protective actions to the SEM, and to provide recommendations and Health Physics (HP) coverage for onsite corrective actions.

5.2.1.10 Radiation Protection Supervisor

The Radiation Protection Supervisor (RPS) will normally operate from the station HP Office and report to the RAD. The RPS directs the activities of Dose Control, the Inplant Monitoring Team, the Sample Analysis Team, the Personnel Monitoring and Decontamination Team, the Onsite (Out of Plant) Monitoring Team, the Evacuation Monitoring Team, and the Chemistry Team during post-accident sampling.

The RPS will also provide radiological support, as needed, to the Search and Rescue Team, the Damage Control Team, the Fire Team, and the First Aid Team. Additional duties include evaluating onsite radiological conditions and ensuring that appropriate monitoring and sampling is performed. The RPS will further ensure that appropriate personnel monitoring is performed, that personnel exposures are evaluated, and that dose records are maintained.

The RPS shall also recommend onsite protective measures to the RAD and provide survey results and sample analysis results needed for offsite dose assessment.

5.2.1.11 Operational Support Center Director (OSC Director)

The OSC Director will coordinate activities from the Operational Support Center (OSC) and shall report to the SEM. The duties and responsibilities of the OSC Director include coordinating response of the Fire Team, the First Aid Team, the Damage Control Team, and the Search and Rescue Team. The OSC Director shall dispatch the above teams and personnel when directed to do so by the SEM or designee.

5.2.1.12 Maintenance Support Team

The Maintenance Support Team will operate out of the TSC under the direction of the EMD.

Duties of the Maintenance Support Team include: advising the EMD on emergency maintenance activities and assisting him in directing the activities of the Damage Control Team, if activated. The Maintenance Support Team will also assist the EMD in developing emergency maintenance procedures.

5.2.1.13 Technical Support Team

The Technical Support Team will operate out of the TSC under the direction of the ETD.

The Team shall assist the ETD in analyzing electrical, mechanical, instrumentation and control, chemistry, reactor physics, thermohydraulic and thermodynamic problems and in developing solutions to the problems. The Team shall also assist in developing procedures necessary to deal with the emergency condition.

5.2.1.14 Chemistry Team

The Chemistry Team reports to the ETD and operates out of the Chemistry area of the Station.

The Team shall consist of the Team Leader and a Team member.

This Team will conduct the necessary chemistry sampling and sample analysis. The Team will also obtain post-accident liquid samples.

5.2.1.15 Administrative Support Team

The Administrative Support Team will operate from the TSC under the direction of the EAD.

The duties of the Administrative Support Team will be to assist the EAD on emergency fire protection, security, administrative and logistical support activities. The Team is also responsible for providing Quality Assurance review of emergency procedures and activities and provide clerical and records support. If the emergency at the Station is Security related, the Team Leader shall report directly to the SEM. If the emergency at the Station is a fire, the Loss Prevention Coordinator or his assistant shall report directly to the SEM.

5.2.1.16 Security Team

The Security Team reports to the EAD. This Team will provide coverage in all necessary areas of the Station.

The team will maintain personnel accountability, provide site access control, provide station security, and activate the LEOF. The Team will also maintain liaison and communications with local law enforcement agencies when directed to do so by the SEM.

5.2.1.17 Dose Assessment Team

This Team will operate out of the TSC under the direction of the RAD once the TSC is activated.

Duties of this Team include: maintaining contact with and transmitting instructions to the Offsite Monitoring Teams and the Evacuation Monitoring Team (if activated), performing offsite dose assessment calculations, and informing the RAD of offsite release calculations and dose projections, until the LEOF is activated.

The Dose Assessment Team will transmit health physics and environmental information to the NRC using the Health Physics Network (HPN) until the LEOF assumes this duty.

The Dose Assessment Team will also provide continued updates to the LEOF regarding meteorological conditions, process monitor readings, and sample analysis results.

Once the LEOF is activated, the Dose Assessment Team Leader will report the results of the offsite releases and all dose projections to date to the RAC in the LEOF. The Dose Assessment Team Leader will also inform the RAC of the locations of the Offsite Monitoring Teams and of the current data received from these Teams.

5.2.1.18 Offsite Monitoring Teams

These Teams will report to the Dose Assessment Team in the TSC or to the RAC in the LEOF, once activated. These Teams will provide offsite monitoring and sample collection as directed by the Dose Assessment Team or the RAC. Each Team will consist of a Team Leader and a Team Member.

5.2.1.19 Evacuation Monitoring Team

This Team reports to the Dose Assessment Team in the TSC from the Remote Assembly Area.

The duties of this Team include: monitoring station personnel at the Remote Assembly Area following a site evacuation, collecting personnel dosimetry, and decontaminating personnel, as necessary. This Team will be activated only if site evacuation is ordered by the SEM and it may consist of only one person.

5.2.1.20 Inplant Monitoring Teams

This Team reports to the RPS in the Station HP Office.

This Team will perform inplant monitoring and sample collection as directed by the RPS. The Team will also provide monitoring services to the Search and Rescue Team, the Damage Control Team, the Fire Team, and the First Aid Team, if required.

5.2.1.21 Sample Analysis Team

This Team reports to the RPS in the Station HP Office.

The Team shall analyze samples collected offsite and other samples collected, as required. The team shall also analyze post-accident liquid and gaseous samples.

Note that this Team may consist of only one person.

5.2.1.22 Personnel Monitoring and Decontamination Team

This Team reports to the RPS in the Station HP Office.
Note that this Team may consist of only one person.

The Team duties include: monitoring personnel, decontaminating personnel, as necessary, and providing monitoring services to the Search and Rescue Team, the Damage Control Team, the Fire Team, and the First Aid Team, if required.

5.2.1.23 Onsite (Out of Plant) Monitoring Team

This Team reports to the RPS and operates out of the Station HP Office. The team will perform onsite (out of plant) monitoring and sample collection as directed by the RPS.

5.2.1.24 Fire Team

The Fire Team members arriving at the Station to augment the onshift Fire Team will report to the OSC Director in the OSC until the Team is activated by a need of their services.

Upon activation, the Team will report to the Loss Prevention Coordinator or the SEM or the appropriate emergency director.

The onshift Fire Team members with other duties will not report to the OSC, but will remain in their normal duties unless called out to combat a fire. The Fire Team will combat fires in accordance with the Station Fire Protection Program. Appropriately trained local fire fighting companies have agreed to assist the Station Fire Team, if requested.

5.2.1.25 First Aid Team

Emergency response personnel reporting to the Station to augment the onshift First Aid Team will report to the OSC Director in the OSC until their services are needed. Upon activation, the Team will report to the SEM or the appropriate emergency director.

The Team will respond to first aid emergencies in accordance with the Station Administrative Procedures and in accordance with standard first aid practices.

The onshift First Aid Team members with other duties will not report to the OSC, but will remain in their normal duties unless activated to respond to a first aid emergency.

5.2.1.26 Damage Control Team

The Damage Control Team will report to the OSC Director. When their support is required, the team will report to the EMD or the appropriate emergency director.

In addition to the Damage Control Team composition shown in Table 5.3, mechanics, welders, and electricians may be called in to augment the team as required by the EMD.

This Team will perform emergency repairs as required.

5.2.1.27 Search and Rescue Team

This Team will report to the OSC Director in the OSC until circumstances require their function to be performed. Upon activation, the Team will report to the SEM, the Loss Prevention Coordinator or the appropriate emergency director.

The Search and Rescue Team will search for and rescue personnel following an explosion, a fire, or any other hazardous event. The Team will also locate personnel unaccounted for during an emergency.

5.3 Augmentation of Onsite Emergency Organization

All of the offsite support listed below is available during any emergency at the nuclear power station. With the declaration of Alert or higher classification, the Corporate Emergency Response Plan is activated to proceduralize the process of obtaining support.

The Corporate Response Manager has responsibility for directing the corporate emergency response effort. He is provided recommendations concerning the participation required of the Corporate Emergency Response Team (CERT) by the Recovery Manager and his support staff from the LEOF.

The Recovery Manager coordinates all responses from offsite support departments and governmental agencies with the station through the SEM and his support staff.

The organization and emergency planning at the North Anna and Surry Power Station are very similar. Either site could obtain from the other site: Administrative and technical personnel, radiological detection instruments (including use of the other's radiological count room), and additional protective clothing, equipment or supplies. Each station will serve as the primary source of emergency resources for the other station.

All additional personnel directed to report to the site during the emergency shall report to the SEM for assignment.

The participating agencies and support services who have been asked to assist the station in time of an emergency are listed, by Letter of Agreement, in Appendix 1 of this Emergency Plan. Favorable responses have been received from the local city and county governments in the environs of the station, as well as from the Commonwealth of Virginia Department of Emergency Services and Bureau of Radiological Health, State Department of Health.

5.3.1 Headquarters Support:

a. Environmental Monitoring

Provisions for obtaining additional environmental monitoring personnel shall be the responsibility of the CERT.

b. Logistics Support for Emergency Personnel

CERT Administrative Services will be responsible for all administration and logistics including accommodations, Corporate communications, purchasing, finance, commissary, sanitary, transportation, and security services.

c. Technical Support for Planning and Re-entry/Recovery Operations

Technical support directed by the Recovery Manager includes trained technical personnel and their equipment in the areas of nuclear fuel management, water quality, air quality, quality assurance, engineering, health physics, and chemistry.

Additional technical support would be obtained from the other nuclear station, A/E, and NSSS vendor. Consulting services would be obtained as necessary.

d. Notification of Governmental Authorities

CERT management located in the Richmond Headquarters have normal telephone service and may contact required governmental agencies, as necessary. The LEOF would serve as the point of interaction between the station, governmental authorities, and Corporate management.

e. Release of Information to News Media

News releases shall be coordinated with the Public Affairs Department and approved by the Recovery Manager. The Chief Technical Spokesperson is responsible for meeting with the news media. Releases will be coordinated with the appropriate governmental authorities. Briefings can be conducted at the Local Media Center or the Joint Public Information Center. The Recovery Manager will process news releases for the SEM through the Joint Public Information Center Director when the LEOF is activated. At any other time, the Corporate Office will relate newsworthy information to the media.

5.3.2 Vendor and Contractor Support

Support will be obtained from Stone & Webster (the A/E) and Westinghouse (the NSSS vendor) as needed for emergency and recovery operations. Experienced personnel with indepth expertise in station design, engineering and construction will be obtained to aid in solving critical technical problems.

This support is normally solicited by the Corporate Response Manager or his representative. In the event of an emergency, both Westinghouse and Stone & Webster will be informed of the plant status. In addition, the Institute of Nuclear Power Operations can be contacted to provide sources of additional support, if necessary.

5.3.3 Local Services Support

Letters of Agreement in support of the Surry Emergency Plan will be re-negotiated once every 2 years and are listed in Appendix 1 of this Emergency Plan. Negotiation responsibility lies with the Supervisor Emergency Planning. Letters of Agreement are limited to Federal, State, local and volunteer organizations.

Agreements have been arranged to provide fire fighting, rescue squad, medical and hospital services. Procedures for obtaining offsite services are provided in Abnormal Procedures and Emergency Plan Implementing Procedures. Responding rescue squads are trained in the handling, treatment, and transportation of injured personnel.

The Medical College of Virginia (MCV), Virginia Commonwealth University, has developed an emergency plan designed to provide medical care in the case of a radiation emergency. The MCV Radiation Emergency Plan supports the Virginia Power nuclear power stations in the case of occupational and/or major accidents, including contaminated personnel. A copy of the MCV Radiation Emergency Plan can be found in Appendix 2.

Radiological Count Laboratories (with response time), that could provide emergency radiological supplies and services, include:

Babcock & Wilcox, Lynchburg, VA (4 hours)

University of Virginia, Charlottesville, VA (3 hours)

Virginia Commonwealth Laboratories, Richmond, VA (75 minutes)

Medical College of Virginia, Richmond, VA (75 minutes)

Newport News Shipbuilding & Drydock, Newport News, VA (45 minutes)

Norfolk Naval Shipyard, Norfolk, VA (60 minutes)

Bureau of Radiological Health State Mobile Laboratory (75 minutes)

College of William and Mary, Williamsburg, VA (75 minutes)

5.4 Coordination with Participating Government Agencies

The State organization for response to radiological emergencies is based on normal governmental structures and channels of communication with the Governor in his role as Director of Emergency Services directing the response through the State Coordinator of Emergency Services. The State Coordinator of Emergency Services coordinates the overall response and the Department of Health provides technical advice and assistance on radiological accident assessment, protective action, radiological control, and radiological monitoring.

Responsibility for radiological emergency response rests primarily with the elected officials of local governments. As time is a major factor in realizing the benefits of protective action in the event of a radiological emergency, certain of these actions are predetermined and agreed upon by the local governing body and are implemented without delay upon notification of a radiological emergency. An insta-phone (dedicated hot-loop system), continuously monitored by the Station Control Room, is used for normal transmission of emergency notifications to these authorities (See Section 7.2.2.5). Procedures for authentication of an emergency via the use of restricted, unpublished call-back telephone numbers are maintained in State and local Radiological Emergency Response Plans should verification be desired. When this notification is received, the Commonwealth of Virginia Radiological Emergency Response Plan is also implemented and the State Department of Health initiates action to assess and evaluate the radiological situation in order to provide guidance and assistance to local governments. After the initial immediate action, subsequent protective actions are made based on the results of the State evaluation of the radiological situation and Virginia Power recommendations.

State and Federal agencies provide assistance, as required. Response operations at the State level are coordinated by the Department of Emergency Services.

The State will also provide police support in the event of the activation of this plan. In the event of an emergency, the dispatcher at the State Police Headquarters in Richmond, Virginia may be called. First response would be from police units normally based in the local areas. These would soon be supplemented by additional units dispatched from other parts of the state. The State Police would provide traffic control and additional security.

The local County Sheriff's of Surry and Isle of Wight counties also respond to this plan. They perform essentially the same functions as the State Police and coordinate their efforts with that organization.

The Company also maintains liaison and agreement with local Fire Departments and Rescue Squads that will provide assistance, if requested, by the SEM.

In the event of an emergency, the Station will be in communication with the Surry, Isle of Wight, York, James City, Williamsburg, and Newport News Directors of Emergency Services who have the capability of activating their Emergency Operations Centers.

The Station relies upon Surry and Isle of Wight Counties to provide assistance in the event an evacuation from the site requires a remote assembly point or any services the counties are capable of providing to mitigate any results of the emergency.

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The Station will also maintain close contact with NRC Headquarters and the Region II Offices in Atlanta. This is an important function to ensure that accurate information and assessment of the emergency are available to the Federal Government. As a results of these communications the NRC can best appraise their response to the emergency. In a like manner, the U.S. Department of Energy, Oak Ridge Operations, will provide radiological assistance to the Station in the event of an emergency. The Station will provide the necessary assembly point and information of the emergency. This agency will coordinate all its efforts with the participating Federal, State and local agencies responding to the emergency.

The Station has the responsibility to provide to supporting agencies involved in the recovery of the facility or participating in controlling the emergency the necessary information to permit them to use their resources. In the case of the local counties the Company provides communication, and when needed, training. This training takes the form of participation in drills and exercises by the county and radiological training for members of local volunteer rescue squads and fire departments. Local Police are trained by State agencies. The Company will also arrange drills and exercises on a routine basis to ensure the plan is workable and to gain experience in its implementation.

The total effort of all parties involved shall be directed toward minimizing the results of an emergency and working toward the recovery of the facility with the least impact on the population at large.

5.4.1 Commonwealth of Virginia Department of Emergency Services

The Virginia Department of Emergency Services (DES) organization is based on normal governmental structures and channels of communication with the Governor in his role as Director of Emergency Services directing the response through the State Coordinator of Emergency Services. The State Coordinator of Emergency Services coordinates the overall response operations at the State level. The DES is assigned the following specific tasks:

- a. Operate the State Emergency Operations Center (EOC)
- b. Warning in coordination with State Police and operators of fixed nuclear facilities
- c. Emergency communications
- d. Assist political subdivision in development and maintenance of local radiological emergency response plans
- e. Coordinate emergency response actions of Federal and State agencies
- f. Public information, assisted by the State Department of Health
- g. Coordinate radiological emergency response training.

Operators of fixed nuclear facilities will notify State and local government officials when a radiological emergency exists.

Primary means of notification by operators of fixed nuclear facilities shall be by insta-phone. Radio and commercial telephone will be used as a back-up. The State Radiological Emergency Response Organization and local government Radiological Emergency Response Organization's charts are provided in Appendix 2 to COVRERP. Specific information concerning the notification and activation of the Department of Emergency Services is given in Appendix 3 of COVRERP.

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The State Emergency Operations Center (EOC) is located in Richmond, Virginia. There are local EOCs in Surry, Isle of Wight, York, James City counties, and in the cities of Newport News and Williamsburg. The DES will send appropriate liaison personnel to the LEOF upon activation.

5.4.2 Commonwealth of Virginia Department of Health

Department of Health personnel, in coordination with the DES, provide technical advice and assistance on radiological accident assessment, protective actions, radiological exposure control, and radiological monitoring.

The Department of Health is assigned the following tasks:

- a. Accident assessment, to include provision of radiological assessment personnel, determination of actual offsite radiological consequences, record keeping and documentation of offsite effects of the accident.
- b. Advise State and local officials on the implementation of pertinent protective action based on accident assessment.
- c. Establish radiological exposure control for State and local government radiological emergency response personnel, other emergency response personnel, and the affected populace.
- d. Determine the availability and coordinate use of medical facilities that could accommodate and care for persons involved in a radiological emergency who may require medical care, including station personnel who may be injured and contaminated in numbers beyond the resources of the Medical College of Virginia.
- e. Provide other emergency health services.

- f. Develop criteria for establishing controlled areas surrounding an accident site, including ingress/egress control provisions and perimeter radiological surveillance of persons entering or leaving controlled areas.
- g. Develop criteria for re-entry into homes and evacuated areas and advise local government when these criteria have been met.
- h. Develop and conduct, in coordination with the DES, training programs for medical support personnel who may be called upon to care for offsite victims of a radiological accident.
- i. Procure, store and issue potassium iodine.

Upon either an Alert or higher classification, the Department of Emergency Services will notify the Bureau of Radiological Health, State Department of Health. The Department of Health will implement its response procedures. The local county health department is the primary health response agency, with the State Department of Health providing assistance to them, as required, with emphasis on the special requirements for those individuals who are contaminated with radioactivity. Accident assessment personnel, as part of the Radiological Emergency Response Team (RERT), will operate from the State EOC.

5.4.3 Additional State Agencies

Other State organizations having possible responsibilities in a radiological emergency are: Department of Agriculture and Consumer Services, State Air Pollution Control Board, Department of Conservation and Historic Resources, Division of Consolidated Laboratory Services, Department of Corrections, Department of Forestry, Commission of Game and Inland Fisheries, Virginia Department of Transportation, Department of Military Affairs, Marine Resources Commission, Department of Mental Health and Mental Retardation, Department of State Police, State Water Control Board, Department of Waste Management, and the Department of Social Services.

5.4.4 Surry County

The authority and responsibilities of Surry County presented in the Surry County Radiological Emergency Response Plan (RERP) applies to radiological emergencies within the county caused by events at the Surry Power Station. The plan:

- a. Assigns responsibilities to county offices and organizations in radiological emergency response and preparedness.
- b. Sets forth procedures for disseminating warning or radiological emergencies to the citizens of the county.
- c. Specifies response actions for specific emergency classifications.
- d. Delineates the policies and concepts under which the county government will operate in radiological emergency response. County agencies and departments will plan and prepare for response to radiological emergencies in accordance with the Surry County RERP.

Specific tasks in radiological emergency response are assigned to the following:

County Office of Emergency Services

Sheriff's Department

Department of Public Health

Superintendent of Schools

Department of Social Services

Volunteer Fire Companies

Surry County Volunteer Rescue Squad

See Appendix 1 to Surry County RERP for details concerning the tasks assigned to each organization.

Upon appropriate notification from the SEM, the County Sheriff's Office will notify the County Coordinator of Emergency Services, or his designated representative who shall:

- a. Verify the notification from Surry Power Station
- b. Initiate the key county official's alert system
- c. Initiate public warning procedures, as ordered by appropriate State authority
- d. Commence evacuation of people from the affected area when directed by the appropriate State authority.

The County Coordinator of Emergency Services or his representative will activate and ensure that the EOC is manned 24 hours per day.

The SEM will notify the Surry Sheriff's Office if onsite personnel are evacuated. The County Sheriff's Office telephone will serve as the local point for official communications within and out of the county, prior to establishment of the EOC. When the EOC is established, this responsibility will transfer to the EOC.

The Sheriff's Office will:

- a. Initiate the key official's alert system
- b. Initiate the traffic control plan, and
- c. Notify Headquarters, Division V, State Police

The County Office of Emergency Services with its EOC is located in the Surry County Government Center. The Surry County Radiological Emergency Response Functional Organization is shown in the Surry County RERP.

5.4.5 James City, Isle of Wight and York Counties, and the Cities of Williamsburg and Newport News

The authority and responsibilities of the above counties and cities during a radiological emergency are presented in their respective RERP. The RERPs apply to the radiological emergencies within these locations caused by events at the Surry Power Station. The James City/Williamsburg, Isle of Wight, York and Newport News RERPs are identical to the Surry RERP (as described in Section 5.4.4 above) except for information that is specific to Surry County.

In the event of an emergency of any classification, the SEM will notify all local jurisdictions (Surry County, York County, James City County, Isle of Wight County, Williamsburg City, and Newport News City) and the DES by using the Insta-phone loop.

If the Insta-phone is out of service, commercial telephone lines will be used to make the notifications. The above localities have a system to call back to the power station and verify the message.

5.4.6 Counties and Cities Within the Fifty Mile EPZ

The counties and cities directly involved in the emergency plan are Surry, Isle of Wight, James City, Williamsburg, York and Newport News. They have emergency response functions as previously stated in this section.

The counties and cities within the fifty mile EPZ are listed in Figure 5.5a. In the event of an emergency, notification of and interaction with these entities is a function of the DES.

5.4.7 Oak Ridge Operations, Emergency Preparedness Program, Section II Radiological Assistance Plan Region 2, U.S. Department of Energy (DOE)

The SEM or the Recovery Manager can request assistance from DOE, Oak Ridge Operations (Oak Ridge, TN) and can request implementation of the DOE Radiological Monitoring and Assessment Plan and the Interagency Radiological Assistance Plan.

The DOE Radiological Assistance Program provides: radiological advice and assistance to minimize injury to people, to minimize loss of property, to cope with radiological hazards, and to protect the public health and safety whenever the DOE believes that such action is necessary or upon request from DOE contractors, NRC and State licensees, Federal, State, and local agencies, private organizations or private persons.

The Interagency Radiological Assistance Plan (IRAP) was developed to coordinate the activities of participating Federal agencies with those State and local health, police, fire, and civil defense agencies which provide rapid and effective radiological assistance in handling radiological incidents. The DOE is the coordinating agency for the IRAP.

Further information concerning objectives and organization is provided in the DOE Plan (See Appendix 3). The expertise and resources of DOE and its contractors in handling and radiological incidents are outlined in Section IV of the DOE Plan.

The Company will provide designated facilities for the Federal response agencies in the LEOF. Telephones will be made available, as necessary. Since there are three commercial air terminals close to Surry Power Station (Patrick Henry International Airport in Newport News, Virginia; Richmond International Airport in Richmond, Virginia; and Norfolk International Airport in Norfolk, Virginia) and since all of these facilities are within 75 minutes driving time of the station, it is estimated that from the time of initiation of the Federal response that the DOE could be expected at the site within 5 hours.

MINIMUM SHIFT MANNING REQUIREMENTS

		TABLE 5.1			
Major Functional Area	Major Tasks	Position Title	Shift	≅ 30 Min.	≅ 60 Min.
Plant Operations and Assessment of Operational Aspects	Plant Operations	Shift Supervisor (SRO)	2*	--	--
		Control Room Operator (RO)	3*	--	--
		Control Room Operator (AO)	4	--	--
		Shift Technical Advisor	1*	--	--
Emergency Direction and Control	Direction and Control of onsite Emergency Activities	Station Emergency Manager	1***	--	--
Notification/Communication	Notify station, local, State, and Federal personnel and maintain communication	Emergency Communicator	2***	--	2
Radiological Accident Assessment and Support of Operational Accident Assessment	Local Emergency Operations Facility (LEOF) Recovery Manager	Recovery Manager	(Refer to Table 5.2)		
	TSC Offsite Dose Assessment	Radiological Assessment Director/	1***	--	1
	LEOF Offsite Dose Assessment	Radiological Assessment Coordinator	(Refer to Table 5.2)		

MINIMUM SHIFT MANNING REQUIREMENTS

		TABLE 5.1			
Major Functional Area	Major Tasks	Position Title	Shift	= 30 Min.	= 60 Min.
Radiological Accident Assessment and Support of Operational Accident Assessment [cont.]	Offsite Surveys	Offsite Monitoring Team Leader	--	--	2
		Offsite Monitoring Team Member	--	--	2
	Onsite (out of plant) Surveys	Onsite Monitoring Team Leader	--	--	1
		Onsite Monitoring Team Member	--	--	1
	Inplant Surveys/ Radiochemistry	Inplant Monitoring Team Leader	1	--	1
		Inplant Monitoring Team Member	1	--	1
	Chemistry	Chemistry Team Leader	--	--	1
		Chemistry Team Member	1	--	1
Plant System Engineering, Repair and Corrective Action	Technical Support	Operational - Technical Support Team Member (STA)	1***	--	1
		Core - Technical Support Team Member	--	1	--

MINIMUM SHIFT MANNING REQUIREMENTS

TABLE 5.1					
Major Functional Area	Major Tasks	Position Title	Shift	≈ 30 Min.	≈ 60 Min.
Plant System Engineering Repair and Corrective Action [cont.]	Technical Support [cont.]	Electrical - Technical Support Team	--	--	1
		Mechanical - Technical Support Team Member	--	--	1
	Repair and Corrective Action	Mechanical Maintenance - Damage Control Team Member	1**	1	1
		Rad Waste Operator - Damage Control Team Member	1***	--	--
		Electrical Maintenance - Damage Control Team Member	1**	--	2
		Instrument and Control - Damage Control Team Member	--	--	2
Protective Actions	Radiation Protection:	Personnel Monitoring Team Leader	1***	--	2
	a. Access Control	Personnel Monitoring Team Member	1***	--	2
	b. HP Coverage for repair, corrective actions, search and rescue, first air, and firefighting.				
	c. Personnel monitoring d. Dosimetry				

MINIMUM SHIFT MANNING REQUIREMENTS

TABLE 5.1

Major Functional Area	Major Tasks	Position Title	Shift	≈ 30 Min.	≈ 60 Min.
Firefighting and Rescue Operations	Firefighting	Fire Team Members	5***	5*** plus local support	
First Aid and Rescue Operations	First Aid and Rescue	First Aid Team Members	2***	2*** plus local support	
Site Access Control and Personnel Accountability	Security and Personnel Accountability	Security Personnel	(Proprietary)		
Total				13	25

NOTES:

- * Station Technical Specifications allowances for reduced staffing with both units in cold shutdown condition apply.
- ** Mechanical and electrical maintenance personnel are normally onsite on a 16 hour per day, 7 day per week basis. This coverage is provided by personnel who are assigned to other functions during the period that mechanical and electrical maintenance personnel are not onsite.
- *** This coverage is provided by personnel who may be assigned other functions.

EMERGENCY AND RECOVERY CORPORATE RESPONSE

REQUIRED FOR NUCLEAR STATION EMERGENCIES

(ALERT STATUS AND ABOVE)

Major Functional Area (Emergency Position Title)	Major Tasks	Position Title	Available In	Alternate Within
Management of Local Emergency Operations Facility (Recovery Manager)	To coordinate the Company's response to Emergency and Recovery with Federal, State and Local authorities	Vice-President Nuclear Operations	1½ hrs.	
		Manager Nuclear Operations and Maintenance Support		
		Manager Nuclear Licensing		1½ hrs.
Health Physics & Chemistry (Radiological Assessment Coordinator)	Report to Recovery Manager to conduct radiological assess- ment	Superintendent Radiological Waste	1½ hrs.	
		Staff Health Physicist		1½ hrs.
Technical Support (Technical Support Manager)	Reports to the Corporate Response Manager to provide technical and evaluation support.	Director-Safety Evaluation and Control	1½ hrs.	
		Manager Nuclear Analysis and Fuel		1½ hrs.

EMERGENCY AND RECOVERY CORPORATE RESPONSE
REQUIRED FOR NUCLEAR STATION EMERGENCIES

(ALERT STATUS AND ABOVE)

Major Functional Area (Emergency Position Title)	Major Tasks	Position Title	Available In	Alternate Within
Plan/Design/Construction (Plan/Design/Construction Manager)	Reports to the Corporate Response Manager to provide engineering, technical and vendor support in areas dealing with construction or design changes.	Manager Nuclear Site Services	1½ hrs.	
		Manager Mechanical Engineering		1½ hrs.
News Center Interface (Chief Technical Spokesperson)	Reports to the Recovery Manager to become the Company Spokesman in any statements to the news media.	Vice-President Nuclear Engineering	1½ hrs.	
		Vice-President Fossil/ Hydro Operations		1½ hrs.

RECOMMENDED CANDIDATES FOR EMERGENCY RESPONSE POSITIONS
TABLE 5.3

<u>EMERGENCY RESPONSE POSITION</u>	<u>RECOMMENDED CANDIDATES</u>
Station Emergency Manager	Station Manager Assistant Station Manager (O&M) Assistant Station Manager (NS&L) Superintendent Operations Senior Reactor Operator license holders
Emergency Communicator	Control Room Operator (Licensed) Control Room Operator (Unlicensed) Training Department staff designees
Emergency Procedures Coordinator	Assistant Station Manager (NS&L) Superintendent Nuclear Training or Training Department designee Coordinator-Emergency Planning
Emergency Operations Director	Superintendent Operations Operations Coordinator (SRO Licensed)
Emergency Technical Director	Superintendent Engineering Superintendent Technical Services Supervisor Site Engineering Programs Supervisor Systems Engineering
Emergency Maintenance Director	Superintendent Maintenance Supervisor Electrical Maintenance
Shift Technical Advisor (Control Room) (also Technical Support Team member)	Designated engineers
Emergency Administrative Director	Supervisor Administrative Services Supervisor Records Management (Nuclear) Supervisor - Office
Radiological Assessment Director	Superintendent Health Physics Supervisor Health Physics Station Health Physicist Health Physics Shift Supervisor
Radiation Protection Supervisor	Health Physics Supervisor Assistant Health Physics Supervisor Health Physics Shift Supervisor Health Physics Technician Health Physics Technician Trainee

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EMERGENCY RESPONSE POSITION

RECOMMENDED CANDIDATES

Operational Support Center
Director

Mechanical Supervisor
Electrical Maintenance Coordinator
Mechanical Foreman

Maintenance Support Team Leader

Supervisor Maintenance Services
Supervisor Mechanical Maintenance

Maintenance Support Team Member
(Warehouse)

Warehouse representative

Maintenance Support Team Member
(Mechanical Maintenance)

Mechanical Supervisor
Mechanical Foreman

Maintenance Support Team Member
(Electrical Maintenance)

Electrical Foreman

Maintenance Support Team Member
(Planning & Support Services)

Planning Department representative

Technical Support Team Leader

Site Engineering Programs
Supervisor System Engineering
Supervisor Design Engineering

Technical Support Team Member
Reactor Engineer (Core)

Designated engineer

Technical Support Team Member
Mechanical Engineer

Designated engineer

Technical Support Team Member
Electrical Engineer

Designated engineer

Chemistry Team Leader/Member

Senior Chemistry Technician
Chemistry Technician
Chemistry Technician Trainee

Administrative Support Team
Leader

Supervisor Security (NUC)
Supervisor Security Operations

Administrative Support Team
Member (Quality Assurance)

Supervisor Quality
Designated QA representative

Administrative Support Team
Member (Loss Prevention)

Loss Prevention Coordinator
or Assistant

Administrative Support Team
Member (Safety)

Safety Coordinator
or designee

Administrative Support Team
Member (Clerical Staff)

Designated Administrative Personnel

EMERGENCY RESPONSE POSITION

Security Team Leader

Security Team Members

Dose Assessment Team Leader

Dose Assessment Team Member

Sample Analysis or Monitoring
Team leader *Sample Analysis or Monitoring
Team member *

Damage Control Team Leader

Damage Control Team Member
(Mechanical Maintenance)Damage Control Team Member
(Electrical Maintenance)Damage Control Team Member
(Welder)Damage Control Team Members
(Instrumentation and Control)
(2 required)Damage Control Team Members
(Quality Assurance)
(2 required)Damage Control Team Member
(Rad Waste Operator)RECOMMENDED CANDIDATESSecurity Shift Supervisor
Assistant Security Shift SupervisorSecurity Officers
Security Control System Officers
Administrative Security OfficerHealth Physicist
Assistant Health Physics Supervisor
Health Physics Technician
Health Physics Technician TraineeAssistant Health Physics Supervisor
Health Physics Technician
Health Physics Technician TraineeHealth Physics Shift Supervisor
Health Physics Technician
Health Physics Technician TraineeHealth Physics Technician
Health Physics Technician Trainee
Health Physics Specialist
Health Physics Decon Technician

Mechanical Foreman

Mechanical Foreman

Electrical Foreman

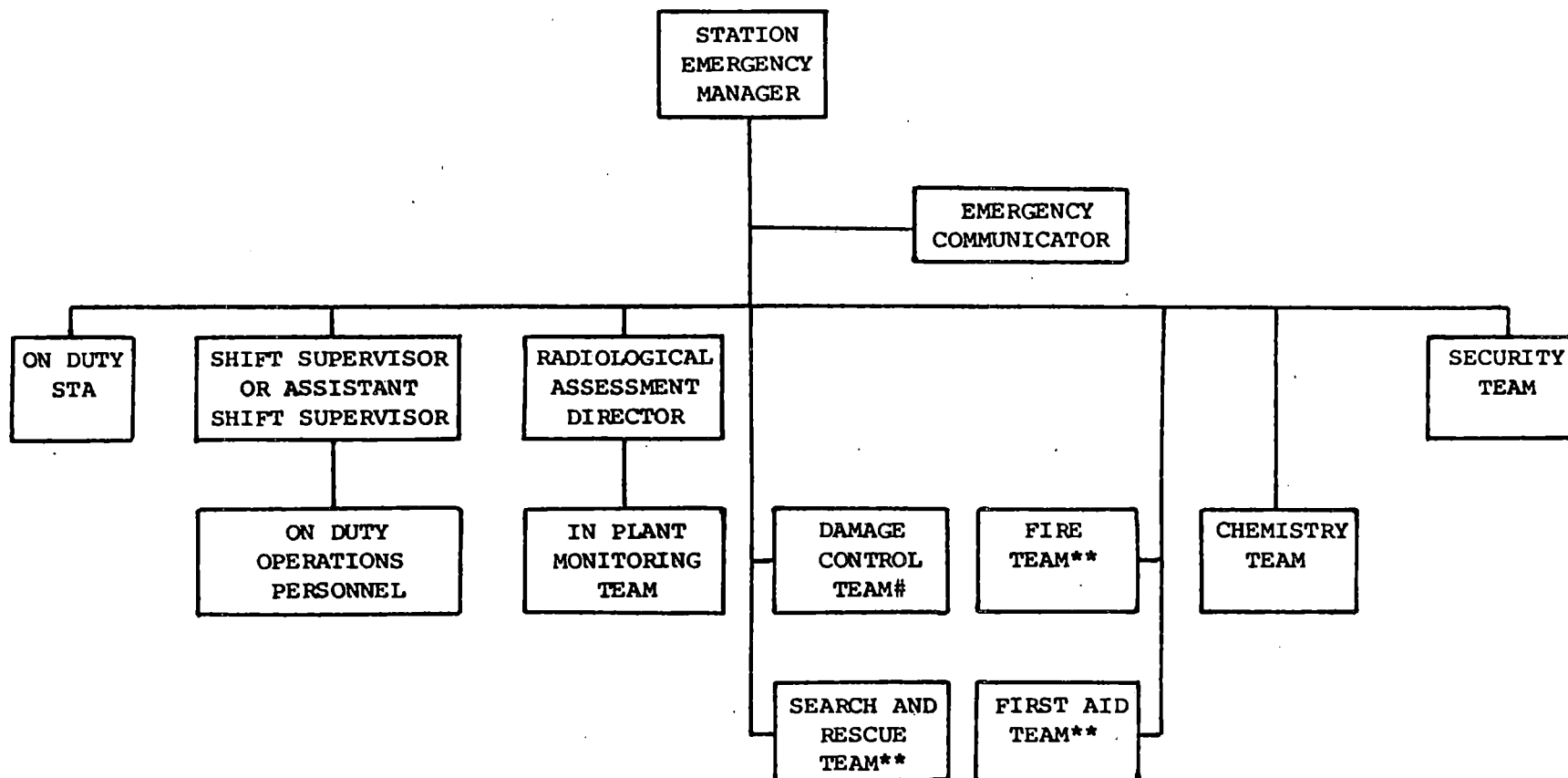
Welding Foreman

Senior Nuclear Instrument Technician
Nuclear Instrument Technician

Quality Control Inspectors

Control Room Operator
Control Room Operator Trainee

STATION EMERGENCY ORGANIZATION PRIOR TO AUGMENTATION*

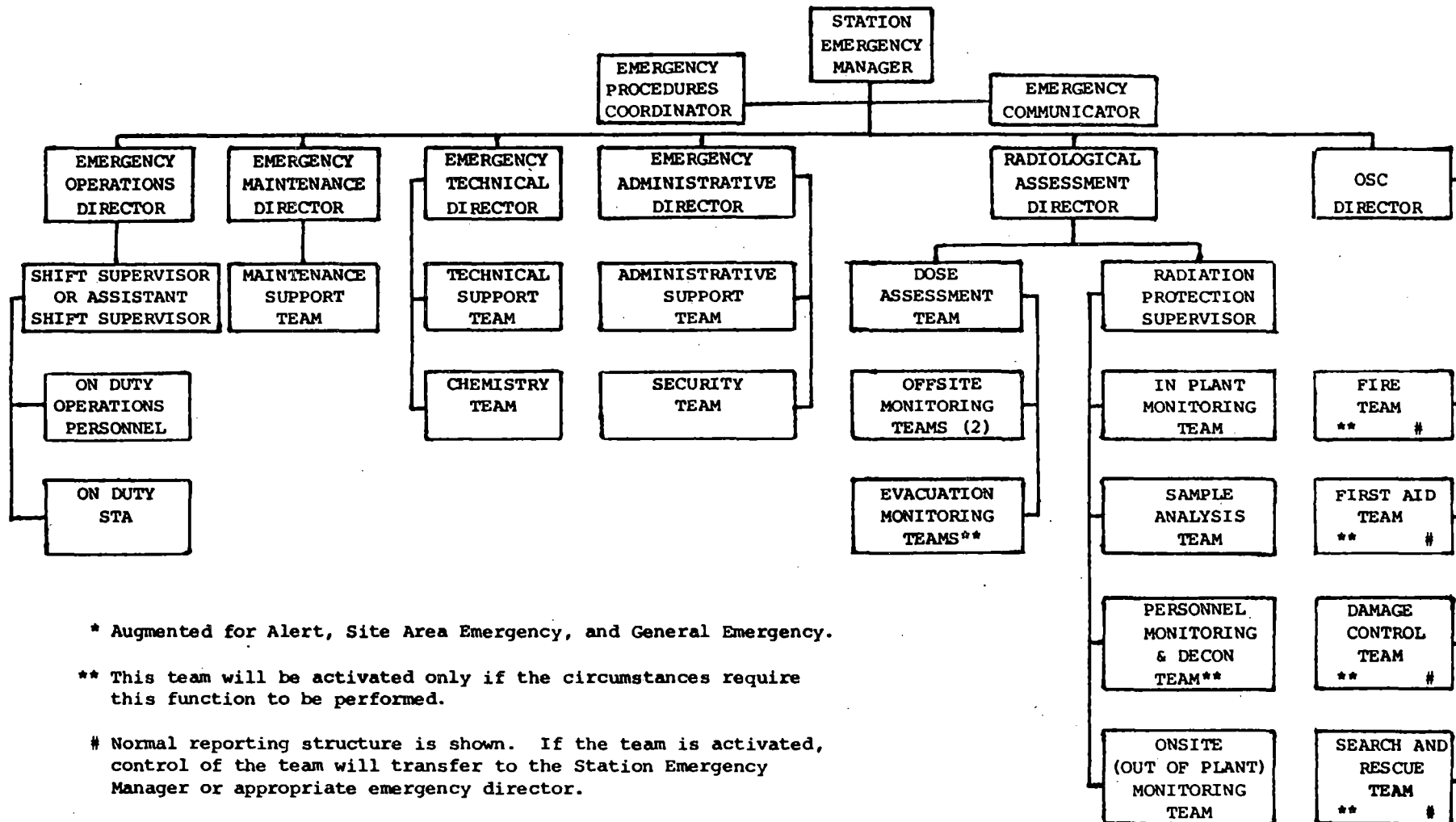


* Augmented for Alert, Site Area Emergency, and General Emergency.

** This coverage is provided by personnel who may be assigned other functions.

This coverage may not be provided on a full time basis.

STATION EMERGENCY ORGANIZATION FOLLOWING AUGMENTATION*



* Augmented for Alert, Site Area Emergency, and General Emergency.

** This team will be activated only if the circumstances require this function to be performed.

Normal reporting structure is shown. If the team is activated, control of the team will transfer to the Station Emergency Manager or appropriate emergency director.

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Table 5.3

EMERGENCY RESPONSE POSITION

RECOMMENDED CANDIDATES

Fire Team Leader

Fire Team Scene Leader
Fire Brigade Member

Fire Team Member

Fire Brigade Member

First Aid Team Leader

First Aid Team Captain

First Aid Team Member

First Aid Team Members

Search and Rescue Team Leader

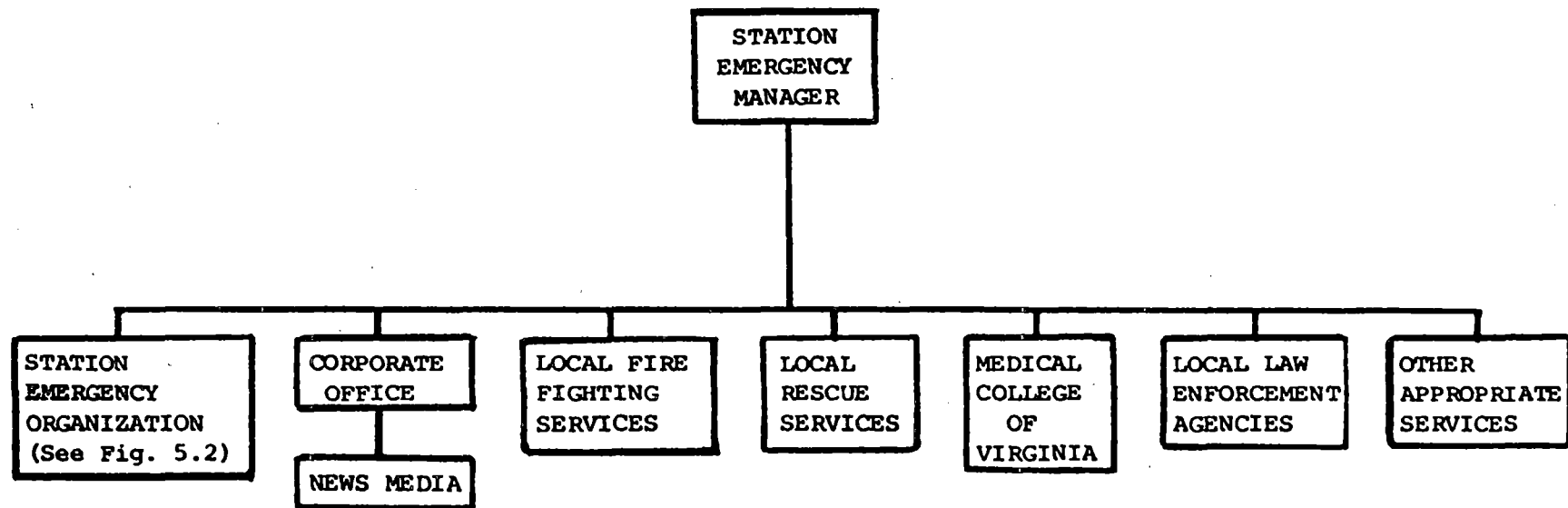
Fire Team Scene Leader
Fire Brigade Member

Search and Rescue Team Member

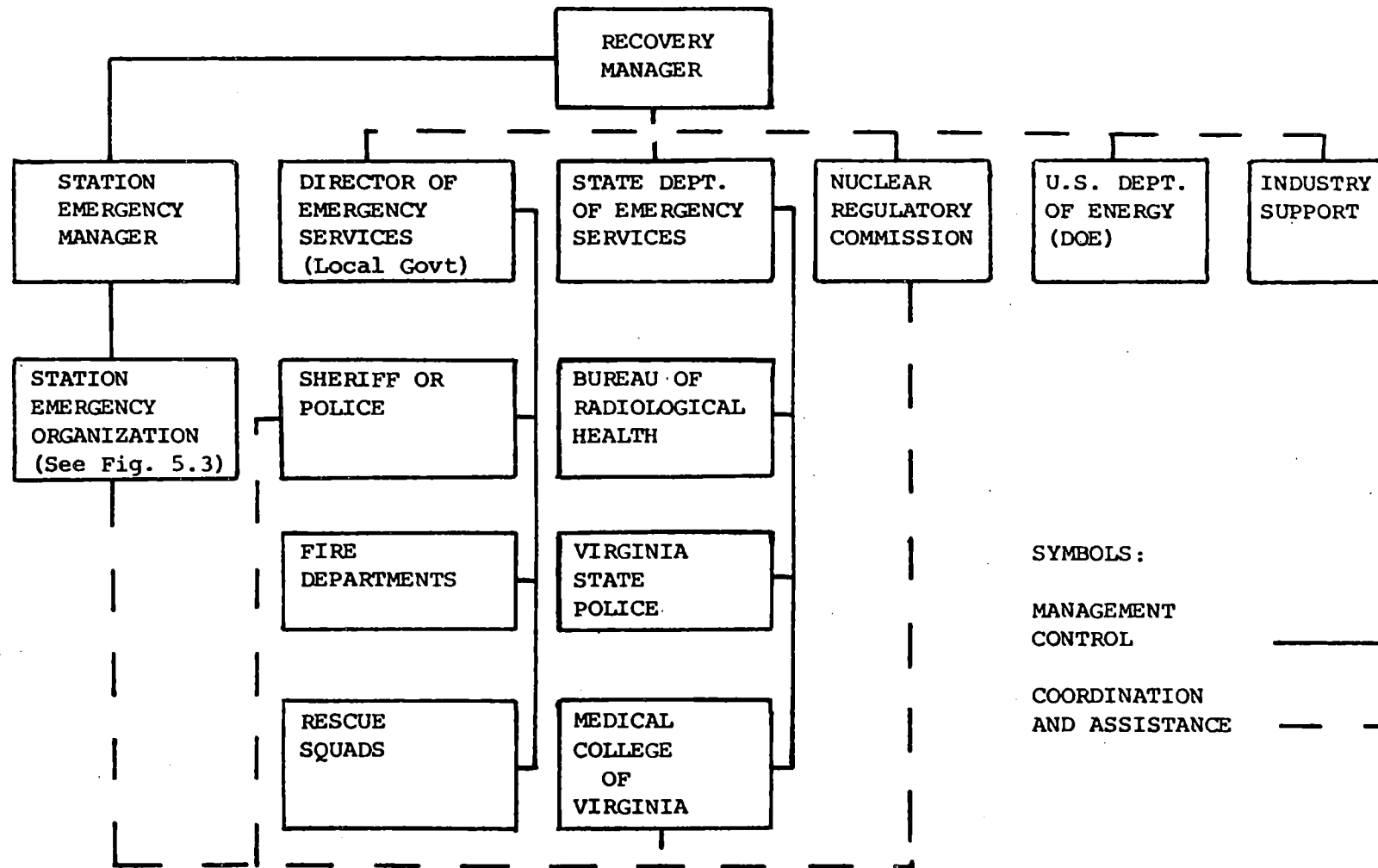
Fire Brigade Member
First Aid Team Captain
First Aid Team Members

* Use of "Monitoring Team" here refers to the Offsite, Evacuation, Inplant, and Onsite (Out of Plant) Monitoring Teams, and the Personnel Monitoring and Decontamination Team.

STATION-TO-SUPPORT GROUP INTERFACING PRIOR TO
AUGMENTATION OF THE ONSITE EMERGENCY ORGANIZATION



STATION-TO-SUPPORT GROUP INTERFACING
AFTER LEOF ACTIVATION



SYMBOLS:

MANAGEMENT
CONTROL

COORDINATION
AND ASSISTANCE

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Figure 5.5a

SURRY POWER STATION

CITIES AND COUNTIES WITHIN THE 50 MILE EMERGENCY PLANNING ZONE *

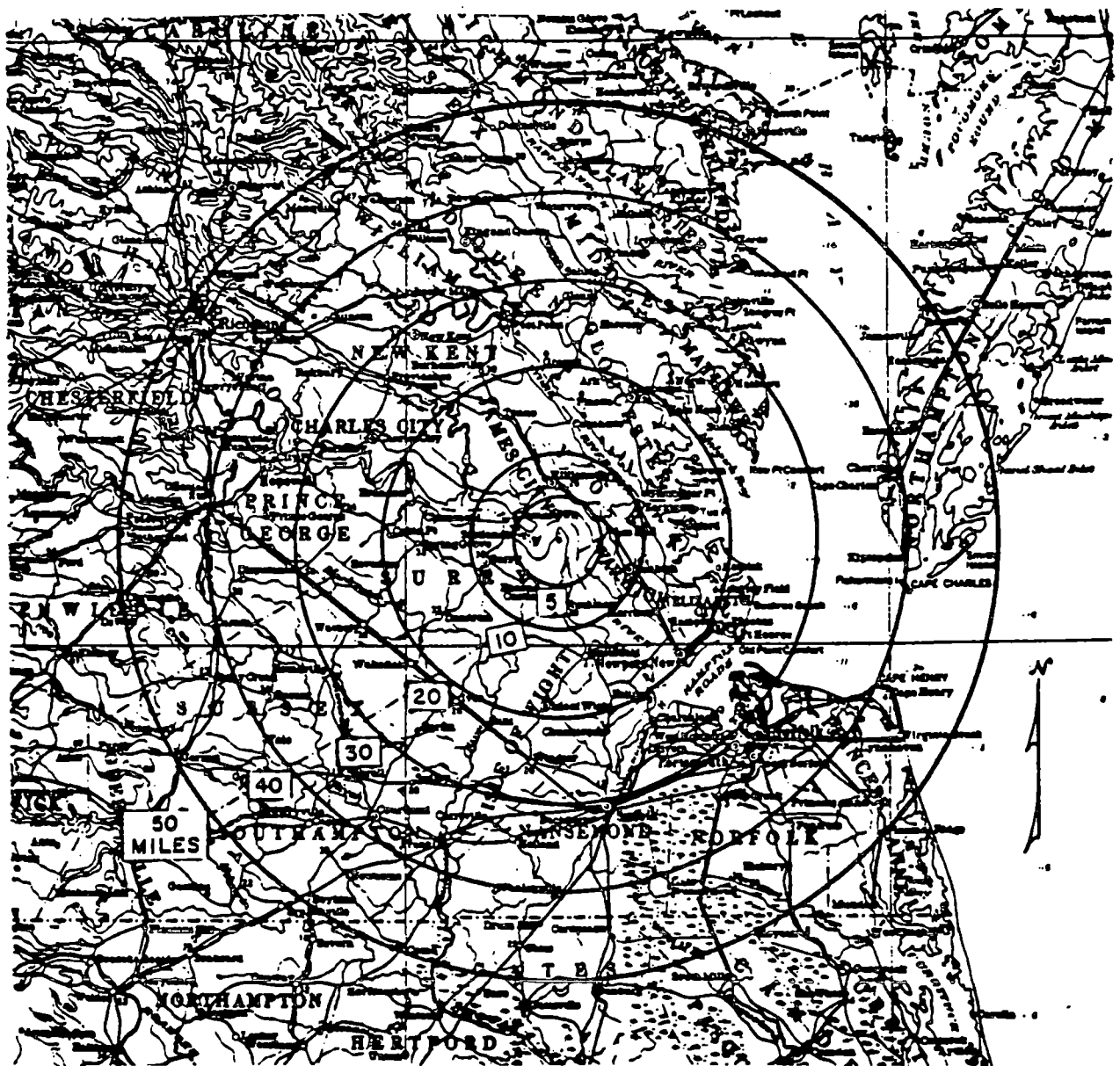
<u>VIRGINIA COUNTIES</u>	<u>VIRGINIA CITIES</u>
1. Surry	24. Suffolk
2. Isle of Wight	25. Williamsburg
3. Southhampton	26. Chesapeake
4. James City	27. Newport News
5. York	28. Hampton
6. Charles City	29. Portsmouth
**7. Henrico	30. Norfolk
**8. Chesterfield	**31. Richmond
9. Northhampton	32. Virginia Beach
10. Northumberland	33. Colonial Heights
11. Lancaster	34. Hopewell
12. Richmond	35. Petersburg
**13. Essex	36. Franklin
14. Middlesex	37. Poquoson
15. Mathews	* That portion of the State of
16. Gloucester	North Carolina lying within the
**17. King & Queen	50 Mile Zone has been excluded.
**18. King William	(Reference NRC Letter of
**19. Hanover	January 13, 1981, Serial Number 39)
20. New Kent	** Within 50 miles of North Anna Power
21. Prince George	Station and Surry Power Station
22. Dinwiddie	
23. Sussex	
20. New Kent	
21. Prince George	
22. Dinwiddie	
23. Sussex	

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Figure 5.5b

SURRY POWER STATION

FIFTY MILE EMERGENCY PLANNING ZONE



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SURRY POWER STATION
EMERGENCY PLAN

SECTION 6

EMERGENCY MEASURES

<u>Part</u>	<u>Subject</u>	<u>Page No.</u>
6.0	Emergency Measures	6.3
6.1	Activation of the Emergency Plan	6.3
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6.0 Emergency Measures

Emergency measures provide preplanned actions, methods, and criteria which guide personnel during the course of an emergency.

6.1 Activation of the Emergency Plan

Each full-time employee of the station is required to be familiar with the provisions of the Emergency Plan. Any employee, upon becoming aware of an emergency condition, must immediately notify the Shift Supervisor on duty unless it is apparent notification has already taken place. Upon such notification, or other indications, the Shift Supervisor becomes and assumes the responsibilities of the Station Emergency Manager. The Station Emergency Manager classifies the emergency and proceeds to take appropriate actions and make specific recommendations to offsite agencies as stated in the EPIPs. The Station Emergency Manager may be relieved by other individuals, as described in Section 5 of this Plan. In addition to the above, the Station Emergency Manager notifies the Department of Emergency Services of conditions which may require activation of the Commonwealth of Virginia Radiological Emergency Response Plan (COVRERP) and activation of the local city and county plans. The Surry, Isle of Wight, James City, Williamsburg, York and Newport News Radiological Emergency Response Plans are modeled after COVRERP. The city and county plans alert and/or assign personnel to specific duties.

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State and local officials will be notified of station conditions approximately 15 minutes after declaration of an emergency and approximately every 30 minutes thereafter, unless otherwise agreed upon with the State. Information will be provided to the State and local governments on the "Report of Emergency to State and Local Governments" form for all classes of emergencies; it is normally transmitted over the Insta-Phone. The "Report of Radiological Conditions to the State" will be provided to the State EOC on the "ring-down" phone or commercial phone. The following is a list of the information that is to be provided to the State and local officials, when applicable:

- Type of release and elevation of release
- Time of start of release (estimated)
- Duration of release
- Time between reactor shutdown and beginning of release
- Wind direction and speed and stability class
- Temperature
- Precipitation
- Iodine/noble gas ratio
- Projected total release (equivalent curies of Iodine-131 and Xenon-133)
- Actual site boundary whole body dose rate
- Estimated whole body dose rates at site boundary, at 2 miles, 5 miles and 10 miles
- Projected total integrated whole body dose at site boundary, 2 miles, 5 miles and 10 miles

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- Projected total integrated thyroid dose at site boundary, 2 miles, 5 miles and 10 miles
- Actual surface contamination type, quantity and zone
- Brief narrative of station condition

The State EOC will notify the State Bureau of Radiological Health, the State Coordinator of Emergency Services, and other State agencies with radiological emergency response tasks and local governments adjacent to those affected by the emergency (see Appendix 3 to COVERP).

6.2 Assessment Actions

EPIP-1.01 is the controlling procedure for classification and is supported by various written procedures that specifically address assessment actions.

The following list of assessment actions does not imply each action would be taken in any given situation, but serves to demonstrate that assessment actions have been considered which are sufficiently broad to cover the entire classification system.

6.2.1 Natural Phenomena Assessment Actions

- a. Major storm systems are monitored if it is anticipated they may affect station status.
- b. Local wind speed and direction are measured and recorded. Chart recorders in the Control Room provide an indication of trend.
- c. Atmospheric stability class is determined.
- d. The significance of earthquakes in the immediate area is determined.

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- e. The effect of rainfall, snow, hail, sleet or other precipitation on the operation of the station or on the mobility of onsite and offsite transportation is to be evaluated.
- f. Ongoing or potential effects on communication systems are evaluated.

6.2.2 Personnel Hazard Assessment Actions

- a. Account for all personnel in the station by using appropriate EIPs.
- b. Locate unaccounted for personnel.
- c. Dispatch teams to determine the extent of personnel injuries.
- d. Determine personnel exposure or contamination.

6.2.3 Station Condition Assessment Actions

6.2.3.1 Radiological Conditions

EIPs contain radiological effluent values characteristic of a spectrum of abnormal conditions and accidents. These values and other information are tabulated to initiating conditions for each of the emergency classifications. Specific setpoints and alarms, both audio and visual, in the Control Room alert the operator.

Selected effluent process monitors are set with a control function to terminate a release if the setpoint is exceeded. Assessment actions for this event are to:

- a. Monitor Control Room instrumentation available to determine the status of the Reactor Coolant System boundary, such as primary system pressure, temperature, and flows.

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- b. Monitor instrumentation to determine containment conditions such as temperature, pressure, humidity and radiation levels.
- c. Monitor secondary system status, such as steam and feedwater temperature, flows, and pressure.
- d. Dispatch teams for visual examinations of systems affected, if practical.

6.2.3.2 Non-Radiological Conditions

Non-radiological events affecting station conditions (included in Table 6.3b) are assessed according to the Emergency Action Level (EAL) Table in EPIP-1.01, Attachment 1.

- a. Determine extent and its potential for adverse impact upon the station and/or public.
- b. Evaluate valid indications to determine effects.
- c. Dispatch appropriate assessment teams when advisable.
- d. Relay information to appropriate Emergency Director and/or the Station Emergency Manager.

6.2.4 Offsite Condition Assessment Actions

- a. Determine the status of the system grid (adequacy of power supply).
- b. Determine the extent of qualified manpower availability from within the Company.
- c. Determine the extent of outside agency availability and the response time frame involved.

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- d. Determine the availability of supplies and equipment which may be required for response to the emergency.
- e. Relay information to the Recovery Manager.

6.2.5 Onsite Radiological Assessment Actions

- a. Evaluate data from the installed radiation monitoring system.
- b. Determine the system involved and then evaluate the maximum activity involved from system inventory data or calculations.
- c. Dispatch teams to perform radiation and contamination surveys.

6.2.6 Offsite Radiological Assessment Actions

- a. Estimate total quantities of activity released from information available onsite.
- b. Dispatch radiation monitoring teams offsite to perform radiation and contamination surveys.
- c. Estimate projected exposures and contamination both onsite and offsite, utilizing the established relationships of effluent monitor readings or sample results, and various meteorological conditions as defined in the EIPs and HP Manual. The procedures provide for alternate methods utilizing system inventory and release rates when all or part of the effluent monitors are out of service.
- d. Estimate liquid release as a percent of Technical Specification limits.
- e. Estimate total quantities of activity released using offsite radiological data.

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f. Dose rates for key isotopes listed in Table 6.5 will be determined using offsite measurements of contamination, water, and air activity levels. Estimates of the integrated dose rates will then be made and compared with the protective action guides. The Station Emergency Manager will determine the necessary recommendations for actions. The details of this process are contained in the EPIPs.

6.2.7 Post-Accident Sampling

The Station has EPIPs, Health Physics and Chemistry Procedures for dealing with post-accident sampling. These include assessment functions to confirm radiation area monitoring data, including process vents, ventilation vents and liquid release pathways. A containment atmosphere sample can be obtained in an area of low background radiation. Procedures and guidelines are provided for routine and emergency iodine monitoring. Silver Zeolite cartridges are readily available for emergency use and may be analyzed by the multi-channel analyzers or portable instrumentation.

Increased range radiation monitors have been installed to monitor important potential release points. These high range monitors include the process vent stack, ventilation vent stack and the main steam header discharges.

The Sentry High Radiation Sampling System (HRSS) has been installed to accommodate post-accident sampling requirements. The primary purpose of the HRSS is to safely secure timely samples for analysis, while at the same time minimizing exposure to the Sample Analysis Team.

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The HRSS is designed to meet the following criteria: to minimize operator exposure by providing shielding, in-line dilution for coolant and gases, flushing capability, and direct connections to rad waste for disposal. Further design criteria were implemented for rapid sampling and analysis by use of direction indicating valves and system mimics to aid operator understanding of system functions. Cooling, depressurization, and handling casks for high activity samples are also provided.

The HRSS may also be used for routine sampling as well as post-accident sampling. The system also provides the capability to take samples outside of containment.

6.2.8 Response to NUREG-0578

The station's response to NUREG-0578 and the NRC letter to power reactor licensees dated October 30, 1979, demonstrates the onsite capability and resources to provide initial values and continuing assessment throughout the course of the accident. Post-accident sampling capability, radiation and effluent monitors, inplant iodine instrumentation and containment radiation monitoring are as follows:

6.2.8.1 Post-Accident Sampling Capability

- a. The HRSS allows for sampling and analyzing various contaminated systems and containment atmosphere in a post-accident environment. It provides the ability to obtain in-line and grab samples of reactor coolant and containment atmosphere, the ability to cool and depressurize samples which are at high temperature and

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- pressure to allow in-line and grab sampling and in-line analysis, and a means to remotely dilute reactor coolant and containment sump samples to reduce personnel exposure levels. Prior to installation of the HRSS, modifications to the previously existing sampling system provided this capability as required by NUREG-0578. That interim system is no longer used.
- b. Post-accident high range effluent monitors were installed on the Process Vent, Ventilation Vent, and steam release pathways to meet short-term requirements of NUREG-0578. Upgrades required by NUREG-0737 have been completed.
 - c. Post-accident iodine sampling capabilities have been enhanced by changing procedures and adding Silver Zeolite cartridges. The Silver Zeolite retention efficiency for Xenon is such that radioiodine can easily be detected.
 - d. The Containment Air Sampling System has been modified to allow post-accident containment sampling without exceeding 10CFR20 guidelines.

6.2.9 Offsite Monitoring Teams

Health Physics personnel are available for offsite emergency monitoring within the 10-Mile EPZ.

Instrument resources include radiation detection instruments and air sampling instruments. The following is the portable equipment available for this purpose:

- a. 8 Beta-Gamma Survey Meters
- b. 3 High Range Gamma Survey Instruments
- c. 2 Battery Powered Portable Air Samplers
- d. Portable Iodine Monitoring Instruments

Laboratory equipment includes the following:

- a. 2 Solid State Detectors with a Multi-Channel Analyzer
- b. 1 Proportional Counter
- c. 1 Tritium Analyzer
- d. 1 Onsite Whole Body Counter
- e. 1 TLD Reader Processor

Additional personnel and equipment will be available from the North Anna Power Station.

In the event of an emergency, Radiation Monitoring Teams will assemble in the Health Physics area and be given instructions as defined in the EPIPs as to location and types of samples that may be required within the plume exposure pathway.

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The Radiation Monitoring Teams have the capability of communicating with the Control Room at all times. However, their direct communication line will be shifted to the Technical Support Center (TSC) and the Local Emergency Operations Facility (LEOF) as those locations are activated. The LEOF is the central location for the gathering of field information. Transportation for offsite monitoring teams will be provided by company vehicles assigned to the station and communication is by means of UHF mobile radios.

UHF portable radios are available and in use onsite, some permanently assigned to HP. These will be used by the offsite monitoring team for reporting to the TSC and/or the LEOF. Two offsite monitoring teams can be dispatched within one hour.

6.3 Corrective Actions

Certain situations may arise which require corrective actions as part of emergency management. Procedures (emergency, abnormal, or operating) specify corrective actions which allow for isolating affected components or using alternate equipment to supplement or replace defective equipment for the safe shutdown of a unit. Fire fighting and first-aid teams respond to emergencies, as necessary. Security personnel respond to those matters concerning the security of the station, including personnel accountability, callout of emergency response personnel, and access control.

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6.4 Protective Actions

a. Offsite Criteria for Evacuation Within the 10-Mile Emergency Planning Zone (EPZ)

Offsite evacuation of the 10-Mile EPZ will be recommended to officials in accordance with criteria given for the General Emergency as detailed in Section 4 or when otherwise appropriate.

Warning to the public within the 10-Mile EPZ will be the responsibility of State and local officials assisted by the State Police Department, upon request. The primary methods of warning the public are by use of the Early Warning System sirens and route alerting by State and local emergency and police personnel. Other warning methods may include: telephone communications, television and radio Emergency Broadcast System stations, and personal contact. In addition to local emergency planning for evacuation, the COVRERP charges local governments with the responsibility to conduct information programs to educate their citizens on:

1. radiological hazards,
2. procedures for notification of a radiological emergency,
3. evacuation routes and assembly points, and
4. other protective measures.

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b. Onsite Criteria for Evacuation

The area within 1650 feet of Surry Unit 1 is defined as the Exclusion Area for the purposes of this Plan. Company employees, contractor personnel, and occasional visitors at the site may be in the Exclusion Area. The immediate area surrounding the units which has been enclosed by a fence or other barrier is defined as the Protected Area. The Station Emergency Manager will recommend or initiate the evacuation of the Protected Area, and will take appropriate measures in cooperation with State and local agencies for evacuation of persons in the Exclusion Area and those members of the public who may be passing through the site or within company property. Virginia Power will also commit Company personnel and appropriate equipment (e.g., search lights, power amplified loudspeakers) to clear the Exclusion Area when required. Evacuation of non-essential personnel within the Exclusion Area, Protected Area and the site may occur if projected doses to the majority of the affected personnel will exceed 1 Rem Whole Body or 5 Thyroid due to inhalation.

Members of the public considered "transients" on Company property shall be evacuated by Security personnel immediately after an Alert or higher classification is announced by the Station Emergency Manager. Evacuation of additional personnel will be as determined by the Station Emergency Manager in order to maintain exposures as low as reasonably achievable and remain within 10CFR20 limits. A tone alert system, tested weekly for operability, shall be activated by the control room, with an announcement for site evacuation of specified individuals.

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Visitors to the station are under continuous escort by personnel knowledgeable in emergency personnel accountability procedures. Contractor personnel are also trained in personnel accountability procedures.

6.4.1 Protective Cover, Evacuation, Personnel Accountability

6.4.1.1 Onsite

- a. Action criteria for evacuation of those workers classified as non-essential workers is specified in Section 6.4.b. and 6.4.1.1.b.
- b. Onsite personnel will be immediately notified of the emergency if it is an Alert or greater classification. Alarms will be sounded and announcements will be made if site evacuation is necessary. Radiation monitoring teams will be dispatched to the remote assembly areas. Those individuals within the Exclusion Area will be alerted by other station personnel.
- c. EPIP-5.03 addresses personnel accountability within 30 minutes with and without site evacuation. Station Security utilizes EPIP-5.03, Personnel Accountability, to notify the Emergency Assembly Area Leaders to perform accountability on the personnel in their Emergency Assembly Area. The results of accountability are reported to Security. Security reconciles the lists of badge numbers received from the Emergency Assembly Areas with those badges known to be within the Protected Area as determined by the access control computer system or a search of the badge racks. Security will forward a list of all

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personnel determined to be missing within the Protected Area to the Emergency Administrative Director in the TSC or to the Station Emergency Manager if the TSC has not been activated.

Emergency Assembly Areas have been established at numerous places within the Protected Area. After accountability is completed, an evaluation is made and search teams may be dispatched to account for any individual noted as missing or unaccounted for. If a site evacuation is ordered without accountability having been taken, evacuees turn-in their badges to Security when departing and emergency response facility representatives forward lists of all individuals who are not evacuating to Security. Security's list of personnel within the Protected Area is checked against the names obtained from each facility to determine if any personnel are missing. Emergency Assembly Areas have been established outside the Protected Area to facilitate the dissemination of information to personnel.

Continuous accountability of personnel not evacuating the site shall be maintained throughout the emergency. Those individuals in the Restricted Controlled Area monitor themselves for contamination prior to entering the Restricted Clean Area.

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Individuals evacuating give their security badges to Security personnel, but retain their dosimetry. They proceed in an orderly manner on Route 650 to Route 628 and turn left. The Remote Assembly Area is approximately 1.1 miles down Route 628 on the right. (See Figure 6.1). An Alternate Remote Assembly Area has been established at the tip of Hog Island Wildlife Management Area.

6.4.1.2 Offsite

A General Emergency will be declared when offsite Protective Action Guides (whole body dose 2 Rem, Thyroid 12 Rem) are likely to be exceeded due to a direct radiation or inhalation hazard or when non-radiological conditions exceed General Emergency EALs. These action guides are based upon NUREG-0654, EPA protective action guidelines, and agreements with the Commonwealth of Virginia. A Site Area Emergency will be declared for offsite doses exceeding 0.5 Rem whole body or 1 Rem Thyroid.

The recommended protective actions that the station will make to the State will be based upon current meteorological data such as wind direction, speed and stability class. This will be factored against protection afforded by dwellings in the plume exposure pathway. The station will have the necessary technical data upon which to base protection factors.

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The local housing is dominated by framed houses, primarily single story, with very few of these houses having basements. There is also a growing number of mobile homes, especially in the more rural areas.

The City of Williamsburg has virtually no mobile homes. Approximately 70% of the dwellings are constructed of brick with 30% of these having 2 stories. Housing on the campus of The College of William and Mary consists of multi-story buildings made of brick with slate roofing. Visitors to the area find shelter in many local motels. Williamsburg motels are dominated by brick construction, while outside this area, one and two story, wood and aluminum sided motels prevail.

The evaluations by the station will be based on the most conservative protection factor for these types of dwellings.

See Tables 6.1 and 6.2 for representative shielding factors from gamma cloud source and for surface deposited radionuclides. The reference used to obtain these factors was SAND 77-1725, Public Protection Strategies for Potential Nuclear Reactor Accidents: Sheltering Concepts with Existing Public and Private Structures. An Alert may be declared with doses less than those above.

It is estimated that the primary sector and the two buffer sectors ($67\frac{1}{2}^\circ$ sector) can be alerted of the emergency within 15 minutes with the Early Warning System.

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Figure 6.2 shows designated sectors and zones around Surry Power Station. Evacuation time estimates are contained in Appendix 4 to this plan. Table 6.4a and 6.4b depict population data by sector and evacuation times. The existing evacuation time estimate studies will be provided to the Virginia Department of Emergency Services following the 10-year census. At that time, the DES will make the determination whether or not a new study is required for the EPZ.

The first specific recommendation to the State and local authorities would follow the format of Table 6.3. This recommendation will be made by the Station Emergency Manager or Recovery Manager. The minimum protective action recommendation following the declaration of a General Emergency would be to shelter within a 360 degree radius through Zone 2 and the downwind and adjacent sectors through Zone 5.

Evacuation zones, routes, and relocation centers have been established in the event that an evacuation is recommended. This information is published in brochures and distributed by the State.

6.4.2 Use of Onsite Protective Equipment and Supplies

6.4.2.1 Respiratory Protection

Virginia Power has a comprehensive respiratory protection program at its nuclear stations. The Radiation Protection Plan establishes the Respiratory Protection Program which is implemented by Health Physics procedures. Those individuals likely to wear respirators are given a pulmonary examination and formal classroom training on respiratory protection including a practical examination. A "fit test" is given before an individual is allowed to enter an area requiring respiratory protection.

6.4.2.2 Use of Protective Clothing

The station maintains an adequate inventory of protective clothing in the Clean Change Room. Contaminated clothing is washed at the station and reissued provided contamination is below established radiation criteria. A Radiation Work Permit system is utilized whereby Health Physics establishes personnel protective clothing and equipment criteria. Such clothing may consist of cotton coveralls, hoods, cotton glove inserts, rubber gloves, plastic shoe covers, rubber shoe covers and rubber boots. Station personnel are given formal classroom training on how to don and remove protective clothing so as to minimize personal contamination or introduction of contamination into adjacent areas.

6.4.2.3 Thyroid Blocking Agent

The Company's Employee Health Services Department, with the advice of its Physician Consultant, has authorized the use of a thyroid blocking agent for a potential radioiodine inhalation situation (EPIP-5.07).

6.4.3 Contamination Control Methods

6.4.3.1 Onsite Exclusion Area

As previously stated in Section 6.4.b., the area within 1650 feet of Surry Unit 1 is the Exclusion Area. Virginia Power Security personnel may patrol the land area to ensure eviction of unauthorized personnel. Since the station's drinking water supply is from deep wells, there is no agricultural production in this area, and there are no milk cows in this area, contamination control methods affecting these are unnecessary. The area may be returned to a status not requiring evacuation when projected doses to the majority of non-essential workers is expected to be less than 1 Rem Whole Body, less than 5 Rem Thyroid due to inhalation, and less than 1000 dpm/100 cm² Beta-Gamma contamination.

6.4.3.2 Emergency Planning Zone (EPZ)

COVRERP's Appendix 7 states the methods to be utilized in preventing or minimizing direct or subsequent ingestion exposure to radioactive materials deposited on the ground or other surfaces.

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Upon notification of a radiological emergency within the State which may affect livestock, crops, or farmlands, the State Department of Agriculture and Consumer Services will institute a program to assess the impact upon the agriculture community. Members of the department will take samples of milk from dairy cattle in the affected area for analysis and will monitor soil, crops and farm equipment for contamination.

Samples will be taken at localities where radiation levels exceed 0.05 mR/hr at one-inch. The Department of Agriculture and Consumer Services will supply uncontaminated feed for dairy cattle and livestock removed from the contaminated land of farms located near the station. Monitoring the ingestion from the food pathway chain is approximately confined to the area within a 50-Mile radius of the station.

Follow-up action includes the disposition of radiologically contaminated materials. The local government(s) has the prime responsibility of affected area ingress and egress. Assistance from the State Police shall be supplied as requested by local officials. There are no withdrawals of James River water for public or private water supplies within Surry, James City, Isle of Wight, and York counties and the cities of Williamsburg and Newport News. Most of Surry County and Isle of Wight County water supplies come from wells.

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Waller Mill, Harwood Mill, Bethel and Newport News Reservoirs supply water for the Williamsburg, Newport News and Hampton areas. The respective local public health departments are the primary health response agencies for monitoring water supplies, with assistance given by the State Department of Health.

The 10-Mile EPZ may be returned to a status not requiring Protective Action Recommendations when projected doses to the public are expected to be less than 2.0 Rem Whole Body, less than 12 Rem Thyroid due to inhalation, and less than 0.05 mR/hr ground contamination above normal background.

6.4.4 Messages to the Public Via the Media

Pre-planned messages have been prepared for transmittal to the public via radio and television broadcasting stations. These messages are consistent with the emergency classification system and give instructions with regard to specific actions to be taken by occupants of the area. Samples of the messages are contained in Forms 6.1 through 6.5. These messages will be released to the media by the State or Local Director of Emergency Services or his/her designated representative.

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6.5 Aid to Affected Personnel

The Company has made arrangements with the Medical College of Virginia (MCV), Virginia Commonwealth University, to provide medical assistance to personnel injured or exposed to radiation and/or radioactive material. MCV has developed its own plan for responding to the emergency (Appendix 2 of this Plan). MCV's plan sets up a specialized area of the hospital for treatment with appropriate Health Physics functions after verifying authenticity of the call. A coded system alerts hospital team members. Radiation monitoring equipment, dosimetry, and protective clothing are available at the area. The station will provide and distribute self-reading and accumulative type dosimeters to all personnel involved in emergency onsite response regardless of their affiliation with the Company. The station shall have this capability on a 24-hour basis. Dose records shall be maintained and checked throughout the emergency. These procedures are also followed under normal conditions.

6.5.1 Emergency Exposure Limits

Upon authorization by the Station Emergency Manager, emergency response personnel may, because of necessity, receive exposures to contamination and radiation in excess of normal established limits. Volunteer emergency workers are selected using the following criteria: They are volunteers who are in good physical health and familiar with the consequences of emergency exposure. Volunteers should be older than 45 years of age and not be female capable of reproduction. EPIPs state that dose should not exceed 25 Rem Whole Body or 125 Rem Thyroid due to inhalation.

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If a life saving action is involved, the dose should not exceed 75 Rem Whole Body (For life saving action, no specific limit is established for Thyroid dose). (Reference EPIP-5.06) These guidelines are consistent with EPA Emergency Worker and Life Saving Activity Protective Actions Guides.

Emergency exposure may be authorized for such needs as: removal of injured personnel, undertaking corrective actions, performing assessment actions, providing first-aid, performing personnel decontamination, providing ambulance service, providing medical treatment, etc.

6.5.2 Decontamination and First-Aid

The Station Health Physics Procedures and EIPs shall specify the levels of permissible radioactive contamination for workers and equipment. In these procedures, actions are to be taken when contamination is discovered to be greater than 1000 dpm/100 square centimeters of removable contamination. Any detected personnel contamination will initiate appropriate evaluation and decontamination in accordance with these procedures.

Procedures have been developed (EPIP-4.21) to provide for the monitoring of vehicles and personnel at the remote assembly areas (RAA). Should decontamination of vehicles or personnel be arranged, Health Physics personnel can perform the task at the Station, at the RAA, or if necessary at the Surry County High School (in accordance with the Surry County Radiological Emergency Response Plan).

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The station has the necessary decontamination facilities as stated above, and waste disposal using the normal station methods may be supplemented by storage onsite.

The station has a First-Aid Facility that contains the normal complement of first-aid supplies and equipment necessary to treat those injuries not involving hospitalization or professional medical services. SUADM-ADM-15, First Aid Treatment, contains guidance for the care of injured/sick personnel, including training requirements. At least two individuals onsite are trained and certified, and available to respond to personnel injury.

Medical facilities and services include:

1. Company nurse available on a part-time basis
2. Company Class A Ambulance onsite
3. Local Rescue Squads in Surry and Isle of Wight
4. The station First-Aid Facilities
5. The Medical College of Virginia facilities

6.5.3 Medical Transportation

Arrangements have been made with Volunteer Rescue Squads in the counties of Surry and Isle of Wight to transport injured contaminated personnel to the Medical College of Virginia, if applicable. Response team members have received training concerning transportation of contaminated injured individuals. A Health Physics technician, with appropriate instrumentation, would normally accompany the contaminated injured to MCV. The approximate time to transport a patient to MCV is 75 minutes.

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The response time for local rescue squads is 30 minutes to arrive at the station. In addition, a station ambulance is also available to transport contaminated injured personnel.

Contaminated injured individuals will be suitably clothed or prepared to prevent the spread of contamination in the transporting vehicle and/or the vehicle itself suitably prepared to limit the spread of contamination. Communication can be maintained between the Station and MCV by OPX circuits or commercial land lines. The station can communicate with the Ambulance by use of Virginia Power UHF Radio and the ambulance can communicate with MCV by way of the HEAR system.

6.5.4 Medical Treatment

The MCV-Virginia Power Radiation Emergency Plan provides guidance for treatment of contaminated injured personnel by qualified individuals. In addition, the State Department of Health maintains a list of facilities that have the capability of receiving and treating injured and/or contaminated individuals. In the event the facilities at MCV become overextended, the State Department of Health would be called to coordinate further assistance.

6.6 Offsite Support

In addition to the offsite agencies listed above, volunteer fire departments in the counties of Surry and Isle of Wight have agreed to assist in fighting fires. A list of services and equipment is included in the Letters of Agreement in Appendix 1.

The time of response of volunteer fire departments from Surry and Smithfield, Virginia varies from 30 minutes to 45 minutes, unless adverse weather conditions prevail.

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Police support for an emergency is provided by State and local governments, as detailed in the respective Emergency Plans.

6.7 Onsite Control

The Station has onsite contamination control procedures that provide for access control. These procedures state the criteria for permitting the return of the areas and their contents to normal use.

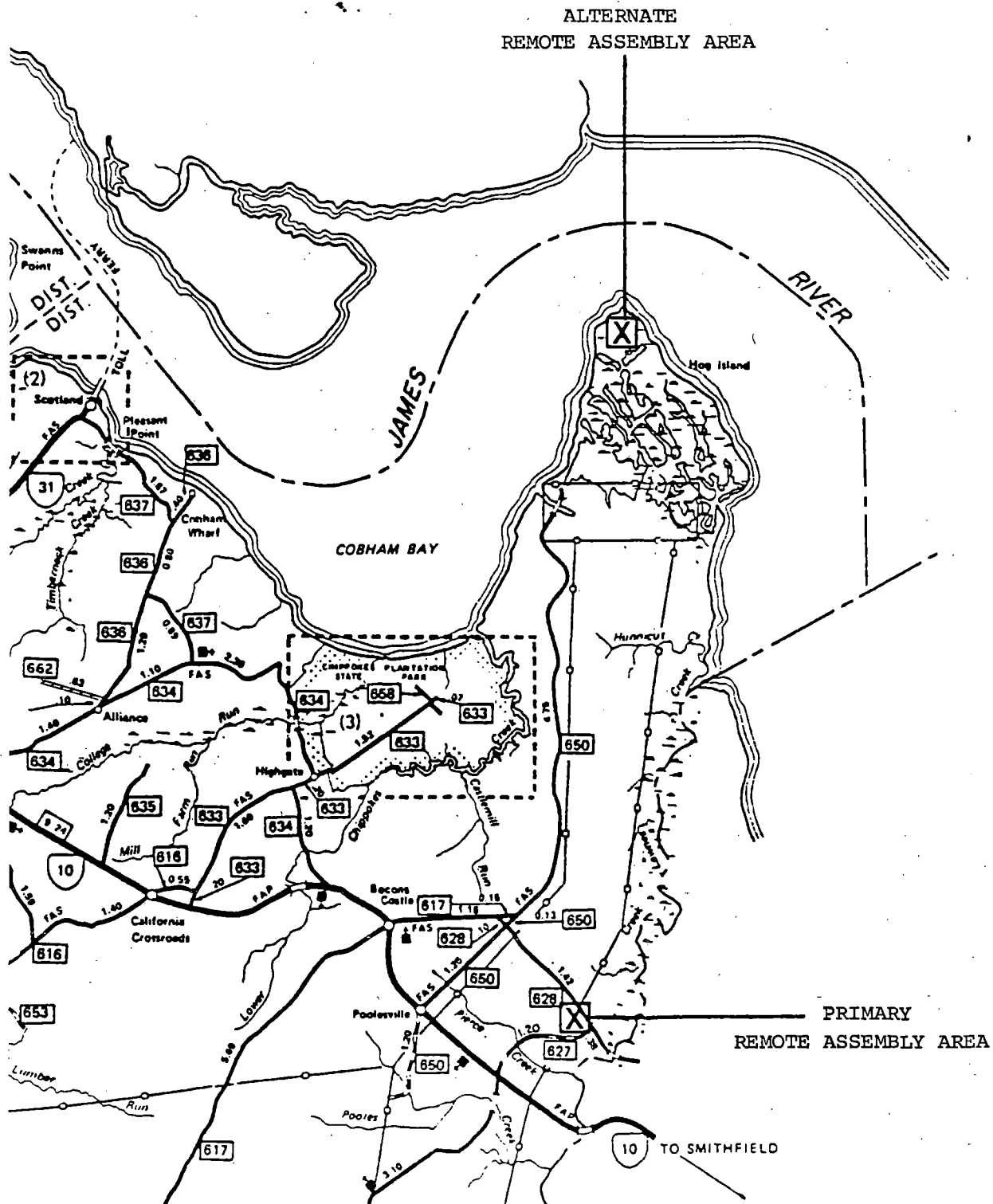
No food supplies are grown on the site and the water supplies come from deep wells. However, there are procedures to monitor contamination in areas designated permissible for employees to eat and drink during the emergency and recovery phases of operation.

6.8 Offsite Services

If onsite personnel are required to relocate or routinely leave the site during an emergency, the station will provide adequate supplies for personnel decontamination and clothing, as necessary.

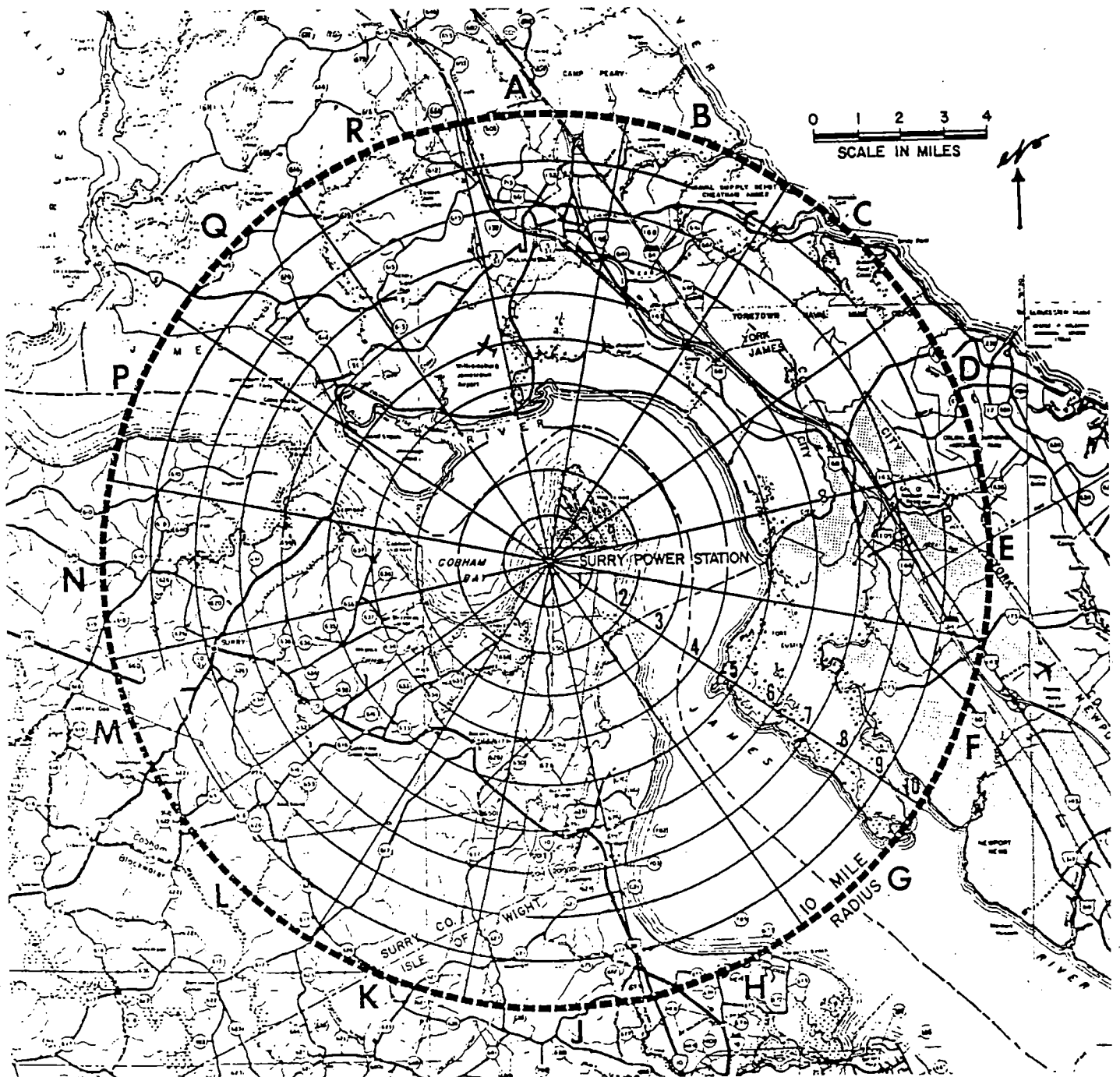
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PRIMARY AND ALTERNATE REMOTE ASSEMBLY AREAS



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SURRY POWER STATION SECTORS AND ZONES



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REPRESENTATIVE SHIELDING FACTORS FROM GAMMA CLOUD SOURCE

Structure or Location	Shielding Factor (a)	Representative Range
Outside	1.0	-
Vehicles	1.0	-
Wood-frame house ^(b) (no basement)	0.9	-
Basement of wood house	0.6	0.1 to 0.7 ^(c)
Masonry house (no basement)	0.6	0.4 to 0.7 ^(c)
Basement of masonry house	0.4	0.1 to 0.5 ^(c)
Large office or industrial building	0.2	0.1 to 0.3 ^(c,d)

- (a) The ratio of the dose received inside the structure to the dose that would be received outside the structure.
- (b) A wood frame house with brick or stone veneer is approximately equivalent to a masonry house for shielding purposes.
- (c) This range is mainly due to different wall materials and different geometries.
- (d) The shielding factor depends on where the personnel are located within the building (e.g., the basement or an inside room).

REPRESENTATIVE SHIELDING FACTORS FOR SURFACE DEPOSITED
RADIONUCLIDES

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Structure or Location	Representative Shielding Factor ^(a)	Representative Range
1 m above an infinite smooth surface	1.00	-
1 m above ordinary ground	0.70	0.47-0.85
1 m above center of 50-ft roadways 50% decontaminated	0.55	0.4-0.6
Cars on 50-ft road:		
Road fully contaminated	0.5	0.4-0.7
Road 50% decontaminated	0.5	0.4-0.6
Road fully decontaminated	0.25	0.2-0.5
Trains	0.40	0.3-0.5
One- and two-story wood-frame house (no basement)	0.4 ^(b)	0.2-0.5
One- and two-story block and brick house (no basement)	0.2 ^(b)	0.04-0.40
House basement, one or two walls fully exposed:	0.1 ^(b)	0.03-0.15
One story, less than 2 ft of basement, walls exposed	0.05 ^(b)	0.03-0.07
Two stories, less than 2 ft of basement, walls exposed	0.03 ^(b)	0.02-0.05
Three- or four-story structures, 5000 or 10,000 ft ² per floor:		
First and second floors	0.05 ^(b)	0.01-0.08
Basement	0.01 ^(b)	0.001-0.07
Multistory structures, >10,000 ft ² per floor:		
Upper floors:	0.01 ^(b)	0.001-0.02
Basement	0.005 ^(b)	0.001-0.015

(a) The ratio of dose received inside the structure to the dose that would be received outside the structure.

(b) Away from doors and windows.

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EPA PAG AND PROTECTIVE ACTIONS FOR NUCLEAR INCIDENTS

<u>Projected exposure dose (rem) to the general population</u> (2)	<u>Recommended actions</u> (3)	<u>Comments</u>
Whole body - 1	1. No protective action required	Previously recommended protective actions may be reconsidered or terminated.
Thyroid - 5	2. State may issue an advisory to seek shelter and await further instructions or to voluntarily evacuate.	
	3. Monitor environmental radiation levels.	
Whole body - 1 to 5	1. Seek shelter and await further instructions.	
Thyroid - 5 to 25	2. Consider evacuation particularly for children and pregnant women.	
	3. Monitor environmental radiation levels.	
	4. Control access.	
Whole body - 5 and above	1. Conduct mandatory evacuation of populations in the predetermined area.	Seeking shelter would be an alternative if evacuation were not immediately possible.
Thyroid - 25 and above	2. Monitor environmental radiation levels and adjust area for mandatory evacuation based on these levels.	
	3. Control access.	

(1) EPA-520/1-75-001

(2) State PAG are within these limits (see Tab B to Appendix 6, COVRERP)

(3) These actions are recommended for planning purposes. Protective action decisions at the time of the incident must take into consideration the impact of existing constraints.

GENERAL EMERGENCY PROTECTIVE ACTIONS⁽¹⁾

EVENT

CORE MELT SEQUENCE

1. LOCA with containment failure occurring or imminent (cf., Steam Generator tube rupture with breaker in Main Steam).
 - a. Wind speed less than 2.5 mph - Consider 5-mile affected sectors sheltering and 6 to 10-mile affected sectors evacuation and 5-mile unaffected sectors evacuation.
 - b. Wind speed greater than 2.5 mph - Consider 10-mile affected sectors sheltering and 5-mile unaffected sectors evacuation.
2. LOCA with containment failure likely
 - a. Consider 5-mile radius evacuation and 6 to 10-mile affected and adjacent sectors evacuation.
3. LOCA with containment failure not likely (cf., Steam Generator tube rupture with Main Steam Safety lift)
 - a. Consider 2-mile radius evacuation and 5-mile affected and adjacent sectors evacuation and 6 to 10-mile affected and adjacent sectors sheltering.
4. Containment fission product activity low.
 - a. Consider 2-mile radius evacuation.

SIGNIFICANT RELEASE POTENTIAL

1. Site Boundary projected dose exceeds 2 rem whole body or 12 rem thyroid.
 - a. Consider 2-mile radius evacuation.
2. Loss of 2 fissions-product barriers with potential loss of the third barrier.
 - a. Consider 2-mile radius sheltering and 5-mile affected and adjacent sectors sheltering.

MISCELLANEOUS EVENTS

1. Loss of Physical Control (Security) of the Station
 - a. Consider 2-mile radius evacuation.
2. Major events which singly or in combination cause massive damage to Station
 - a. Consider 2-mile radius evacuation.
3. Judgement by Station Emergency Manager that public's health or safety may be unprotected.
 - a. Consider 2-mile radius sheltering and 5-mile affected and adjacent sectors sheltering.

1) Appendix 1, NUREG-0654/FEMA-REP.1, Rev. 1
2) Protective action decisions at the time of an incident must consider impact of existing conditions and constraints.

POPULATION DISTRIBUTION AND EVACUATION TIME ESTIMATES (1)

Area	Permanent Population**	Permanent Population Vehicles	Transient Population	Transient Population Vehicles	Evacuation Capacity/Hour	Notification Time	Preparation Time	Evacuation Time Normal Condition	Evacuation Time Adverse Condition	Confirmation Time
Total Area Within 2-Miles	45	15	--	--	1,200+	0:45	2:00	2:15	2:15	2:15

Within 5 Miles

Surry County	832	278	55	14	2,400	0:45	2:00	2:15	2:30	2:30
Isle of Wight Co.	15	5	--	--	1,200+	0:45	2:00	2:15	2:15	2:15
James City County	1,188	396	2,500	625	1,200+	0:45	2:00	3:45	5:30*	3:45

Within 10 Miles

Surry/Isle of Wight	3,695	1,232	--	--	6,000	0:45	2:00	2:15	2:30	2:15
James City County	16,264	5,739	35,000	8,750	7,200	0:45	2:00	5:15	7:15*	5:15
Williamsburg	14,434	4,347	23,700	5,925		0:45	2:00	3:45	5:30*	3:45
York County	11,484	3,587	2,500	625	3,600	0:45	2:00	3:15	5:00*	3:15
Newport News	53,950	17,250	--	--	9,600	0:45	2:00	5:15	7:00*	5:15

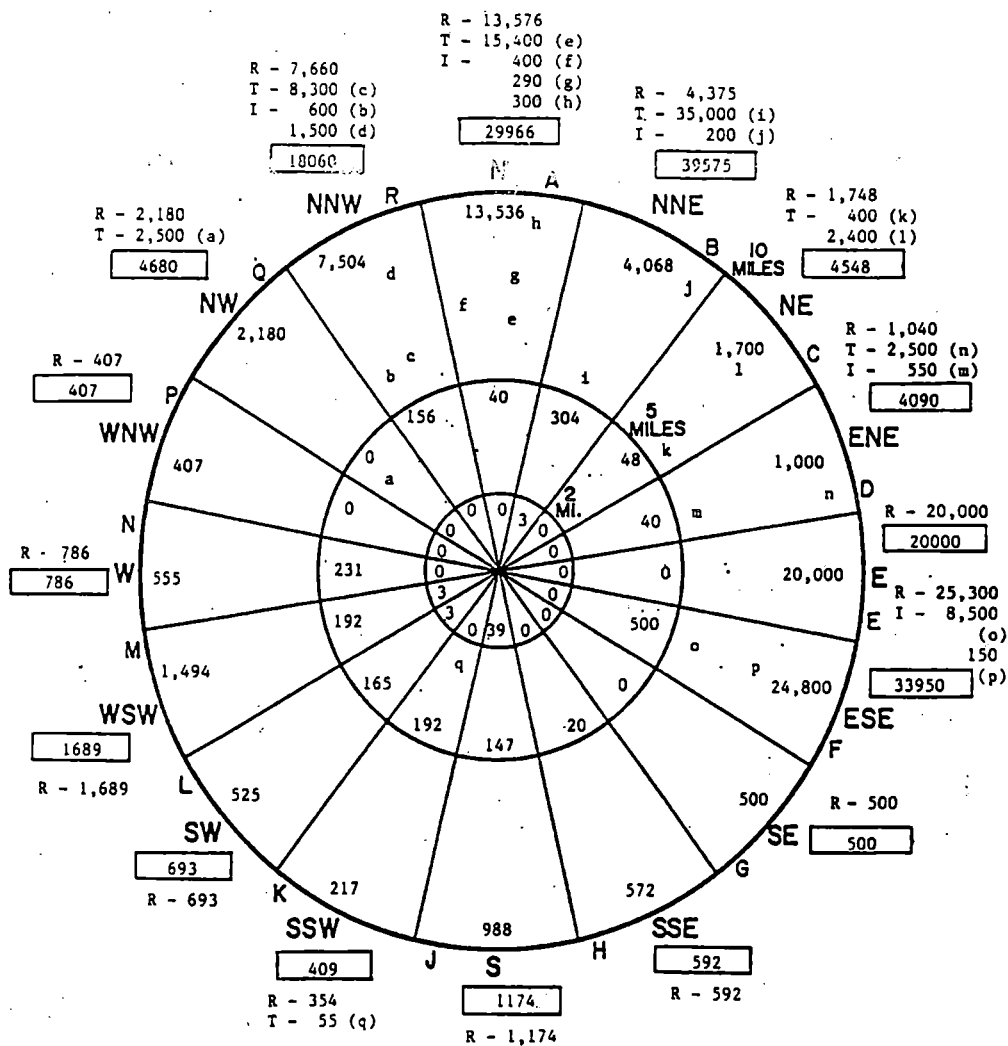
*These evacuation times can be reduced by 1 hour or more by assigning multiple evacuation routes during a winter weekday evacuation.

**Figures in this column include institutionalized population.

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(1) (SOURCE: COMMONWEALTH OF VIRGINIA RADIOLOGICAL EMERGENCY RESPONSE PLAN, APPENDIX 4)

POPULATION DATA BY SECTOR (1)



POPULATION TOTALS			
Ring, Miles	Ring Population	Total Miles	Cumulative Population
0 - 2	48	0 - 2	48
2 - 5	4,535	0 - 5	4,583
5 - 10	161,079	0 - 10	165,662

(1) (Source: Commonwealth of Virginia Radiological Emergency Response Plan, Appendix 4)

RADIONUCLIDES WITH SIGNIFICANT CONTRIBUTION TO DOMINANT EXPOSURE MODES (1) FEB 18 1988

<u>Radionuclides with Significant Contribution to Thyroid Exposure</u>		<u>Radionuclides with Significant Contribution to Whole Body Exposure</u>		<u>Radionuclides with Significant Contribution to Lung Exposure (Lung only controlling when thyroid dose is reduced by iodine blocking or there is a long delay prior to releases)</u>	
<u>Radionuclide</u>	<u>Half Life (days)</u>	<u>Radionuclide</u>	<u>Half Life (days)</u>	<u>Radionuclide</u>	<u>Half Life (days)</u>
I-131	8.05	I-131	8.05	I-131	8.05
I-132	0.0958	Te-132	3.25	I-132	0.0958
I-133	0.875	Xe-133	5.28	I-133	0.875
I-134	0.0366	I-133	0.875	I-134	0.0366
I-135	0.280	Xe-135	0.384	I-135	0.280
Te-132	3.25	I-135	0.280	Cs-134	750
		Cs-134	750	Kr-88	0.117
		Kr-88	0.117	Cs-137	11,000
		Cs-137	11,000	Ru-106	365
				Te-132	3.25
				Ce-144	284

(1) Derived from NUREG 0654.

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SAMPLE EMERGENCY MESSAGE SENT TO MEDIA

LOCAL--NO ACTION NECESSARY

AT _____ AM/PM TODAY, AN INCIDENT OCCURRED AT _____
_____ (insert name of facility) ALTHOUGH SMALL RELEASES OF
RADIOACTIVE MATERIALS TO THE AIR/WATER DID OCCUR, THE RELEASE HAS ENDED.
NO PRECAUTIONARY ACTIONS ARE NECESSARY ON THE PART OF THE PUBLIC. STATE
DEPARTMENT OF HEALTH PERSONNEL ARE MONITORING THE SITUATION. SPECIFIC
ACTIONS WILL BE TAKEN IF WARRANTED. PLEASE STAY TUNED TO THIS STATION FOR
FURTHER INFORMATION.

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SAMPLE EMERGENCY MESSAGE SENT TO MEDIA

STATE--NO ACTION NECESSARY

AT _____ AM/PM TODAY, AN INCIDENT OCCURRED AT _____

(insert name of facility) LOCATED IN _____

(insert name of County/City) ALTHOUGH SMALL RELEASES OF
RADIOACTIVE MATERIALS TO THE AIR/WATER DID OCCUR, THE RELEASE HAS ENDED.
NO PRECAUTIONARY ACTIONS ARE NECESSARY ON THE PART OF THE PUBLIC.
PERSONNEL FROM THE HEALTH AND OTHER STATE AGENCIES ARE MONITORING THE
SITUATION. SPECIFIC ACTIONS WILL BE TAKEN IF WARRANTED. PLEASE STAY
TUNED TO THIS STATION FOR FURTHER INFORMATION.

SAMPLE EMERGENCY MESSAGE SENT TO MEDIA
LOCAL--NOTIFICATION/WARNING

AT _____ AM/PM TODAY, AN ACCIDENT OCCURRED AT _____

(insert name of facility) CONDITIONS ARE SUCH AT THE
FACILITY THAT A RELEASE OF RADIOACTIVE MATERIALS TO THE ATMOSPHERE IS
POSSIBLE. IF A SIGNIFICANT RELEASE OCCURS YOU MAY BE DIRECTED TO EVACUATE
YOUR HOME AND REPORT TO _____ (Assembly Center) SCHOOL. IF
EVACUATION IS ORDERED, LEAVE IMMEDIATELY BY PERSONAL VEHICLE OR BOARD A
SCHOOL BUS WHICH WILL BE DISPATCHED INTO THE AREA. BRING ENOUGH PERSONAL
CLOTHING AND HYGENIC ITEMS FOR EACH MEMBER OF THE FAMILY TO LAST A WEEK.
BRING ANY SPECIAL DRUGS. ON DEPARTING, TIE A HANDKERCHIEF OR OTHER CLOTH
MATERIAL ON THE FRONT DOOR KNOB OR MAILBOX SO THAT EMERGENCY SERVICES AND
SECURITY PERSONNEL WILL KNOW THAT THE HOUSE HAS BEEN EVACUATED. PLACE
LIVESTOCK IN SHELTERED AREAS IF POSSIBLE. FOLLOW-UP ACTIONS WILL BE TAKEN
LATER IN PROVIDING FOR LIVESTOCK.

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SAMPLE EMERGENCY MESSAGE SENT TO MEDIA
LOCAL--SHELTERING OR EVACUATION NECESSARY

(A NEWS RELEASE OF THIS TYPE CAN BE MADE BY THE LOCAL DIRECTOR OF EMERGENCY SERVICES OR HIS DESIGNATED REPRESENTATIVE).

THIS IS AN IMPORTANT BULLETIN FROM THE STATE DEPARTMENT OF EMERGENCY SERVICES. THIS IS NOT, REPEAT, NOT A TEST. THIS IS A RADIATION EMERGENCY. AT _____ AM/PM TODAY, AN INCIDENT OCCURRED AT _____ (insert name of facility). THERE WAS A RELEASE OF RADIOACTIVE MATERIALS TO THE AIR/WATER _____ (insert body of water). ALL EFFORTS ARE BEING MADE BY THE FACILITY STAFF TO BRING THE RELEASE UNDER CONTROL. THE GOVERNOR, UPON THE ADVICE OF THE DEPARTMENT OF HEALTH HAS ORDERED ALL RESIDENTS (OR SELECTED PERSONS--E.G., PREGNANT WOMEN AND ALL CHILDREN) IN SPECIFIED AREAS UP TO FIVE MILES OF THE FACILITY TO EVACUATE IMMEDIATELY. ALL PERSONS EVACUATING THEIR HOMES SHOULD REPORT FIRST TO THE EVACUATION ASSEMBLY CENTER WHERE THEY WILL BE REGISTERED, ISSUED POTASSIUM IODIDE TO PROTECT THE THYROID, AND MONITORED FOR CONTAMINATION AND DECONTAMINATED, IF NECESSARY.

(Identify areas, evacuation routes and evacuation assembly center.) FOLLOW DIRECTIONS OF STATE AND LOCAL POLICE, SHERIFF'S DEPARTMENT PERSONNEL, AND OTHER AUTHORITIES. SHELTER, FOOD, AND MEDICAL SERVICES ARE AVAILABLE AT THE _____ (Evacuation Assembly Center). STUDENTS WILL BE BROUGHT DIRECTLY TO THE _____ (Evacuation Assembly Center) FROM SCHOOL.

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RESIDENTS WHO WORK OUTSIDE THE AFFECTED AREA SHOULD GO DIRECTLY TO THE
_____ (Evacuation Assembly Center). RESIDENTS OF
_____ (Identify areas) ARE ADVISED TO REMAIN IN THEIR HOMES WITH
ALL DOORS AND WINDOWS CLOSED AND AIR CONDITIONERS OFF UNTIL OTHERWISE
NOTIFIED. IF HOME HAS A BASEMENT, STAY THERE. STAY TUNED TO THIS STATION
FOR FURTHER ADVISORIES.

NOTE: REPEAT ABOUT EVERY 10 MINUTES.

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SAMPLE EMERGENCY MESSAGE SENT TO MEDIA
STATE--SHELTERING OR EVACUATION NECESSARY

AT _____ AM/PM TODAY, AN INCIDENT OCCURRED AT _____
_____ (insert name of facility). THERE WAS A RELEASE OF
RADIOACTIVE MATERIALS TO THE AIR/WATER _____
(describe body of water). AT THIS MOMENT, ALL EFFORTS ARE BEING MADE BY
THE FACILITY STAFF TO BRING THIS RELEASE UNDER CONTROL (OR) AT THIS TIME
THE RELEASE HAS ENDED. PEOPLE RESIDING OR WORKING WITHIN _____ MILES OF
THE FACILITY ARE TO STAY INDOORS (OR) ARE INSTRUCTED TO EVACUATE TO THE
_____ SCHOOL IMMEDIATELY. THE STATE DEPARTMENT OF EMERGENCY
SERVICES IS NOTIFYING POLITICAL SUBDIVISIONS AFFECTED AND APPROPRIATE STATE
AGENCIES TO TAKE ACTIONS IN ACCORDANCE WITH THEIR RESPONSIBILITIES IN THE
STATE RADIOLOGICAL EMERGENCY RESPONSE PLAN. A STATE EMERGENCY FOR
_____ COUNTY/CITY HAS BEEN DECLARED BY THE GOVERNOR.

FURTHER INFORMATION WILL BE BROADCAST AS IT BECOMES AVAILABLE.

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SURRY POWER STATION
EMERGENCY PLAN

SECTION 7

EMERGENCY FACILITIES AND EQUIPMENT

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7.0 Emergency Facilities and Equipment

The facilities required in the implementation of the Plan consist of the Control Room, Operational Support Center (OSC), Technical Support Center (TSC), Local Emergency Operations Facility (LEOF), Local Media Center (LMC), and Corporate Emergency Response Center (CERC). A description of each is given below. The OSC, TSC, and LEOF were designed to meet the intent of the guidance in NUREG-0696; responses to NUREG-0737 Supplement 1 made specific commitments regarding these facilities. Communication systems for each are described in Section 7.2.1.

7.1 Emergency Response Facilities

a. Control Room

The Main Control Room of the unit(s) affected shall suffice as the Emergency Control Center. Access to the Control Room shall be limited to those individuals responsible for direct operation of the station, plus other technical advisors, as necessary.

b. Operational Support Center (OSC)

The third floor conference room in the Maintenance Building is designated as the OSC. The Fire Team, First Aid Team, Search and Rescue Team and Damage Control Team are based adjacent to this area and are under the direction of the OSC Director. An emergency kit is kept in the OSC. It contains dosimeters, respirators, protective clothing and radiological supplies and metering equipment. Additional supplies are kept at the Health Physics office. The Emergency Switchgear Room is designated as the backup OSC.

c. Technical Support Center (TSC)

The TSC has been established adjacent to the Control Room. This TSC contains a complete controlled set of drawings, technical manuals, and other records which are properly stored and accessible. Radiation monitoring equipment is available for both airborne particulate and direct radiation measurements at this location.

d. Local Emergency Operations Facility (LEOF)

The LEOF is located on Company-owned property adjacent to the Training Complex Simulator Building. Corporate, Federal and State officials may assemble at this location. The State official will act as the liaison between the Virginia Department of Emergency Services (DES) Emergency Operations Center and local officials. This facility shall also be the center for the receipt and analysis of all field monitoring data available from NRC, State and Virginia Power field teams. Radiation monitoring equipment is available for both airborne particulate and direct radiation measurements at this location.

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e. Local Media Center (LMC)

The LMC is located on Company-owned property near the station. Virginia Power, Federal and State officials will brief members of the news media at this location. The Joint Public Information Center (JPIC) is located at the Innsbrook Technical Center. The Corporate Emergency Response Plan provides details about these facilities. Small groups of the media may be accommodated at the LEOF in a location designated and approved by the Recovery Manager.

f. Corporate Emergency Response Center (CERC)

The Corporate Emergency Response Center (CERC) and the Corporate Emergency Operations Facility (CEOF) are located at the Innsbrook Technical Center in Richmond, Virginia. Further details are contained in the Corporate Emergency Response Plan.

7.2 Communications System

The station communications system is designated to provide communications to all essential areas of the station associated with Surry Units 1 and 2 and to essential locations remote from the station during normal operation and under accident conditions.

Communication systems vital to Units 1 and 2 operation and safety are designed and provided, as necessary, so that failure of one component would not impair the reliability of the total system. This is accomplished within the station by using four systems. For communication from within to outside the station, five systems are provided. Schematics showing the scope and variety of the communications system are shown in Figures 7.4 at the end of this section.

7.2.1 Communication Systems Within the Station

Communication systems within the station are discussed below.

7.2.1.1 Public Address and Intercom System

A five channel public address and intercom system is installed in the station. This system is designed to be adequate for use of operational communications and emergency communications. Loud speaker and paging phone stations are located throughout the station. The coverage of the loud speakers permits broadcasts to be heard in Surry Units 1 and 2, as well as in the construction areas.

The System is normally used in daily operational activities to communicate messages between individuals in the station. In the event of an emergency, the system is used to alert station personnel of any abnormal occurrence or emergency situation and to communicate emergency messages between individuals.

The public address system power is supplied from a power supply which will maintain the system in an operational condition in the event of a station power failure. Zones are provided within the station to ensure operability of a major portion of the system should equipment in a zone become inoperative. The zone with the defective equipment can be manually isolated from the system until repairs are completed.

7.2.1.2 Radio Communication

A UHF two-way radio system is provided at the station consisting of a base station/repeater and hand-held portable radios. This system allows direct communications between the Main Control Room and portable or mobile radios. The portables and mobiles can also communicate directly with one another, without use of the repeater.

7.2.1.3 Private Branch Telephone Exchange (PBX)

The PBX system provides switched local and trunked telephone service. The PBX switching equipment is physically located in the Administration Building and is connected to a commercial telephone exchange in Smithfield, Virginia.

7.2.1.4 Sound Powered Telephone System

A sound powered telephone communications system is installed in the station and serves Surry Units 1 and 2. This system is a multiple channel system connecting selected operating areas of Surry Units 1 and 2.

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Headsets consisting of an earphone and microphone are connected to a two wire channel for communication between persons in different areas. Operation of this system is not dependent on the availability of the electrical power system. This system is normally used for maintenance and/or calibration of equipment. During an emergency, the system could be an alternate means of relaying messages between different operating areas.

Communication systems available at each Emergency Response Facility include:

Control Room:

1. Automatic Ring Downs (ARDs) to the System Operator, TSC, OSC, DES, Control Room Annex, Emergency Switchgear Room, and Condensate Polishing Building
2. Insta-Phone
3. Station PBX phones
4. Virginia Power OPX phones
5. 4 Radio Frequencies
6. NRC Emergency Notification System (ENS) phone
7. Commercial Phone
8. Public Address Intercom and Sound Powered Phone System

Technical Support Center

1. ARDs to the Control Room, OSC, LEOF, CERC, Emergency Switchgear Room, Primary Remote Assembly Area, and Security Shift Supervisor.
2. Insta-Phone
3. Station PBX Phones
4. Virginia Power OPX Phones
5. Commercial Phones
6. NRC ENS phone
7. Public Address Intercom
8. 2 Radio Frequencies
9. NRC Health Physics Network (HPN) phone

Operational Support Center (OSC)

1. Public Address Intercom
2. ARDs to Control Room and TSC
3. 4 Radio Frequencies
4. Station PBX phone

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Local Emergency Operations Facility (LEOF)

1. ARDs to TSC, CERC, JPIC, LMC, DES, Surry County
and James City County
2. Insta-phone
3. State Controlled Administrative Telephone System
(SCATS)
4. Commercial Phone
5. 3 Radio Frequencies
6. Station PBX Phones
7. Virginia Power OPX Phones
8. NRC ENS phone
9. NRC HPN phone

Local Media Center (LMC)

1. 46 Commercial Lines
2. ARDs to LEOF and JPIC

Corporate Emergency Response Center (CERC)

1. Virginia Power OPX Phones
2. ARDs to LEOF and TSC
3. Insta-phone monitor

7.2.2 Offsite Communications Systems

Those systems provided for communication between the station and offsite are described below.

7.2.2.1 Commercial Telephone

Commercial telephone lines are provided between the station and a commercial telephone exchange in Smithfield, Virginia. These lines are connected into the station PBX. Lines are available for general communications.

A full period leased line (independent of station PBX) is also provided for general communications between the station and Virginia Power Headquarters in Richmond, Virginia. Unlisted central office lines are also available to key personnel (independent of the station PBX). To notify the Sheriff's Office of an emergency, station personnel would dial the Sheriff's number in the normal manner.

7.2.2.2 Microwave System

A Virginia Power owned microwave system is installed to provide communication channels between the station and Virginia Power Headquarter's PBX and the System Operations Center. It is battery operated at all locations to provide continuous operation upon loss of AC. The Microwave System includes two direct extensions to the Headquarters: (1) a direct line to the Virginia Power System Operations Center, and (2) a line that connects the managerial offices of the station with Production Operations in Richmond. To make emergency notification, either could relay the notification by commercial phone.

7.2.2.3 Radio Communication System - Ultra High Frequency (UHF)

UHF two-way radio systems are provided for station operations, Security, Health Physics monitoring and to meet the requirements of 10CFR50, Appendix R. The Health Physics monitoring frequency allows two-way communication between the LEOF or the TSC, and the monitoring teams in the field out to about 10 miles. The Security frequency allows two-way communications between the Security Central Alarm station and portable or mobile units (approximately a 10 mile radius of the station). All of these units will be able to communicate with one another without the use of the Base/Repeater (shorter range). The Security Central Alarm Station has two-way communication with the Surry County Sheriff's Department using the method of transmitting on a Virginia Power frequency and receiving on the Sheriff's frequency. Security portable and mobile units also have the capability to communicate through the station operations UHF System and establish contact with the Main Control Room.

7.2.2.4 Dedicated and Unlisted Communications

Two separate commercial telephone lines are dedicated to the NRC. These telephones and other unlisted numbers are located in areas within the station manned normally 24 hours per day, or which will be manned during emergencies. A dedicated line is also available between the LEOF and CERC (CEOF).

7.2.2.5 Instaphone Loop

An Instaphone Loop has been installed that permits simultaneous telephone-speaker communications from the station to the counties of Surry, Isle of Wight, James City and York; cities of Williamsburg and Newport News, and the State DES. This loop can be activated at the station from the Control Room, TSC, or LEOF. Transmissions can be monitored from the CERC.

Back-ups to this system include a branch of the State Controlled Administrative Telephone System (SCATS), the OPX and commercial phones.

7.2.3 Communication System Reliability

A failure of one communication system will not affect the operation of other communication systems at the station. Three of the four systems provided for communication within the station rely on station power. The public address system has an emergency backup. The sound powered phone system does not rely on any station power system. Since the onsite communication system normally will be in use, equipment failure will not go unnoticed. Connecting wiring for individual components in each system are routed along separate paths in the station. The multiplicity of onsite communications network ensures the availability of adequate communications.

The five systems provided for communications between the station and offsite locations are routed along different paths to assure that one accident will not affect all systems. Equipment for these systems is located in different areas of the station, thus ensuring that an accident in one area of the station would not incapacitate all five communication systems. Failure of normal power supplies would not deprive the station of offsite communication capability. The usage of the offsite communication provides added assurance that failure will not go undetected. Telephone lines which are dedicated are checked at specified intervals.

7.2.4 Communication Responsibilities

7.2.4.1 The Station Emergency Manager has the responsibility of communicating with the dispatchers at the Department of Emergency Services; the Sheriff's Offices in the counties of Surry, Isle of Wight and York; and the Police Departments of James City County, Williamsburg, and Newport News. All of these offices provided 24-hour dispatcher coverage. Upon activation of the LEOF, the Recovery Manager is responsible for notifying State and local governments of emergency status.

7.2.4.2 State and Local Entities Contiguous to the 10 Mile EPZ

The station will not inform political jurisdictions within the 50 mile zone other than those listed above. The State is relied upon to perform this function.

7.2.4.3 Federal Response

The Station Emergency Manager or Recovery Manager shall communicate with Federal Emergency Response organizations. When calling the NRC they communicate with the Operations Officer. The Recovery Manager may contact DOE (IRAP) and communicate with the duty officer. Other Federal Agencies are normally contacted by the State DES.

7.2.4.4 Local Emergency Facilities

It shall be the responsibility of the Station Emergency Manager to ensure that communications are established between and to the LEOF, TSC, and OSC. Communication shall also be maintained by the field monitoring teams using UHF two-way radios. This information will be radioed to the TSC where the Radiological Assessment Director or his alternate will be working.

7.2.4.5 Emergency Personnel

The Station Emergency Manager shall implement EPIP-1.01, Emergency Manager Controlling Procedure, which will ensure the activation of the Corporate Emergency Response Plan and the rapid activation of station personnel to deal with the emergency if the situation requires such action.

7.2.4.6 Communication with Local Emergency Operations Facility

In the event that the severity of the emergency calls for the activation of the LEOF, the Recovery Manager shall take steps to ensure that telephone communications are working between the LEOF and the TSC. Information from field monitoring teams shall be radioed to the LEOF where the Radiological Assessment Coordinator will be working.

7.3 Assessment Facilities

The following instrumentation and monitoring techniques are available for emergency assessments in each of the categories listed below:

7.3.1 Onsite Systems and Equipment

7.3.1.1 Natural Phenomena

In the event an emergency is the result of a natural phenomena, there is instrumentation to monitor its severity. Located onsite is the station meteorological system with the capability of giving wind direction, wind speed (up to approximately 125 miles per hour) and temperatures. There is also seismic instrumentation in the containment which monitors acceleration levels of ground movement. Meteorological and seismic instrumentation have readily accessible read-outs in the Control Room. Onsite hydrological monitoring consists of readouts in the Control Room of:

- a. Intake Canal Water Table Level
- b. Containment Sub-surface Drainage Control Level
- c. Intake Canal Water Level
- d. Intake-Outlet Canal Temperature Variance

The State maintains a composite sampling station at the road bridge over the outlet canal.

If necessary, samples can be obtained from the onsite wells and monitoring points for analysis by Health Physics personnel.

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7.3.1.2 Radiological Conditions

The installed Radiation Monitoring System (RMS) consists of process monitors and area monitors which read-out and record in the Control Room. The process system continuously monitors selected lines containing, or possibly containing radioactive effluents. The system's function is to warn personnel of increasing radiation levels to give early warning of a system malfunction, and to record and control discharges of radioactive liquids and gases to the environment. This system serves both units and consists of active channels and spare channels. Examples of process monitors are:

- * Ventilation Vent Gas and Particulate, including high range monitors
- * Process Vent Gas and Particulate, including high range monitors

Containment Gas and Particulate

* Used for initial off-site release assessment.

* Condenser Air Ejector Effluent

Steam Generator Blowdown

Liquid Waste

Component Cooling Water

Reactor Coolant Letdown

* Main Steam Line High Range Monitors

Area Monitors are placed at specific locations in the station with the following examples:

* Containment High Range

New Fuel Storage

Spent Fuel Pit Bridge

Auxiliary Building Central Area

Decontamination Building

Primary Sample Room

Main Control Room

Containment Manipulator Crane Bridge

Incore Instrument Area

Portable radiation detection equipment consists of low and high range instruments to measure gamma radiation levels from 0.01 mR/hr to 1000 R/hr.

* Used for initial off-site release assessment

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Portable units are also available to measure alpha, beta, and neutron radiation. This equipment is maintained by the Health Physics Department and is used on a routine basis.

Emergency kits are set aside solely for emergency use. A monthly surveillance is performed on emergency kit equipment for inventory purposes and operations check. Calibration is performed according to the frequency provided by station procedures. There are sufficient reserves of equipment available to replace those which are removed for calibration or repair. There are nine emergency kits at Surry Power Station. These kits can be found in the following locations: OSC-1, Control Room-1, TSC-1, LEOF-1; Health Physics Office-1, and Maintenance Services Building-4. The contents of each kit are listed in Appendix 7.

Sampling equipment is available to take low or high volume air samples. Battery operated air samplers can be used to collect low volume samples either onsite or offsite. Portable instrumentation has the capability to measure silver zeolite cartridges used for sampling radioiodine. Portable instrumentation is battery operated and has the capability to measure radioiodine concentrations as low as 5×10^{-8} $\mu\text{Ci/cc}$ under field conditions. Plastic bags and bottles are available to be used for collecting water, soil, foodstuffs, or other samples.

Equipment installed for use in environmental surveillance, such as air samplers and thermoluminescent dosimeters (TLDs) could readily be used to obtain offsite data. The station's environmental radiological monitoring program provides offsite dosimetry devices which comply with requirements of the NRC Radiological Assessment Branch Technical Position for Environmental Radiological Monitoring Programs. Also two Virginia Power TLDs have been placed in each accessible $22\frac{1}{2}^{\circ}$ sector at an approximate 5 mile radius from the station for accident monitoring, with 4 TLDs being used as "controlled dosimeters". This system is duplicated with vendor TLDs. Maps showing the locations of this dosimetry are shown in Figures 7.1, 7.2 and 7.3. The State has also duplicated such accident monitoring for verification purposes. Fixed laboratory facilities include a gamma spectroscopy system, gas flow proportional counter, and liquid scintillation counter.

While such equipment is not intended to be portable, it could be removed from the counting room and relocated should such action be required. The equipment and facilities at the North Anna Power Station are also available in the event of an emergency.

Emergency Plan Implementing Procedures provide the methodology for determining the magnitude of a release by three separate and independent methods: (1) using data or samples continuously obtained by the onsite Radiation Monitoring System, (2) using known inventory data for the system(s) affected, and (3) obtaining offsite data from the air samplers or dosimeters which are continuously in place, or taking radiation surveys and appropriate samples, and using this data to calculate releases.

The high range effluent monitors on the Process Vent, Ventilation Vent, and lines can be utilized to determine the source term.

7.3.1.3 Station Conditions

Installed in the Main Control Room is the necessary instrumentation readout to assess station status.

Typical Control Room Instrumentation

- . Wide Range Reactor Coolant System Pressure
- . Wide Range Reactor Coolant System Hot Leg Temperature
- . Wide Range Reactor Coolant System Cold Leg Temperature
- . Pressurizer Level
- . Incore Thermocouples
- . Refueling Water Storage Tank Level
- . Containment Sump Level
- . High Head Safety Injection Flow
- . Auxiliary Feedwater Flow

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- . Emergency Condensate Storage Tank Level
- . Containment Pressure
- . Containment Radiation - Gas and Particulate
- . Steamline Pressure
- . Steam Generator Narrow Range Level
- . Steam Generator Wide Range Level
- . Air Ejector Radiation
- . Steam Generator Blowdown Radiation
- . Letdown Activity
- . Boric Acid Tank Level
- . Control Room and other Area Radiation Monitors
- . Containment Temperature

7.3.1.4 Fire Detection

The station's Fire Protection System is designed to furnish water and other extinguishing agents with the capability of extinguishing any single or probable combination of simultaneous fires that might occur. The station is designed to minimize the use of combustible materials and to make the greatest possible use of fire retardant materials.

These systems are designed in accordance with the standards of the National Fire Protection Association and are based on the recommendations of the nuclear insurers to provide the following:

1. Supply of water for the fire protection system
2. Automatic fire or smoke detection in the more critical areas

3. Fire extinguishment by fixed equipment actuated automatically or manually, and
4. Manually operated portable fire extinguishing equipment at strategic locations.

The station has a full-time Loss Prevention Coordinator with responsibility for the station's fire detection and suppression programs and a Fire Brigade. Brigade members are given training equivalent to the State's certification program.

7.3.2 Facilities and Equipment for Offsite Monitoring

The facilities and equipment located at the North Anna Power Station may be utilized, as applicable, during emergency conditions at the Surry Station. Such equipment may include meteorological and/or seismic data, respiratory protection equipment, portable radiation detection instrumentation and count room facilities. Seismic data may be obtained from the National Earthquake Information Service. Meteorological data can be obtained from the following:

<u>LOCATION</u>	<u>ORGANIZATION</u>	<u>DISTANCE FROM SURRY (MILES)</u>
Chesterfield	Virginia Power	55
Yorktown	Virginia Power	13
Richmond International Airport	National Weather Service	50
Patrick Henry International Airport	Federal Aviation Administration	11
Norfolk Naval Air Station	US Navy	32

<u>LOCATION</u>	<u>ORGANIZATION</u>	<u>DISTANCE FROM SURRY</u> (MILES)
Fort Eustis	US Army	6
Langley Air Force Base	US Air Force	22
Milford Haren	US Coast Guard	35
South Island	US Coast Guard	40

There are no meteorology facilities close to the site in Surry County other than the Company's own facility. The meteorology equipment at the site meets the criteria of Regulatory Guide 1.23, Onsite Meteorological Programs, dated February 17, 1972.

The basic functions of the Station's Meteorological Program are to provide the capability for making meteorological measurements and for making predictions of the atmospheric effluent transport and diffusion. These capabilities are provided by two systems.

The Primary System consists of a 150 foot tower with sensors at the 150-foot, 30-foot, and ground levels. The 150-foot level sensors determine wind speed, wind direction, sigma theta, and differential temperature. The 30-foot level sensors determine wind speed, wind direction, sigma theta, temperature, differential temperature, and dewpoint. Precipitation is measured at ground level.

The Back-up System consists of a 35-foot tower with sensors at the top which determine wind speed, wind direction and sigma theta.

Tower data output are sent via shielded cables to strip chart recorders in the Control Room. This information can be accessed from the Control Room, TSC, LEOF, and CERC using the ERFCS.

The Bureau of Radiological Health has a mobile laboratory with radioassay equipment to respond to radiation emergencies. This van is equipped to respond to radiation emergencies. This van is equipped with a radio assigned to a Virginia Power frequency for communication purposes. Additional details for offsite monitoring can be found in Section 7.3.1.2. Virginia Power does not maintain a mobile laboratory. Offsite Hydrological Monitoring is performed by the State.

7.3.3 Emergency Response Facility Computer System (ERFCS)

The ERFCS provides plant monitoring, data acquisition, and critical plant data in the form of real-time status displays for the purpose of making a rapid evaluation of the reactor plant's safety status. ERFCS monitors are located in the Control Room, TSC, LEOF, and CERC. Signal inputs for most components monitored by the ERFCS are taken from instrument terminals in the Control Room.

The ERFCS includes the Safety Parameter Display System (SPDS), Emergency Response Guidelines (ERGs), process and instrument displays (P&IDs), pressure-temperature plant displays, and radiation and meteorological (RAD/MET) displays. Monitor displays are continuously updated by the computer systems as

they collect and process parametric data from the various plant sensors.

The SPDS monitors reactivity control, core cooling and heat removal, secondary heat removal, Reactor Coolant System (RCS) integrity, radioactivity control, and Containment integrity.

The ERGs aid the operator in deciding which recovery procedure to use to restore the plant to safe and normal conditions. Six critical safety function status the displays are used to evaluate subcriticality, core cooling, heat sink, integrity, containment, and inventory.

The P&IDs provide real-time configuration schematics on plant parameters, valve positions, equipment operational status, and out-of-specification conditions.

Pressure-temperature plot displays provide a view of the plants overall performance either with respect to the primary plant or the primary loops with their steam generators.

The RAD-MET displays are used by Dose Assessment personnel in the TSC and LEOF. A Meteorological and Dose Calculations computer model provides the capability to estimate the concentrations of various dose equivalent isotopes from the plant site outward to a radial range of 10 miles.

7.4 Protective Facilities

If offsite evacuation is ordered, local government(s) will evacuate members of the public (private and public vehicles) to the primary offsite assembly points. These individuals shall be registered, monitored for contamination, and provided food and shelter.

7.5 First-Aid and Medical Facilities

7.5.1 Onsite Facilities

Section 6.5 describes these facilities.

7.5.2 Offsite Facilities

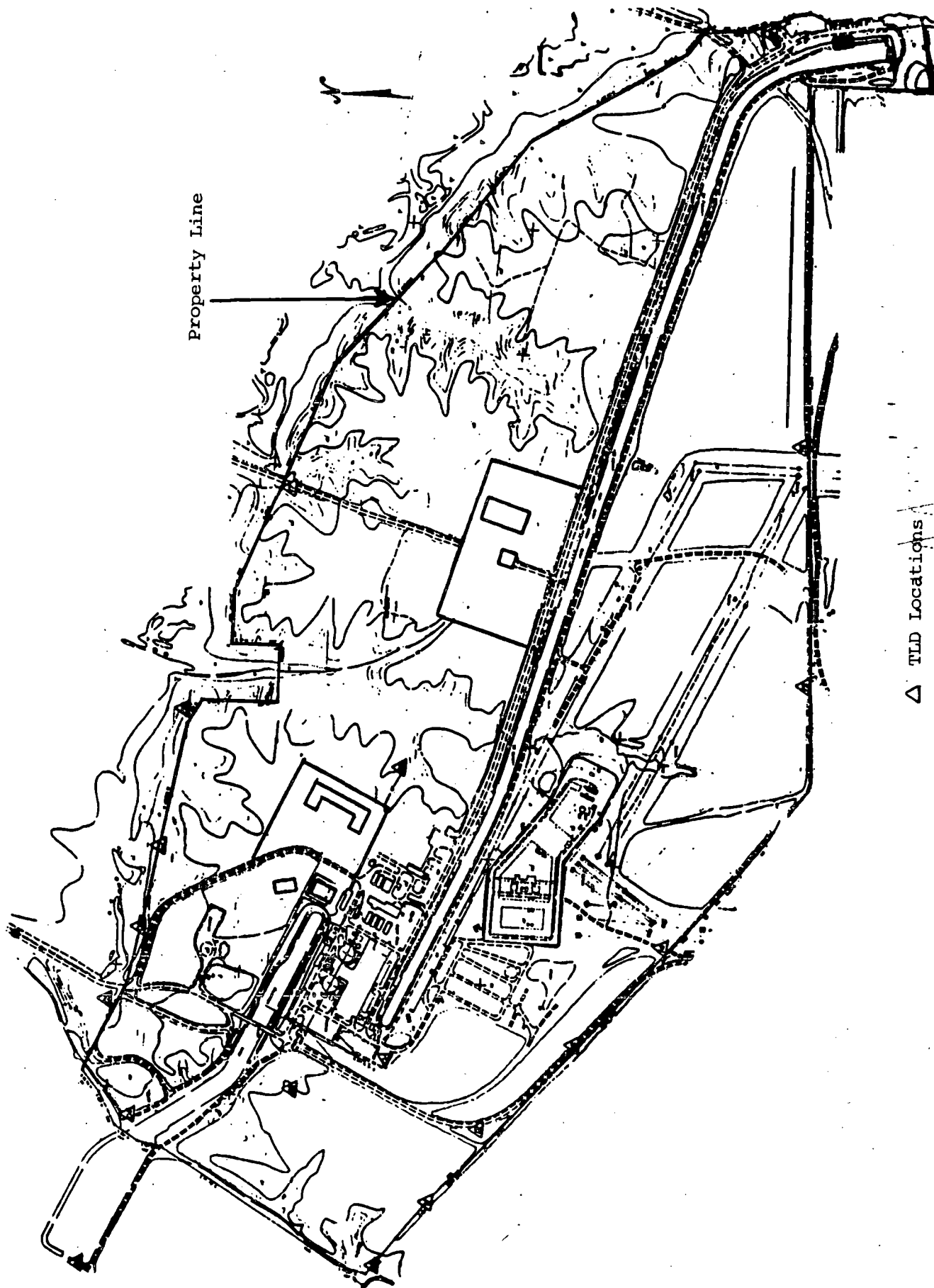
Section 6.5 describes these facilities.

7.6 Damage Control Equipment and Supplies

The station maintains an adequate supply of damage control equipment and supplies, and could rely on additional equipment and supplies from the North Anna Power Station. The station maintains a normal supply of mechanical tools and equipment which are used in the day to day maintenance of the station. The Warehouse maintains an inventory of supplies required for the normal operation of the station. These supplies are in various tool cribs in the station and at the Warehouse. Other equipment and supplies include full face respirators with proper filters or canisters, SCBA respirators, air supplied respirators, protective clothing, radioactive waste containers, ion-exchange resin (liquid waste processing), portable radios, pagers, various communication devices, portable lighting equipment, and Company-owned vehicles. Where appropriate, calibration and inventory are conducted in accordance with station procedures. Equipment and supplies will be transferred to the OSC as needed.

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Figure 7.1

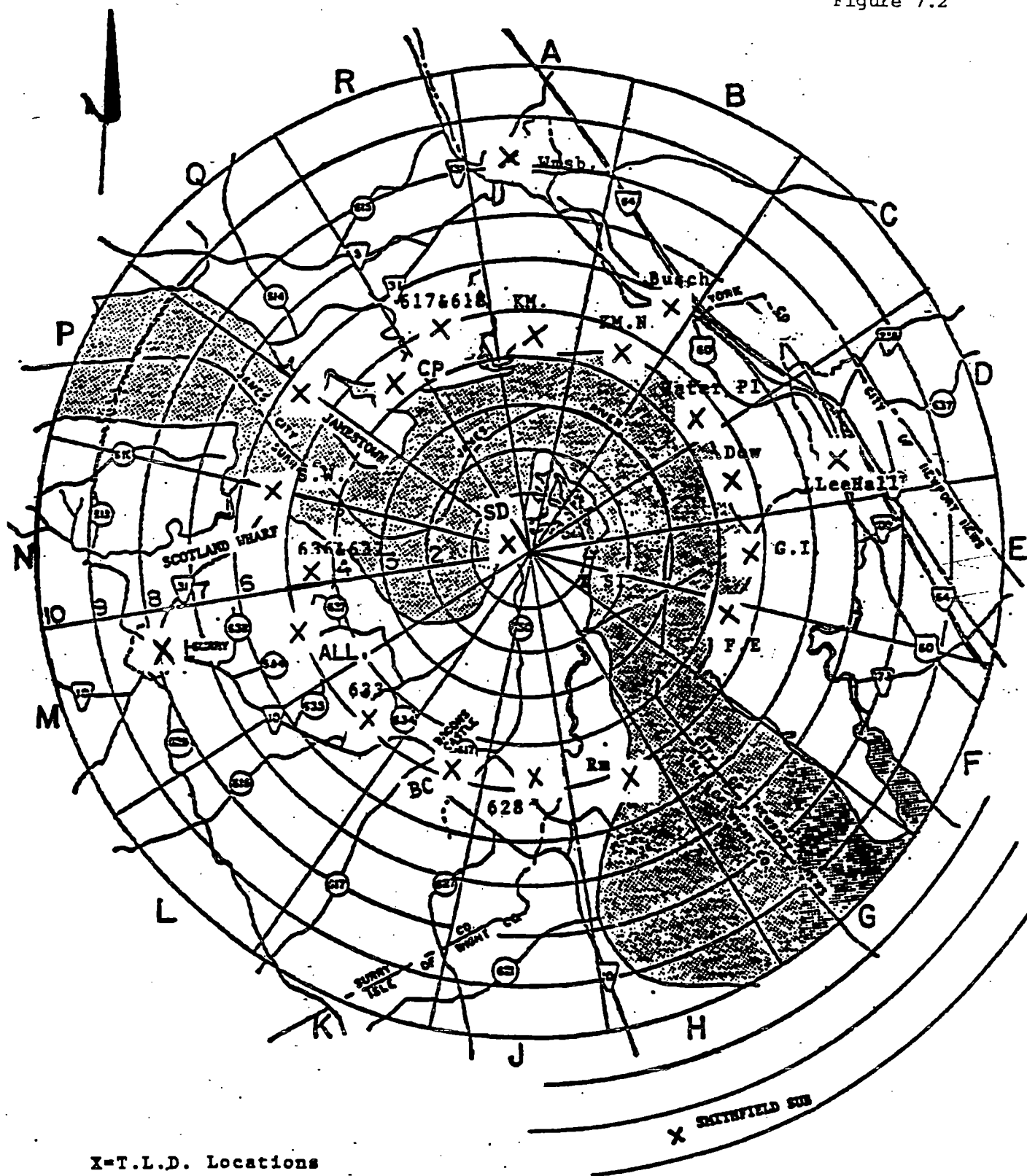


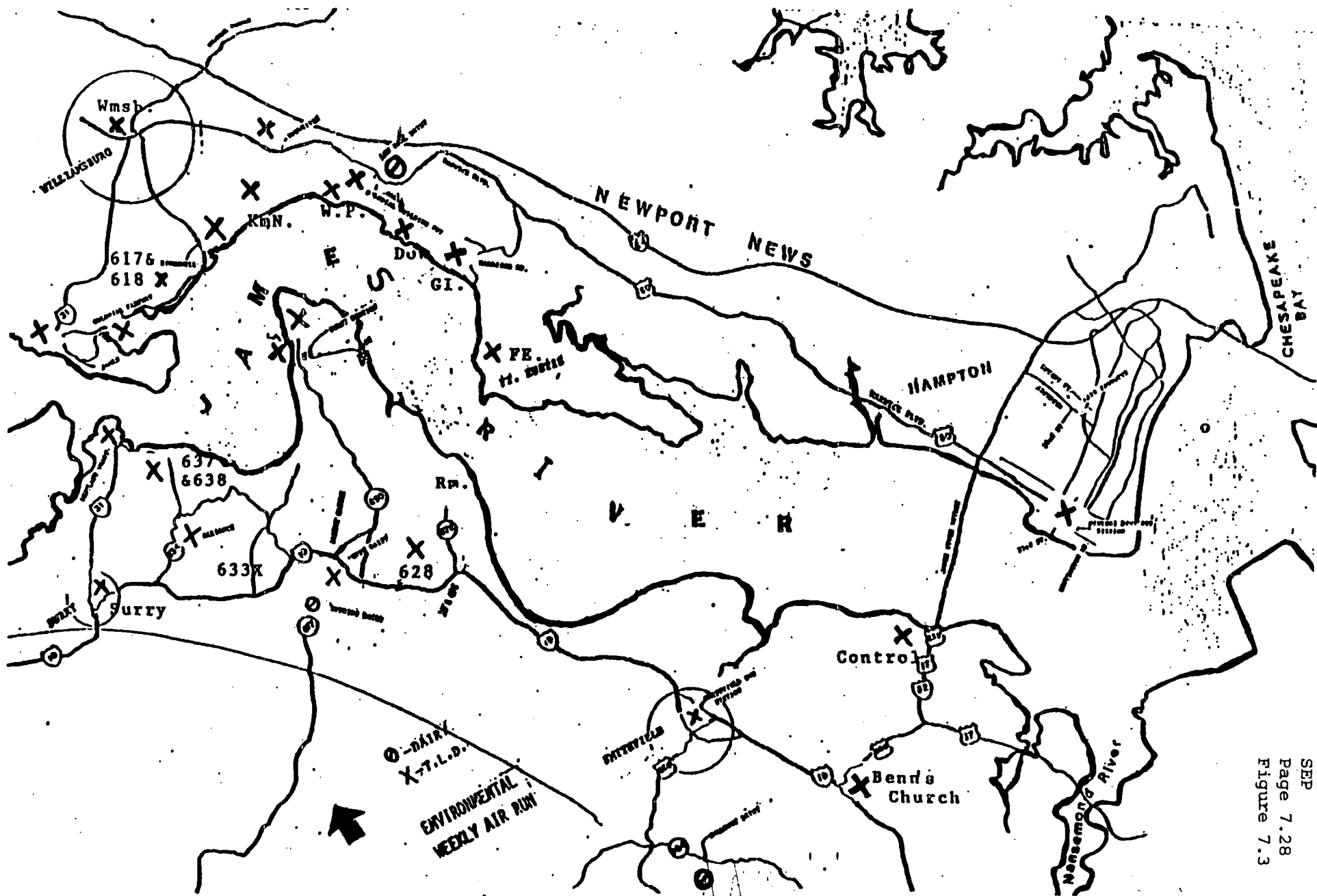
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Figure 7.2



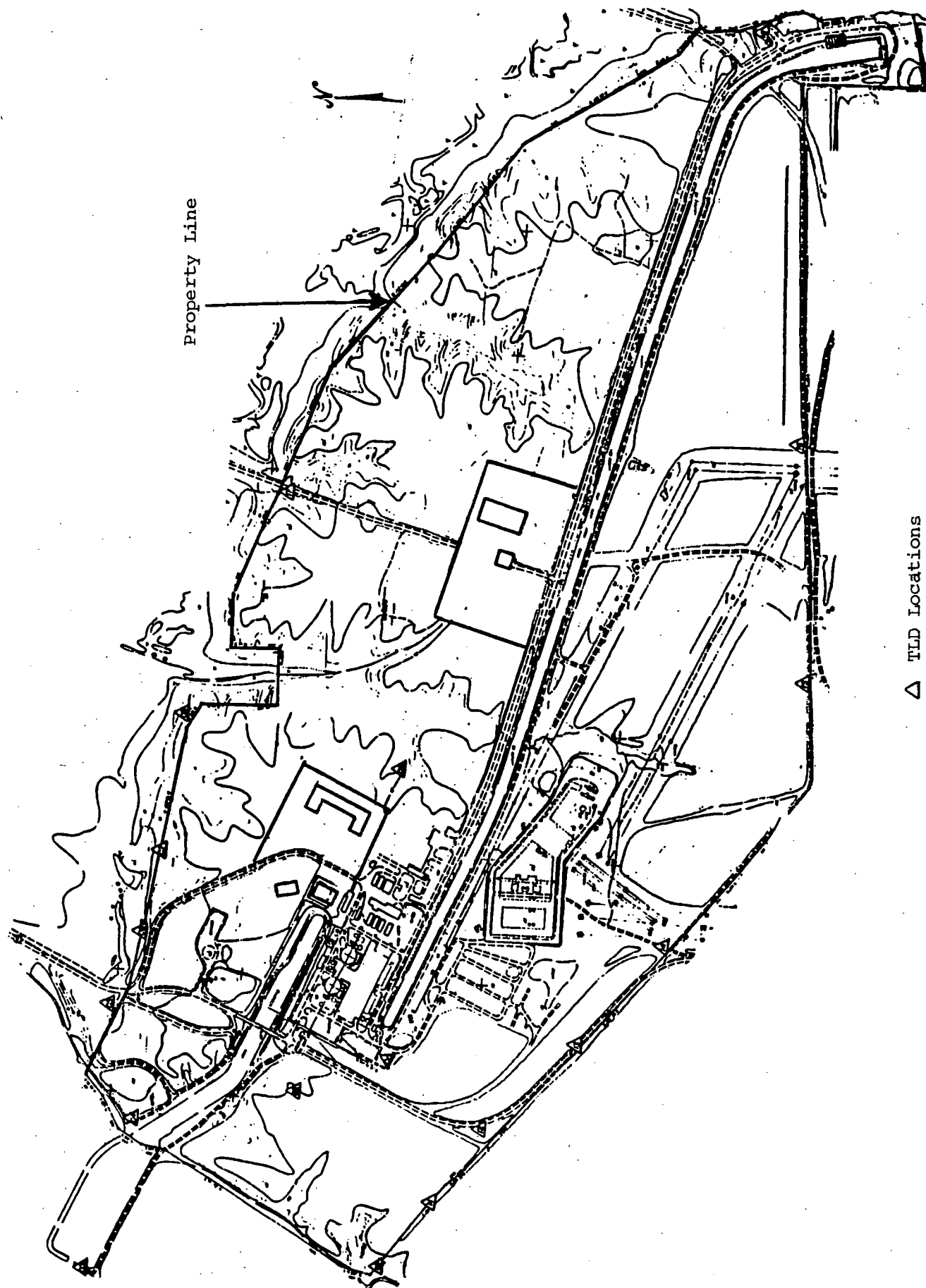


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Figure 7.1



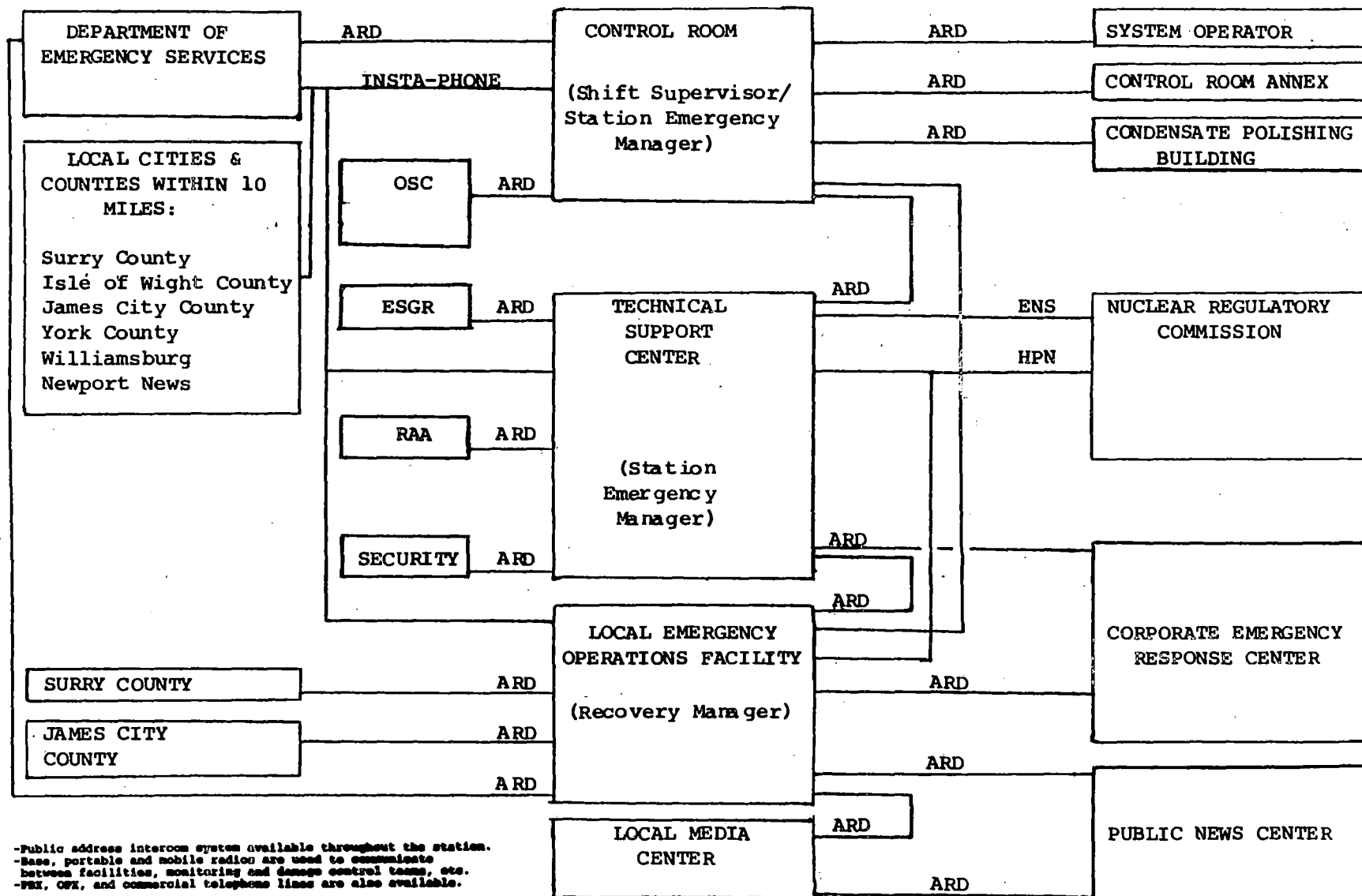
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Figure 7.4

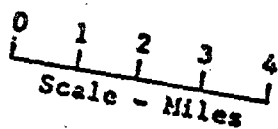
COMMUNICATIONS LINKS

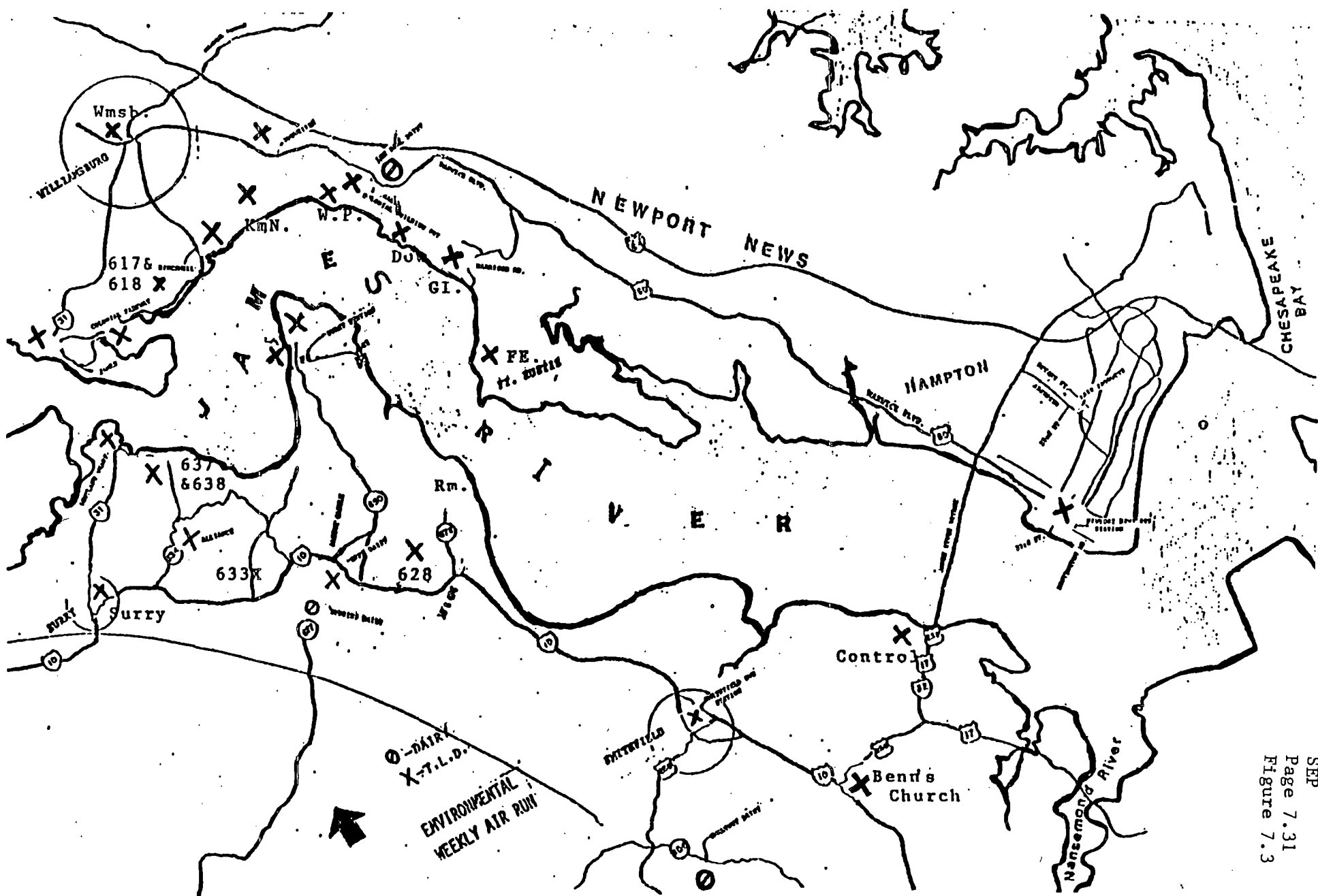


-Public address intercom system available throughout the station.
 -Base, portable and mobile radios are used to communicate between facilities, monitoring and damage control teams, etc.
 -VEX, OVX, and commercial telephone lines are also available.

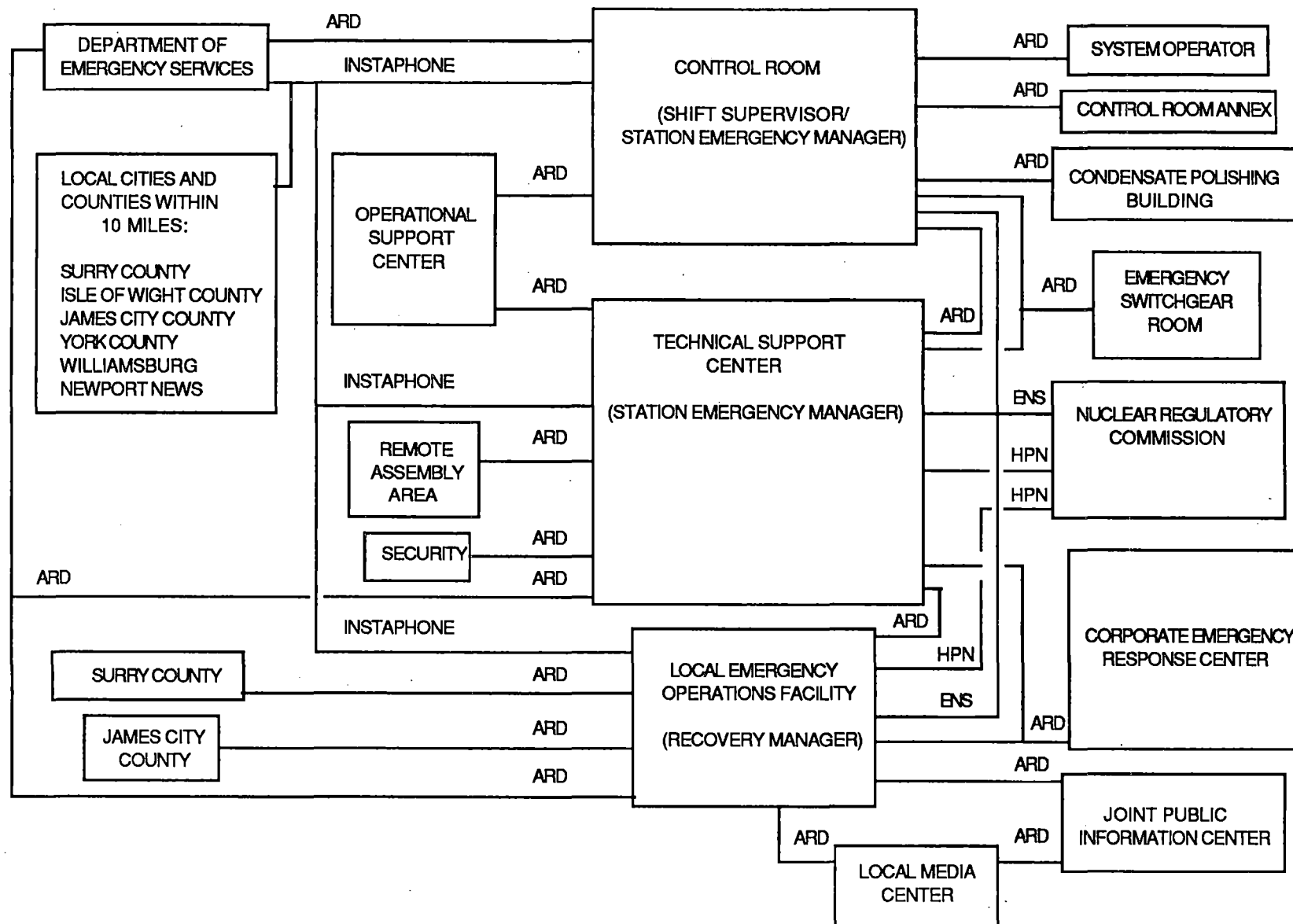
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X SMITHFIELD SUB





COMMUNICATIONS LINKS



LEGEND:
ARD - AUTOMATIC RINGDOWN
ENS - NRC EMERGENCY NOTIFICATION SYSTEM
HPN - NRC HEALTH PHYSICS NETWORK

NOTE:
1. PUBLIC ADDRESS INTERCOM SYSTEM AVAILABLE THROUGHOUT THE STATION.
2. BASE, PORTABLE AND MOBILE RADIOS ARE USED TO COMMUNICATE BETWEEN FACILITIES, MONITORING AND DAMAGE CONTROL TEAMS, ETC.
3. PBX, OPX AND COMMERCIAL TELEPHONE LINES ARE ALSO AVAILABLE.

SURRY POWER STATION
EMERGENCY PLAN

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SECTION 8

MAINTAINING EMERGENCY PREPAREDNESS

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8.0 MAINTAINING EMERGENCY PREPAREDNESS

Emergency preparedness is maintained by designated individuals who have responsibility for developing, maintaining and coordinating Virginia Power's capability for responding to emergencies. The emergency plans and associated implementing procedures contain the guidance necessary to accomplish that task. These procedures and related documents are revised as required and reviewed at least annually. Personnel who may be required to fill emergency response positions receive initial and annual training in their functional responsibilities. Training is also provided to various offsite groups that have agreed to support station personnel during an emergency. Emergency equipment to support these personnel is kept operational by a Periodic Testing maintenance program. Periodic drills and an annual exercise are conducted to identify strengths and weaknesses in the emergency preparedness of Virginia Power. To further ensure that emergency response capability is provided and maintained, the public is informed of notification methods and guidelines used to protect their health and safety in an emergency, and independent reviews of the total emergency preparedness program are conducted.

8.1 RESPONSIBILITIES FOR MAINTAINING EMERGENCY PREPAREDNESS

The Vice President Nuclear Operations has been assigned the overall authority and responsibility for maintaining emergency preparedness. He has delegated this responsibility to the Manager Nuclear Programs and Licensing and the Station Manager. The Manager Nuclear Programs and Licensing has delegated the responsibility for corporate emergency preparedness to the Supervisor Emergency Planning. These responsibilities include:

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- a) coordinating the Company emergency preparedness program with offsite emergency response organizations;
- b) coordinating Company emergency preparedness planning activities;
- c) conducting public information and media information activities;
- d) coordinating emergency exercises between Company departments and offsite agencies;
- e) coordinating emergency preparedness program reviews;
- f) coordinating emergency preparedness activities between the stations and other Company departments;
- g) providing support to the stations in the area of emergency preparedness;
- h) obtaining letters of agreement from appropriate offsite emergency response organizations; and
- i) coordinating the annual review of Emergency Action Levels with state and local governmental officials.

The Station Manager has designated the Assistant Station Manager, Nuclear Safety and Licensing (NS&L), with the responsibility for station emergency preparedness. These responsibilities have been delegated to the Coordinator-Emergency Planning. These responsibilities include:

- a) coordinating the station emergency preparedness program with offsite agencies;
- b) coordinating station emergency preparedness planning activities;
- c) performing the annual review of the emergency plan and its implementing procedures;
- d) maintaining the Surry Power Station Emergency Plan.

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- e) verifying distribution of copies of the Surry Power Station Emergency Plan and EPIPs to persons or organizations with responsibility for implementation of the plan or procedures;
- f) coordinating emergency preparedness training and verifying that it is performed as required;
- g) verifying that required testing and maintenance of emergency equipment is performed;
- h) coordinating drills and exercises and verifying that they are conducted as required; and
- i) verifying that required emergency preparedness records are maintained and filed.

8.2 MAINTENANCE OF THE EMERGENCY PLAN, EMERGENCY PLAN IMPLEMENTING PROCEDURES, EMERGENCY PERSONNEL NOTIFICATION LIST, AND EMERGENCY RESPONSE PERSONNEL ROSTER

Station documents that are required to ensure emergency preparedness include the Surry Emergency Plan (SEP) and the Emergency Plan Implementing Procedures (EPIPs). The Coordinator-Emergency Planning shall review design changes and initiate appropriate revisions to the EPIPs and SEP when appropriate.

8.2.1 Review of the Emergency Plan and Emergency Plan Implementing Procedures

The Coordinator-Emergency Planning shall review the SEP and its implementing procedures at least every 12 months and certify that they are adequate and current. The results of this review shall be reported to the Station Nuclear Safety and Operating Committee (SNSOC) and the documentation filed in Station Records. The SNSOC

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shall review proposed revisions to these documents and recommend action to the Station Manager who is responsible for their approval. If a proposed revision is judged to decrease the effectiveness of these documents with respect to 10CFR50.47(b) or 10CFR50, Appendix E, it shall be submitted to the NRC for approval in accordance with the requirements of 10CFR50.54(q) prior to implementation. Revisions to these documents shall be dated and marks will be placed on the affected pages to indicate where changes are made.

8.2.2 Review of the Emergency Personnel Notification List and Emergency Response Personnel Roster

The Coordinator-Emergency Planning shall review Emergency Personnel Notification List in the Emergency Telephone Directory and the Emergency Response Personnel Roster at least quarterly for accuracy and shall ensure that required revisions are made. Documentation of this review shall be filed in Station Records.

8.2.3 Distribution of Emergency Plans and Implementing Procedures.

In accordance with 10CFR50, Appendix E, copies of plan and implementing procedure revisions shall be submitted to the NRC within 30 days after approval. The Coordinator-Emergency Planning shall ensure that revisions to the SEP are distributed to those offsite agencies that require them in order to perform their emergency response functions.

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8.3 TRAINING OF STATION PERSONNEL

Emergency preparedness of station personnel is maintained through an integrated training program that includes general orientation for all persons badged at the station and detailed training for persons with emergency response functions during an emergency where appropriate to supplement the general orientation and normal job related training.

The primary objectives of this training program are to:

- a) familiarize emergency response personnel with the SEP and its implementing procedures,
- b) inform emergency response personnel of their functional responsibilities during an emergency; and
- c) ensure emergency response personnel maintain familiarity with the SEP and its implementing procedures and their functional responsibilities during an emergency.

8.3.1 Responsibilities for Maintaining Emergency Preparedness Training

The responsibilities for ensuring adequate emergency preparedness training is provided are as follows:

- a) The Station Manager is responsible for ensuring station personnel are adequately trained in accordance with this plan.
- b) Department superintendents and supervisors are responsible for ensuring their personnel receive adequate training. This includes designating individuals who may serve as primary, interim or alternate emergency response personnel and ensuring they successfully complete the training specified in this plan.

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- c) The Superintendent Nuclear Training is responsible for developing and scheduling training programs that meet the requirements of this plan, assisting in the development of training programs for offsite support personnel, and for maintaining records to document training conducted.
- d) The Coordinator-Emergency Planning is responsible for independently verifying that the training required by the plan is accomplished and coordinating training of offsite support personnel (See Section 8.4).

8.3.2 General Employee and Visitor Training

All persons badged to enter the Protected Area unescorted receive as part of Nuclear Power Station General Employee Training (NPSGET), initial and annual training in the following subjects:

- a) general scope of the Surry Power Station Emergency Plan,
- b) reporting an emergency,
- c) emergency alarms and announcements,
- d) response to an emergency,
- e) personnel accountability,
- f) site evacuation,
- g) visitor control during an emergency, and
- h) basic principles of radiological safety.

Questions on the SEP shall be included in the NPSGET examination. Certain visitors to the station shall, when the nature of their work makes it necessary, receive appropriate training in some or all of the above subjects as determined in accordance with station administrative procedures.

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8.3.3 Emergency Response Personnel Training

Personnel designated by their supervisors to fill interim, primary or alternate positions in the station emergency response organization shall receive, in a timely manner, training necessary to prepare them to perform their functions during an emergency. This training shall include an overview of the SEP with emphasis on emergency organization and emergency response facilities. Table 8.1 lists which classes are required for designated personnel and includes class descriptions

8.3.4 Conduct of Practical Training Sessions

Practical training sessions are intended to demonstrate to emergency response personnel the proper EPIP response and to provide a training opportunity which will allow emergency responders to perform assigned tasks. Correction of inappropriate performance shall be made as soon as it occurs and a demonstration of the proper performance given by the instructor.

Whenever practical, drills and other exercises not required by this plan, including table top exercises, shall be evaluated using the criteria described in Section 8.3.5. Successful participation in such events is intended to satisfy those training requirements best taught during a practical training session.

8.3.5 Examinations

Emergency response personnel shall be evaluated following training to verify training effectiveness and trainee comprehension. A written examination or performance checklist will be administered following a period of instruction. The examination may consist of

essay questions and/or multiple choice questions. A minimum score of 70% shall be considered passing. Trainee comprehension and competence can also be evaluated using a performance checklist. The checklist shall be derived from appropriate lesson plans or appropriate EPIPs may be used. Failure to satisfactorily perform any one of the key functions on the checklist or properly complete an EPIP will constitute failure.

Equivalency credit may be awarded to an individual who has demonstrated a full understanding of class contents (e.g., for an individual who has conducted the class, who has developed the lesson plan or quiz/examination for the class, or who has significantly contributed to the development of drills/exercises in the functional area related to the class). Award of equivalency credit requires approval by the Superintendent Nuclear Training and Station Manager.

Members of the Fire Brigade and First Aid Team receive an emergency plan overview as part of General Employee Training. In addition, they receive specialized instruction in fire fighting, search and rescue, and first aid treatment as required by their respective governing documents, as appropriate. Class N (see Table 8.1) is provided to Fire Brigade and First Aid Team members to orient them with those topics not covered elsewhere. The nature of this orientation is such that a formal evaluation is not appropriate.

8.3.6 Training Records

The Superintendent Nuclear Training is responsible for ensuring that the required records of emergency plan training are maintained. These records shall be filed in the Surry Power Station Training Records Vault.

The required emergency plan training records shall include:

- a) an attendance record for each classroom and practical training session showing the subjects taught, the date of the session, the instructor's name, the attendee's names, and the attendee's examination score for written examination and/or pass/fail score for a practical demonstration (not applicable for Class N); and
- b) a master copy of each written examination administered and each checklist used (not applicable for Class N).

8.4 TRAINING OF OFFSITE SUPPORT PERSONNEL

The various offsite organizations which could support the station during an emergency receive training as part of their own emergency preparedness programs. For example, Virginia Power corporate personnel receive emergency preparedness training as part of the Corporate Emergency Response Plan, and the State and local governments conduct training for their personnel as part of their radiological emergency response plans. However, in order to promote effective emergency response capability, the station offers site specific emergency response training on an annual basis to the following emergency support organizations:

Surry Volunteer Fire Department
Smithfield Volunteer Fire Department
Surry Volunteer Rescue Squad
Isle of Wight Volunteer Rescue Squad
Surry County Sheriff

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Isle of Wight County Sheriff
York County Sheriff
James City County Police Department
Williamsburg Police Department
Newport News Police Department
Virginia Department of State Police

Training shall consist of:

- a) the basic scope of the Surry Power Station Emergency Plan,
- b) emergency classifications;
- c) notification methods;
- d) basic radiation protection
- e) station access procedures;
- f) the individual, by title, in the station emergency response organization who will direct their activities onsite; and
- g) expected roles

The Coordinator-Emergency Planning is responsible for offering this training and coordinating it with the Loss Prevention Coordinator, Safety Coordinator, or Supervisor Security as appropriate.

The Coordinator-Emergency Planning shall ensure that the following are maintained and filed in Training Records:

- a) copies of the letters offering the training, and
- b) an attendance record showing the subjects taught, the name and organization of each attendee, and the date of the training session.

The training required for non-licensee augmentation personnel, contacted under provisions of Section 5.3 of the Emergency Plan, will be administered per the requirements of paragraph 4.4.4, SUADM-TR-01, Qualification and Training.

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8.5 EMERGENCY DRILLS

As a part of maintaining emergency preparedness, periodic drills shall be conducted. The primary objectives of drills are to:

- a) verify that alarms, safety devices, and communications systems function as required;
- b) demonstrate the adequacy of station procedures used during an emergency;
- c) familiarize station emergency response personnel with planned emergency response actions; and
- d) disclose any deficiencies in emergency planning that may require corrective action.

A list of required drills and their frequency is shown in Table 8.2. A maximum allowable variance not to exceed 25% may be applied to the frequency interval.

A drill may be held in conjunction with another drill or conducted as part of an exercise. Objectives for drills held in conjunction with exercises shall be included within the overall scope and objectives of the annual exercise. Drill scenario and narratives will be incorporated into the emergency exercise package. It is not required that all emergency response personnel with a particular emergency function participate in a drill covering that function. Drills shall be supervised by an individual qualified to conduct and evaluate the drill.

Scenarios will be developed prior to each drill. The scenario should allow free play for decision making and shall include:

- a) the objectives of the drill;
- b) appropriate evaluation criteria;

- c) the date and time period of the drill;
- d) the participating personnel or organization;
- e) a detailed narrative description of the real and simulated events including such things as simulated casualties, offsite assistance, rescue of personnel, simulated activity levels, and deployment of monitoring teams, as appropriate;
- f) a time schedule of the real and simulated events; and
- g) provision for qualified drill controllers and observers.

Critique sheets will be developed and provided to observers to document their evaluation of the drill. Observers will list names of drill participants on these critique sheets. Corrective actions identified as a result of the drill evaluation will be entered into the Commitment Tracking System.

Participation by offsite organizations may be simulated.

The person responsible for conducting the drill will ensure that the drill is properly documented. The following records of each drill will be maintained in Station Records:

- a) the drill scenario package, and
- b) the post drill critique.

Records of drills held in conjunction with an exercise may be integrated into the exercise package (i.e., scope, objectives, and critique).

8.5.1 Communications Drills

The communications drills shall include:

- a) use of emergency communications systems between the Control Room, the TSC, the LEOF, the OSC, the NRC Operations Center, the State EOC, local EOCs, and the Onsite and Offsite Monitoring Teams; and

- b) sending, receiving, and understanding the content of messages.

8.5.2 Fire Drills

Fire drills are conducted in accordance with the requirements of the Surry Power Station Fire Protection Program, which meets the requirements of 10CFR50, Appendix R, Section III.I, Fire Brigade Training.

8.5.3 Medical Emergency Drills

The medical emergency drills shall include:

- a) a simulated contaminated, injured individual;
- b) participation by a local rescue squad;
- c) transport to an offsite medical facility; and
- d) participation by the offsite medical facility.

8.5.4 Environmental Monitoring Drills

The environmental monitoring drills shall include:

- a) collection of water, vegetation, soil, and air samples from onsite and offsite locations;
- b) analysis of the above samples;
- c) communications with the monitoring teams; and
- d) use of appropriate procedures for collecting and analyzing samples

8.5.5 Post-Accident Sampling Drills

The post-accident sampling drills shall include:

- a) sampling of liquids with actual elevated activity levels using the post-accident sampling system;
- b) analysis of the above samples; and

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- c) use of appropriate procedures for collecting and analyzing samples.

8.5.6 Radiological Monitoring Drills

The radiological monitoring drills shall include:

- a) response to simulated elevated airborne and/or liquid activity levels, as appropriate;
- b) response to simulated elevated area radiation levels;
- c) analysis of the simulated radiological situation; and
- d) use of appropriate procedures for evaluating the simulated radiological situation.

8.6 EMERGENCY EXERCISES

An emergency exercise shall be conducted at least once per calendar year.

The primary objectives of an emergency exercise are to:

- a) verify the integrated capability of the various emergency response organizations to respond to an emergency;
- b) test a major portion of the basic elements existing within the emergency response plans and organizations;
- c) demonstrate the adequacy of procedures used during an emergency;
- d) familiarize emergency response personnel with planned emergency response actions; and
- e) disclose any deficiencies in emergency planning that may require corrective action.

Emergency exercises shall be of two types: full scale exercises and small scale exercises. Full scale exercises are joint exercises which test as many elements of the State, local and station plans as are reasonably achievable without mandatory public participation. Small scale exercises

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test the adequacy of the communications links, verify that response agencies understand emergency action levels, and test at least one other major component of the offsite emergency response plans, such as offsite medical support, offsite fire assistance, offsite monitoring, or offsite law enforcement assistance.

8.6.1 Scheduling of Emergency Exercises

An emergency exercise shall be conducted at Surry Power Station at least once per calendar year. On odd numbered years, the Surry exercise shall be a full scale exercise, with a small scale exercise being held on even numbered years. (Full scale exercises are held at North Anna Power Station on even numbered years).

Emergency exercises should be scheduled to be held at different times of the year, and to begin on both weekends and weekdays. During a 6 year period, at least one exercise should begin between midnight and 6:00 a.m. and at least one exercise should begin between 6:00 p.m. and midnight. Some exercises should be unannounced.

8.6.2 Emergency Exercise Content

The content of exercises shall be varied from year to year, so that all major elements of the State, local, and station plans are tested within a 5 year period.

Full scale exercises shall include:

- a) an emergency classification of at least Site Area Emergency;
- b) a mobilization of as many elements of the State, local, and station plans as is reasonably achievable without mandatory public participation; and

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- c) involvement of federal emergency response agencies at least once every 5 years.

Small scale exercises shall include:

- a) an emergency classification of at least Alert;
- b) use of the communications links; and
- c) activation of at least one offsite emergency response plan action.

8.6.3 Emergency Exercise Scenarios

Each emergency exercise shall be based on a preplanned, written scenario. The scenario may be developed by the NRC. If the scenario is not provided by the NRC, the Coordinator-Emergency Planning shall ensure its development and shall provide it to the Supervisor Emergency Planning for review.

Each emergency exercise scenario shall include:

- a) the basic performance objectives of the exercise;
- b) the evaluation criteria used to verify that performance objectives are met;
- c) the date, initiation time, and duration of the exercise;
- d) the participating organizations;
- e) the simulated events;
- f) a time schedule of the real and simulated initiating events;
- g) a narrative summary describing such items as simulated casualties, offsite assistance, rescue of personnel, use of protective equipment, simulated activity and radiation levels, and deployment of monitoring teams;

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- h) a description of the number, location, and duties of the exercise controllers and observers; and
 - i) a description of the arrangements made for and advance materials to be provided to the observers.

Advance knowledge of the scenario shall be held to a minimum to ensure realistic participation by those involved.

8.6.4 Conduct of Emergency Exercises

The emergency exercise will be initiated and supervised by controllers. These controllers shall ensure that:

- a) the information supplied to the participants is of sufficient detail to allow realistic analysis of the simulated events and to provide a basis for rational decision making;
- b) the information is supplied on a real time basis; and
- c) the exercise is not so structured as to prevent free play and independent decision making on the part of the participants.

8.6.5 Emergency Exercise Evaluation and Corrective Action

Emergency exercises shall be evaluated by qualified observers. Observers shall be selected based on expertise, knowledge of the areas to be evaluated, and familiarity with emergency response requirements. Observers may include offsite personnel from Federal, State, and/or local governments.

Specific areas which shall be evaluated when applicable are:

- a) condition recognition;
- b) assessment and classification;
- c) notification;
- d) initiation of onsite protective actions;

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- e) recommendation of offsite protective actions;
- f) callout of emergency response personnel;
- g) emergency response facility activation and operation;
- h) use of communications systems;
- i) coordination with offsite agencies;
- j) corrective actions;
- k) record keeping;
- l) use of procedures;
- m) radiological monitoring and sampling; and
- n) site evacuation.

Critiques will be held as soon as possible after the exercise. Critiques should be attended by exercise controllers, observers, and key participants. Notes of critique comments shall be recorded.

Observers shall complete critique sheets documenting their observations. Critique sheets shall be submitted to the Coordinator-Emergency Planning in accordance with the schedule established for the exercise.

The Coordinator-Emergency Planning shall submit a Post-Exercise Critique, based on comments and critique notes, and including suggested corrective actions, to the Assistant Station Manager (NS&L). The Post-Exercise Critique will be forwarded to the Station Manager within 60 days following the exercise. The Station Manager shall review the report, determine the required corrective actions, and ensure they are placed in the Commitment Tracking System.

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8.6.6 Records of Emergency Exercises

The Coordinator Emergency Planning shall ensure that the following records are filed in Station Records:

- a) the exercise scenario package, and
- b) the post exercise critique.

8.7. TESTING AND MAINTENANCE OF EMERGENCY EQUIPMENT

Emergency equipment shall be periodically tested to identify and correct deficiencies. The testing shall include:

- a) a monthly inventory of emergency kits;
- b) a monthly inventory and operational check of dedicated emergency survey instrumentation;
- c) a monthly inspection and operational check of self-contained breathing apparatus;
- d) a semi-annual calibration of dedicated emergency survey instrumentation;
- e) a monthly operational check of communications with the State and local governments;
- f) a monthly operational check of communications with the NRC.

Testing following use of equipment during an emergency shall include:

- a) an inventory of emergency kits;
- b) an inventory and operational check of dedicated emergency survey instrumentation;
- c) an inspection and operational check of self-contained breathing apparatus.

Details of these tests and the responsibility for performing them are given below.

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8.7.1 Testing of Emergency Kits

The contents of the emergency kits dedicated for emergency use shall be inventoried monthly and following their use during an emergency. These tests shall be documented and the documentation filed in Station Records. The Coordinator-Emergency Planning shall ensure these tests are conducted and documented.

8.7.2 Testing of Emergency Survey Instrumentation

Dedicated emergency survey instrumentation shall be inventoried and operationally checked monthly and following any emergency requiring their use. They shall be calibrated semi-annually. These tests shall be documented and the documentation filed in Station Records. The Coordinator-Emergency Planning shall ensure these tests are conducted and documented.

8.7.3 Testing of Respiratory Equipment

Self-contained breathing apparatus shall be inspected and operationally checked monthly and following use during an emergency. These tests shall be documented and the documentation filed in Station Records. The Superintendent Health Physics shall ensure these tests are conducted and documented.

8.7.4 Testing of Communications Equipment

All State and local ringdown loop (Insta-phone) extensions and the ringdown phone to the State EOC located at the station and LEOF shall be operationally checked on a monthly basis. In addition, all NRC Emergency Notification System ringdown extensions and NRC Health Physics Network extensions located at the station and LEOF, with the exception of NRC Resident Inspector's extensions, shall be operationally checked monthly.

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These tests shall be documented and the documentation filed in Station Records. The Coordinator-Emergency Planning shall ensure these tests are conducted and documented.

8.8 INFORMING THE PUBLIC

The public shall be informed at least annually of how they will be notified and what their actions should be in an emergency. The information provided to the public shall include:

- a) educational information on radiation;
- b) contact points for additional information;
- c) special needs of the handicapped;
- d) initial actions following Early Warning System activation;
- e) protective actions, such as sheltering or evacuation; and
- f) evacuation routes.

The Company will coordinate its efforts with State and local authorities to ensure the public is informed by using the best means available.

These means may include:

- a) information in telephone books;
- b) utility bill inserts;
- c) newspaper ads, and
- d) posting in public areas.

The information will be distributed to ensure coverage within the 10 mile emergency planning zone. The Company shall also establish a telephone system for dealing with rumors. The numbers of the telephone will be announced over the Emergency Broadcast System and individuals within the 10 mile emergency planning zone will be invited to call collect.

The Supervisor Emergency Planning shall ensure that the public and the media are informed annually to acquaint them with:

- a) emergency plans;
- b) information concerning radiation; and
- c) points of contact for release of public information in an emergency.

8.9 INDEPENDENT REVIEW OF THE EMERGENCY PREPAREDNESS PROGRAM

An independent review of the emergency preparedness program shall be conducted at least every 12 months in accordance with 10CFR50.54(t). This review shall include:

- a) the Surry Power Station Emergency Plan and its implementing procedures;
- b) emergency plan training;
- c) emergency drills;
- d) emergency exercises;
- e) emergency equipment;
- f) interfaces with State and local governments; and
- g) required records and documentation.

This review shall be conducted by an organization which has no direct responsibility for emergency preparedness, such as the Quality Assurance Department through audits, and emergency exercise surveillance and participation. Consultants may be used if they possess the necessary expertise.

The results of the review and recommendation for improvements shall be documented and reported to appropriate company management. The part of the review involving the evaluation for adequacy of interface with State

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and local governments shall be available to the appropriate State and local governments. The recommendations for improvement shall be answered and corrective actions implemented, as soon as possible. The following records shall be filed in Station Records and maintained for 5 years:

- a) the review results and recommended improvements;
- b) the answers to recommended improvements, and
- c) a description of the corrective actions taken.

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TABLE 8.1

EMERGENCY PREPAREDNESS TRAINING

EMERGENCY RESPONSE POSITION	CLASS
Station Emergency Manager	A, B
Emergency Communicator	A, C, O
Emergency Procedures Coordinator	A, B
Emergency Operations Director	A, B
Emergency Maintenance Director	A, D
Emergency Technical Director	A, M
Emergency Administrative Director	A, E, F
Radiological Assessment Director	A, H, I, J
Radiation Protection Supervisor	A, H, J
Operational Support Center Director	A, D
Maintenance Support Team	A, D
Technical Support Team	
- Team Leader	A, M, O
- Elect/Mech/Reactor Engineers	A, M, O
- Shift Technical Advisor	A, B, O
Chemistry Team	A, L
Administrative Support Team	
- Team Leader	A, E, G
- Clerical Personnel	A, E
- Loss Prevention/Safety Personnel	A, N
- Quality Assurance Personnel	A, D
Security Team	A, G
Dose Assessment Team	A, H, I
Sample Analysis and Monitoring Teams	A, K
Fire Team	A, N
First Aid Team	A, N
Damage Control Team	A, D
Search and Rescue Team	A, N

Class A: Emergency Plan Overview

The training will emphasize the subject matter required of all emergency response personnel: Emergency organization, emergency classification system, personnel accountability, emergency exposure limits, offsite support group capabilities, emergency response facilities, security access control and evacuation requirements, potential emergency radiological conditions, and exposure control techniques.

Class B: Emergency Management

The training will emphasize: Assessing emergencies, classifying emergencies, capabilities of the Emergency Response Facility Computer System, notifications and reports to offsite authorities, emergency organization, communications systems, emergency telephone directory, contaminated injured personnel actions, search and rescue operations, site evacuation, emergency radiation exposure authorization and recovery.

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Class C: Emergency Communicator

The training will emphasize: Notifications and reports to offsite authorities, communications systems, and emergency telephone directory.

Class D: Damage Control

The training will emphasize: Emergency Plan and Damage Control Team organization, Operational Support Center activation, communications systems, and emergency radiation exposure authorization.

Class E: Technical Support Center Administration

The training will emphasize the activation and administration of the Technical Support Center.

Class F: Administration of Site Evacuation

The training will emphasize site evacuation procedures.

Class G: Security

The training will emphasize: Notification of station personnel, LEOF activation, personnel accountability/evacuation, and station access control during an emergency.

Class H: Dose Assessment

The training will emphasize: Emergency Health Physics organization and dose assessment calculations.

Class I: RAD-MET

The training will emphasize the use of the Emergency Response Facility Computer System Radiological-Meteorological Model.

Class J: Radiation Protection

The training will emphasize: Radiological Assessment Director Controlling Procedure, Radiation Protection Supervisor Controlling Procedure, emergency exposure evaluation and protective measures.

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Class K: Radiological Monitoring

The training will emphasize: Respiratory protection, personnel decontamination, implant monitoring, offsite monitoring, monitoring of emergency centers and remote assembly areas, contaminated injuries, and radio communications.

Class L: Chemistry

The training will emphasize: Post accident sampling of containment air, post accident sampling of reactor coolant, and air and high level activity sample analysis.

Class M: Technical Support

This training will emphasize: Organizational interfaces and responsibilities, and communications systems.

Class N: Fire, First Aid, and Search and Rescue Team Training

This training will emphasize: Organizational interfaces, search and rescue procedures, and communications systems.

Class O: Emergency Response Facility Computer System (ERFCS)

The training will emphasize: Use of the Safety Parameter Display System (SPDS) and the Piping and Instrument Diagrams (P&ID).

NOTES:

The Security Department is responsible for the conduct of Class G and ensuring that documentation is properly maintained.

The Loss Prevention Department and the Safety Department are responsible for documenting the conduct of Class N for the Fire Team and the First Aid Team, respectively.

Fire Team members shall also receive Fire Brigade training as required by the Surry Power Station Fire Protection Program, which meets the requirements of 10CFR50, Appendix R.

First Aid Team members shall also receive training as required by SUADM-ADM-15, First Aid Treatment, which meets the requirements of the Accident Prevention Manual.

The training requirements outlined above were instituted by the 7-30-87 revision of this Plan. Implementation of the revised requirements are being phased in over a twelve month period. Emergency response personnel trained to the previous standard remain qualified until their qualification expires or July 31, 1988, whichever occurs first.

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TABLE 8.2

REQUIRED DRILLS, DRILL FREQUENCY, AND RESPONSIBILITY

<u>DRILL TYPE</u>	<u>FREQUENCY</u>	<u>RESPONSIBILITY</u>
Communications	Once per 366 days	Coordinator-Emergency Planning
Fire	In accordance with Surry Fire Protection Program (quarterly)	Loss Prevention Coordinator
Medical Emergency	Once per 366 days	Coordinator-Emergency Planning
Environmental Monitoring	Once per 366 days	Superintendent Health Physics
Post-Accident Sampling	Once per 366 days	Superintendent Health Physics and Supervisor Chemistry
Radiological Monitoring	One per 184 days	Superintendent Health Physics

SURRY POWER STATION
EMERGENCY PLAN

SECTION 8

MAINTAINING EMERGENCY PREPAREDNESS

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8.0 MAINTAINING EMERGENCY PREPAREDNESS

Emergency preparedness is maintained by designated individuals who have responsibility for developing, maintaining and coordinating Virginia Power's capability for responding to emergencies. The emergency plans and associated implementing procedures contain the guidance necessary to accomplish that task. These procedures and related documents are revised as required and reviewed at least annually. Personnel who may be required to fill emergency response positions receive initial and annual training in their functional responsibilities. Training is also provided to various offsite groups that have agreed to support station personnel during an emergency. Emergency equipment to support these personnel is kept operational by a Periodic Testing maintenance program. Periodic drills and an annual exercise are conducted to identify strengths and weaknesses in the emergency preparedness of Virginia Power. To further ensure that emergency response capability is provided and maintained, the public is informed of notification methods and guidelines used to protect their health and safety in an emergency, and independent reviews of the total emergency preparedness program are conducted.

8.1 RESPONSIBILITIES FOR MAINTAINING EMERGENCY PREPAREDNESS

The Vice President Nuclear Operations has been assigned the overall authority and responsibility for maintaining emergency preparedness. He has delegated this responsibility to the Manager Nuclear Programs and Licensing and the Station Manager. The Manager Nuclear Programs and Licensing has delegated the responsibility for corporate emergency preparedness to the Supervisor Emergency Planning. These responsibilities include:

- a) coordinating the Company emergency preparedness program with offsite emergency response organizations;
- b) coordinating Company emergency preparedness planning activities;
- c) conducting public information and media information activities;
- d) coordinating emergency exercises between Company departments and offsite agencies;
- e) coordinating emergency preparedness program reviews;
- f) coordinating emergency preparedness activities between the stations and other Company departments;
- g) providing support to the stations in the area of emergency preparedness;
- h) obtaining letters of agreement from appropriate offsite emergency response organizations; and
- i) coordinating the annual review of Emergency Action Levels with state and local governmental officials.

The Station Manager has designated the Assistant Station Manager, Nuclear Safety and Licensing (NS&L), with the responsibility for station emergency preparedness. These responsibilities have been delegated to the Coordinator-Emergency Planning. These responsibilities include:

- a) coordinating the station emergency preparedness program with offsite agencies;
- b) coordinating station emergency preparedness planning activities;
- c) performing the annual review of the emergency plan and its implementing procedures;
- d) maintaining the Surry Power Station Emergency Plan.

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- e) verifying distribution of copies of the Surry Power Station Emergency Plan and EIPs to persons or organizations with responsibility for implementation of the plan or procedures;
- f) coordinating emergency preparedness training and verifying that it is performed as required;
- g) verifying that required testing and maintenance of emergency equipment is performed;
- h) coordinating drills and exercises and verifying that they are conducted as required; and
- i) verifying that required emergency preparedness records are maintained and filed.

8.2 MAINTENANCE OF THE EMERGENCY PLAN, EMERGENCY PLAN IMPLEMENTING PROCEDURES, EMERGENCY PERSONNEL NOTIFICATION LIST, AND EMERGENCY RESPONSE PERSONNEL ROSTER

Station documents that are required to ensure emergency preparedness include the Surry Emergency Plan (SEP) and the Emergency Plan Implementing Procedures (EIPs). The Coordinator-Emergency Planning shall review design changes and initiate appropriate revisions to the EIPs and SEP when appropriate.

8.2.1 Review of the Emergency Plan and Emergency Plan Implementing Procedures

The Coordinator-Emergency Planning shall review the SEP and its implementing procedures at least every 12 months and certify that they are adequate and current. The results of this review shall be reported to the Station Nuclear Safety and Operating Committee (SNSOC) and the documentation filed in Station Records. The SNSOC

shall review proposed revisions to these documents and recommend action to the Station Manager who is responsible for their approval. If a proposed revision is judged to decrease the effectiveness of these documents with respect to 10CFR50.47(b) or 10CFR50, Appendix E, it shall be submitted to the NRC for approval in accordance with the requirements of 10CFR50.54(q) prior to implementation. Revisions to these documents shall be dated and marks will be placed on the affected pages to indicate where changes are made.

8.2.2 Review of the Emergency Personnel Notification List and Emergency Response Personnel Roster

The Coordinator-Emergency Planning shall review Emergency Personnel Notification List in the Emergency Telephone Directory and the Emergency Response Personnel Roster at least quarterly for accuracy and shall ensure that required revisions are made. Documentation of this review shall be filed in Station Records.

8.2.3 Distribution of Emergency Plans and Implementing Procedures.

In accordance with 10CFR50, Appendix E, copies of plan and implementing procedure revisions shall be submitted to the NRC within 30 days after approval. The Coordinator-Emergency Planning shall ensure that revisions to the SEP are distributed to those offsite agencies that require them in order to perform their emergency response functions.

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8.3 TRAINING OF STATION PERSONNEL

Emergency preparedness of station personnel is maintained through an integrated training program that includes general orientation for all persons badged at the station and detailed training for persons with emergency response functions during an emergency where appropriate to supplement the general orientation and normal job related training.

The primary objectives of this training program are to:

- a) familiarize emergency response personnel with the SEP and its implementing procedures,
- b) inform emergency response personnel of their functional responsibilities during an emergency; and
- c) ensure emergency response personnel maintain familiarity with the SEP and its implementing procedures and their functional responsibilities during an emergency.

8.3.1 Responsibilities for Maintaining Emergency Preparedness Training

The responsibilities for ensuring adequate emergency preparedness training is provided are as follows:

- a) The Station Manager is responsible for ensuring station personnel are adequately trained in accordance with this plan.
- b) Department superintendents and supervisors are responsible for ensuring their personnel receive adequate training. This includes designating individuals who may serve as primary, interim or alternate emergency response personnel and ensuring they successfully complete the training specified in this plan.

- c) The Superintendent Nuclear Training is responsible for developing and scheduling training programs that meet the requirements of this plan, assisting in the development of training programs for offsite support personnel, and for maintaining records to document training conducted.
- d) The Coordinator-Emergency Planning is responsible for independently verifying that the training required by the plan is accomplished and coordinating training of offsite support personnel (See Section 8.4).

8.3.2 General Employee and Visitor Training

All persons badged to enter the Protected Area unescorted receive as part of Nuclear Power Station General Employee Training (NPSGET), initial and annual training in the following subjects:

- a) general scope of the Surry Power Station Emergency Plan,
- b) reporting an emergency,
- c) emergency alarms and announcements,
- d) response to an emergency,
- e) personnel accountability,
- f) site evacuation,
- g) visitor control during an emergency, and
- h) basic principles of radiological safety.

Questions on the SEP shall be included in the NPSGET examination. Certain visitors to the station shall, when the nature of their work makes it necessary, receive appropriate training in some or all of the above subjects as determined in accordance with station administrative procedures.

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8.3.3 Emergency Response Personnel Training

Personnel designated by their supervisors to fill interim, primary or alternate positions in the station emergency response organization shall receive, in a timely manner, training necessary to prepare them to perform their functions during an emergency. This training shall include an overview of the SEP with emphasis on emergency organization, emergency response facilities, and emergency action levels. Table 8.1 lists which classes are required for designated personnel and includes class descriptions.

8.3.4 Conduct of Practical Training Sessions

Practical training sessions are intended to demonstrate to emergency response personnel the proper EPIP response and to provide a training opportunity which will allow emergency responders to perform assigned tasks. Correction of inappropriate performance shall be made as soon as it occurs and a demonstration of the proper performance given by the instructor.

Whenever practical, drills and other exercises not required by this plan, including table top exercises, shall be evaluated using the criteria described in Section 8.3.5. Successful participation in such events is intended to satisfy those training requirements best taught during a practical training session.

8.3.5 Examinations

Emergency response personnel shall be evaluated following training to verify training effectiveness and trainee comprehension. A written examination or performance-based checklist will be administered following a period of instruction. The examination

may consist of essay questions and/or multiple choice questions. A minimum score of 70% shall be considered passing. Trainee comprehension and competence can also be evaluated using a performance-based checklist. The checklist shall be derived from appropriate lesson plans or appropriate EPIPs may be used. Failure to satisfactorily perform any one of the key functions on the checklist or properly complete an EPIP will constitute failure. Equivalency credit may be awarded to an individual who has demonstrated a full understanding of class contents (e.g., for an individual who has conducted the class, who has developed the lesson plan or quiz/examination for the class, or who has significantly contributed to the development of drills/exercises in the functional area related to the class). Award of equivalency credit requires approval by the Superintendent Nuclear Training and Station Manager.

8.3.6 Training Records

The Superintendent Nuclear Training is responsible for ensuring that the required records of emergency plan training are maintained. These records shall be filed in the Surry Power Station Training Records Vault.

The required emergency plan training records shall include:

- a) an attendance record for each classroom and practical training session showing the subjects taught, the date of the session, the instructor's name, the attendee's names, and the attendee's examination score for written examination and/or pass/fail score for a practical demonstration; and

- b) a master copy of each written examination administered and each checklist used.

8.4 TRAINING OF OFFSITE SUPPORT PERSONNEL

The various offsite organizations which could support the station during an emergency receive training as part of their own emergency preparedness programs. For example, Virginia Power corporate personnel receive emergency preparedness training as part of the Corporate Emergency Response Plan, and the State and local governments conduct training for their personnel as part of their radiological emergency response plans. However, in order to promote effective emergency response capability, the station offers site specific emergency response training on an annual basis to the following emergency support organizations:

- a) Surry Volunteer Fire Department
- b) Smithfield Volunteer Fire Department
- c) Surry Volunteer Rescue Squad
- d) Isle of Wight Volunteer Rescue Squad
- e) Surry County Sheriff
- f) Isle of Wight County Sheriff
- g) York County Sheriff
- h) James City County Police Department
- i) Williamsburg Police Department
- j) Newport News Police Department
- k) Virginia Department of State Police

Training shall consist of:

- a) the basic scope of the Surry Power Station Emergency Plan,

- b) emergency classifications;
- c) notification methods;
- d) basic radiation protection
- e) station access procedures;
- f) the individual, by title, in the station emergency response organization who will direct their activities onsite; and
- g) expected roles

The Coordinator-Emergency Planning is responsible for offering this training and coordinating it with the Loss Prevention Coordinator, Safety Coordinator, or Supervisor Security as appropriate.

The Coordinator-Emergency Planning shall ensure that the following are maintained and filed in Training Records:

- a) copies of the letters offering the training, and
- b) an attendance record showing the subjects taught, the name and organization of each attendee, and the date of the training session.

The training required for non-licensee augmentation personnel, contacted under provisions of Section 5.3 of the Emergency Plan, will be administered per the requirements of paragraph 4.4.4, SUADM-TR-01, Qualification and Training.

8.5 EMERGENCY DRILLS

As a part of maintaining emergency preparedness, periodic drills shall be conducted. The primary objectives of drills are to:

- a) verify that alarms, safety devices, and communications systems function as required;
- b) demonstrate the adequacy of station procedures used during an emergency.
- c) familiarize station emergency response personnel with planned emergency response actions; and
- d) disclose any deficiencies in emergency planning that may require corrective action.

A list of required drills and their frequency is shown in Table 8.2. A maximum allowable variance not to exceed 25% may be applied to the frequency interval.

A drill may be held in conjunction with another drill or conducted as part of an exercise. Objectives for drills held in conjunction with exercises shall be included within the overall scope and objectives of the annual exercise. Drill scenario and narratives will be incorporated into the emergency exercise package. It is not required that all emergency response personnel with a particular emergency function participate in a drill covering that function. Drills shall be and supervised by an individual qualified to conduct and evaluate the drill.

Scenarios will be developed prior to each drill. The scenario should allow free play for decision making and shall include:

- a) the objectives of the drill;
- b) appropriate evaluation criteria;

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- c) the date and time period of the drill;
- d) the participating personnel or organization;
- e) a detailed narrative description of the real and simulated events including such things as simulated casualties, offsite assistance, rescue of personnel, simulated activity levels, and deployment of monitoring teams, as appropriate;
- f) a time schedule of the real and simulated events; and
- g) provision for qualified drill controllers and observers.

Critique sheets will be developed and provided to observers to document their evaluation of the drill. Observers will list names of drill participants on these critique sheets. Corrective actions identified as a result of the drill evaluation will be entered into the Commitment Tracking System.

Participation by offsite organizations may be simulated.

The person responsible for conducting the drill will ensure that the drill is properly documented. The following records of each drill will be maintained in Station Records:

- a) the drill scenario package, and
- b) the post drill critique.

Records of drills held in conjunction with an exercise may be integrated into the exercise package (i.e., scope, objectives, and critique).

8.5.1 Communications Drills

The communications drills shall include:

- a) use of emergency communications systems between the Control Room, the TSC, the LEOF, the OSC, the NRC Operations Center, the State EOC, local EOCs, and the Onsite and Offsite Monitoring Teams; and

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- b) sending, receiving, and understanding the content of messages.

8.5.2 Fire Drills

Fire drills are conducted in accordance with the requirements of the Surry Power Station Fire Protection Program, which meets the requirements of 10CFR50, Appendix R, Section III.I, Fire Brigade Training.

8.5.3 Medical Emergency Drills

The medical emergency drills shall include:

- a) a simulated contaminated, injured individual;
- b) participation by a local rescue squad;
- c) transport to an offsite medical facility; and
- d) participation by the offsite medical facility.

8.5.4 Environmental Monitoring Drills

The environmental monitoring drills shall include:

- a) collection of water, vegetation, soil, and air samples from onsite and offsite locations;
- b) analysis of the above samples;
- c) communications with the monitoring teams; and
- d) use of appropriate procedures for collecting and analyzing samples

8.5.5 Post-Accident Sampling Drills

The post-accident sampling drills shall include:

- a) sampling of liquids with actual elevated activity levels using the post-accident sampling system;
- b) analysis of the above samples; and

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- c) use of appropriate procedures for collecting and analyzing samples.

8.5.6 Radiological Monitoring Drills

The radiological monitoring drills shall include:

- a) response to simulated elevated airborne and/or liquid activity levels, as appropriate;
- b) response to simulated elevated area radiation levels;
- c) analysis of the simulated radiological situation; and
- d) use of appropriate procedures for evaluating the simulated radiological situation.

8.6 EMERGENCY EXERCISES

An emergency exercise shall be conducted at least once per calendar year.

The primary objectives of an emergency exercise are to:

- a) verify the integrated capability of the various emergency response organizations to respond to an emergency;
- b) test a major portion of the basic elements existing within the emergency response plans and organizations;
- c) demonstrate the adequacy of procedures used during an emergency;
- d) familiarize emergency response personnel with planned emergency response actions; and
- e) disclose any deficiencies in emergency planning that may require corrective action.

Emergency exercises shall be of two types: full scale exercises and small scale exercises. Full scale exercises are joint exercises which test as many elements of the State, local and station plans as are reasonably achievable without mandatory public participation. Small scale exercises

test the adequacy of the communications links, verify that response agencies understand emergency action levels, and test at least one other major component of the offsite emergency response plans, such as offsite medical support, offsite fire assistance, offsite monitoring, or offsite law enforcement assistance.

8.6.1 Scheduling of Emergency Exercises

An emergency exercise shall be conducted at Surry Power Station at least once per calendar year. On odd numbered years, the Surry exercise shall be a full scale exercise, with a small scale exercise being held on even numbered years. (Full scale exercises are held at North Anna Power Station on even numbered years).

Emergency exercises should be scheduled to be held at different times of the year, and to begin on both weekends and weekdays. During a 6 year period, at least one exercise should begin between midnight and 6:00 a.m. and at least one exercise should begin between 6:00 p.m. and midnight. Some exercises should be unannounced.

8.6.2 Emergency Exercise Content

The content of exercises shall be varied from year to year, so that all major elements of the State, local, and station plans are tested within a 5 year period.

Full scale exercises shall include:

- a) an emergency classification of at least Site Area Emergency;
- b) a mobilization of as many elements of the State, local, and station plans as is reasonably achievable without mandatory public participation; and

- c) involvement of federal emergency response agencies at least once every 5 years.

Small scale exercises shall include:

- a) an emergency classification of at least Alert;
- b) use of the communications links; and
- c) activation of at least one offsite emergency response plan action.

8.6.3 Emergency Exercise Scenarios

Each emergency exercise shall be based on a preplanned, written scenario. The scenario may be developed by the NRC. If the scenario is not provided by the NRC, the Coordinator-Emergency Planning shall ensure its development and shall provide it to the Supervisor Emergency Planning for review.

Each emergency exercise scenario shall include:

- a) the basic performance objectives of the exercise;
- b) the evaluation criteria used to verify that performance objectives are met;
- c) the date, initiation time, and duration of the exercise;
- d) the participating organizations;
- e) the simulated events;
- f) a time schedule of the real and simulated initiating events;
- g) a narrative summary describing such items as simulated casualties, offsite assistance, rescue of personnel, use of protective equipment, simulated activity and radiation levels, and deployment of monitoring teams;

- h) a description of the number, location, and duties of the exercise controllers and observers; and
- i) a description of the arrangements made for and advance materials to be provided to the observers.

Advance knowledge of the scenario shall be held to a minimum to ensure realistic participation by those involved.

8.6.4 Conduct of Emergency Exercises

The emergency exercise will be initiated and supervised by controllers. These controllers shall ensure that:

- a) the information supplied to the participants is of sufficient detail to allow realistic analysis of the simulated events and to provide a basis for rational decision making;
- b) the information is supplied on a real time basis; and
- c) the exercise is not so structured as to prevent free play and independent decision making on the part of the participants.

8.6.5 Emergency Exercise Evaluation and Corrective Action

Emergency exercises shall be evaluated by qualified observers. Observers shall be selected based on expertise, knowledge of the areas to be evaluated, and familiarity with emergency response requirements. Observers may include offsite personnel from Federal, State, and/or local governments.

Specific areas which shall be evaluated when applicable are:

- a) condition recognition;
- b) assessment and classification;
- c) notification;
- d) initiation of onsite protective actions;

- e) recommendation of offsite protective actions;
- f) callout of emergency response personnel;
- g) emergency response facility activation and operation;
- h) use of communications systems;
- i) coordination with offsite agencies;
- j) corrective actions;
- k) record keeping;
- l) use of procedures;
- m) radiological monitoring and sampling; and
- n) site evacuation.

Critiques will be held as soon as possible after the exercise. Critiques should be attended by exercise controllers, observers, and key participants. Notes of critique comments shall be recorded.

Observers shall complete critique sheets documenting their observations. Critique sheets shall be submitted to the Coordinator-Emergency Planning in accordance with the schedule established for the exercise.

The Coordinator-Emergency Planning shall submit a Post-Exercise Critique, based on comments and critique notes, and including suggested corrective actions, to the Assistant Station Manager (NS&L). The Post-Exercise Critique will be forwarded to the Station Manager within 60 days following the exercise. The Station Manager shall review the report, determine the required corrective actions, and ensure they are placed in the Commitment Tracking System.

8.6.6 Records of Emergency Exercises

The Coordinator Emergency Planning shall ensure that the following records are filed in Station Records:

- a) the exercise scenario package, and
- b) the post exercise critique.

8.7 TESTING AND MAINTENANCE OF EMERGENCY EQUIPMENT

Emergency equipment shall be periodically tested to identify and correct deficiencies. The testing shall include:

- a) a monthly inventory of emergency kits;
- b) a monthly inventory and operational check of dedicated emergency survey instrumentation;
- c) a monthly inspection and operational check of self-contained breathing apparatus;
- d) a semi-annual calibration of dedicated emergency survey instrumentation;
- e) a monthly operational check of communications with the State and local governments;
- f) a monthly operational check of communications with the NRC.

Testing following use of equipment during an emergency shall include:

- a) an inventory of emergency kits;
- b) an inventory and operational check of dedicated emergency survey instrumentation;
- c) an inspection and operational check of self-contained breathing apparatus.

Details of these tests and the responsibility for performing them are given below.

8.7.1 Testing of Emergency Kits

The contents of the emergency kits dedicated for emergency use shall be inventoried monthly and following their use during an emergency. These tests shall be documented and the documentation filed in Station Records. The Coordinator-Emergency Planning shall ensure these tests are conducted and documented.

8.7.2 Testing of Emergency Survey Instrumentation

Dedicated emergency survey instrumentation shall be inventoried and operationally checked monthly and following any emergency requiring their use. They shall be calibrated semi-annually. These tests shall be documented and the documentation filed in Station Records. The Coordinator-Emergency Planning shall ensure these tests are conducted and documented.

8.7.3 Testing of Respiratory Equipment

Self-contained breathing apparatus shall be inspected and operationally checked monthly and following use during an emergency. These tests shall be documented and the documentation filed in Station Records. The Superintendent Health Physics shall ensure these tests are conducted and documented.

8.7.4 Testing of Communications Equipment

All State and local ringdown loop (Insta-phone) extensions and the ringdown phone to the State EOC located at the station and LEOF shall be operationally checked on a monthly basis. In addition, all NRC Emergency Notification System ringdown extensions and NRC Health Physics Network extensions located at the station and LEOF, with the exception of NRC Resident Inspector's extensions, shall be operationally checked monthly.

These tests shall be documented and the documentation filed in Station Records. The Coordinator-Emergency Planning shall ensure these tests are conducted and documented.

8.8 INFORMING THE PUBLIC

The public shall be informed at least annually of how they will be notified and what their actions should be in an emergency. The information provided to the public shall include:

- a) educational information on radiation;
- b) contact points for additional information;
- c) special needs of the handicapped;
- d) initial actions following Early Warning System activation;
- e) protective actions, such as sheltering or evacuation; and
- f) evacuation routes.

The Company will coordinate its efforts with State and local authorities to ensure the public is informed by using the best means available.

These means may include:

- a) information in telephone books;
- b) utility bill inserts;
- c) newspaper ads, and
- d) posting in public areas.

The information will be distributed to ensure coverage within the 10 mile emergency planning zone. The Company shall also establish a telephone system for dealing with rumors. The numbers of the telephone will be announced over the Emergency Broadcast System and individuals within the 10 mile emergency planning zone will be invited to call collect.

The Supervisor Emergency Planning shall ensure that the public and the media are informed annually to acquaint them with:

- a) emergency plans;
- b) information concerning radiation; and
- c) points of contact for release of public information in an emergency.

8.9 INDEPENDENT REVIEW OF THE EMERGENCY PREPAREDNESS PROGRAM

An independent review of the emergency preparedness program shall be conducted at least annually in accordance with 10CFR50.54(t). This review shall include:

- a) the Surry Power Station Emergency Plan and its implementing procedures;
- b) emergency plan training;
- c) emergency drills;
- d) emergency exercises;
- e) emergency equipment;
- f) interfaces with State and local governments; and
- g) required records and documentation.

This review shall be conducted by an organization which has no direct responsibility for emergency preparedness, such as the Quality Assurance Department through audits, and emergency exercise surveillance and participation. Consultants may be used if they possess the necessary expertise.

The results of the review and recommendation for improvements shall be documented and reported to appropriate company management. The part of the review involving the evaluation for adequacy of interface with State

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and local governments shall be available to the appropriate State and local governments. The recommendations for improvement shall be answered and corrective actions implemented, as soon as possible. The following records shall be filed in Station Records and maintained for 5 years:

- a) the review results and recommended improvements;
- b) the answers to recommended improvements, and
- c) a description of the corrective actions taken.

TABLE 8.1

EMERGENCY PREPAREDNESS TRAINING

EMERGENCY RESPONSE POSITION	CLASS
Station Emergency Manager	A, B
Emergency Communicator	A, C, O
Emergency Procedures Coordinator	A, B
Emergency Operations Director	A, B
Emergency Maintenance Director	A, D
Emergency Technical Director	A, M
Emergency Administrative Director	A, E, F
Radiological Assessment Director	A, H, I, J
Radiation Protection Supervisor	A, H, J
Operational Support Center Director	A, D
Maintenance Support Team	A, D
Technical Support Team	
- Team Leader	A, M, O
- Elect/Mech/Reactor Engineers	A, M, O
- Shift Technical Advisor	A, B, O
Chemistry Team	A, L
Administrative Support Team	
- Team Leader	A, E, G
- Clerical Personnel	A, E
- Loss Prevention/Safety Personnel	A, N
- Quality Assurance Personnel	A, D
Security Team	A, G
Dose Assessment Team	A, H, I
Sample Analysis and Monitoring Teams	A, K
Fire Team	A, N
First Aid Team	A, N
Damage Control Team	A, D
Search and Rescue Team	A, N

Class A: Emergency Plan Overview

The training will emphasize the subject matter required of all emergency response personnel: Emergency organization, emergency classification system, personnel accountability, emergency exposure limits, offsite support group capabilities, emergency response facilities, security access control and evacuation requirements, potential emergency radiological conditions, and exposure control techniques.

Class B: Emergency Management

The training will emphasize: Assessing emergencies, classifying emergencies, capabilities of the Emergency Response Facility Computer System, notifications and reports to offsite authorities, emergency organization, communications systems, emergency telephone directory, contaminated injured personnel actions, search and rescue operations, site evacuation, emergency radiation exposure authorization and recovery.

Class C: Emergency Communicator

The training will emphasize: Notifications and reports to offsite authorities, communications systems, and emergency telephone directory.

Class D: Damage Control

The training will emphasize: Emergency Plan and Damage Control Team organization, Operational Support Center activation, communications systems, and emergency radiation exposure authorization.

Class E: Technical Support Center Administration

The training will emphasize the activation and administration of the Technical Support Center.

Class F: Administration of Site Evacuation

The training will emphasize site evacuation procedures.

Class G: Security

The training will emphasize: Notification of station personnel, LEOF activation, personnel accountability/evacuation, and station access control during an emergency.

Class H: Dose Assessment

The training will emphasize: Emergency Health Physics organization and dose assessment calculations.

Class I: RAD-MET

The training will emphasize the use of the Emergency Response Facility Computer System Radiological-Meteorological Model.

Class J: Radiation Protection

The training will emphasize: Radiological Assessment Director Controlling Procedure, Radiation Protection Supervisor Controlling Procedure, emergency exposure evaluation and protective measures.

Class K: Radiological Monitoring

The training will emphasize: Respiratory protection, personnel decontamination, implant monitoring, offsite monitoring, monitoring of emergency centers and remote assembly areas, contaminated injuries, and radio communications.

Class L: Chemistry

The training will emphasize: Post accident sampling of containment air, post accident sampling of reactor coolant, and air and high level activity sample analysis.

Class M: Technical Support

This training will emphasize: Organizational interfaces and responsibilities, and communications systems.

Class N: Fire, First Aid, and Search and Rescue Team Training

This training will emphasize: Organizational interfaces, search and rescue procedures, and communications systems.

Class O: Emergency Response Facility Computer System (ERFCS)

The training will emphasize: Use of the Safety Parameter Display System (SPDS) and the Piping and Instrument Diagrams (P&ID).

NOTES:

The Security Department is responsible for the conduct of Class G and ensuring that documentation is properly maintained.

The Loss Prevention Department and the Safety Department are responsible for documenting the conduct of Class N for the Fire Team and the First Aid Team, respectively.

Fire Team members shall also receive Fire Brigade training as required by the Surry Power Station Fire Protection Program, which meets the requirements of 10CFR50, Appendix R.

First Aid Team members shall also receive training as required by SUADM-ADM-15, First Aid Treatment, which meets the requirements of the Accident Prevention Manual.

The training requirements outlined above differ from those previously included in this Plan. Implementation of the revised requirements are to be phased in over a twelve month period. Emergency response personnel trained to the previous standard remain qualified until their qualification expires or July 31, 1988, whichever occurs first.

TABLE 8.2

REQUIRED DRILLS, DRILL FREQUENCY, AND RESPONSIBILITY

<u>DRILL TYPE</u>	<u>FREQUENCY</u>	<u>RESPONSIBILITY</u>
Communications	Once per 366 days	Coordinator-Emergency Planning
Fire	In accordance with Surry Fire Protection Program (quarterly)	Loss Prevention Coordinator
Medical Emergency	Once per 366 days	Coordinator-Emergency Planning
Environmental Monitoring	Once per 366 days	Superintendent Health Physics
Post-Accident Sampling	Once per 366 days	Superintendent Health Physics and Supervisor Chemistry
Radiological Monitoring	One per 184 days	Superintendent Health Physics

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SURRY POWER STATION
EMERGENCY PLAN

SECTION 9

RECOVERY

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9.0 Recovery

Once the onsite hazard potential has passed, steps will be taken to recover from the incident. All actions will be preplanned in order to limit exposures. Following an emergency which results in the contamination of otherwise uncontaminated areas within the Exclusion Area, recovery efforts will be directed towards restoring the site to its pre-emergency condition to the extent reasonable. An area outside the Restricted Area of the station will be considered contaminated by the event if greater than 1000 dpm/100cm² of removable (smearable) beta-gamma activity is present or fixed beta-gamma activity results in radiation levels exceeding 5000 dpm (100 cpm above normal background with thin window GM probe) measured at approximately one-inch from an accessible surface. Areas will be roped off and posted with radiation levels and stay times based on results of surveys. Portable shielding material may be used whenever deemed necessary. Access to the area will be controlled and exposures of personnel documented.

The following guidelines for emergency exposure of personnel will be followed during recovery operation, as well as other emergency operations:

- a. ~~Every reasonable effort will be made to minimize Recovery Team person-~~
nel exposure.
- b. Under emergency conditions not requiring action to prevent serious injury or to prevent substantial loss of property, Recovery Team personnel exposure shall not exceed 10CFR20 limits.

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- c. Under emergency conditions where immediate action is necessary to prevent serious injury or to prevent substantial loss of property, Recovery Team personnel exposure authorized by the Station Emergency Manager, with the consent of the individuals to be exposed should not exceed 25 rem whole body exposure, except for life saving purposes. Every reasonable effort will be made to keep planned emergency exposures within regulatory limits.
- d. Under emergency conditions where the hazards are such that life would be in jeopardy or there would be severe effects on the health of the public, Recovery Team volunteers may receive a planned whole body dose of up to 75 rem.

Emergency and lifesaving radiation exposures can be authorized ONLY by the Station Emergency Manager.

9.1 Safety Analysis

If the reactor has been shut down because a safety limit was exceeded, a complete analysis of the circumstances leading up to and resulting from the situation together with recommendations to prevent a recurrence will be issued by SNSOC. Notification of such occurrences will be made to the NRC as specified in the Technical Specifications.

9.2 Recovery Methodology

The recovery of the station after an emergency is a prime consideration. Procedures will be written immediately prior to the recovery phase that address recovery following a Site Area Emergency or General Emergency, including when and how it will take place.

The decision to relax protective measures is based upon a comprehensive review of station system parameters. These shall include but not be limited to the following:

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- a. Stability of the reactor shutdown condition, i.e., successful movement toward a cold shutdown condition.
- b. Integrity of the Reactor Containment Building.
- c. Operability of Radioactive Waste Systems and Decontamination Facilities.
- d. The availability and operability of a heat sink.
- e. The integrity of power supplies and electrical equipment.
- f. The operability and integrity of instrumentation including radiation monitoring equipment. In the latter instance, this shall include portable equipment assigned to the emergency.
- g. Availability of trained personnel and support services.

The decision on the Company's part to relax protective measures shall be reached in and by a meeting of the Station Emergency Manager and the Recovery Manager or their alternates. They will base their decision upon input from their advisors. The decision shall be concurred in by the Corporate Response Manager. Notification of the decision and any resulting changes to the Corporate or Station response to the recovery, shall be maintained between Federal, State, and local entities.

~~The following conditions shall be considered appropriate for the consideration of relaxation of protective measures:~~

- a. Station parameters of operation no longer indicate a potential or actual emergency exists.
- b. The release of radioactivity from the station is controllable and no longer exceeds permissible levels and no danger to the public from this source is credible.
- c. The station is capable of sustaining itself in a long term shutdown condition.

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d. Station entry and cleanup is possible without workers receiving in excess of their permissible exposures.

Because it is not possible to foresee the entire consequences of an emergency, general procedures will be written together with appropriate plans that will formalize the manner in which the decision is reached. Specific plans to suit the occasion will be produced together with this decision. The plan by which the decision is reached will specifically require evaluation of the potential of the emergency. Further discussions of recovery efforts is provided in Sections 5.0 and 6.0 of this Plan.

9.3 Notification

The Recovery Manager shall notify the onsite support agency representatives and the Station Emergency Manager that a decision has been reached to initiate a recovery operation, and that this decision has been concurred in by the Corporate Response Manager. He shall then call the NRC Region II, NRC Headquarters, DOE (IRAP), the State Emergency Operations Center, and the Local County Emergency Operations Centers with the same information. He shall also inform these agencies if any change in organizational structure is to occur because of the recovery.

9.4 Population Exposure

Total population doses shall be periodically estimated in those affected sectors and zones by utilizing population distribution maps within the emergency planning zones.

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Station personnel shall initially determine those doses and will identify whole body exposure based on external dose equivalent Xe-133 gamma radiation and thyroid exposure resulting from inhalation of radioiodines (dose equivalent I-133). The methodology used shall be consistent with that presented in Regulatory Guide 1.109, Calculations of Annual Dose to Man from Routine Releases of Reactor for the Purpose of Evaluating Compliance with 10CFR50, Appendix I, dated October, 1977, and Regulatory Guide 1.111, Methods of Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routing Releases from Light-Water Cooled Reactors, dated July, 1977.

Activation of the Corporate Emergency Response Plan shall include corporate personnel determining population doses utilizing the GASPAR computer code or equivalent and shall include whole body exposure from external gamma radiation and from ingestion of radioactive material, thyroid exposure from the inhalation or ingestion of radioiodines and the exposure of other organs from inhalation or ingestion of radioactive materials.

9.5 Corporate Plan

The Corporate Emergency Response Plan contains details of the level of corporate response to an emergency. The chart of this organization is contained in the Corporate Emergency Response Plan. The Corporate Emergency Response Plan requires that a Recovery Center be setup on the fifth floor of the Company's Corporate Headquarters. The Recovery Team will consist of Company management and supervisory personnel with experience and authority to assure the best available use of the Company's resources to assist in a rapid recovery from a declared emergency. The Corporate Response Manager or his alternate will head this team. All members on the team will have alternates.

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12-10-82

SURRY EMERGENCY PLAN

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AGREEMENT LETTERS

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COMMONWEALTH of VIRGINIA

Department of Game and Inland Fisheries

4010 WEST BROAD STREET
BOX 11104
RICHMOND, VA 23230

February 8, 1988

Mr. W. L. Stewart
Vice President - Nuclear Operations
Virginia Power
P. O. Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

I have been authorized by the Director, J. A. Remington, to advise you that the Game Department is still in agreement with the Emergency Plans for Surry and North Anna Power Stations.

This agency will assist you in any future emergency situations as outlined in your plan, to the greatest extent possible at the time any emergency might evolve, just as we have previously agreed.

We agree to provide the following support to any emergency that may occur at either the Surry or North Anna Power Stations upon the direction of the State Office of Emergency and Energy Services.

1. Develop procedures for and coordinate the disposition of wildlife and fish affected by radiological contamination.
2. Develop procedures for and coordinate the provision of uncontaminated feed for wildlife, if required.
3. Assist the Department of Welfare in radiological monitoring and damage assessment.
4. Assist in warning people in boats and traffic control of boats on Lake Anna in the vicinity of the North Anna Power Station.
5. Assist in traffic control of boats and ships on the James River in the vicinity of the Surry Power Station.

Sincerely,

A handwritten signature in cursive script, appearing to read "G. Simmons".

Col. Gerald Simmons
Chief, Law Enforcement Division

GS:1b

AN EQUAL OPPORTUNITY EMPLOYER



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COMMONWEALTH of VIRGINIA

C.M.G. BUTTERY, M.D.
COMMISSIONER

Department of Health
Richmond, Virginia 23219
February 4, 1988

Mr. W. L. Stewart
Vice President
Nuclear Operations
Virginia Power
POB 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

Should it be necessary to implement the Surry or North Anna Power Station Emergency Plan, this agency will respond in accordance with the provisions of the Commonwealth of Virginia Radiological Emergency Response Plan (COVRERP). The response of all State agencies is coordinated by the Department of Emergency Services.

We agree to provide the following services and equipment in the event of a response to an emergency at the Surry or North Anna Power Station:

1. Perform accident assessment, to include:
 - a. Provision of accident assessment and monitoring personnel and equipment;
 - b. Radiological assessment, to include:
 1. Determination of actual off-site radiological consequences.
 2. Recordkeeping and documentation of off-site effects of the accident.
2. Coordinate the radiological evaluation of personnel at relocation centers, including development and administration of plans for the distribution of radioprotective drugs.
3. Advise State and local officials on the implementation of pertinent protective actions based on accident assessment. Coordinate the establishment of radiological exposure control for:
 - a. State and local government radiological emergency response personnel.
 - b. Other emergency response personnel.
 - c. The affected populace.

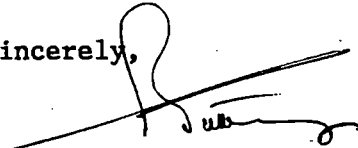
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4. Determine the availability of and coordinate the use of medical facilities that could accommodate and care for persons involved in a radiological emergency who may require medical care.
5. Provide other emergency public health services.
6. Develop criteria for establishing controlled areas or zones surrounding an accident site, including ingress/egress control provisions and supervising perimeter radiological surveillance of persons entering or leaving controlled zones or areas.
7. Develop criteria for re-entry into homes and evacuated areas and advise local government when these criteria have been met.
8. Develop and conduct, in coordination with the Department of Emergency Services, training programs for emergency support personnel.
9. Provide a mobile laboratory with radiological analysis equipment and radio communication capabilities.

If you have any questions or comments regarding these commitments, please contact the Bureau of Radiological Health at 804/786-5932.

Sincerely,



C. M. G. BATTERY, M.D., M.P.H.
State Health Commissioner



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COMMONWEALTH of VIRGINIA

COLONEL R.L. SUTHARD
SUPERINTENDENT

DEPARTMENT OF STATE POLICE

Post Office Box 1067, Chesapeake, Virginia 23320-1067

February 2, 1988

Mr. W. L. Stewart
Vice President - Nuclear Operations
Virginia Power
Post Office Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

We have reviewed the Surry Emergency Plans and we will provide all possible assistance in the event of an emergency.

We agree to provide the following support to any emergency that may occur at the Surry Power Station upon the direction of the Department of Emergency Services.

1. Assist local officials in disseminating warning.
2. Assist in evacuation in coordination with local officials.
3. Enforce access/egress provision in controlled areas, when established, in coordination with local officials.
4. Provide traffic control.
5. Assist to the extent possible in radiological monitoring of vehicles and personnel at traffic control points.

Sincerely,

A handwritten signature in cursive script, appearing to read "J. S. Conner".

J. S. Conner, Captain
Fifth Division Commander
(AC 804/420-3410)

JSC/fs



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COMMONWEALTH of VIRGINIA

Department of Emergency Services

A. E. SLAYTON, JR.
State Coordinator

Keith R. Keister
Deputy Coordinator

310 Turner Road
Richmond, Virginia 23225-6491
(804)674-2499

February 5, 1988

Mr. William L. Stewart
Vice President for Nuclear Operations
Virginia Power
Post Office Box 26666
Richmond, Virginia 23261

Dear Bill:

Reference is made to your letter of February 1, 1988, regarding the need to update our Letter of Agreement in compliance with the federal criteria prescribed by NUREG 0654/FEMA-REP-1.

We have reviewed the North Anna and Surry Power Stations' emergency plans and are assured that they properly interface with the state Radiological Emergency Response Plan (RERP) as well as with the local RERPs, site-specific to either power station. Upon receiving notification of a radiological accident at a Virginia Power nuclear power station, state agencies and local governments will implement their Radiological Emergency Response Plans in accordance with state and local government authorities. Specifically, the Department of Emergency Services (DES) agrees to implement all or part of the following actions in the event of a radiological emergency:

1. Operate the state Emergency Operations Center (EOC).
2. Provide DES operations officer(s) to the EOF.
3. Provide warning in coordination with other state and local government agencies and the nuclear facility operator.
4. Provide emergency communications.
5. Coordinate emergency response actions of federal and state agencies.
6. Notify the following federal agencies of a radiological emergency:
 - a. Federal Emergency Management Agency (FEMA) when the emergency action level at a nuclear power facility is classed as an Alert and provide updated information and request assistance, if required, when the emergency action level is classed as a Site Area Emergency or General Emergency.

Mr. William L. Stewart
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- b. Federal Aviation Administration air controllers at Richmond International Airport of a radiological emergency and request that aircraft be instructed to avoid affected airspace until notified otherwise.
 - c. Commander, Fifth U. S. Coast Guard District of a radiological emergency at the Surry Power Station and request establishment of traffic control of boats and ships on the James River in the vicinity of the power station.
 - d. Fort Eustis in the event of an incident at the Surry Power Station that could affect the health and safety of personnel stationed at this military installation.
7. Notify CSX Transportation (Dispatcher's Office, 226-7419) of a radiological emergency at the North Anna or Surry Power Station and request that rail service in the affected area be discontinued temporarily.
 8. Notify the state Bureau of Radiological Health, Department of Health (day--(804) 786-5932; night--(804) 674-2400) immediately of all classes of accidents and incidents reported by operators of nuclear facilities.
 9. Notify the Department of Transportation to establish roadblocks and to temporarily terminate ferry service between James City County and Surry County, when appropriate.
 10. Notify other state agencies that have emergency task assignments identified in the State RERP.
 11. Notify the State of Maryland EOC of radiological accidents at the North Anna Power Station resulting in either a Site Area Emergency or General Emergency. Notify the State of North Carolina EOC of radiological accidents at the Surry Power Station resulting in either a Site Area Emergency or General Emergency.
 12. Provide public information, based on information furnished by the Department of Health and the nuclear facility operator.
 13. Request all assistance, except for monitoring and assessment, from the federal government in accordance with the Federal Radiological Emergency Response Plan.

In support of the emergency response actions stated above, we will, on an annual basis, perform the following missions:

SEP
App 1-9

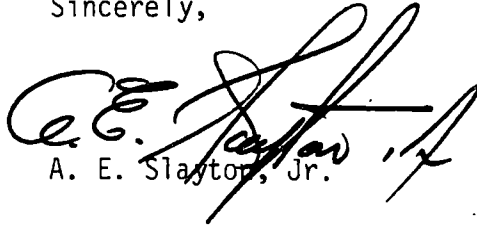
Mr. William L. Stewart
Page 3
February 5, 1988

APR 27 1989

1. Assist state agencies and political subdivisions in the development, promotion, and maintenance of plans, procedures, and preparedness programs.
2. Coordinate radiological emergency response training and conduct annual training exercises.
3. Maintain a list of media representatives, including names and telephone numbers, and as necessary, issue news releases respective to emergency operations involving the North Anna and Surry Power Stations.

These actions are authorized by the Governor of Virginia (Executive Order Number 24 (86) and are consonant with the Commonwealth of Virginia Emergency Services and Disaster Law of 1973 (Code of Virginia, Chapter 3.2, Title 44), as amended.

Sincerely,



A. E. Slattery, Jr.

AESjr/GOU/jgl



Medical College of Virginia
Virginia Commonwealth University

SEP
App 1-10

APR 27 1989

February 11, 1988

Mr. W. L. Stewart
Vice President, Nuclear Operations
Virginia Power
P. O. Box 26666
One James River Plaza
Richmond, Virginia 23261

Dear Mr. Stewart:

LETTER OF AGREEMENT
NORTH ANNA AND SURRY POWER STATIONS

The Medical College of Virginia/Virginia Commonwealth University agrees to participate in the implementation of the Virginia Power's Radiation Emergency Plans for the North Anna and Surry Power Stations and to support the plans within the limits of our organizational capabilities.

The Medical College of Virginia/Virginia Commonwealth University agrees to participate in any planning, training and drilling necessary to insure preparedness. We agree that upon verification of an emergency at either station the following services will be provided:

1. Facilities to treat up to four seriously injured and radioactively contaminated patients in the emergency department.
2. Facilities to treat up to ten non-seriously injured radioactively contaminated patients in the Sanger Hall morgue area.
3. Hospital transportation (stretchers) to move patients from the morgue area to the emergency department.
4. Campus Police to support traffic control and maintain security around the treatment areas.
5. Central Services supplies (oxygen, defibrillators, etc.) to support treatment in the morgue area.
6. Monitoring and counting equipment for the detection and analysis of radioactivity or radiation.

SEP
App 1-11

APR 27 1989

2

7. Decontamination and other supplies necessary for the isolation and treatment of radioactively contaminated patients.

These services will be available 24 hours a day and are outlined in greater detail in the MCV Radiation Emergency Plan. The Radiation Safety Section of the Office of Environmental Health and Safety is responsible for supplying the radiological support services necessary for the implementation of this plan.

Sincerely,



Alastair M. Connell, M. D.
Vice President for Health Sciences

AMC:t

Surry's Something Special

SEP
App 1-12

Surry County

P.O. Box 65

Surry, Virginia 23883

February 3, 1988



"The Countrie it selfe, I must
confesse is a very pleasant land,
rich in commodities;
and fertile in soyle . . ."

-Samuel Argall, ca. 1609

APR 27 1989

M. SHERLOCK HOLMES
Chairman, Board of Supervisors

EDWARD W. JOHNS
Vice-Chairman

JOHN R. CURTIS

WALTER N. HARDY

RAY D. PEACE

STEPHANIE F. EDLER
County Administrator

(804) 294-5271

Mr. W. L. Stewart, Manager
Nuclear Operations and Maintenance
Virginia Electric and Power Company
Richmond, Virginia 23261

Dear Mr. Stewart:

We have received your letter of February 1, 1988 indicating a need to revise our agreement with you for your new Surry Emergency Plan.

This letter is to inform you we are willing to participate in the Emergency Plan by providing the following:

1. Operate the County Emergency Operations Center.
2. Coordinate the overall emergency response of all county departments and organizations.
3. Serve at the County point-of-contact with State/Federal agencies.
4. With mechanical equipment provided by Virginia Power, give early warning to the public.
5. Coordinate radiological emergency response training.
6. Initiate the key county official alert system and notify assisting agencies and departments to evacuate the public from affected areas.

Sincerely,

Walter N. Hardy

Walter N. Hardy, Chairman
Board of Supervisors

SEP
App 1-13

APR 27 1989

MEMBER



Commonwealth of Virginia

COUNTY OF SURRY

SHERIFF'S DEPARTMENT

W. C. ANDREWS, JR.

SHERIFF

SURRY, VIRGINIA



(804) 294-3156

February 2, 1988

Mr. W. L. Stewart
Vice President - Nuclear Operations
Virginia Power
P.O. Box 26666
Richmond, VA 23261

Dear Mr. Stewart,

In reference to your letter of February 1, 1988, I am in agreement with your Surry Emergency Plan and am willing to participate in the Emergency Plan if necessary. The Sheriff's Department is capable of providing the following services:

1. Receive the notification of the radiological emergency and notify the County Coordinator or his designated representatives.
2. Warn key County officials and agencies assigned a radiological emergency responsibility.
3. Warn the public.
4. Evacuate the public from the area affected upon notification from the County Coordinator of Emergency Services.
5. Establish traffic control.
6. Conduct initial radiological monitoring in accordance to Appendix 6 of the Surry County RERP.
7. Enforce access/egress control provisions, when established, in coordination with the State Police.
8. Operate the Emergency Communications Center.

Very Truly Yours

W. C. Andrews, Jr.
Sheriff - Surry County

SEP
App 1-14

APR 27 1989



SURRY VOLUNTEER RESCUE SQUAD INC.



February 5, 1988

Mr. W. L. Stewart
Vice Present - Nuclear Operations
Virginia Power
P. O. Box 26666
Richmond, VA 23261

Dear Mr. Stewart,

I am writing in response to your letter of February 1, 1988, regarding "Letters of Agreement" to support the Surry Power Station Emergency Plan.

This letter is to inform you that we are in agreement with the Surry Emergency Plan and are willing to support it should the occasion arise.

Accordingly, I hereby submit the following AGREEMENT:

We are in agreement with the Virginia Power Surry Power Station Emergency Plan and will respond to it within the capabilities of our organization, should our services be requested.

Sincerely,

Thomas A. Gwaltney, Captain

Thomas A. Gwaltney, Captain
Surry Volunteer Rescue Squad, Inc.

SERVICES:	Emergency First Aid and Rescue
EQUIPMENT:	three (3) Ambulances - capacity 6 persons
PERSONNEL:	twenty (20) members
RESPONSE TIME:	15 to 30 minutes

P.O. Box 188, Surry, Virginia 23883

SEP

APR 27 1989

App 1-15

Surry Volunteer Fire Department
Surry, Virginia 23883
February 7, 1988

Mr. W. L. Stewart
Vice President
Nuclear Operations
Virginia Electric and Power Company
P.O. Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

I have received your letter dated February 5, 1988 indicating that it is necessary to revise our agreement with your emergency plan and if we will support the Surry Power Station Emergency Plan if requested.

This letter is to inform you that we are in agreement with the Surry Emergency Plan and are willing to support it should the occasion arise.

Accordingly, I hereby submit the following AGREEMENT:

We are in agreement with Virginia Electric and Power Company's Surry Power Station Emergency Plan and will respond to it within the capabilities of our organization should our services be requested.

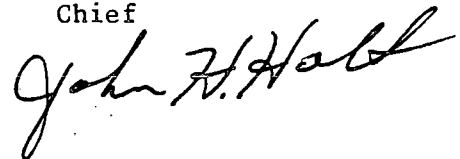
Services: Fire Protection and Emergency Assistance

Equipment: One (1) 750 GPM Pumper, 750 gallons water
One (1) 500 GPM Pumper, 500 gallons water
One (1) 1300 gallon Tanker
One (1) Attack Truck, 250 GPM with 240
gallon tank (FWD)
One (1) 1000 GPM Pumper, 1000 gallon tank

Personnel: 26 members

Response Time: 15 minutes

John H. Holt
Chief



JHH/rb



Department of Energy

Oak Ridge Operations
P. O. Box E
Oak Ridge, Tennessee 37831

SEP
App 1-16

APR 27 1989

February 22, 1988

Mr. W. L. Stewart
Vice President - Nuclear Operations
Virginia Power
P. O. Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

DOE RADIOLOGICAL ASSISTANCE AVAILABILITY FOR SURRY AND NORTH ANNA POWER STATIONS

This letter and its enclosure are in response to your February 1, 1988, letter requesting an updated letter of agreement regarding the availability of DOE Radiological Assistance.

The DOE, Oak Ridge Operations, has revised (December 1985) the US DOE-Region 2 Radiological Assistance Plan which was issued in November 1979. The new document entitled, "Guide for Requesting Radiological Assistance," is based on the Federal Radiological Emergency Response Plan issued as an operational plan in the Federal Register on November 8, 1985. Letters of Agreement are not formally required because of our responsibilities under this plan, but this letter and document will serve to update any existing letters between your organization and the US DOE, Oak Ridge Operations. A brief summary of DOE responsibilities is included below. Additional details are included in the document that is provided, as well as instructions on how to request assistance and a description of the capabilities available.

The U. S. Department of Energy (DOE) will respond to requests for radiological assistance from licensees, Federal, State, and local agencies, private organizations, or individuals involved in or cognizant of an incident believed to involve source, byproduct or special nuclear material as defined by the Atomic Energy Act of 1954, as amended, or other ionizing radiation sources.

Unless DOE or a DOE contractor is responsible for the ionizing radiation source or radioactive material involved in the incident, DOE radiological assistance will be limited to advice and emergency action essential for the control of the immediate hazards to health and safety. Radiological emergency assistance will be provided in accordance with the Federal Radiological Emergency Response Plan (FRERP) which includes the Federal Radiological Monitoring and Assessment Plan (FRMAP).

Mr. W. L. Stewart

-2-

February 22, 1988

The DOE provides and coordinates off-site radiological monitoring and assessment support to State and local governments. DOE's support is augmented by several other Federal agencies including FEMA, NRC, EPA, HHS, USDA, DOC, DOD, and DOT. After the initial emergency phase, the coordination of these responsibilities will be transferred to the EPA, who has responsibility for coordination of the intermediate and long-term radiological monitoring and assessment as stated in the FRERP.

The responsibility of the post-incident recovery, including further action for the protection of individual and the public health and safety, should be assumed by the appropriate responsible Federal, State, or local governments, or private authority as soon as the emergency conditions are terminated.

Should you require additional information, please contact me at (615) 576-6578 or FTS 626-6578.

Sincerely,



Jeffrey D. Slack
Emergency Preparedness Coordinator

Enclosure:
As Stated

cc w/o enclosure:
Director, OEES (VA)
Director, EH-33, HQ
W. P. Snyder, CC-10
Marvin Barton, AD-462



SEP
App 1-18

APR 27 1989

COUNTY of ISLE OF WIGHT

THE COURTHOUSE

April 25, 1988

Mr. W. L. Stewart, Vice President
Nuclear Operations
Virginia Power Company
Post Office Box 26666
Richmond, VA 23261

Dear Mr. Stewart:

A request has been made by your company to update the existing letter of agreement which specifies the arrangement for the exchange of information by agencies agreeing to respond to any emergencies at the Surry Power Station. This letter serves to update our previous letter of agreement that Isle of Wight County is willing to participate in the emergency plan if required and we are capable of providing the following services:

1. Operate the County emergency operating center.
2. Coordinate the overall emergency responses of the County.
3. Serve as the County point of contact with State and Federal agencies.
4. Provide public information.
5. Coordinate radiological emergency response training.

Yours very truly,

Ludford T. Creef, III
Ludford T. Creef, III
Public Works Director
Emergency Services Coordinator

LTC:db

cc: Myles E. Standish, Emergency Services Director

SHERIFF'S DEPARTMENT

COUNTY OF ISLE OF WIGHT
COMMONWEALTH OF VIRGINIA

C. W. PHELPS

SHERIFF

February 5, 1988

SEP
App 1-19

APR 27 1989

Mr. W. L. Stewart
Vice President - Nuclear Operations
Virginia Electric and Power Company
Richmond, Virginia 23261

Dear Sir:

I have received your letter dated February 1, 1988 indicating that it is necessary to revise our agreement with your emergency plan and if we will participate in the Surry Emergency Plan if requested.

This letter is to inform you we are in agreement with the plan and are willing to participate in the Emergency Plan if required. We are capable of providing the following services:

1. Receive and verify the notification of the radiological emergency.
2. Warn key County officials and other agencies assigned a radiological emergency responsibility.
3. Warn the public.
4. Evacuate the public from the area affected.
5. Traffic control.
6. Conduct initial radiological monitoring.
7. Access/egress control, in coordination with the State Police.
8. Operate the Emergency Communications Center.

Respectfully,



C. W. Phelps, Sheriff

CWP:ahp

ISLE OF WIGHT, VIRGINIA 23397

OFFICE: SMITHFIELD 357-2151, WINDSOR 242-6114, FRANKLIN 562-3275 RESIDENCE: 357-7319

APR 27 1989



Isle of Wight Volunteer Rescue Squad

POST OFFICE BOX 97
SMITHFIELD, VIRGINIA 23430

February 16, 1988

Mr. W. L. Stewart
Vice President - Nuclear Operations
Virginia Power Company
P. O. Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart,

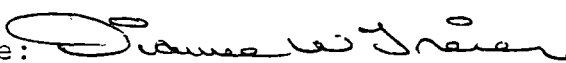
I have received your letter dated February 1, 1988, indicating that it is necessary to update our agreement with your emergency plan and whether or not we will support the Surry Power Station Emergency Plan if requested.

This letter is to inform you that we are in agreement with the Surry Emergency Plan and are willing to support it, should the occasion arise.

Accordingly, I hereby submit the following AGREEMENT:

We are in agreement with the Virginia Power Company's Surry Power Station Emergency Plan and will respond to it within the capabilities of our organization, should our services be requested.

Signature:


Dianne W. Treier, President
Isle of Wight Volunteer
Rescue Squad
P. O. Box 97
Smithfield, Virginia 23430

Date:

SERVICES : Emergency Medical Care and Transportation with
Advanced Life Support, 24 hours per day.

EQUIPMENT : 4 ambulances, Class B, 1 rescue vehicle, 1 jaws
of life and 2 MSA Air Packs, 1 portable
generator and lighting system.

PERSONNEL : 40 members

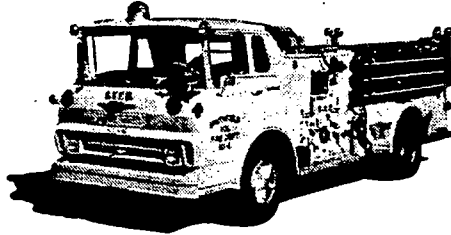
RESPONSE TIMES: Immediate (20 minutes)

DWT/akh

SMITHFIELD VOLUNTEER FIRE DEPARTMENT, INC.

SEP
App 1-21

APR 27 1988



SMITHFIELD, VIRGINIA 23430

February 14, 1988

Mr. W. L. Stewart
Vice-Pres. Nuclear Operations
Virginia Power
Richmond, Virginia 23261

Dear Mr. Stewart:

I have received your letter dated February 1, 1988, indicating that it is necessary to revise our agreement with your emergency plan and if we will support the Surry Power Station Emergency Plan if requested.

This letter is to inform you that we are in agreement with the Surry Emergency Plan and are willing to support it should the occasion arise.

Accordingly, I hereby submit the following Agreement:

We are in agreement with the Virginia Power's Surry Power Station Emergency Plan and will respond to it within the capabilities of our organization, should our services be requested.

Signature *John R. Stedinger*
Chief, Smithfield Vol. Fire Dept., Inc

Services: Fire Protection plus those requested to Command
Post Equipment: 1st call 1-1,000 GPM Pumper followed by
1-750 GPM Pumper upon request.
Personnel + 10 Trained Personnel
Response Times: 20 minutes



City Of Newport News

Virginia 23607

SEP
App 1-22

APR 27 1989

Office Of The City Manager

2400 Washington Avenue
(804) 247-8411

February 16, 1988

Mr. W. L. Stewart
Vice President - Nuclear Operations
Virginia Power Company
P. O. Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

This is in reply to your letter of February 1, 1988 regarding updating the existing "Letter of Agreement" between Virginia Power Company and the City of Newport News pertaining to emergencies at the Surry Nuclear Power Station.

In accordance with Nuclear Regulatory Directive 0654/FEMA-REP-1, and the Commonwealth of Virginia Radiological Emergency Response Plan (Annex I-V, Vol. II, Commonwealth of Virginia Emergency Operations Plan), the City of Newport News agrees to the following covenants relative to emergency assistance to the Surry Nuclear Power Station:

STATEMENT OF AGREEMENT

Premise: The mission of the City of Newport News local government is to plan and prepare for response to radiological emergencies to ensure maximum protection of the public with the least possible cost and disruption.

Covenant: The City of Newport News will provide the following services as delineated in the City of Newport News Radiological Emergency Response Plan. These are, but not limited to:

1. Operate the Emergency Operations Center at 2400 Washington Avenue.
2. Establish and operate an alternative Emergency Operations Center, if required.

Mr. W. L. Stewart
Page Two
February 16, 1988

APR 27 1989

3. Serve as the City's point of contact with State and Federal agencies.
4. Coordinate the dissemination of public information.
5. Coordinate the overall emergency response of the City.
6. If required, locate the Mobile Command/Command Post vehicle with communications equipment at a selected site.
7. Receive and verify the notification of the radiological emergency.
8. Warn key officials assigned to radiological emergency responsibility.
9. Warn the public.
10. Evacuate the public from affected area.
11. Provide traffic control.
12. Notify City Fire Department of radiological monitoring needs.
13. Provide access/egress control in coordination with State Police and other area law enforcement agencies.
14. Provide personnel to staff radiological teams.

Proviso: Protective action within the Surry Nuclear Power Station will be the responsibility of the facility operator. If requested by the facility operator, the City of Newport News will provide on-site assistance such as ambulance, medical, hospital, fire, and police services as practicable, within the capabilities of the City's emergency services without undue risk to the citizens of Newport News.

Further, these services will be provided on the basis that the facility operator shall defend, indemnify, and save harmless the City of Newport News from all claims by third parties for property damage, personnel injury or death which may arise

SEP
App 1-24

Mr. W. L. Stewart
Page Three
February 16, 1988

APR 27 1989

out of the activities of City emergency units while responding to on-site assistance within the boundaries of the Surry Nuclear Power Station.

I trust the above listed information will suffice for the updating of the "Letter of Agreement" relative to the radiological emergencies at the Surry Nuclear Power Station.

If we can be of further assistance, please feel free to contact me or Mr. Frank Pittman, Emergency Management Coordinator, telephone 804/247-8606.

Sincerely,

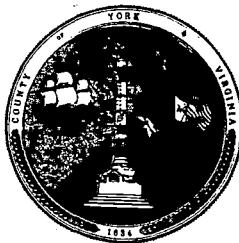

Ed Maroney
City Manager

EM:FEP:lm

cc: Chief, Fire Dept.
Chief, Police Dept.

BOARD OF SUPERVISORS

Mrs. Julia A. Jensen, Chairman
Mr. James W. Funk, Vice Chairman
Mrs. Sandra M. Lubbers
Dr. W. Ward Anderson, Jr.
Mr. Jere M. Mills



SEP
App 1-25
COUNTY ADMINISTRATOR
John M. Richardson

ASSISTANT COUNTY ADMINISTRATOR
Robert L. Steele

COUNTY OF YORK, VIRGINIA

"Where Independence Was Won"

APR 27 1989

February 9, 1988

Mr. W. L. Stewart
Vice President-Nuclear Operations
Virginia Power
P. O. Box 26666
Richmond, Virginia 23261

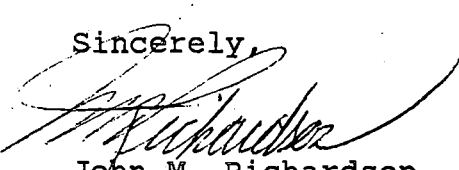
Dear Mr. Stewart:

I am in receipt of your letter of February 1, 1988, and at present we have an established Emergency Operation Center (EOC) in the basement of the Courthouse. We continue to update our Radiological Emergency Response Plan Standard Operating Procedures and can:

- operate the County EOC;
- serve as County point-of-contact with state and federal agencies as required;
- coordinate the overall emergency response plan of the County;
- disseminate public information as outlined by the State Department of Emergency Services in our updated Radiological Emergency Response Plan; and
- have available well-trained radiological response personnel and are continually adding to this group through general refresher courses.

Should you have any questions, please contact Wallace J. Robertson, Coordinator of Emergency Services, at (804) 898-0180.

Sincerely,


John M. Richardson
County Administrator
Director of Emergency Services

JMR/WJR/ese

SEP
App 1-26

APR 27 1989

P. S. WILLIAMS

Sheriff, County of York

(804) 898-0224

Post Office Box 396
Yorktown, Virginia 23690-0396



February 2, 1988

Mr. W. L. Stewart
Vice President-Nuclear Operations
Virginia Power
P.O. Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

As you have requested in your letter dated February 1, 1988, this letter is to update our agreement with your emergency plan and our participation in the Surry Emergency plan if requested.

We will be capable of providing the following services if requested:

1. Receive and verify the notification of the radiological emergency.
2. Warn key County officials and other agencies assigned a radiological emergency responsibility.
3. Warn the public.
4. Evacuate the public from the area affected.
5. Traffic control.
6. Access/egress control, in coordination with the State Police.
7. Operate the Emergency Communication Center.

Sincerely yours,

P. S. Williams,
Sheriff of York County

PSW:CJ:jd

SEP
App 1-27

APR 27 1989



CITY OF WILLIAMSBURG
WILLIAMSBURG, VIRGINIA

23185

February 2, 1988

Mr. W. L. Stewart
Vice President-Nuclear Operations
Virginia Electric & Power Company
Richmond, Virginia 23261

Dear Mr. Stewart:

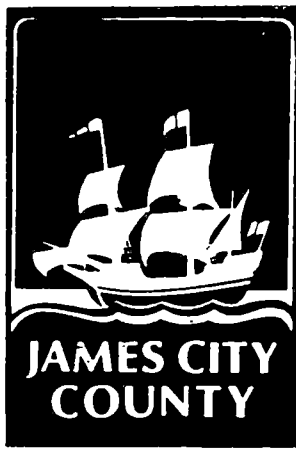
I have received your letter dated February 1, 1988 indicating that it is necessary to update our agreement with your emergency plan.

This letter is to inform you that we agree to participate in the Emergency Plan by exchange of information with all agencies responding to an emergency at Surry Power Station. The City will perform the following functions, if necessary:

1. Operate the City Emergency Operating Center.
2. Coordinate the overall emergency response of the City.
3. Serve as the City point-of-contact when interfacing with James City County.
4. Coordinate public information releases with the County EOC.
5. Coordinate radiological emergency response training.
6. Receive and verify notification of the radiological emergency.
7. Initiate the key City official alert system.
8. Warn the public.
9. Evacuate the public from the areas affected.
10. Traffic Control.
11. Coordinate with and assist the County Police Department.

Very truly yours

Frank Force
City Manager
City of Williamsburg



Mailing Address:
P.O. Box JC
Williamsburg, Va.
23187-3627
Tel. 253-6605

SEP
App 1-28

APR 27 1989

OFFICE OF COUNTY ADMINISTRATOR
COUNTY GOVERNMENT CENTER, 101 MOUNTS BAY ROAD

Board of Supervisors

PERRY M. DEPUE
JACK D. EDWARDS
THOMAS D. MAHONE
THOMAS K. NORMENT, JR.
STEWART U. TAYLOR

County Administrator
DAVID B. NORMAN

March 1, 1988

W. L. Stewart, Vice President
Nuclear Operations
Virginia Power
P.O. Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

Please accept this letter as James City County's intent to comply with NUREG-0654, Rev. 1. James City has developed a response plan to encompass any emergency which should arise at the Surry Nuclear Power Plant and will cooperate with the plant and the State of Virginia and surrounding jurisdictions should an incident occur.

James City is prepared to carry out the following activities:

1. Operate the County Emergency Operations Center.
2. Coordinate the overall emergency response of the County.
3. Serve as the County point-of-contact with the State and Federal agencies.
4. Disseminate public information.
5. Coordinate radiological emergency response training.
6. Receive and verify notification of the radiological emergency.
7. Alert key County officials and other agencies assigned a radiological emergency response responsibility.
8. Alert the public "activate sirens."
9. Evacuate the public from the area affected.
10. Traffic control.

SEP
App 1-29

APR 27 1989

W. L. Stewart
March 1, 1988
Page 2

11. Conduct initial radiological monitoring.
12. Access/egress control, in coordination with the Police Department.
13. Increase staff in Central Dispatch while incident is in progress.

Sincerely,



David B. Norman
County Administrator

DBN:vas

U.S. Department
of Transportation

United States
Coast Guard



Commander
Fifth Coast Guard District

SEP
App 1-30

APR 27 1989

Federal Building
431 Crawford Street
Portsmouth, VA 23705-5004
Staff Symbol: (mpv)
Phone: (804) 398-6389

5050
01 MAR 1989

Mr. William L. Stewart
Vice President - Nuclear Operations
Virginia Power
P. O. Box 26666
Richmond, VA 23261

Dear Mr. Stewart:

The Fifth Coast Guard District will continue its agreement to respond to an emergency at the Surry Power Station. Coast Guard assistance during an emergency will primarily consist of controlling vessel traffic on the James River in the vicinity of the power station, broadcasting notices to mariners regarding the emergency, and rendering other traditional humanitarian aid.

The initial emergency report and request for Coast Guard assistance should be directed to the Marine Safety Office, Hampton Roads, VA., 24 hour telephone number, (804) 441-3307. The alternate unit to which the report can be made would be the Fifth Coast Guard District Operations Center, 24 hour telephone number, (804) 398-6231.

The commitment of Coast Guard resources in any particular instance is conditional upon the availability and limitations of such resources, including consideration of other competing demands. Of paramount concern to me is the safety of Coast Guard personnel while assisting in these instances. Coast Guard response personnel do not have radiological monitoring capabilities.

Each of our organizational elements involved has a copy of your emergency plan. For this plan to remain effective, it is important that four copies of all subsequent revisions be forwarded to the above address for distribution within our organization.

Sincerely,

A handwritten signature in dark ink, appearing to read "A. D. Breed".

A. D. BREED

Rear Admiral 1, U. S. Coast Guard
Commander, Fifth Coast Guard District

RADIATION EMERGENCY PLAN

MCV-VIRGINIA POWER

I. Introduction

The Medical College of Virginia/Virginia Commonwealth University (MCV/VCU) recognizes its responsibility as a major medical health care center to deal with radiation emergencies. The following plan is designed to provide medical care in the case of either a major or minor radiation emergency in the central Virginia region.

The basic plan revolves around the Radiation Safety Section of the Office of Environmental Health & Safety (OEHS). The expertise and equipment necessary to deal with radiation hazards will be drawn from this group. The plan supports Virginia Power's nuclear reactors in the case of occupational and/or major accidents. Financial costs for maintenance of the plan are borne by both Virginia Power and the University. Costs of services rendered during an actual emergency will be charged to the organization or individual serviced.

It is hoped that this plan provides the central Virginia region with a major medical radiation emergency center capable of dealing with the area's needs. Copies of the plan are available through the OEHS at P.O. Box 112, MCV Station, Richmond, VA 23298.

August 8, 1986 *

* as amended December 2, 1986.

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II. Definitions

Controlled Area: That area controlled by the Radiation Safety Team in order to restrict the spread of contamination within Sanger Hall or the Emergency Department. It shall include, but not be limited to, the morgue, shower rooms B2-058 and B2-060, the immediate loading dock area and/or the Non-Acute area of the Emergency Department.

Irradiated Patient: A patient who has been exposed to high levels of radiation either as a whole body exposure or as an exposure to any part of the body. Depending on the severity of the exposure, the patient may demonstrate symptoms characteristic of the acute radiation syndrome. (See Appendix VI) Individuals exposed to neutron radiation may also be radioactive.

Radioactive Patient: An individual who has sustained an injury or is otherwise in need of medical treatment and is also radioactive. There are three specific categories of radioactive patients:

Internally Contaminated Patient: A patient who is radioactive because of the ingestion, inhalation, and/or absorption of radioactive materials.

Externally Contaminated Patient: A patient who has radioactive material on the skin, in a wound, or in the eyes, ears, nose, or mouth.

Neutron-Irradiated Patient: A patient who is radioactive due to a very high exposure to neutrons.

Monitoring Equipment: Any equipment used for the immediate detection of radiation. (Example: GM Counter)

Radioactive Material: Any material which undergoes a spontaneous decay with the emission of radiation.

Type "A" Plan: Involves the treatment of ten or more radioactive patients in the event of a major radiation disaster at one of the Virginia Power plants.

Type "B" Plan: Deals with handling a limited number of patients from minor radiation accidents. Less structured than Plan "A", it is designed to cover a broad range of emergencies.

Dosimeter: Any device which measures the amount of radiation to which an individual is exposed. (Example: Film Badge)

Decontamination: The process of removing radioactive material from the external surfaces of a person, object, etc.

Swipe Test: A piece of filter paper or a cotton swab wiped over an area to detect removable radioactivity. Removable radioactivity (if present) adheres to the paper or swab; it is then counted using the appropriate radiation detecting equipment.

Dose: A measure of energy deposited per unit mass from radiation. Basic unit is Rad (100 ergs/gm).

Exposure: A measure of energy deposited from X or gamma radiation in air. The basic unit is the Roentgen.

Curie: A measure of radioactivity equal to 3.7×10^{12} disintegrations per second. Given the symbol Ci, it can further be divided into mCi, uCi, and nCi, equal to 10^{-3} Ci, 10^{-6} Ci, and 10^{-9} Ci, respectively.

Radiation Producing Device: Any electronic product that produces ionizing radiation when energized.

III. Description of Potential Emergencies

A. Introduction

A radiation accident may be defined as an unforeseen occurrence which generates contaminated or irradiated patients. The MCV/VCU Radiation Emergency Plan is a comprehensive plan designed to deal with radiation emergencies which might occur in the central Virginia area. Listed below are brief descriptions of those possible areas in which radiation emergencies might occur.

B. Potential Emergencies

Transportation: A large volume of radioactive materials is transported throughout the local Richmond area (radiopharmaceuticals, sealed sources, reactor fuel, etc.). The likelihood of a transportation accident occurring in this area resulting in the contamination or irradiation of a number of individuals is very small. In most cases nearly complete decontamination can be accomplished at the accident site before transporting the patient.

Industrial: There are a number of companies in the Richmond area using radioactive sources for different industrial purposes (tank monitors, density evaluation, etc.). Most of these sources are sealed and failure of the container is very unlikely. If, however, this should occur, medical injuries will probably be relatively minor. Assessment of internal uptake will be the major problem.

Power Reactors: There are presently four (4) operating power reactors in Virginia. Inherent in this plan is the ability to deal with occupational and major reactor accidents occurring at these reactors. Occupational accidents will generally be of a minor nature (cuts, contaminated wounds, abrasions, etc.). In most cases nearly complete decontamination can be accomplished at the accident site before transporting the patient. Although the likelihood of a major reactor accident is extremely small, the Nuclear Regulatory Commission requires that these power reactors maintain a plan for dealing with the patients generated by a reactor accident. If a major accident occurs, the plan should be able to handle up to 10 patients at a time. Contamination and/or irradiation problems should be expected. Medical needs may vary from minor abrasions to major surgery.

Hospitals: Many hospitals in the area use radioactive material and/or radiation producing devices. Accidents may occur in the Nuclear Medicine Divisions. Generally these will be of a minor nature and can be dealt with on location. Accidents in Radiation Therapy or Diagnostic Radiology rarely occur. Radiation exposure to the whole body and to the hands and forearms is possible in these areas due either to equipment malfunction or to improper working techniques. Medically injured individuals need not be treated by this plan unless they are contaminated with radioactive materials.

Research: Many of the Universities and other research institutions in the area use radioactive materials and radiation producing devices for research purposes. Activity levels and radiation levels are generally very small. If an accident should occur, partial decontamination can be accomplished at the accident site before transporting the patient. Most accidents in these facilities will be of a minor nature.

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IV. Delineation of Authority and Responsibilities

A. External Staff

1. **Hospital Superintendent:** Upon receiving notification of a radiation accident the Hospital Superintendent is responsible for alerting the appropriate individuals. He will be responsible for deciding which plan (A or B) to activate. He is also responsible for obtaining the following information about the accident:
 - a. Time that the accident occurred.
 - b. Number of victims.
 - c. Severity of injuries.
 - d. Number of neutron-irradiated victims.
 - e. Estimate of dose received by victims.
 - f. Estimated time of arrival.
2. **University Press Officer:** The University Press Officer is responsible for the handling of all information released to the news media. He may be called upon by Radiation Safety to prevent unauthorized members of the press from entering the controlled area. All news releases will be cleared with the University Press Officer and Virginia Power officials.
3. **Housekeeping Staff:** The Housekeeping Staff located on the B-2 level of Sanger Hall are responsible for removing all vehicles from the loading dock area and closing off and securing their area adjacent to the morgue.
4. **Transportation to MCV:** In the event of a Virginia Power accident, Virginia Power is responsible for transporting the injured persons to MCV via the established routes. If helicopter service is used, the helicopter should be routed to the emergency landing area in "T" parking lot. Emergency vehicle transportation will be awaiting. The emergency department at MCV currently has two systems for radio communication with incoming ambulances:
 - a. HEAR (Hospital Emergency and Administrative Radio) System: operating on 155.340 MHZ.
 - b. COR (Coronary Observation Radio) System: current frequencies are MED 1, MED 4, MED 5, MED 8.

B. Internal Staff

1. **Radiation Safety Director:** The Radiation Safety Director, along with the Medical Director, is responsible for coordinating all radiation emergency activities within MCV/VCU. He has unrestricted authority in deciding what measures should be taken regarding personnel within the controlled area. He and the Medical Director will evaluate all patient needs.
2. **Medical Director:** The Medical Director is in charge of all medical aspects of the emergency plan. He works with the Radiation Safety Director to evaluate the needs and insure the safety of all patients and personnel within the controlled area.
3. **VCU Police (Security):** The MCV/VCU police will be called upon to prevent unnecessary vehicles from entering the loading dock and to keep unauthorized personnel away from the

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control area doorways and locking the elevators. If necessary, the police will unlock the gate to the ramp of the loading dock. They will also aid in routing the transport vehicles. If requested, the VCU Emergency Service Van will be made available for use.

4. Hospital Transportation: The Hospital Transportation Department will be notified to provide four (4) stretchers and three (3) persons to wait in the corridor outside of the OEHS. These individuals will be responsible for transporting patients from the controlled area to the Emergency Department in the Main Hospital.
5. Central Service: Central Service is responsible for bringing two (2) life packs, each including one (1) defibrillator and one (1) heart monitor, one (1) adult code blue cart, and two (2) portable oxygen set-ups with stands to the corridor outside of the OEHS.
6. Pharmacy: Pharmacy will provide one (1) Medical Emergency Disaster Kit and will deliver the kit to the OEHS. Drugs contained within the Medical Emergency Disaster Kit are listed in Appendix VII.

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V. PLAN A

(Dr. Yellow)

A. Introduction

In the event of a major radiation accident, either at one of Virginia Power's reactors or elsewhere in the central Virginia region, it is likely that a number of individuals will require immediate medical attention. In some cases, life-saving measures may be necessary. The fact that these individuals may be contaminated and/or radioactive will require that special precautions be taken. The following plan is designed to handle a maximum of ten (10) patients at any one time. The number of patients, the severity of injuries and the degree of contamination are the factors which will determine the routing of the patients. The MCV/VCU Emergency Department is equipped to treat as many as 4 contaminated patients who need emergency medical care. See Figure 1 for a patient routing flow chart.

The MCV/VCU emergency response time (the time required to establish the controlled areas and assemble and fully prepare the necessary medical and radiological staff) is approximately twenty (20) minutes. When the estimated time of arrival (ETA) is much greater than the preparation time of the emergency response team, notification procedures may differ from the standard "Dr. Yellow" alert.

B. Notification

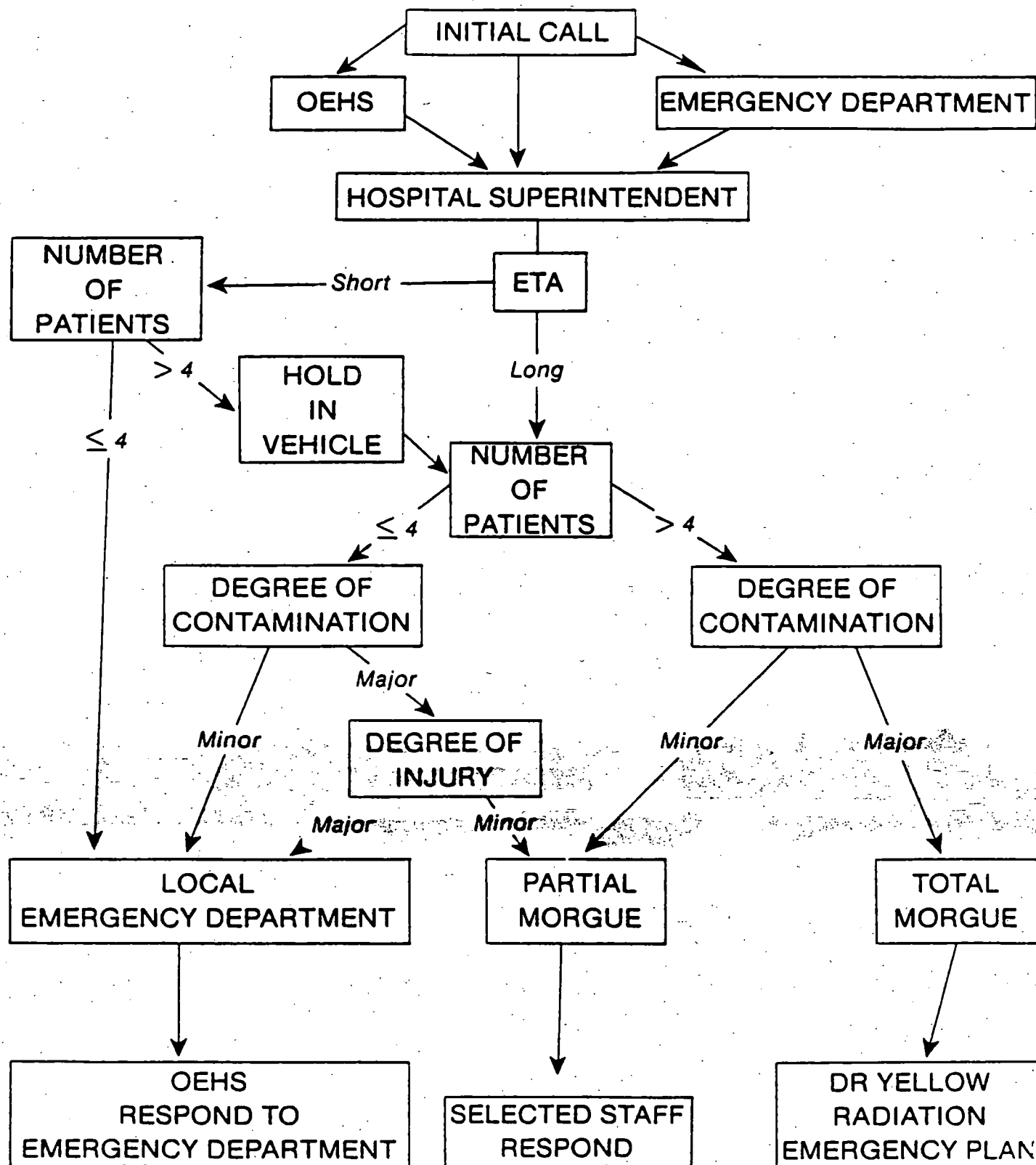
In the event of a major radiation accident, the MCV Hospital Superintendent should be notified at [redacted]. The Hospital Superintendent must then verify that the call is genuine by confirming it with the caller (Virginia Power: appropriate shift supervisor; Surry 357-3184, Ext. 201/202; North Anna [redacted]).

If the ETA is much greater than the MCV/VCU emergency response time, rather than initiating the "Dr. Yellow" alert, the Hospital Superintendent will notify Radiation Safety ([redacted]) of the emergency. The Hospital Superintendent and the Radiation Safety Director will then contact the necessary medical staff. Once a Medical Director has been assigned, he will request additional staff and supplies as he deems necessary. In a situation where the ETA is close to the MCV/VCU emergency response time, the Hospital Superintendent will initiate the following notification procedure:

1. Contact Radiation Safety via the Radiation Emergency line at [redacted]. After working hours all calls to this number are forwarded to Telepage. Initiate a group call to four (4) members of Radiation Safety.
2. Inform the Radiation Safety Director of the emergency and forward pertinent information such as the number of victims, the ETA, the accident scenario, etc.
3. Instruct Telepage ([redacted]) to make the "Dr. Yellow" announcement (warning sound; "Dr.

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FIG. 1
RADIATION EMERGENCY
ROUTING DIAGRAM
FOR PATIENTS



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Yellow", "Dr. Yellow", B-2 Sanger Hall; repeat) and to start contacting members on the alert list (see Appendix I).

4. Alert the MCV/VCU police to the situation.
5. Arrange for transportation from "I" parking lot to MCV if helicopter services are to be utilized (see Figure 4).

C. Procedures

Once a sufficient number of individuals from the Radiation Safety Team have reached the control area outside of Radiation Safety, the following procedure will be initiated:

1. Radiation Safety personnel will open the emergency cabinet located in room B2-010 and place the equipment in the hallway.
2. A Radiation Safety Director and a Medical Director will be chosen from those persons responding. Together they will assign job tasks for the rest of the team.
3. One individual will be assigned to cordon off the control area as shown in Figure 2. All necessary materials (ropes, signs, etc.) are stored in the emergency cabinet.
4. All individuals who are assigned to the control areas will then don anti-contamination suits and will be provided with dosimeters by the Personnel Monitoring Specialist.
5. Each member of the team will then move to and begin preparing his assigned area. Job descriptions are found in the following sections.
6. Incoming patient flow will be as follows (refer to Figure 2): Each patient moves from receiving area A to evaluation area B. Based on the medical and radiological evaluations, the patient will then go to either the emergency department, area F, or area C. Once decontaminated in area F, the patient will move to area C. From area C the patient will move to area E for medical care and/or further decontamination. Following treatment the patient will exit through area D. The most seriously injured victims will be routed to the emergency department in order to provide premium medical care as well as decontamination. Contaminated victims with minor or no injuries may be sent to the morgue area in MER.

D. In Route Communications

The HEAR (Hospital Emergency and Administrative Radio) system, operating on 155.340 MHZ, is available for relaying vital medical information from the ambulance rescue team to the MCV Emergency Department or Emergency Services Van. The Emergency Department can then dispatch this information to the Medical Director for further evaluation, or can phone-link the Medical Director to the transportation vehicle. If utilized, the Emergency Services Van will be located in the loading dock area of Sanger Hall.

E. Emergency Team and Areas of Responsibility

1. Police
 - a. One Police officer will be located at the Marshall Street entrance to the Sanger Hall loading

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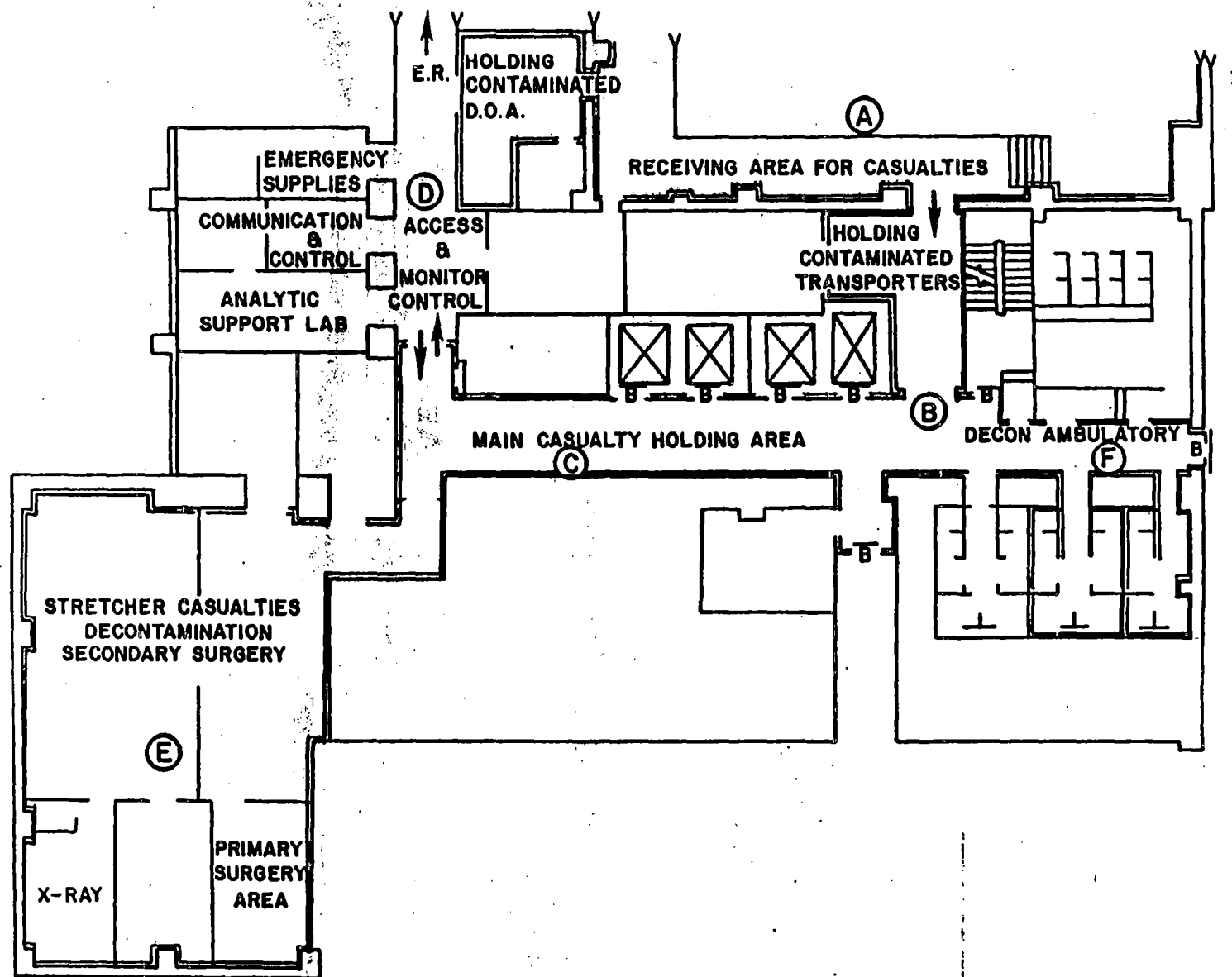


Fig. 2 ME Control Area

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dock. His job function is to direct incoming vehicles. He shall insure that only authorized vehicles enter the loading dock. (See Figures 3 and 4)

- b. One police officer will be located on the loading dock. His job function is to direct incoming vehicles. He shall aid in the control of unauthorized individuals.
- c. One police officer will be located at the East end of the hallway outside Radiation Safety. His job function is to insure that only authorized individuals enter the control area.
- d. One police officer shall insure that the elevators that open into the control area are locked on the B-2 level of Sanger Hall and that no one uses them.
- e. Additional police officers responding shall be utilized for controlling and routing traffic outside of Sanger Hall and the receiving area.
- f. One or more police officers will also be needed on the B-2 loading dock if the Emergency Services Van is utilized. They will receive and relay information concerning incoming patients.

2. Medical Staff

- a. Area E: The staff located in this area shall be capable of providing all necessary medical services, including emergency surgery. The number of doctors and nurses assigned will be decided by the Medical Director. A radiologic technologist should be available to perform mobile x-ray examinations.
- b. Area C: The staff located in this area will provide general first aid and/or any pre-operational medical care. The Medical Director will appoint the appropriate individuals to this area.
- c. Area B: The Medical Director and any supportive staff he needs shall be located in this area to evaluate all incoming cases.
- d. Area A: The staff will consist of paramedical personnel able to assist in the transfer of patients from incoming vehicles.

3. Radiation Safety Staff

- a. Area A: The Incoming Monitoring Specialist will evaluate the radiation hazard from incoming patients.
- b. Area B: The Radiation Safety Director, along with the Medical Director, will be responsible for routing incoming patients.
- c. Area F: The Evaluator of Ambulatory Casualties is in charge of the decontamination of patients routed to his area.
- d. Area C: The Area Monitoring Specialist will check for contamination throughout the controlled area.
- e. Area E: The Evaluator of Stretcher Casualties will be involved in the decontamination of stretcher casualties.

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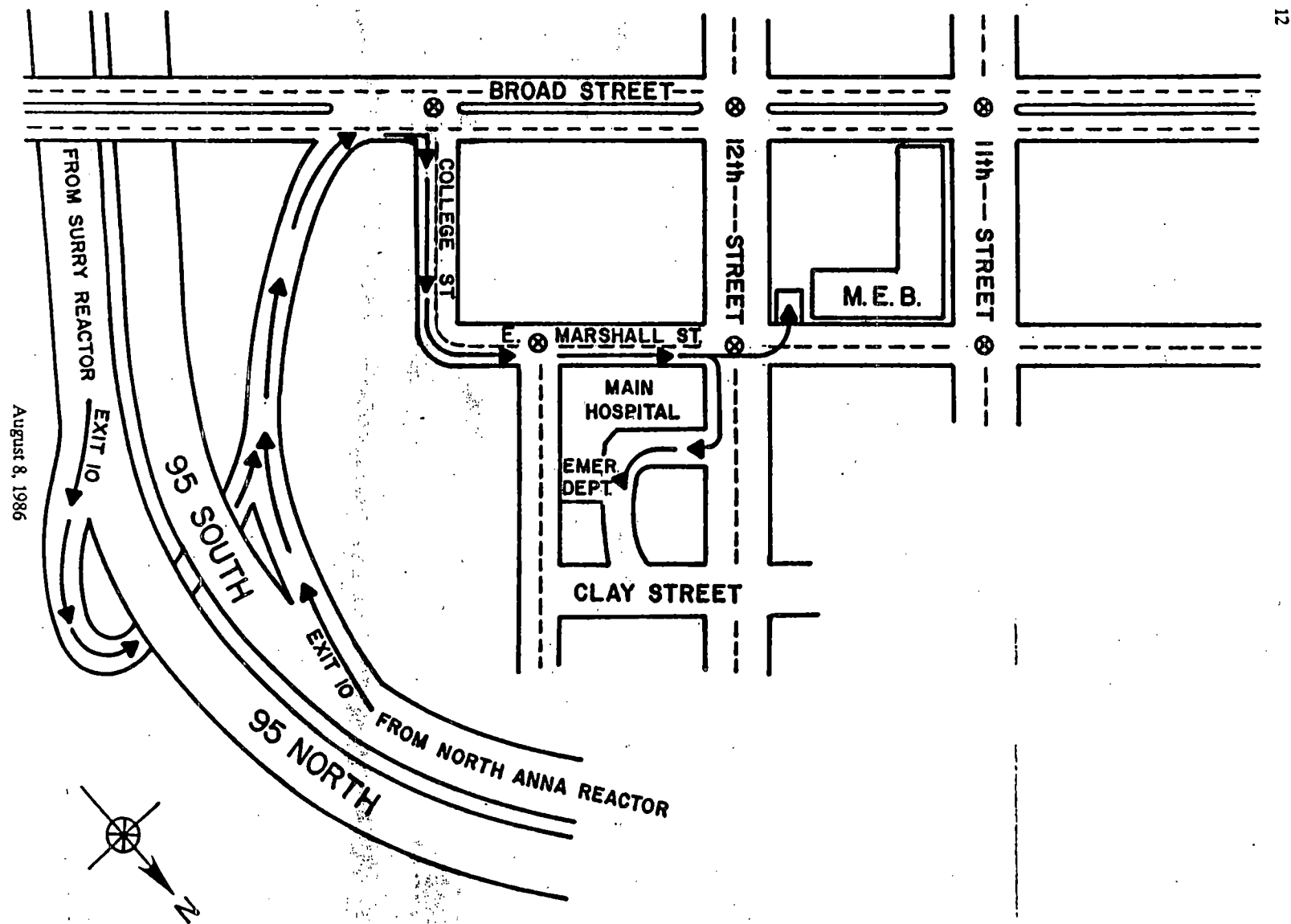


Fig. 3 Incoming Vehicle Route

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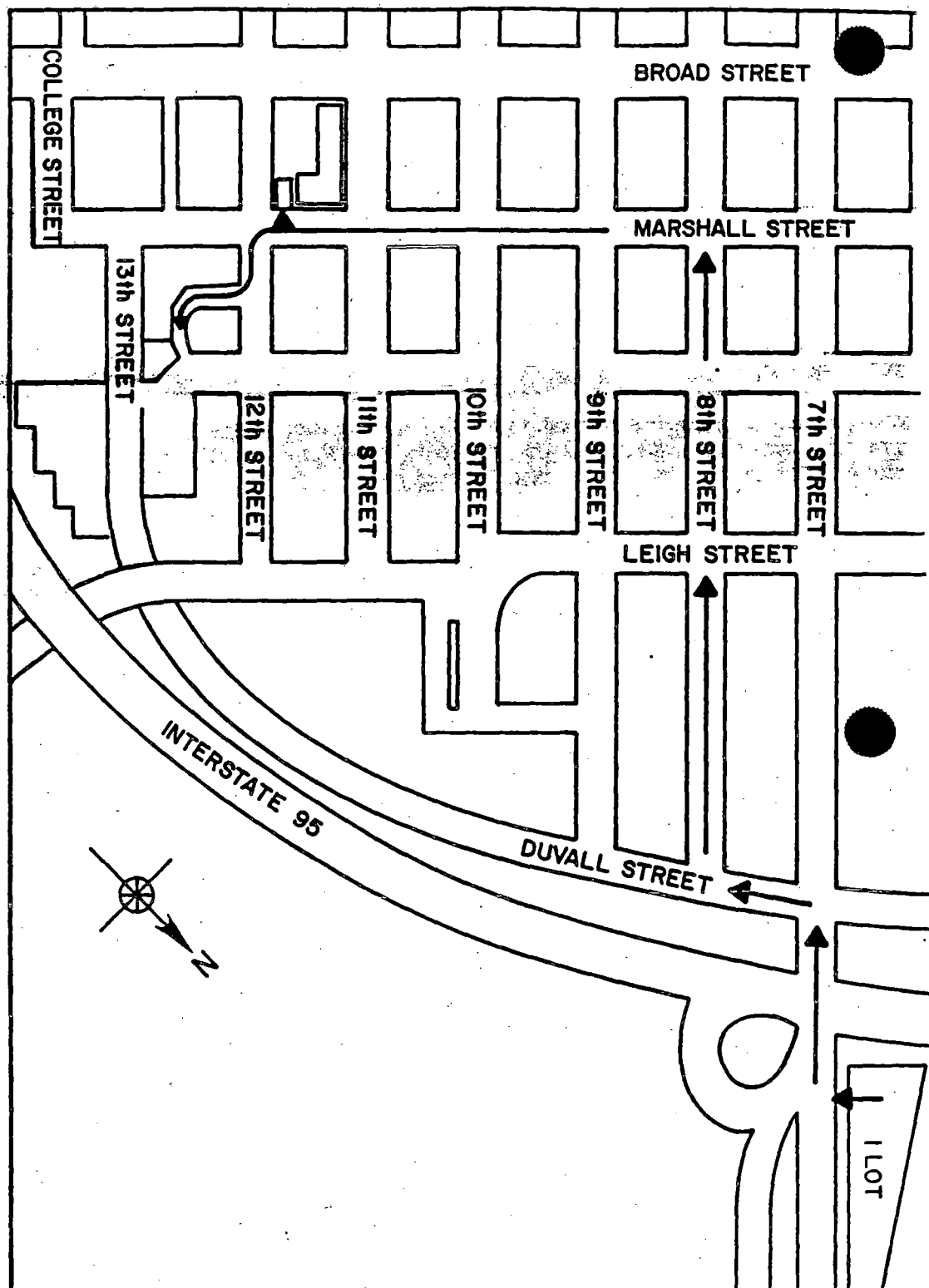


Fig. 4 Heliport Vehicle Route

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- f. Area D: The Personnel Monitoring Specialist will see that all persons in the controlled area are properly outfitted with protective clothing, dosimeters, etc.
- g. Analytic Lab: The Analytic Lab Counting Specialist will coordinate all radioactive analysis procedures.

F. Radiation Safety Personnel Procedures

Seven specific job descriptions have been assigned to the Radiation Safety Team. Their procedures are outlined below along with the equipment that is set aside for each of them.

1. Radiation Safety Director (Faculty)

- a. He is responsible for alerting those members of the Radiation Safety Team he considers necessary. (See Alert List - Appendix I)
- b. He, along with the Medical Director, will evaluate the arriving casualties and decide where to route each victim.
- c. He is equipped with a beta/gamma monitor, an alpha monitor and an ionization chamber for quick assessment of the radiological hazards associated with each patient.
- d. He attaches a patient identification tag.

2. Evaluator of Stretcher Casualties (faculty) Morgue Area

The evaluation of the radiation doses to casualties is very difficult. Therefore, accurate notes will be recorded and samples/swipes taken for further analysis. Virginia Power will provide exposure values which will be useful in the later stages of evaluation. As far as possible, the following procedures will be followed:

- a. Before any decontamination is undertaken, a survey will be made of each patient and the radiation exposure values and radioactive contamination levels at known distances and sites will be recorded.
- b. If the patient's clothes are contaminated, they will be removed, placed in a plastic bag and carefully labeled.
- c. The patient will then be monitored again and if there is removable contamination on his body he will be transferred to the morgue table and washed down. Ordinary soap with lukewarm water will be used initially, followed by decontamination fluids. (See Appendix V for further information)
- d. Where possible, swipes will be taken of contaminated areas, placed in bottles or plastic bags and carefully marked (patient's name, swab site, etc.)
- e. If radioactivity is distributed throughout the body and hair, it may be due to neutron activation. In this case a sample of hair will be taken for further analysis and a quick estimate of whole body neutron exposure will be made as follows:

Place a GM tube against the abdomen with the person bent over or, if this is not practical, under the armpit (keep away from local contamination). The neutron dose received can then be estimated (from the Na-24 produced) using the following calculations:

$$\text{Dose (rads)} = \frac{8.000 \times \text{mR/hr}}{\text{Body wt. (lbs.)}} \quad \text{If surveyed at 2 hours after accident}$$

$$= \frac{16.000 \times \text{mR/hr}}{\text{Body wt. (lbs.)}} \quad \text{If surveyed at 15 hours after accident}$$

- f. If after decontamination the exposure level at one meter is less than 20 mR/hr, the patient may be released to hospital areas (with the proper warning label attached).
- g. If the exposure level from the patient is greater than 100 mR/hr, a pocket ion chamber, in addition to the TLD badge, will be issued to each worker.

3. Evaluator of Ambulatory Casualties (Faculty)

The responsibilities of this person are the same as the Evaluator of Stretcher Casualties. This person will be situated in the shower area.

4. Personnel Monitoring Specialist (Technical)

- a. This person is responsible for the radiation monitoring of VCU personnel.
- b. Once the controlled area has been cordoned off, all persons in the area will be issued a TLD body badge (in addition to any badge they may have). The badge number and the individual's name will be recorded.
- c. All persons in the morgue and shower areas will have:
 - 1) Coveralls and waterproof apron
 - 2) Waterproof overshoes
 - 3) cap
 - 4) rubber or surgical gloves
 - 5) surgical mask
- d. All persons outside the above areas should wear:
 - 1) Coveralls
 - 2) overshoes
 - 3) cap
 - 4) surgical mask
 - 5) surgical or rubber gloves
- e. If it is anticipated that a person might receive a radiation dose greater than one rad, an additional pocket ion chamber will be issued. That person will stop working if he receives greater than 5 Roentgen exposure. All potentially pregnant females will be excluded from the Radiation Safety Team.

- f. Depending on the number of individuals responding to the emergency, the Personnel Monitoring Specialist may also be required to serve as the Analytic Lab Counting Specialist.

5. Area Monitoring Specialist (Technical)

- a. As soon as notification is received, this person will cordon off the area shown on the map by way of rope and warning signs that read Caution: Radioactive Materials - Do Not Enter Without Permission".
- b. He works with security to ensure that no unauthorized persons enter the area.
- c. He works to keep the hall area as free of contamination as possible by mopping up spills, etc.
- d. He will take special care that no one spreads contamination from the main decontamination areas --the morgue and the showers--into the Hall.
- e. He will periodically monitor the loading dock and decontaminate where necessary.

6. Incoming Monitoring Specialist (Technical)

- a. This person performs the initial monitoring of all incoming injured personnel.
- b. He also monitors paramedics and other support personnel in the loading dock area to prevent the spread of contamination.
- c. He reports to the Radiation Safety Director the presence of highly contaminated casualties who are awaiting treatment.
- d. He monitors transportation personnel before their departure to insure they are not contaminated.

7. Analytic Lab Counting Specialist (Technical)

- a. This person will be familiar with the operation of all counting instruments in the Radiation Safety laboratory.
- b. The gas proportional counter will be used for the detection of alpha and beta contamination.
- c. The liquid scintillation counter may be used for the detection of tritium and other weak beta emitters from swipe samples and urine samples.
- d. Two multichannel analyzers and one single channel analyzer, each equipped with a NaI crystal, will be available to detect gamma radiation from samples, radioactive iodine in the thyroid or other radionuclides deposited within the body.
- e. TLD body badges may be evaluated using the TLD reader to provide monitoring results for each person in the controlled area.
- f. Careful records will be kept in order to provide labeled results for all swipe samples received and all TLD body badges read.

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G. Equipment Available to Safety Office Personnel

The emergency equipment is maintained in a locked cabinet in Radiation Safety (B2-012). It has been divided into seven marked boxes so that each team member has the correct equipment for his duties.

1. Equipment for Radiation Safety Director

- a. Beta/gamma geiger counter.
- b. Ion chamber survey meter.
- c. Alpha monitor, probe AC-3.
- d. Clipboard with pad and pencil.

2. Equipment for Evaluator of Stretcher Casualties

- a. Beta/gamma geiger counter.
- b. Clipboard with pad, pencil, and felt marker.
- c. Fifteen (15) large plastic bags for clothing.
- d. Alcohol swabs and small plastic bags for patient samples.
- e. Q-tips and small plastic bags or tubes for patient samples.
- f. Tie-on labels.
- g. Roll of warning tape.
- h. Scissors.
- i. Decontaminating fluid.
- j. Rolls of absorbent paper.
- k. Sheets (Available in Morgue).

3. Equipment for Evaluator of Ambulatory Casualties

- a. Beta/gamma geiger counter.
- b. Patient clothing (available in Morgue).
- c. Items (b) through (k) above.

4. Equipment for Personnel Monitoring Specialist

- a. Beta/gamma geiger counter.
- b. Twenty (20) pen dosimeters (1R) and charger.
- c. Twenty-five (25) loaded TLD badges (keep two for control purposes).
- d. Clipboard with pad, pencil, and felt marker.
- e. Large plastic bags for contaminated protective clothing.
- f. Forty (40) coveralls or surgical gowns.
- g. Ten (10) waterproof aprons (available in Morgue).
- h. Twenty-five (25) surgical face masks.
- i. Twenty-five (25) surgical caps.
- j. Thirty (30) waterproof overshoes.
- k. Ten (10) cotton overshoes.
- l. Fifty (50) pair of rubber gloves.
- m. Supply of labels and warning tape.
- n. Rolls of absorbent paper.
- o. Decontaminating swabs.
- p. Two (2) breathing masks (respirators).
- q. Five (5) pair of waterproof boots.

5. Equipment for Area Monitoring Specialist

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- a. Beta/gamma geiger counter.
 - b. Air Sampler.
 - c. One-hundred (100) feet of rope.
 - d. Five (5) signs ("Caution Radioactive material--Do Not Enter Without Permission").
 - e. Five (5) large plastic bags.
 - f. Clipboard with pad, pencil, and felt marker.
 - g. Rolls of absorbent paper (Kitchen Towels).
 - h. Cleaning equipment: mop, bucket, soap, and sponge (available in Morgue).
 - i. Decontaminating fluid.
 - j. Rolls of warning tape.
 - k. Assorted caution signs.
 - l. Scissors.
6. Equipment for Incoming Monitoring Specialist
- a. Ion Chamber.
 - b. G-M Detector.
7. Equipment for Analytic Lab Specialist
- a. Gas Proportional Counter.
 - b. Liquid Scintillation Counter.
 - c. Multichannel Analyzer with NaI well crystal.
 - d. Single Channel Analyzer with NaI 2x2 crystal.
 - e. Multichannel Analyzer with NaI 2x2 crystal.
 - f. TLD Reader.

H. Medical Equipment Available to the Area

1. Two (2) heart monitors.
2. Two (2) defibrillators.
3. One (1) adult code blue cart.
4. Two (2) portable oxygen set-ups.
5. One (1) medical emergency disaster kit.
6. Three (3) LV. poles (stored in Radiation Safety).
7. Four (4) stretchers and three (3) attendants.

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VI. PLAN B

(Minor Accidents)

A. Introduction

In the event of an accident within MCV/VCU or the central Virginia region (see description of potential emergencies), MCV will provide facilities for receiving the injured and/or contaminated victims. In these situations the number of individuals requiring emergency assistance will probably be small. Seriously injured victims will be routed to the MCV Emergency Department. Members of the Radiation Emergency Team will then respond to the Emergency Department. In some cases the Radiation Safety Director may decide to send a team to the accident scene. For this reason Plan B will be flexible, yet extensive enough to ensure the proper handling of each situation. The VCU Emergency Services Van will be utilized to transport the Radiation Emergency Team to the accident site.

B. Notification

The Radiation Safety emergency line () is always open for emergency calls. In the event an emergency call is received during regular working hours, the person receiving the call will take the name and location of the caller and also obtain the necessary information about the accident. All information will be recorded.

The Radiation Safety Director or a member of the Radiation Safety Team will then be notified. He/she will decide what action to take. If an emergency call is received after working hours, the call will automatically be transferred to Telepage. Telepage will then contact one or more members of the Radiation Safety team and the Hospital Superintendent.

C. Procedure

All members of the Radiation Safety team notified to assist in the handling of the particular emergency shall assemble in the corridor outside of Radiation Safety (Sanger Hall B2-014). The Radiation Safety Director (or team leader) will assign specific positions and responsibilities to each person. (See Plan A - Job Descriptions). The emergency cabinet in Room B2-010 will be opened and the appropriate protective clothing and equipment will be distributed. All persons will then proceed to their respective locations in the controlled area in MEB or the Emergency Department. These areas will be cordoned off if necessary. The personnel will be chosen according to their medical and/or radiological specialties.

D. Procedure for the Care of Contaminated Patients in the Emergency Department.

1. Any Emergency Department (ED) employee receiving notification of the impending arrival of a patient (s) potentially contaminated with radioactive substances should notify the Charge Nurse in the ED and the senior-most Surgical Resident so that they may obtain the necessary data to complete the "Radiation Emergency Notification Report" (See Appendix IX).
2. After completing the "Radiation Emergency Notification Report" the senior most Surgical Resident will notify the Medical Director of the ED of the anticipated situation. The Charge Nurse will notify the Environmental Health and Safety Office (OEHS) and the Administrator of Emergency Services. In the absence of the Administrator of Emergency Services the Charge

Nurse will notify the Hospital Superintendent.

3. Based on the information received during the initial telephone or radio communication the pre-hospital providers will be instructed to initiate Advanced Life Support as necessitated by the patient's clinical status and to either deliver the patient(s) to the ED ambulance area or to the Sanger Hall Loading Dock (see Figure 1 for triage criteria).
4. The Hospital Superintendent will notify the VCU Police, if indicated, to secure the anticipated delivery site. When the ambulance arrives at one of the designated locations, the patient will be assessed, in the ambulance, by both the senior-most Surgical Resident and the Safety Officer. All ED staff will don protective gear prior to coming into contact with the patient. Assessment of the degree of contamination will be done by the OEHS Staff Member while the physician assesses the patient's clinical status. **EMERGENCY LIFE-SAVING MEASURES ARE TO ALWAYS TAKE PRECEDENCE OVER DECONTAMINATION ACTIVITIES.**
5. The patient(s) will then be transported to designated rooms in the Non-Acute ED, via the doorway which connects the ambulance entrance to the Non-Acute ED, (See Figure 5) on a stretcher which has been equipped with the special decontamination tub. The patient(s) will be transported by ED staff who have donned the appropriate protective garb.
6. Rooms G-211, 212, 213, and 214 in the Non-Acute ER (see Figure 6) will be used for all patients seen in the ED unless the number of patients requiring medical care and decontamination exceeds the space available in the designated rooms. In such an event the Charge Nurse, in consultation with the senior-most Surgical and senior-most Medical Residents and the OEHS Staff Member will determine the placement of patients in the ED.
7. Pre-hospital providers should be instructed to remain with their vehicles until they and their vehicles can be thoroughly surveyed, decontaminated and released for duty by the OEHS.
8. After stabilization and medical treatment of the patient is achieved, decontamination procedures are to be initiated as follows.
 - a. If gross decontamination has not been done, remove the patient's clothing and belongings, place them in a plastic bag, and label them with the patient's name and tag stating "Radioactive - DO NOT DISCARD". The OEHS Staff member will be responsible for decontamination activities associated with the patients's belongings.
 - b. If requested by the OEHS Staff Member, evaluation of the possibility of internal contamination will be done, i.e., cotton swab samples of ear canals, nostrils and mouth. These swabs will be placed in separate containers labeled with the patient's name, date and site of sample. Blood work may also be ordered by the physician.
 - c. The entire body will be monitored, front and back, by the OEHS to determine the area and extent of contamination. Decontamination is to be done in the following priority: (see attachment "Specific Area Decontamination - Suggested Methods")
 1. Contaminated open wounds
 2. Contaminated eyes
 3. Contaminated nostrils or mouth
 4. Contaminated ear canals
 5. Contaminated intact skin
 6. Contaminated hair

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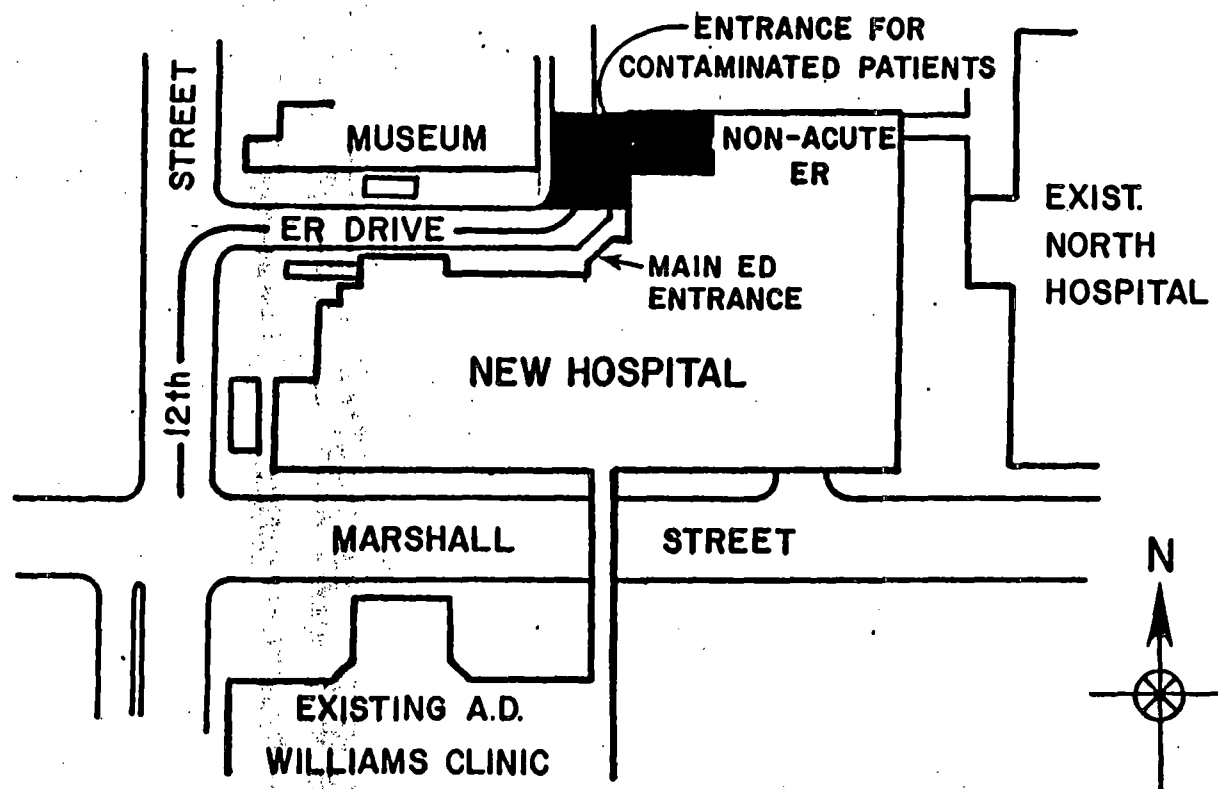


Fig. 5 Emergency Department Control Area

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SEP

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ED Treatment & Decontamination Area

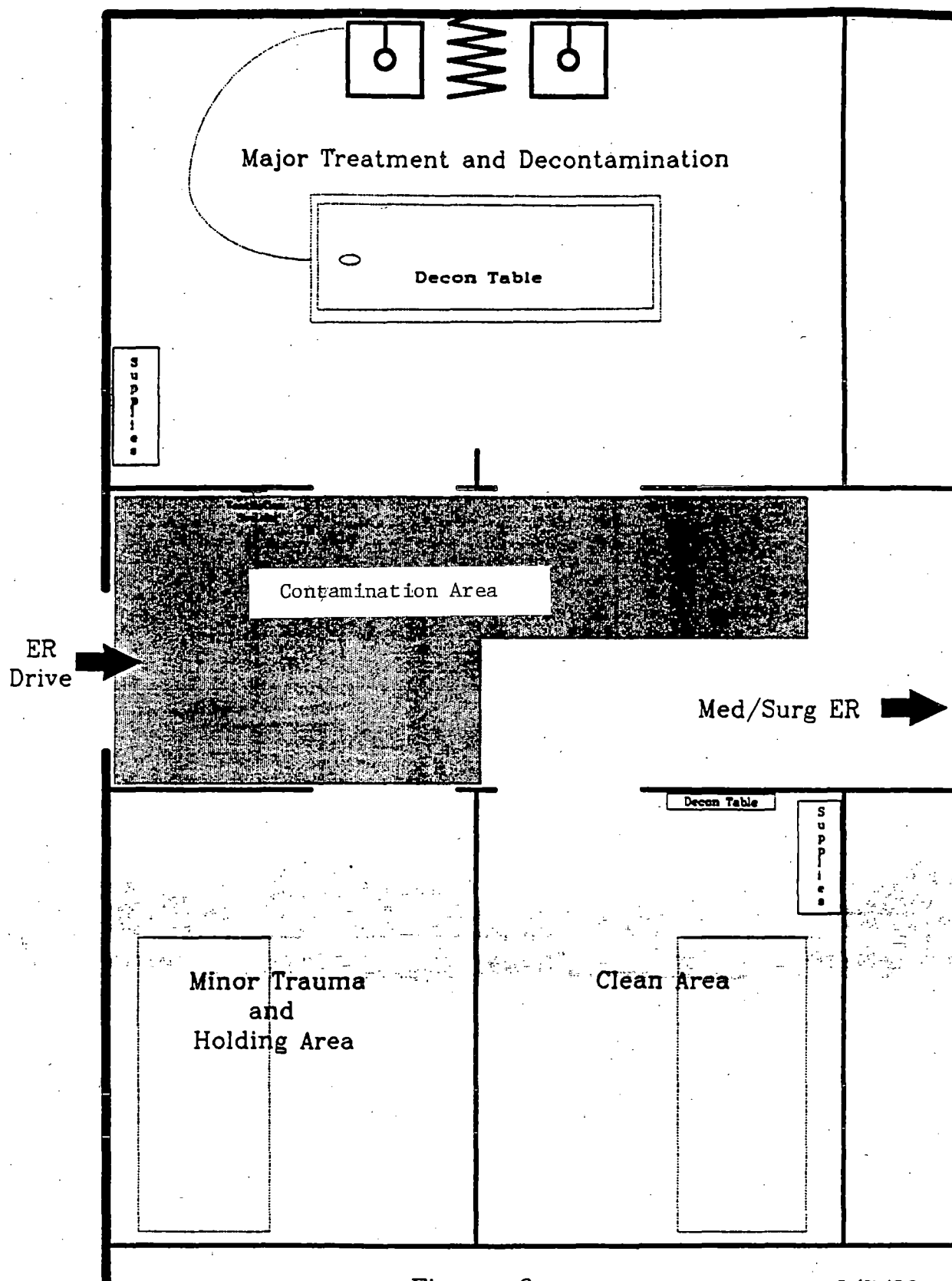


Figure 6

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- d. Decontamination procedures should be continued as long as efforts continue to be effective in reducing levels of contamination. If skin abrasions occur the procedures should be discontinued.
 - e. Meter readings should be obtained throughout the decontamination procedure by the OEHS and recorded.
 - f. Following decontamination, "Post Decontamination" swabs will be collected and labeled for analysis by the OEHS.
 - g. The decontamination area floor should be covered with a plastic sheet and a clean stretcher brought into the area to transfer the patient out of the room.
 - h. Personnel not involved with the decontamination procedures should transport the decontaminated patient once they are out of the area. The stretcher and all individuals who enter the decontaminated area should be surveyed by the OEHS Staff Member before they exit the room.
 - i. Patients awaiting decontamination should be covered with a sheet and be attended by nursing and medical staff who have donned protective clothing as indicated by the OEHS Staff Member.
9. Upon termination of the decontamination efforts, all personnel must follow the same monitoring and decontamination routine as the patients. Protective clothing worn by the staff are to be saved for proper disposal under the direction of the OEHS.
10. If specialized medical treatment is required for patients with ingestion or massive exposure of radiation, the physician directly involved in the management of radiation accident victims can request assistance from the Radiation Emergency Assistance Center/Training Site (REAC/TS) in Oak Ridge, Tennessee. REAC/TS provides telephone consultation on a 24 hour basis, or a response team, after consultation with OEHS Staff Member, can be dispatched, if necessary. REAC/TS will accept patients, following initial treatment and provide treatment related to their radiation injuries. REAC/AS can be contacted:

Monday through Friday, 8:00 a.m. to 4:30 p.m. --

After hours listed above --

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APPENDIX I

Dr. Yellow
(Alert List)

1. RADIATION SAFETY TEAM OFFICE HOME

Staff

Dr. Dean W. Broga
Mary Beth Pappas
Betty Schwab
Dr. Panos Fatouros
Robert Howells
Nick Perdikaris
Robert Walter
Steve Atkins

Technicians

Ronald Guye
John Carter
Emily Talpas

2. MEDICAL TEAM

Dr. W. Dingleline (VA. POWER)

Dr. Alton Sharpe
Dr. Melvin Fratkin
Dr. G. Watson James
Dr. James Tatum
Dr. Tim Burke
Dr. Boyd Haynes
Chief Medical Resident, Telepage
Chief Surgical Resident, Telepage
Chief Burn Resident, Telepage
Telepage
Nursing Supervisor
VCU Police
Pharmacy (Disaster Kit)
Transportation
Central Service
Dr. Kevin Cooper, Disaster Commit.
Carole Roper, Media Services
Celia Barnes, Information Services

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3. Additional Support Specialists

Dr. Lorne Garretson
(Poison Control)
Dr. Timothy Merz
(Radiobiology)
Dr. W.H. Barr
(Pharmacy)
Dr. Richard King
Mr. Marc Gilbert
(Medical Physicist)
St. Mary's Hospital
Dr. Alfred M. Strash

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APPENDIX II

External Support Specialists

Nuclear Regulatory Commission
101 Marietta Street, Suite 3100
Atlanta, GA 30303

U. S. Department of Energy Regional Office
Radiation Emergency Assistance Center (REACS)
P.O. Box E - Oak Ridge
Oak Ridge, TN

Methodist Hospital number:

Virginia State Department of Health
Radiological Health Section
109 Governor Street
Richmond, VA 23219

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APPENDIX III

Analytic Lab Equipment

1. **Intertechnique Liquid Scintillation Spectrometer
(Model SL-30)**
2. **Ludlum Mini-Scaler & Eberline Gas Proportional Counter
(Model FC-2)**
3. **Tracor-Northern Multi-Channel Analyzer
(Model TN-1705)**
4. **Hamner-Harshaw Single-Channel Analyzer**
5. **Nuclear Data Multi-Channel Pulse Height Spectrometer
(Model ND-62)**
6. **1/2" X 1/2" Sodium Iodide Crystal**
7. **1" x 1" Sodium Iodide Crystal**
8. **2" x 2" Sodium Iodide Crystal**
9. **Well Type Sodium Iodide Crystal**
10. **Eberline TLD Reader (Model TLR-5)**

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APPENDIX IV

RULES OF THUMB

Alpha Particles

1. It requires an alpha particle of at least 7.5 MeV to penetrate the protective layer of the skin, 0.07 mm thick.

Beta Particles

1. It requires a beta particle of at least 70 keV to penetrate the protective layer of the skin, 0.07 mm thick.
2. The range (R) of beta particles in g/cm (thickness in cm multiplied by the density in g/cm) is approximately equal to the maximum energy (E) in MeV divided by 2 (i.e., $R = E/2$).
3. The range of beta particles in air is about 12 ft per MeV; for example, a 3 MeV beta has a range of about 36 ft in air.
4. A chamber wall thickness of 30 mg/cm will reduce a flux of 1 MeV (max.) betas by 30% and a flux of 0.4 MeV betas by a factor of 4 or 5.
5. The intensity of bremsstrahlung increases approximately with the energy of the beta particle and about the square of the atomic number of the absorbing material.
6. When betas of 1 to 2 MeV pass through light materials such as water, aluminum, or glass, less than 1% of their energy is dissipated as bremsstrahlung.

PERSONNEL DECONTAMINATION

Method*	Surface	Action	Technique	Advantages	Disadvantages
Soap and water	Skin and hands	Emulsifies and dissolves contaminate.	Wash 2-3 minutes and monitor. Do not wash more than 3-4 times.	Readily available and effective for most radioactive contamination.	Continued washing will defat the skin. Indiscriminate washing of other than affected parts may spread contamination.
Soap and water	Hair	Same as above.	Wash several times. If contamination is not lowered to acceptable levels, shave the head and apply skin decontamination methods.		
Lava soap, soft brush, and water	Skin and hands	Emulsifies, dissolves, and erodes.	Use light pressure with heavy lather. Wash for 2 minutes, 3 times. Rinse and monitor. Use care not to scratch or erode the skin. Apply lanolin or hand cream to prevent chapping.	Same as above.	Continued washing will abrade the skin.
Tide or other detergent (plain)	Same as above.	Same as above.	Make into a paste. Use with additional water with a mild scrubbing action. Use care not to erode the skin.	Slightly more effective than washing with soap.	Will defat and abrade skin and must be used with care.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

A P P E N D I X V

PERSONNEL DECONTAMINATION--Continued

Method*	Surface	Action	Technique	Advantages	Disadvantages
Mixture of 50% Tide and 50% corn-meal	Skin and hands	Emulsifies, dis-solves, and erodes.	Make into a paste. Use with addi-tional water with a mild scrubbing action. Use care not to erode the skin.	Slightly more ef-fective than washing with soap.	Will defat and abrade skin and must be used with care.
5% water solution of a mixture of 30% Tide, 65% Cal-gon, 5% Carbose (carboxymethyl cellulose)	Same as above.	Same as above.	Use with water. Rub for a minute and rinse.	Same as above.	Same as above.
A preparation of 8% Carbose, 3% Tide, 1% Versene, and 88% water homogenized into a cream.	Same as above.	Same as above.	Use with addi-tional water. Rub for 1 minute and wipe off. Follow with lano-lin or hand cream.	Same as above.	Same as above.
Titanium dioxide paste. Prepare paste by mixing precipitated tita-nium dioxide (a very thick slurry, never permitted to dry) with a small amount of lanolin. If not successful, go on to next step.	Skin, hands, and extremities. Do not use near face or other body openings.	Same as above.	Work the paste into the affected area for 2 min-utes. Rinse and wash with soap and warm water. Monitor.	Removes contami-nation lodged under scaly sur-face of skin. Good for heavy surface contami-nation of skin.	If left on too long will remove skin.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

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PERSONNEL DECONTAMINATION--Continued

Method*	Surface	Action	Technique	Advantages	Disadvantages
Mix equal volumes of a saturated solution of potassium permanganate and 0.2 N sulfuric acid. (Saturated solution of KMnO_4 is 6.4 grams per 100 ml of H_2O .) Continue with next step.	Skin, hands, and extremities. Do not use near face or other body openings.	Dissolves contaminant absorbed in the epidermis.	Pour over wet hands, rubbing the surface and using hand brush for not more than 2 minutes. Rinse with water.	Superior for skin contamination. May be used in conjunction with titanium oxide.	Will remove a layer of skin if in contact with the skin for more than 2 minutes.
Apply a freshly prepared 5% solution of sodium acid sulfite. (Solution made by dissolving 5 gm of NaHSO_3 crystals in 100 ml distilled water.)	Same as above.	Removes the permanganate stain.	Apply in same manner as above. Apply for not more than 2 minutes. The above procedure may be repeated. Apply lanolin or hand cream when completed.		Same as above.
Flushing	Eyes, ears, nose, and mouth	Physical removal by flushing.	Roll back the eyelid as far as possible, flush with large amounts of water. If isotonic irrigants are available, obtain them without delay. Apply to eye continually and then flush with large amounts of water.	If used immediately will remove contamination. May also be used for ears, nose, and throat.	When using for nose and mouth, contaminated individual should be warned not to swallow the rinses.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

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PERSONNEL DECONTAMINATION--Continued

Method*	Surface	Action	Technique	Advantages	Disadvantages
Flushing (Cont'd)			(Isotonic irrigant [0.9% NaCl solution]: 9 grams NaCl in beaker, fill to 1000 cc with water.) Can be purchased from drug suppliers, etc.		
Flushing	Wounds	Physical removal by flushing.	Further decontamination should be done under medical supervision. Wash wound with large amounts of water and spread edges to stimulate bleeding, if not profuse. If profuse, stop bleeding first, clean edges of wound, bandage, and if any contamination remains, it may be removed by normal cleaning methods, as above.	Quick and efficient if wound not severe.	May spread contamination to other areas of body if not done carefully.
Sweating	Skin of hands and feet	Physical removal by sweating.	Place hand or foot in plastic glove or boot. Tape shut. Place near source of heat for 10-15 minutes or	Cleansing action is from inside out. Hand does not dry out.	If glove or boot is not removed shortly after profuse sweating starts and part washed with soap

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

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PERSONNEL DECONTAMINATION--Continued

Method*	Surface	Action	Technique	Advantages	Disadvantages
Sweating (Cont'd)			until hand or foot is sweating profusely. Remove glove and then wash using standard techniques. Or gloves can be worn for several hours using only body heat.		and water immediately, contamination may seep into the pores.

AREA AND MATERIAL DECONTAMINATION

Method*	Surface	Action	Technique	Advantages	Disadvantages
Vacuum cleaning	Dry surfaces	Removes contaminated dust by suction.	Use conventional vacuum technique with efficient filter.	Good on dry, porous surfaces. Avoids water reactions.	All dust must be filtered out of exhaust. Machine is contaminated.
Water	All nonporous surfaces (metal, painted, plastic, etc.).	Dissolves and erodes.	<u>For large surfaces</u> Hose with high-pressure water at an optimum distance of 15 to 20 feet. Spray vertical surfaces at an angle of incidence of 30° to 40°; work from top to bottom to avoid recontamination. Work upwind to avoid spray.	All water equipment may be utilized. Allows operation to be carried out from a distance. Contamination may be reduced by 50%. Water equipment may be used for solutions of other decontaminating agents.	Drainage must be controlled. Not suitable for porous materials. Oiled surfaces cannot be decontaminated. Not applicable on dry contaminated surfaces (use vacuum); not applicable on porous surfaces such as wood, concrete,

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

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AREA AND MATERIAL DECONTAMINATION--Continued

Method*	Surface	Action	Technique	Advantages	Disadvantages
Water (Cont'd)	All surfaces	Dissolves and erodes.	Determine cleaning rate experimentally, if possible; otherwise, use a rate of 4 square feet per minute. For small surfaces Blot up liquid and handwipe with water and appropriate commercial detergent.	Extremely effective if done immediately after spill and on nonporous surfaces.	canvas, etc. Spray will be contaminated. Of little value in the decontamination of large areas, longstanding contaminants and porous surfaces.
Steam	Nonporous surfaces (especially painted or oiled surfaces).	Dissolves and erodes.	Work from top to bottom and from upwind. Clean surface at a rate of 4 square feet per minute. The cleaning efficiency of steam will be greatly increased by using detergents.	Contamination may be reduced approximately 90% on painted surfaces.	Steam subject to same limitations as water. Spray hazard makes the wearing of waterproof outfits necessary.
Detergents	Nonporous surfaces (metal, painted, glass, plastic, etc.).	Emulsifies contaminant and increases wetting power of water and cleaning efficiency of steam.	Rub surface 1 minute with a rag moistened with detergent solution then wipe with dry rag; use clean surface of the rag for each application. Use a power rotary brush with	Dissolves industrial film and other materials which hold contamination. Contamination may be reduced by 90%.	May require personal contact with surface. May not be efficient on longstanding contamination.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

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AREA AND MATERIAL DECONTAMINATION--Continued

Method*	Surface	Action	Technique	Advantages	Disadvantages
Detergents (Cont'd)			pressure feed for more efficient cleaning. Apply solution from a distance with a pressure proportioner. Do not allow solution to drip onto other surfaces. Mist application is all that is necessary.		
Complexing agents	Nonporous surfaces (especially unweathered surfaces; i.e., no rust or calcareous growth).	Forms soluble complexes with contaminated material.	Complexing agent solution should contain 3% (by weight) of agent. Spray surface with solution. Keep surface moist 30 minutes by spraying with solution periodically. After 30 minutes, flush material off with water. Complexing agents may be used on vertical and overhead surfaces by adding chemical foam (sodium carbonate or aluminum sulfate).	Holds contamination in solution. Contamination may be reduced by 75% in 4 minutes on unweathered surfaces. Easily stored; carbonates and citrates are nontoxic, noncorrosive.	Requires application for 5 to 30 minutes. Little penetrating power of small value on weathered surfaces.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

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AREA AND MATERIAL DECONTAMINATION--Continued

Method*	Surface	Action	Technique	Advantages	Disadvantages
Organic solvents	Nonporous surfaces (greasy or waxed surfaces, paint or plastic finishes, etc.).	Dissolves organic materials (oil, paint, etc.).	Immerse entire unit in solvent or apply by wiping procedure (see Detergents).	Quick dissolving action. Recovery of solvent possible by distillation.	Requires good ventilation and fire precautions. Toxic to personnel. Material bulky.
Inorganic acids	Metal surfaces (especially with porous deposits; i.e., rust or calcareous growth); circulatory pipe systems.	Dissolves porous deposits.	Use dip-bath procedure for movable items. Acid should be kept at a concentration of 1 to 2 normal (9 to 18% hydrochloric, 3 to 6% sulfuric acid). Leave on weathered surfaces for 1 hour. Flush surface with water, scrub with a water-detergent solution, and rinse. Leave in pipe circulatory system 2 to 4 hours; flush with plain water, a water-detergent solution, then again with plain water.	Corrosive action on metal and porous deposits. Corrosive action may be moderated by addition of corrosion inhibitors to solution.	Personal hazard. Wear goggles, rubber boots, gloves, and aprons. Good ventilation required because of toxicity and explosive gases. Acid mixtures should not be heated. Possibility of excessive corrosion if used without inhibitors. Sulfuric acid not effective on calcareous deposits.
Acid mixtures: hydrochloric, sulfuric, acetic, citric acids, acetates, citrates	Nonporous surfaces (especially with porous deposits); circulatory pipe systems.	Dissolves porous deposits.	Same as for inorganic acids. A typical mixture consist of 0.1 gal. hydrochloric acid, 0.2 lb sodium acetate and 1	Contamination may be reduced by 90% in 1 hour (unweathered surfaces). More easily handled than inorganic acid solution.	Weathered surfaces may require prolonged treatment. Same safety precautions as required for inorganic acids.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

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AREA AND MATERIAL DECONTAMINATION--Continued

Method*	Surface	Action	Technique	Advantages	Disadvantages
Acid mixtures (Cont'd) Caustics: lye (sodium hydroxide) calcium hydroxide potassium hydroxide	Painted surfaces (horizontal).	Softens paint (harsh method).	gal. water Allow paint-remover solution to remain on surface until paint is softened to the point where it may be washed off with water. Remove remaining paint with long-handled scrapers. Typical paint remover solution: 10 gal. water, 4 lb lye, 6 lb boiler compound, 0.75 lb corn-starch.	Minimum contact with contaminated surfaces. Easily stored.	Personal hazard (will cause burns). Reaction slow; thus, it is not efficient on vertical or overhead surfaces. Should not be used on aluminum or magnesium.
Trisodium phosphate	Painted surfaces (vertical, overhead).	Softens paint (mild method).	Apply hot 10% solution by rubbing and wiping procedure (see Detergent).	Contamination may be reduced to tolerance in one or two applications.	Destructive effect on paint. Should not be used on aluminum or magnesium.
Abrasion	Nonporous surfaces.	Removes surface.	Use conventional procedures, such as sanding, filing, and chipping; keep surface damp to avoid dust hazard.	Contamination may be reduced to as low a level as desired.	Impracticable for porous surfaces because of penetration by moisture.
Sandblasting	Nonporous surfaces.	Removes surfaces.	Keep sand wet to lessen spread of contamination.	Practical for large surface areas.	Contamination spread over area must be removed.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

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Summary of clinical effects

Range	0 to 100 rem Subclinical range	100 to 1000 rem Therapeutic range			Over 1000 rem Lethal range	
		100 to 200 rem	200 to 600 rem	600 to 1000 rem	1000 to 5000 rem	Over 5000 rem
		Clinical surveillance	Therapy effective	Therapy promising	Therapy palliative	
Incidence of vomiting	None	100 rem: 5% 200 rem: 50%	300 rem: 100%	100%	100%	
Delay time	—	3 hours	2 hours	1 hour	30 minutes	
Leading organ	None	Haematopoietic tissue			Gastrointestinal tract	Central nervous system
Characteristic signs	None	Moderate leukopaenia	Severe leukopaenia; purpura; haemorrhage; infection. Epilation above 300 rem		Diarrhoea; fever; disturbance of electrolyte balance	Convulsions; tremor; ataxia; lethargy
Critical period post-exposure	—	—	4 to 6 weeks		5 to 14 days	1 to 48 hours
Therapy	Reassurance	Reassurance; haematologic surveillance	Blood transfusion; antibiotics	Consider bone marrow transplantation	Maintenance of electrolyte balance	Sedatives
Prognosis	Excellent	Excellent	Good	Guarded	Hopeless	
Convalescent period	None	Several weeks	1 to 12 months	Long	—	
Incidence of death	None	None	0 to 80% (variable)	80 to 100% (variable)	90 to 100%	
Death occurs within	—	—	2 months		2 weeks	2 days
Cause of death	—	—	Haemorrhage; infection		Circulatory collapse	Respiratory failure; brain oedema

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APPENDIX VI
EMERGENCY DOSE ASSESSMENT

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APPENDIX VII

Medical Emergency Disaster Kit

Atropine Sulfate	20 - 0.6mg/ml Tubex
Cefazolin	20 - 1.0gm vials (Ancef)
Cefoxitin	10 - 1.0gm vials
Clindamycin	20 - 300mg/2 ml Ampules
Dexamethasone	15 - 4mg/ml vials
Dopamine	20 - 200mg/5 ml Ampules
Epinephrine	10 - 1:1000 1 ml Tubex
Furosemide	10 - 20mg/2 ml Ampules
Gentamicin	10 - 80mg/2 ml
Lidocaine	5 - 2gm vials for IV use
Methylprednisolone Inj.	10 - 1gm vials (Solu-Medrol)
Pancronium Bromide Inj.	10 - Ampules
Penicillin VK	10 - 5 million unit vials
Phenytoin	5 - 100mg/2 ml Ampules
Sodium Bicarbonate Inj.	20 - 50Eq/50 ml
Tetanus Toxoid	50 - 0.5 ml Tubex
Tubex Cartridges	15 - 2cc size
Triple Antibiotic Ophthalmic Ointment	5 - Tubes

APPENDIX VIII

DATA COLLECTION FOR RADIATION HAZARD ANALYSIS

The radiation problems associated with an accident patient may arise from any or all of the following:

1. External irradiation
2. Neutron activation
3. External contamination
4. Internal contamination

In order to evaluate the relative hazard from a patient it is necessary to collect data and samples from the patient for subsequent analysis. Given below are the types of data and samples that should be collected, depending upon the condition of the patient:

1. External Irradiation
 - a. Ionization chamber readings indicating exposure as well as cpm with a geiger counter (for precautionary measures)
 - b. Personnel dosimeters, if worn
2. Neutron Activation
 - a. Ionization chamber readings indicating exposure as well as cpm with a geiger counter
 - b. Metal object (jewelry, belt buckles, coins)
 - c. A sample of hair
3. External Contamination
 - a. Ionization chamber readings indicating exposure as well as cpm with a geiger counter.
 - b. Swipes from skin
 - c. Nose swabs
 - d. Ear swabs
 - e. Swipes around eyes
 - f. Clothing samples
4. Internal Contamination
 - a. Swabs of body orifices
 - b. Urine - series of 24 hour samples
 - c. Blood - within 72 hours
 - d. Feces - series of 24 hour samples
 - e. Vomitus

The following data sheet should be filled out for each patient.

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PATIENT DATA SHEET

Name _____
Age _____ Sex _____

Date _____
Time _____

A. Exposure Rate and cpm



mR/hr at 6 inches



GM

cpm at 6 inches



NaI

cpm at 6 inches

B. Neutron Activation

List object or samples collected:

1N _____
2N _____
3N _____
4N _____

C. Suspected Internal Contamination

_____ None
_____ Ingested
_____ Inhaled

_____ Absorbed thru skin
_____ Location _____
_____ Absorbed thru wound
_____ Location _____

Internal samples

1I _____
2I _____
3I _____
4I _____
5I _____
6I _____

Possible radionuclides

D. Suspected External Contamination



Location of swipes

1E _____
2E _____
3E _____
4E _____
5E _____
6E _____
7E _____
8E _____
9E _____
10E _____

Possible radionuclides

Show locations
of swipes

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Table I
FISSION PRODUCTS BY INCREASING T_γ

T_γ (MeV)	Nuclide	Yield(%)	Half-life	Type	Cross references
0.030	Ba-140	11	12.8 d		
0.091	Nd-147	28	5.3 d		
0.134	Ce-144	11	284 d		
0.145	Ce-141	48	33 d		
0.267	Y-95	6	11 m	Solid	Tc-104, La-142, Pr-146
0.293	Ce-143	46	33 d		
0.36	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
0.364	I-131	82	8.1 d	Iodine	I-132, I-133, I-135
0.487	La-140	40	40.2 h		
0.52	I-132	20	2.3 h	Iodine	I-131, I-133, I-135
0.53	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
0.53	I-133	90	21 h	Iodine	I-131, I-132, I-135
0.533	Nd-147	13	11.1 d		
0.537	Ba-140	34	12.8 d		
0.59	Cs-140		66 s	Volatile	
0.65	La-142	48	92.5 m	Solid	Y-95, Tc-104, Pr-146
0.662	Cs-137	85	30 y		
	Ba-137m		2.6 m		
0.67	I-132	144	2.3 h	Iodine	I-131, I-133, I-135
0.724	Zr-95	49	65 d		
0.74	Pr-146	16	24 m	Solid	Y-95, Tc-104, La-142
0.748	Sr-91	27	9.7 h		
0.756	Zr-95	49	65 d		
0.765	Nb-95	100	35 d		
0.773	I-132	89	2.3 h	Iodine	I-131, I-133, I-135
0.78	Pr-146	15	24 m	Solid	Y-95, Tc-104, La-142
0.86	I-135	11	6.7 h	Iodine	I-131, I-132, I-133
0.88	Br-84	51	31.7 m	Halogen	Br-87
0.88	Cs-140		66 s	Volatile	
0.89	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
0.955	I-132	22	2.3 h	Iodine	I-131, I-133, I-135
1.01	Br-84	10	31.7 m	Halogen	Br-87
1.025	Sr-91	30	9.7 h		
1.14	Cs-140		66 s	Volatile	
1.14	I-135	37	6.7 h	Iodine	I-131, I-132, I-133
1.15	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
1.25	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
1.28	I-135	34	6.7 h	Iodine	I-131, I-132, I-133
1.37	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
1.40	I-132	14	2.7 h	Iodine	I-131, I-133, I-135
1.44	Br-87		55 s	Halogen	Br-84
1.46	I-135	12	6.7 h	Iodine	I-131, I-132, I-133
1.51	Pr-146	27	24 m	Solid	Y-95, Tc-104, La-142
1.596	La-140	96	40.2 h		
1.6	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
1.62	Cs-140		66 s	Volatile	
1.72	I-135	19	6.7 h	Iodine	I-131, I-132, I-133
1.80	i-135	11	6.7 h	Iodine	I-131, I-132, I-133

Table I

FISSION PRODUCTS BY INCREASING T_γ (cont'd.)

T_γ (MeV)	Nuclide	Yield(%)	Half-life	Type	Cross references
1.85	Br-87		55 s	Halogen	Br-84
1.85	Cs-140		66 s	Volatile	
1.90	Br-84	18	31.7 m	Halogen	Br-87
1.9	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
2.06	Cs-140		66 s	Volatile	
2.2	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
2.32	Cs-140		66 s	Volatile	
2.41	La-142	15	92.5 m	Solid	Y-95, Tc-104, Pr-146
2.48	Br-87		55 s	Halogen	Br-84
2.55	La-142	11	92.5 m	Solid	Y-95, Tc-104, Pr-146
2.64	Br-87		55 s	Halogen	Br-84
2.7	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
2.72	Cs-140		66 s	Volatile	
2.98	Br-87		55 s	Halogen	Br-84
3.15	Cs-140		66 s	Volatile	
3.18	Br-87		55 s	Halogen	Br-84
3.2	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
3.4	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
3.7	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
3.8	Br-87		55 s	Halogen	Br-84
3.93	Br-84	13	31.7 m	Halogen	Br-87
4.0	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
4.19	Br-87		55 s	Halogen	Br-84
4.4	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
4.7	Tc-104		18 m	Solid	Y-95, La-142, Pr-146
4.8	Br-87		55 s	Halogen	Br-84
5.0	Br-87		55 s	Halogen	Br-84
5.2	Br-87		55 s	Halogen	Br-84

Table II
FISSION PRODUCTS, HALF-LIVES, AND PROMINENT GAMMAS
BY INCREASING ATOMIC MASS

Nuclide	Type*	Half-life	Critical Organ	Prominent Gammas - MeV(Yield-%)
Br-84	H	31.7 m		0.81 (9), 0.88 (51), 1.01 (10), 1.90 (18), 3.93 (13)
Br-87	H	55 s		1.44, 1.85, 2.48, 2.64, 2.98, 3.18, 3.80, 4.19, 4.8, 5.0, 5.2
Sr-91		9.7 h	Bone	0.748 (27), 1.025 (30)
Y-95	S	11 m		0.267 (6)
Zr-95		65 d	T.B.	0.724 (49), 0.756 (49)
Nb-95		35 d	T.B.	0.765 (100)
Tc-104	S	18 m		0.36, 0.53, 0.89, 1.15, 1.25, 1.37, 1.6, 1.9, 2.2, 2.7, 3.2, 3.4, 3.7, 4.0, 4.4, 4.7
I-131	I	8.1 d	Thyroid	0.364 (82)
I-132	I	2.3 h	Thyroid	0.52 (20), 0.67 (144), 0.773 (8), 0.955 (22), 1.40 (14)
I-133	I	21 h	Thyroid	0.53 (90)
Xe-133		5.3 d		0.081 (37)
I-135	I	6.7 h	Thyroid	0.86 (11), 1.14 (37), 1.28 (34), 1.46 (12), 1.72 (19), 1.80 (11)
Cs-137		30 y	T.B.	
Ba-137		2.6 m		0.662 (85)
Cs-140	V	66 s		0.59, 0.88, 1.14, 1.62, 1.85, 2.06, 2.32, 2.72, 3.15
Ba-140		12.8 d	Bone	0.030 (11), 0.537 (34)
La-140		40.2 h	Liver	0.487 (40), 1.596 (96)
Ce-141		33 d	Liver	0.145 (48)
La-142	S	92.5 m		0.65 (48), 2.41 (15), 2.55 (11)
Ce-143		33 h	Liver	0.293 (46)
Ce-144		284 d	Bone	0.134 (11)
Pr-146	S	24 m		0.455 (77), 0.74 (16), 0.78 (15), 1.51 (27)
Nd-147		11.3 d	Liver	0.091 (28), 0.533 (13)

*Types of fission products:

H - Halogens
S - Solids
I - Iodines
V - Volatiles

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Table I
ACTIVATION PRODUCTS BY INCREASING γ ENERGY

T_γ	Yield (%)	Nuclide	Half-life
0.068	42	Ta-182	111.0 d
0.072	11	W-187	24.0 h
0.100	14	Ta-182	111.0 d
0.133	48	Hf-181	40 d
0.134	9	W-187	24.0 h
0.152	7	Ta-182	111.0 d
0.192	2.8	Fe-59	45.0 d
0.197	97	O-19	1.8 h
0.222	8	Ta-182	111.0 d
0.320	9	Cr-51	27.0 d
0.346	13	Hf-181	40 d
0.368	4.5	Ni-65	2.6 h
0.479	23	W-187	24.0 h
0.482	81	Hf-181	40 d
0.511	194	F-18	30 s
0.511	30	Co-58	71.0 d
0.511	38	Cu-64	12.8 h
0.552	5	W-187	24.0 h
0.618	6	W-187	24.0 h
0.686	27	W-187	24.0 h
0.724	49	Zr-95	65 d
0.756	49	Zr-95	65 d
0.773	4	W-187	24.0 h
0.810	99	Co-58	71.0 d
0.835	100	Mn-54	300 d
0.847	99	Mn-56	2.6 h
0.865	1.4	Co-58	71.0 d
0.87	3	N-17	4.1 s
1.039	9	Cu-66	4.6 m
1.095	56	Fe-59	45.0 d
1.115	16	Ni-65	2.6 h
1.122	34	Ta-182	111.0 d
1.173	100	Co-60	5.2 y
1.189	16	Ta-182	111.0 d
1.222	27	Ta-182	111.0 d
1.231	13	Ta-182	111.0 d
1.292	44	Fe-59	45.0 d
1.293	99	Ar-41	1.8 h
1.332	100	Co-60	5.2 y
1.369	100	Na-24	15.0 h
1.37	59	O-19	1.8 h
1.481	25	Ni-65	2.6 h
1.780	100	Al-28	2.0 m
1.811	29	Mn-56	2.6 h
2.110	15	Mn-56	2.6 h
2.754	100	Na-24	15.0 h
6.13	69	N-16	7.3 s
7.11	5	N-16	7.3 s

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Table II

ACTIVATION PRODUCTS BY INCREASING ATOMIC MASS

Nuclide	Half-life	Critical Organ	Prominent Gammas - MeV (Yield-%)
H-3	12.3 y	B.T.	NA
C-14	5700 y	Fat	NA
N-16	7.3 s		6.13 (69), 7.11 (5)
N-17	4.1 s		0.87 (3)
F-18	30 s	T.B.	0.511 (194)
O-19	1.8 h		0.197 (97), 1.37 (59)
Na-24	15.0 h	T.B.	1.369 (100), 2.754 (100)
Al-28	2.0 m		1.780 (100)
Si-31	2.8 h	Lung	NA
Ar-41	1.8 h	T.B.	1.293 (99)
Cr-51	27.0 d	T.B.	0.320 (9)
Mn-54	300 d	Liver	0.835 (100)
Fe-55	2.9 y	Spleen	NA
Mn-56	2.6 h	Pancreas	0.847 (99), 1.811 (29), 2.110 (15)
Co-58	71.0 d	T.B.	0.511 (30), 0.810 (99), 0.865 (1.4)
Fe-59	45.0 d	Spleen	0.192 (2.8), 1.095 (56), 1.292 (44)
Co-60	5.2 y	T.B.	1.173 (100), 1.332 (100)
Cu-64	12.8 h	Spleen	0.511 (38)
Ni-65	2.6 h	Bone	0.368 (4.5), 1.115 (16), 1.481 (25)
Cu-66	4.6 m		1.039 (9)
Zr-95	65 d	T.B.	0.724 (49), 0.756 (49)
Hf-181	40 d	Spleen	0.133 (48), 0.346 (13), 0.482 (81)
Ta-182	111.0 d	Liver	0.068 (42), 0.100 (14), 0.152 (7), 0.222 (8), 1.122 (34), 1.189 (16), 1.222 (27), 1.231 (13)
W-187	24.0 h	T.B.	0.072 (11), 0.134 (9), 0.479 (23) 0.552 (5), 0.618 (6), 0.686 (27), 0.773 (4)

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APPENDIX IX
MEDICAL COLLEGE OF VIRGINIA HOSPITALS
EMERGENCY DEPARTMENT

RADIATION EMERGENCY NOTIFICATION REPORT - INITIAL DATA BASE
(To Be Completed Immediately by Surgical Resident)

PERSON MAKING NOTIFICATION:

Name _____ Date _____
Title _____ Affiliation _____
Address _____ Telephone _____
Patients to be admitted to MCVH: _____ Total Number _____

Name (if available)	Triage to ED or Sanger	Injury but no Radiation or Contamination	Radiation Exposure	Internal	External	Contaminated

Will patients be: surveyed for contamination? _____ Decontaminated _____

Nature of accident: Type of radiation source _____

If shipment: Name of Transport: _____

Person in charge of radiation evaluation: _____

Expected time of arrival at Hospital: _____

Notification taken by : _____

Notification verified by : _____

Time: _____

August 8, 1986

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APPENDIX 3-1

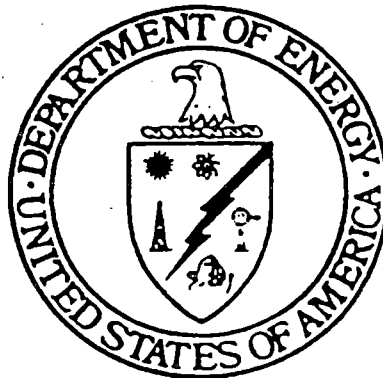
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APPENDIX 3

DEPARTMENT OF ENERGY

RADIOLOGICAL ASSISTANCE PLAN

APR 3 1986



**GUIDE
FOR
REQUESTING RADIOLOGICAL ASSISTANCE**

**Oak Ridge Operations Office
U.S. Department of Energy, Region 2**

APR 3 1986

For Radiological Assistance

CALL:

U. S. Department of Energy, Oak Ridge Operations Office
Commercial: (615) 576-1005 or 525-7885
FTS: 626-1005

(see page iii and iv for reporting information
needed by the Department of Energy)

Requests for assistance in formulating state/local radiological assistance plans and for information on training for radiological incidents should be addressed to:

Emergency Preparedness Director
Environment, Safety, and Health Division
U. S. Department of Energy
Post Office Box E
Oak Ridge, Tennessee 37831

**THIS GUIDE IS DESIGNED FOR USE BY THOSE
REQUIRING RADIOLOGICAL ASSISTANCE IN DOE REGION 2.**

- Assistance may be required by operators of fixed nuclear facilities, transporters of nuclear materials, and others who come into contact with such materials, as well as state and local governments.
- This guide will tell those requiring radiological assistance what information they should supply and what types of assistance can be provided.

**THIS GUIDE SUPPORTS THOSE NEEDING RADIOLOGICAL
ASSISTANCE IN DOE REGION 2.**

• Arkansas	• Puerto Rico
• Kentucky	• Tennessee
• Louisiana	• Virginia
• Mississippi	• Virgin Islands
• Missouri	• West Virginia

**THE FIRST STEP IN REQUESTING RADIOLOGICAL ASSISTANCE
IS TO CALL THE OAK RIDGE OPERATIONS CENTER (OROC).**

- OROC is the 24-hour point of contact for accident assessment, decontamination, medical advice, equipment, and other DOE-related support.
- The OROC may be reached at the following numbers:

Commercial: (615) 576-1005 or 525-7885
FTS: 626-1005

**THE LEVEL OF ASSISTANCE PROVIDED DEPENDS ON
INCIDENT SEVERITY.**

- Telephone advice by specialists.
- An Oak Ridge Radiological Assistance Team may be partially or fully activated.
- A multi-agency Federal response may be activated for major emergencies at the request of the state and local government.

**THIS GUIDE DETAILS HOW DOE-ORO PROVIDES
RADIOLOGICAL ASSISTANCE.**

- What information is requested when reporting an accident (page iii, iv).
- DOE-ORO policies for providing radiological assistance.
- Specific DOE-ORO responsibilities and actions.
- DOE-ORO and other Federal Agency response sequences, facilities, and resources.

NOTE: When you request radiological assistance, DOE-ORO will ask you to provide the following information for their report form (reproduced below).

1. Obtain the following information regarding the caller (individual reporting the incident):

Date _____ Time Received _____

a. Telephone No. _____
Area Code Number Extension

Location: _____

b. Caller's Identity: _____
First Name Middle Initial Last Name
Official Position: _____

c. Brief Description of Incident: _____

d. How Received: 525-7885 _____ 576-1005 _____
FTS 626-1005 _____ Other _____

2. If caller *can* remain on the line, hold the call and transfer it to the first available Health Physicist using the Radiological Assistance Call List.

3. If the caller *cannot* stay on the line, obtain the following details:

- a. Information concerning the incident.

(1)
Location: _____
Town State
Highway Miles From Town

b. Date and Time of Occurrence: _____

c. Nature of Incident: _____

- d. Isotope, quantity, and form of radioactive material involved: _____

- e. Description of any shipping containers involved: _____

- f. Name, address, and phone number of shipper: _____

- g. Name, address, and phone number of consignee: _____

- h. Other information from shipping label or waybill: _____

- i. Is material escorted? By whom? _____

- j. Radiation level readings around container: _____

- k. Type of instrument used to read radiation level: _____

- l. Extent of damage and personal injury: _____

- m. Actions at site to protect people and property: _____

- n. What information has been released to the public? _____

4. Relay, by the most expeditious means available, the details obtained above to the Health Physicist (see paragraph 3, above) and carry out any further instructions which he/she may give.

REPORT TAKEN BY _____

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GUIDE FOR REQUESTING RADIOLOGICAL ASSISTANCE

I. GENERAL INFORMATION

A. INTRODUCTION

The Department of Energy's Oak Ridge Operations Office has prepared this guide for use by state and local officials, emergency response personnel, and industries or institutions in DOE Region 2 that may need assistance in dealing with a radiological emergency or problem.

DOE has divided the country into eight regions, with a Regional Coordinating Office (see Figure I-1) responsible for providing radiological assistance in each region. DOE-ORO is responsible for Region 2, consisting of the states of Arkansas, Kentucky, Louisiana, Mississippi, Missouri, Tennessee, Virginia, and West Virginia, as well as Puerto Rico and the Virgin Islands. Requests for technical radiological assistance from these areas should be directed to DOE-ORO.

DOE radiological assistance is part of an integrated Federal plan to support state or local authorities during a radiological emergency. This plan, the Federal Radiological Emergency Response Plan (FRERP), describes the agencies' roles during the response to a large radiological emergency and specifies how their efforts would be coordinated with each other and with the state. The Federal agencies participating in the FRERP include the departments of Agriculture, Commerce, Defense, Energy, Health and Human Services, Housing and Urban Development, Interior, and Transportation as well as the Environmental Protection Agency, the Federal Emergency Management Agency, the National Communications System, and the Nuclear Regulatory Commission.

The radiological portion of this plan, in which DOE has a key role, is called the Federal Radiological Monitoring and Assessment Plan (FRMAP). Most of the above agencies can provide technical advice or assistance as part of their radiological response. The FRMAP replaces the Interagency Radiological Assistance Program (IRAP), the previous plan for interagency cooperation. On the regional level, DOE-ORO has developed its own plan, FRMAP-2, to implement its response under the FRERP.

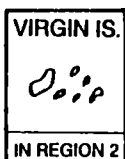
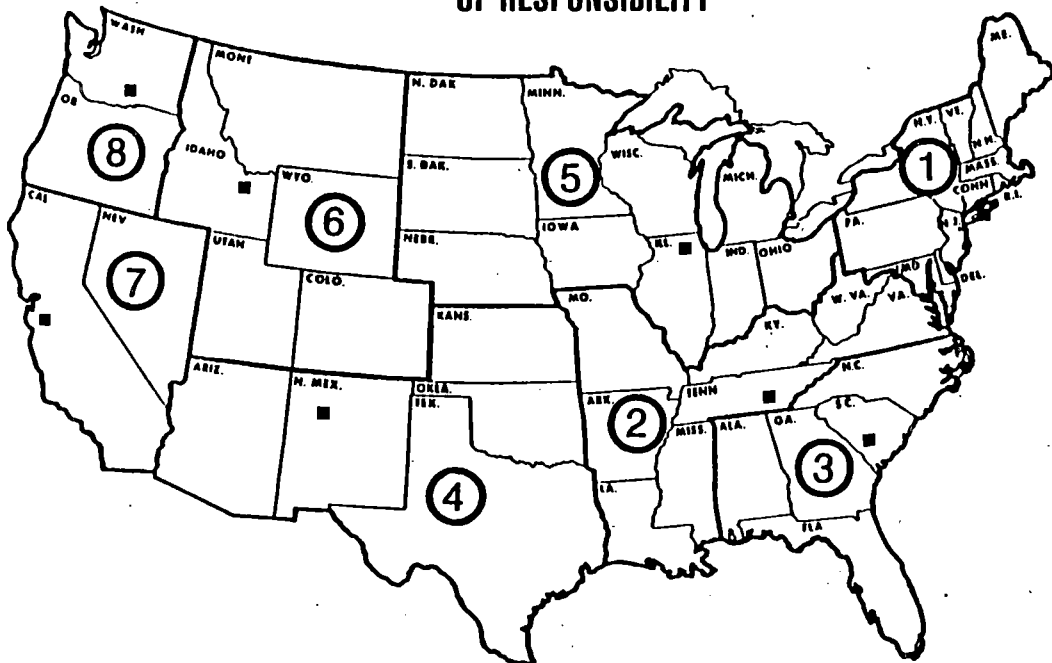
While the FRERP would not be expected to be implemented unless there were a large radiological accident which stressed the state's response capability, the FRMAP or radiological assistance portion of the plan can be used without activation of the full plan. The FRMAP covers a range of responses, from advice given by telephone or the dispatch of a small DOE Radiological Assistance Program (RAP) team (the type of responses DOE has traditionally provided), to a second Federal agency assisting in the response, or a large, multi-agency response, as might occur in the event of a serious accident at a commercial nuclear power plant.

12/85

Figure I-1. Department of Energy Regional Coordinating Offices for Radiological Assistance

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GEOGRAPHICAL AREAS OF RESPONSIBILITY



	REGIONAL COORDINATING OFFICE	POST OFFICE ADDRESS	TELEPHONE FOR ASSISTANCE
①	BROOKHAVEN AREA OFFICE	UPTON, LI NEW YORK 11973	(516)282-2200
②	OAK RIDGE OPERATIONS OFFICE	P.O. BOX E OAK RIDGE TENNESSEE 37830	(615) 578-1005 or (615) 525-7885
③	SAVANNAH RIVER OPERATIONS OFFICE	P.O. BOX A AKEN, S.C. 29801	(803) 725-3333
④	ALBUQUERQUE OPERATIONS OFFICE	P.O. BOX 5400 ALBUQUERQUE, NEW MEXICO 87115	(505) 844-4667
⑤	CHICAGO OPERATIONS OFFICE	9800 S. CASS AVE. ARGONNE, ILLINOIS 60439	DUTY HRS. (312) 972-4800 OFF HRS. (312) 972-5731
⑥	IDAHO OPERATIONS OFFICE	785 DOE PLACE IDAHO FALLS, IDAHO 83402	(208) 528-1515
⑦	SAN FRANCISCO OPERATIONS OFFICE	1333 BROADWAY OAKLAND, CALIFORNIA 94612	(415) 273-4237
⑧	RICHLAND OPERATIONS OFFICE	P.O. BOX 550 RICHLAND, WASHINGTON 98352	(509) 373-3800

If there should be a major radiological incident that requires activation of the FRERP, the plan assigns several Federal agencies coordination responsibilities.

1. The cognizant Federal agency (CFA), the Federal agency that owns, regulates, or licenses the material or facility involved in the incident, is responsible for coordinating onsite assistance. If there is no CFA, the state or local licensing authority conducts the onsite response with the Federal agencies assisting as requested. (The Nuclear Regulatory Commission is the CFA for accidents at commercial nuclear power plants.)
2. The Federal Emergency Management Agency (FEMA) coordinates the overall Federal assistance, particularly the non-radiological offsite assistance (shelter, food, transportation, etc.). A Senior FEMA Official (SFO) will be named to be the contact point for state requests for general assistance.
3. FEMA and the CFA have joint responsibility for presenting Federal recommendations on protective measures to the State and coordinating, with the State, the Federal release of public information.
4. The DOE coordinates all Federal radiological monitoring and assessment assistance to the state during the emergency stage under the FRMAP portion of the plan. DOE will name an Off-Site Technical Director (OSTD) to coordinate the Federal radiological assistance to the State.
5. The Environmental Protection Agency assumes the coordinating role for intermediate and long-term radiological assistance from DOE at a mutually agreeable time.

The incremental response outlined in this document will allow the state or local government or other requesting entity to get the type of assistance it needs. As the emergency situation changes, the Federal response can be scaled up or down as necessary to provide whatever support is desired.

B. PURPOSE OF THIS GUIDE

The Oak Ridge Operations Office has developed this guide

1. To explain how requests for radiological assistance should be made and what kinds of responses are possible,
2. To familiarize potential users with DOE-ORO responsibilities under the FRMAP portions of the Federal plan,

3. To describe some of the resources available from DOE-ORO and other Federal agencies and Contractors when requests for assistance are directed to DOE-ORO, and
4. To provide basic response guidelines for those initially responding to a radiological accident.

C. DOE-ORO RESPONSE GUIDELINES

Assistance provided by DOE supplements and supports the resources of the state, the CFA, or commercial operators. DOE will respond to requests for radiological assistance from state or local authorities, other Federal agencies, or commercial operators.

State or local jurisdiction will be respected when providing radiological assistance. When a commercial operator requests assistance from DOE before notifying the licensing Federal agency or appropriate state agency, DOE-ORO will make these notifications. Assistance will be provided, unless the licensing agency or state ask DOE-ORO not to respond. DOE-ORO assistance also does not prejudice the right of commercial operators to determine the disposition of their property.

The DOE-ORO FRMAP-2 will be implemented in DOE Region 2 in the following situations.

1. DOE radiological assistance is requested to support a state or local authority, another Federal agency, or a commercial entity in order to prevent or mitigate a threat to health or property posed by radiological materials.
2. DOE-ORO assumes initial responsibility for emergency response when an incident in Region 2 involves DOE materials or materials in DOE custody.
3. DOE-ORO assumes initial responsibility for responding to a nuclear weapon accident in Region 2. After DOE's Accident Response Group (ARG) arrives at the scene, the ARG provides the DOE onsite response. DOE-ORO may remain to provide offsite assistance to the state or local government, if requested to do so.

D. POLICY

All activities under FRMAP-2 will support the monitoring and assessment programs of the state, the owner of the radioactive material or operator of the facility involved, the assessment needs of the CFA, or be carried out to meet DOE statutory responsibilities in Region 2. When providing radiological assistance, DOE-ORO coordinates its activities with state and local governments with jurisdiction, DOE

headquarters, and other Federal agencies. DOE-ORO and other participating Federal agencies will contribute the use of their facilities, personnel, and other resources, as required.

Radiological assistance activities under FRMAP-2 will follow the statements of policy in the FRERP (Federal Register, Vol. 49, No. 178). These are listed below. Many of the items, however, are more applicable to a large, multi-agency Federal response.

1. Federal agency plans and procedures for implementing the FRMAP will be consistent with any Federal radiological emergency planning requirements for state and local governments and specific facilities.
2. The participating Federal agencies will maintain facilities, equipment, and personnel to carry out their statutory responsibilities. Existing radiological monitoring and assessment capabilities developed to carry out those responsibilities will be made available to state and local authorities with jurisdiction, and to other Federal agencies in an emergency if other resources are not available.
3. The Federal agencies will make their resources available on request. An agency may decline to provide any needed resources only if doing so would prevent that agency from carrying out its essential mission and emergency functions.
4. During the emergency phase of the Federal response, the DOE will coordinate all Federal offsite radiological monitoring and assessment operations and integrate the data derived from those activities. EPA will assume the lead agency responsibility for coordinating the intermediate and long-term offsite radiation monitoring activities after receiving adequate assurance from the Department of Energy and other Federal agencies that they will commit the required resources, personnel, and funds for the duration of the Federal response effort. The full FRMAP response will be terminated when the EPA Administrator determines, after consultation with the CFA and state and local officials, that:
(a) There is no longer a threat to the

public health and safety or to the environment, or (b) state and local resources are adequate for the situation or (c) the Federal agencies are carrying out only non-emergency statutory responsibilities, or (d) there is mutual agreement of the agencies involved to terminate their responses.

5. An agency that makes its resources available, although under the general direction of DOE (or later, EPA) does not place itself under the authority of the coordinating agency.
6. DOE (or later, EPA) will maintain a common and consistent set of all offsite radiological monitoring data and provide it, with interpretation, to the CFA, to the states, and to groups that these agencies designate, as well as to other Federal agencies involved in the emergency responses. The principal description of the combined offsite and onsite radiological conditions will come from the CFA and the State.
7. The Federal radiological monitoring and assessment response will be in support of, and coordinated with, that of the state and local governments with jurisdiction. The resources of DOE and the participating agencies will be used only when state and local resources are not adequate. All offsite activities will be coordinated with those of the state.
8. Federal assistance will be initiated when the Federal Radiological Emergency Response Plan is in effect, or through a request from a state or local government, another Federal agency or private entity, or (in rare cases) when DOE after notification of an incident, but in the absence of implementation of the FRERP or formal state request, believes it must respond to meet statutory requirements to protect public safety. Whenever DOE responds without a state request, the state will be notified by DOE. Requests from private entities will be referred to

the state before any decision on response is made to ensure there will not be a duplication effort.

9. Agencies carrying out statutory responsibilities related to radiological monitoring and assessment during a Federal response will also coordinate their activities through DOE (or later, EPA). This coordination will not limit the normal working relationship between a Federal agency and its state counterpart nor restrict the flow of information from that agency to the state.
10. Federal agencies, as their resources permit, will assist other Federal agencies and state and local governments with planning and training activities designed to improve local response capabilities, and will cooperate in drills, tests, and exercises.
11. Appropriate independent emergency actions may be taken by the participating Federal agencies on their own authority to save lives, minimize immediate hazards, and gather information about the emergency that might be lost by delay. Such action will not preempt later implementation of the FRMAP.
12. Funding for each agency's participation in support of the FRMAP is the responsibility of that agency unless provided for by other agreements.

E. SCOPE OF ASSISTANCE

DOE-ORO will provide radiological assistance for all types of incidents (fixed facility, transportation, nuclear weapons, etc.) that occur within Region 2. This aid may be in response to requests from state and local governments, DOE or DOD Contractors, other Federal agencies, or private entities. (The appropriate state authorities will be contacted when requests come from private entities to ensure there will not be any duplication of state efforts.) DOE-ORO may, if needed, also assist other DOE regional offices or other Federal agencies in a response outside of Region 2 or support DOE headquarters in a headquarters-directed response.

The amount of radiological assistance provided by DOE or other Federal agencies in Region 2 will depend on the severity of the

incident. FRMAP-2 details the DOE-ORO implementation of a response to a range of incidents; a brief description of possible responses is given below.

1. Telephone Advice -- When a request for assistance is received by the Oak Ridge Operations Center, the person taking the call will transfer the call to one of the DOE health physicists who will complete the Radiological Assistance Report. If the caller cannot remain on the line, the caller will be asked for the necessary information to complete the Radiological Assistance Report. This information will be provided to the health physicist. If medical advice is needed, one of the physicians at the Radiation Emergency Assistance Center and Training Site in Oak Ridge (REAC/TS) will be notified. The health physicist and/or physician may be able to provide all the necessary advice by telephone or refer the call to the state or appropriate authority.
2. Radiological Assistance Team -- If onsite assistance is necessary, DOE-ORO will send a Radiological Assistance Program (RAP) team to the incident. The size and composition of the team can vary according to the needs of the requesting party. In addition to DOE and DOE Contractor radiological specialists, the RAP team can include medical experts from REAC/TS or public information staff to assist in providing accurate information to the public. The RAP team will assist in the response until released by the requesting party or when the team leader feels that the requesting party has the resources it needs to continue the response on its own.
3. Limited Multi-Agency Response -- The FRMAP provides for interagency cooperation during a response. There may be incidents in which the RAP team from Oak Ridge might be assisted or supplemented by equipment and personnel from another Federal agency, in order to best meet the needs for a prompt or satisfactory response. When time is critical to the response and another Federal agency with radiological capabilities has a nearby facility, DOE-ORO may arrange for that agency to provide the initial response.
4. Multi-Agency Response -- In a serious or prolonged radiological emergency, a large Federal monitoring effort may be needed or the affected state may ask for more general Federal assistance and activation of the FRERP. In these situations, the DOE-ORO response is incorporated into the monitoring and assessment portion of the response described in the FRERP. DOE-ORO resources will be supplemented by those of DOE Contractors, other DOE regional offices, and other Federal agencies participating in FRMAP.

F. EMERGENCY ORGANIZATION

No single Federal organization exists to provide all the assistance that a state or requesting party might need. The range of possible accidents does not make this feasible. The emergency response is designed to expand from the base of one health physicist on the telephone to the complex FRERP organization. Changes in the organization of the DOE and FRMAP portion of the Federal response should flow smoothly from the simpler to the more complex situation, so that the state or requesting authority can tailor its response to the severity of the incident, not to the current DOE organization.

The basic organizational structure for a RAP response involving only DOE-ORO and its Contractor personnel is illustrated in Figure I-2. This describes a large RAP response, one that might form the initial phase of a larger Federal response. All the indicated people would not respond if they were not needed.

In a large, multi-agency response, DOE would move to coordinate all the Federal radiological assistance and coordinate the monitoring and assessment efforts with those of the state. The RAP team leader may be named the DOE Off-Site Technical Director (OSTD) or a more senior DOE official may be asked to assume that role. The DOE team will be incorporated into the larger response. DOE-ORO resources will be supplemented by those of other DOE field offices and their Contractors.

The OSTD may establish a Federal Radiological Monitoring and Assessment Center (FRMAC), a place from which all the Federal agencies participating in or supporting the radiological response can direct and coordinate their efforts. The state's technical staff and monitoring efforts may also move to this location, if the state wishes to do so, so that all the data collection and assessment efforts can be coordinated. Liaisons from the FRMAC will be located in the other emergency operating centers, as needed, to insure that the FRMAC activities are coordinated with those of the other centers. The FRMAC will produce compiled, quality-controlled radiological data for the CFA and the state or appropriate local authority.

The organization structure for a FRMAC in Region 2 is shown in Figure I-3. This organization is based on function, instead of participating agency. For example, the Data Evaluation and Assessment Group may contain representatives from DOE-ORO, DOE Contractors, the state, the Nuclear Regulatory Commission, the Environmental Protection Agency, Health and Human Services, or the Department of Agriculture, and even representatives of the National Weather Service or the Department of the Interior, if their technical input is needed in the assessment.

DOE-ORO can arrange for the necessary personnel and equipment, in cooperation with other agencies, to support the state's need for monitoring and assessment. Other DOE resources that may be available include the following: the Aerial Measuring System, the Atmospheric

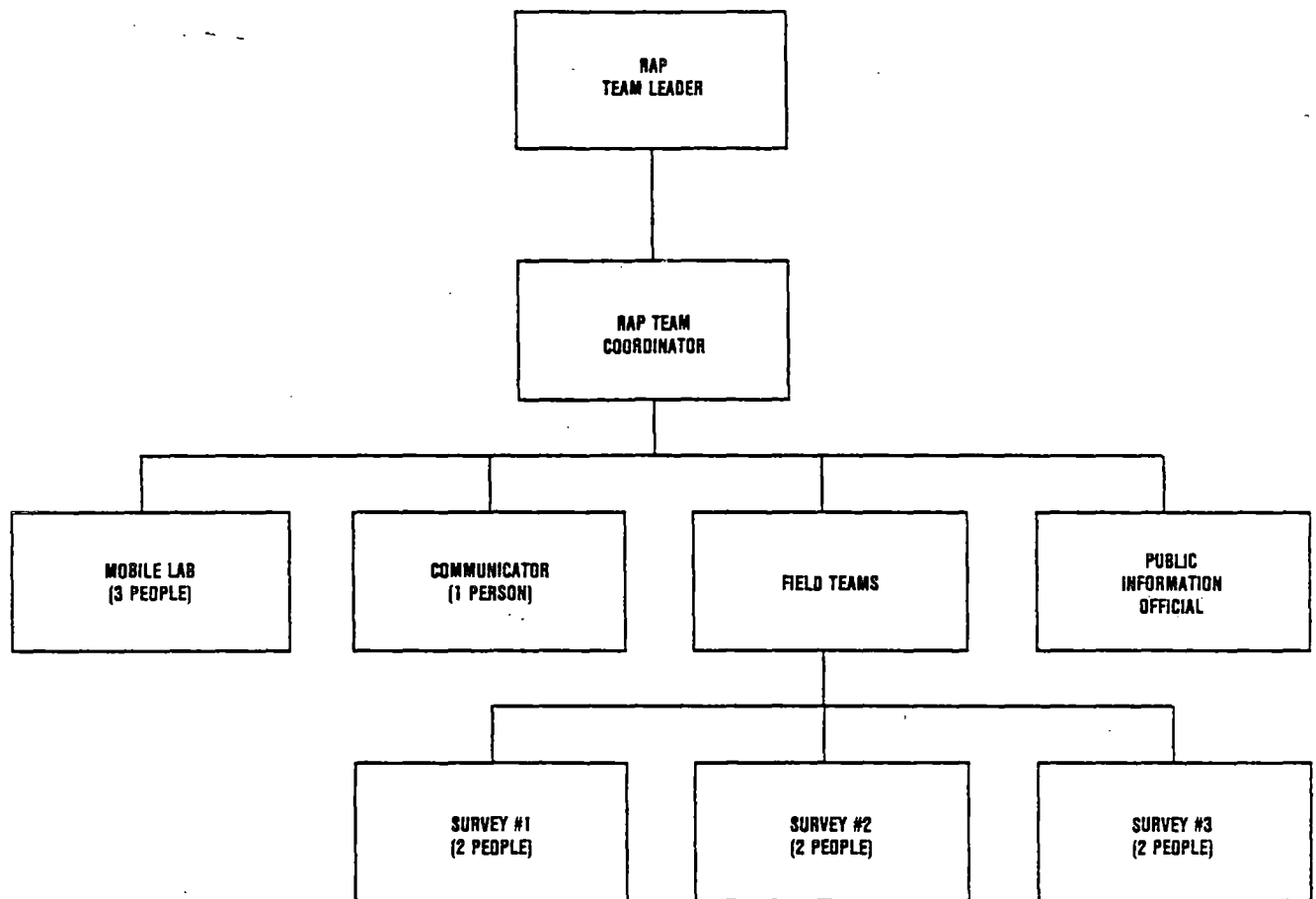
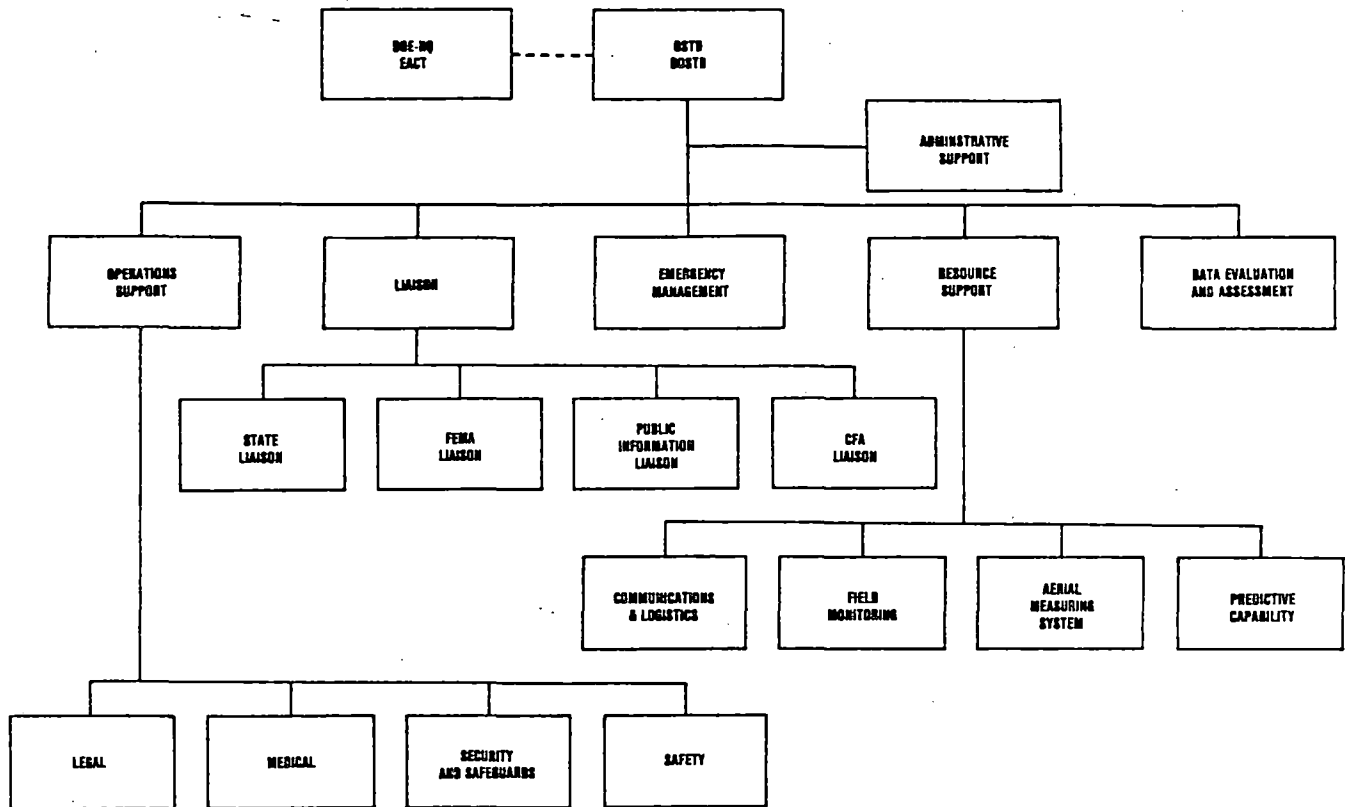


Figure I-2. RAP Team Organization



LEGEND

OSTD — OFFSITE TECHNICAL DIRECTOR
 DOSTD — DEPUTY OFFSITE TECHNICAL DIRECTOR
 DOE-HQ — DEPARTMENT OF ENERGY, HEADQUARTERS,
 EMERGENCY ACTION COORDINATION TEAM
 FEMA — FEDERAL EMERGENCY MANAGEMENT AGENCY
 CFA — COGNIZANT FEDERAL AGENCY

Figure I-3. FRMAC Organization

Release Advisory Capability, the Joint Nuclear Accident Coordinating Center, and the Nuclear Emergency Search Team. These resources provide aerial monitoring and mapping, predictive capabilities, analysis, logistical support, and weapons search and disposal capability.

DOE is also prepared to provide the necessary people and supplies (office supplies, electrical generator, communications, etc.) to support the operation of the FRMAC itself, so that the state requesting assistance will not have to allocate limited resources for this purpose. DOE-ORO will work with the states to identify possible locations for the FRMAC near fixed nuclear facilities, but the decision on the location of the FRMAC will be made at the time of the incident. (A list of commercial power reactors in Region 2 is found at the back of this document.)

II. HOW RADIOLOGICAL ASSISTANCE IS PROVIDED

A. INTRODUCTION

DOE is responsible for coordinating the Federal radiological monitoring and assessment assistance to the state during the early stages of the emergency under FRMAP. DOE-ORO will respond to requests for radiological assistance in Region 2. The following information describes the facilities providing radiological assistance which are available through DOE-ORO, and details potential levels of DOE-ORO response to requests for radiological assistance and the radiological emergency response sequence.

B. FACILITIES FOR RADIOLOGICAL ASSISTANCE

1. DOE-ORO

In the event of a radiological incident the following facilities are available depending on incident severity.

- a. Oak Ridge Operations Center (OROC) -- A continuously-staffed facility which functions as the notification center for all radiological emergencies having an impact on DOE-ORO (including requests for radiological assistance).
- b. Emergency Response Center (ERC) -- A facility adjacent to the OROC from which major radiological emergency responses that impact DOE-ORO facilities can be directed. It is also used to coordinate radiological assistance response to fixed nuclear facilities, transportation, or nuclear weapons accidents.

2. DOE-ORO Contractors

For accidents on DOE-operated or DOE Contractor-operated sites, DOE-ORO Contractor organizations may direct the radiological assistance operations from their Emergency Operating Centers (EOC). The facility EOC is usually the plant or laboratory shift superintendent's office.

3. DOE-HQ

The DOE-HQ EOC is located in Germantown, Maryland. This facility is continuously staffed and serves as the HQ notification center for all types of occurrences. Requests for assistance for DOE agency-wide resources are approved through this facility.

C. LEVEL OF RESPONSE

Radiological assistance may be provided as follows:

1. For some minor incidents, only advice by telephone will be given (including medical assistance by REAC/TS through the OROC).
2. In other minor incidents, DOE-ORO may arrange for assistance to be provided at the scene of the incident by other Federal agencies which are located nearby.
3. When the requesting authority requires DOE supported radiological monitoring and assessment, the FRMAP is activated and DOE-ORO will dispatch a RAP Team to the scene of the incident. This team usually consists of three or four individuals. Depending on the extent and complexity of the incident, the RAP Team may include a RAP Team Leader, Health Physicists or Technicians, a Communicator, Radiochemists, Field Surveyors, a Medical Advisor, a Public Information Specialist, a Security Officer, and other Specialists as required. However, for larger, more serious incidents either a full RAP Team of eleven members may be dispatched, or a large FRMAP response organization led by the OSTD may be required. Upon activation, the OSTD first decides on the location near the incident for the FRMAC. The FRMAC will be staffed by DOE personnel who will coordinate all Federal radiological assistance response. When the emergency phase of the response is over and upon mutual agreement between DOE and EPA, the EPA assumes the FRMAP coordination role.
4. For major incidents requiring multi-agency Federal assistance, beyond radiological monitoring and assessment, the FRERP is activated and the RAP Team is incorporated into the FRMAP portion of the response.

D. RADIOLOGICAL EMERGENCY RESPONSE SEQUENCE

Figure II-1, DOE-ORO Radiological Emergency Response Overview Logic is provided to represent graphically the initial sequence of events that follow a request for radiological assistance. Activities include the request for assistance from an authorized Region 2 authority, the assessment of the incident at DOE-ORO, and the provision of advice and/or assistance from DOE-ORO or its Contractors.

Upon notification by the requesting authority that DOE-ORO radiological assistance is required, the following actions are taken:

1. OROC obtains initial information from the requesting authority. This information includes: the caller's telephone number, full name and official position, and a general description of the incident.

2. If only medical assistance is needed, OROC transfers the call to REAC/TS.
3. If medical assistance is not required or other aid is needed in addition to medical assistance, the OROC will transfer the call to the first available DOE-ORO Health Physicist. However, if the requesting authority cannot remain on the line, more detailed information has to be provided to the OROC. The OROC then notifies the first available DOE-ORO Health Physicist.
4. From the information obtained from the requesting authority or the OROC, the Health Physicist assesses the incident and provides the appropriate advice. Should the Health Physicist decide that radiological assistance is not required, no further action will be taken. If necessary, the Health Physicist may refer the incident to a facility closer to the incident to provide more timely assistance. This can be a facility of another Federal agency under FRMAP. Otherwise, the DOE-ORO activates a full or partial RAP Team. Once assembled, the RAP Team is dispatched to the incident site.

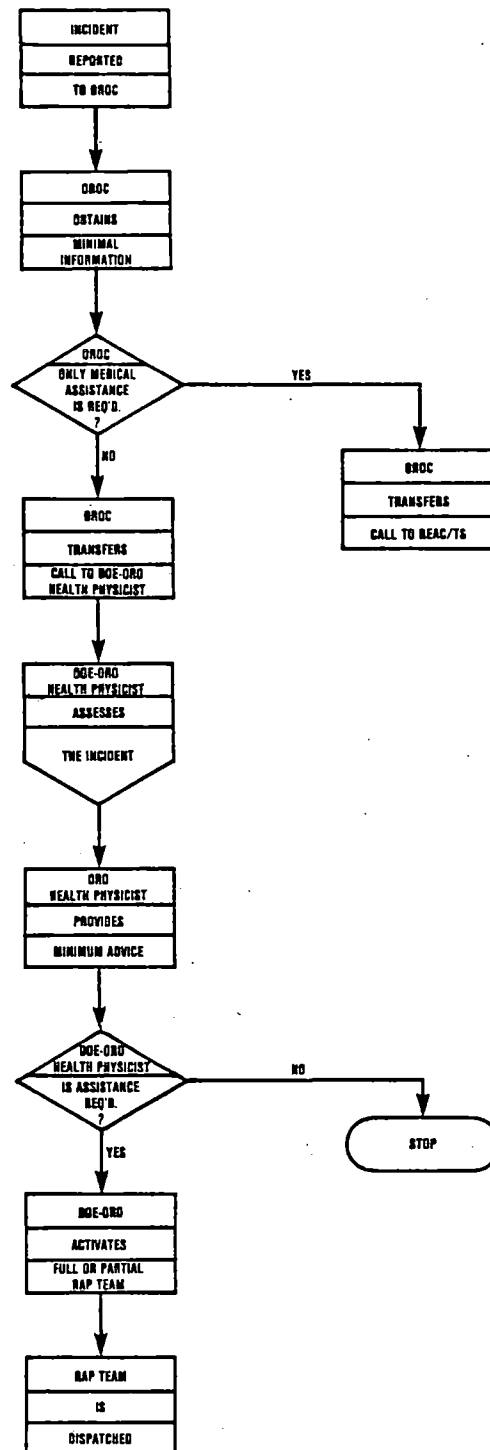


Figure II-1. DOE-ORO Radiological Emergency Response Overview Logic

III. IMMEDIATE RADIOLOGICAL ACTIONS FOR REQUESTING AUTHORITIES

Depending on incident type, these are immediate actions and precautions that are appropriate for authorities requesting radiological assistance to take until DOE-ORO directed assistance arrives at the incident location. Emergency action guidelines are provided for incidents involving radioactive materials and for nuclear weapons accidents.

A. EMERGENCY ACTION GUIDELINES FOR INCIDENTS INVOLVING RADIOACTIVE MATERIAL

When incidents involve a spill or release of radioactive material, or there are personal injuries in incidents involving radioactive materials, the following radiological emergency actions and precautions should be applied:

1. Notify immediately state/local officials responsible for public health in the state in which the incident occurred.
2. Make every reasonable effort to rescue injured or trapped persons. Remove them from the incident area, as soon as they can be safely moved, after immediate life-saving measures are taken.
3. When it is necessary to send an individual to a hospital or other medical facility before a radiological emergency team or physician knowledgeable in radiological health arrives, inform the hospital/medical facility and the ambulance or other transporting vehicle personnel who will be in contact with the individual of the possibility of radioactive contamination.
4. When there is doubt that the radioactive material is still confined to its container, assume that the immediate incident area is contaminated with radioactive material and that anyone and anything in the area may be contaminated. Take special care to minimize personal contact with the outer clothing of individuals, the surface of the ground, vegetation, and the surfaces of things within or removed from the incident area.
5. Individuals not sent to a hospital/medical facility who are suspected of having been exposed to radioactive material, should be urged to remain in the area until they can be appropriately monitored.
6. Obtain names and addresses of all persons involved, including those who insist on leaving the area and those removed for medical attention.

7. Restrict access to the incident area and prevent unnecessary handling of incident debris. Keep the public away from the incident area.
8. Fight fire as though toxic chemicals were involved. To the extent possible, keep upwind and avoid smoke, fumes, and dust. Segregate clothing and tools used at the fire until they can be checked for radioactive contamination before being returned to normal use.
9. When a transportation incident involves radioactive material, DO NOT move vehicles, shipping containers, or wreckage except to rescue people. Detour pedestrian and vehicular traffic. If a right-of-way must be cleared before radiological emergency assistance arrives, move vehicles and debris the shortest distance required to open a pathway. Before permitting the passage of traffic, spillage on the cleared pathway should be washed, or wetted and swept, to the edge of the pathway with minimum dispersal of wash water and spilled material.
10. DO NOT eat, drink, or use tobacco products in the incident area, or use food or drinking water that may have been in contact with the radioactive material.
11. DO NOT handle, use, or remove from the incident area any material, equipment, or other items suspected of being radioactively contaminated unless released by radiation monitoring personnel.

B. NUCLEAR WEAPONS ACCIDENT HAZARDS: EMERGENCY PROCEDURES AND
RESPONSIBILITIES

The Department of Defense and the Department of Energy have specially trained and equipped radiological assistance teams prepared to deal with all aspects of accidents involving nuclear weapons. These teams include explosive disposal personnel and decontamination specialists. Their assistance may be obtained by contacting the nearest military or DOE installation.

In the event of an accident involving nuclear weapons or military vehicles suspected of carrying nuclear weapons, report the incident immediately to fire and police departments, and in addition, to the nearest military installation or DOE office. Give brief details of the accident. In the event of an accident occurring on a military base, all concerned should follow the accident procedures of the base.

1. Actions by First Observer Pending Arrival of Authorities

- a. Give immediate assistance to personnel where possible. However, except for the saving of lives, keep away from the accident. There is always the danger of a detonation of the conventional high explosives.
- b. Report the accident immediately, with brief description as above, to the nearest military installation or DOE office, and to the local fire and police departments.
- c. Organize other witnesses to keep sightseers away from the accident. In the open, an exclusion distance of 2,000 feet should be established because of the potential blast hazard from the detonation of conventional high explosives, but cover must be taken even at this range from secondary missiles flung into the air by the explosion.
- d. Stay out of the smoke. If there is a fire, enter the smoke only to save lives. Always approach from upwind and from uphill if possible. If entering the smoke is necessary to save lives, use any immediately available method to prevent smoke from affecting your eyes and throat. Although the smoke may present a toxic, caustic, or minor radioactive hazard, short exposures will not be lethal. If you enter the vicinity of the smoke around the fire, report this to the RAP Team after their arrival so you can be monitored and decontaminated if necessary.
- e. Do not fight a fire where high explosives are present unless there are overriding considerations of public safety. Where large numbers of persons will be endangered by an explosion or densely-populated areas could be contaminated by plutonium, the risk to emergency personnel may be justified.
- f. Do not touch anything unnecessarily and do not pocket or retain as souvenirs any object found in the accident area.

2. Actions by Fire, Police, and Emergency Services Pending Arrival of Special Teams

- a. Rescue and assist injured personnel as practical.
- b. Notify nearest military installation or DOE office of the accident (and of the type of vehicle involved) and give them any information available as to whether nuclear weapons could be or are involved. They will in turn dispatch their own response team to the scene of

the accident and notify the DOE-DOD Joint Nuclear Accident Coordinating Center, as appropriate. In addition, the agency will provide advice regarding the incident until the response team arrives.

- c. Clear area of all non-essential personnel to a distance of at least 2,000 feet or more. Maintain exclusion of the area until arrival of the response team.
- d. When there is a fire, but the weapon is not in the flames and is not torching, extinguish the fire as rapidly as possible using any appropriate method. Try to secure early control of liquid fuel fires with foam and/or other extinguishing agents. In some cases where the weapon is not in the fire, the foam used for extinguishing the fuel fires can be spread over the weapon to protect it from radiated heat from flames. Avoid washing the foam off the weapon with water.
- e. If weapon is engulfed in flames or if the high explosive is burning (torching), clear area out to at least 2,000 feet of all personnel; DO NOT attempt to fight such fires.
- f. Avoid smoke and clear the downwind area of people. If dense smoke must be encountered for long periods of time, dust filtering masks or self-contained breathing apparatus should be used. However, these are not needed for short stays in the smoke, and their nonavailability should never hold up rescue efforts. Personnel who have entered smoke in the accident area must report to the emergency team for monitoring, and if necessary, decontamination, after the initial response is over.
- g. After the burning has subsided, and if the RAP Team has not yet arrived,
 - (i) Do not attempt to clean up the scene of the accident.
 - (ii) Rope off or secure the area and do not permit anyone to enter.
 - (iii) Detain all personnel who may have been contaminated so that they can be monitored by the radiological team when it arrives, in order to prevent them from spreading plutonium.
 - (iv) Follow advice of the RAP Team upon their arrival.

3. Responsibilities

a. General Humane Responsibilities

The major consideration, other than safety of emergency personnel, should be the safety of persons endangered by the accident and/or the potential explosion. These persons may be aircraft crews, truck drivers, couriers, or members of the public.

b. Couriers

Nuclear weapons are classified items, and as such, must be safeguarded at all times. Couriers are personnel who physically accompany shipments of nuclear weapons material for security purposes. In effect, the courier "owns" the material while he or she is the direct custodian of the material. It is the courier's responsibility to protect the material from loss or security compromise.

c. The DOE/DOD Division of Responsibilities

DOE and DOD have agreed on the following general division of responsibility between them in all cases of accidents involving nuclear weapons:

- (i) "Immediate responsibility" for providing technical direction at the scene of an accident will be assumed by the Service or agency (DOE) first arriving on scene.
- (ii) Primary and continuing responsibility for providing technical direction at the scene of the accident will be assumed by the Service or agency (DOE) having physical possession at the time of the accident (when their personnel arrive).

DOE and DOD maintain a Joint Nuclear Accident Coordinating Center which can dispatch additional special teams, as appropriate, upon the request of the responsible agency. DOE continues to have responsibility for coordinating Federal assistance to the state or local authority responsible for the area around the accident site.

IV. AVAILABLE RESOURCES FOR RADIOLOGICAL ASSISTANCE

The expertise and agency-wide resources of DOE, DOE-ORO, DOE-ORO Contractor and other Federal agencies for assistance in handling radiological incidents in Region 2 are available by requesting them from DOE-ORO. The emergency resources and personnel include:

A. DOE-ORO

1. Monitoring equipment for all types of radiation.
2. Extensive capability for analyzing the radioactivity in air, water, or foodstuffs.
3. Shielded containers of various shapes and sizes for use in the event that the original container for the radioactive material is seriously damaged in the incident.
4. A mobile, fully shielded, in vivo total body counter, mounted on a tractor-trailer rig weighing 75,000 pounds, for monitoring internal radiation exposure.
5. A robot that is capable of negotiating a 25% grade and retrieving 200-pound objects, equipped with television, and remotely-operated via a 375-ft. cable.
6. A radiological response vehicle with limited radiological analytical equipment (multichannel analyzer, filter counters, portable radiation monitoring equipment), communications, and other support equipment.
7. Emergency response teams which include health physicists, public information specialists, industrial hygienists, security specialists, photographers, communications specialists, and nuclear engineers are available 24 hours each day. Because their number is limited, DOE-ORO personnel are supported in the response effort by DOE-ORO Contractors. This Contractor support is coordinated by Oak Ridge National Laboratory.
8. The Radiation Emergency Assistance Center and Training Site (REAC/TS) is located within the Methodist Medical Center of Oak Ridge. REAC/TS provides expert advice on the medical management of radiation accidents and is operated for DOE by Oak Ridge Associated Universities.

B. DOE-ORO Contractors

1. DOE-ORO Contractor organizations have extensive equipment and personnel resources available to respond to both onsite and offsite emergencies. These resources are utilized in ongoing

DOE programs where practical, although some dedicated emergency equipment exists. Each Contractor-operated facility is capable of handling credible emergency situations for their facilities and have written agreements for assistance that might be required such as fire fighting, hospital, rental car, or ambulance services.

2. If offsite assistance is requested, such as radiological assistance to a state/local government, DOE-ORO will coordinate the response effort and request available resources from the Contractor organization. These resources are to be made available, provided the safety and operation of the Contractor's facility is not compromised.

C. Other DOE Resources

1. Aerial Measuring System

The Aerial Measuring System is based in Las Vegas, Nevada, and Andrews Air Force Base, Washington, D.C. The system includes airplanes and helicopters with extensive radiation detection, data management, location mapping, and photography equipment. This equipment can be used to locate lost sources, provide aerial surveys, or to supplement DOE-ORO capability with mobile laboratories, field monitors and analytical personnel.

2. Atmospheric Release Advisory Capability

The Atmospheric Release Advisory Capability is operated by Lawrence Livermore National Laboratories in Livermore, California. The Atmospheric Release Advisory Capability provides atmospheric diffusion, deposition, and dose estimates and calculations based on available information from the accident site and/or from the National Weather Service.

3. Accident Response Group (ARG) and Nuclear Emergency Search Team (NEST)

The ARG and/or NEST response is dependent on the emergency situation and the recommendations of DOE-HQ/EACT. Most of the equipment and personnel are based at Las Vegas, Nevada, with other specialists from all over the country included in the response. The ARG is used primarily for response to radiological incidents where nuclear weapons are involved. The NEST is used primarily for locating weapons or dealing with terrorist activities.

4. DOE-JNACC

The Joint Nuclear Accident Coordinating Center (JNACC) is located at Kirkland Air Force Base in Albuquerque, New Mexico. The facility is operated jointly by DOD and DOE for

coordination of emergency response to nuclear weapons accidents or incidents, regardless of custody or responsibility for the particular weapon involved. JNACC also serves as the contact point for DOE to request DOD resources for other types of incidents.

D. Other Federal Agencies Participating Under FRMAP

1. Department of Defense (DOD)

Contributes radiological monitoring instruments, equipment, and personnel including aircraft, nuclear weapons specialists, radiation monitoring specialists, and radiation medical specialists and provides logistical support as requested.

2. Environmental Protection Agency (EPA)

Provides on request, national environmental systems, mobile resources and laboratories to help assess environmental conditions and also provides advice on the use of their Protective Action Guidelines and suggests mitigation procedures.

3. Department of Health and Human Services (HHS)

a. Centers for Disease Control

Provides consultation to health professionals, coordinates medical services and provides assistance for health risk interpretation of radiation exposure data. The Centers for Disease Control's staff assigned to state health departments are available for immediate, onsite consultation.

b. Health Resources and Services Administration

Provides medical care capability assessments to state/local governments, consultation for emergency triage and treatment, and emergency medical services.

c. Food and Drug Administration (FDA)

Conducts investigations, food and animal feed analyses, and drug surveillance. The Winchester Engineering and Analytical Center, located in the Boston area, provides radioactivity analysis of food and other samples in response to requests for emergency assistance. FDA's Headquarters' National Center for Devices and Radiological Health has a staff of radiation protection personnel to provide advice and assistance by phone or onsite.

4. Department of Agriculture (USDA)

Works in conjunction with HHS and EPA to sample, monitor and test agriculture products and animal feed for radiological contamination and assists in assessing damage to agriculture and monitoring emergency production processing and distribution of food. In coordination with HHS, USDA ensures the availability of food and feed during the radiological incident. Also makes available its National Radio Fire Cache on the request of DOE, which includes fire-fighting equipment, heavy machinery, aircraft and radio communications systems.

5. Department of Commerce (DOC)

a. National Oceanic and Atmospheric Administration (NOAA)

Provides local and regional weather forecasts and meteorological data needed during a radiological emergency response.

b. National Bureau of Standards

Provides instrument calibration, temporary shielding materials, and reference data.

c. National Marine Fisheries Service

Provides information on fisheries resources that might be contaminated by the incident.

6. Federal Emergency Management Agency (FEMA)

Coordinates, on request, all Federal assistance to the state/local governments with the exception of the Federal radiological monitoring and assessment effort. Helps coordinate logistical support services for the offsite radiological response.

7. Department of the Interior (DOI) U.S. Geological Survey

Provides hydraulic and geologic data on water resources that might be impacted by an incident and on the structural geology of any site, and simulates hydraulic systems to estimate possible contamination of water systems.

8. Nuclear Regulatory Commission (NRC)

Provides offsite monitoring, data collected by NRC personnel, and up-to-date reports regarding onsite conditions. Also provides technical advice, equipment, and personnel on request.

9. National Communications System

Coordinates and manages telecommunications support for Federal agencies during radiological emergencies by providing technical support during the pre-emergency or emergency planning phase, assessing the availability of telecommunications, and taking the necessary actions to satisfy essential telecommunications requirements in the emergency area.

V. REFERENCES

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- Title 18 USE -
- Section 231 - Destruction of Government Property
 - Section 238-285 - Civil Disorders
 - Section 791-798 - Treason and Subversive Activity
 - Section 841-848 - Espionage and Information Control
 - Section 876-878 - Actual or Threatened Use of Explosive Agents, Persons or Property
 - Section 1361-1363 - Extortion and Threats
 - Section 2101 - Malicious Mischief
 - Section 2151-2156 - Riots
 - Section 5641-6619 - Sabotage
 - Embezzlement and Threat

Title 44 CFR - Part 351 - Radiological Emergency Planning and Response

VI. DEFINITIONS

1. ACCIDENT. An unforeseen or unplanned event.
 - a. Operational Accident. An event stemming from a DOE operations which presents a potential risk to life, health, property, or the environment.
 - b. Radiological Accident. A loss of control of radioactive material which presents a potential hazard to people, property, or the environment, or exceeding the established limits (see Chapter XI, DOE 5480.1A) for exposure to ionizing radiation.
 - c. Nuclear Weapon Accident. An unexpected event involving nuclear weapon or nuclear weapon components which result in any of the following:
 - (1) Accidental or unauthorized arming, launching, firing, or use of a nuclear weapon.
 - (2) Nuclear detonation.
 - (3) Non-nuclear detonation/burning of a nuclear weapon.
 - (4) Radioactive contamination.
 - (5) Seizure, theft, or loss of a nuclear weapon or nuclear weapon component.
 - (6) Public hazard, actual or implied.
2. ACCIDENT RESPONSE GROUP (ARG). A group composed of Department of Energy (DOE) and DOE Contractor personnel, selected from a pre-established roster, assigned responsibility for providing DOE assistance to peacetime accidents involving nuclear weapons anywhere in the world.
3. COGNIZANT FEDERAL AGENCY. A cognizant Federal agency is the Federal agency that owns, authorizes, regulates, or is otherwise deemed responsible for the affected nuclear facility or radioactive material causing the emergency and has the authority for taking action on the emergency site.
4. EMERGENCY. Any significant deviation from planned or expected behavior or course of events which could endanger or adversely affect people, property, or the environment.

- a. Natural Phenomena Emergency. A condition caused by such natural phenomena as flood, earthquake, fire, storm or other natural occurrences.
- b. Operational Emergency. A condition caused by accident or incidents stemming from DOE operations which presents a potential risk to life, health, property, or the environment.
- c. Radiological Emergency. A condition or potential condition which would result in the accidental release or loss of control of radioactive material.
- c. Terrorist Threats or Acts. Any potential or actual occurrence which creates or appears likely to create a condition resulting in sabotage, bodily harm, unlawful access to DOE or DOE Contractor facilities, or the interruption or loss of vital services.
- e. Special Nuclear Materials Emergency. Any situation involving stolen, lost, or unauthorized possession of source material, special nuclear material, byproduct material of U.S. and/or foreign manufacture, improvised nuclear explosives, or radioactive dispersal devices, or the threatened use of said items.
5. EMERGENCY ACTION AND COORDINATION TEAM (EACT). A DOE team designated to coordinate response to emergencies involving DOE or requiring DOE assistance.
6. EMERGENCY EQUIPMENT. Any equipment which may be required to measure, control, or mitigate the consequences of an emergency.
7. EMERGENCY OPERATIONS CENTER (EOC). An Emergency Operations Center is an alternate control center, located where possible in a secure, and protected location, and designed and equipped to support a cadre of management and supporting personnel who will direct DOE field operations in an emergency.
8. EMERGENCY PLAN. A plan detailing the potential emergencies that might be encountered, and the organization and resources that will be available to respond to such emergencies.
9. EMERGENCY PLANNING ZONE. An area for which planning is done to assure that prompt and effective actions can be taken to protect people, property, and the environment in the event of a major emergency.
10. EMERGENCY PLANNING, PREPAREDNESS, AND RESPONSE.
- a. Planning. The development and preparation of emergency plans and procedures, and the determination of availability of resources to provide an effective response.

b. Preparedness. The training of personnel, acquisition of resources and facilities, and testing of emergency plans and procedures to assure an effective response.

c. Response. The action(s) taken to cope with and minimize the effects of an emergency.

11. EMERGENCY RESOURCES. People, facilities or equipment that have been provided for use in an emergency response.
12. FACILITY. Plant, laboratory, office, or building used by DOE, its Contractors, or subcontractors for which an emergency plan is required.
13. FEDERAL RADIOLOGICAL EMERGENCY RESPONSE PLAN (FRERP). A comprehensive plan for coordinating the overall Federal government response to a radiological emergency, and describes the roles of the individual Federal agencies in that response.
14. FEDERAL RADIOLOGICAL MONITORING AND ASSESSMENT CENTER (FRMAC). A center near the scene of a radiological incident from which the DOE Off-Site Technical Director conducts the FRMAP response. This center generally need not be located near the onsite or Federal-state operations centers as long as its operations can be coordinated with them.
15. FEDERAL RADIOLOGICAL MONITORING AND ASSESSMENT PLAN (FRMAP). A plan to provide radiological monitoring and assessment assistance to the state and local government in response to radiological incidents. This plan, required by 44 CFR 351, is a revised version of the Interagency Radiological Assistance Plan.
16. JOINT NUCLEAR ACCIDENT COORDINATING CENTER (JNACC). A joint DOE/DOD capability at Kirkland Air Force Base, Albuquerque, New Mexico, responsible for maintaining current information on the location of specialized DOE and DOD teams or organizations capable of providing nuclear weapons accident assistance.
17. NATIONAL SECURITY AREA. An area established on non-Federal lands located within the United States, its possessions, or its territories for the purpose of safeguarding classified information or protecting DOE equipment and/or material. Establishment of a National Security Area temporarily places such non-Federal lands under the effective control of the DOE and results only from an emergency event. The senior DOE representative having custody of the material at the scene will define the boundary, mark it with a physical barrier, and post warning signs. The landowner's consent and cooperation will be obtained whenever possible; however, operational necessity will dictate the final decision regarding location, shape, and size of the National Security Area.

18. NUCLEAR MATERIAL. A collective term including source material, special nuclear material, and those other materials to which DOE Order 5630.1 applies. Examples of materials to be included are uranium of any enrichment, plutonium, thorium, deuterium, tritium, neptunium-237, and enriched lithium.
19. NUCLEAR THREAT INCIDENT. Any situation involving stolen, lost, or unauthorized possession of source materials, special nuclear materials, radioactive byproducts, nuclear weapons/devices of U.S. and/or foreign manufacture, improvised nuclear explosives, radioactive dispersal devices, or the threatened use of said items.
20. OFF-SITE TECHNICAL DIRECTOR (OSTD). The DOE or EPA official designated to coordinate the Federal radiological monitoring and assessment activities under FRMAP.
21. REQUESTING AUTHORITY. The organization that directly requests DOE radiological assistance.
22. RESPONSE MANAGER. In a major emergency the Response Manager serves in the ERC to focus on the emergency response coordination, notifications, and requests for assistance required in an emergency at a DOE-ORO facility. In a major emergency the Deputy Manager, or his designee serves as the Response Manager.
23. REQUESTING AUTHORITY. The organization that directly requests DOE radiological assistance.
24. SHELTER. A facility specifically constructed to protect, house, and supply the essential needs of designated individuals during the period of emergency.
25. SOURCE MATERIAL. Either: (a) Uranium, thorium, or any other material which is determined by DOE, pursuant to the provisions of Section 61 of the Atomic Energy Act, to be source material or (b) ores containing one or more of the previously mentioned materials, in such concentration as DOE may, by regulation, determine.
26. SPECIAL NUCLEAR MATERIAL (SNM). Either: (a) Plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which DOE, pursuant to the provisions of Section 11.a.a., and Section 51 of the Atomic Energy Act, determines to be special nuclear material (not including source material) or (b) any material artificially enriched by any of the previously mentioned, not including source material.

VII. ACRONYMS AND ABBREVIATIONS

AMERD	Assistant Manager for Energy, Research and Development
ARG	Accident Response Group
CFA	Cognizant Federal Agency
COTR	Contracting Officers Technical Representative
DOC	U.S. Department of Commerce
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
EACT	Emergency Action and Coordination Team
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ERC	Emergency Response Center
ES&H	Environmental, Safety, and Health
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FRERP	Federal Radiological Emergency Response Plan
FRMAP	Federal Radiological Monitoring and Assessment Plan
FRMAC	Federal Radiological Monitoring and Assessment Center
HHS	U.S. Department of Health and Human Services
HUD	Housing and Urban Development
IRAP	Interagency Radiological Assistance Plan
JNACC	Joint Nuclear Accident Coordinating Center
NDA	National Defense Area

NEST	Nuclear Emergency Search Team
NOAA	National Oceanic and Atmospheric Administration
NRC	Nuclear Regulatory Commission
NSA	National Security Area
NUWAX	Nuclear Weapons Accident Exercise
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations Office
OROC	Oak Ridge Operations Center
OSTD	Off-Site Technical Director
RAP	Radiological Assistance Program
REAC/TS	Radiation Emergency Assistance Center and Training Site
SMB	Senior Management Board
SNM	Special Nuclear Material
USDA	U.S. Department of Agriculture

VIII. COMMERCIAL NUCLEAR POWER REACTORS IN REGION 2

SITE	PLANT NAME	CAPACITY NET MW(e)	COMMERCIAL UTILITY	OPERATION
ALABAMA				
*Scottsboro	Bellefonte Nuclear Plant, Unit 1	829	Tennessee Valley Authority	1985
*Scottsboro	Bellefonte Nuclear Plant, Unit 2	820	Tennessee Valley Authority	1986
ARKANSAS				
Russellville	Arkansas Nuclear One, Unit 1	850	Arkansas Power & Light Co.	1974
Russellville	Arkansas Nuclear One, Unit 2	912	Arkansas Power & Light Co.	1974
LOUISIANA				
Taft	Waterford Generating System, Unit 3	1104	Louisiana Power & Light Co.	1983
Francisville	River Bend Station, Unit 1	934	Gulf States Utilities Co.	1985
Francisville	River Bend Station, Unit 2	934	Gulf States Utilities Co.	Indef.
MARYLAND				
*Lusby	Calvert Cliffs Nuclear Power Plant, Unit 1	845	Baltimore Gas & Electric Co.	1975
*Lusby	Calvert Cliffs Nuclear Power Plant, Unit 2	845	Baltimore Gas & Electric Co.	1977
MISSISSIPPI				
Port Gibson	Grand Gulf Nuclear Station, Unit 1	1250	Mississippi Power & Light Co.	1983
Port Gibson	Grand Gulf Nuclear Station, Unit 1	1250	Mississippi Power & Light Co.	Indef.
MISSOURI				
Fulton	Callaway Plant, Unit 1	1120	Union Electric Co.	1984
NEBRASKA				
*Brownville	Cooper Nuclear Station	778	Nebraska Public Power District & Iowa Power & Light Co.	1974
PENNSYLVANIA				
*Shippingport	Beaver Valley Power Station, Unit 1	852	Duquesne Light Co. & Ohio Edison Co.	1976
*Shippingport	Beaver Valley Power Station, Unit 2	833	Duquesne Light Co. & Ohio Edison Co.	1986
TENNESSEE				
Daisy	Sequoyah Nuclear Plant, Unit 1	1148	Tennessee Valley Authority	1981
Daisy	Sequoyah Nuclear Plant, Unit 2	1148	Tennessee Valley Authority	1982
Spring City	Watts Bar Nuclear Plant, Unit 1	1177	Tennessee Valley Authority	1984
Spring City	Watts Bar Nuclear Plant, Unit 2	1177	Tennessee Valley Authority	1985
Oak Ridge	Clinch River Breeder Reactor Plant	350	Department of Energy	Indef.
VIRGINIA				
Gravel Neck	Surry Power Station, Unit 1	788	Virginia Electric & Power Co.	1972
Gravel Neck	Surry Power Station, Unit 2	788	Virginia Electric & Power Co.	1973
Mineral	North Anna Power Station, Unit 1	907	Virginia Electric & Power Co.	1979
Mineral	North Anna Power Station, Unit 2	907	Virginia Electric & Power Co.	1980
~~Mineral~~	~~North Anna Power Station, Unit 2~~	~~907~~	~~Virginia Electric & Power Co.~~	~~1980~~

*Reactors with 10-50 miles EPZ in Region 2 states.

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APPENDIX 4

EVACUATION TIME STUDY

29 1982

SURRY NUCLEAR POWER STATION

ESTIMATION OF EVACUATION TIMES

Prepared for

VIRGINIA ELECTRIC AND POWER COMPANY

Prepared by

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March 1981

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1. INTRODUCTION

STUDY OBJECTIVES

This report describes the estimates of time required to evacuate the population from about a 10-mile radius of the Surry Nuclear Power Station.

Two objectives are served by this analysis:

- An assessment of evacuation times to serve the state and local emergency civil preparedness agencies in selecting appropriate public protective action during an emergency.
- To indicate potential problem areas in the event a mass evacuation is necessary and thus provide a focus for review of manpower and other resources required to effect an effective area evacuation.

LOCATION OF THE SURRY STATION

The Surry Nuclear Power Station is located on the James River in the northeastern portion of Surry County, Virginia, approximately 46 miles from Richmond and 25 miles from the urban concentrations of the Tidewater area. (See Figure 1.)

LOCAL PREPAREDNESS AND EVACUATION PLANNING

An evacuation time estimate assumes that an effective local preparedness plan is in operation. Among the elements of such a local preparedness plan, some of the more critical elements are identified:

- Detailed evacuation plans, addressing notification, routing, manpower and resource requirements, confirmation of evacuation, and transportation of non-vehicle-owning population (schools, non-auto-owning households and persons in institutions)
- Local notification procedures and hardware, including sirens, public address and telephone notification, and procedures for broadcasting radio and television information

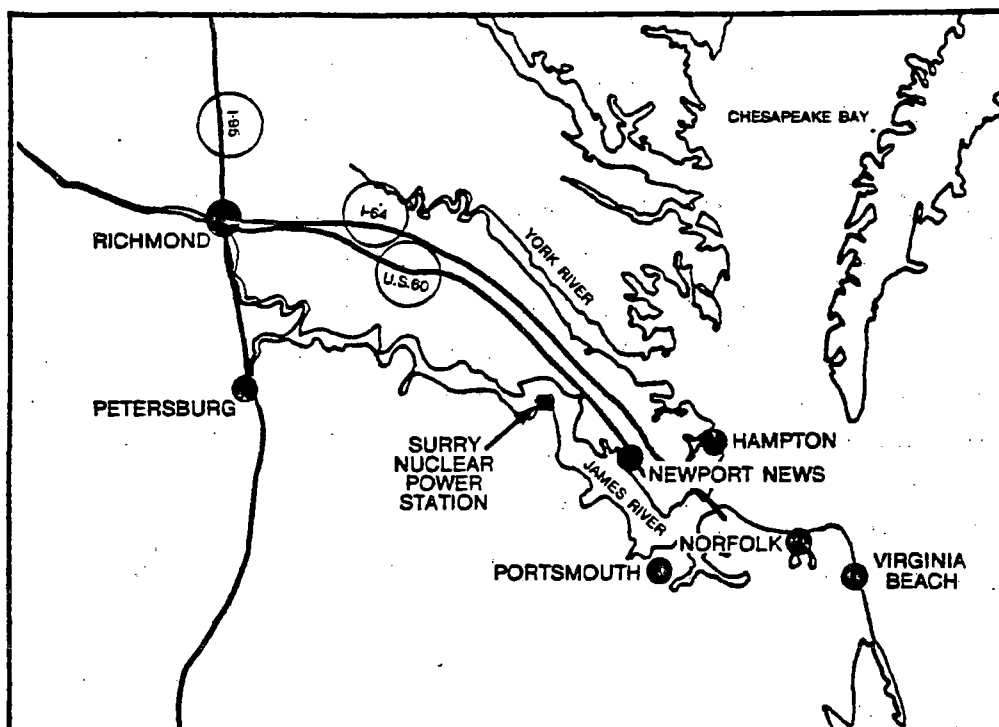


Figure 1. Location of the Surry Nuclear Power Station

- Communication within the EPZ, and between the Surry Station, State Emergency Preparedness Agency and communities, and within the communities themselves
- Local mobilization and decisionmaking
- Detailed traffic control plan
- Securing buses for transporting the school population
- Securing buses and other vehicles for transporting non-auto-owning households and persons in institutions
- Securing ambulances for non-ambulatory populations
- Reception centers and procedures for clearing evacuated population through them
- Manpower (traffic control, supervisory, security emergency services) for conducting the evacuation

The existing local Radiological Emergency Response Plans (December 1980) address most of the critical elements outlined above.

THE EMERGENCY PLANNING ZONE (EPZ) BOUNDARY

The Surry Station EPZ boundary is defined almost entirely along major roadways or arterial streets in the area. The geographic extent of local jurisdictions precluded the effective use of municipal boundaries in defining the EPZ.

SUMMARY OF ESTIMATING TECHNIQUE

The method used in developing evacuation time estimates is based on separating the population into segments, according to how they evacuate the area. For each population segment, a series of discrete action steps is defined, and the completion times for each step determined.

These times for completing each step are then linked together statistically to yield the total evacuation time for that population segment.

Two cases of evacuation time estimates are made:

1. For evacuation during a summer Sunday when temporary (tourist) population is greatest
2. For evacuation on a winter weekday when schools are in session

SUMMARY OF EVACUATION TIMES

On a summer Sunday all evacuation routes on the north side of the James River will be congested during a general area evacuation. The total evacuation time of 5:15 hours will be determined by the capacities of the individual routes out of the area. On the south side of the James River, with little or transient travel, the evacuation time is determined by the expected rate at which local residents receive the emergency notification information and the rate at which they can prepare to leave home. The estimated evacuation time for the area south of the James River is 2:15 hours.

During the wintertime, when there are few or no transients in the area, the evacuation on most routes is determined by the rate at which the population can be prepared to leave home. Notable exceptions to this are the evacuation of the concentrated populations in Newport News and Williamsburg. In these areas, roadway congestion will develop on the local roads leading to the major evacuation routes. With more road capacity available for fewer cars (i.e., no transient traffic) the estimated evacuation time is 3:45 hours on a winter weekday.

II. CHARACTERISTICS OF THE SURRY STATION VICINITY

HIGHWAY SYSTEM IN THE SURRY STATION VICINITY

Some important features of the highway system and highway travel in the 10-mile area of the Surry Station (Figure 2) are noted.

- The James River traverses the emergency planning zone from northwest to southeast. There are no bridges crossing the river within the EPZ. The areas north and south of the river are thus separate and distinct areas.
- An intercity major trunk highway, I-64, runs along the north side of the river. This facility is of major significance in both local and interregional travel.
- Two other primary highways, U.S. 60 and State Route 143, run generally parallel to the interstate route. These highways serve a predominantly local travel function.
- Other travel facilities in the area north of the river are essentially routes that feed into the major arterials noted above. One major local traffic distribution facility is the Colonial Parkway. This is a freeway-type facility that provides access to the historic centers in the area.
- On the south side of the river, the road facilities are typically local land access facilities without any major trunk facility alignments.

EXISTING TRAFFIC VOLUMES

The existing traffic volumes suggest some distinct patterns:

- Major traffic flows exist on I-64--20,000 average daily traffic (ADT) in the Williamsburg area, and 35,000 ADT in Newport News.
- On U.S. 60 and State Route 143, maximum traffic flows occur within the urban portions of Newport News. In the Williamsburg area, those facilities have an average daily volume of 10,000 to 12,000. Outside the urban areas the ADT's on these routes is about 5,000.
- On the south side of the river, the traffic volumes are typical of rural access roads in sparsely populated areas with volumes generally about 2,000 to 3,000 or less.

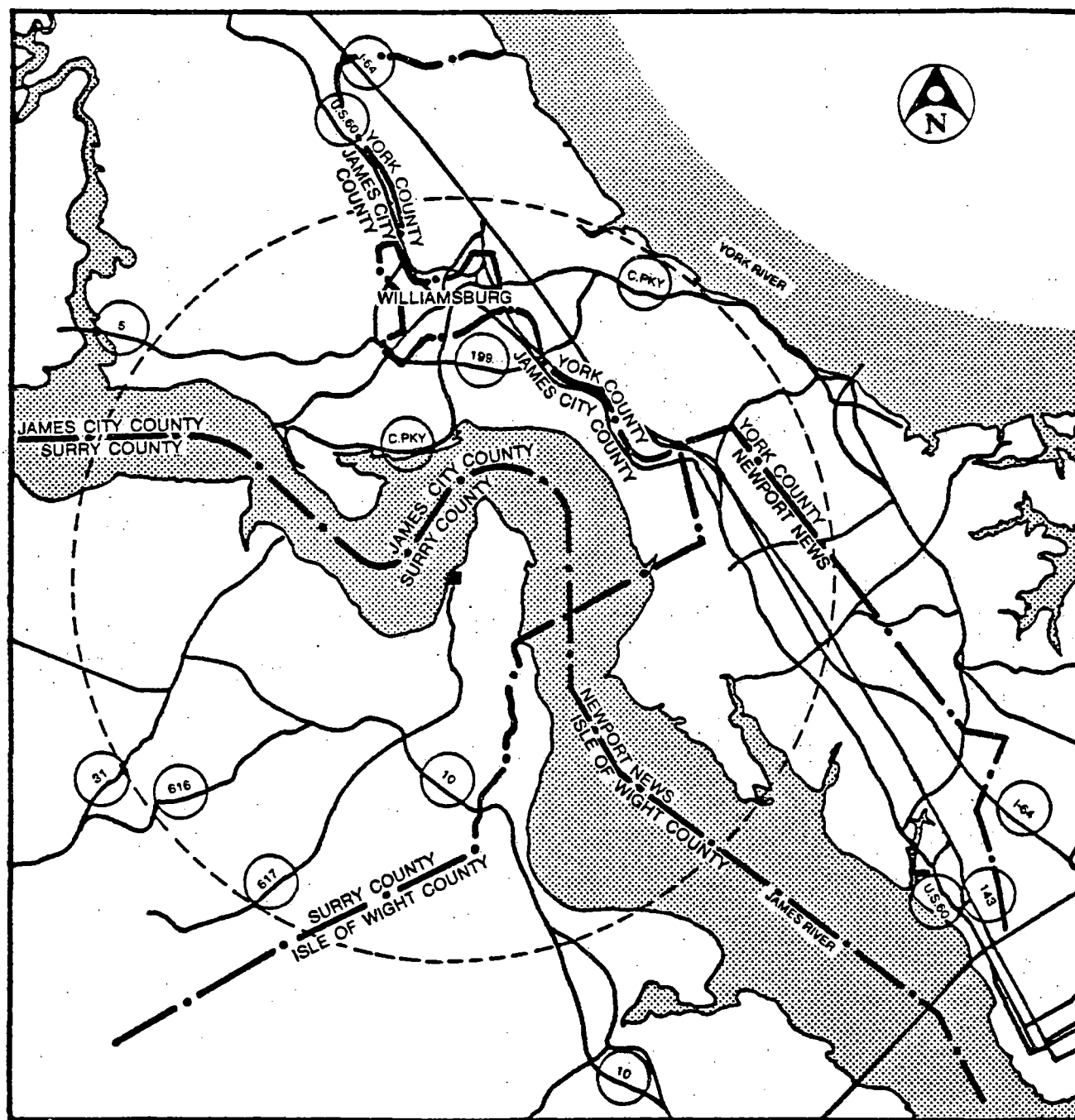


Figure 2. Highway System in the Vicinity of the Surry Power Station

SPECIAL FACILITIES IN THE SURRY STATION EPZ

Special facilities in the EPZ include hospitals, large recreational attractions, educational institutions, and military establishments.

Two hospitals, Williamsburg Community Hospital and Eastern State Hospital, are located in the Williamsburg area.

The College of William and Mary is the only major educational institution in the Surry EPZ which contains a significant population of resident students.

Three military establishments, Fort Eustis, Naval Weapons Station and the Naval Supply Depot, are located within the EPZ. The combined daytime population of these military establishments is about 7,000 persons.

Major recreational facilities in the EPZ are Busch Gardens, Colonial Williamsburg, and historical parks in Jamestown and York County. The summer peak transient population within the EPZ is estimated to be about 55,000 persons.

III. POPULATION OF THE SURRY STATION EPZ

TOTAL POPULATION CHARACTERISTICS

The total permanent resident population of the Surry Station EPZ,¹ is 86,617 persons (Table 1). This population is distributed to 23,400 households.

TABLE 1. TOTAL RESIDENT POPULATION OF THE SURRY STATION EPZ
(1980 PRELIMINARY CENSUS DATA)

<u>Government Unit</u>	<u>Population within the EPZ</u>	<u>Households within the EPZ*</u>
James City County	16,502	4,583
York County	8,584	2,384
Williamsburg	11,644	3,234
Newport News	45,300	12,583
Isle of Wight	900	250
Surry	3,687	1,024
TOTAL	86,617	24,058

* Estimated on the basis of U.S. Census Household Size Data.

The distribution of the population over the EPZ is quite varied. Major population concentrations exist in the Williamsburg and Newport News sectors of the EPZ. The balance of the area is rather sparsely populated. Only about five percent of the area resident population is located on the south side of the river in Surry County and Isle of Wight County.

1. As defined in: Commonwealth of Virginia, Emergency Response Plan -- Radiological Emergency Response Plan, June 1980.

On the north side of the river, about one-half of the EPZ population resides in the City of Newport News.

Seasonal and Transient Population

During the summer months, the population of the EPZ is greatly increased by transient persons visiting the area for short periods of time (overnight or day trips). Under peak conditions on a summer weekend, 55,000 seasonal and transient persons are added to the permanent population of 86,600. This additional population is concentrated at Busch Gardens, Colonial Williamsburg, and the historical parks.

The greatest concentration of transients occurs at Busch Gardens where peak attendance may amount to 35,000 persons. The transient population at Busch Gardens varies by time of year. During the winter period from late October to April, the park facilities are closed to the public.

Other key visitor attractions in the area are Colonial Williamsburg and the Colonial Historical Parks. Peak attendance at the Historical Parks is estimated at 1,500 persons. At Colonial Williamsburg, the peak attendance is estimated at 15,000 persons.

AUTOMOBILE OWNERSHIP

Table 2 shows the distribution of auto-owning and non-auto-owning households in the Surry Station EPZ. Some patterns of auto ownership of interest in estimating evacuation times are noted:

- Sixteen percent of the households in the EPZ do not own an auto.
- Nearly three-quarters of the non-auto-owning households are in Newport News and Williamsburg. These two areas also have two-thirds of the EPZ area population.
- Relatively few non-auto-owning households are in the rural areas.

TABLE 2. AUTO OWNERSHIP IN THE SURRY STATION EPZ

Government Unit	Households With Auto Available				Population Without Auto Available
	0	1	2	3+	
James City County	628	2,502	1,319	133	1,256
York County	150	1,135	970	128	300
Williamsburg	495	1,901	727	110	990
Newport News	2,315	6,077	3,674	516	4,630
Isle of Wight	54	133	57	6	104
Surry	205	568	225	26	410
Total	3,847	12,316	6,972	919	7,690

The transient population is, for purposes of evacuation time estimation, assumed to be 100 percent auto-owning. Those transients that visit the area by bus travel virtually exclusively by charter bus and thus have "private" transportation.

The seasonal population (for example, the student body at the College of William and Mary) has a large public transport-dependent component. With an estimated private auto fleet on campus of about 800 and a total staff and student body of 8,500, the non-car-owning individuals are in excess of 7,500 persons.

POPULATION SEGMENTS AS DEFINED FOR EVACUATION ANALYSIS

In estimating evacuation times, four population segments are identified on the basis of how persons are evacuated from the EPZ:

- Auto-owning population. This population segment consists of all members of car-owning families, except children at school at the time of a general emergency.
- School population. All children at school at the time of a general emergency, regardless of automobile ownership status of their families.

- Non-auto-owning households. All persons (except school children) in households where a car is not reasonably available for evacuation.
- Population in institutions such as hospitals and nursing homes, etc. and not having access to a private vehicle for evacuation.

Rearranging the EPZ population into these categories (Table 3) reveals that:

- Most of the population (76 percent) is in the auto-owning segment.
- The next largest segment is the school population, accounting for 13 percent of the population.
- The non-auto-owning population accounts for 9 percent of the Surry Station EPZ inhabitants.
- The institutionalized population comprises 2 percent of the total population.

TABLE 3. SURRY STATION EPZ POPULATION BY SEGMENTS

<u>Population Segment</u>	<u>Population¹</u>	<u>Percent of Total Population</u>
Auto-owning Population ²	65,747	76
School Population ³	11,820	13
Non-Auto-Owning Population	7,690	9
Population in Institutions ⁴	1,360	2

1. Permanent population. Seasonal and transient population of 55,000 persons not included.
2. Auto-owning population excludes school children.
3. All school children regardless of car-owning status of their households.
4. Does not include nursing homes.

IV. THE EVACUATION SEQUENCE FOR SURRY STATION

GENERAL CONCEPT OF EVACUATION

The overall purpose of the evacuation is simply to remove the population of the EPZ as rapidly as possible. The evacuated population is directed to reception centers, where it is temporarily lodged or reassigned to other mass care facilities.

Wherever possible, the evacuating population will leave the EPZ by means of private automobiles. Persons without automobile transportation will be transported by transit vehicles, ambulances and other available vehicles.

In general, motorists will leave the EPZ by the most direct route; that is, the shortest route out of the EPZ. Traffic direction at key locations will help balance the traffic volumes on the evacuation routes. Normal traffic flow will generally be observed, with most or all streets open to all vehicles and functioning in their usual manner.

In estimating evacuation times, the EPZ population is grouped according to how it evacuates: (1) auto-owning population; (2) school population; (3) non-auto-owning population; and (4) persons in institutions.

Each of these groups follows a different sequence in evacuating:

- The auto-owning population, after receiving the notice to evacuate, assembles the family (except for children at school) at home, prepares for evacuating the home and drives out of the EPZ. Non-residents (for example, Park visitors) simply assemble the group with which they are traveling, and leave the area.
- The school population is transported out of the EPZ directly from the schools. School buses are used to evacuate this population.
- Non-auto-owning households prepare for leaving their home, assemble at collection locations, and are then transported out of the EPZ in buses or other vehicles.
- Persons in institutions (hospitals, etc.) are prepared for evacuation, then transported out of the EPZ in buses and ambulances.

POSSIBLE EVACUATION TIME PERIODS

The length of time needed for evacuation of the Surry Station EPZ will vary, depending on the time of day, day of week and season of year in which the evacuation occurs. Four possible time periods are identified:

- Nighttime
- Daytime on a summer weekend ("Summer Sunday" case)
- Daytime on a winter weekend
- Daytime on a "winter weekday" case

In estimating evacuation times, the "worst cases" of these four time periods should be adopted; that is, evacuation time estimates should reflect conditions likely to cause the longest evacuation times.

Nighttime Evacuation

In a night evacuation, the notification process would be slowed by people having to wake up and comprehend the evacuation information being broadcast. Additional time would be required to prepare vehicles for evacuation in the dark. On the other hand, for most segments of the population, the families would be intact at the time of notification, since schools are not in session and relatively few employees are on the job.

Daytime on a Summer Weekend ("Summer Sunday" Case)

In any daytime evacuation, the notification time is at a minimum, since most people are awake, and many are already listening to radio and television broadcasts. Families are more likely to be at the same location on weekends, since schools are not in session and relatively few persons are at work. Outdoor recreation is at a peak during this season, and many non-residents are at the recreational areas.

Daytime/Weekday Evacuation ("Winter Weekday" Case)

During a daytime/weekday evacuation, a majority of the employed population would be on the job. During most of the year, schools are in session and the transportation of students becomes a large issue in any evacuation. For much of the population, a daytime/weekday evacuation creates additional action steps, since families must be assembled prior to leaving the home and evacuating the EPZ. Also, during the daytime/weekday period, the likelihood of persons being away from home without a vehicle are greatest.

Critical Time Periods

For the evacuation of the Surry Station EPZ, the critical time period—that is, the period for which evacuation is likely to require the most time—is the "Summer Sunday". During this period, the population and vehicle accumulation in the EPZ is at a maximum.

The next most critical time period is the "Winter Weekday" period. During this period, the time needed to assemble family units is likely to be at its maximum. Furthermore, the daytime/weekday periods raises issues of school population evacuation which do not exist in other time periods.

Separate evacuation time estimates are prepared for both of these time periods, i.e., for "Summer Sunday" and "Winter Weekday".

POPULATION SEGMENTS TO BE EVACUATED

As a first step in estimating the evacuation times for the Surry EPZ, its population is divided into segments by HOW that segment leaves the EPZ (see Section IV).

Family Units

Families (excluding children in school) are evacuated as units. On weekdays, assembly of the family units involves members returning home from their jobs,

shopping, etc. On weekends, many families are already assembled and can immediately prepare to leave home. Non-resident families (for example, Park visitors) are already assembled, and evacuate with almost no further preparation.

EVACUATION ACTION STEPS

For each population segment, the evacuation sequence consists of a series of action steps. These are clearly defined actions, performed in a predictable sequence (see Figure 3).

Subdividing the evacuation process into these discrete steps improves the accuracy of the estimates of time needed for the entire evacuation. In place of a single estimate of the entire evacuation process, for which data are not available, this process permits the estimation of time for each individual step, for most of which data are readily available.

Public Agency and Private Steps

Some of the evacuation steps identified in Figure 7 are performed by public agencies. For all population groups, the "Evacuation Notice" action is the responsibility of public agencies. For those persons evacuated by means other than privately-owned vehicles, public agencies have the additional responsibility for the actual evacuation step; for example, "Evacuate School Population in Buses", "Evacuate Non-Auto-Owning Households in Buses", etc. For the population in institutions, the "Mobilize Population" step is also a public agency responsibility.

Those action steps not the responsibility of public agencies are done at the initiative of the individuals being evacuated. For the auto-owning population, all steps after the initial "Receive Broadcast Information" are private actions; that is, they are initiated by the individuals being evacuated. Similarly, two of the steps in the evacuation of non-auto-owning households are private steps.

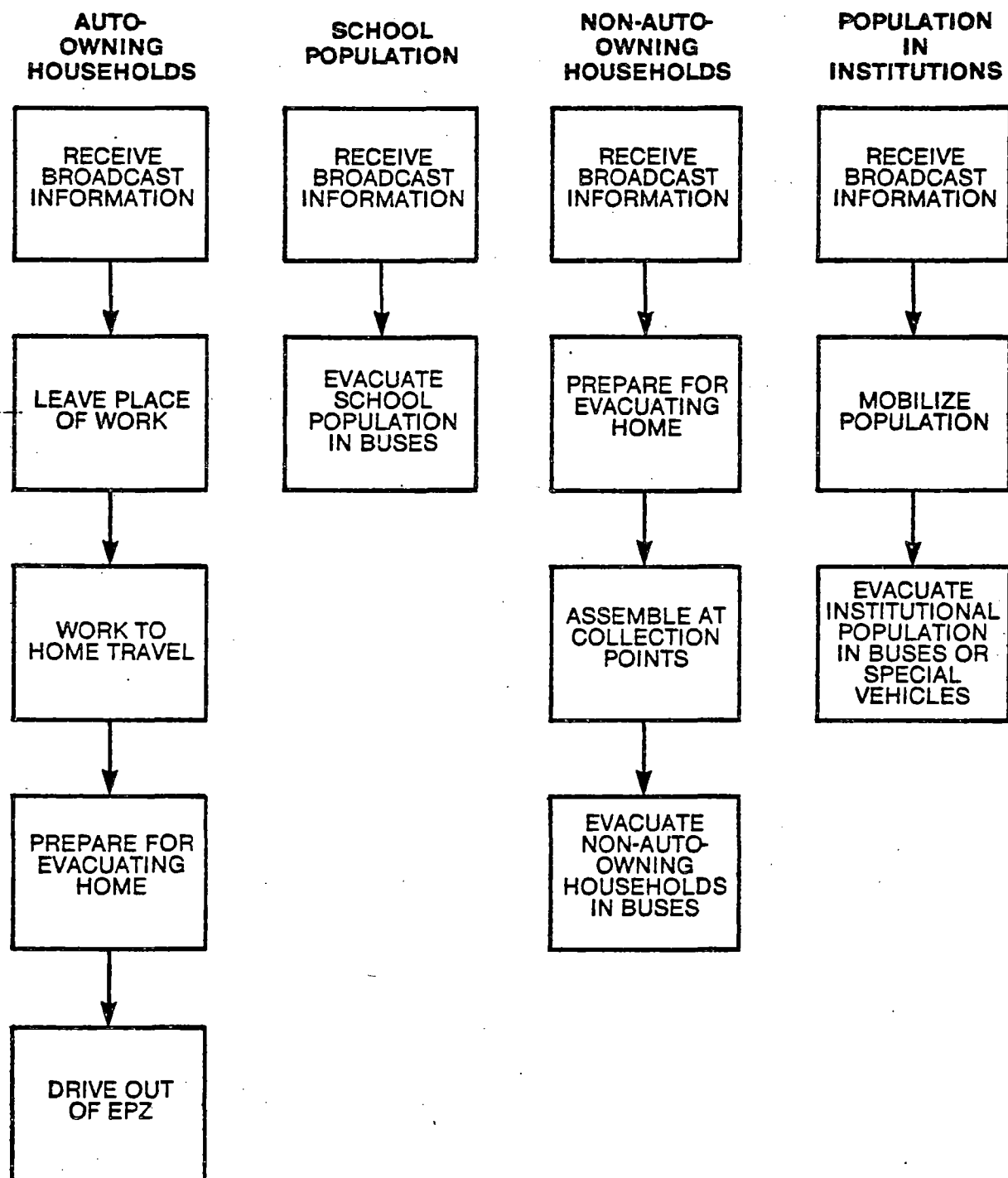


Figure 3. Population Segments and Evacuation Sequences

EVACUATION OF AUTO-OWNING POPULATION

The action steps described in the following sections describe the sequence of evacuation for resident auto-owning households, evacuating the area during the daytime/weekday period. For some other components of the auto-owning population, the sequence is shortened and certain action steps are omitted. For example, the transient population does not need to return home from work, nor to prepare for leaving a household. In the calculation of evacuation times, only those action steps appropriate to the population component are included.

Receive Broadcast Information

Following the decision to evacuate, the first activity is the notification of the public that an emergency exists. This is accomplished either by the sounding of sirens, or activation of other alert systems (such as NOAA), or through the use of mobile PA units. This notification alerts the public that an emergency exists, and that they should tune in to radio and television broadcasts for further information.

The next activity is the broadcast of radio and television information, with specific instructions for evacuating.

Leave Place of Work

The rate at which workers will leave their jobs to return home to prepare for evacuation depends on the particular work environment and upon the responsibility level of the worker. It is to be expected that most of the work force will be able to leave their jobs almost immediately, quite similar to a normal departure from work at the end of the workday. A number of workers, however, will require some job "close-down" time in work situations; for example, those that involve machinery, construction equipment, or cash registers in retail sales establishments. Supervisory employees, managers and independent business operators will generally require the greatest amount of time to secure their place of work and to assure that all employees and others on the premises have departed.

Work-to-Home Travel

Travel of the employees from their place of work to home is essentially a normal journey-to-work travel time distribution. The maximum trip length for work trips in the EPZ is not likely to exceed 20 miles, and the average trip is less than three miles. An average travel speed of 20-30 miles per hour is typical for the travel home for area workers.

This movement of workers, because of the short time over which it occurs, can be expected to cause some traffic congestion. This level of congestion should be similar to that occurring during the twice-daily work travel peak. It is expected that the road system will handle this volume of traffic with essentially the same level of service as during the peak hours on a typical working day.

Prepare for Evacuating Home

People can be expected to react differently to any emergency situation, and the conditions imposing an evacuation need on the area population are likely to generate great differences in the amount of time that people will spend in preparing to leave their home. Three factors in particular affect the amount of time needed to prepare for evacuating a household:

1. Whether or not adults are at home when notice to evacuate is received. If so, preparation time is shortened (compared to households where no adults are at home) since preparation for evacuation can begin before workers arrive at home.
2. Number of children and other dependents at home. These increase the time needed to prepare the household for evacuation.
3. The amount of property to be secured. Farms are the extreme case, and may require up to two hours to secure. On the other hand, small households, for example, in apartments, can be prepared for evacuation in minutes.

Travel Out of the EPZ

After households are secure, auto-owning households will drive out of the EPZ by the most direct routes available.

The auto-owning population will drive either to reception centers established outside the EPZ, or to other destinations (primarily homes of friends and relatives) of their own choosing.

Public agencies will give routing advice for this travel, by means of preparedness plans prior to the emergency and through information broadcasts during the actual evacuation. Police officers will also channel flows of traffic out of the EPZ.

During the evacuation, normal traffic operations will generally prevail. Specifically, two-way streets will continue in two-way operation, traffic signals will continue to function, and so forth. Some modifications might be made; for example, some three-lane roads may be operated in an "imbalanced" manner, with two lanes flowing out of the EPZ and only one lane used for inbound traffic.

During much of the evacuation, traffic will be only moderately congested. However, at several locations and during certain periods, significant traffic congestion and delays are expected.

EVACUATION OF SCHOOL POPULATION

Receive Broadcast Information

Following the decision to evacuate, the local preparedness agencies notify schools directly of the need for evacuation. This is done through radio warning systems and telephone calls directly to the schools.

Evacuate School Population in Buses

The school population is transported directly by bus from school to mass care centers. Generally, an entire school will be transported to the same reception center. School children will not return home prior to evacuation. The picking up of school children at school by families is discouraged.

School bus fleets from all districts within the Surry EPZ and from neighboring districts within about a 20-mile distance of the EPZ will be used for evacuation. All school buses used in these districts, whether publicly or privately owned, will be used to evacuate students from the EPZ.

NON-AUTO-OWNING HOUSEHOLDS

Receive Broadcast Information

The procedure for receiving broadcast information is the same as for the auto-owning population (above). This may include the sounding of sirens or mobile public address and possibly some direct notification by telephone calls.

Prepare for Evacuating Home

This step is the same as for the auto-owning population (above). As in the case of the auto-owning population, primary factors in the time required for this action are whether or not an adult is at home at the time of notification, the number of dependents to be evacuated, and the extent of property to be secured.

Assemble at Collection Points

A significant fraction of the non-auto-owning population (perhaps as much as 50 percent) will be evacuated as passengers in private vehicles driven by family, neighbors or friends. This component of the non-auto-owning population could then be considered, in effect, as part of the auto-owning population.

Persons from non-auto-owning households who do not evacuate as passengers in private vehicles will assemble at locations (for example, churches and public buildings) designated as collection points. From the collection points, buses will transport them to the reception centers.

Most of the population in settled areas lives within one mile of a collection point, and the majority of this population will walk there. Persons unable to walk to the

collection point will, by telephone, request transit service from their homes to the collection point. The rural non-auto-owning population will be taken to collection points in transit vehicles and in some cases, automobiles.

Evacuate Non-Auto-Owning Households in Buses

Transit buses will pick up evacuees who have assembled at the collection points, and take them to the reception centers outside the EPZ.

Potential sources of buses include private common carrier fleets, public transit systems from within the EPZ, and public transit systems from outside the EPZ, particularly from the Tidewater urban area.

POPULATION IN INSTITUTIONS

Receive Broadcast Information

Following the decision to evacuate, the local preparedness agencies will notify institutions directly about the need to evacuate. This is done by radio warning system or telephone calls.

Mobilize Population

The institutional population is instructed about evacuation procedures by the staff of that particular institution. Necessary personal effects are assembled. Essential medical records are gathered.

Evacuate Institutional Population in Buses or Special Vehicles

Transit buses will pick up ambulatory hospital patients, nursing home residents and other persons not requiring ambulance transportation. These passengers will be transported directly to specially designated reception centers. Generally, all residents of a given institution will be evacuated to the same reception center. Potential sources of buses include private common carrier fleets, public transit systems

within the EPZ and public transit systems from outside the EPZ, particularly from the Tidewater urban area.

Non-ambulatory persons will be transported directly from institutions by ambulance. These vehicles will be drawn from the fleets normally based within the EPZ, supplemented by ambulances from neighboring communities.

SUMMARY OF THE EVACUATION PROCESS

In order to examine the "worst case" for which evacuation times are not a maximum, the evacuation is assumed to occur during the daytime on a summer weekend. The next most critical period, daytime on a winter weekday, is also examined.

Four population groups, having distinctly different evacuation methods, are recognized.

For each population group, the evacuation sequence consists of a number of clearly defined action steps as summarized in Table 4.

TABLE 4. SUMMARY OF EVACUATION ACTION STEPS

POPULATION SEGMENT	ACTIONS STEPS AND DESCRIPTION
<u>Auto-Ownning Population</u> (All members of households, except school children, having a private vehicle available for evacuation)	1. RECEIVE BROADCAST INFORMATION, including instructions for evacuating 2. *LEAVE PLACE OF WORK. 3. *WORK-TO-HOME TRAVEL, similar to normal work trip 4. *PREPARE FOR EVACUATING HOME (close house, secure property) 5. DRIVE OUT OF THE EPZ in private vehicles, using most direct routes
<u>School Population</u> (All persons in schools, whether public or private)	1. RECEIVE BROADCAST INFORMATION, including instructions for evacuating 2. EVACUATE SCHOOL POPULATION IN BUSES from districts in EPZ and other sources
<u>Non-Auto-Ownning Population</u> (Persons not having a private vehicle available for evacuation)	1. RECEIVE BROADCAST INFORMATION, including instructions for evacuating 2. PREPARE FOR EVACUATING HOME (close house, secure property) 3. ASSEMBLE AT COLLECTION POINTS such as churches or public buildings 4. EVACUATE NON-AUTO-OWNING POPULATION IN BUSES from EPZ and other sources
<u>Persons in Institutions</u> (Hospitals, nursing homes, Naval Base, etc.)	1. RECEIVE BROADCAST INFORMATION, including instructions for evacuating 2. MOBILIZE POPULATION, prepare population for evacuation 3. EVACUATE INSTITUTIONAL POPULATION IN BUSES OR SPECIAL VEHICLES

* These steps omitted by non-residents; for example, Park visitors.

V. EVACUATION ROUTES

GENERAL STRATEGY OF EVACUATION ROUTING

This chapter considers the evacuation of the largest population segment of the EPZ -- those using private automobiles. The basic objective of evacuation routing for automobile traffic is to permit vehicles to exit as rapidly as possible from the EPZ. The overall evacuation strategy is derived from key geographic features of the EPZ such as the location of the Surry Nuclear Power Station and the constraint on north-south movement presented by the James River, as well as from the characteristics and configuration of the road network. The basis of the strategy is the evacuation of principal year-round population centers by the most direct movement possible. The major components of this strategy are illustrated in Figure 4 and summarized below:

- Newport News, the largest population concentration of the EPZ, should be evacuated directly to the southeast.
- Williamsburg, the second ranking population center, should be evacuated directly to the northwest.
- The southern half of the EPZ should be evacuated both to the west and to the southwest.
- The major population concentration at Busch Gardens is to be distributed onto three major travel arteries, I-64, Route 60 and Route 143.

These major movements define the corridors for evacuation of the population of the EPZ. Clearly, this strategy provides for the separation of the major flows which is important to the minimization of traffic conflict.

ROAD NETWORK FOR VEHICLE EVACUATION

The characteristics of the road system within the EPZ were presented in Chapter II. A capsule description of the facilities available for evacuation traffic would note that the EPZ is served by a full range of facility types that includes one interstate highway, Federal primary system routes as well as primary and second-

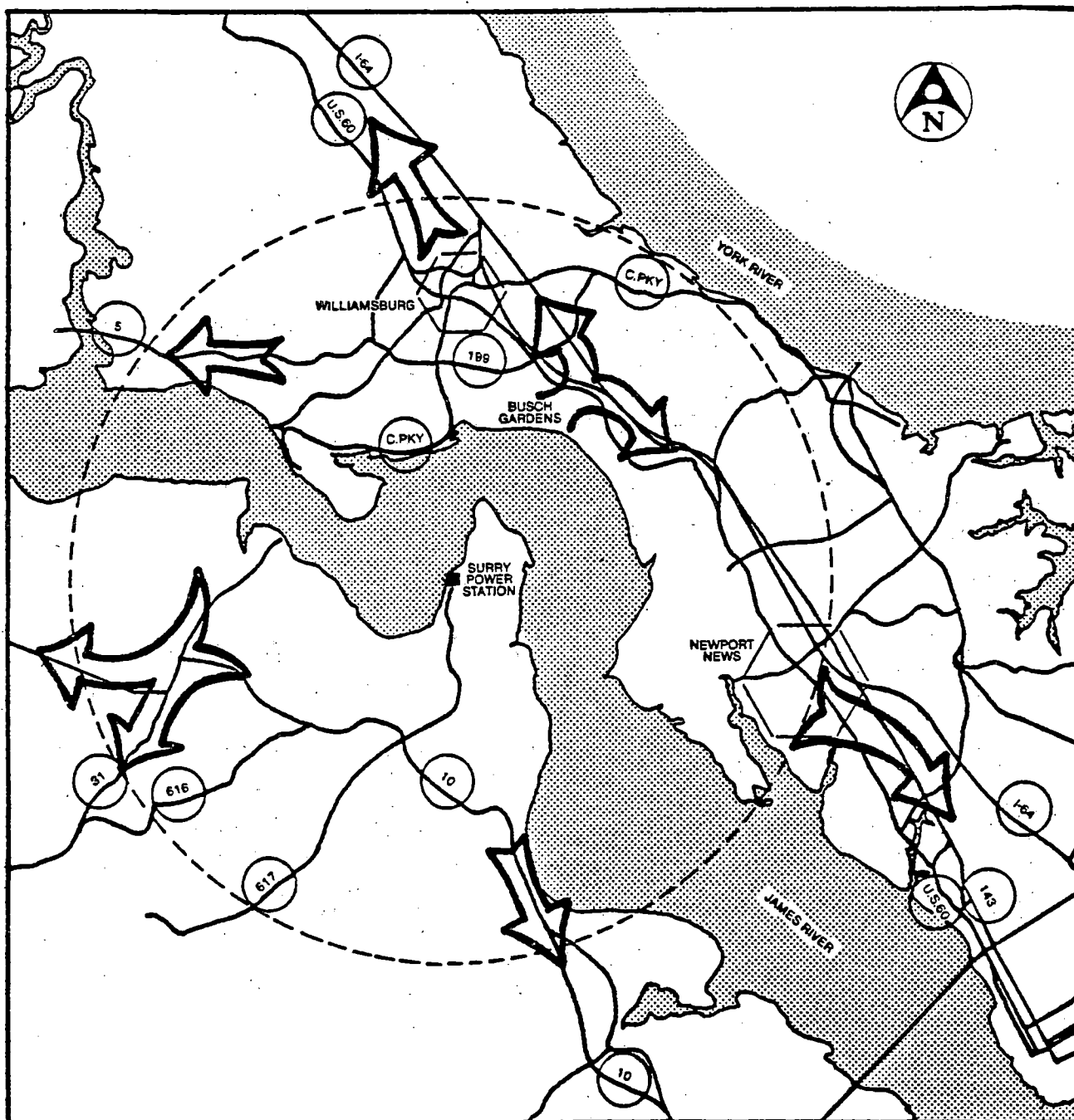


Figure 4. Evacuation Routing Strategy

ary state roads. The major facilities, I-64 and Route 60, are continuous and offer high capacity for traffic exiting the area to the northeast and southwest.

Figure 5 identifies the "gateway" points where roads cross the boundary of the EPZ. This set of fifteen gateway points represents the total roadway capacity for evacuation. In general, the capacity of a roadway is determined by the capacities of its intersections, rather than by its cross sections at the non-intersection locations. In the case of evacuation routes, capacity is likely to be determined by a "critical intersection". These are intersections that represent the "bottlenecks" on the evacuation routes. In general, they are locations at which (1) the evacuation route has a high traffic volume, after having collected traffic from various tributary roads, and (2) cross-street traffic at the intersection is significant, reducing the amount of time available for evacuation traffic to move through the intersection.

The capacity of an intersection is based on a maximum flow of 1,500 vehicles per lane hourly, with full assignment of the right-of-way (or, in other words, 1,500 vehicles hourly if there is no cross-street traffic). This capacity is then adjusted downward to reflect the demands of the cross traffic. At the critical intersections, which are establishing the capacity on the evacuation routes, the total capacity is adjusted downward to 80 percent of the maximum to reflect this cross-street traffic. The resulting capacity is 1,200 vehicles per lane per hour.

On freeways where there is no interference to traffic from side streets and driveways, capacity is 1,800 vehicles per hour, and on ramps to the freeways the capacity is 1,500 vehicles per hour.

The total capacity of the Surry EPZ gateway points is approximately 27,600 vehicles per hour. This estimate of total capacity is based upon the use of hard-surface highways and primary and secondary roads as evacuation routes, and does not include local urban streets and unpaved roads.

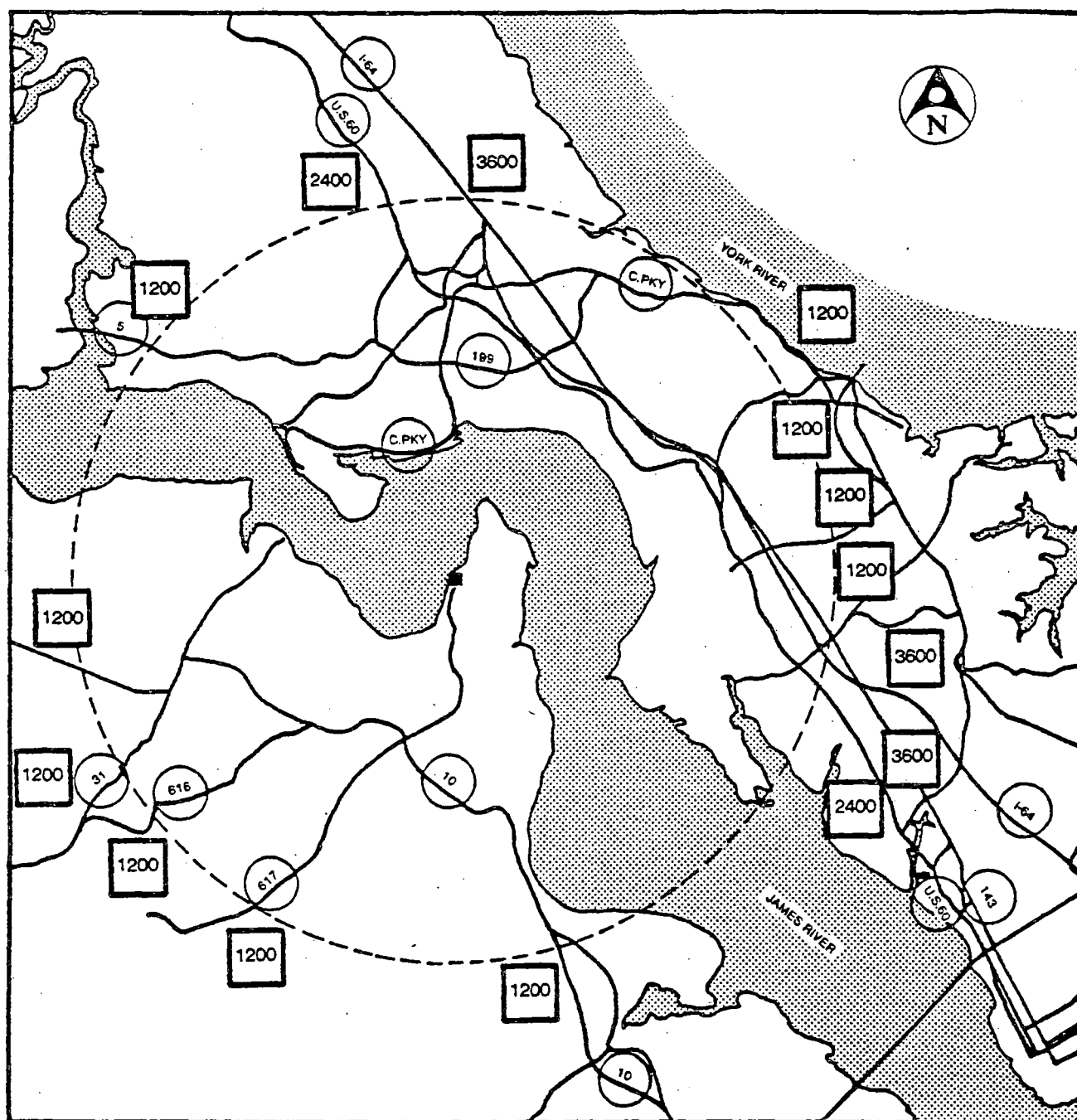


Figure 5. Evacuation Gateways and Capacities

FORECASTING EVACUATION TRAFFIC

The review of data on the characteristics of the population of the EPZ included an assessment of auto ownership patterns in the area. At this point in the analysis, we consider the generation of automobile vehicle trips for the evacuation of those households with an auto available. It is important to recognize that automobile evacuation trips and total automobiles within the EPZ are not necessarily the same.

The trip generation step is a calculation based upon the auto ownership patterns of the year-round residents and the vehicles associated with recreational visitors and seasonal residents. The patterns of auto ownership and the median household size (number of persons per household) indicate that there are households with fewer vehicles than licensed drivers and households with more vehicles than licensed drivers. Recreational vehicles, for example, are often "excess" vehicles that are used only for special purposes. The trip generation step is built up from the segments of the auto-owning population and recognizes that households with only one or two vehicles will utilize a greater proportion of their cars than households with three or more vehicles. Table 5 presents the total vehicle trips forecast for the EPZ under the two different evacuation scenarios.

TABLE 5. EVACUATION TRAFFIC ESTIMATE

<u>Government Unit</u>	<u>Case A: Summer Sunday</u>		<u>Case B: Winter Weekday</u>	
	<u>Total</u>	<u>Peak Hour</u>	<u>Total</u>	<u>Peak Hour</u>
James City County	17,706	16,820	5,610	4,768
York County	3,724	3,538	2,918	2,480
Williamsburg	8,925	8,479	3,958	3,364
Newport News	15,402	14,632	15,402	13,092
Isle of Wight	306	291	306	260
Surry	1,254	1,192	1,254	1,065
Total	47,317	44,951	29,448	25,029

This forecast level of auto vehicle trips averages approximately 85 percent of the estimated total number of vehicles in the EPZ. This level of vehicle utilization appears reasonable when allowances are made for vehicles being outside the EPZ at the time of evacuation, vehicles being out of service for mechanical problems, and the number of "excess vehicles" in households where there are not as many licensed drivers as vehicles.

INDIVIDUAL EVACUATION ROUTES

In order to assess the time required to evacuate the Surry EPZ, individual exit routes were developed for "watershed area" relative to the major evacuation routes. This enables a relatively "fine-grained" analysis that can be related to actual concentrations of population and the evacuation route options available to each subarea.

Individual evacuation routes are determined following these guidelines:

- The route must lead fairly directly out of the EPZ, and should not have a circuitry of greater than 150 percent. (Circuitry is the amount by which the actual road distance exceeds the straight-line distance).
- The routes must be at least collector streets in the urban areas, or at least paved secondary roads in the rural areas. Local urban streets and unpaved rural roads are not designated as evacuation routes.

The system of evacuation routes is shown in Figure 6. For each of the evacuation scenarios carried through the analysis, the forecast traffic volumes were assigned to the system of evacuation routes. For the purposes of this analysis, it was assumed that overall, traffic facilities would be operated in a relatively normal fashion. That is to say that few instances of special traffic management capability were assumed. Noteworthy exceptions include assumed 3-lane outbound traffic on Route 143. In addition to these operating characteristics, a relatively low-level of traffic control intervention and direction was assumed for a limited number of intersections.

Beyond this, little effort was made to balance or optimize traffic flows. It is important to recognize that individual motorists will have a very imperfect knowl-

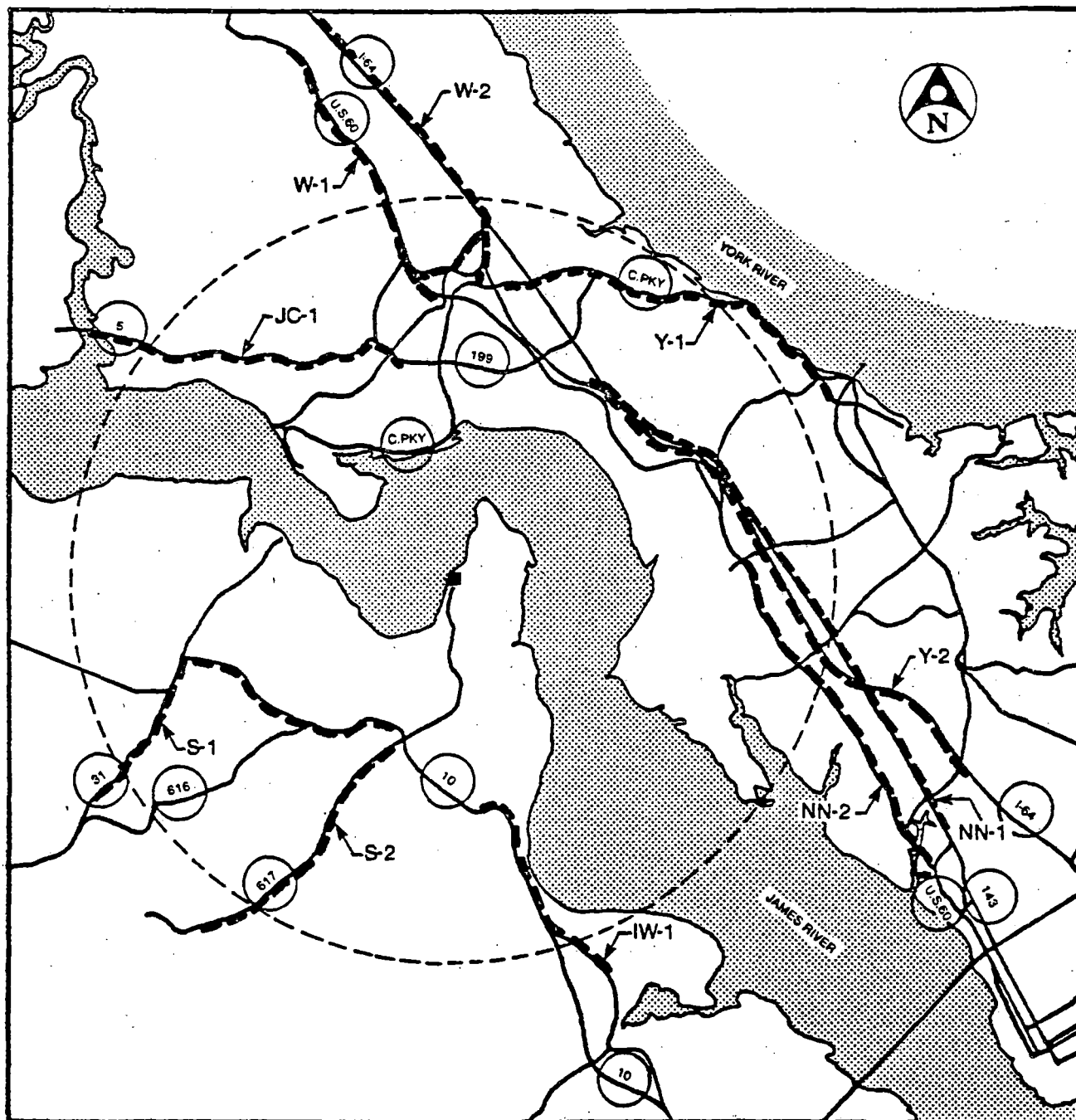


Figure 6. Evacuation Routes

edge of traffic conditions elsewhere in the region and will only have a limited set of route options for evacuation. Thus, significant imbalances and congestion are inevitable because severe peaking characteristics foreclose chances of a situation where available roadway capacity would be utilized most efficiently. Still, it is worth noting that even under an ideal assumption of optimal traffic balance with full utilization of gateway capacity, there would be 1.7 hours of traffic flow through the gateways in the summer-Sunday case and 1.1 hours in the winter-weekday case. Of course, actual evacuation times will be much longer, reflecting the effects of "bottlenecks" and traffic congestion.

PERFORMANCE OF THE EVACUATION TRAFFIC SYSTEM

The traffic volumes forecast for the evacuation routes indicate that there will be a broad range of traffic system operating conditions under both of the evacuation scenarios. The leading characteristics of the evacuation traffic system are described generally below. A more detailed analysis of the traffic congestion and delay is provided in a subsequent chapter. An overall assessment of evacuation traffic conditions indicates that:

- The largest problems in the winter-weekday case are related to Newport New traffic. A few areas and roadways emerge as critical areas for estimation of evacuation times and traffic delays.
- The largest problem in the summer-Sunday case is in Busch Gardens traffic access to I-64. The limited nature of the transportation network leading to I-64 means that the few available evacuation routes will be swamped with traffic.
- Movement on the south side of the James River is relatively unconstrained. Analysis indicates that backups will occur but that these should be relatively limited in scope and duration because the capacity exists to accommodate anticipated peak-hour flows.

VI. SUMMARY OF EVACUATION TIME ESTIMATES

METHOD FOR ESTIMATING EVACUATION TIMES

Population Segments

Evacuation times are estimated separately for each of the four population groups discussed earlier:

1. Auto-Owning Population
2. School Population
3. Non-Auto-Owning Population
4. Population in Institutions

Time Periods

Evacuation times are estimated for two different time periods (cases) as discussed previously in Chapter V:

1. Daytime on a "Summer Sunday", and
2. Daytime on a "Winter Weekday"

Action Steps

Each population segment follows a specific sequence of action steps in evacuating the EPZ. (See Chapter V for a detailed discussion of these steps). The times needed to complete each of these steps is then estimated. For the auto-owning households, for example, estimates are made for the time required for (1) receiving broadcast information, (2) leaving place of work, and so forth.

The times needed to complete each step are not expressed as a single value of time, such as an average or a median value. Rather, the times required for each step are stated as the distribution of times, relating the fraction of the population completing a particular step to the elapsed time after notice to evacuate.

Time Required for a Series of Action Steps

The total evacuation time is calculated by linking together the times required to complete the individual steps. The resulting total times for evacuations are stated, as are the times for the individual steps, as a distribution of times, showing the fraction of the population which completes the total evacuation process within a given amount of elapsed time.

Assignment of the Traffic to the Evacuation Routes

The traffic due to the evacuation of the auto-owning households is "assigned" (that is, distributed) to the available roads out of the EPZ, as shown in the previous chapter. Delays due to this traffic are calculated, and the evacuation times are adjusted to reflect these delays.

EVACUATION TIMES FOR CASE A: SUMMER SUNDAY

Figure 7 shows the time needed to evacuate the population of the entire Surry Station EPZ under a summer weekend condition (that is, under Case A: Summer Sunday).

The critical population element is the auto-owning population; in other words, it is this element of the population that established the total evacuation time. Other elements of the population (for example, population in institutions) can be evacuated in a shorter time than the auto-owning population, provided that vehicles are available for their evacuation. Consequently, their evacuation does not add to the total evacuation time.

As indicated in Figure 7, the total time needed to evacuate both the transient and resident population of the entire Surry EPZ on a summer Sunday is 5 hours and 15 minutes.

The initial population element is this evacuation time is the auto-owning population; in other words, it is this element of the population that establishes the total

ALL RECREATIONAL AND RESIDENT POPULATION
EVACUATED WITHIN 5 HOURS 15 MINUTES
AFTER START OF EVACUATION NOTICE

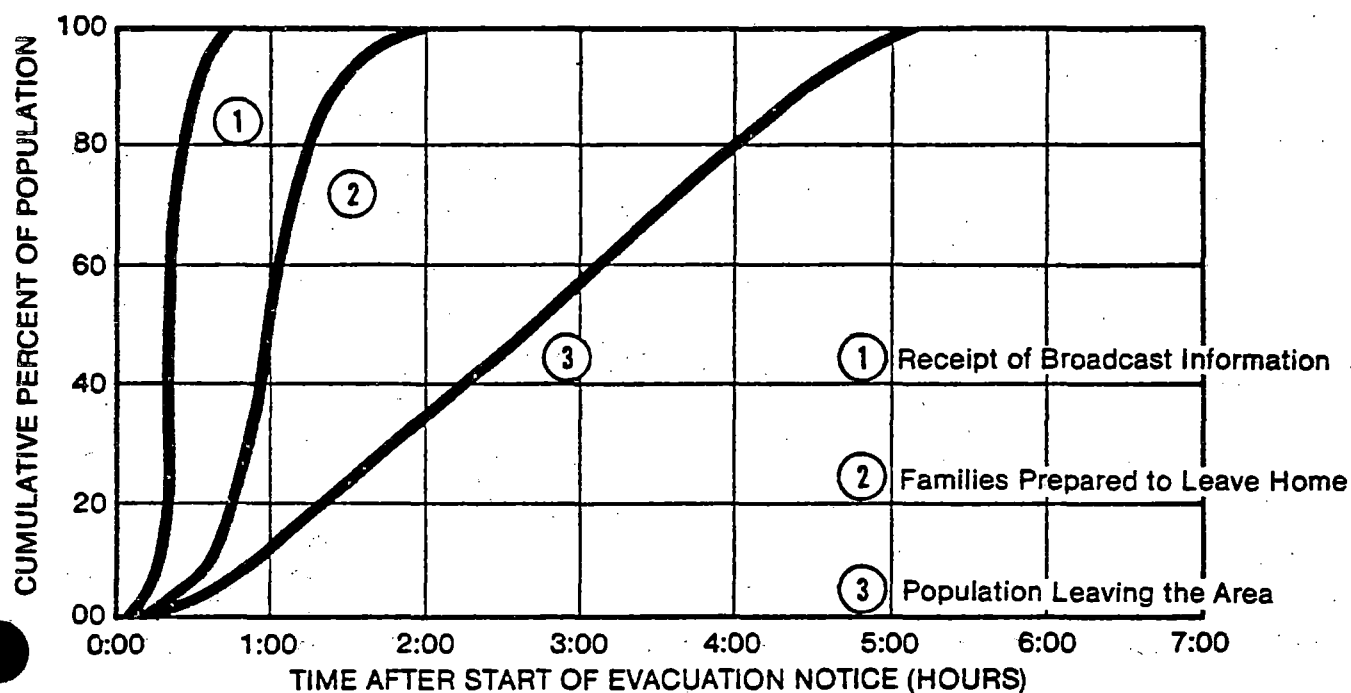


Figure 7. Evacuation Times: Case A, Summer Sunday

evacuation time. Other elements of the population (for example, population in institutions) can be evacuated in less time than the auto-owning population, provided only that vehicles are available for their transport. Consequently, their evacuation does not add to the total evacuation time.

Formation of Traffic Congestion

At numerous points within the Surry EPZ, particularly in the Williamsburg and Newport News areas, traffic backups (queues) will form during part of the evacuation process. These are caused as the auto-owning population completes the necessary preparation to leave their homes or the Parks, and enters the street

system at a rate greater than the capacity of that street system to carry them. As a consequence, traffic begins to back up, starting at critical intersections ("bottle-necks") at which traffic demands are the greatest. Congestion then spreads rapidly from these critical intersections. Shortly after they first form, queues spread along arterial streets, blocking traffic attempting to feed in from side streets. In the worst case, congestion spreads generally throughout an area, with all arterial and collector streets and even some local streets blocked.

During the period in which this congestion is occurring, the rate of evacuation is fixed by the capacity of the street system, and is no longer determined by the rate at which the population finishes preparations to leave their households or the Parks. Motorists leaving their homes and entering the street system during such a period are simply "stored" in traffic queues in the street system. Under such conditions, increasing the speed of notification and the clearing of households and Parks does not improve the total evacuation time, but rather merely puts more vehicles into the traffic congestion.

Extent of Traffic Congestion

The level of congestion, the length of time spent in traffic backups, and the length of these backups are quite extensive.

- Length of delays: The maximum delay for the entire Surry Station EPZ will be experienced by traffic exiting from Busch Gardens and Williamsburg. For a vehicle entering the end of the traffic congestion at its maximum, the delay will be 2 hours and 45 minutes. In other words, a vehicle entering the street system at the peak of the congestions will not move (or will scarcely move) for a period of 2 hours and 45 minutes. This is the maximum time, which represents a worst case. Delay times for other motorists range downward from this maximum; nevertheless, the majority of the Busch Gardens and Williamsburg populations will have delay times in the order of 1 hour.

The Newport News traffic is next in order of length of traffic delay experienced, with a maximum delay of 1 hour and 15 minutes.

- Length of Traffic Backup. In some locations, the amount of traffic that is attempting to enter the street system exceeds the space available on the road system. In other words, there is not enough space on the streets to store the vehicles attempting to get onto the street system.

This situation is the most severe at Busch Gardens where traffic will be backed up inside the Gardens parking area.

Next in terms of length of traffic backups are Williamsburg and Newport News. However, these backups are spread over numerous local streets and are not concentrated on a single highway.

Traffic Congestion and Driver Behavior

There is considerable uncertainty as to what might happen to driver behavior in 30- to 90-minute traffic backups under circumstances such as an evacuation. The existing evidence for this type of occurrence is sketchy and uneven. In some more or less documented instances, such as evacuation after chemical spills or evacuation related to natural disasters, generally orderly traffic flow has been reported.

Some specific motorist behavior problems that could be caused by delays of the length expected in the Surry EPZ evacuation include:

- Creation of more lanes in the outbound directions; in effect, a one-way system out of the area, as motorists impatient with the length of queue simply begin using the left-hand (that is, inbound) lanes for travel out of the area. This is not necessarily a poor strategy if planned, but could be chaotic if it occurs spontaneously.

Furthermore, if a two-lane flow must be returned to a single lane at some downstream point, then there is no advantage in the two-lane flow. To the contrary, the merging activity as the two lanes are combined into one will cause a loss in capacity relative to a single, smoothly flowing lane.

- Blocking cross streets at intersections: This is a common type of traffic disorder, even under normal traffic situations, and it can almost certainly be predicted that this will happen under evacuation circumstances, particularly since at times the length of queue will extend back through several intersections.
- Disregard of normal traffic devices (such as signals, lane markings, signs, etc.) is a frequent consequence of routine traffic congestion such as that occurring at sporting events, traffic accidents, construction locations, etc. Disregard of traffic-control devices could be assumed to be even more widespread during evacuation of the Surry EPZ. Abandoning vehicles is frequently seen in situations no worse than routine large snowfalls. If vehicles are abandoned along the roadways, or in the traffic lanes, they will seriously diminish the capacity of the roadway and cause bottleneck situations.

- Running out of fuel: It is quite likely that in any sort of traffic tie-up, some vehicles will run out of fuel, particularly since there is no time to fill cars with fuel before starting. In this situation, abandoned vehicles along the roadways seriously impair the capacities of those roads.
- Attempting to reenter area: Despite instructions to the contrary, some motorists will attempt to enter areas being evacuated, in order to gather family members, secure property, etc. Traffic caused by this activity will generate turning movements and could reduce capacity at critical intersections.

These adverse effects can be mitigated through the following actions:

- Maintain high visibility of both local and state police.
- Provide for tow truck services at critical locations where major backups are expected.
- Continuous broadcast information to the public reporting on progress in the evacuation.

EVACUATION TIMES FOR CASE B: WINTER WEEKDAY

Figure 8 shows the time needed to evacuate the population of the entire Surry EPZ under a working day during school hours (Case B: Winter Weekday).

The critical population element in this evacuation time is the auto-owning population; in other words, it is this element of the population that establishes the total evacuation time. Other elements of the population (for example, population in institutions) can be evacuated in less time than the auto-owning population, provided only that vehicles are available for their transport. Consequently, their evacuation does not add to the total evacuation time.

As indicated in Figure 8, the entire EPZ population is evacuated within 4 hours and 45 minutes after the start of notification.

Traffic Congestion in a Winter Weekday Evacuation

Traffic congestion occurs on several evacuation routes during a Winter Weekday evacuation. However, under normal weather and traffic control conditions, this

ALL POPULATION
EVACUATED WITHIN 4 HOURS 45 MINUTES
AFTER START OF EVACUATION NOTICE

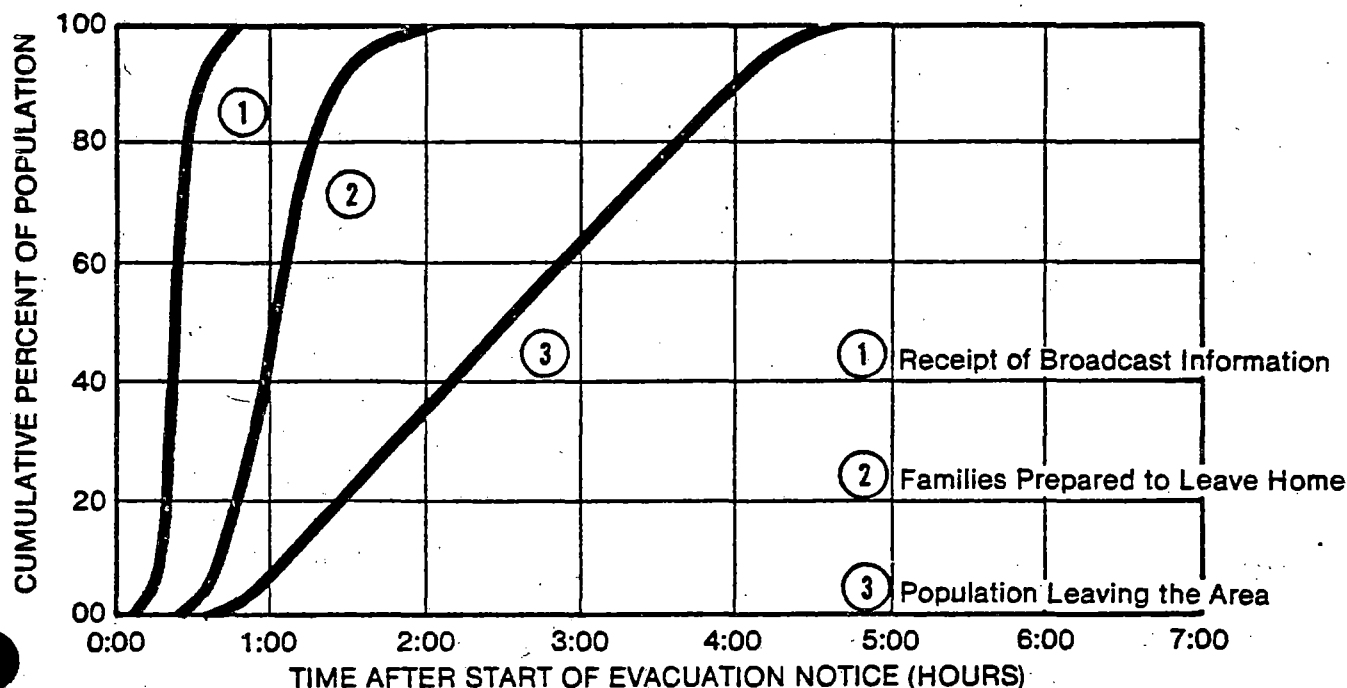


Figure 8. Evacuation Times: Case B, Winter Weekday

congestion dissipates prior to the time that all households have left home and entered the street system. Consequently, evacuation time is determined by the rate at which the population finishes preparation to leave their households, and is not determined by the capacity of the street system.

In a Winter Weekday evacuation, the road system is operating at capacity for a substantial part of the evacuation period. Any appreciable loss of capacity (for example, because of severe weather, uncontrolled traffic flow, etc.) would cause evacuation time to be extended beyond the 4 hours and 45 minutes estimated above.

EVACUATION OF THE SCHOOL POPULATION

The determining factor in the time for the evacuation of the school population is mobilizing the available school bus fleet. The school population can be notified well in advance of the arrival of school buses. After notification, preparation to leave the school premises is almost immediate (similar to a routine fire drill). Buses will be loaded immediately upon arrival at the schools and will then travel directly out of the EPZ.

A bus fleet large enough to carry the entire school population in a single trip is assumed in estimating these evacuation times. This fleet will be drawn from all districts within or partly within the EPZ. In addition, other buses will be drawn from districts not within the EPZ but in the close vicinity of it.

EVACUATION OF THE NON-AUTO-OWNING HOUSEHOLDS

The determining factor in the rate of evacuation for the non-auto-owning population is the availability of buses for transporting this segment of the population. The non-auto-owning population can be assembled at collection points well in advance of the arrival of buses for their evacuation. Buses will be loaded immediately upon arriving at the collection points, will travel directly to the reception center, and will rerun to the collection points for a second load.

A bus fleet sufficiently large to evacuate the non-auto-owning population in two trips is critical to achieving total evacuation time estimated above (5 hours-15 minutes on a Summer Sunday, and 4 hours-45 minutes on a Winter Weekday). If a sufficiently large bus fleet could not be mobilized, and a third trip out of the EPZ were needed (even if by only a few buses), the total evacuation time for the non-auto-owning population would increase and could become the critical (i.e., determining) element of the evacuation time.

Interestingly, a bus fleet larger than that needed to carry the non-auto-owning population in two trips provides only marginal savings in total evacuation time. For example, a fleet large enough to carry 75 percent of the non-auto-owning population at one time would improve total evacuation time by only 10 minutes.

EVACUATION OF THE POPULATION IN INSTITUTIONS

The determining factor in the rate of evacuation for the population in institutions is the availability of buses and ambulances for transporting this segment of the population. The population in institutions can be mobilized for evacuation well in advance of the arrival of buses for their evacuation. Buses would be loaded immediately upon arrival at the institutions, would travel directly to the reception centers, and would return to the institutions for a second load.

A bus (and ambulance) fleet large enough to evacuate the population in institutions in two and three trips, respectively, is critical to achieving the total evacuation times estimated above. If a sufficiently large bus and ambulance fleet could not be mobilized, and additional trips out of the EPZ were needed (even if only by a few vehicles), the total evacuation time for the population in institutions would increase and could become the critical (i.e., determining) factor in evacuation time.

IMPACT OF SEVERE WEATHER ON EVACUATION TIME

Severe weather, in the form of a major ice storm, would lengthen the normal weather evacuation time to 6 hours and 30 minutes after start of notification (i.e., 1 hour and 45 minutes more than evacuation time under normal weather conditions on a Winter Weekday).

This severe weather evacuation time assumes a slowdown in traffic but no loss in street capacity (i.e., no lanes or streets blocked). The impact of contingencies which cause loss of traffic capacity (i.e., blocked lanes or entire roads) cannot be estimated without specifying the exact nature of the problem. In general, any loss of capacity on any major evacuation route will cause major traffic problems throughout the evacuation period.

SUMMARY OF EVACUATION TIMES

Table 6 summarizes total evacuation times for:

- Summer Sunday and Winter Weekday cases
- Normal weather conditions
- Severe weather conditions

TRAFFIC CONTROL MEASURES

The following traffic control measures will aid the evacuation of the population from the Surry EPZ in the event of a general emergency.

Increasing Outbound Road Capacity

Routes 60 and 143 in the Newport News area are four-lane undivided facilities. With little traffic control effort, facilities can be made to operate with three outbound travel lanes and reserving onelane for inbound emergency traffic. Such action should not be initiated until about one hour following the emergency notification to allow workers to return home without undue travel constraint.

To effect such three-lane outbound operations will not require extensive barricading or signing. Police officer control at major intersections to direct drivers into three lanes will suffice.

Access to the Evacuation Routes

Key capacity constraints exist at the access points to the major evacuation routes, i.e., major intersections of collector roads with Routes 60 and 143, and access ramps to I-64. The evacuation time may be significantly impacted unless these key points are effectively controlled by police officers. High visibility of the police force at these major congestion points will aid in maintaining public confidence and in maintaining orderly traffic flow. To prevent roadway blockage by disabled vehicles (overheating, running out of gas, etc.) in these key access areas, tow trucks should be on standby at these locations to rapidly remove such vehicles. Key access locations are identified in Figure 9. In addition to these locations, all major intersections in the urban areas of Williamsburg and Newport News will require police officer control.

TABLE 6. EVACUATION TIMES FOR THE SURRY STATION

Area	Permanent Population	Permanent Population Vehicles	Transient Population	Evacuation Capacity/Hr.	Notification Time	Preparation Time	Evacuation Time Normal Condition	Evacuation Time Adverse Condition	Confirmation Time	Transient Population Vehicles
Total Area Within 2-Miles	38	13	--	--	1,200+	0:45	2:00	2:15	2:15	2:15

Within 5 Miles

Surry Co.	686	233	--	--	2,400	0:45	2:00	2:15	2:30	2:30
Isle of Wight Co.	15	5	--	--	1,200+	0:45	2:00	2:15	2:15	2:15
James City Co.	899	305	2,500	806	1,200+	0:45	2:00	3:45	5:30*	3:45

Within 10 Miles

Surry & Isle of Wight	3,851	1,309	--	--	6,000	0:45	2:00	2:15	2:30	2:15
James City Co.	15,603	5,305	35,000	11,290	7,200	0:45	2:00	5:15	7:15*	5:15
Williamburg	11,644	3,959	15,400	4,968		0:45	2:00	3:45	3:00	3:45
York Co.	8,584	2,918	2,500	806	3,600	0:45	2:00	3:15	2:15	3:15
Newport News	45,300	15,402	--	--	9,600	0:45	2:00	5:15	4:15	5:15

*These evacuation times can be reduced by 1 hour or more by assigning multiple evacuation routes during a winter weekday evacuation.

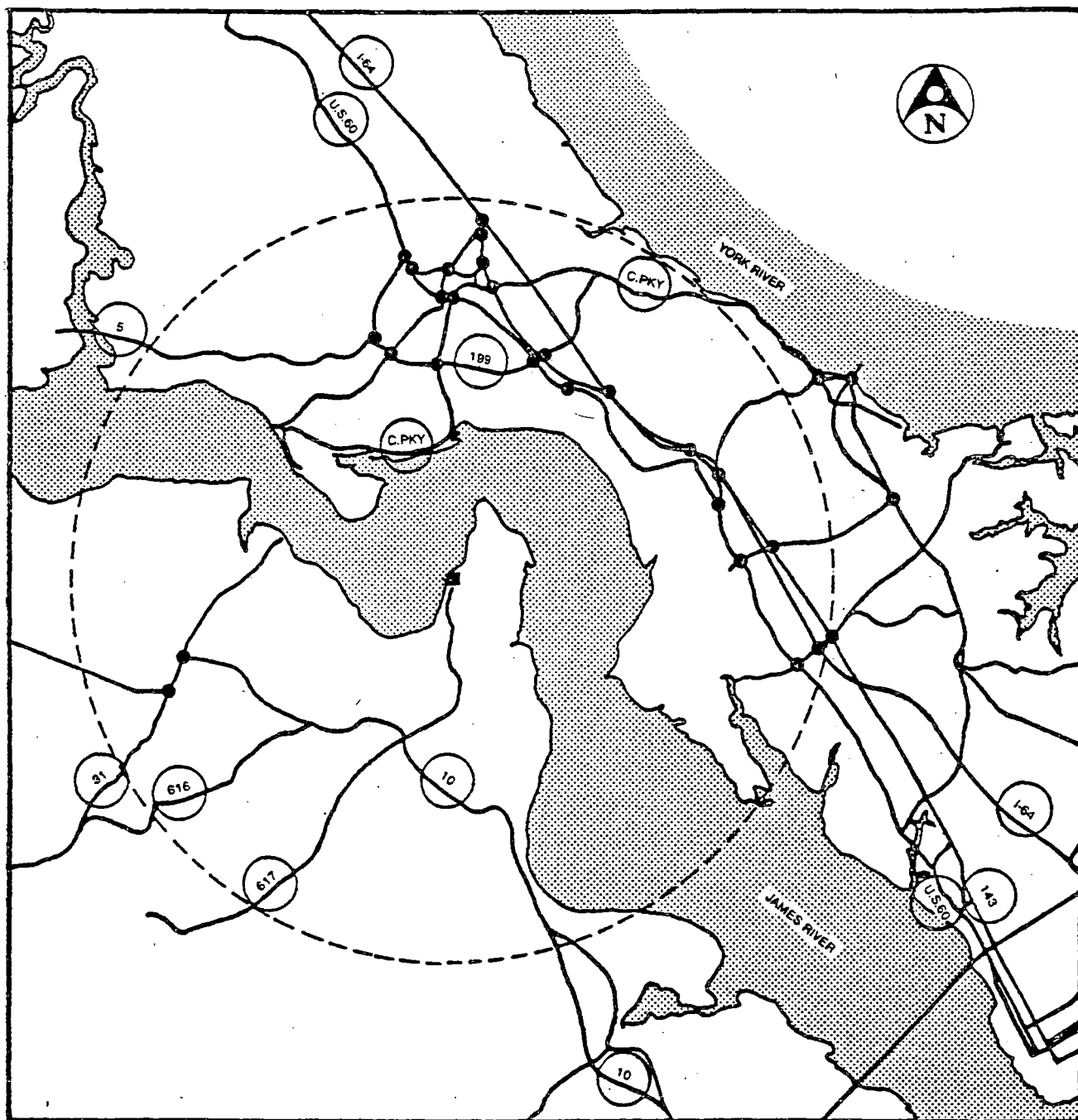


Figure 9. Key Traffic Control Points

Distribution of Busch Garden Traffic

The large transient population at Busch Gardens during a peak attendance day may represent in excess of 10,000 cars. No single travel facility in the area is able to accommodate such a magnitude within one or two hours. The proposed evacuation strategy for Busch Gardens is to direct visitors both northerly onto Route 60 and southerly onto I-64. To expedite the access to I-64, it is suggested that the railroad crossing (used only for emergency fire services) be used during an evacuation to allow Busch Gardens traffic to reach I-64 via Route 143 in addition to the access via Route 199.

VII. CONFIRMATION OF EVACUATION

CONFIRMATION PROCESS

The confirmation process measures how effectively the evacuation is being accomplished. Confirmation is conducted by the local civil defense agencies, beginning at about the time at which evacuation was estimated to be complete.

Confirmation of evacuation is essential for security reasons, to assure that all the population has left the area, and to assist those persons having difficulties in evacuating.

POSSIBLE APPROACHES TO CONFIRMING THE EVACUATION OF THE EPZ

Confirmation of evacuation may be approached in various ways:

- Active or passive -- Proof of evacuation may require some action by the evacuee, or, on the other hand, may be accomplished through other means, without any action on the part of the evacuee.
- Extent of coverage of the population -- The confirmation process may include 100 percent of the population (that is, every household) or it may be on a sampling basis, with some fraction of the total population surveyed.
- Detailed method of confirmation -- A variety of detailed methods of confirmation is possible. One such method is for the evacuating household to leave some indication (sign, flag, symbol, etc.) at their residence upon evacuating. Security personnel would patrol through the EPZ, monitoring the progress of the evacuation and the rate at which the residents are leaving.

Another method of confirmation is to have monitors call households by telephone and ascertain that they have left the area.

These methods may be supplemented by monitoring the outbound flow of traffic and recording the cumulative number of people leaving the area.

RECOMMENDED CONCEPT FOR CONFIRMING EVACUATION, IN THE SURRY STATION EPZ

Considering the population, road system and other characteristics of the Surry Station EPZ, a confirmation concept having these features is recommended:

- Passive -- The compliance problems with active methods of confirmation (that is, which require action on the part of the evacuees) are large, and substantial numbers of the evacuation population would not comply with any such plan. Furthermore, the size of the population in the Surry Station EPZ dictates major administrative effort in simply monitoring the confirmation indicators. For this reason, a passive confirmation concept (that is, one not requiring any action by the evacuee) is strongly recommended.
- Sampled -- It is not realistic to plan any confirmation system for the Surry Station EPZ that is based on 100 percent confirmation that each of the 24,000 households has evacuated. To do this would require either (a) an unreasonable number of monitors to cover all households in the EPZ or (2) a length of time required that extends far beyond the expected maximum evacuation times.

Consequently, a confirmation concept based on sampling (rather than full counting) of the EPZ population is strongly recommended. It stresses that the accuracy of a sampled approach is quite likely to be as good, or even better, than an active system with its attendant problems on non-compliance by the evacuating households.

- Confirmation by Telephone -- A suitable method for accomplishing a passive, sampled confirmation of evacuation is through a telephone sampling method. In such a method, monitors call a randomly selected group of households to confirm that evacuation has occurred. If continuing information on a cross section of households is desired, this sampling could be repeated at regular intervals.

SEP
APP. 5.1

FEB 13 1988

APPENDIX 5
EPIP EMERGENCY PLAN

CROSS REFERENCE

SEP
APP. 5.2

FEB 18 1988

EMERGENCY PLAN
SECTION IMPLEMENTED

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APPENDIX 6

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CROSS REFERENCE

NUREG-0654 CROSS REFERENCE INDEX

SURREY EMERGENCY PLAN

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9	7.3.1.2
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APPENDIX 7

SEP
APP. 7.1

APR 27 1989

SURRY POWER STATION
UNIT NOS. 1 & 2

APPENDIX 7

EMERGENCY KITS CONTENTS

The contents of the nine (9) emergency kits established for use by emergency response personnel at Surry Power Station are identified by general category below.

COMMUNICATIONS

No specific communications equipment is contained in any kit, but the following radios are available for emergency communication:

Portable - Health Physics Office

Mobile - Management and station vehicles

PROTECTION

ITEM	No.	Kit 1 MS Bldg	Kit 2 MS Bldg	Kit 3 MS Bldg	Kit 4 MS Bldg	Kit 5 HP Area	Kit 6 LEOF	Kit 7 CR	Kit 8 OSC	Kit 9 TSC
Coveralls	2 pr									
Rubber Gloves	6 pr									
Cotton Inserts	6 pr									
Rubber Boots	2 pr									
Cotton Hoods	2									
Plastic Booties	4pr									
Full Face Resp.	2				N/A					
Iodine Cannister	2				N/A					
Anti-fog	1btl				N/A					
Wet Suit	2	N/A	N/A	N/A	N/A		N/A			
Paper Suit	25	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A
Paper Booties	25pr	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A
Barricade Rope	50ft	N/A	N/A	N/A						
Radiation Sign	4	N/A	N/A	N/A						
Contamin Sign	4	N/A	N/A	N/A						

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RADIATION MONITORING

ITEM	No.	Kit 1 MS Bldg	Kit 2 MS Bldg	Kit 3 MS Bldg	Kit 4 MS Bldg	Kit 5 HP Area	Kit 6 LEOF	Kit 7 CR	Kit 8 OSC	Kit 9 TSC
E 530 N	1				N/A					N/A
E-120	1									N/A
RM-14 w/210	1									N/A
RO-2 w/Batt	1				N/A	N/A	N/A	N/A	N/A	N/A
Air Sampler Head	1				N/A					N/A
Air Sampler	1	N/A	N/A	N/A	N/A					N/A
A/S w/batt	1				N/A	N/A	N/A	N/A	N/A	N/A
TLD	2*				N/A	N/A		N/A	N/A	N/A
SRD 0-200 mR	2*				N/A					N/A
SRD 0-1.5 R	2*				N/A					N/A
SRD 0-10 R	2**				N/A					N/A
SRD 0-200 R	25	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
SRD Charger	1				N/A					N/A
Smears w/env	100									N/A
100 ml Bottle	25				N/A					N/A
Gelman Filters	1 Box				N/A					N/A
Silver Zeolites	10				N/A					N/A
Gas Chamber	1				N/A			N/A	N/A	N/A
Teletector	3	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A

* Kit 6 should contain 50 dosimeters

** Kit 5 should contain 25 dosimeters

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PROTECTION

ITEM	No.	Kit 1 Envr Bldg	Kit 2 Envr Bldg	Kit 3 Envr Bldg	Kit 4 Envr Bldg	Kit 5 HP Area	Kit 6 LEOF	Kit 7 CR	Kit 8 OSC
Coveralls	2 pr								
Rubber Gloves	6 pr								
Cotton Inserts	6 pr								
Rubber Boots	2 pr								
Cotton Hoods	2								
Plastic Booties	4pr								
Full Face Resp.	2				N/A				
Iodine Cannister	2				N/A				
Anti-fog	1btl				N/A				
Wet Suit	2	N/A	N/A	N/A	N/A		N/A		
Paper Suit	25	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Paper Booties	25pr	N/A	N/A	N/A		N/A	N/A	N/A	N/A
Barricade Rope	50ft	N/A	N/A	N/A					
Radiation Sign	4	N/A	N/A	N/A					
Contamin Sign	4	N/A	N/A	N/A					

RADIATION MONITORING

ITEM	No.	Kit 1 Envr Bldg	Kit 2 Envr Bldg	Kit 3 Envr Bldg	Kit 4 Envr Bldg	Kit 5 HP Area	Kit 6 LEOF	Kit 7 CR	Kit 8 OSC
E 530 N	1				N/A				
E-120	1								
RM-14 w/210	1								
Air Sampler	1	N/A	N/A	N/A	N/A				
A/S w/batt	1				N/A	N/A	N/A	N/A	N/A
TLD	2*				N/A	N/A		N/A	N/A
SRD 0-200 mR	2*				N/A				
SRD 0-1.5 R	2*				N/A				
SRD 0-10 R	2**				N/A				
SRD 0-200 R	25	N/A	N/A	N/A	N/A		N/A	N/A	N/A
SRD Charger	1				N/A				
Smears w/env	100								
100 ml Bottle	25				N/A				
Gelman Filters	1 Box				N/A				
Silver Zeolites	10				N/A				
Gas Chamber	1				N/A			N/A	N/A
Teletector	3	N/A	N/A	N/A	N/A		N/A	N/A	N/A

* Kit 6 should contain 50 dosimeters

** Kit 5 should contain 25 dosimeters

INDEX OF
EMERGENCY PLAN IMPLEMENTING PROCEDURES
SURRY POWER STATION
UNITS 1 AND 2

REVISED INDEXES

A revised index was distributed on the following dates. This revision sheet will serve as proof of date distributions of indexes were made.

Date of Revised Indexes

Initials

02-12-85

DKP

08-01-85

MAG